# 11.2 Notice of Preparation/Initial Study Comment Letters

This document is designed for double-sided printing to conserve natural resources.

## Robert Dmohowski

**From:** Steven Posey <stevenrposey@gmail.com>
**Sent:** Friday, January 27, 2023 10:06 AM
**To:** Robert Dmohowski
**Subject:** GPA22-00002 - EIR Scope and Content Comments

**Warning: External Source**

Mr. Dmohowski,

Although I am wholly opposed to the proposed Toll Brothers Apartment Living project (the Project) at the North County Transit District Oceanside Transit Center Site (the Site), I recognize the City of Oceanside (the City) must consider proposed development to continue the city's progression.

Of significant importance to me is the alignment of the Project with the City's economic development strategy. Under that strategy, the City seeks to strengthen its presence in healthcare, biotechnology, information/communications technology, sports/active lifestyle products, hospitality, and agriculture. This project does not align with those objectives.

Accordingly, in my opinion, the EIR scope and content should consider the following areas.

**Air Quality** - the Project proposes 547 residential apartment units and 165 hotel rooms.

- Apartment units; assuming 1.5 tenants per unit brings approximately 820 additional residents to the Site with San Diego County statistics showing approximately 74% of residents commute to work alone (DataUSA), means approximately 606 additional vehicles commuting to/from work during weekdays. As the City currently lacks a significant employer base, it is expected that nearly all of those residents will be commuting to work, negatively affecting air quality.
- Hotel rooms: assuming 2.5 visitors per hotel room, approximately 412 additional visitors can be projected to the Project. Although the Project includes a transit center, it is unlikely that visitors to the City will utilize the transit center. My experience is that visitors to the City use personal or rental vehicles rather than public transit. Assuming 65% of hotel room visitors drive to the Project, potentially 107 (165 * .65) additional vehicles will be operating in the City. Those additional vehicles will contribute to negative air quality.

Air Quality Scope and Content - the EIR should provide for modeling of likely commute times/distances of residents and visitors of the Project and the long-term effect on the health of residents.

**Transportation** - the Project brings an estimated 713 vehicles to the Project.

- Apartment units: the additional 606 vehicles belonging to residents of the Project will contribute to both weekday commuting traffic and weekend lifestyle traffic. Mission Avenue experiences heavy congestion every day, particularly between the hours of 6:00 AM to 8:00 AM and 4:00 PM to 7:00 PM. Likewise, County Highway S21, as a main traffic artery, experiences heavy congestion throughout the day.
- Hotel rooms: visitors to the Project are likely to visit other locations in the area for their entertainment experiences. Those visitors will contribute to increased traffic on both Mission Avenue and Highway S21.

Transportation Scope and Content - the EIR should include modeling of the negative effects of an additional 713 cars using those two main traffic arteries and the likelihood of future road expansion within the City.

**Aesthetics**

- The project further degrades the coastal view, both from the Oceanside Pier and the area above the strand. Much of the appeal of the City is the local feel when walking from Pacific Street to Mission Avenue for dinner or entertainment (Sunset Market, etc.). The Project will erode that feel as the multi-store building becomes a greater focal point than the current use of the Site. Additionally, the views from the Oceanside Pier have deteriorated due to development along Pacific Street and Myers Street.

Aesthetics Scope and Content - the EIR should consider the continued degradation of the views and feel of the City and model the potential long-term impact of changes to the locale.

**Public services** - the Project brings approximately 1,232 residents and visitors to the Project.

- Police protection: The Project degrades police protection in the City. The addition of 1,232 additional persons will result in increased police protection calls, diverting resources from other areas. Although studies do not correlate multi-family housing with increases in reported crimes, , the Project may act as an attractant for criminal activity or unhoused individuals. The existence of below grade parking may bring unhoused individuals seeking a secure overnight location. Further, open space that provides for potential illicit transactions should be considered and addressed.

Public Services Scope and Content - the EIR should review other completed projects with similar characteristics and the demand for police protection following completion of the project.

Thank you,
Steven R. Posey, DBA

January 31, 2023

Mr. Rob Dmohowski, AICP
Principal Planner, City of Oceanside
300 N. Coast Hwy
Oceanside, CA 92054
rdmohowski@oceansideca.org

Dear Mr. Dmohowski -

This submittal relates to the proposed Oceanside Transit Center Mixed Use Project (OTC) AKA GPAA22-00002. Please have it included in the reviews by the Planning Commission, City Council and Coastal Commission.

While generally attractive, an aspect of this proposed development, as currently configured, is very troubling from the perspective of an owner of property on South Cleveland just south of the Transit Center. This is due to the proposed relocation of the bus stalls from the mixed-use area near the northern portion of the Transit Center to an area very close to Missouri at the southern edge. Beginning on the south side of Missouri is a very nice neighborhood that is quite residential in nature.

The current site plan shows bus parking stalls near Missouri, with a turnaround loop adjacent to Missouri and even an egress point for buses onto Missouri. This of course would be unsightly and noisy for the residential owners on South Cleveland, not to mention the significant diminution of air quality, and be utterly inconsistent with the current residential use. Many of the newer residential owners paid significant amounts for their properties and would likely suffer economic harm as well.

The current configuration does not appear to take into consideration the fact that the area to the south of the site is far more residential than the area to the north. As a matter of common sense and the quality of life of the residential owners on South Cleveland, this calls for a significant reconfiguration of the bus traffic on the development. A development of this size and lack of topography always has multiple configurations which pencil out well.

At a minimum, the bus stalls and the turnaround loop should be backed further away from Missouri and there should be intensive screening from South Cleveland via a wall, berming and vegetation.

I and my neighbors would appreciate your further consideration of the South Cleveland neighborhood in the planning discussions. Thank you.

Very truly yours,

Marc M. Jacobs
404 S. Cleveland St., Unit 105
mjacobs8285@gmail.com

February 8, 2023

Mr. Rob Dmohowski, AICP
Principal Planner, City of Oceanside
300 N. Coast Hwy
Oceanside, CA 92054
rdmohowski@oceansideca.org

Dear Mr. Dmohowski -

This letter supplements my January 31, 2023 letter regarding the proposed Oceanside Transit Center Mixed Use Project (OTC) and is sent in place of the Public Scoping Meeting Comment Form. Please have it also included in the reviews by the Planning Commission, City Council and Coastal Commission.

As you know, I attended the Scoping Meeting held on February 1, 2023. Unfortunately, the concerns of the residents of the South Cleveland area were exacerbated. In discussions with fellow residents, I learned that the developer's reaction to previously-raised concerns about the proposed location of the bus stalls and turnaround has been to make a mere ten foot change. This of course is not a good faith effort and in no way addresses those concerns. And the site plan now shows a meager five plants' worth of screening from Missouri.

Further, another resident who spoke made clear that there is significant particulate matter in the air carried by the off-shore breeze and deposited on properties to the east of the OTC and in the lungs of residents of those properties. Despite this challenge, the developer proposes moving the bus parking stalls quite close to the densely populated South Cleveland residential area, thereby compounding this problem for a significant number of people. Moreover, to add an egress point for buses onto Missouri, thereby bringing to a quiet neighborhood the attendant noise pollution, would be a travesty. The developer statement at the meeting that it was "mindful of surrounding residential uses" looks, at best, ironic.

I encourage you, as soon as you have the opportunity since time is growing short, to drive the perimeter of the OTC. You will be reminded that the South Cleveland area is the most densely residential area which adjoins the OTC (other than to the west of it where the trains run). I would hope that you will also conclude that it is in the interests of the community to compel the developer to make reasonable efforts to mitigate the bus parking stall location and turnaround issue. The developer could either significantly reconfigure the bus route on the property or, at a minimum, at least modify the bus parking stalls and turnaround such they would be substantially further from Missouri and make a more professional effort to screen the bus stalls and any turnaround from Missouri.

The currently proposed site plan with its subsequent minimal modification is inadequate for this project to live well with its South Cleveland neighbors, who will suffer from significant additional pollution. Please contact me at your earliest convenience. Thank you.

Very truly yours,

Marc M. Jacobs
404 S. Cleveland St., Unit 105
mjacobs8285@gmail.com

February 13, 2023

Mr. Rob Dmohowski, AICP
Principal Planner, City of Oceanside
300 N. Coast Hwy
Oceanside, CA 92054
rdmohowski@oceansideca.org

Re: Proposed Oceanside Transit Center Mixed Use Project

Dear Mr. Dmohowski -

Since I have not yet heard from you in response to my February 8, 2023 letter, and since today is the last day of the 30-day public review period related to preparation of a draft EIR, I write this letter to add to that letter, as well as my January 31, 2023 letter, regarding the proposed project. Please have it also included in the reviews by the Planning Commission, City Council and Coastal Commission.

As I have said before, I am an owner of property in the South Cleveland neighborhood. It is very troubling to me that the currently proposed project places the "butt end" of the project in terms of its environmental impact right next to the most densely residential of the areas adjoining the OTC. I respectfully request the following:

(1) A description of the meaningful discussion of project alternatives which occurred that attempted to avoid this obvious problem of adverse environmental impacts, as required by CEQA;

(2) That the draft EIR, in addressing the environmental impacts of the proposed project, include (x) the potential diminution in air quality near the currently proposed location of the bus parking stalls and turnaround, which would require testing of the current air quality in the South Cleveland neighborhood to establish an environmental baseline, and evaluation of the impact of said currently proposed location, and (y) evaluation of the attendant noise pollution on the South Cleveland neighborhood;

(3) That the draft EIR also include, at a minimum, mitigation of these impacts to be required by the Planning Commission pursuant to, *inter alia,* §21004 of CEQA, which would consist of some relocation of said impacts and significant screening from the South Cleveland neighborhood; and

(4) Receipt of the draft EIR as soon as it is available.

Again, you may contact me at the email address below. Thank you.

Very truly yours,

Marc M. Jacobs
414 S. Cleveland St., Unit 105
mjacobs8285@gmail.com

P.S. Please note that my prior letters contained a typo in my property address. Above is the corrected address.

January 30, 2023

Mr. Rob Dmohowski, AICP, Principal Planner
City of Oceanside 300 N. Coast Hwy Oceanside, CA 92054

Sent via email to rdmohowski@oceansideca.org

Mr, Dmohowski,

The attached are comments related to the EIR Scope for the Oceanside Transit Center Mixed Use Project (OTC) AKA GPAA22-00002 proposed by North County Transit and Toll Brothers Apartments. Please also include these comments in other reviews and comments related to this project. These may include Planning Commission review, Council review, Coastal Commission review, Federal reviews, and applications (for consideration of the project or grants).

Overall this project has many good attributes, but one aspect of the development is of concern to many of our fellow neighbors South of the Transit Center and directly adjacent to the newly proposed relocation of the bus stalls. NCTD and Toll Brothers are jointly proposing to relocate the bus stalls (For NCTD, Greyhound, Bus Bridge buses and Special Event buses) and the transit center approximately 1,000 feet south and in a fashion that will be adjacent to our homes. Our neighborhood consists of ground-level residential, and this location is problematic due to the following issues:

1. Additional pollution – additional noise pollution from increased traffic, including diesel vehicles
2. Additional pollution – additional residential air pollution relocated from a commercial area
3. Additional pollution – new trash in residential area relocated from current transit center
4. Additional pollution – increased traffic and parking in residential areas from busses and private vehicles
5. Additional pollution - additional stormwater pollution that leads to the ocean
6. Additional unhoused population and accompanying challenges
7. Reduced property values due to some of the above-noted issues

This new and unexpected change moves air pollution, trash, increased noise, and greater vehicle traffic nearer ground-level homes. In addition, it relocates the unhoused population who use the bus stalls and staging areas for sleeping, assembling, drug use, other illicit activities, and other incompatible uses near ground-level homes in its new suggested placement. We do know the Bosie Decision impacts how the unhoused population is addressed and this concerns us even more since government entities (and others) have very little control over these issues. We do know even the best intentions of government agencies have unintended and unconsidered impacts. For example, our neighbors have been advised from senior NCTD Leadership, that NCTD realized, after the most recent relocation and construction of the New Coaster Platform, that they should have included shore power to reduce the idling/pollution of the Coaster, which now must idle if it's in the station for 1 hour or less. We believe that with a thorough review of all areas indicated in the EIR project description and additional input

provided by this group and others, a better project with mitigated impacts can be constructed for the benefit of old and new oceanside residents, businesses, and visitors. One additional item, of many we have seen missing, is how will the number of bus bridge buses that will provide support to Amtrak, Coaster, and Metrolink customers be accommodated when tracks are down or under construction. Currently, four or more buses are supporting Amtrak due to the San Clemente track construction, and there does not seem to be sufficient capacity in the proposed plan for these considerations. Further, it does not appear that the height of the residential building is sufficient to allow bus bridge buses or special event buses (like double-decker buses providing transport to Oceanside Harbor Days) to pass under the proposed structure to exit out Michigan to Coast Highway. This would leave Missouri as the only alternative street, further impacting the residential area.

It should be noted that the new placement is unlike the majority of multi-story residential and commercial uses with the bus stalls' current placement. Some of our neighbors have also reviewed the typical wind patterns on the SDG&E website for this new location, and it looks like the typical onshore breeze will not dissipate but instead concentrate the Sprinter, Coaster and now the bus particulate matter (PM), and other greenhouse gasses (GHG) on an already impacted residential population. Many of the newly impacted residents, in our estimation (looking at the residential density and age of the housing stock), may be a lower income and more vulnerable population (Children, elderly, and others) than the existing bus stall placement, and this could disproportionately impact them. The San Diego Air Pollution Control District (APCD) has differing standards for mostly residential areas when considering acceptable air pollution levels due to longer-term pollution exposure for residential uses. This should also be considered with regard to the proposed relocation of the bus stalls to an almost completely residential area versus the current mixed-use location. The EIR for this project should evaluate the impacts of the bus stall relocation and all potential alternatives and mitigation.

NCTD staff have advised us they want the bus stalls nearer the Coaster and Sprinter for ease of the users; however, other alignments would be less impactful to the existing and future residential populations in the newly suggested alignment.

Several of our residents did a significant amount of research prior to purchasing our homes, and one even talked to Oceanside City Staff, NCTD Staff, and SANDAG Staff. In each conversation, they were advised that there were no plans to move the bus stalls to the southerly position, which was specifically asked. It also appears that the proposed relocation could not be undertaken under the City Zoning and Land Use Maps. If NCTD is looking for an alignment that may best serve direct access to transit, might we suggest an East-West alignment for bus queuing on Michigan to Coast Highway? This would allow for the most direct access to the transit options, and massing the buildings on either side would create a sound/impact barrier to those residential and other uses to the north and south. This option would place buses on a solely commercial street with no direct access to the southern residential neighborhoods. Another consideration is leaving the bus stalls where they are and placing the hotel near the southern location.

To date, we have not seen any project alternatives in the proposed development materials. These alternatives are missing for the project and specific project elements, including the proposed relocation of the bus stalls, street alignments, project density, and building placement (partial list). We feel all alternatives need to be considered, so all approving authorities can best review, consider and determine how best to construct the project with minimal environmental and community impacts.

Several of our residents are employed in law enforcement, government, healthcare, private business owners, homeless support professionals, and lawyers (to name a few professions). We do understand the need for additional housing and how the State and Courts have removed many of the provisions of local control. The highest and best use of the site can address issues related to local control and the dictated State and Court conditions at the same time. The plan presented does not need to be constructed as designed. Although this may provide the highest value to NCTD and Toll Brothers, “Highest And Best Use”, should also consider those who were here under prior and existing conditions/regulations (to the extent legally feasible) and minimize (mitigate) the impacts to those who have already called this area home.

The plan indicates a seven-year timeline for construction. It is unclear how this long and delayed process will impact coastal access, pollution, traffic, and other potential negative impacts. The plan should clearly outline current, interim, and final construction timeline impacts and mitigation.

As Oceanside residents and business owners, we believe that with the consideration of our comments related to the proposed bus stall placement and the corresponding impacts of the project overall, this project can be constructed in a way that allows for our continued quiet enjoyment of the homes south of the proposed project site and does not constitute a property taking.

Thank you for the consideration of our input.

Kevin Ham
414 South Cleveland Street
Oceanside CA 90254

## Robert Dmohowski

**From:** Kevin Ham <kevinjham@gmail.com>
**Sent:** Wednesday, February 8, 2023 10:53 AM
**To:** Robert Dmohowski
**Subject:** EIR Input for Oceanside Transit Center Projecy
**Attachments:** Judge halts Junipers housing in Rancho Penasquitos over EIR - The San Diego Union-Tribune.pdf

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Rob,

Here are some additional comments related to the EIR for the Oceanside Transit Center project.

1. Please see the attached article that the total impact of other projects should be considered in the EIR. For example, there are two projects, I personally know of, that should be considered and there may be more. I understand there will be a development proposal coming forward on the Pier and Beach Parking lot 26 and second the Coast Highway roundabouts and street narrowing is moving forward. For example, the coast highway plan could severely limit throughput for busses at Washington and Wisconsin and it may be best to keep the busses on Seagaze for freeway and regional access.

2. Smoking in or near public buildings is restricted and as such NCTD does not let staff, employees, contractors, and customers smoke on site and this can have a significant impacts on nearby oceanside residents and businesses. By intensifying the site, the new residents, businsses, additional employees and customers will smoke by or near and not on the NCTD/Toll Brothers site, thereby creating air pollution and cigarette butt pollution that will impact the air quality for residents and the cigarette butts will end up in the Ocean.

Thank you.

Kevin

## Robert Dmohowski

**From:** Kevin Ham <kevinjham@gmail.com>
**Sent:** Wednesday, February 8, 2023 1:50 PM
**To:** Robert Dmohowski
**Subject:** Oceanside transit center EIR review input

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Rob,

Another project that should be considered as part of the cumulative impacts related to the EIR for the Oceanside Transit Center Redevelopment proposal.

Thank you

Kevin

Theater built in 1990s kicked off Oceanside's redevelopment boom. It's time for a change

https://www.sandiegouniontribune.com/communities/north-county/story/2022-07-03/theater-built-in-1990s-kicked-off-oceansides-redevelopment-boom-its-time-for-a-change

Developer proposes replacing Regal Cinemas and vacant shops with seven-story combo of residences and restaurants

## Robert Dmohowski

**From:** Kevin Ham <kevinjham@gmail.com>
**Sent:** Friday, February 10, 2023 9:40 AM
**To:** Robert Dmohowski
**Subject:** A Few More Questions from Neighbors

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Rob,

Here are a few more comments the neighbors asked me to send.

Thank you

Kevin

Did the Coaster EIR contemplate moving the bus stalls and station due to the relocation of the Coaster platform? What is of concern here is mission creep. NCTD now advises they need to move the buses closer to the Coaster and Sprinter, but they made this change and it should have been identified and addressed in the Coaster EIR document and made widely available to the public. If it was identified what was the recommended mitigation?

NCTD travels not only to the freeway, but North and South, mostly on Coast highway. It does not appear that a path of travel is identified for these routes. Will the buses still travel on Coast highway and will they at any time travel on local stress and what will the impacts and mitigation be? Will buses be banned from non identified streets and in what case might they travel on local streets and how often? Due to the width of many neighborhood streets, NCTD buses need to straddle both lanes. This is evident on Coast highway, and when they run special routes for events on neighborhood streets. This increases pollution, slows traffic, endangers bicyclists and pedestrians. Does this mean the removal of parking and if so where, how much and what will the mitigation be?

Is there a Pandemic response plan?

If the space in the new development is activated, as declared by Toll Brothers, how would this increase traffic, pollution and specifically what will those events and activities be, who will manage them, and what will the limits and restrictions of those activities be? Might there be public demonstrations in this new public space and how would this be managed and by who. Again what are the impacts and mitigation related to these questions?

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January 18, 2023

Rob Dmohowski
City of Oceanside
300 N. Coast Highway
Oceanside, CA 92054

**Re: 2023010231, Oceanside Transit Center Redevelopment Project, San Diego County**

Dear Mr. Dmohowski:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). **AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements.** If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

**Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.**

AB 52

**7.** Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:

**a.** The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or

**b.** A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

**8.** Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

**9.** Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

**10.** Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:

**a.** Avoidance and preservation of the resources in place, including, but not limited to:

**i.** Planning and construction to avoid the resources and protect the cultural and natural context.

**ii.** Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

**b.** Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:

**i.** Protecting the cultural character and integrity of the resource.

**ii.** Protecting the traditional use of the resource.

**iii.** Protecting the confidentiality of the resource.

**c.** Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

**d.** Protecting the resource. (Pub. Resource Code §21084.3 (b)).

**e.** Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).

**f.** Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

**11.** Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:

**a.** The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.

**b.** The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.

**c.** The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

3. Contact the NAHC for:
   a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
   b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
   a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
   b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
   c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Pricilla.Torres-Fuentes@nahc.ca.gov.

Sincerely,

*Pricilla Torres-Fuentes*

Pricilla Torres-Fuentes
Cultural Resources Analyst

cc: State Clearinghouse

## Robert Dmohowski

**From:** Tom Lichterman <tlichterman@cox.net>
**Sent:** Thursday, January 19, 2023 8:46 AM
**To:** Robert Dmohowski
**Cc:** mike_bullock@earthlink.net; 'Tom Frankum'
**Subject:** OTC Redevelopment Project - CEQA Scoping
**Attachments:** Ltr to NCTD re OTC Redevelopment Plan 10-24-22 FINAL.pdf

**Warning: External Source**

Hello Rob,
I received notification of a CEQA scoping public meeting being conducted on February 1 at 6:00PM. For the record, the Oceanside Bicycle and Pedestrian Committee wishes to resubmit our comment letter of October 24, 2022 for inclusion in the CEQA scoping documentation and response process. Though we have subsequently met with NCTD/Toll Bros. on this project after our conversation with you, we have yet to see any concrete changes proposed that would make the proposed facility more amendable to active transportation users, and the transit center more visible to the public. We have also received no update on the specific parking management system that will be employed for cars, nor the accommodations that will be made for storing bicycles.

This facility, once built, will be a part of the community for 40 or more years, and our Committee wants to ensure the final facility meets everyone's needs, not just the apartment developer and apartment dwellers. This is, after all, first and foremost, a public transit facility, and it's the most important one in the NCTD system.

Thank you for your consideration and inclusion of our comment letter in the CEQA process.

Tom Lichterman, Chairman
Oceanside Bicycle and Pedestrian Committee

**City of Oceanside Bicycle and Pedestrian Committee**
**BikeWalk Oceanside**
Phone: 619-200-6133 • E-Mail: tlichterman@cox.net

October 24, 2022

Mr. Michael McCann
Regional Director of Acquisitions and Development
Toll Brothers Apartment Living
C/O North County Transit District
810 Mission Avenue
Oceanside, CA 92056

RE: Oceanside Transit Center Redevelopment Plan

Dear Mr. McCann,

The Oceanside Bicycle and Pedestrian Committee is a citizen's advisory committee whose role is to advise the City on programs, projects, and policies which improve bicycling and walking in the community. The Committee's membership includes over 75 Oceanside residents who are concerned about bicycling and walking infrastructure and opportunities. Our goals are to promote bicycling and walking in the community for health, recreation, and transportation, to promote bicycle and pedestrian safety, and to improve bicycling and pedestrian facilities.

On September 15, three members of the Oceanside Bicycle and Pedestrian Committee attended the OTC Redevelopment Plan "Open House" at the City. We have a number of comments and concerns about the proposed redevelopment plan from the transportation, transit, and active transportation perspectives which we wish to share with NCTD at this time. Our comments are based on the overall site plan graphic which was posted at the Open House and is attached for reference. We realize that this layout may still be somewhat conceptual at this time.

**Transit Related:**

1. The current OTC is strategically the most important transit facility in the entire NCTD system, if not the entire county, with 3 intercity/commuter rail lines, the SPRINTER Light Rail Line, seven NCTD bus routes, FLEX service, and intercity bus service. The Committee understands and appreciates that NCTD wishes to modernize the facility and pursue revenue generation opportunities, and believes that both transit- and mixed-use development goals can be met on the site. However, it is the Committee's belief that the transit functions should be highly visible, with a "grand transit entrance" or plaza on one of the key street frontages, designed with the transit and active transportation user in mind. Such a transit plaza could serve as the entrance to all the transit services available, provide real time traveler information, and include access to bike storage, rental bikes and other services. The San Diego Association of Governments (SANDAG) refers to such centers as "Mobility Hubs" and has developed an extensive list of the types of services such facilities can offer (see for example: https://www.sdforward.com/fwddoc/mobipdfs/mobilityhubcatalog-features.pdf ).

With the proposed Plan layout, it seems like the transit facility is practically hidden from view of the rest of the community to the north, east and south, behind large residential buildings and parking structures. The transit and transportation functions appear to be a far lower priority in the proposed Plan than residential uses, despite the major importance of this transportation facility to north county.

2. The current OTC was opened approximately 1983 and will have served the community for at least 40 years by the time the redevelopment occurs. The current OTC has 17 bus stalls for NCTD buses and 5 bus stalls for intercity bus services. In addition to the regular routes, some of these stalls are used by backup or layover buses. The proposed plan shows only ten NCTD bus stalls and two Greyhound stalls. Where will the other stalls be located? Is NCTD envisioning a significant reduction in bus services with this plan? If this facility will potentially serve the community for another 40 to 50 years, shouldn't growth in service, not reduction, be planned for?

3. Bus-to-rail integration is a major concern with the current transit facility. It is roughly a 3-minute walk from the bus island to the SPRINTER platforms currently, and an even longer walk to the COASTER Platform #3 which most COASTERs use. Bus-to-rail integration needs to be carefully thought out to ensure it is as convenient as possible. It is not clear from the overall site plan how this integration will work.

**Active Transportation:**

4. Access to the facility for transit users arriving by bike or on foot is not very user-friendly. It appears biking and walking transit users must enter between large residential building blocks on roadways used by motor vehicles, rather than entering through an inviting "grand transit plaza" as suggested above. There should be safe, separate bike lanes or paths into the facility to lead the user from points north, east, and south of the facility, to the transit services area. Use of active transportation modes to access the facility will become more and more important as we address climate change, and the facility should encourage this and be as easy as possible to access on foot or by bicycle.

5. Bicycle parking and storage needs to be carefully planned to encourage use of alternative modes. Specifically, such bicycle storage must be in clear view of NCTD Customer Service or Security offices and staff, to provide a greater sense of security for those leaving bikes at the facility. Bike parking must also accommodate three different user groups:
    a. Daily commuters, who will leave their bikes for extended periods, multiple days per week. This parking should be in the form of a secured "Bike Shed" similar to the one recently added at Oceanside City Hall, with secure access provisions.
    b. Casual bike users, who may come to the OTC to visit Customer Service or other services in the center. For these users, secure bike racks in clear view of Customer Service office staff should be planned for.
    c. Bikeshare bikes – Eventually, a docked bike share program similar to Encinitas' Bcycle e-bike share will come to Oceanside. The site plan should identify multiple locations on the facility grounds for these bikeshare dock installations, again, in open view of other activities on the property to promote security.

**Car Parking:**

6. This facility will have one of the largest car parking facilities in the City of Oceanside. The proposed site plan does not indicate how the identified parking resources will be managed. The OTC redevelopment should include a comprehensive car parking system that will tie the various uses together. A good car parking system will be automated, value-priced, and have congestion pricing algorithms as needed. It will also be shared among all site users and it will provide earnings to those currently losing money (i.e., those who don't solo drive) because car parking is being provided.

   Car parking is very expensive to provide. We should not ignore the cost and how it discriminates against those that might like to drive less than average. On the other hand, there must be an "add-in" payment, as needed, so that workers that must drive everyday will not lose money. We must accommodate disabled drivers and protect privacy.

   The proposed parking system would increase economic fairness and modal choice while it would reduce driving. It would maximize transit ridership instead of maximizing driving to and from the Transit Center. This shift in mode choice is critical to help meet regional and state-wide climate stabilization targets and reduce greenhouse gas emissions.

   The car parking system we are proposing is identified in the Oceanside Climate Action Plan (CAP) Transportation Demand Management Ordinance. However, it is only suggested, not yet required. Future updates to Oceanside's CAP may require such a system at large projects such as this one.

**On-Going Community Input:**

7. A project of this magnitude and potential impact on the community deserves an on-going community outreach and participation process. We strongly urge NCTD and its partners to establish a community stakeholder and advisory commission to guide the development plans. This commission should include representation from all affected community members, including transit users, modal service providers, local residents, merchants, and City management, and their input and advice should be carefully considered in order to achieve the best outcome for all parties. The Oceanside Bicycle and Pedestrian Committee would be honored to be a part of that outreach process.

Thank you for your consideration.

Sincerely,

Tom Lichterman

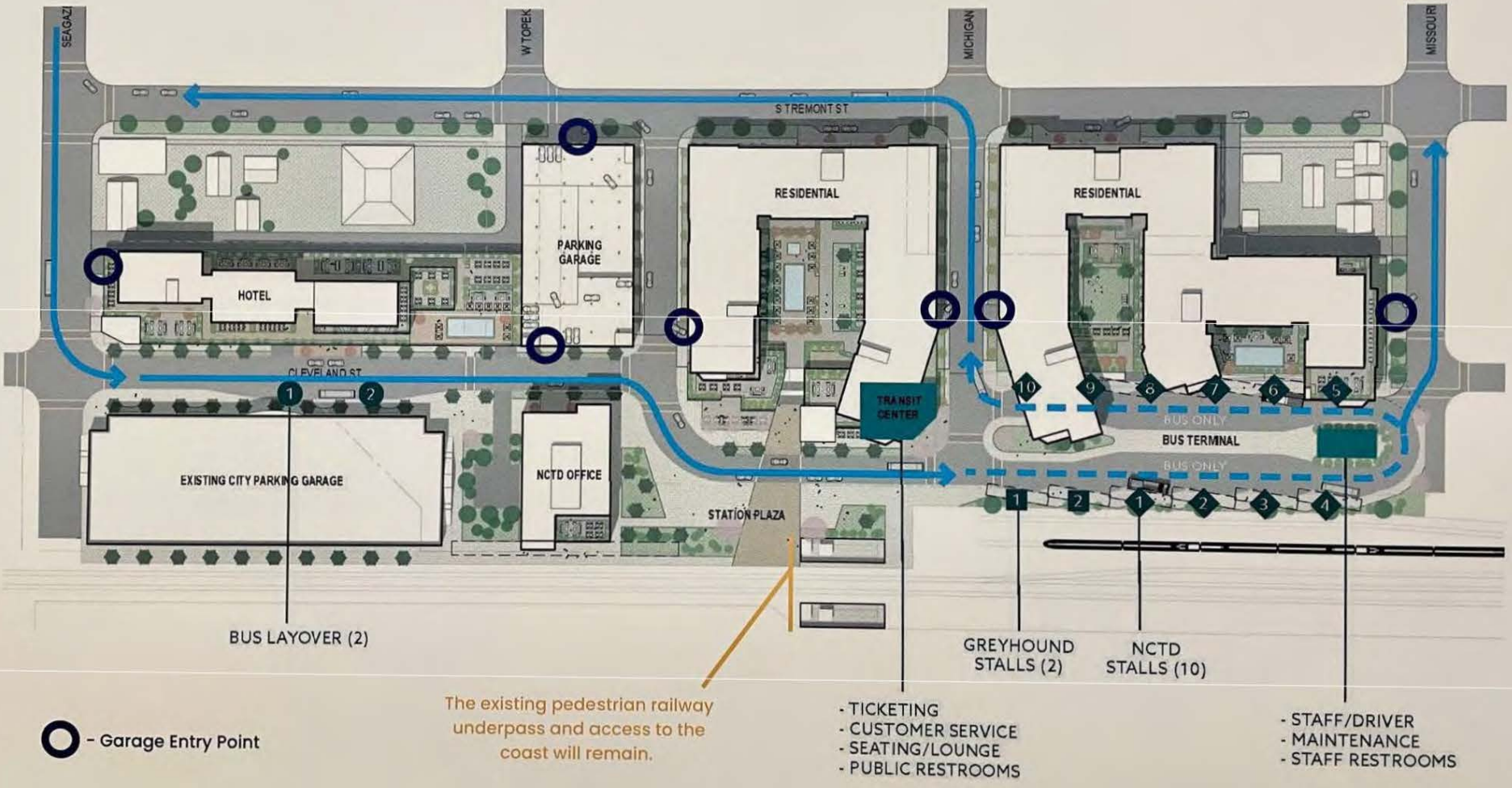
Tom Lichterman
Chairman, Oceanside Bicycle and Pedestrian Committee

cc: Oceanside Bicycle and Pedestrian Committee Members
Oceanside Mayor and City Council
Matt Tucker, NCTD
Lillian Doherty, NCTD
Katie Persons, NCTD
Jose Cervantes, NCTD
Marisa Mangan, SANDAG

ATTACHMENT

## oved Circulation

design of the bus terminals will improve circulation through the site. Passengers will have easy p
s from the new Transit Center, which is just north of the shaded waiting area.



City of Oceanside Bicycle and Pedestrian Committee
BikeWalk Oceanside
Phone: 619-200-6133 • E-Mail: tlichterman@cox.net

February 1, 2023

Rob Dmohowski,
Principal Planner
City of Oceanside
300 N. Coast Highway
Oceanside, CA 92054

RE: Oceanside Transit Center Redevelopment Project – CEQA Scoping Meeting Comments

Dear Mr. Dmohowski,

The Oceanside Bicycle and Pedestrian Committee is a citizen's advisory committee whose role is to advise the City on programs, projects, and policies which improve bicycling and walking in the community. The Committee's membership includes over 75 Oceanside residents who are concerned about bicycling and walking infrastructure and opportunities. Our goals are to promote bicycling and walking in the community for health, recreation, and transportation, to promote bicycle and pedestrian safety, and to improve bicycling and pedestrian facilities.

The Committee previously submitted a detailed comment letter dated October 24, 2022, to NCTD, The Toll Brothers, and the City on the Oceanside Transit Center (OTC) Redevelopment Project. The concerns expressed in that letter remain the principal concerns of our Committee, and we respectfully re-submit that letter (attached) as comments in the Scoping Meeting. Our concern-areas in that letter were in the following categories:

1. Transit Related
2. Active Transportation
3. Car Parking
4. On-going Community Input

Having not yet received a formal response on many of these concern areas from the Applicant, the purpose of this follow-up letter is to provide additional input relative to the CEQA Scoping Process, as well as our thoughts on potential approaches the Applicant could use to address our previously-stated concerns.

An overriding interest of our Committee, aside from the four concern categories above, is that the OTC project should contribute to climate-stabilization goals, which should be an important CEQA focus. The current proposal, based on what we have seen to date, fails to do this in some key respects, as discussed further below.

**1. Transit-Related Concerns**

We previously pointed out the regional significance of the existing Oceanside Transit Center, being the most important transit center in the NCTD system, with 3 intercity/commuter rail lines, the SPRINTER Light Rail Line, seven NCTD bus routes, FLEX service, and intercity bus service. Our overriding concern in this area is that the proposed redevelopment hides the existence of the OTC from the existing neighborhood and Coast Highway, blocking its view to these areas behind large apartment building blocks.This contrasts with the existing facility,

which is clearly a transit center when viewed from all three of the adjacent street frontages. We believe that by hiding the transit center from the public, the public will be less aware of transit and transportation alternatives, thus generating more motor-vehicle greenhouse gas emissions than a design more open and visible to the community would.

The proposed redevelopment also provides no more transit bus capacity than the existing facility, despite likely growth in the area over the life of the OTC, which could extend out 40 to 60 years. We believe there are alternative ways to develop the site to provide greater transit capacity.

***Potential Approaches to Address these Concerns:***
Reconfigure the building blocks so as to create a view corridor to the transit center from at least Tremont and Michigan Street. We believe Michigan will be one of the most important approaches to access both the on-site development and the transit center. The Michigan corridor should be widened, by narrowing the apartment building blocks and creating a pleasant view to towards the west and the transit center.

Signage should also be generously used to make it clear to the public that there is an important public transit and rail center here. Consider the creation of an archway structure over Michigan between the two apartment building blocks with large signage such as "To Transit Center", "Grand Central Oceanside", or words to that effect. Ensure a strong tie-in to the roundabout planned by the City at Coast Highway and Michigan. For example, Michigan, from the Coast Highway roundabout to Cleveland, could be a uniformly designed and landscaped "complete street," with traffic slowed enough to make all active transportation modes pleasant to use. Consider an art project at the roundabout with a subject related to the OTC and/or our climate crisis. Consider approaches from Topeka, Tremont, and the new access road that is west of Tremont, between the new parking garage and the north face of the apartment building, all having the same features as the Michigan entrance street. Consider these features for Cleveland.

Analyze the internal frontage on Cleveland Street to see if additional bus layover bays can be constructed, to allow for system expansion as well as to handle emergency or overflow needs, such as the current bus bridge operating between Irvine and Oceanside due to the track problems in San Clemente.

**2. Active Transportation Concerns**

We previously commented that access to the proposed transit facility for transit users arriving by bike or on foot is not very user-friendly. It appears biking and walking transit users must enter between large residential building blocks on narrow roadways used by motor vehicles, rather than entering through an inviting "grand transit plaza" access. There are no separate bike lanes or paths into the facility. Use of active transportation modes to access the facility will become more and more important as we address climate change, and the facility should encourage this and be as easy as possible to access on foot or by bicycle. Finally, bicycle parking and storage for varied user groups (Daily Commuters, Casual Bike Users, Bikeshare Bikes) has not been indicated on the draft plan.

The Sierra Club has a policy statement that is very applicable to this project and reflects our Committee's viewpoint:

*Rail systems are most effective in stimulating compact development patterns, increasing public transit patronage and reducing motor vehicle use. Station access should be provided by foot, bicycle and public transit, with minimal, but full-priced, public parking. Accommodation of pedestrians, bicycles and public transit should be given priority over private automobiles.*

***Potential Approaches to Address these Concerns:***
Reduce the width of the northern apartment building block in order to widen Michigan and create a better view corridor to the transit center. Use some of this extra right-of-way width to install separated bike lanes on Michigan, leading directly to the transit center area. Identify and establish bike parking and storage areas in clear view of the NCTD Customer Service Center, for security, including both a high-security bike lock-up facility and short-term use bike racks. The boutique hotel also proposed for the site should supply complimentary bikes for their guests' use, along with information on local biking destinations, to help mitigate local traffic and emissions. Guests from around the world can come to this hotel using only a plane-train combination. With downtown, the beach, the San Luis Rey River Bike Trail, and the numerous rail-bike trip options, many guests won't need to drive during their visit.

**3. Car Parking Concerns**

We previously stated that this facility will have one of the largest car parking facilities in the City of Oceanside. The proposed site plan does not indicate how the identified parking resources will be managed. By continuing the existing facility's policy of "free parking", the proposed facility will continue to encourage single-occupant auto travel to the OTC, thereby generating more climate-destabilizing greenhouse gases than a properly-managed and priced parking facility. The existing policy will also encourage employees to drive to the office building, boutique hotel patrons to use a car on their visit, and apartment residents to own more cars than they would otherwise.

***Potential Approaches to Address these Concerns:***
The OTC redevelopment should include a comprehensive car parking system that will tie the various uses together. A good car parking system will be automated, value-priced, and have congestion pricing algorithms as needed. It will also be shared among all site users and it will provide earnings to those currently losing money (i.e., those who don't solo-drive) because "free" car parking is being provided. The car parking system should be created by a third-party vendor, selected using a Requirements Document and an RFP process. The vendor should also be good at solar canopies, charging stations, and buying and selling electricity. The proposed parking system would increase economic fairness and modal choice while it would reduce driving and VMT. It would maximize transit ridership instead of maximizing driving to and from the OTC. This shift in mode choice is critical to help meet regional and state-wide climate stabilization targets by reducing greenhouse gas emissions.

**4. On-Going Community Input:**

We previously pointed out the need for a community outreach and participation process for a project of this magnitude and potential impact on the community. Oceanside's District 1, all of Oceanside, and SANDAG all have a huge stake in the final form of the OTC. So far, there has been only one public meeting, held back in September, 2022, and it seems that the design has progressed very far with very little community input being taken into consideration. We learned, for example, that the Applicant was not aware of the Mobility Hub Elements that SANDAG had

recommended for this facility in a 2017 report. To our knowledge, there is no on-going community stakeholder group or meeting process, other than a plan to hold two "thematic" meetings managed by the Applicant.

***Potential Approaches to Address these Concerns:***
Establish a community stakeholder and advisory commission to guide development plans, including representation from all affected community members, including transit users, modal service providers, local residents, merchants, and City management. Establish a process for ensuring their input is carefully considered in design revisions in order to achieve the best outcome for all parties. Ensure that the Mobility Hub Elements previously identified by SANDAG for this facility are incorporated into the design.

It should be remembered that the existing facility is 40 years old, and that whatever is ultimately constructed will no doubt be in the community for at least another 40 years. Let's ensure it is the best facility possible.

Thank you for your consideration.

Sincerely,

Tom Lichterman
Chairman, Oceanside Bicycle and Pedestrian Committee

cc: Oceanside Bicycle and Pedestrian Committee Members
Oceanside Mayor and City Council
Matt Tucker, NCTD
Lillian Doherty, NCTD
Katie Persons, NCTD
Jose Cervantes, NCTD
Marisa Mangan, SANDAG

ATTACHMENT – October 24, 2022 Comment Letter

# Oceanside Transit District Project

I (Kim Hunt) attended a meeting at Mainstreet Oceanside and one thing I heard was that Oceanside wants to do its best with this project. Here are my comments:

## Bus Transit Area

The current area is off Seagaze Street between Tremont and the Oceanside parking garage. This area is the appropriate location for the bus transit area.

### Pros

1) This area has been designed so it is large enough for the current use of:
    a. NCTD buses
    b. Greyhound buses
    c. Amtrak buses (when needed due to unforeseen problems)
    d. Metrolink buses (when needed due to unforeseen problems)
    e. Emergency firetruck vehicles
    f. Emergency ambulance vehicles
    g. NCTD Supervisor vehicles
    h. Police vehicles

    The only vehicles not using this area are taxi cabs, Uber, Lyft, the new O'side electric free ride vehicles but maybe this is the area that will be used in the future for these units. There seems to be plenty of space for increases in NCTD buses.

2) The location of the current bus area is ideal for people connecting to Amtrak, Sprinter, Coaster, Metrolink, other buses, as well as being accessible to people going to downtown Oceanside.
3) The location is the only "park" area for Oceanside residents in the downtown area with shade structures, beautiful trees, grass, and seating.
4) The utility area has been designed so the washrooms are convenient for the bus riders, and others, as there are no facilities on NCTD buses.
5) By leaving the bus area where it is, Oceanside does not incur any of the costs involved in moving the bus area. It also makes for more space in area that will be used to design low cost housing.

### Cons

1) I see no cons in leaving this area as it is.

## New Parking Facilities

I have concerns about the study that has been done to determine how many parking spaces are being developed when the current parking lot is removed. At the meeting, I heard that NCTD has indicated that this parking lot is under-utilized. That surprises me because in the summer months (before COVID), the parking lot was always completely full. I have memories of driving round and round to find a parking space so I could park before riding the Coaster. I am concerned that the numbers that the NCTD report has provided are counts that were done during the COVID pandemic and do not truly reflect the usage of this parking lot. Beside parking for a day trip using the Coaster, I know people who have parked overnight for a longer trip to San Diego or to Los Angeles.

It was unclear to me as to the additional parking that would be provided for the new housing units. It seemed that there was going to be one parking spot for most of the units and only a few units would have 2 parking spots. We need to be realistic. Even if this meets the parking requirement for this housing project, the majority of couples have two cars, regardless of whether or not the couple uses public transportation. Therefore, each unit truly needs to have 2 parking spaces provided or there will be an explosion of street parking in the downtown and surrounding streets of Oceanside.

There also needs to be adequate parking for transit users who do not live in the new housing buildings. The point of adequate parking is so that public transportation users **will drive** to the Transit Center to park their cars before riding the Coaster, Metrolink, or Amtrak. If adequate parking does not exist, then people will be discouraged from using public transportation and will drive their cars to their destination instead of using public transportation. I would think that discouraging ridership is undesirable.

How do you plan on keeping cars owned by the residents of the new housing building from using the parking spaces needed for public transportation users? This problem needs to be addressed before the start of this project so that the necessary planning is in the design documents.

Then there is the planning necessary for the fact that all vehicles in the future will be electric vehicles. The plan must assume that all vehicles are electric vehicles and put in the necessary utilities required in the parking structures to support this future.

## Affordable Housing Building Design

The best design that I have seen that maximizes parking as well as including apartments is the SALT building on Cleveland Street. Instead of the design that Tollbrothers has proposed, why not do something like the SALT building. The design needs to prioritize the parking necessary for both residents and public transportation users before designing apartments.

## NCTD Front Counter Office for NCTD, AMTRAK, METROLINK, COASTER, Greyhound

First off, there is no need for this office. Everyone is doing business on their cell phones. Perhaps, a kiosk is needed but not something grand. The current Amtrak office is located in the appropriate place by Track 1.

## Retail Along The Modified Cleveland Street

The current plan to move the buses, to upgrade Cleveland Street with only bus traffic, and to make retail space along this corridor is not a good plan. Since no cars are driving along this area, then all the customers would need to be walking customers. The people walking along here are going to catch public transport, not stop and shop. Where should the retail be located? On Tremont Street, of course.

## Boutique Hotel

If there truly is a need for a boutique hotel, here are some suggestions.

1. Build the hotel on Tremont near the Fin Hotel. This will provide more customers for the shops and restaurants along the Coast Highway.
2. Make the hotel the top floors of the Affordable Housing building. Those rooms will get a better view of the ocean and the height limit will be allowed because affordable housing is being included in the new building.
3. Have all the retail shops located in the new building along Tremont Street.

Thank you kindly for considering my thoughts on this project. Let's make it **The Best** project for Oceanside.

Kim K Hunt
301 Mission Avenue, #608
Oceanside, CA 92054
Kimhunt888@gmail.com
760-978-2203

February 1, 2023 submittal

Mr. Rob Dmohowski, AICP, Principal Planner
City of Oceanside 300 N. Coast Hwy Oceanside, CA 92054
rdmohowski@oceansideca.org

Mr. Dmohowski,

The attached are comments related to the EIR Scope for the Oceanside Transit Center Mixed Use Project (OTC) AKA GPAA22-00002 proposed by North County Transit and Toll Brothers Apartments. Please also include these comments in other reviews and comments related to this project. These may include Planning Commission review, Council review, Coastal Commission review, Federal reviews, and applications (for consideration of the project or grants).

Overall this project has many good attributes, but one aspect of the development is of concern to many of our fellow neighbors South of the Transit Center and directly adjacent to the newly proposed relocation of the bus stalls. NCTD and Toll Brothers are jointly proposing to relocate the bus stalls (NCTD & Greyhound) and the transit center approximately 1,000 feet south and in a fashion that will be adjacent to our homes. Our neighborhood consists of ground-level residential, and this location is problematic due to the following issues:

1. Additional pollution – additional noise pollution from increased traffic, including diesel vehicles
2. Additional pollution – additional residential air pollution relocated from a commercial area
3. Additional pollution – new trash in residential area relocated from current transit center
4. Additional pollution – increased traffic and parking in residential areas from busses and private vehicles
5. Additional pollution - additional stormwater pollution that leads to the ocean
6. Additional unhoused population and accompanying challenges
7. Reduced property values due to some of the above-noted issues

This new and unexpected change moves air pollution, trash, increased noise, and greater vehicle traffic nearer ground-level homes. In addition, it relocates the unhoused population who use the bus stalls and staging areas for sleeping, assembling, drug use, other illicit activities, and other incompatible uses near ground-level homes in its new suggested placement. We do know the Bosie Decision impacts how the unhoused population is addressed and this concerns us even more since government entities have very little control over these issues. We do know even the best intentions of government agencies have unintended and unconsidered impacts. For example, our neighbors have been advised that NCTD realized, after the most recent relocation and construction of the New Coaster Platform, that they should have included shore power to reduce the idling/pollution of the Coaster, which now must idle if it's in the station for 1 hour or less. We believe that with a thorough review of all areas indicated in the EIR project description and additional input provided by this group and others, a better project with mitigated impacts can be constructed for the benefit of old and new oceanside residents, businesses, and

visitors. One additional item, of many we have seen missing, is how will the number of bus bridge buses that will provide support to Amtrak, Coaster, and Metrolink customers be accommodated when tracks are down or under construction. Currently, four or more buses are supporting Amtrak due to the San Clemente track construction, and there does not seem to be sufficient capacity in the proposed plan for these considerations. Further, it does not appear that the height of the residential building is sufficient to allow bus bridge buses or special event buses (like double-decker buses providing transport to Oceanside Harbor Days) to pass under the proposed structure to exit out Michigan to Coast Highway. This would leave Missouri as the only alternative street, further impacting the residential area.

It should be noted that the new placement is unlike the majority of multi-story residential and commercial uses with the bus stalls' current placement. Some of our neighbors have also reviewed the typical wind patterns on the SDG&E website for this new location, and it looks like the typical onshore breeze will not dissipate but instead concentrate the Sprinter, Coaster and now the bus particulate matter (PM), and other greenhouse gasses (GHG) on an already impacted residential population. Many of the newly impacted residents, in our estimation (looking at the residential density and age of the housing stock), may be a lower income and more vulnerable population (Children, elderly, and others) than the existing bus stall placement, and this could disproportionately impact them. The San Diego Air Pollution Control District (APCD) has differing standards for mostly residential areas when considering acceptable air pollution levels due to longer-term pollution exposure for residential uses. This should also be considered with regard to the proposed relocation of the bus stalls to an almost completely residential area versus the current mixed-use location. The EIR for this project should evaluate the impacts of the bus stall relocation and all potential mitigating alternatives.

NCTD staff have advised us they want the bus stalls nearer the Coaster and Sprinter for ease of the users; however, other alignments would be less impactful to the existing and future residential populations in the newly suggested alignment.

Several of our residents did a significant amount of research prior to purchasing our homes, and one even talked to Oceanside City Staff, NCTD Staff, and SANDAG Staff. In each conversation, they were advised that there were no plans to move the bus stalls to the southerly position, which was specifically asked. It also appears that the proposed relocation could not be undertaken under the City Zoning and Land Use Maps. If NCTD is looking for an alignment that may best serve direct access to transit, might we suggest an East-West alignment for bus queuing on Michigan to Coast Highway? This would allow for the most direct access to the transit options, and massing the buildings on either side would create a sound/impact barrier to those residential and other uses to the north and south. This option would place buses on a solely commercial street with no direct access to the South Cleveland Street residential neighborhood. Another consideration is leaving the bus stalls where they are and placing the hotel near the southern location.

To date, we have not seen any project alternatives in the proposed development materials. These alternatives are missing for the project and specific project elements, including the proposed relocation of the bus stalls, street alignments, project density, and building placement (partial list). We feel all alternatives need to be considered, so all approving authorities can best review, consider and determine how best to construct the project with minimal environmental and community impacts.

Several of our residents are employed in law enforcement, government, healthcare, private business owners, homeless support professionals, and lawyers (to name a few professions). We do understand the need for additional housing and how the State and Courts have removed many of the provisions of local government control. The highest and best use of the site can address issues related to local control and the dictated State and Court conditions at the same time. The plan presented does not need to be constructed as designed. Although this may provide the highest value to NCTD and Toll Brothers, “Highest And Best Use”, should also consider those who were here under prior and existing conditions/regulations (to the extent legally feasible) and minimize (mitigate) the impacts to those who have already called this area home.

The plan indicates a seven-year timeline for construction. It is unclear how this long and delayed process will impact coastal access, pollution, traffic, and other potential negative impacts. The plan should clearly outline current, interim, and final construction timeline impacts and mitigation.

As Oceanside residents and business owners, we believe that with the consideration of our comments related to the proposed bus stall placement and the corresponding impacts of the project overall, this project can be constructed in a way that allows for our continued quiet enjoyment of the homes south of the proposed project site and does not constitute a property taking.

Thank you for the consideration of our input.

Signed and Submitted By

Caitlin Kelly

Name: Caitlin Kelly

Address: 414 South Cleveland St. #101, Oceanside, CA 92054

Email: ckelly711@gmail.com

## Robert Dmohowski

**From:** Diane Nygaard <dnygaard3@gmail.com>
**Sent:** Friday, February 10, 2023 10:38 AM
**To:** Robert Dmohowski
**Subject:** Comments on Oceanside Transit Center NOP

**Warning: External Source**

Mr.Dmohowski

We have the following comments on the NOP for the Oceanside Transit Center for specific items to be addressed in the environmental analysis. Please reply to confirm timely receipt of these comments.

**Project description**

- This needs to include projected transit demand for all modes using the transit center and how demand translates to facilities.

This is of particular concern as regional and local plans to reduce GHG rely on increased use of alternative transportation. This needs to be specific for each mode. For example a key limitation for Coaster and Sprinter service is headways. What is assumed about future headways and has the design accommodated that as well as other carriers rail service that uses the Oceanside platforms? Increased rail use will rely on better access by buses, pedestrians and bicycle. The current transit center has 17 stalls for local buses and 5 for intercity. What increase in bus access is projected both locally and regionally and how does this relate to the number of stalls provided for busses?

This is also an issue with the existing underground crossing of the tracks that is already over capacity at peak times.

**Project objectives**

- evaluate compliance with project objectives- particularly coastal access

One of the stated objectives is to "enhance coastal access." It seems to be assumed that the proposed project meets its stated objectives but this should be evaluated both for the proposed project and for alternatives.

The railroad tracks provide a major physical barrier to the coast. This project will add hundreds of residences on the east side of the tracks where access is already restricted. The DEIR needs to specifically assess the ability to access the coast through and around the project. This needs to consider the capacity of the existing undercrossing of the tracks, sidewalks and bike access.

**Land Use**

- Compliance with SANDAG smart growth and TOD design guidelines

SANDAG has developed guidelines for mobility hubs like this transit center. This includes features that optimize multi-modal access, features to be included and visibility to the community. Is the proposed project in full compliance with these criteria and if not what design changes or other mitigation could address that?

This needs to specifically evaluate multi-modal connections at this regional transit center. How long is the distance /time for bus to rail connections? How easy is it to navivgate this site- particularly for those who may be first time users of the facility?

- compliance with General Plan Circulation Element multi modal policies

This is of particular concern at a Smart Growth location like this, on the edge of downtown where there should be optimum access for all modes.

- compliance with parking guidelines

Providing 1,798 parking spaces needs to be considered as counter productive to reducing auto use. There is language the Specific Plan that parking standards may be revised - presumably to be reduced. Providing free parking incentivizes more car use, and wastes space on cars that could better enhance the public spaces on this site. The project compliance with parking and muilti-modal transportation guidelines in the General Plan- Land Use and Circulation all i need to be evaluated.

- indirect impacts of vacating existing downtown NCTD headquarters building

At a previous community meeting it was stated that this was part of the overall project, but it was not included in the NOP. At a minimum this is an indirect impact that should be considered.

- analysis of multi-modal circulation in project vicinity

At the NOP a figure was shown that described circulation within the project site. That is just a small part of the circulation that needs to be considered. Connections for all modes of transportation to all directions needs to be considered.

**Air Quality**

- Air quality analysis needs to consider impacts of emissions from idling busses and trains

The DEIR needs to consider potential impacts of adding dense residential uses in close proximity to idling vehicles that can be high emitters of numerous air pollutants of concern. That analysis should go beyond the typical CO2 hot spot analysis associated with stop signs.

**Public Health and Safety**

- high transient population use of transit centers

High transient and homeless populations in the downtown area, and historically of concern at transit centers needs to be considered.

- dogs and pet waste impacts

Residential uses typically have 1 dog for every 3-4 units. That is a large number of dogs sharing public spaces with hundreds of transit users.

**VMT Analysis**

- Consider alternatives ways to evaluate the impacts of the hotel on VMT

The city of Oceanside analysis methodology essentially only counts hotel employees. Far more potential ADT would come from hotel visitors than employees. How can those hotel visitor trips best be considered?

**Cumulative Impacts**

- Consideration of other potential traffic generating uses

A recent court ruling on the Juniper project raised the need to do a more thorough review of particularly traffic impacts from other potential projects- whether formally approved yet or not. See the attached Minute Order.

**Alternatives Analysis**

- There should be an alternative that optimizes GHG emission reductions

This could assume the existing intensity of development, But would be designed specifically to maximize GHG emission reductions. This should include things like no gas hook-ups, comprehensive sustainability program for the hotel operations, and TDM program that optimizes the use of alternative transportation for all users of the site and includes provisions for supporting a downtown shuttle service.

Thank you for considering these comments.

Diane Nygaard
On behalf of Preserve Calavera

**SUPERIOR COURT OF CALIFORNIA,**
**COUNTY OF SAN DIEGO**

**MINUTE ORDER**

DATE: 02/03/2023 TIME: 04:00:00 PM DEPT:

JUDICIAL OFFICER PRESIDING: Ronald F. Frazier
CLERK: Sarah Doski
REPORTER/ERM:
BAILIFF/COURT ATTENDANT:

CASE NO: **37-2021-00033583-CU-TT-CTL** CASE INIT.DATE: 08/05/2021
CASE TITLE: **PQ-NE Action Group vs City of San Diego [E-FILE]**
CASE CATEGORY: Civil - Unlimited CASE TYPE: Toxic Tort/Environmental

**APPEARANCES**

The Court, having taken the above-entitled matter under submission on 2/2/23 and having fully considered the arguments of all parties, both written and oral, as well as the evidence presented, now rules as follows:

Petitioner PQ-NE Action Group's Petition for Writ of Mandate is GRANTED IN PART. (ROA 1, 49.)

This proceeding concerns Respondent City of San Diego's approval of a residential development known as a Junipers Project ("Project") located in the Rancho Penasquitos area. Real Parties in Interest Carmel Partners, LLC and Carmel Land, LLC ("RPIs") are the Project applicants.

Petitioner seeks a writ of mandate vacating the City's approval of the Project.

*Whether the EIR Adequately Considers Cumulative Impacts*

An Environmental Impact Report ("EIR") must consider a project's "cumulative impacts." (14 C.C.R. § 15130(a).) "[A] cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts." (14 C.C.R. § 15130(a)(1).) "The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and *reasonably foreseeable probable future projects*." (14 C.C.R. § 15355(b).)

Petitioner asserts the EIR failed to adequately consider the cumulative impact of the Project together with the Millennium PQ and Trails at Carmel Mountain Ranch projects. In opposition, Respondent and the RPIs assert these projects did not qualify for inclusion in the cumulative impacts study. Specifically, Respondent and the RPIs assert the City used the Project's Notice of Preparation of the EIR (April 10, 2018) as the cutoff date, and neither the Millennium PQ nor the Trails projects were analyzed because neither of these applications was "deemed complete" before this date. (AR 43:11381-11406; 15:4859.)

"[M]ere awareness of proposed expansion plans or other proposed development does not *necessarily* require the inclusion of those proposed projects in the EIR." (*Gray v. County of Madera* (2008) 167

Cal.App.4th 1099, 1127 (emphasis added).) However, "any future project where the applicant has devoted significant time and financial resources to prepare for any regulatory review *should be considered* as probable future projects for the purposes of cumulative impact." (*Id*. at pp. 1127-28 (emphasis added).) "Projects that are undergoing environmental review are reasonably probable future projects." (*Id*. at p. 1127.)

Here, the administrative record reflects both the Millennium PQ and Trails projects were reasonably probable future projects known to the City well before the draft EIR was published. Although the City attempts to assert it was not obligated to consider these projects because neither of the applications was "deemed complete" before the Project's April 10, 2018 Notice of Preparation was issued, the court is not persuaded.

The EIR states the Millennium PQ application was deemed complete on June 14, 2019 and the Trails application was deemed complete on January 31, 2020. (AR 15:4859.) However, the record and judicially noticeable documents demonstrate the City was concurrently evaluating the Project, Millennium PQ, and the Trails for many months prior to the publication of the draft EIR. (AR 225:24408-24412, 15:4991; Pet. RJN at Exh. A.) The City was clearly aware Millennium PQ and Trails were reasonably probable future projects.

The court is sympathetic to the City's desire to apply a bright-line rule. However, the legal authorities reflect a more flexible approach. (14 C.C.R. § 15355(b); *Gray* at pp. 1127-28.) RPIs cited both *Gray* and *South of Market Community Action Network v. City and County of San Francisco* (2019) 33 Cal.App.5th 321 as support for their position that the City's selection of the Notice of Preparation date as the cutoff was reasonable. Notably, however, both these cases are distinguishable on their facts from the case presented here. In *Gray*, the court noted "the County could not locate any project where an applicant has filed for review with the County Planning Department" before determining the County had reasonably exercised its discretion to set the date of the project application as the cutoff. (*Gray* at p. 1128.) By contrast, here there is evidence the City was aware of other probable future projects in close proximity to the Project.

Likewise, in *South of Market*, the plaintiffs asserted the EIR had used an outdated list of projects and made "generalized observations that development is 'rampant,'" but the court noted the lack of evidence that the list was "defective or misleading, or that the City ignored projects that were in the pipeline for the purpose of adjudging cumulative impacts." (*South of Market* at p. 336-37.) Thus, "[t]he City had discretion to determine a reasonable date as a cutoff for which projects to include in the cumulative impacts analysis, and plaintiffs have not shown the City's decision to use a 2012 project list was unsupported by substantial evidence." (*Id*. at p. 337.) Here, Petitioner has sufficiently demonstrated Petitioner's decision to exclude Millennium PQ and the Trails projects was not reasonable under the facts. In the court's view, the close proximity of these projects – particularly Millennium PQ, which is adjacent to the Project – renders the City's decision all the more arbitrary.

Thus, the EIR fails to comply with CEQA because it did not adequately consider the cumulative impact of Millennium PQ, Trails, and the Project.

As to these grounds, the Petition is granted.

*Whether the EIR Adequately Considers Wildfire Safety Impacts*

"An EIR shall identify and focus on the significant effects of the proposed project on the environment."

(14 C.C.R. § 15126.2(a).) This includes "any potentially significant direct, indirect, or cumulative environmental impacts of locating development in areas susceptible to hazardous conditions (e.g., floodplains, coastlines, *wildfire risk areas*)...." (*Ibid.*, emphasis added.)

Within the context of wildfire safety impacts, Petitioner argues the EIR failed to consider the cumulative impacts of the Project together with the Millennium PQ (which will use the same evacuation exit) and Trails projects (which will significantly increase the number of evacuating residents). The court agrees and finds the EIR also fails to comply with CEQA because it did not adequately consider the cumulative impact of Millennium PQ, Trails, and the Project when evaluating the Project's wildfire safety risks.

In their opposition, Respondent and RPIs point out the RPIs commissioned a study on Millennium PQ's impact on evacuation times, and that the study concluded the community's evacuation time would only increase from 3.5 to 3.8 hours if Millennium PQ project were also considered. (AR 21:10659-10662.) As a preliminary matter, this study still does not take the Trails project into consideration. Further, "CEQA requires agencies to discuss a project's potentially significant impacts in the draft EIR and final EIR." (*Sierra Watch v. County of Placer* (2021) 69 Cal.App.5th 86, 103; see also 14 C.C.R. § 15120.) "[T]o the extent an agency omits an adequate discussion of a project's potential impacts in its EIR, it cannot afterward make up for the lack of analysis in the EIR through post-EIR analysis." (*Ibid.*, citing *Save Our Peninsula Committee v. Monterey Cty. Bd. of Supervisors* (2001) 87 Cal.App.4th 99, 130.)

Here, the RPIs submitted the study on the eve of the City Council hearing. (AR 21:10659.) The memo is dated June 11, 2021 and the City Council hearing was held June 15, 2021. No such analysis is contained in either the draft EIR or final EIR. Thus, the EIR fails to comply with CEQA requirements. This deficiency cannot be cured by post-EIR analysis, and in any event the post-EIR analysis is still insufficient because it does not consider the Trails project.

As to these grounds, the Petition is granted.

At hearing, Petitioner argued the EIR also improperly omitted consideration of Pacific Village in its analysis of cumulative impacts with regard to evacuation and wildfire safety. In response, RPIs asserted this issue was waived because it had not been asserted during the administrative process. However, it appears this issue was raised before the agency. (AR 018319.) The court agrees the EIR also fails to comply with CEQA requirements because it omits Pacific Village from its cumulative impact analysis for evacuation and wildfire safety.

Petitioner also argues the EIR's wildfire analysis is not supported by substantial evidence, challenging several of the assumptions made in evaluating the Project's impact on evacuation. As to these grounds, the Petition is denied.

Third, Petitioner asserts the EIR obfuscates wildfire and evacuation risks because it uses a "voluntary" Fire Protection Plan and Wildfire Evacuation Plan. As to these grounds, the Petition is denied.

*Whether the EIR Adequately Considers Transportation Impacts*

Petitioner asserts the EIR did not adequately analyze and mitigate transportation impacts.

As to these grounds, the Petition is denied. There is substantial evidence in the record to support the EIR's transportation impact analysis.

*Whether the EIR Adequately Considers Greenhouse Gas Impacts*

Consistent with CEQA Guidelines, the City has a Climate Action Plan (CAP) Consistency Checklist. The City's CAP "was adopted to ensure that emissions from activities in the City would not exceed established state targets" and the Checklist "serves as the significance determination threshold for cumulative impacts related to climate change." (AR 16:6498.) "If a project is not consistent with the City's CAP, as determined through the CAP Consistency Checklist, a potentially significant cumulative GHG impact would occur." (AR 16:6474.)

Petitioner asserts the EIR did not adequately disclose and mitigate greenhouse gas impacts.

As to these grounds, the Petition is denied. There is substantial evidence in the record to support the EIR's conclusion the Project will not significantly impact greenhouse gas emissions.

*Whether the EIR Adequately Considers Land Use Impacts*

"The EIR shall discuss any inconsistencies between the proposed project and applicable general plans, specific plans and regional plans." (14 C.C.R. § 15125(d).)

Petitioner asserts the EIR did not adequately disclose or mitigate the Project's land use impacts.

As to these grounds, the petition is denied. There is substantial evidence in the record to support the EIR's conclusion the Project is consistent with the City's General Plan, the Rancho Penasquitos Community Plan, and the San Diego Association of Governments' Regional Transportation Plan/Sustainable Communities Strategy.

*Whether the EIR Adequately Considers Biological Impacts*

Petitioner asserts the Project failed to adequately mitigate biological impacts. Petitioner's argument is not entirely clear here. Although the California Department of Fish and Wildlife made certain mitigation recommendations to the City in a comment on the Project, it appears these concerns were considered by the City, even if the recommendations were not incorporated into the Project's approval.

As to these grounds, the Petition is denied. There is substantial evidence in the record to support the EIR's conclusion the Project will not significantly impact biological resources.

*Whether a Variance from the City's Affordable Housing Ordinance Should Have Been Granted*

City Code requires affordable housing units to be "comparable in bedroom mix, design, and overall quality of construction to the market-rate" housing units. (San Diego Mun. Code § 142.1304(e)(2).) Variances may be sought under certain circumstances. (SDMC §§ 142.1310, 142.1311.)

Petitioner asserts the City's determination to grant a variance from its affordable housing ordinance lacked substantial evidence. The RPIs obtained a variance to provide an alternative mix of one- and two-bedroom units rather than a mix of two- and three-bedroom units. (AR 21:10189.)

As to these grounds, the Petition is denied. There is substantial evidence in the record to support the granting of a variance.

*Requests for Judicial Notice*

Petitioner's requests for judicial notice submitted with its moving papers are granted as to Exhibits A, B, and C and denied as to Exhibit D. (Evid. Code § 452(b), (c); ROA 50.) As to Exhibit D, judicial notice is denied on the grounds it is not relevant.

Respondent's and RPIs' requests for judicial notice are granted. (ROA 55; Evid. Code § 452(c).)

Petitioner's requests for judicial notice submitted with its reply papers are granted. (ROA 58; Evid. Code § 452(c).)

However, all counsel are admonished for submitting separate, additional memoranda regarding the requests for judicial notice. Although the court considered these unauthorized memoranda, they are improper absent leave of court. "Any request for judicial notice must be made in a separate document listing the specific items for which notice is requested and must comply with rule 3.1306(c)." (Cal. R. Court, rule 3.1113(*l*).) The rule contemplates *a list of items*, not lengthy additional briefing. Any legal argument should have been included in the opening, opposition, and reply memoranda, not in the requests for judicial notice or other unauthorized memoranda. The rules requiring a separate document for a request for judicial notice may not be used to circumvent the court's rules regarding page limits for memoranda. (Cal. R. Court, rule 3.1113(d).)

*Request for Separate Hearing re: Remedy*

At hearing, RPIs' counsel requested that the court set a separate hearing and allow further briefing if it was inclined to confirm its tentative ruling. This request is denied.

A writ of mandate shall issue vacating Respondent's approval of the Project and suspending any and all activity pursuant to Respondent's approval of the project until Respondent has fully complied with CEQA requirements. (Pub. Res. Code § 21168.9.)

Petitioner is to submit a proposed Judgment within five (5) days.

Judge Ronald F. Frazier

## Robert Dmohowski

**From:** Erich Corduan <corduan@icloud.com>
**Sent:** Wednesday, February 1, 2023 5:11 PM
**To:** Robert Dmohowski
**Subject:** Transit Center Project
**Attachments:** Oside Transit Center.pdf

Warning: External Source

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Since we would be impacted by the relocation of bus stalls to the south side of the transit center property, it would be much better if the busses were located closer to Michigan Street and in in industrial area and not in the residential area south of the transit center. The replacement of small businesses with multi family residential units has increased the tax base for Oceanside, and it would not be advisable to lower property values by putting bus traffic on the adjoining streets.

Erich and Barbara Corduan
414-104 S. Cleveland St.
Oceanside, CA 92054

February 1, 2023 submittal

Mr. Rob Dmohowski, AICP, Principal Planner

City of Oceanside 300 N. Coast Hwy Oceanside, CA 92054 rdmohowski@oceansideca.org

Mr, Bmohowski,

The attached are comments related to the EIR Scope for the Oceanside Transit Center Mixed Use Project (OTC) AKA GPAA22-00002

North County Transit and Toll Brothers Apartment overall the project has many wonderful attributes, but one aspect of the development is of concern to many of our fellow neighbors South of the Transit Center and directly adjacent to the newly proposed relocation of the bus stalls. They are jointly proposing to relocate the bus stalls (NCTD & Greyhound) and the transit center approximately 1,000 feet and in a fashion that will be adjacent to our homes. Our neighborhood consists of ground level residential, and this location is problematic due to the following issues:

1. Additional noise - New vehicles
2. Additional pollution - Air and stormwater systems that lead to the ocean
3. Additional trash
4. Additional traffic
5. Additional unhoused population and accompanying challenges
6. Reduced property values

This new and unexpected change, moves air pollution, trash, increased noise, and greater vehicle traffic nearer ground level homes. In addition, it relocates the unhoused population who use the bus stalls and staging areas for sleeping, assembling, drug use, other illicit activities and other incompatible uses near ground level homes in its new suggested placement. We do know the Bosie Decision impacts how the unhoused population is addressed and this concerns us even more since government entities have very little control. We do know even the best intentions of government agencies have unintended and unconsidered impacts. For example; our neighbors have been advised that NCTD realized after the most recent relocation and construction of the New Coaster Platform, that they should have

included shore power so as to reduce the idling/pollution of the Coaster which now must idle if it's in station for 1 hour or less. We believe that a thorough review of all areas indicated in the EIR project description and additional input provided by this group and others, a better project with mitigated impacts can be constructed for the benefit of old and new oceanside residents, businesses and visitors. Just one additional item, of many we have seen missing, is how will the number of buses which will provide support to Amtrak, Coaster and Metrolink customers be accommodated when tracks are down or under construction? Currently there are 5 or more buses that are supporting Amtrak due to the San Clemente track construction and there does not seem to be sufficient capacity in the proposed plan for these considerations.

It should be noted that the new placement is unlike the majority of multi-story residential and commercial uses with the bus stalls current placement. Some of our neighbors have also reviewed the typical wind patterns on the SDG&E website for this new location and it looks like the typical onshore breeze will not dissipate, but instead concentrate, the Sprinter, Coaster and now the bus particulate matter (PM 2.5 and above) and other greenhouse gasses on an already impacted residential population. Many of the newly impacted residents, in our estimation,(looking at the residential density and age of the housing stock), may be a lower income population than the existing placement and this could disproportionately impact them.

NCTD staff have advised us they want the bus stalls located nearer the Coaster and Sprinter for ease of the users, however there are other alignments that would be less impactful to the existing and future residential populations in the newly suggested alignment.

Several of our residents did a significant amount of research prior to purchasing our homes and one even talked to Oceanside City Staff, NCTD Staff and SANDAG Staff. In each conversation they were advised there were no plans to move the bus stalls to the southerly position, which was specifically asked. It also appears that the proposed relocation could not be undertaken under the City Zoning and Land Use Maps. If NCTD is looking for an alignment that may best serve direct access to transit, might we suggest an East-West alignment for bus queuing on Michigan. This would allow for the most direct access to the transit options and with the massing of the buildings on either side, this would create a sound/impact barrier

to those residential and other uses to the north and south. This option would place buses on a solely commercial street with no direct access to the South Cleveland Street residential neighborhood.

Several of our residents have been or are currently law enforcement, government officials, healthcare, Oceanside Business owners, homeless support professionals, lawyers. We do understand the need for additional housing and how the State and Courts have removed many of the provisions of local government control. The highest and best use of the site can address issues related to local control and the dictated State and Court conditions at the same time. The plan presented does not need to be constructed as designed. Although this may provide the highest value to NCTD and Toll Brothers, "Highest And Best Use", should consider those who were here under prior and existing conditions/regulations (to the extent legal feasible) and minimize (mitigate) the impacts to those who have called this area home.

Signed and Submitted By

Erich Corduan

ERICH CORDUAN

Name

414-104 S. Cleveland St

Oceanside CA 92054

Address

Barbara Corduan

Barbara Corduan

Name

414 - 104 S. Cleveland St.

Oceanside CA. 92054

Address

1 February 2023

City of Oceanside
Attn: Mr. Rob Dmohowski, AICP, Principal Planner
300 N. Coast Highway
Oceanside, CA 92054

*Submitted via email to rdmohowski@oceansideaca.org.*

**Re: Oceanside Transit Center Redevelopment Notice of Preparation (SCH #2023010231)**

Dear Mr. Dmohowski,

I have reviewed the Notice of Preparation of a Draft Environmental Impact Report for the proposed Oceanside Transit Center Redevelopment ("Project") which has been proposed there in Oceanside and have the following comments for inclusion in the study.

It is rather concerning to see that the answer for 4.17(b) in the initial study has been pegged as being potentially inconsistent given that the Project is to be located across two census tracts which per the SANDAG San Diego Region SB743 VMT Maps, are currently below the regional mean in the present and going forward into the future. Furthermore, as the project is collocated with a major regional transit center featuring service from a variety of modes and operators to many destinations around the San Diego region and elsewhere in Southern California as well as the Coastal Rail Trail, it should be achievable to produce a project which reduces VMT even below the favorable numbers already attributed to the location and this Project certainly should be able to be screened out of further VMT analysis. Therefore, if preliminary studies indicate that the Project would not be able to meet VMT targets, that is a serious problem.

While the honesty of that potential outcome is at least helpful to have at this point, it also indicates that changes need to be made to fix that issue. Based on the documents, the Project proposes to build 1,238 additional parking spaces over the existing 560 which will be replaced while adding only 547 residential units and 165 hotel rooms. Thus, the Project would more than triple the amount of parking available, including a substantial amount of parking for homes that should be some of the easiest places to be car-free in the city. This is an action which is known to increase VMT.[1]

Recognizing this, the California Legislature passed, and Governor Newsom signed into law Assembly Bill 2011 (Friedman, 2022) which eliminated nearly all parking minimums for locations near high-quality transit—locations such as that of the Project. So while it might not be appropriate to provide no parking at all, there is undoubtedly substantial improvement to be realized by either reducing the parking provided as part of this Project or increasing the number of units provided to better match with the amount of parking that is proposed. Additionally, other tools such as charging for the parking separately would also help optimize the amount of parking that is provided.[2] Doing so would ensure that new residents are able to choose how many cars they actually need to bring with them, if any at all, and thus help keep VMT under thresholds by

[1] Weinberger, R., Seaman, M., & Johnson, C. (2009). Residential off-street parking impacts on car ownership, vehicle miles traveled, and related carbon emissions: New York City case study. *Transportation Research Record*, *2118*(1), 24-30.

[2] Manville, M. (2017). Bundled parking and vehicle ownership: Evidence from the American Housing Survey. *Journal of Transport and Land Use*, *10*(1), 27-55.

Marven E. Norman
PO Box 1147
San Bernardino, CA 92402

introducing people to a plethora of transportation options from the very the moment they move in.[3]

Another issue is that of bike parking. As previously noted, the Project documents mention the construction of 1,798 parking spots for automobiles. However, after conducting a text search of the Initial Study, I was unable to locate any mention of how much bicycle parking would be provided by the Project. That is concerning because bicycling is another excellent alternative available as a TDM measure to help reduce VMT, particularly with the recent proliferation of electric bikes.[4] Various studies have demonstrated that many people are able to replace a substantial portion of their car travel with an (e-)bike, but concerns about whether their bike will still be there when they return are a deterrent to bike usage.[5] Thus, the inclusion of access to bikes should be provided for Project residents, including shared cargo options (perhaps in partnership with the City, such as the program currently underway in Oakland, CA[6]) that would enable people who are unable (or unwilling) to spend significant sums of money on such a machine to still have access to a bike option which can replace a car on many trips, including those to transport people or significant loads.

Furthermore, as one of the outcomes of the Project seeks to modernize the transit center located at the site, the lack of mention of bike parking is concerning. The existing 26-spot facility available at the current transit center is simply not enough and should be upgraded as part of the Project to provide additional spots available to both residents of the planned housing as well as for visitors to the hotels and transit center. (It could also provide a central parking spot for people headed elsewhere in the downtown Oceanside area.) Though it is unlikely that the Oceanside Transit Center would see the level of bike parking demand that is common in The Netherlands where bike parking at train stations routinely exceeds 3,000 spots (even in cities a mere fraction of the size of Oceanside such Assen,[7] Delft,[8] or Zwolle[9]), bike parking should be provided in an amount similar to the car parking, including secure parking for the residential portion equal to at least one spot per unit or hotel room as well as a portion available for public use, including some spots that do not need pre-registration to be able to use so that it is a more viable option for visitors and transit patrons.

Thank you for receiving these comments. If there are any questions, please do not hesitate to reach out for clarification.

Sincerely,

Marven E. Norman

CC: RailPAC, San Diego County Bicycle Coalition

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[3] Næss, P., Peters, S., Stefansdottir, H., & Strand, A. (2018). Causality, not just correlation: Residential location, transport rationales and travel behavior across metropolitan contexts. *Journal of transport geography*, *69*, 181-195.

[4] Fukushige, T., Fitch, D., & Handy, S. (2021). Bike-Share in the Sacramento Region Primarily Substitutes for Car and Walking Trips and Reduces Vehicle Miles Traveled.

[5] Rietveld, P., & Daniel, V. (2004). Determinants of bicycle use: do municipal policies matter?. *Transportation research part A: policy and practice*, *38*(7), 531-550.

[6] https://www.smartcitiesdive.com/news/oakland-oakdot-ebikes-library-carb-zero-emission-mobility/629678/

[7] https://www.jefietswilnooitmeeranders.nl/station-assen/

[8] https://bicycledutch.wordpress.com/2018/11/20/the-delft-bicycle-parking-facility-revisited/

[9] https://bicycledutch.wordpress.com/2021/03/03/new-zwolle-station-bicycle-parking-facility/

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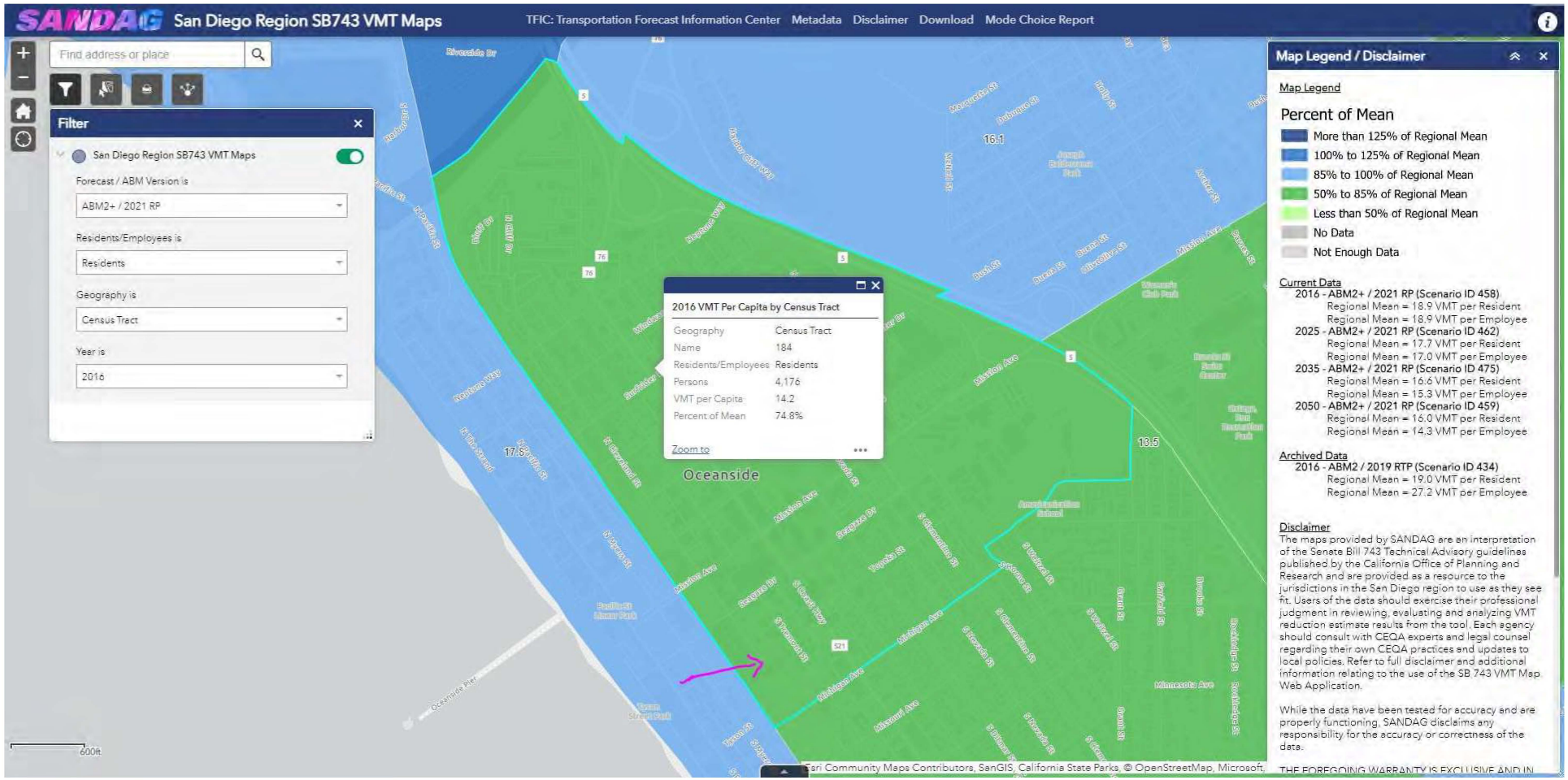


Figure 1. SANDAG San Diego Region SB743 VMT Maps with Census Tract #184 selected, where the proposed Project would be located.

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San Bernardino, CA 92402

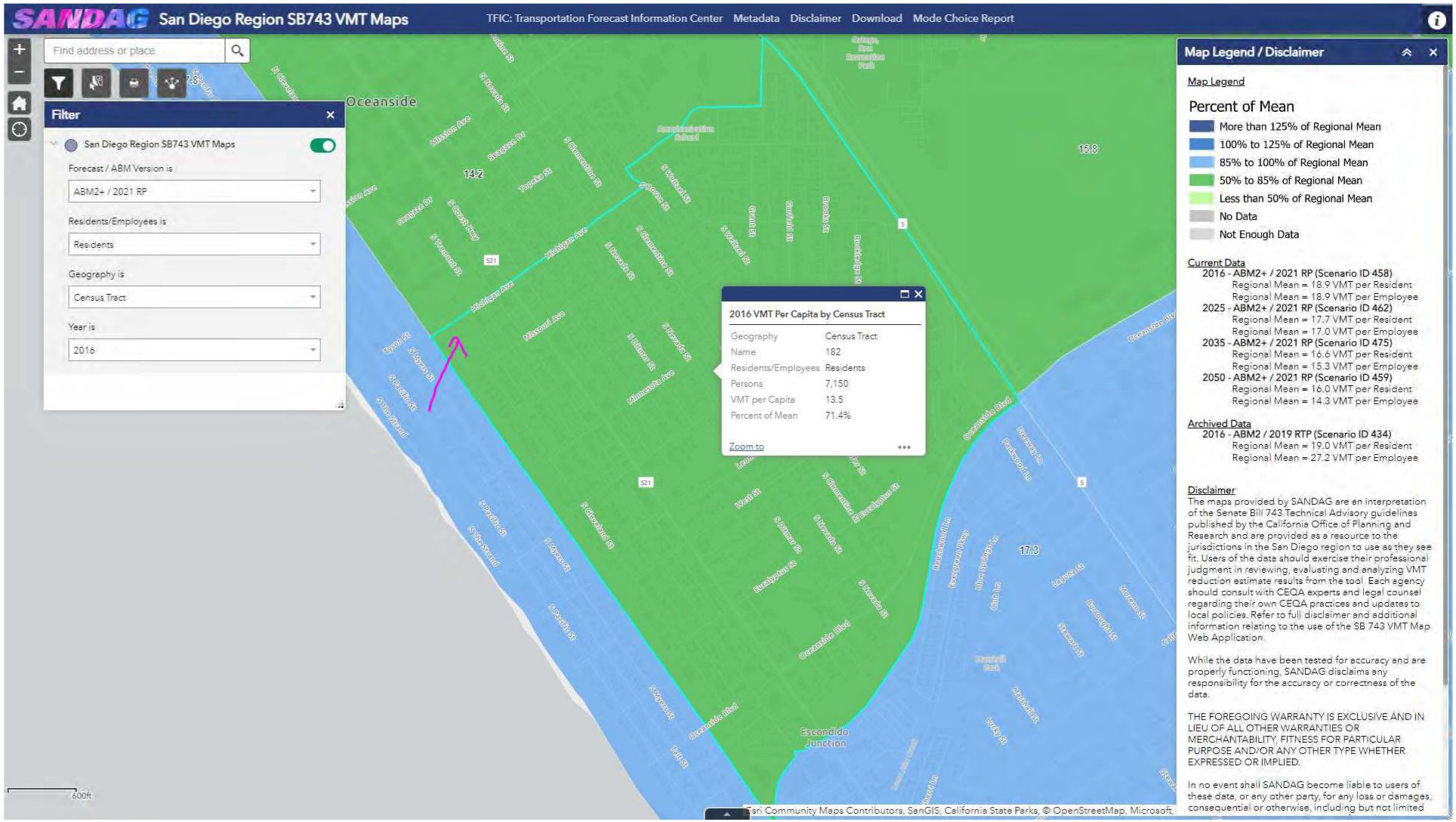


Figure 2. SANDAG San Diego Region SB743 VMT Maps with Census Tract #183 selected, where the proposed Project would be located.

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San Bernardino, CA 92402

## Robert Dmohowski

**From:** Patrick Papacek <ppapacek@yahoo.com>
**Sent:** Monday, February 6, 2023 8:57 PM
**To:** Robert Dmohowski
**Cc:** Eric Joyce
**Subject:** Comments on Transit Center Redevelopment EIR

**Warning: External Source**

Mr Dmohowski,

My name is Patrick Papacek and my wife Amy and I reside at 438 South Cleveland #7.

After attending the meeting last Wednesday and review the presentation, I would like to add public comments to the record pertaining to the Transit Center Redevelopment.

First of all the Development seems to be 95% Apartments and Hotel space and 5% Transit oriented. The presentation even highlighted that the ticketing area was just a small portion next to the train tracks.

Secondly, the Bus stalls are too close to Missouri and should be moved north to minimize pollution and noise to the homes on Cleveland Street to the south. The busses will also bring additional foot-traffic right on top of the existing homes on Cleveland vs keeping the traffic nearer to Mission and many of the people who currently utilize their services.

There should be more and/or improved coastal access under the train tracks similar to the beautiful ramp access north of Mission on Pierview. The current tunnel is small, dark, with narrow ramps. Having better access at this location will also reduce traffic into the neighborhoods to the south.

There are far too many apartments (500+!) This will just increase congestion. The streets around the existing Pierside apartments are crowded, noisy with continual traffic. We do not want to see that level of traffic spilling into the neighborhoods to the south.

There should be a percentage of owner-occupied units. We need home ownership not more apartments and short-term rentals, or Airbnb's.

This is an obvious apartment development project vs transit center development. I see little that is 'transit oriented' or even in the way of 'public space' improvements. The end result seems that it would only bring in more congestion pollution by bringing busses closer to existing homes. It seems as if this is project designed to maximize the profits of Toll Brothers vs enhancing Oceanside and I believe it is the responsibility of you and the city planners to do what is best for the City, and if that means trimming the profits of a developer then that is what needs to be done.

Finally, and this may seem a small point but there are two huge trees on Tremont street. Each must be over 100 years old. It is also imperative that these are not cut down.

Respectfully
Patrick Papacek

**Robert Dmohowski**

**From:** mike_bullock@earthlink.net
**Sent:** Wednesday, February 8, 2023 5:24 PM
**To:** 'Chris Orlando'; 'Michael Winter'; Russ Cunningham; Robert Dmohowski; 'Tracey Foster'; 'Lillian Doherty'
**Cc:** 'Matthew Tucker'; 'OTC Community Outreach'; becollins92@gmail.com
**Subject:** RE: 2/1/23 OTC Scoping Meeting - Follow Up

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

**Categories:** Red Category

**Warning: External Source**

Mr. Orlando,

At the Zoom meeting, with the Bicycle-Pedestrian Committee, NCTD, and Toll Brothers, it appeared that you were responding to the parking comments. Therefore, I assume you know the answer to my questions about the OTC parking. (However, if anyone else knows, please respond. Maybe I am the only one who *doesn't* know the answers. I am sure Mr. Winter knows the answers.)

1. How many parking spaces are in the North Building of the Apartments?
2. The South Building of the Apartments?
3. The Hotel?
4. The office? (I think zero.)
5. The existing parking garage?
6. The new parking garage?
7. Out of all of these spaces, how many parking spaces are underground?

As a reminder, from Mr. Dmohowski's email, the

says this:

> ***Consistency with the CAP Checklist also assumes that a project will comply with the following requirements for new development:***

***3050 Transportation Demand Management – New non-residential development and additions to existing non-residential development that generate more than 50 daily employee trips must prepare and implement a transportation demand management (TDM) plan that results in a minimum alternative employee commute share of 20 percent.***

That may be difficult, with "free" parking. Given our "Code Red Climate Emergency" (quote from the Secretary General of the UN), we need to stop being unfair to those that might like to drive less because doing so will reduce driving. Also, Appendix E of CARB's recently released Scoping Plan (how to achieve the State's Climate Mandates) calls for the pricing of parking. However, we can never take money away from workers. However, if a worker drives every day, their Charge (per pay period) is going to be larger than their Earnings. Therefore, there will need to be an amount called an "Add in" provided so that the sum of the three variables is zero. The car parking system being proposed by the Bicycle-Pedestrian Committee does this.

Regards to all,

Mike

---

**From:** OTC Community Outreach <outreach@osidetransit.com>
**Sent:** Tuesday, February 7, 2023 1:18 PM
**To:** OTC Community Outreach <outreach@osidetransit.com>
**Subject:** 2/1/23 OTC Scoping Meeting - Follow Up

Hello Everyone,

Thank you for attending last week's CEQA Scoping Meeting for the proposed redevelopment of the Oceanside Transit Center. We appreciate you taking the time to attend and share your thoughtful comments.

If you are interested in submitting a public comment related to the Environmental Impact Report (EIR), the deadline to do so is February 13 at 5pm. You can find more details and contact information on our website: www.osidetransit.com/outreach. We have also posted the presentation slides.

Coming up, we will be launching a series of thematic meetings on February 22. The first theme is Transit and Mobility. It will be conducted in two parts. Please visit our website www.osidetransit.com for more information and for upcoming meeting details.

If you would like to set up an individual or small group meeting, please do not hesitate to reach out to me.

Thank you again!

Arlene
OTC Community Outreach

# Oceanside Transit Center Redevelopment EIR

## PUBLIC SCOPING MEETING
## COMMENT FORM

**NAME AND ADDRESS OF COMMENTOR:** (include group or public agency affiliation, as applicable)

Mike Bullock
1800 Bayberry Drive
Oceanside, CA 92054
mike_bullock@earthlink.net

**COMMENTS:**

Please provide your comments on potential environmental issues/impacts that you feel should be addressed as part of the EIR. Attach additional pieces of paper, as needed.

This form and/or additional comments can be submitted to City staff at the Scoping Meeting or mailed to the City of Oceanside, 300 N. Coast Hwy, Oceanside, California 92054, Attention: Mr. Rob Dmohowski. Comments may also be e-mailed to: rdmohowski@oceansideca.org. Please note that comments are due on February 13, 2023.

The ~~Env~~ Impact that must be in ~~scope~~ scope is climate destabilization. ~~Climate~~ Human survival requires climate stabilization.

The current practice of "free parking" does not conform to Appendix F of CARB's Scoping Plan which says that priced parking is needed to achieve the state mandate for 2030 emissions, which is not enough to stabilize the climate at a livable level.

**From:** mike_bullock@earthlink.net <mike_bullock@earthlink.net>
**Sent:** Monday, February 13, 2023 4:50 PM
**To:** Robert Dmohowski <RDmohowski@oceansideca.org>
**Cc:** Russ Cunningham <RCunningham@oceansideca.org>
**Subject:** [content bypassed security scans] Scoping the EIR for the OTC Redevelopment Project

**Warning: External Source**

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Mr. Rob Dmohowski, AICP, Principal
Planner
City Oceanside
300 N. Coast Highway
Oceanside, CA 92054
rdmohowski@oceansideca.org

Via E-mail: rdmohowski@oceansideca.org

Subject: Scoping the EIR for the OTC Redevelopment Project

Dear Mr. Dmohowski,

I appreciate the opportunity to comment on the subject and the *Notice of Preparation* that was provided.

Please find attached my comment letter. It is the first attached file.

I have also attached all 10 of the letter's references. They are in order and named to show their reference number.

Thank you for your leadership in performing your critical work. Thank you for reading this material and for providing the comments and response. Please let me know if you would like to meet to discuss this letter or related topics.

**Highest regards,**

Mike Bullock
1800 Bayberry Drive
Oceanside, CA 92054
760 421 9482

Former California Democratic Party Delegate, 76th Assembly District (author of 2 adopted resolutions and 5 Platform changes)
Former Elected (now Associate) Member of the San Diego County Democratic Party Central Committee (author of 5 adopted resolutions)

Final title before leaving Aerospace: ***Senior Staff Systems Engineer***

Air and Waste Management Association published and presented papers:
Author, ***The Development of California Light-Duty Vehicle (LDV) Requirements to Support Climate Stabilization: Fleet-Emission Rates & Per-Capita Driving***
Author, ***A Climate-Killing Regional Transportation Plan Winds Up in Court: Background and Remedies***
Co-author, ***A Plan to Efficiently and Conveniently Unbundle Car Parking Cost***

Quotes from the Secretary General of the UN:

1.) We have a Code Red Climate Emergency
2.) We are solidly on a path to an unlivable planet
3.) We are driving towards Climate Hell with our foot on the accelerator.
4.) We are dangerously close to the point of no return.

**Mike Bullock**
**1800 Bayberry Drive**
**Oceanside, CA 92054**

Feb. 13, 2023

Mr. Rob Dmohowski, AICP,
Principal Planner
City Oceanside
300 N. Coast Highway
Oceanside, CA 92054
rdmohowski@oceansideca.org

Via E-mail: rdmohowski@oceansideca.org

Subject: Scoping the EIR for the OTC Redevelopment

Dear Mr. Dmohowski,

## Introductory Comments

I appreciate the opportunity to comment on this important project. This Transit Oriented Development (TOD) will be a significant improvement in our city of Oceanside. I feel it will be even better if the changes requested in the Oceanside Bicycle Pedestrian letters are made. More than a significant improvement, it will be a jewel in our downtown.

If the OTC gets the car parking management right, it will be much more than what I have described above. Oceanside and the OTC will literally change the world. The world needs to see that the US is going to take meaningful actions regarding its over reliance on cars, given humanity's Code Red Climate Emergency. This project could start that process. Better systems catch on. They are emulated. The world needs the OTC to implement car parking systems that will quickly become widely used.

## Comments on the Subject (NOP) Letter

### Project Description

These "topical areas" are identified in the letter in this sentence:

> *These 17 topical areas are aesthetics, air quality, biological resources, cultural resources, energy, geology and soils, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, land use and planning, noise, population and housing, public services, recreation, transportation, tribal cultural resources, and utilities and service systems.*

Energy and GHG emissions are closely tied together. A detailed description of those topical areas would show that their derivative impacts overwhelm the other topical areas on the list. Our GHG emissions have put us on a path to extinction. What does that do to the other topical areas? For example, how does mass starvation impact “recreation”, or even “biological resources”?

The elephant in the room is that GHG emissions have put the Earth’s atmospheric CO2_e at an outrageously high and extremely dangerous level.

Regardless, this commitment is then made:

> *These impacts will be analyzed in detail in the EIR. The EIR will also address mandatory findings of significance. The EIR will address the short- and long-term effects of the proposed project on the environment. Feasible mitigation measures will be proposed for impacts that are determined to be potentially significant and reasonable alternatives will be considered.*

Analyzing *greenhouse gas emissions* in detail means what? The phrase “potentially significant” should not be applied to GHG emissions, given our climate change predicament. Here is what the Secretary General says about “greenhouse gas emissions”:

1.) We have a Code Red Climate Emergency.
2.) We are solidly on a path to an unlivable planet.
3.) We are driving towards Climate Hell with our foot on the accelerator.
4.) We are dangerously close to the point of no return.

How could GHG emissions NOT be significant? Do the practices planned for the OTC conform to what will be needed to stabilize the climate at a livable level? The above statements from the NOP letter covers up the physical reality of our climate crisis.

It says, “*Feasible mitigation measures will be proposed for impacts that are determined to be potentially significant and reasonable alternatives will be considered*”. What will the feasible mitigation measures accomplish? Will they conform to a plan to achieve climate stabilization at a livable level, something we desperately need to do? Or will the topic of climate stabilization be ignored?

**The Environmental Impact of Climate Destabilization Must be Described in Detail, Instead of the “GHG Emissions”, Which on Its Face, Sounds Harmless**

Many readers will see GHG on a list with other items, such as aesthetics, air quality, biological resources, cultural resources, geology and soils, hazards and hazardous materials, hydrology and water quality, land use and planning, noise, population and housing, public services, recreation, transportation, tribal cultural resources, and utilities and service systems. They will be reassured that GHG is no more important than these items and they have nothing to worry about. They will conclude that the very few

citizens that seem to be worried (worked up) about GHG are that way because they have been misled by alarmists. Nothing could be further from the truth. This is not Toll Brothers fault. This is the fault of our political institutions.

This promise was made:

*these impacts will be analyzed in detail in the EIR.*

To do that, the following information must be included.

**Critical Background Information for the EIR Analyzing GHG**

Readers need to understand how much trouble we are in and how we got where we are.

The parameters of humanity's Code Red Climate Emergency need to be explained. Therefore, at the front of any EIR, the information shown in Figures 1 through 3 should be included and explained.

Figure 1 shows the rise of the world's atmospheric CO2 over the last 50 years.

Figure 2 shows both the

- atmospheric temperature (averaged over a year and averaged over the earth, derived from an isotope analysis) and
- atmospheric CO2 (from air bubbles in ice-core samples),

over 800,000 years. It should be noted that our species is thought to be only around 300,000 years old. The Red line is the temperature, and the Blue Line is the atmospheric CO2, in the units of parts per million, ppm.

Figure 2 shows that when climate deniers say that our Earth's climate is always changing, and so therefore climate change is natural, they are correct, except for one important fact. There is nothing natural about the outrageous, recent run-up of atmospheric CO2, to over 420 ppm, in such a short time, shown on the far-right side of Figure 2. The slope is so steep that it appears to be an instantaneous spike, on the far-right side of Figure 2.

Figure 3 shows just 1% (which is 1,000 years) of the distance on Figure 2, from current time to the first 100,000 years into the past. For Figure 3, the color conventions are switched, from what they are in Figure 2. The red line is the earth's atmospheric CO2 and temperature is the blue line. Figure 3 shows that the CO2 spike is the result of our combustion of fossil fuels, because its beginning coincides with the start of our industrial revolution. Figure 3 covers the time of the development of our civilization. It shows that temperature and atmospheric CO2 were normal, until about 150 years ago, which is the start of our industrial revolution, when we started to burn fossil fuels. By doing extensive calculations, we know how much CO2 we have produced from the combustion of fossil fuels. Then, by directly measuring the atmospheric CO2 and the acidity of the oceans, we know where that CO2 currently resides. We also know that atmospheric CO2 traps heat. There is no doubt that we have an Anthropogenic Global Warming (AGW) catastrophe in the making. We are living in a spike of CO2. Neither the magnitude

(around 420 ppm) nor the slope (around 3 ppm per year) have occurred in millions of years. Achieving climate-stabilizing requirements ("targets") is our only hope.

**Figure 2 Atmospheric CO2, Increasing Over Recent Decades**

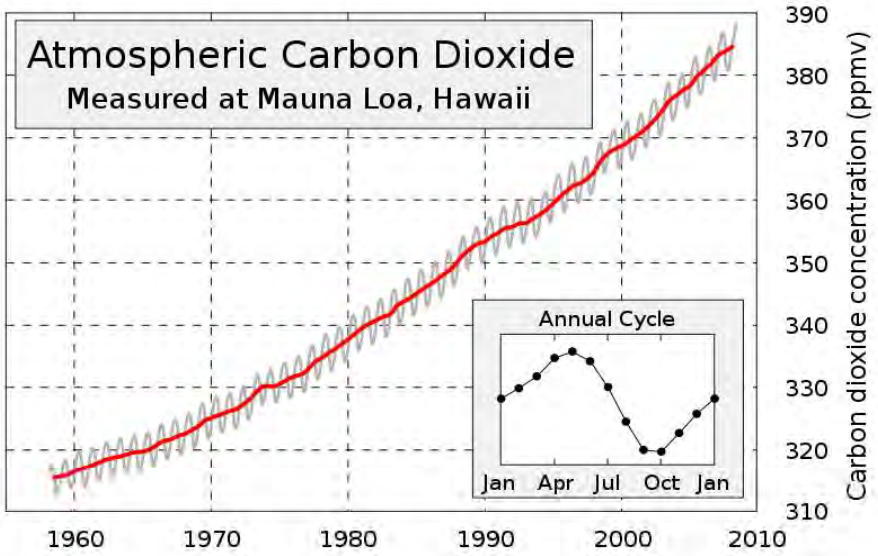



**Figure 3 Atmospheric CO2 and Mean Temperature, from 800,000 Years Ago, with Current CO2 Spike**

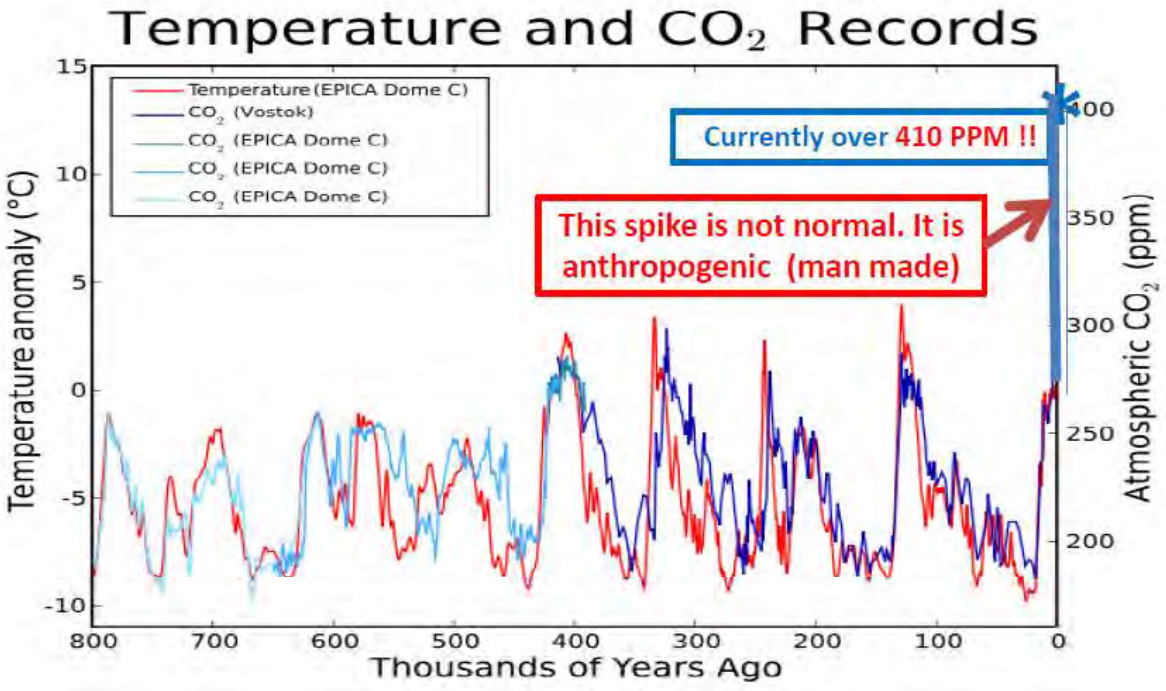
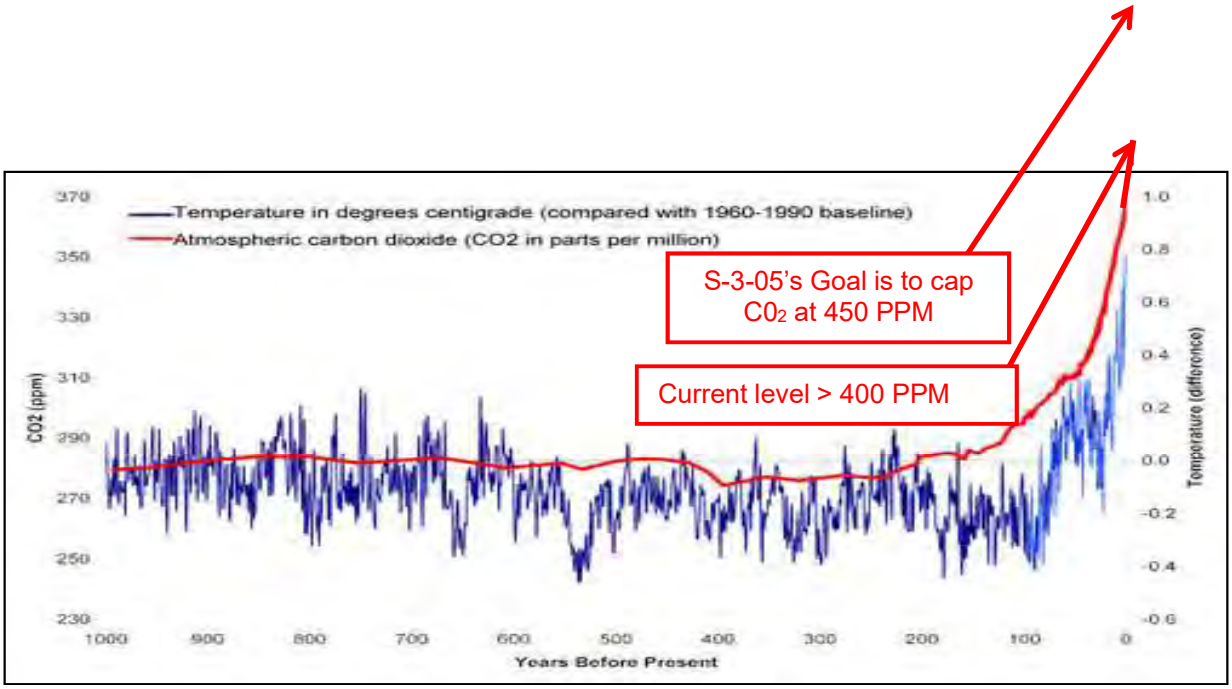


**Figure 4** **Atmospheric CO2 and Mean Temperature, Over the Last 1,000 Years**




It should also be clearly stated that cars and light-duty trucks (Light-Duty Vehicles, or LDVs), by far, emit more GHG than any other category of emission. Electricity emits the 2nd most. However, there is a good chance that California can achieve the 2030 climate-stabilization requirement that is derived below (80% below our 1990 value), for the category of electricity. By approximating the renewable content of our electricity as zero, in 1990, the 2030 climate-stabilization requirement for electricity is to have its renewable content be 80%. Many cities in California have stated in their Climate Action Plans (CAPs) that their electricity will be 100% renewable by 2035. Unfortunately, such optimism cannot be expressed for LDVs. Our only hope is the implementation of a plan, containing enforceable mitigation measures, that will, taken together, do these two things, in sufficient magnitude:

- cause the cars on the road in 2030 to be more efficient and
- reduce our per-capita driving (VMT).

Such a plan will be identified below, as part of the required discussion of climate stabilization.

With that background provided, the EIR's scope must include a discussion of climate stabilization, as follows.

**Climate Stabilization/Destabilization**

Climate stabilization at a livable level is the avoidance of climate destabilization. Human survival requires climate stabilization. Given this fact, climate stabilization is an overwhelmingly important topic.

Destabilization occurs when the magnitude of at least one destabilizing climate process gets high enough that it greatly exceeds our GHG emission reductions, such that even net zero will not be enough. Its positive feedback will cause the process to accelerate out of control, resulting in an atmospheric level of GHG well beyond what would destroy the habitat of living plants and animals, except perhaps various forms of microbiology. As a 1st example, warming melts the permafrost, emitting methane (CH4), which is a very powerful GHG. It is well known that the amount of methane under the permafrost is enough to destroy our habitat, several times over. As a 2nd example, warming burns our Sierra Nevada, Amazon, and other forests, putting CO2 in the atmosphere, with that CO2 causing more warming and more forest burning. As a 3rd example, as our oceans warm, they will have less ability to have CO2 dissolved, known as acidification. If our oceans warm enough to start to give up their CO2 (less acidification), that CO2 in our atmosphere will cause warming, which warms the oceans, causing more CO2 to go out of solution. As another ominous problem, we are losing ice. Trapped heat warms the atmosphere (this what we track and call "warming"), warms the oceans, and melts ice. The heat used to melt ice does not warm the atmosphere and it does not warm the oceans. However, there is a downside to this advantage of ice melting, thereby removing some of the trapped heat. It is that we lose the ice that we melt. Ice reflects sunlight and that sunlight is not diverted by GHG. Therefore, it is harmful to lose ice because that reflection is help us. Also, less ice means less ice will be melted and so the calories being used to melt ice will instead warm our atmosphere and our oceans. If we keep our atmospheric levels of CO2 high, we will eventually run out of ice.

There are many ways the climate change catastrophe may unfold. Our job is to try to take actions that are sufficient to prevent the catastrophe from getting beyond our control.

In 2011, California's Attorney General sent a comment letter to SANDAG regarding its Draft Regional Transportation Plan. In the letter she stated that *climate stabilization is the objective that is relative under CEQA*. This is shown in Footnote 21 at the bottom of Page 8 of Reference 1, the 2nd attached file in the email containing this letter. Therefore, the topic of climate stabilization/destabilization must be fully covered in any legal and legitimate EIR for a project that has an impact on GHG emissions. That includes an honest, no "rose-colored-glasses" allowed, and complete description of climate destabilization. Such a description must include phrases such as "a devastating collapse of the human population" (from Scientific American), "mass starvation" (this would be caused by destroying our planet's human habitat), "loss of most life forms on the planet except perhaps considering microbiology" (climate destabilization may not sterilize the planet), and so on.

An Environmental Impact Report must report on environmental impacts in a complete and honest way, regardless of how grim that message might be. Climate destabilization will be very difficult to avoid. We are "solidly on a path" as the Secretary General has stated. The practices of the OTC will either be part of a solution, or they will be part of the impending failure.

The legal principal of “cumulative effects” is important. What if all developments with parking operated that parking the same way the OTC will operate its parking?

The practices used in the OTC, which will take infrastructure and written understandings, must be the practices needed to achieve climate stabilization, unless Oceanside wants to admit in the EIR that it is contributing to climate destabilization, which must be fully defined and described. Since Light Duty Vehicles (LDVs) are the category of GHG emission that emits the most, the EIR must also evaluate the driving reductions achieved from its enforceable mitigation measures and practices.

**Mitigation Measures Necessary to Achieve Climate Stabilization**

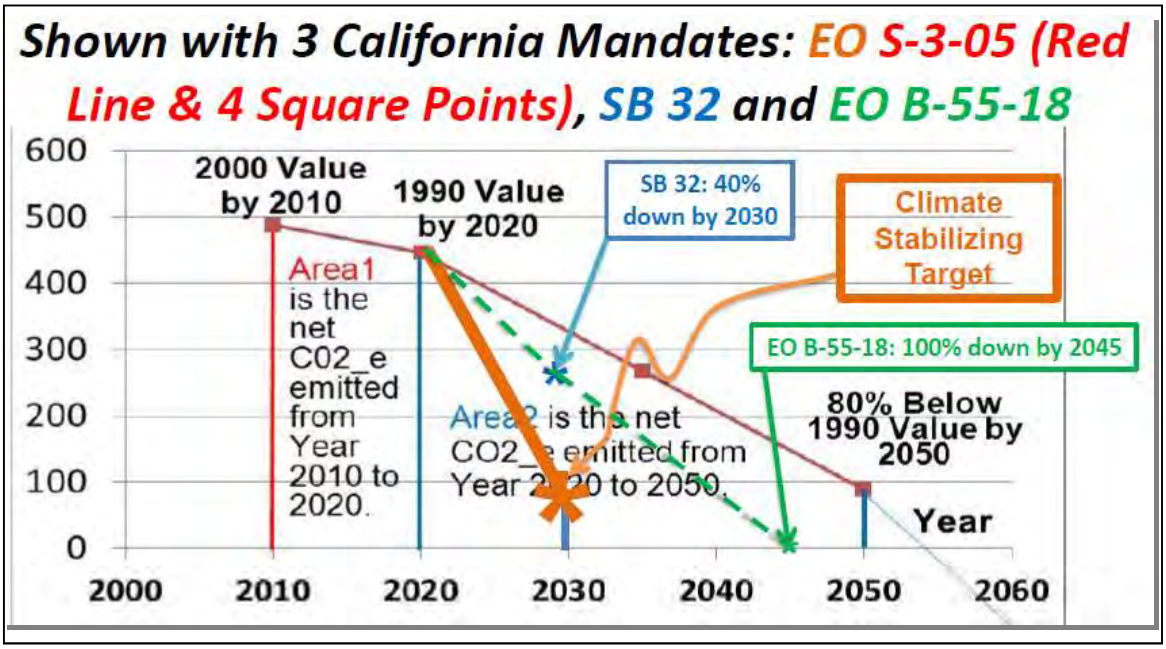
CARB’s 2022 Scoping Plan is about achieving California’s Climate Mandates The first-occurring California Climate Mandate is to emit at no more than 40% below our 1990 GHG emission value, by 2030. This falls significantly below the science-based 2030 climate-stabilization requirement that can be derived from an unambiguous statement by James Hansen, as follows.

The Reference 2 (the 3rd attached file in the email with this letter as the 1st attached file) statement on Page 14 is that the required rate of reduction, if commenced in 2020, would be 15%. That rate means that the factor of 0.85 must be achieved, year after year. If done for 10 years, the factor would be $(0.85)^{10} = 0.2$, by 2030. This reduction of 80% down from the 2020 value matches the 2050 target requirement of Executive Order S-3-5, which is 80% below the 1990 value. According to S-3-05, the 2020 emission value should be the same as the 1990 emission value. The S-3-05 emission of 2050 was designed to support capping atmospheric CO2 at 450 PPM. “Capping” means that the sum of all emissions (anthropogenic and natural) equals the sum of all sequestration (mostly photosynthesis.) Therefore, the Reference 2 statement author (Dr. James Hansen) wanted the world to achieve the third target of S-3-05, to get the atmospheric CO2 to stop going up, 20 years sooner (2030 instead of 2050) than what S-3-05 was written to achieve. Part of the problem with S-3-05 is that it was written in 2005 and humanity has not reduced their emissions as much as was hoped and we have learned more about our climate predicament.

To put this in focus, it is helpful to view the 2030 climate stabilization requirement against our state climate mandates. This is shown in Figure 4.

The California climate mandate for 2030 is only 40 percent below the 1990 value. However, Reference 3, the CARB Scoping Plan, which is the 4th attached file, makes it clear that significant driving reductions are needed to achieve the 40% reduction value, because we cannot possibly phase out the internal combustion engine LDVs fast enough. For example, on Page 100 of Reference 3, it says we must reduce VMT. On Page 117 of Reference 3, it says that we are failing, and we must therefore “double down” on our VMT reduction.

**Figure 4 The 2030 Climate Stabilization Target Compared to State Mandates**




Page 192 of Reference 3 says, “VMT reductions will play an indispensable role in reducing overall transportation energy demand and achieving the state’s climate, air quality, and equity goals.”

Page 194 of Reference 3 says, “The pace of change to reduce VMT must be accelerated.”

Page 192 of Reference 3 says, “Appendix E (Sustainable and Equitable Communities) elaborates on reasons for reducing VMT and identifies a series of policies that, if implemented by various responsible authorities, could help to achieve the recommended VMT reduction trajectory included in this Scoping Plan (and related mode share increases for transit and active transportation).”

The 5th attached file in the email with this letter is Appendix E of the 2022 Scoping Plan. It is Reference 4 for this email.

On Page 4 of Reference 4 the truth is stated about our need to reduce VMT:

> ***2.1 Zero-emission vehicles are not enough to solve the climate crisis.***
>
> *Contrary to popular belief, zero-emission vehicles (ZEV) alone are not enough to solve the climate crisis. The 2022 Scoping Plan illustrates that despite cleaner vehicles and low-carbon fuels, the path to carbon neutrality by 2045 also depends on reducing per capita VMT (the total passenger vehicle miles driven by an average person in California on any given day). To meet the carbon neutrality goal, the Scoping Plan proposes reducing VMT from 24.6 miles per day in 2019*

*to 18.4 miles by 2030 (a 25 percent reduction) and to 17.2 miles per day by 2045 (a 30 percent reduction).*

Note the large per-capita driving reduction that is needed by 2030, just to achieve the 2030 State Mandate, which is only half or what is needed, according to Dr. James Hansen, who wants to avoid climate catastrophe.

On its Page 16, Reference 4 advocates for "parking fees."

On its Page 18, Reference 4 states that "free parking" incentivizes driving alone; and that for the State to meet its climate goals, parking cash-out is needed. Also, that a state action is to end its subsidies to car parking for its 200,000 employees. Would the NCTD do the same for its employees? This letter shows a painless way to make that happen. Painless in the sense that even employees that drive everyday will not lose any money.

In Reference 4, on Page 27, the Scoping plan says the State should take this action, with reasons then added, as follows:

*Reduce or eliminate parking requirements (and/or enact parking maximums, as appropriate) and promote redevelopment of excess parking, especially in infill locations. Building parking for infill development makes construction costs more prohibitive, considering parking can cost up to $100,000 per stall, which takes away both physical space and budget from the construction of housing and other needed services and amenities.*

Reference 5 is Appendix D of the CARB Scoping Plan. It is the 6th attached file in the email with this letter. It has a focus on local actions.

From Page 9 of Reference 5:

*Local jurisdictions should focus on these three priority areas when preparing a CEQA-qualified CAP:*

- *Transportation electrification*
- *VMT reduction*
- *Building decarbonization*

*By prioritizing climate action in these three priority areas, local governments can address the largest sources of GHGs within their jurisdiction.*

Table 1 of Reference 5 says, "pricing parking" is a priority GHG Reduction Strategy.

Table 3 of Reference 5 says, "For multifamily residential development, requiring parking costs to be unbundled from costs to rent or own a residential unit" is a key project attribute that reduces GHG.

Footnote 54 of Reference 5 states that, "AB 2097, adopted by the Legislature and signed by the Governor in September 2022 eliminates parking requirements for residential and commercial development within a half-mile of transit". I point this out without comment as to whether less parking could be provided.

However, here is an official policy of the Sierra Club showing that they want parking at train stations to be minimal, full-priced, and open to all drivers ("public"):

*Rail systems are most effective in stimulating compact development patterns, increasing public transit patronage, and reducing motor vehicle use. Station access should be provided by foot, bicycle, and public transit, with minimal, but full-priced, public parking. Accommodation of pedestrians, bicycles and public transit should be given priority over private automobiles.*

The conclusion is that the practices of the OTC development must at least match the recommendations of References 2, 3, and 4 because they only about State Mandates, which are easier than the climate stabilization requirement of 80% below our 1990 level by 2030. (Note: the 2030 requirement explains why all the COP 25, 26, 27, etc. meetings are trying to get larger commitments from member countries, for the year of 2030. It also explains the UN Secretary's comments shown above.)

Reference 6 is a peer reviewed (by the AWMA, multiple times) report showing how cars can meet the industrialized world's 2030 climate-stabilizing requirement, as derived from Dr. Hansen's statement (80% below the 1990 value by 2030.) Its Table 11 shows the measures needed to get the necessary VMT reductions. Its 3rd most important measure is to have "Value-Priced Parking (Unbundle the Cost)". This must be widely implemented, by 2030. For convenience the Table is shown here at Table 1. We need to have a vendor who is skilled at car-parking policy, as defined in Reference 7 and 8 (the 8th and 9th attached file, respectively, in the email containing this letter.) Reference 9, the 10th attached file in the email containing this letter, shows that the CEO of ACE parking would like ACE Parking to be the car parking vendor that designs, implements, and operates, in accordance with an agreed-upon contract or understanding, automated, value-priced car parking systems that will increase fairness and decrease the choice to drive.

## Car Parking Systems for the 5 Parking Facilities

Figure 5 was provided by the NCTD and/or Toll Brothers. The dark circles show the garage entry points. This shows that the hotel will have its own parking, for its guests, their visitors, and the employees. Likewise, for both the North and the South buildings of the apartments. The existing garage, shown in the northwest (lower left hand) corner of Figure 5, has 450 spaces. The sum of all new spaces is 1,800 spaces. It is assumed, for discussion, that the hotel, with 547 units has 750 spaces and the hotel, with 141 rooms, has 150 spaces. Therefore, the hotel and the apartments are adding 700 parking spaces. Therefore, the new parking garage would have 900 spaces.

### Apartments, Rewards-Based Unbundling

For the apartments, assigned parking should be unbundled from the rent with a "Rewards-Based Unbundling" system. Each month, the household in each unit selects the number of assigned parking spaces they want to rent, including the choice of zero parking spaces. Compared to the "bundled parking" system (often erroneously called "free parking"), rents for the living space will be significantly lower, under any system of

unbundling. Management needs to compute the monthly price for the parking with the same method (cost plus profit or as much as the market will bear, or some other method) that is used to determine the rent for the apartment.

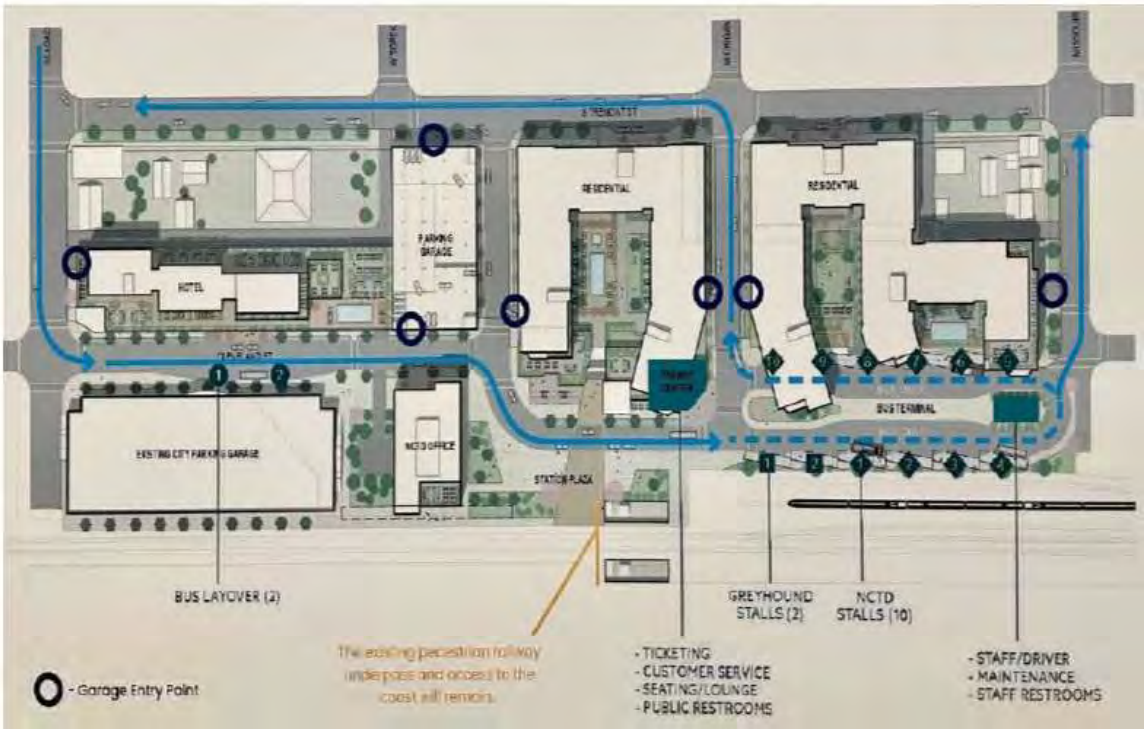
**Table 1 Enforceable Measures to Reduce 2030 Per Capita Driving By 32% With Respect to 2005 Per Capita Driving**

California designs and implements this

Local governments do this with a 3rd party vendor

| Driving-Reduction Requirments | Per-Cent Reduction | Factor |
|---|---|---|
| Legislated (SB 375) Plans to Reduce Driving | 12% | 0.88 |
| Value-Priced Road Use Charge (RUC) | 10% | 0.90 |
| Value-Priced Parking (Unbundling the Cost) | 8% | 0.92 |
| Transfer Highway Expansion Funds to Transit | 2% | 0.98 |
| Increase Height & Density by Transit Stations | 2% | 0.98 |
| "Complete Streets", "Road Diet" (walk/bike) | 1% | 0.99 |
| *Pay-to-Graduat*e Bicycle Traffic-Skills Class | 1% | 0.99 |
| Bicycle Projects to Improve Access | 1% | 0.99 |
| **Product of Factors** | | **0.68** |
| **% Reduction** | | **32%** |

**Figure 5 The Garage Entry Points**



Rewards-Based Unbundling adds complexity, compared to the standard method of unbundling the cost of the assigned parking. However, it is a critically important, driving mitigation measure. It rewards driving less. It is fully automated, meaning that the money flows out of an account depending on the data that is collected regarding the status of the parking space. Privacy must also be provided. Here is how this works.

Rewards-Based Unbundling

There are three price rates (per minute) defined. One is the "Full Price". It is computed by dividing the monthly price by the number of minutes in the month. The "Storage Price" is discounted from the Full Price. For example, it might be 30% less that the Full Price. The 3rd price rate defined is the "Vacant Price". Since the parking is assigned, it is still unavailable to other drivers, even though the assigned car is not present. Therefore, the assigned space is still being rented when the space is vacant. The Vacant Price needs to be higher than the Full Price so that the owner gets, for all the assigned car parking spaces, the Full Price. The Vacant Price can be computed from the Full Price and the Storage Price, from an assumed average fraction of time that the space is vacant, to achieve the Full Price.

Table 2 shows the variable names, the abbreviated variable names used for the algebraic derivations, the definitions, how to calculate the variable, and example values.

**Parking Assigned to a Hotel Room**

The best case is that hotel patrons arrive by transit and never use a car. Given the hotel's proximity to transit, the ocean, and downtown, many guests will not ever use a car during their stay. Complementary bicycles should be provided, as is done in many European hotels. Lists of good bike rides should be provided, including the scenic San Luis River Trail. Many visitors, especially from large American and foreign cities, will arrive on transit.

For guest that want to rent an assigned parking space, a "per day" version of the Awards-Based Unbundling system described for the hotel should be used.

**Parking Not Assigned to an Apartment or a Hotel Room**

In this discussion, "earnings" refers to the revenue collected, minus the cost of collection and distribution. That cost should be a small percent of the revenue. The vendor operating the parking should be focused on the technology available and always be improving their efficiency. Records of each parking stall's usage would be kept. There is an overall amount of earnings from various sources and there is also an earnings amount that is given to an individual. For this discussion, it is assumed that the earnings stay withing the project, meaning that they are only given to these three groups.

**Table 2 Variables, Example Values, and an Example Calculation of a "Vacant Price"**

| Variables Used to Implement a Rewards-Based Unbundling Car Parking System | | | | |
|---|---|---|---|---|
| **Name** | **Varible Name** | **Definition** | **Calculation/Determination** | **Example Value** |
| Monthly Price | $P_{month}$ | The montly price to rent an assigned parking place | Same method used to determine the appropriate rent for the living space | $300 |
| Full Price | $P_f$ | The full price to rent an assigned parking place, per minute | For a month with 30 days, divide $P_{month}$ by (30 x 24 x 60) | $0.0069 |
| Storage Discount | $d_s$ | The percent reduction from the Full Price | Provides an incentive to drive less. For a monthly cost of $300, if this is 30%, up to $90 per month could be earned, by not driving. | 30% |
| Storage Price | $P_s$ | The price to rent an assigned parking place, per minute, when the assigned car is present | This is the "Full Price" reduced by the "Storage Discount" | $0.0049 |
| Fraction Vacant | $f_v$ | A value that is used to compute the Vacant Price, so that the owner gets the full value of the parking | Fraction Vacant, either assumed or the learned average, from data collection | 0.70 |
| Vacent Price (per minute) | $P_v$ | Price to rent an assigned parking place, per minute, when the assigned car is not present, sized so the owner gets, on average, the Monthly Price | From an algebraic derivation $P_v = [ P_f - (1 - f_v) * P_s ] / f_v$ | $0.0078 |

1. Workers, that might drive to the OTC, including those that work at the hotel, the apartment, the office building, AMTRAK, the coffee shop, restaurant and so on
2. Transit riders of driving age
3. The NCTD, Oceanside, and the Toll Brothers

These three groups will be referred to as "Workers", "Riders" and "Management". How the "Management" earnings are divided up among the three entities would be up to them. How the parking earnings are divided up may be driven by Reference 10, which is the 11th attachment of the email with this letter. Reference 10 is the *Toll Brothers Agreement for the Oceanside Transit Center Redevelopment Project."*

On Page 4 of Reference 10, it calls for 560 replacement transit parking spaces.

The parking needs to be value priced with a congestion-pricing algorithms that is used as required to ensure that the desired maximum occupancy rate is never exceeded. A congestion pricing algorithm is provided in Reference 7, which is the 8th attached file in the email containing this letter.

Parking needs to be available to the public. Surfers, shoppers, diners, and others will want to use the parking. Some fraction of the parking is for the three groups identified above. There should be no limit to how much the groups should earn. If a transit rider bikes to the station and takes an all-day trip to San Diego and finds that the car parkin earnings exceeds the fare, so be it. The parking system should maximize transit ridership, not driving to the station.

It is assumed here, for discussion, that there are 300 workers that are assigned 300 equivalent spaces. Being a transit supporter, I will assign the value of 600 spaces for transit and 300 for the workers. These values will be used to compute the parking lot earnings for these two groups.

The calculations of the earnings would be independent of driving. For an individual worker their earnings would be proportional to the time they spend at work. For an individual transit rider of driving age, their earnings would be proportional to the time they spend on a round trip.

The first step in dividing up the earnings is to consider the sum of parking available to the public, riders, and workers. Based on the assumptions above, there are 450 spaces in the existing garage and 900 spaces available in the new parking garage for a total of 1350 spaces. The workers would get 300/1350 = 0.22. The riders would get 600/1350 = 0.44. Therefore, the first step would be to divide up the total earning generated by the two parking garages. The workers would get 22%, the riders would get 44%, and the “three groups” would get 34%.

We would want people to have an account for the parking (and eventually, nearly all parking) and, if they own vehicles, have the vehicles associated with the account. The person’s presence (not the car, but the person) could be automated with the use of an RFID, carried, in some fashion, by the person. Every car has a license plate that can be easily read. It a car enters that is not associated with an account (the license plate is not recognized), the license plate can be associated, in its state data file, with an address for billing. Therefore, the car owner (perhaps a surfer or a shopper) will get charged, including a processing and billing fee, since the person did not get an account. The billing letter will encourage the owner to establish an account in the car parking system. They will be told that if they happen to be a worker or a train rider, they will not get earnings until they get an account and are sent an RFID that can generate time-spent data, to be used to calculate earnings.

Workers also need to be given and “add-in” value, as described in Reference 8. This means that even if a worker drives every day, they will lose no money under this system.

## References

The referenced documents were attached to the email sent with this letter as its first attachment. They are all available from Mike Bullock at mike_bullock@earthlink.net

## In Closing

Thank you for your leadership in performing your critical work. Thank you for reading this material and for providing the comments and response as required for a comment letter on a NOP/Scoping letter. Please let me know if you would like to meet to discuss this letter or related topics.

## Highest regards,

Mike Bullock
1800 Bayberry Drive
Oceanside, CA 92054
760 421 9482

Former California Democratic Party Delegate, 76th Assembly District (author of 2 adopted resolutions and 5 Platform changes)
Former Elected (now Associate) Member of the San Diego County Democratic Party Central Committee (author of 5 adopted resolutions)

Final title before leaving Aerospace: ***Senior Staff Systems Engineer***

Air and Waste Management Association published and presented papers:
Author, ***The Development of California Light-Duty Vehicle (LDV) Requirements to Support Climate Stabilization: Fleet-Emission Rates & Per-Capita Driving***
Author, ***A Climate-Killing Regional Transportation Plan Winds Up in Court: Background and Remedies***
Co-author, ***A Plan to Efficiently and Conveniently Unbundle Car Parking Cost***

Quotes from the Secretary General of the UN:

1.) We have a Code Red Climate Emergency
2.) We are solidly on a path to an unlivable planet.
3.) We are driving towards Climate Hell with our foot on the accelerator.
4.) We are dangerously close to the point of no return.

.

**From:** mike_bullock@earthlink.net <mike_bullock@earthlink.net>
**Sent:** Monday, February 13, 2023 4:50 PM
**To:** Robert Dmohowski <RDmohowski@oceansideca.org>
**Cc:** Russ Cunningham <RCunningham@oceansideca.org>
**Subject:** [content bypassed security scans] Scoping the EIR for the OTC Redevelopment Project

**Warning: External Source**

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Mr. Rob Dmohowski, AICP, Principal
Planner
City Oceanside
300 N. Coast Highway
Oceanside, CA 92054
rdmohowski@oceansideca.org

Via E-mail: rdmohowski@oceansideca.org

Subject: Scoping the EIR for the OTC Redevelopment Project

Dear Mr. Dmohowski,

I appreciate the opportunity to comment on the subject and the *Notice of Preparation* that was provided.

Please find attached my comment letter. It is the first attached file.

I have also attached all 10 of the letter's references. They are in order and named to show their reference number.

Thank you for your leadership in performing your critical work. Thank you for reading this material and for providing the comments and response. Please let me know if you would like to meet to discuss this letter or related topics.

**Highest regards,**

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*KAMALA D. HARRIS*
*Attorney General*

*State of California*
*DEPARTMENT OF JUSTICE*

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September 16, 20I1

Honorable Jerome Stocks
Chair, Board of Directors
San Diego Association of Governments
401 B Street, Suite 700
San Diego, CA 92101

RE: **Oraft Environmental Impact Report for 2050 Regional Transportation Plan and Sustainable Communities Strategy**

Dear Chairman Stocks and Honorable Members of the Board:

Attorney General Kamala D. Harris submits the following comments on the Draft Environmental Impact Report (DEIR) prepared for the San Diego Association of Governments' (SANDAG) 2050 Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS).[1] While we recognize the difficulty of SANDAG's task- to prepare the first SCS in the State as required by SB 375[2]..:.our review of the DEIR for the RTP/SCS has revealed some significant legal problems, as set forth below. We believe that SANDAG has the ability to correct these problems and improve the RTP/SCS, which will benefit not only the San Diego region, but will help to set the standard for other Metropolitan Planning Organizations across California.

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[1] The Attorney General submits these comments pursuant to her independent power and duty to protect the environment and natural resources of the State from pollution, impairment, or destruction, and in furtherance of the public interest. (See Cal. Const., art. V, § 13; Gov. Code, §§ 12511, 12600-12612; *D'Amico v. Bd. of Medical Examiners* (1974) 11 Cal.3d I, 14-15.) This letter is not intended, and should not be construed, as an exhaustive discussion of the DEIR's compliance with the California Environmental Quality Act (CEQA).

[2] Senate Bill 375 (Chapter 728, Statutes of2008).

**Comments on the DEIR**

**Localized Air Pollution**

The SANDAG region has some of the most serious local air quality problems in the State and the nation - in substantial part caused by vehicle emissions. The harm from these pollutants is not necessarily distributed equally throughout the region, but may be more concentrated in communities immediately adjacent to large-scale industrial and commercial development and major transportation corridors, and may more particularly affect certain segments of the population. As discussed below, our review of the DEIR indicates that SANDAG has set too low a bar for determining whether the air quality impacts of its RTP/SCS are significant, and, further, has failed to analyze the impacts of projected increases in pollution on communities that are sensitive or already overburdened with pollution, in violation of CEQA.

Background: PoHutants of Concern in the San Diego Air Basin

It is well established that "[t]he significance of an activity depends upon the setting." *(Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 718 [citing Cal. Code Regs., tit. 14, § 15064, subd. (b)]; see also *id.* at 721.) Accordingly, the significance of any added pollutant emissions must be judged in the context of an air basin that already exceeds health-based federal air quality standards. (See *ibid.)* The San Diego area was ranked by the American Lung Association this year as having the seventh worst ozone problem, and the fifteenth worst particulate pollution problem, in the nation.[3] Pollutants of concern in the San Diego air basin include ozone, the chemical commonly called "smog," which may permanently decrease lung furiction;[4] and particulate matter, which impairs lung function and can exacerbate asthma. Small particulate matter (2.5 microns in size or less), a component of diesel exhaust, is of particular concern, because it can penetrate deeply into the lungs, bypassing the body's defenses, and can carry carcinogens on the surface of the particles.

The seriousness of the localized air pollution problem as it exists today in the region can hardly be overstated. The area exceeded the health-based federal ozone standard on 24 days in 2009, and it exceeded the federal particulate standard on 4 days. The basin exceeded the more stringent California standard for ozone on 127 days in 2009, and the fine-particulate standard on 78 days. The area has a history of failing to meet applicable air quality objectives. The San Diego Air Pollution Control District (APCD) stated in its 2009 Regional Air Quality Strategy (RAQS) that it has not consistently met the Health and Safety Code's 5% per year ozone reduction target during any year during the 2003-2006 time period, and that the APCD expects reductions of only about 3% per year during the 2006-2009 time period. (San Diego APCD 2009-RAQS, p. 2.)

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[3] American Lung Association, *State of the Air 201I,* at pp. 11, 13.
[4] Gauderman, et al., *The Effects of Air Pollution on Lung Development from IO to I8 Years of* Age (Sept. 9, 2004) 351 The New England Journal of Medicine 1057-1068.

SANDAG's Focus on "Conformity" with the State Air PoUution Plans Fajls Adequately to Address the Region's Serious Air Quality Problems.

Where an area exceeds federal air quality standards for air pollutants, federal law allows funding of the individual transportation projects listed in an RTP only if the RTP "conforms" to a federally approved state plan to meet those federal standards. The DEIR's analysis of whether localized air pollution resulting from the RTP/SCS is significant under CEQA focuses almost exclusively on whether such conformity is achieved. There are significant problems with this limited approach, which substitutes a determination of whether certain federal laws are met for SANDAG's obligation under CEQA to conduct a thorough analysis of the actual effects on the air and on public health that will result from the addition of the many hundreds of miles of highway expansion and extensions that are in the RTP/SCS.

California's most recent federally approved plan was prepared in 2007, and therefore does not reflect current conditions. The DEIR acknowledges that the federal EPA is expected to soon reclassify the San Diego Air Basin as in "serious" nonattainment of the federal ozone standard, a designation that requires attainment of the federal standard by June of 2013. (DEIR, p. 4.3-6.) Demonstrating conformity with the 2007 plan emissions budgets does not, by itself, show that relevant health effects created by the new pollution generated by the RTP/SCS have been analyzed and disclosed, or even that the relevant federal standards will be met. Instead, EPA's reclassification of the air basin as having worse air quality, and the imposition of such a short deadline for meeting the federal. ozone standard, indicates a more serious air pollution problem that may require more stringent control measures to protect the public health.[5]

In addition, the DEIR fails to analyze whether the California standard for ozone, more stringent than the federal standard, will be met during the life of the RTP/SCS, or what the RTP/SCS's contribution to current or future violations of that standard will be. The DEIR appears to rely solely on the RAQS to meetthe state ozone standard. (See DEIR at p. 4.3-29-30.) Yet, as noted, the region has not consistently met the RAQS 5% per year ozone reduction target. The fact that U.S. EPA is expected to reclassify the Basin as in "serious" nonattainment of the less stringent federal ozone standard would indicate that the RAQS standards have not been enough to prevent deteriorating air quality. Thus, any assumption that the RAQS will consistently achieve the 5% reduction target in the future is unsupported, and any assertion that the RAQS will attain the state ozone standard at a time certain unfounded. A full analysis is

[5] Even if conformity with federal standards in state-approved plans were an appropriate benchmark for significance under CEQA, the DEIR does not contain a quantitative analysis, using the most recent available air quality measurements as the baseline, to determine whether the federal air quality standards will actually be met, and what the public health consequences would be of adding the expected pollutant load from the RTP/SCS to existing conditions. (DEIR, at p. 4.3-14.)

needed to show that the emissions caused by the RTP/SCS at different time points during its life will not contribute significantly to violations of the state ozone standard in the San Diego Air Basin.

SANDAG Has Failed Adequately to Address Impacts to Public Health and Communities Already Burdened with Pollution.

We commend SANDAG for including in its DEIR a chapter entitled "Environmental Justice." (DEIR, ch. 4.06.) That section appears to focus primarily on the RTP/SCS's effect on access to transit by traditionally underserved communities. SANDAG has, however, failed to analyze other equally, if not more, significant effects of the RTP/SCS on communities currently experiencing environmental !!]justice. The principal omission of the DEIR is the lack of any discussion of the impacts of the increased air pollution that will result from carrying out the RTP/SCS on communities already severely impacted by air pollution. As noted, CEQA requires that the significance of environmental impacts be considered in context. *(Kings County Farm Bureau, supra,* 221 Cal.App.3d at 718.) Such context may appropriately include (1) whether the region includes communities or subpopulations that may be particularly sensitive to increases in pollution; and (2) whether such communities or groups are already at or near their capacity to bear any additional pollution burden.

The DEIR does not identify whether the area affected by the RTP/SCS includes particularly sensitive communities that will be affected disproportionately by the acknowledged increase in pollution. "[A] number of studies have reported increased sensitivity to pollution, for communities with low income levels, low education levels, and other biological and social factors. This combination of multiple pollutants and increased sensitivity in these communities can result in a higher cumulative pollution impact." (Office of Environmental Health Hazard Assessment, *Cumulative Impacts: Building a Scientific Foundation* (Dec. 2010), Exec. Summary at p. ix.)[6] Research in other parts of California has shown that disadvantaged and minority communities are often exposed to unhealthful air more frequently and at higher levels than other groups.[7] Identifying these communities is an essential part of describing the relevant CEQA setting.

Once such communities are identified, SANDAG must analyze how the health of the residents in these communities would be expected to be particularly affected. As discussed, residents already are experiencing serious air pollution that is impacting health and welfare, and it is reasonable to assume that these effects currently are more concentrated in certain areas of the region, for example, in communities adjacent to large-scale industrial or commercial operations or transportation corridors used by heavy-duty trucks. In addition, viewed at the individual community scale, there may be synergistic adverse effects. For example, research

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[6] Available at http://oehha.ca.gov/ej/cipa123110.htm1.

[7] Hall and Brajer, *The Benefits of Meeting Federal Clean Air Standards in the South Coast and San Joaquin Valley Air Basins* (2008) at 22-23.

has shown that increases in greenhouse gas emissions may result in localized ozone increases; such increases have been observed in California.[8]

We believe that particulate pollution may be of special concern to already burdened communities. As discussed, diesel particulate emissions have serious health effects, since they impact respiratory function and can exacerbate asthma. Further, diesel particulates are known to the State of California to cause cancer,9 and have been listed by the Air Resources Board (ARB) as a toxic air contaminant.[10] The DEIR shows that particulate matter pollution will increase over the life of the RTP/SCS. (DEIR, Table 4.3-5, p. 4.3-25.) It also reports that the ARB estimated in 2000 - over a decade ago - that a subset of particulate pollution, fine particulates emitted by diesel vehicles, created an additional cancer risk of 720 cancer cases per one million persons exposed in the San Diego Air Basin. (DEIR, p. 4.3-8.) For comparison purposes, a private business must provide a warning if it exposes individuals to a chemical that poses an increased cancer risk often cases in one million people exposed. (Cal. Code Regs, tit. 27, § 25703(b).)

Despite this high cancer risk, and the DEIR's own recognition that particulate pollution will increase over the life of the RTP/SCS, the DEIR does not analyze what public health effects the increase in particulate matter will cause. Nor does it estimate what portion of the increase in particulate pollution will be carcip.ogenic diesel particulate matter, and disclose the public health effects that increase may cause. Such an analysis is required under CEQA, so that both the decision maker and the public can know the full consequences of the decision being made. *(Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1219-1220.) We are especially concerned that no analysis is presented either of the current risk from particulate pollution, nor of the impact of the projected increase in particulate pollution, on already overburdened or sensitive communities. Given the increase in particulate emissions shown in the DEIR, given the emphasis in the RTP/SCS on the Goods Movement Strategy for the San Diego region (RTP/SCS, Chapter 6), and given the DEIR's recognition that much of this goods movement will be accomplished by diesel trucks (DEIR, p. 4-16-8; see, also, RTP/SCS, Tech. Appdx. 4, p. 4 [estimating that roads and truckways will carry 90% by volume of goods through the region]), it is incumbent on SANDAG to fully analyze the public health consequences of the RTP/SCS in general, and of the Goods Movement Strategy, in particular.[11]

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[8] Jacobson, *Enhancement of Local Air Pollution by Urban CO2 Domes* (2010) Environ. Sci. Technol. 2497-2502. This phenomenon is of concern because, as discussed, under the RTP/SCS, vehicle miles travelled (VMT) trends up as the total number of vehicles on the road increases. (DEIR, pp. 4.12-16, 4.12-21, 4.12-24; contrast with Table TA 3.1, showing an overall decrease of 1% in VMT by 2050.) Increases in VMT cause increased emissions of greenhouse gases, which may in turn exacerbate localized pollution.

[9] Cal. Code Regs., tit. 27, § 27001.

[1] Cal. Code Regs., tit. 17, § 93000.

[11] See *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1219-1220, cited above.

The goal of an RTP/SCS is a sustainable community, and no community can be sustainable unless its public health is protected. Thus, while the inclusion of a separate chapter of the DEIR on environmental justice is commendable, the current analysis is deficient, and should be redone and expanded to disclose the full scope of the air pollution and public health consequences of the RTP/SCS, and to propose mitigation measures for those consequences that are proportional to the seriousness of the impacts. *(City of Marina v. Board of Trustees of the California State University* (2006) 39 Cal.4th 341, 361-62.) We would be happy to work with SANDAG in making this part of the DEIR more meaningful.

SANDAG Has Failed Adequately to Consider Feasible Mitigation for Localized Air Quality Impacts.

Although it finds the RTP/SCS's impacts on localized air pollution to be significant, the DEIR proposes almost no mitigation measures to reduce or offset these impacts. Instead, the DEIR states that "mitigation measures at the program level is [sic] infeasible" for ozone precursors and carbon monoxide, and defers all mitigation for these pollutants to individual project-level CEQA processes. (DEIR, pp. 4.3-46, 4.3-47, 4.3-48.) CEQA requires that project changes or mitigation either be adopted or shown through substantial evidence to be infeasible; the DEIR, however, does not make such a showing.

The DEIR offers virtually no evidence that program-level mitigation is actually infeasible, and the mitigation measures it does propose lack certainty and are incomplete. For example, compliance with future local land use plans (the scope of which is not now known) is identified as the only feasible mitigation for ozone-related impacts. (DEIR, p. 4.3-48.) Mitigation for fine particulate matter is not discussed separately from mitigation for coarse particulates, despite their different sizes, health impacts, and sources. The dust control measures in the DEIR are not shown to be effective against fine particulates, which come more from industrial processes and fuel combustion than from ground disturbance.. The DEIR's treatment of mitigation for conventional air pollution does not comply with CEQA's substantive mandate to mitigate all significant impacts. (Pub. Resources Code,§§ 21002, 2108l(a).)

It is vital for the health of the San Diego region's public that all feasible mitigation be adopted and carried out to prevent further deterioration of the already unhealthy air, and it is also vital for the region's economy. Research shows consistently that the costs of reducing pollution are far outweighed by clean-air benefits such as increased worker productivity, increased agricultural outputs, and reductions in mortality and illness that result from cleaner air.[12] The research cited above -- finding minority communities more severely affected by air pollution -- also calculated the significant costs associated with polluted air in other air basins. Costs ranged

[12] On a nationwide basis, the Office of Management and Budget has estimated that the benefits of clean air regulations outweigh the costs by a ratio of about four to one. 0MB, "Informing Regulatory Decisions: 2003 Report to Congress on the Coasts and Benefits of Federal Regulations and Unfunded Mandates on State, Local, and Tribal Entities."

from $1,250 per person per year in the South Coast Air Basin to $1,600 per person per year in the San Joaquin Valley Air Basin, due to increased health care costs and emergency room visits, missed work and school days, and even premature deaths.[13] CEQA mandates that SANDAG improve its analysis of the feasibility oflocalized air pollution mitigation, and the economic benefits of cleaner air and healthier communities must be considered in the feasibility calculus.

**Climate Change Impacts: Greenhouse Gas Emissions**

Before discussing the DEIR's treatment of GHG emissions, it is important first to establish the relevant context for evaluating significance. The climate is affected by the concentration of GHGs in the atmosphere. The concentration of carbon dioxide, the primary GHG, has increased from approximately 280 parts per million (ppm) in pre-industrial times to well over 380 ppm, according to the National Oceanic and Atmospheric Administration's (NOAA) Earth Systems Research Laboratory.[14] Almost all •of the increase is due to human activities (such as fossil fuel use).[15] The current rate of increase in carbon dioxide concentrations is about 1.9 ppm/year; present carbon dioxide concentrations are higher than any time in at least the last 650,000 years.[16] GHGs persist in the atmosphere for decades and in some cases millennia.[17]

The atmosphere and the oceans are reaching their capacity to absorb GHGs without significantly (and perhaps abruptly) changing the Earth's climate. California is already seeing the effects of climate change. As the Resources Agency observed in its 2009 report, we already are experiencing sea level rise, coastal erosion, increased average temperatures, more extreme hot days and increased heat waves, fewer shifts in the water cycle, and increases in the fre?uency and intensity of wildfires. (Resources Agency, *2009 Cliinate Adaptation Strategy* at p. 3.) [8] These effects are expected to increase with rising GHG levels in the atmosphere.

The burdens of climate change will not be shared equally. Future climate scenarios are expected to disproportionately affect, for example, the urban poor, the elderly and children, traditional societies, agricultural workers and rural populations. (Office of Environmental Health Hazard Assessment, *Indicators of Climate Change in California: Environmental Justice Impacts* (Dec. 2010) at p. 2.)[19]

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[13] Hall and Brajer, at 5.
[14] See http://www.epa.gov/climatechange/science/recentac.html.
1s *Id.*
16 *Id.*
[17] Intergovernmental Panel on Climate Change, *Frequently Asked Questions,* FAQ 10.3 (2007), available at www.ipcc.ch/pdf/assessment-report/ar4/wgl/ar4-wgl-fags.pdf.
[18] Available at http://www.cHmatechange.ca.gov/adaptation/.
[19] Available at http://oehha.ca.gov/multimedia/epic/epicl23110.html.

In order to stabilize the climate and avoid the most catastrophic outcomes of climate change, we must substantially reduce our annual GHG emissions over time, achieving a low-carbon future by midcentury. California has memorialized this overarching environmental objective in law. Under AB 32[20], by 2020, California must reduce its total statewide greenhouse gas emissions to the level they were in 1990. (Health & Saf. Code,§ 38550). To achieve AB 32's 2020 target, total statewide greenhouse gas emissions must be reduced by approximately 15 percent from current (2008) levels. AB 32 implements Executive Order S-03-05 (2005),[21] which set the statewide 2020 target as an interim step to reducing statewide emission levels, by 2050, to 80 percent below 1990 levels. "The 2020 goal was established to be an aggressive, but achievable, mid-term target, and the 2050 greenhouse gas emissions reduction goal represents the level scientists believe is necessary to reach levels that will stabilize climate." (Air Resources Board (ARB), Scoping Plan at p. 4.)2[2]

The emissions reductions required to reach our statewide climate objective are substantial. In the longer term, we must reduce our total GHG emissions by approximately four percent per year between 2020 and 2030, and our per capita emissions by slightly less than five percent per year during the 2020 to 2030 period, with continued reductions required through midcentury. (These reductions required are graphically illustrated by the chart from ARB's Scoping Plan, attached to this letter as Exhibit A.) One of the prime objectives of SB 375, a law supporting and complementary to AB 32, and of the requirement for Sustainable Communities Strategies, is to create a long-term downward trajectory for GHG emissions in California through transportation and land use strategies.

Given the seriousness of the climate change problem, and the enormity of our GHG reduction task, we are greatly concerned that, when viewed in context, the RTP/SCS seems to be setting the region on acourse that is inconsistent with the State's climate objectives. Specifically, per capita GHG emissions from cars and light-duty trucks increase as compared to the previous year after 2020 (see RTP, Table 301 at p. 3-3), while AB 32 requires that we must aggressively and steadily reduce total per capita GI-IG emissions during this time period. (See Exhibit A.) Moreover, the total number of vehicle miles travelled (VMT) driven in the San Diego region will steadily increase over the life of the RTP/SCS over the 2010 baseline by 10%, 32%, and 51% in 2020, 2035, and 2050, respectively. (DEIR, pp. 4.12-16, 4.12-21, 4.12-24;

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2[o] Cal. Health and Safety Code, § 38,500, *et seq.*

[21] The DEIR states that the Executive Order "does not constitute a 'plan' for GHG reduction, and no state plan has been adopted to achieve the 2050 goal." (DEIR, pp. 4.8-29 to 4.8-30.) The DEIR therefore does not find the RTP/SCS's failure to meet the Executive Order's goals to be a significant impact. This position fails to recognize that Executive Order S-3-05 is an official policy of the State of California, established by a gubernatorial order in 2005, and designed to meetthe environmental objective that is relevant under CEQA (climate stabilization). SANDAG thus carmot simply ignore it.

[22] Available at http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf. The Scoping Plan was readopted by ARB on August 24, 2011.

contrast with Table TA 3.1.) Under the most optimistic figures presented in the DEIR, total VMT will drop only 1% over current levels by 2050. Moreover, the DEIR predicts that the 14.33 million metric tons of greenhouse gases (expressed as MMT of carbon dioxide equivalent) emitted by cars and light duty trucks in 2010 (DEIR, p. 4.8-5) will fall to 12.04 MMT in 2020 (DEIR, p. 4.8-20), based largely on statewide tailpipe and fuel standards, but will then begin rising again, to 12.94 MMT in 2035 and 14.74 MMT in 2050. (DEIR, pp. 4.8-23, 4.8-25, respectively.) Thus, although SANDAO will meet the SB 375 goals for per capita OHO targets for cars and trucks set for it by ARB in 2020 and 2035, the DEIR shows that total OHO emissions from cars and light-duty trucks in 2050 will increase over the 2010 emissions level.

The DEIR finds the impact of the RTP/SCS on OHO emissions to be not significant in 2020 (DEIR, p. 4.8-20), significant in 2035 (DEIR, p. 4.8-23), and significant in 2050 (DEIR, p. 4.8-25). SANDAO must, however, make a determination whether the project as a whole has significant climate change impacts. We believe strongly that it does. What the DEIR shows is that the suite of strategies relied on by SANDAO, which include a heavy reliance on roadway expansion projects, does not deliver OHO reductions that are sustainable in the long term. In fact, infrastructure and land use decisions made in the early years of the RTP/SCS may lock in transportation inefficiencies and preclude any realistic possibility of meeting the Executive Order's goal of an 80% reduction in OHO emissions. The DEIR states that "[t]otal land-use based OHO emissions in 2050 are projected to be 21.85 MMT CO2e, or 50 percent greater than OHO emissions in 2010 (Table 4.8-11)," (DEIR at p. 4.8-24.) The DEIR should address the impact of the draft RTP/SCS on this important long-term policy in greater detail.

The DEIR is legally deficient for the additional reason that it does not analyze potential changes to the project design or specific mitigation measures for the OHO emissions impacts from land use; it makes only a generalized promise to prepare future RTPs "to incorporate policies and measures that lead to reduced OHO emissions." (DEIR, p. 4.8-35.) Further, the DEIR proposes some mitigation measures for OHO emissions attributable to transportation, but does not include any transportation mitigation that relates to land use, nor does it show that any such measures would be infeasible. We believe that CEQA requires much more analysis of potential mitigation measures, and that postponing this discussion and analysis until future RTP/SCS's and individual projects is a violation ofCEQA's substantive provisions. (Public Res. Code§§ 21002, 21081(a); see *Communities for a Better Environment v. City of Richmond* (2010) 184 Cal.App.4th 70, 89-96.) SANDAO has the authority to approve the RTP/SCS even if it will have substantial environmental impacts, and CEQA will not second-guess the wisdom of that choice, so long as substantial evidence supports SANDAO's findings. (Public Res. Code § 21081(b).) However, SANDAO may not approve an environmentally damaging project until and unless it has adopted all feasible mitigation measures or shown that further mitigation - including land use mitigation - is infeasible. The DEIR does not yet do so.

We recognize that this is the first SCS prepared in California, and that SANDAO is chaiting new territory·. However, the legal requirements of CEQA, including the requirement to mitigate significant impacts to the extent feasible, are not satisfied simply because the RTP/SCS meets the targets contained in SB 375 for 2020 and 2035. CEQA demands a full analysis and all

feasible mitigation of every significant impact resulting from the implementation of the RTP/SCS, throughout the full life of the Plan. The DEIR does not now provide this for GHG emissions.

**Comments on RTP/SCS**

Although we are not commenting directly onthe legal adequacy of the RTP/SCS under SB 375, we concur in the comments submitted to SANDAG by the California Office of Planning and Research (QPR). As discussed above, we are particularly concerned that per capita greenhouse gas (GHG) emissions associated with cars and light-duty trucks (and associated co-pollutants like particulate matter) begin to rise after 2020. (See QPR comment letter at pp. 3-4; Draft RTP at p. 3-3, Table 3.1; see also DEIR at Tables 4.3-5, p. 4.3-25.) As OPR notes, this "implies that future growth will be unavoidably less transportation efficient, which counters SB 375's underlying purpose." (QPR comment letter at p. 3.) If the RTP/SCS in fact runs counter to SB 375's purpose to reduce transportation-related GHG emissions over time, this would bear on whether the effects of the plan should be considered significant under CEQA.

In addition, OPR's comments discuss a failure of the DEIR and RTP/SCS to fully disclose the methodology by which VMT was projected, making it difficult or impossible for the lay public to determine for itself whether the information presented in the two documents is accurate and supported by substantial evidence. This lack of transparency is also a crucial flaw under CEQA, a statute whose purposes include accountability as to governmental decisions that affect the environment. *(Laurel Heights Improvement Ass'n v. Regents of the University of California* (1989) 47 Cal.3d 376,392 [holding that "the EIR ... is a document of accountability" forthe public officials who certify it].)

**Conclusion**

We appreciate the difficulty of preparing the first SCS in California. We believe that SANDAG has not yet prepared a DEIR on the RTP/SCS that fully satisfies CEQA's requirements, and urge SANDAG to redo several parts of the DEIR, as described in our comments herein. This RTP/SCS presents SANDAG with an opportunity to integrate transportation and land-use planning in a way that reduces GHG emissions and harmful air pollution, and that produces other benefits such as increased mobility and better public health for all the region's residents, particularly its sensitive and already overburdened communities. We

would be happy to work with SANDAG to take the additional steps needed to take full advantage of this opportunity. We appreciate your consideration of our comments.

Sincerely,

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Supervising Deputy Attorney G¥!eral

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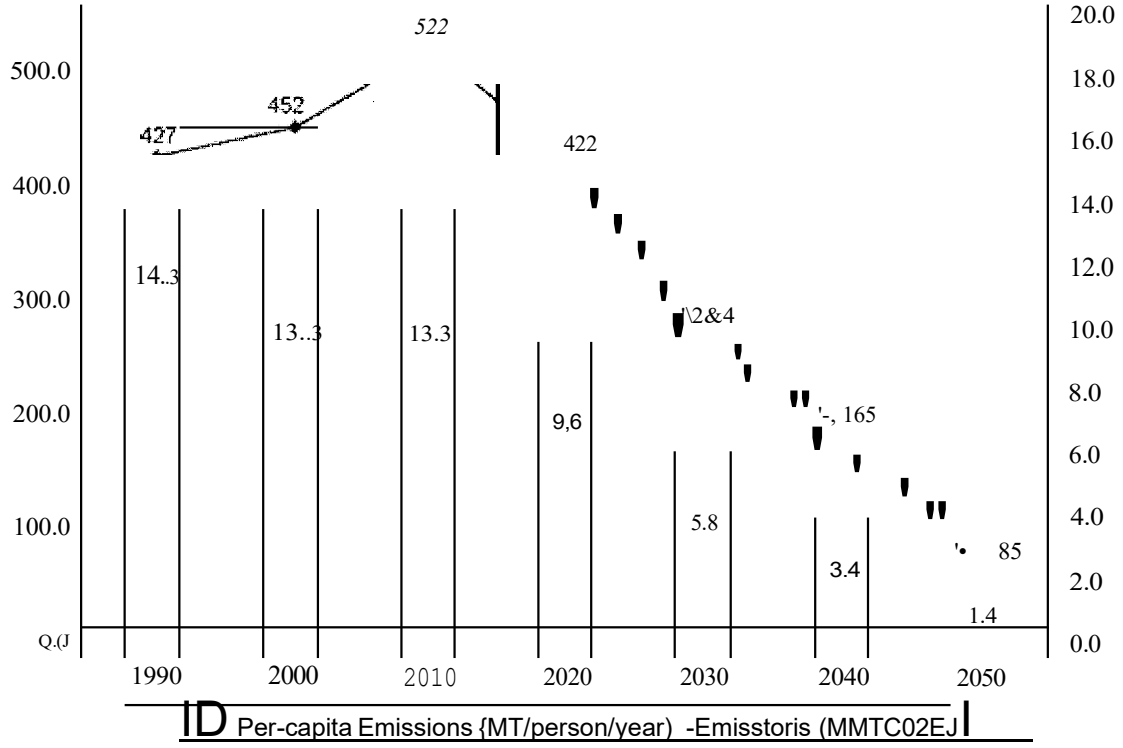
Attorney General

cc: Gary Gallegos, Executive Director, San Diego Association of Governments.
Julie D. Wiley, General Counsel, San Diego Association of Governments

Attachment

**EXHIBIT A**

## Emissions Trajectory Towards 2050




(ARB, Scoping Plan, Figure 6, at p. 118.)

# Exhibit A

# Brief of Amicus Curiae James Hansen

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SAN FRANCISCO DIVISION

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| ALEC L., *et al.*,<br><br>Plaintiffs,<br><br>vs.<br><br>LISA JACKSON, *et al.*,<br><br>Defendants. | Case No.: 4:11-cv-02203 EMC<br><br>Brief for Amicus Curiae Dr. James Hansen<br><br>(Hon. Edward M. Chen) |

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## INTEREST AND IDENTITY OF *AMICUS CURIAE* JAMES HANSEN

*Amicus Curiae* James Hansen, Ph.D., appears here in his individual capacity and not as a representative of any institution with which he is affiliated. The information and opinions in this brief are not necessarily those of any institution with which he is affiliated or those of any party to the present litigation. This brief is offered as an aid to the Court's deliberations over whether the relief sought by plaintiffs in their motion for preliminary injunction is needed to preserve a climate system that is conducive to the survival and wellbeing of our children and their progeny.

Dr. James Hansen directs the NASA Goddard Institute for Space Studies in New York City and is an Adjunct Professor of Earth Sciences at Columbia University's Earth Institute. He was trained in physics and astronomy in the space science program of Dr. James Van Allen at the University of Iowa, receiving his Ph. D. in physics in 1967. Since the mid-1970s, Dr. Hansen has focused on computer simulations and studies of the Earth's climate, for the purpose of understanding the human impact on global climate. Dr. Hansen's testimony to Congress in the 1980s helped raise broad awareness of the global warming issue. In recent years Dr. Hansen has drawn attention to the danger of passing climate tipping points, producing irreversible climate impacts that would yield a different planet from the one on which civilization developed. As part of his work in recent years, Dr. Hansen has outlined steps that are needed to stabilize climate, with a cleaner atmosphere and ocean.

Dr. Hansen was elected to the National Academy of Sciences in 1995.

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## SUMMARY OF ARGUMENT

Global warming due to emissions of greenhouse gases, mainly $CO_2$ from fossil fuel consumption, is already 0.8°C, and a similar or greater amount is "in the pipeline" without any further change of atmospheric composition. Already-observed impacts of this warming include rising sea levels, increased atmospheric moisture resulting in more intense precipitation events, higher temperatures causing more frequent and intense heat waves and droughts, loss of sea ice, ice sheet mass and glaciers, expansion of the subtropics, acidification of the oceans, shifting distributions of plant and animal species, and an increasing rate of species extinctions.

Maintaining a climate that resembles the Holocene epoch, the world of a relatively stable climate system under which civilization developed, requires rapid reduction of fossil fuel $CO_2$ emissions and reforestation. Atmospheric $CO_2$ concentrations passed the level that is estimated to be safe on the long term in, approximately, 1988; global mean temperature now exceeds the Holocene peak; and unabated fossil fuel emissions continue to drive the Earth increasingly out of energy balance. Unless action is undertaken without further delay, so as to return the atmospheric concentration of $CO_2$ to 350ppm by 2100, Earth's climate system will be pressed toward and past points of no return. Effective action remains possible, but delay in undertaking sharp reductions in emissions will undermine any realistic chance of preserving a habitable climate system -- needed by future generations no less than by prior generations.

Plaintiffs in this case seek a preliminary injunction to ensure that Defendants in this matter submit to the Court a plan to preserve the climate system, including a cap on $CO_2$ emissions at 2011 levels by 2013, and emissions reductions thereafter by a minimum of 6% annually. That prescription is consistent with scientific understanding of what is minimally needed to avert truly dangerous climate change and preserve the physical status quo of a habitable climate system. In light of the fossil fuel industry's stranglehold of Congress, the President's demonstrated disinclination to utilize his authority to act, and the fact that further delay vastly increases the risk of irretrievable damage to the climate system, action by this Court now is essential.

# ARGUMENT

## I. INTRODUCTION: THE RELEVANT STATUS QUO IS AN ATMOSPHERE THAT ENSURES A HABITABLE CLIMATE SYSTEM.

Plaintiffs and Defendants both appeal to the Court to preserve the "status quo." Pl's Mot'n for Prelim. Inj at 10; Def. Opp'n to Pl. Mot'n for Prelim. Inj. at 9. Amicus James Hansen also seeks to preserve the status quo; accordingly, this brief begins with an explanation as to what this implies for the global climate system.

Paleoclimate research conducted by Dr. Hansen and others establishes that for most of the Holocene period – the period of the most recent 10,000 years – Earth's climate, though highly variable on a regional basis, has been characterized by reasonably constant mean global temperatures. James Hansen et al., The Case for Young People and Nature: A Path to a Healthy, Natural, Prosperous Future (attached hereto as Exhibit 1) at 6.[1] This constancy enabled the Greenland and Antarctic ice sheets to remain in near mass balance, sea levels to be relatively stable, species to diversify, and civilization to develop.

Largely due to the burning of fossil fuels, the atmospheric $CO_2$ concentration has climbed sharply in recent decades – from 316ppm in 1959 to 390ppm in 2010.[2] In that period, US $CO_2$ emissions more than doubled, from 2.83 to 5.67 billion metric tons.[3] The $CO_2$ concentration is now to a level not seen on Earth for at least 3 million years. Exhibit 1 at 6. The $CO_2$ increment functions as an added blanket on the planet, reducing the amount of heat that would otherwise be re-radiated to space and throwing the planet into energy imbalance. In response, Earth has warmed by approximately 0.8°C over the last century, likely exceeding the prior Holocene peak.

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[1] *See also*, James Hansen and Makiko Sato, Paleoclimate Implications for Human-Made Climate Change 8-14 (2011).

[2] Mauna Loa $CO_2$ annual mean data from http://www.esrl.noaa.gov/gmd/ccgg/trends/.

[3] Carbon Dioxide Information Analysis Center (CDIAC), National $CO_2$ Emissions from Fossil-Fuel Burning, Cement Manufacture, and Gas Flaring: 1751-2008, http://cdiac.ornl.gov/ftp/trends/emissions/usa.dat. The text of this amicus brief here provides the data in units of $CO_2$ by utilizing the CDIAC's carbon-to-$CO_2$ conversion factor of 3.667.

*Exhibit 1* at 7-8. The already apparent impact of this warming is reviewed in the next section. Due to Earth's thermal inertia, a similar or greater amount of additional 2.0°C warming is "in the pipeline" before Earth reaches energy balance at the present level of atmospheric $CO_2$ concentration.[4]

Avoidance of climate tipping points and subsequent points of no return[5] requires effective action to return the atmospheric $CO_2$ concentration to approximately 350ppm by the end of the century. *Exhibit 1* at 8. This would allow additional heat radiation to escape to space so as to restore the planet's energy balance without additional prolonged global warming. *Id.* Such action could stabilize Earth's climate system and mitigate human suffering, but further delay may doom this prospect.

The relevant status quo with respect to the present litigation, therefore, is an atmosphere whose composition of greenhouse gases ensures a relatively stable climate system conducive to the survival and well being of humanity and nature. This requires, then, action to restore the atmospheric $CO_2$ concentration to no more than 350ppm. In that we have currently overshot this safe atmospheric concentration level, as discussed *infra*, failure to act with all deliberate speed in the face of the clear scientific evidence of the danger[6] functionally becomes a decision to eliminate the option of preserving a habitable climate system.

## II. GLOBAL WARMING HAS ALREADY REACHED THE DANGEROUS LEVEL AND, WITHOUT EFFECTIVE ACTION, WILL PRODUCE CATASTROPHIC AND IRRETRIEVABLE LOSSES.

Global climate change does not present merely "the possibility of some remote future injury." Def. Opp'n to Pl. Motion for Prelim. Inj at 9. Instead, it is a phenomenon that is already undermining human and natural systems, causing loss of life, and pressing species to extinction.

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[4] Hansen et al, Target Atmospheric $CO_2$: Where Should Humanity Aim?, hereinafter referred to as "Target $CO_2$," 225, The Open Atmospheric Science Journal (2008).

[5] *Id.*

[6] J. Hansen et al., Dangerous human-made interference with climate, Atmos. Chem. Phys., 7, 2287, 2308 (2007)

Unless arrested by effective action, climate change will produce calamitous consequences for humanity and nature alike, as tipping points are reached and points of no return are crossed.[7] Present and future impacts are addressed in turn.

(a) Present Impacts

While, as noted, global warming to date measures 0.8°C above the 1880-1920 period,[8] it has already led to a 40 percent reduction and an accelerating downward trend in summer Arctic sea ice cover, and an even faster decline in its thickness. *Exhibit 1* at 4. Continental ice sheets of Greenland and Antarctica have begun to shed ice at a rate of several hundred cubic kilometers per year. *Id.* In the past decade, sea level increased about 3cm—a rate of about one foot per century, and nearly twice as fast as the rate of increase during the preceding century.[9] This rise has resulted in losses of coastal wetland areas and greater levels of damage from coastal flooding.[10] For example, in the United States, increased sea level has led to the loss of 1900 square miles of coastal wetland in Louisiana, which in turn exacerbates the area's vulnerability to storm surges like Hurricane Katrina.[11] Mountain glaciers, the source of fresh water to major world rivers during the dry season, are receding rapidly all around the world. *Exhibit 1* at 4. In 1850, Glacier National Park in Montana had 150 glaciers measuring larger than twenty-five acres—today, it has just twenty-five.[12]

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[7] Hansen, et al define "the tipping level [as] the global climate forcing that, if long maintained, gives rise to a specific consequence [and] the point of no return [as] a climate state beyond which the consequence is inevitable, even if climate forcings are reduced. Target $CO_2$ at 225.

[8] The 1880-1920 period is the earliest time at which instrumental data allows accurate specification of global temperature, and the temperature in that period is estimated to be close to pre-industrial temperature averaged over several centuries.

[9] Decl. James Hansen at ¶ 40, 2006 WL 4761053 (D. Vt. 2006).

[10] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, 2007: IMPACTS, ADAPTATION, AND VULNERABILITY, Table 4.1 (hereinafter "IPCC Working Group II").

[11] U.S. Global Change Research Program, 2009: *Global Climate Change Impacts in the United States*, T. Karl, J.M. Melillo, T.C. Peterson (eds.), Cambridge Univ. Press.

[12] Brief of Amici Curiae Climate Scientists James Hansen et al., *Chamber of Commerce of the United States v. EPA*, 2010 WL __ (*citing to* U.S. Geological Survey, *Melting Glaciers Signal Change in National Parks,* http://www.nwrc.usgs.gov/world/content/land5.html).

Tropospheric water vapor and heavy precipitation events have increased. Droughts are more common, especially in the tropics and subtropics. *Exhibit 1* at 4. Coral reef ecosystems are being impacted by a combination of ocean warming and acidification from rising atmospheric $CO_2$, resulting in a 1-2% per year decline in geographic extent. *Exhibit 1* at 4. World health experts have concluded with "very high confidence" that climate change already contributes to the global burden of disease and premature death with altered distribution of some infectious disease vectors.[13] Subtropical climate belts have expanded, contributing to more intense droughts, summer heat waves, and devastating wildfires in the southern United States, the Mediterranean and Middle East regions, and Australia. *Exhibit 1* at 4. Mega-heat waves have become noticeably more frequent, including the 2010 heat wave in Moscow and in Texas in 2011. *Exhibit 1* at 4. It is nearly certain that such "outlier" heat events would not have occurred in the absence of global warming.[14]

(b) Future effects

Scientific prediction of long-term impacts from climate change is imprecise in part because of uncertainty about the relative speed with which amplifying feedbacks, including disintegration of Earth's major ice sheets, will occur. *Exhibit 1* at 13. Citing the Paleoclimate record, Dr. Hansen and colleagues noted the following most recently:

> Precise consequences of continuing [business as usual] emissions for several decades are difficult to define, because Earth has never experienced such a large rapid increase of climate forcings as would occur with burning of most fossil fuels this century. The closest analogy in Earth's history is probably the PETM (Paleocene-Eocene Thermal Maximum) in which rapid global warming of at least 5°C occurred. The PETM warming spike occurred in conjunction with injection of 3000-5000 GtC of carbon into the surface climate system during two 1-2 thousand year intervals separated by several thousand years. It is often assumed that the carbon originated from melting of methane hydrates, because of the absence of other known sources of that magnitude. PETM occurred during a 10-million year period of slow global warming, and thus methane release might have been a feedback magnifying that warming.
>
> The PETM witnessed extinction of about half of small shelled deep ocean

[13] IPCC Working Group II.

[14] J. Hansen, M. Sato, R. Ruedy, Climate Variability and Climate Change: The New Climate Dice, Nov. 10, 2011.

> animals that serve as a biological indicator for ocean life in general, but, unlike several other large warming events in Earth's history, there was little extinction of land plants and animals. An important point is that the magnitude of the PETM carbon injection and warming is comparable to what will occur if humanity burns most of the fossil fuels, but the human-made warming is occurring 10-100 times faster. The ability of life on Earth today to sustain a climate shock comparable to the PETM but occurring 10-100 times faster is highly problematic. Climate zones would be shifting much faster than species have ever faced. Thus if humanity burns most of the fossil fuels, Earth, and all species residing on it, will be pushed into uncharted climate change territory.

*Exhibit 1* at 13 (internal citations omitted).

Based on measurements of observed climate change, computer simulations of the climate system's responses to additional $CO_2$ emissions, as well as information from the paleoclimate record, Dr. Hansen and others have concluded that continued burning over several decades of fossil fuels renders multi-meter sea level rise "practically certain," and create cause "millions of global warming refugees from highly populated low-lying areas . . . throwing existing global demographics into chaos." *Exhibit 1* at 14 (internal citations omitted).

These researchers note, as well, that acidification stemming from ocean uptake of a portion of increased atmospheric $CO_2$ is expected to increasingly disrupt coral reef ecosystem health, with potentially devastating impacts to certain nations and communities. *Exhibit 1* at 16. Hansen and others warn of receding mountain glaciers "with effects on seasonal freshwater availability of major rivers," *Exhibit 1* at 4, illustrating that present atmospheric $CO_2$ leves are "already a threat for future fresh water security." *Id.* at 16.

Increased concentration of $CO_2$ and associated increased global temperatures will deepen impacts on human health, with children being especially vulnerable. *Exhibit 1* at 16. Climate threats to health move through various pathways, especially by placing additional stress on the availability of food, clean air, and clean water. *Exhibit 1* at 16 (*citing to* Bernstein and Myers, *Climate Change and Children's Health*, Current Opin. Pediatrics, 23, 221-226 (2011)). Other principle climate-related impacts on human health include heat waves, asthma and allergies, infectious disease spread, drought, pests and disease spread across taxa: forests, crops and marine life, and winter weather anomalies. *Exhibit 1* at 18 (Table 1).

As noted *supra*, climate zones are already shifting at rates that exceed natural rates of change; this trend will continue as long as the planet is out of energy balance, a conclusion "based on comparison of the observed trend with inter-decadal variability in climate simulations."[15] Dr. Hansen and others note that "as the shift of climate zones becomes comparable to the range of some species, the less mobile species will be driven to extinction." *Exhibit 1* at 15. In 2007, the Intergovernmental Panel on Climate Change (IPCC) summarized studies estimating species extinctions from additional global warming and estimated[16] that for global warming of 1.6°C or more, relative to pre-industrial levels, 9-31 percent of species will be driven to extinction, while with global warming of 2.9°C, an estimated 21-52 percent of species will be driven to extinction.[17]

## III. ACTION TO PHASE OUT $CO_2$ EMISSIONS IS URGENTLY REQUIRED, WHILE DELAY VIRTUALLY ENSURES CALAMITY.

The 2007 consensus statement by the IPCC, summarizing research through 2005, indicated that human-induced warming of Earth of approximately 2°C constituted dangerous climate change. From that, however, no conclusion logically could be drawn as to the danger inherent in lower levels of global warming.

Research by Dr. Hansen and others to assess this question has been spurred on by the realization, as described *supra*, that large climate impacts have commenced already, even though Earth's lagged temperature response to the recent climb in atmospheric $CO_2$ is only 0.75°C above preindustrial levels. Hansen et al estimate that this warming is already at least 0.25°C above the prior Holocene maximum. *Exhibit 1* at 5. Empirical research showing an ongoing and

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[15] Hansen, J., M. Sato, R. Ruedy, *et al.,* 2007b: Dangerous human-made interference with climate: a GISS modelE study, *Atmos. Chem. & Phys.*, 7, 2287-2312.

[16] IPCC Working Group II.

[17] Hansen et al note that "mass extinctions have occurred in conjunction with rapid climate change during Earth's long history. While new species evolved over hundreds of thousands and millions of years, such time scales are almost beyond human comprehension. Accordingly, if we drive many species to extinction we will leave a more desolate planet for our children, grandchildren, and as many generations as we can imagine." *Exhibit 1* at 15.

accelerating mass loss of the Greenland and West Antarctic ice sheets, which began within the last few decades, provides strong confirmation that today's global temperature has reached a level higher than prior Holocene temperatures. *Id.*

Accordingly, the best available current science establishes that today's global temperature is already close to or into the "dangerous zone." *Exhibit 1* at 106. Because the recently-observed climate effects with respect to the ice sheets are still relatively small compared to total ice sheet mass, these feedbacks may not be a major factor if maximum global warming overshoot of ~1°C occurs only briefly and then recedes. *Exhibit 1* at 10-12.

Action therefore must be undertaken to restore the atmosphere's safe level of $CO_2$ concentration to 350ppm, so as to avert any avoidable additional warming that may drive the climate system past tipping points "that assure transition to a very different planet," *Id.* at 12, and keep the period of overshoot to an absolute minimum.

Two underlying reasons that such action must be undertaken without further delay is indicated in Amicus Hansen's most recent research, summarized here, and illustrated in Fig. 1 *infra*. First, a substantial share of any additional infusion of $CO_2$ lasts in the atmosphere for centuries (and while there, continuously acts to further heat the planet). Accordingly, Earth's temperature response to the "radiative forcing" effect of the higher atmospheric $CO_2$ concentration is a function not only of recent emissions, but the persisting share of prior emissions. Second, as a consequence of the long-lived nature of $CO_2$ and the fact that human-derived emissions have already cause a substantial overshoot of the long-term safe atmospheric concentration level, any substantial delay in undertaking effective action – even if such action compelled a sharp cut-off of emissions – would render it impossible to return the atmospheric $CO_2$ concentration to 350ppm within this century. Thus, as illustrated in Fig. 1b, if emissions of $CO_2$ are allowed per business as usual for even two decades longer the concentration of $CO_2$ in the atmosphere will not return, until the year 2150, to the nominally safe level of 350ppm even if

all such emissions were abruptly ceased in the year 2030.[18] In contrast, complete cessation in 2011 would return to the atmospheric $CO_2$ concentration to 350ppm by mid-century. *Exhibit 1* at 9.

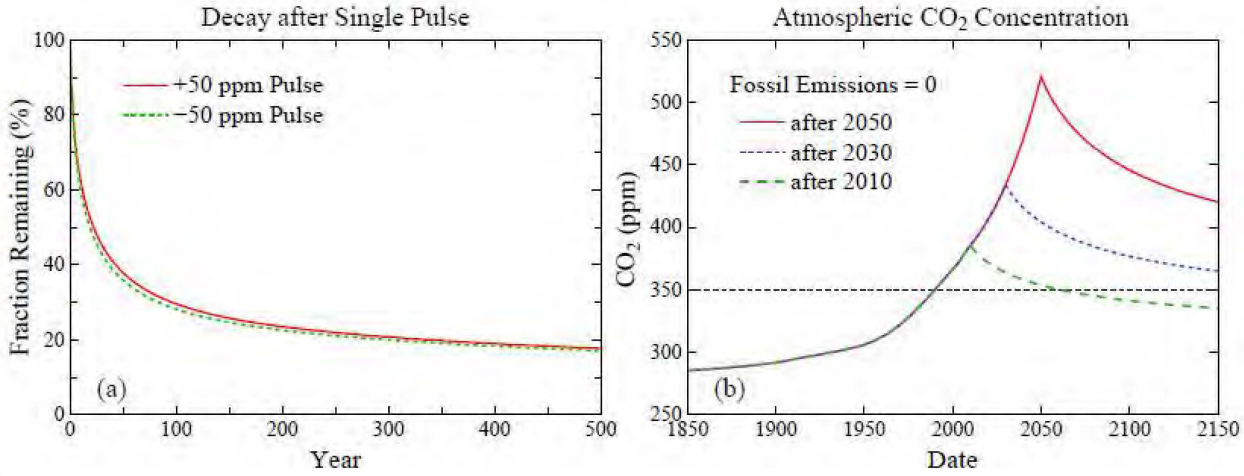


Figure 1. (a) Decay of instantaneous (pulse) injection and extraction of atmospheric $CO_2$, (b) $CO_2$ amount if fossil fuel emissions are suddenly terminated at the end of 2010, 2030, 2050. (Hansen et al., The Case for Young People and Nature: A Path to a Health, Natural, Prosperous Future.)

An abrupt cessation of all $CO_2$, whether in 2011 or 2030, is unrealistic, in part because industry, other business, and consumers alike need time to retool and reinvest in emission-free options to fossil fuels. Accordingly, Hansen et al have proposed a glide path to secure an atmosphere whose $CO_2$ concentration is no higher that 350ppm. Their plan requires emission reductions of 6 percent annually, coupled with a program of reforestation. *Exhibit 1* at 10. This will achieve the goal of restoring the atmosphere to approximately 350ppm if the plan is commenced without delay, and then adhered to. However, consistent with the abrupt phase out scenarios discussed in the prior paragraph *supra*, if the 6 percent annual emission reductions are delayed until 2030, then the global temperature will remain above 1°C higher than preindustrial

[18] *Exhibit 1* at 9. Further, were the emission cessation to commence only after 40 years, Dr. Hansen estimates that the atmosphere would not return to 350ppm $CO_2$ for nearly a 1000 years. *Id.*

levels for nearly 300 years. It would be "highly unlikely," that the planet's major ice sheets would remain "stable at their present size with such long-lasting warmth." *Exhibit 1* at 12-13.

Considered in another way, the required rate of emissions reduction would have been about 3.5% per year if reductions had started in 2005, while the required rate of reduction, if commenced in 2020, will be approximately 15% per year. *Id.* at 6. This illustrates, again, that "the dominant factor, by far, is the date at which fossil fuel emission phase-out begins." *Id.* at 11.

The present danger and impending calamities presented by continued $CO_2$ emissions, and the urgent need to get beyond fossil fuels before Earth is altered in fundamental respects – including its ability to sustain civilization – renders it a first-order tragedy that all serious attempts to address the problem in Congress to date either have been still-borne or killed after some debate. Equally tragic, the executive branch, including our current president, has declined to act with any degree of effectiveness to restrict $CO_2$ and other greenhouse gas emissions from the largest sources – bowing to industry pressure at virtually every turn even though, pursuant to the Supreme Court's leading global warming decision, *Mass. v. EPA*, 549 U.S. 497 (2007), it retains authority to act. The "absence of effective leadership" is attributable, as Amicus Hansen points out, to the "undue sway of special financial interests on government policies."[19] In the absence of political leadership, an Order by this Court granting the injunctive relief sought by plaintiffs in this matter may be the best, the last, and, at this late stage, the only real chance to preserve and restore the atmosphere and climate system.

## CONCLUSION

Systematic reductions in $CO_2$ emissions, for the reasons provided by Dr. Hansen in his work cited throughout this amicus brief, must be undertaken in conjunction with reforestation so as to return the concentration of $CO_2$ in the atmospheric to a level no higher than 350ppm by the end of the century, if not sooner. Plaintiffs in this matter seek an Order by the Court to require Defendants to submit a "Climate Recovery Plan" by next March whose key features, if followed,

[19] *Exhibit 1* at 10 (citing to Oreskes, N.; Conway, E.M., 2010: Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming. Bloomsbury Press, 355 pp. merchantsofdoubt.org.).

will restore the atmosphere and preserve a habitable climate system. This brief has established that such action is urgently required. In particular, the failure to commence $CO_2$ reductions without further delay, and to undertake other measures consistent with the prescription developed by Dr. Hansen and others, and advanced in these proceedings by Plaintiffs, would consign our children and their progeny to a very different planet, one far less conducive to their survival.

Respectfully submitted this 14th day of November, 2011.

/s/

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# 2022 SCOPING PLAN FOR ACHIEVING CARBON NEUTRALITY

NOVEMBER 16, 2022

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# Abbreviations

| | |
|---|---|
| °F | Fahrenheit |
| °C | Celsius |
| AB | Assembly Bill |
| AQMD | Air Quality Management District |
| AR5 | IPCC Fifth Assessment Report |
| BECCS | bioenergy with carbon capture and storage |
| CAISO | California Independent System Operator |
| CalEPA | California Environmental Protection Agency |
| CalGEM | California Geologic Energy Management Division |
| CalSTA | California State Transportation Agency |
| CAP | climate action plan |
| CARB | California Air Resources Board |
| CCR | California Code of Regulations |
| CCS | carbon capture and sequestration |
| CCUS | carbon capture, utilization, and storage |
| CDFA | California Department of Food and Agriculture |
| CDPH | California Department of Public Health |
| CDR | carbon dioxide removal |
| CE | common era |
| CEC | California Energy Commission |
| CEQA | California Environmental Quality Act |
| CES | CalEnviroScreen |
| $CH_4$ | methane |
| CMAQ | Community Multiscale Air Quality |
| CNRA | California Natural Resources Agency |
| $CO_2$ | carbon dioxide |
| COPD | chronic obstructive pulmonary disease |

| | |
|---|---|
| CORE | Clean Off-Road Equipment |
| CPUC | California Public Utilities Commission |
| CVM | Climate Vulnerability Metric |
| DAC | direct air capture |
| DPR | Department of Pesticide Regulation |
| Draft EA | Draft Environmental Analysis for this Scoping Plan |
| EA | Environmental Analysis |
| ED | emergency department |
| EIA | U.S. Energy Information Administration |
| EJ | environmental justice |
| EJ Advisory Committee | Environmental Justice Advisory Committee |
| EO | executive order |
| EV | electric vehicle |
| F-gas | fluorinated gas |
| FCEV | fuel cell electric vehicle |
| GCF | Governors' Climate and Forests Task Force |
| GDP | gross domestic product |
| GHG | greenhouse gas |
| GSP | gross state product |
| GW | gigawatt |
| GWh | gigawatt-hour |
| GWP | global warming potential |
| HDV | heavy-duty vehicle |
| HD ZEV | heavy-duty zero-emission vehicle |
| HFC | hydrofluorocarbon |
| IBank | Infrastructure and Economic Development Bank |
| ICE | internal combustion engine |
| IPCC | Intergovernmental Panel on Climate Change |

| | |
|---|---|
| IPT | incidence-per-ton |
| IWG | Interagency Working Group |
| LCFS | low-carbon fuel standard |
| LDV | light-duty vehicle |
| MDV | medium-duty vehicle |
| MMT | million metric tons |
| $MMTCO_2e$ | million metric tons of carbon dioxide equivalent |
| MOU | memorandum of understanding |
| MRR | Mandatory Reporting of GHG Emissions |
| $MTCO_2e$ | metric tons of carbon dioxide equivalent |
| MW | megawatt |
| $N_2O$ | nitrous oxide |
| NEMS | National Energy Systems Model |
| $NF_3$ | nitrogen trifluoride |
| NOAA | National Oceanic and Atmospheric Administration |
| NOx | nitrogen oxides |
| NRDC | National Resources Defense Council |
| NWL | Natural and Working Lands |
| OEHHA | Office of Environmental Health Hazard Assessment |
| OGV | Ocean-Going Vessel |
| OPR | Governor's Office of Planning and Research |
| OTC | once-through cooled |
| PFC | perfluorocarbon |
| PHMSA | Pipelines and Hazardous Materials Safety Administration |
| PM | particulate matter |
| $PM_{2.5}$ | fine particulate matter |
| PPP | public-private partnership |
| RFS | renewable fuel standard |

| | |
|---|---|
| ROG | reactive organic gases |
| RPS | Renewables Portfolio Standard |
| SB | Senate Bill |
| SC-$CH_4$ | social cost of methane |
| SC-$CO_2$ | social cost of carbon |
| SC-GHG | social cost of greenhouse gases |
| SC-$N_2O$ | social cost of nitrous oxide |
| $SF_6$ | sulfur hexafluoride |
| SGIP | Self-Generation Incentive Program |
| SLCP | short-lived climate pollutant |
| TSD | Technical Support Document |
| UC | University of California |
| UCLA | University of California, Los Angeles |
| UNFCCC | United Nations Framework Convention on Climate Change |
| U.S. EPA | United States Environmental Protection Agency |
| VMT | vehicle miles traveled |
| WUI | wildland-urban interface |
| ZEV | zero-emission vehicle |

# Executive Summary

This Scoping Plan lays out the sector-by-sector roadmap for California, the world's fifth[1] largest economy, to achieve carbon neutrality by 2045 or earlier, outlining a technologically feasible, cost-effective, and equity-focused path to achieve the state's climate target. This is a challenging but necessary goal to minimize the impacts of climate change. There have been three previous Scoping Plans. Previous plans have focused on specific greenhouse gas (GHG) reduction targets for our industrial, energy, and transportation sectors—first to meet 1990 levels by 2020, then to meet the more aggressive target of 40 percent below 1990 levels by 2030. This plan, addressing recent legislation and direction from Governor Newsom, extends and expands upon these earlier plans with a target of reducing anthropogenic emissions to 85 percent below 1990 levels by 2045. This plan also takes the unprecedented step of adding carbon neutrality as a science-based guide and touchstone for California's climate work. The plan outlines how carbon neutrality can be achieved by taking bold steps to reduce GHGs to meet the anthropogenic emissions target and by expanding actions to capture and store carbon through the state's natural and working lands and using a variety of mechanical approaches.

What this means for California is an ambitious and aggressive approach to decarbonize every sector of the economy, setting us on course for a more equitable and sustainable future in the face of humanity's greatest existential threat, and ensuring that those who benefit from this transformation include communities hardest hit by climate impacts and the ongoing pollution from the use of fossil fuels. The combustion of fossil fuels has polluted our air—particularly in low-income communities and communities of color—for far too long and is the root cause of climate change. This Scoping Plan helps us chart the path to a future where race and class are no longer predictors of disproportionate burdens from harmful air pollution and climate impacts.

The major element of this unprecedented transformation is the aggressive reduction of fossil fuels wherever they are currently used in California, building on and accelerating carbon reduction programs that have been in place for a decade and a half. That means rapidly moving to zero-emission transportation; electrifying the cars, buses, trains, and trucks that now constitute California's single largest source of planet-warming pollution. It also means phasing out the use of fossil gas used for heating our homes and buildings. It means clamping down on chemicals and refrigerants that are thousands of times more powerful at trapping heat than carbon dioxide ($CO_2$). It means providing our communities

[1] In October 2022, California was poised to become the world's fourth largest economy.

with sustainable options for walking, biking, and public transit to reduce reliance on cars and their associated expenses. It means continuing to build out the solar arrays, wind turbine capacity, and other resources that provide clean, renewable energy to displace fossil-fuel fired electrical generation. It also means scaling up new options such as renewable hydrogen for hard-to-electrify end uses and biomethane where needed. Successfully achieving the outcomes called for in this Scoping Plan would reduce demand for liquid petroleum by 94 percent and total fossil fuel by 86 percent in 2045 relative to 2022.[2] Despite these world-leading efforts, some amount of residual emissions will remain from hard-to-abate industries such as cement, internal combustion vehicles still on the road, and other sources of GHGs, including high global warming chemicals used as refrigerants.

The plan addresses these remaining emissions by re-envisioning our natural and working lands—forests, shrublands/chaparral, croplands, wetlands, and other lands—to ensure they play as robust a role as possible in incorporating and storing more carbon in the trees, plants, soil, and wetlands that cover 90 percent of the state's 105 million acres while also thriving as a healthy ecosystem. Modeling indicates that natural and working lands will not, on their own, provide enough sequestration and storage to address the residual emissions. For that reason, it is necessary to research, develop, and deploy additional methods of capturing $CO_2$ that include pulling it from the smokestacks of facilities, or drawing it out of the atmosphere itself and then safely and permanently utilizing and storing it, as called for in recent legislation. Carbon removal also will be necessary to achieve net negative emissions to address historical GHGs already in the atmosphere.

This is a plan that aims to shatter the carbon status quo and take action to achieve a vision of California with a cleaner, more sustainable environment and thriving economy for our children. This ambitious plan will serve as a model for other partners around the world as they consider how to make their transition. As we have so often in the past, California can continue to serve as a leader in innovation that has produced not only the fifth largest economy on the planet, but ultimately one of the most energy-efficient economies, with a track record of demonstrating the ability to decouple economic growth from carbon pollution. This plan also builds upon current and previous environmental justice efforts to integrate environmental justice directly into the plan, to ensure that all communities can reap the benefits of this transformational plan. Specifically, this plan:

[2] See *https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-PATHWAYS-data-E3.xlsx* for energy demand reductions.

- Identifies a path to keep California on track to meet its SB 32 GHG reduction target of at least 40 percent below 1990 emissions by 2030.
- Identifies a technologically feasible, cost-effective path to achieve carbon neutrality by 2045 and a reduction in anthropogenic emissions by 85 percent below 1990 levels.
- Focuses on strategies for reducing California's dependency on petroleum to provide consumers with clean energy options that address climate change, improve air quality, and support economic growth and clean sector jobs.
- Integrates equity and protecting California's most impacted communities as driving principles throughout the document.
- Incorporates the contribution of natural and working lands (NWL) to the state's GHG emissions, as well as their role in achieving carbon neutrality.
- Relies on the most up-to-date science, including the need to deploy all viable tools to address the existential threat that climate change presents, including carbon capture and sequestration, as well as direct air capture.
- Evaluates the substantial health and economic benefits of taking action.
- Identifies key implementation actions to ensure success.

The path forward is informed by robust science. The recent Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC) summarizes the latest scientific consensus on climate change. It finds that atmospheric concentrations of $CO_2$ have increased by 50 percent since the industrial revolution and continue to increase at a rate of two parts per million each year.[3] By the 2030s, and no later than 2040, the world will exceed 1.5°C warming unless there is drastic action. While every tenth of a degree matters—every incremental increase in warming brings additional negative impacts—climate-related risks to human health, livelihoods, and biodiversity are projected to increase further under 2°C warming, compared to 1.5°C.[4] For example, at 1.5°C of global warming, we would experience increasing heat waves, longer warm seasons, and shorter cold seasons, but at 2°C of global warming, heat extremes would more often reach critical tolerance thresholds for human health and agriculture.[5] We are already seeing unprecedented climate change impacts, such as continued sea level rise, that are

[3] IPCC. 2021. *Climate Change 2021: The Physical Science Basis.* Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press. https://www.ipcc.ch/report/ar6/wg1/.

[4] IPCC. 2018. *Global Warming of 1.5°C.* World Meteorological Organization. Geneva, Switzerland. 32 pp. https://www.ipcc.ch/sr15/.

[5] IPCC. 2021. Climate change widespread, rapid, and intensifying – IPCC. August. *https://www.ipcc.ch/2021/08/09/ar6-wg1-20210809-pr/.*

"irreversible" for centuries to millennia, and we are dangerously close to hitting 1.5ºC in the near term.[6] To avoid climate catastrophe and remain below 1.5˚C with limited or no overshoot of that threshold, global net anthropogenic $CO_2$ emissions need to reach net zero by 2050.

It has been 16 years since the Global Warming Solutions Act of 2006 was passed and signed into law. In 2017, the second update to the Assembly Bill (AB) 32 Climate Change Scoping Plan[7] (2017 Scoping Plan) laid out a cost-effective and technologically feasible path to achieve the 2030 GHG reduction target. At the time, many characterized the plan and the AB 32 target as unachievable, citing that it would lead to massive business and job loss, and excessive costs. Those predictions proved to be incorrect as California achieved its AB 32 target years ahead of schedule, all the while growing our economy, with the state distinguishing itself as a hub for green technology investment. This Scoping Plan draws on a decade and a half of proven successes and additional new approaches to provide a balanced and aggressive course of effective actions to achieve carbon neutrality in 2045, if not before, in addition to the 2030 goal.

California's economy is projected to grow vigorously in the coming years and decades. In 2045, under a Reference Scenario, the gross state product would be $5.1 trillion, nearly $2 trillion more than in 2021, and allow growth that would add hundreds of thousands of jobs. Under the Scoping Plan scenario, impacts to economic and job growth would be negligible in both 2035 and 2045, while delivering $199 billion of benefits in the form of reduced hospitalizations, asthma cases, and lost work and school days due to the cleaner air supported by this plan. This should come as no surprise given the tremendous growth of California's economy since the Great Recession of 2007–2009, even as the state has taken drastic measures to lower emissions. As noted, the savings associated with ambitious climate action are extensive, both in terms of avoided climate impacts and health costs. As described in Chapter 1, the health costs of climate and air pollution in the U.S. are well over $800 billion today and will continue to grow in the coming years[8] without robust action. Similarly, the costs of delayed or insufficient climate action could cost the

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[6] United Nations. 2021. IPCC report: 'Code red' for human driven global heating, warns UN chief. August 9. *https://news.un.org/en/story/2021/08/1097362*.

[7] CARB. 2017. *California's 2017 Climate Change Scoping Plan.* *https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/scoping_plan_2017.pdf.*

[8] Alwis, D. D., and V. S. Limaye. No date. *The Costs of Inaction: The Economic Burden of Fossil Fuels and Climate Change on Health in the United States.* NRDC, The Medical Society Consortium on Climate and Health, and WHPCA. https://www.nrdc.org/sites/default/files/costs-inaction-burden-health-report.pdf.

U.S. upwards of $14.5 trillion over the next 50 years.[9] We can either take action now or pay the cost of inaction, both now and later.

We cannot take on this unprecedented challenge alone. Collaboration with the federal government, other U.S. states, and other jurisdictions around the world will continue to be fundamental for California to succeed in achieving its climate targets, especially as the pace of our efforts increases in the coming years. We believe this collaboration and coordination also creates a race to the top, encouraging and enabling other jurisdictions to achieve climate and air quality goals as well, and often providing lessons for national action.

One example of fruitful collaboration is California's longstanding vehicle emissions standards programs, which have repeatedly been freely adopted by other states, consistent with the federal Clean Air Act. California's programs frequently pioneer more rigorous standards or new technologies—such as the now-standard catalytic converter and the rules that led directly to the nation-leading numbers of zero-emission vehicles on our roads today. From initial standards for cars and trucks decades ago to the world-leading Advanced Clean Trucks program currently helping to electrify heavy-duty vehicles, this partnership continues to offer regulatory options and spread innovative technologies. A major example of future work is the Advanced Clean Cars II program, which lays out California's legally binding path to achieving 100 percent zero emission vehicle (ZEV) sales in 2035.[10] The California Air Resources Board (CARB) continues to work closely with many other states that also see zero-emission vehicles as critical to their climate and public health goals and expects many states to choose to adopt this regulation as well. This partnership with other states also creates market certainty for automakers, which in turn helps to ensure that California consumers have access to a variety of ZEVs at multiple price points.

## The Scoping Plan Process

Four scenarios were extensively modeled to develop this Scoping Plan, with the objective of informing the most viable path to remain on track to achieve our 2030 GHG reduction target: a reduction in anthropogenic emissions by 85% below 1990 levels and carbon neutrality by 2045. All four have their merits and are informed by stakeholder input. The scenario ultimately chosen as the basis of this Scoping Plan is the alternative that most

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[9] Deloitte. 2022. *The Turning Point: A New Economic Climate in the United States.* https://www2.deloitte.com/content/dam/Deloitte/us/Documents/about-deloitte/us-the-turning-point-a-new-economic-climate-in-the-united-states-january-2022.pdf?id=us:2el:3dp:wsjspon:awa:WSJSBJ:2021:WSJFY22.

[10] Executive Department. State of California. Executive Order N-79-20. *https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf*.

closely aligns with existing statute and Executive Orders. It was selected because it best achieves the balance of cost-effectiveness, health benefits, and technological feasibility.

For the first time, this Scoping Plan includes modeling and quantification of GHG emissions and carbon sequestration in natural and working lands (NWL). To date, the focus has been only on reducing the emissions of GHGs from our transportation, energy, and industrial sectors. The state's 2020 and 2030 GHG reductions targets only include these sources, as they are the primary drivers of climate change and disproportionate harmful air pollution in our vulnerable communities. This Scoping Plan, through the lens of carbon neutrality, expands the scope to more meaningfully consider how our NWL contribute to our long-term climate goals. For the first time, new and cutting-edge modeling tools allow us to estimate the quantitative ability of our forests and other landscapes to remove and store carbon under different scenarios. These cutting-edge tools were developed through a stakeholder process and in coordination with other agencies for the purpose of this update and will continue to be refined over time and made available to others seeking to do similar work.

As recent data and Scoping Plan modeling shows, our NWL also can act as a source of emissions, principally in the form of wildfires. California's forests are experiencing a deadly combination of drought and heat combined with a century of misguided fire suppression management. Scoping Plan modeling shows that, at this time and until our forests reach a balance through appropriate treatments, California's NWL will act as a net source of emissions, not a sink. As such, the Scoping Plan includes policy direction and actions intended to quickly move the sector toward being a net sink and a more natural state, where wildfires will continue to be an important part of the healthy forest cycle but not at the intensity and frequency observed in recent years.

Development of this Scoping Plan also includes careful consideration of, and coordination with, other state agencies, consistent with Governor Gavin Newsom's whole-of-government approach to tackling climate change. State agency plans and regulations, including the SB 100 Joint Agency Report,[11] State Implementation Plan, Climate Action Plan for Transportation Infrastructure,[12] AB 74 Studies on Vehicle Emissions and Fuel

[11] California Public Utilities Commission (CPUC), California Energy Commission (CEC), and CARB. 2021. *SB 100 Joint Agency Report.* https://www.energy.ca.gov/sb100.
[12] California State Transportation Agency (CalSTA). 2021. Climate Action Plan for Transportation Infrastructure. https://calsta.ca.gov/subject-areas/climate-action-plan.

Demand and Supply,[13,14,15] Short-Lived Climate Pollutant Strategy (SLCP Strategy),[16] CARB's Achieving Carbon Neutrality Report,[17] Climate Smart Lands Strategy,[18] Natural Working Land Implementation Plan,[19] and the California Climate Insurance Report: *Protecting Communities, Preserving Nature, and Building Resiliency,*[20] among others, provided critical inputs and data points for this plan. This Scoping Plan is the product of work by multiple agencies across the Administration, including dozens of public workshops and years of rigorous analysis and economic modeling by California's leading institutions. This cooperation on planning lays the foundation for even closer coordination among and between state agencies to put the plan into effect.

The plan is also the product of tireless efforts of, and recommendations from, the AB 32 Environmental Justice Advisory Committee (EJ Advisory Committee). The EJ Advisory Committee, created by statute, plays a critical role to inform the development of each Scoping Plan and helps to ensure environmental justice is integrated throughout the plan. CARB reconvened the EJ Advisory Committee in early 2021 to advise on the development of this Scoping Plan. In their advisory role, the EJ Advisory Committee has worked together to provide inputs to CARB to inform the development of scenarios and the associated modeling. And in April 2022, the EJ Advisory Committee provided draft preliminary recommendations in advance of the Draft 2022 Scoping Plan to help ensure the draft plan meaningfully addresses environmental justice. The CARB Board and EJ Advisory Committee held a joint board hearing on September 1, 2022, where the EJ Advisory Committee presented their final recommendations on the Scoping Plan. Over five dozen of the recommendations are reflected in the Scoping Plan. Going forward, as this plan is ultimately acted on by the Board, ongoing input from the EJ Advisory

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[13] California Environmental Protection Agency (CalEPA). 2021. Carbon Neutrality Studies. https://calepa.ca.gov/climate/carbon-neutrality-studies/.

[14] Brown, A. L., et. al. 2021. *Driving California's Transportation Emissions to Zero.* University of California Institute of Transportation Studies. https://escholarship.org/uc/item/3np3p2t0.

[15] Deschenes, O. 2021. *Enhancing equity while eliminating emissions in California's supply of transportation fuels.* University of California Santa Barbara. https://zenodo.org/record/4707966#.YKPiaKhKi73.

[16] CARB. Short-Lived Climate Pollutants. https://ww2.arb.ca.gov/our-work/programs/slcp.

[17] Energy and Environmental Economics, Inc. 2020. *Achieving Carbon Neutrality in California: PATHWAYS Scenarios Developed for the California Air Resources Board*. October. *https://ww2.arb.ca.gov/sites/default/files/2020-10/e3_cn_final_report_oct2020_0.pdf*.

[18] California Natural Resources Agency (CNRA). 2021. Draft Climate Smart Lands Strategy. *https://resources.ca.gov/Initiatives/Expanding-Nature-Based-Solutions*.

[19] CARB. 2019. *Draft California 2030 Natural and Working Lands Climate Change Implementation Plan. https://ww2.arb.ca.gov/resources/documents/nwl-implementation-draft*.

[20] California Department of Insurance. 2021. *Protecting Communities, Preserving Nature, and Building Resiliency. climate-insurance-report.pdf (ca.gov)*.

Committee will be essential to address environmental justice and achieve the ambitious vision outlined in the plan throughout its implementation in the coming years.

Importantly, per legislative direction, the Scoping Plan development includes modeling and analyses of emissions, economics, air quality, health, jobs, and public health. This work is important to inform the discussion around trade-offs and how to balance the various legislative direction in identifying a path to achieve the state's climate goals. The technical work serves as a backdrop to what this means to Californian's daily lives—to how they will work, play, and live as we act to eliminate fossil fuel combustion and achieve the many public health and environmental benefits that will result from that action.

## Ensuring Equity and Affordability

The state has a long history of public health and environmental protection. However racist and discriminatory practices such as redlining have resulted in low-income communities and communities of color being disproportionately exposed to health hazards and pollution burdens.[21] These communities are often located adjacent to major roadways and large stationary sources that not only emit GHGs, but also harmful localized air pollution. The plan delivers on the promise to transform the way we move, live, and work by nearly eliminating our dependence on fossil fuels. It includes effective actions to move with all possible speed to clean energy, zero-emission cars and trucks, energy-efficient homes, sustainable agriculture, and resilient NWL. And it prioritizes working with the communities most impacted to ensure that these strategies address their needs.

An important part of our equity consideration is ensuring the transition to a zero-emission economy is affordable and accessible, and that it uplifts disadvantaged, low-income communities and communities of color. Some aspects of the transition will have associated costs (e.g., escalating efforts to retrofit existing homes and businesses to support electric appliances and vehicles and increased costs of insurance). The state must ensure that these costs do not disproportionately burden consumers. In addition, the state has an important role to play in providing financial incentives, especially to low-income consumers, to allow for uptake of clean technologies. The Department of Community Services and Development's Low Income Weatherization Program is a prime example of this approach, enabling low-income Californians to be part of the zero-emission transition, all while lowering energy bills. The program provides low-income households with solar photovoltaic systems and energy efficiency upgrades at no cost to residents, helping cushion the impact of climate change on vulnerable communities.

[21] CalEPA. 2021. Pollution and Prejudice: Redlining and Environmental Injustice in California. August 16. *https://storymaps.arcgis.com/stories/f167b251809c43778a2f9f040f43d2f5*.

With this Scoping Plan, the state also adds another tool to help identify and close climate change impact gaps that will emerge over time. As California invests in climate mitigation and adaptation, it is essential to understand the relative impact of climate change across the state's diverse communities. We know not all communities are equally resilient in the face of climate impacts due to persisting health and opportunity gaps. We also know that a global metric such as the Social Cost of Carbon cannot adequately capture the incremental additional impact faced by overly burdened communities. The Climate Vulnerability Metric (CVM) is specifically focused on quantifying the community-level impacts of a warming climate on human welfare.

## Energy and Technology Transitions

To support the transformation needed, we must build the clean energy production and distribution infrastructure for a carbon-neutral future. The solution will have to include transitioning existing energy production and transmission infrastructure to produce zero-carbon electricity and hydrogen, and utilizing biogas resulting from wildfire management or landfill and dairy operations, among other substitutes. In almost all sectors, electrification will play an important role. That means that the grid will need to grow at unprecedented rates and ensure reliability, affordability, and resiliency through the next two decades and beyond. It also means we need to keep all options on the table, as it will take time to fully grow the electricity grid to be the backbone for a decarbonized economy. We also know that electrification is not possible in all situations. As such, this plan systematically evaluates and identifies feasible clean energy and technology options that will bring both near-term air quality benefits and deliver on longer-term climate goals.

This transition will not happen overnight. It will take time and planning to ensure a smooth transition of existing energy infrastructure and deployment of new clean technology. And while this Scoping Plan has the longest planning horizon of any Scoping Plan to date, this 25-year horizon is still relatively short in terms of transforming California's economy. We must avoid making choices that will lead to stranded assets and incorporate new technologies that emerge over time. Importantly, given the pace at which we must transition away from fossil fuels, we absolutely must identify and address market and implementation barriers to be successful. The scale of transition includes adding four times the solar and wind capacity by 2045 and about 1,700 times the amount of current hydrogen supply.

As we transition our energy systems, we must also rapidly deploy the clean technologies that rely on a decarbonized grid. As called for in Executive Order N-79-20, all new passenger vehicles sold in California will be zero-emission by 2035, and all other fleets will have transitioned to zero-emission as fully possible by 2045. This means the percentage of fossil fuel combustion vehicles will continue to rapidly decrease, becoming a fading vision of the past. Successful implementation of this Executive Order (EO) and other zero-emission priorities will have to be attractive to consumers. As an example,

electric and hydrogen transportation refueling must be readily accessible, and active transportation and clean transit options must be cheaper and more convenient than driving.

## Cost-Effective Solutions Available Today

Ultimately, to achieve our climate goals, urgent efforts are needed to slash GHG emissions. Fortunately, cost-effective solutions are available to do so in many cases. In short, this plan relies on existing technologies—it does not require major technological breakthroughs that are highly uncertain.

For example, targeted action to reduce methane emissions can be achieved at low or negative cost, and with significant near-term climate and public health benefits. In many cases, renewable energy and energy storage are cheaper than polluting alternatives, and are already firmly part of our business-as-usual approach; modeling related to the most recent integrated resource planning process at the California Public Utilities Commission (CPUC) has shown that scenarios associated with the best emissions outcomes had the lowest average rates. As another example, research from Energy Innovation shows that the U.S. can achieve 100 percent zero-carbon power by 2035 without increasing customer costs.[22]

The same is either already true, or soon to be true, for zero-emission vehicles as well. Myriad studies show cost parity for light-duty and heavy-duty ZEVs being achieved by mid-decade or shortly thereafter. A carbon neutrality study conducted by the University of California (UC) Institute of Transportation Studies and funded by the California Environmental Protection Agency (CalEPA) shows that achieving carbon neutrality in the transportation sector will *save* Californians $167 billion through 2045.[23] Similar research from the Goldman School of Public Policy at UC Berkeley finds that achieving 100 percent light-duty ZEV sales nationwide would save consumers $2.7 trillion through 2050; equivalent to $1,000 per household, per year, for 30 years.[24]

Many of these outcomes are a direct result of California's vision and policy development to advance clean energy and climate solutions, including through the Renewables Portfolio Standard, Advanced Clean Cars II regulations, SLCP Reduction Strategy, and

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[22] Phadke, A. et al. 2020. "Illustrative Pathways to 100 Percent Zero Carbon Power by 2035 Without Increasing Customer Costs, Energy Innovation." September. *https://energyinnovation.org/wp-content/uploads/2020/09/Pathways-to-100-Zero-Carbon-Power-by-2035-Without-Increasing-Customer-Costs.pdf*.

[23] Brown, A. L., et al. 2021. *Driving California's Transportation Emissions.* *http://dx.doi.org/10.7922/G2MC8X9X*. Retrieved from https://escholarship.org/uc/item/3np3p2t0.

[24] Goldman School of Public Policy. 2021. *2035: The Report: Transportation.* UC Berkeley. April. *https://www.2035report.com/transportation/*.

others. While the world collectively has not yet fully deployed clean energy and climate solutions at the scale needed to adequately address climate change, California has made tremendous progress—even since the last Scoping Plan update in 2017. Continued ambition, leadership, and climate policy development from California will help the state achieve the scale of emissions reductions needed from technologies and strategies that are already cost-effective or close to it today, and will move additional technologies and strategies to that point in the near future. Achieving those outcomes and reducing costs for the entire array of climate solutions needed to achieve carbon neutrality and then maintain net-negative emissions will prove the true measure of California's success. This will enable California to not just meet our own climate targets, but to ultimately develop the replicable solutions that can scale globally to address global warming.

## Continue with a Portfolio Approach

Over the past decade and a half, the state has undertaken a successful three-pronged approach to reducing GHGs: incentives, regulations, and carbon pricing. The 2017 Scoping Plan leveraged existing programs such as the Renewables Portfolio Standard, Advanced Clean Cars, Low Carbon Fuel Standard, Short-lived Climate Pollutant Strategy, mobile source measures to achieve federal air quality targets, and a Cap-and-Trade Program, among others, to lay out a technologically feasible and cost-effective path to achieve the 2030 GHG reduction target. When looking toward the 2045 climate goals and the deeper GHG reductions needed across the AB 32 GHG Inventory sectors, all of the existing programs must be evaluated and, as necessary, strengthened to support the rapid production and deployment of clean technology and energy, as well as the increased pace and scale of actions on our natural and working lands.

The challenge before us requires us to keep all tools on the table. Given the climate mitigation co-benefits, critical actions to deliver near-term air quality benefits, such as those included in the State Implementation Plan to achieve the federal air quality standards, are incorporated into this Scoping Plan, as are new legislative mandates to decarbonize the electricity and cement sectors. And, if additional gaps are identified, new programs and policies must be developed and implemented to ensure all sectors are on track to reduce emissions. Opportunities to leverage these programs to address ongoing air quality disparities must also be considered, along with targeted environmental justice policies such as the AB 617 Community Air Protection Program and the investments made possible through the California Climate Investments Program.

## Conclusion

California has never undertaken such a comprehensive, far-reaching, and transformative approach to fighting climate change as that called for in this plan. Once implemented, it will place every aspect of how we live, work, play, and travel in California on a more sustainable footing, with a focus on directly benefitting those communities already most burdened by pollution. This comprehensive approach reflects how climate change is

already changing life in California. We have all experienced the impacts of devastating wildfires, extreme heat, and drought. Despite much progress, California still has some of the worst air pollution in the nation, especially in the San Joaquin Valley and the Los Angeles Basin, which is driven by the continued use of fossil fuel-powered trucks and cars.

This Scoping Plan provides a solution; a way forward and a vision of a California where we can and will address those impacts. This plan is fundamentally based on hope. It is a hope grounded in experience and science that we can fundamentally improve the California we leave to future generations. The plan is built on the legacy of effective actions and on the conviction that we can effectively marshal the combined capabilities of California—from state, regional, tribal, and local governments to industry to our research institutions, and most importantly, to the nearly 40 million Californians who will benefit from the actions laid out in the plan. It addresses the challenge of our generation by laying out a pathway and guideposts for action across three decades. But the Scoping Plan is only that: a plan. The hard work—and hopeful work—is putting its recommendations into action. And there is no time to waste.

## Post-adoption of the Scoping Plan

As with previous Scoping Plans, CARB Board approval is the beginning of the next phase of climate action. Specifically, approval of this plan catalyzes a number of efforts, including the development of new regulations as well as amendments to strengthen regulations and programs already in place, not just at CARB but across state agencies. The unprecedented rate of transition will also require the identification and removal of market and implementation barriers to the production and deployment of clean technology and energy. All of these actions and more will be needed if we are to achieve our climate goals.

# Chapter 1: Introduction

"The debate is over around climate change. Just come to the state of California. Observe it with your own eyes."

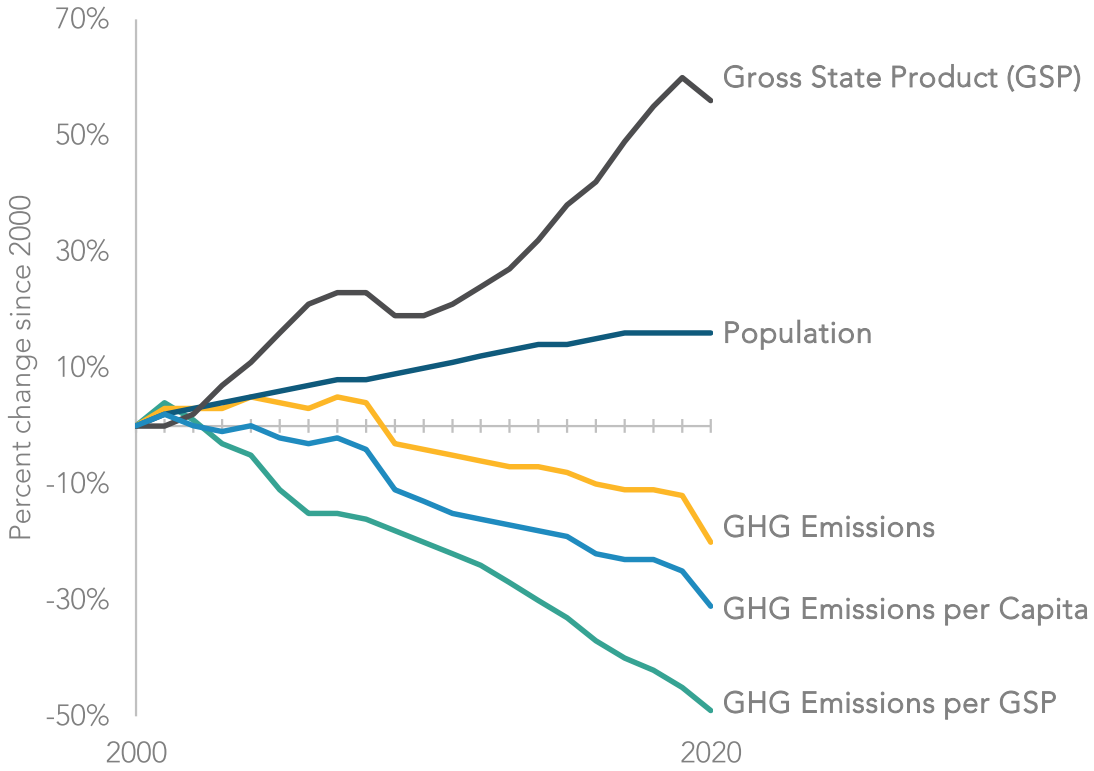
- California Governor Gavin Newsom in September 2020 after surveying the devastation caused by catastrophic wildfires

The impacts of climate change are no longer a distant threat on the horizon—they are right here, right now, with a growing intensity that is adversely affecting our communities and our environment, here in California and across the globe. The science that, decades ago, predicted the impacts we are currently experiencing is even stronger today and unambiguously tells us what we must do to limit irreversible damage: we must act with renewed commitment and focus to do more and do it sooner. That science is indisputable. Unless we increase ambition, we will be faced with more fire, more drought, more temperature extremes, and deadly, choking air pollution. The future of our state—our communities, economy, and ecosystems—is inextricably tied to the way we respond in this decade and the partnerships we forge along the way.

The impacts of climate change fall most heavily on frontline communities that bear the brunt of extreme heat, drought, wildfires, and other effects. Low-income communities and communities of color are also disproportionately impacted by fossil fuel combustion-related air pollution and related health problems. The continued phaseout of fossil fuel combustion will advance both climate and air quality goals and will deliver the greatest health benefits to the most impacted communities.

As it has responded to this climate crisis, California has established itself as a global leader in science-based, public health-focused climate change mitigation and air quality control. The California Legislature has worked with both Republican and Democratic governors to advance action on public health and environmental protections—and California has made progress on addressing climate change during periods of both Republican and Democratic federal administrations. Since the passage of Assembly Bill 32 (AB 32) (Núñez and Pavley, Chapter 488, Statutes of 2006), California has developed bold, creative, and durable policy solutions to protect our environment and public health, all while growing our economy. In fact, California met the target established in AB 32—a return of greenhouse gas (GHG) emissions to 1990 levels by 2020—years ahead of schedule, even as the state established itself as the one of the largest economies in the world. As Figure 1-1 below shows, California's emissions and economic growth have continued to decouple, and California is now the fifth largest economy in the world.

**Figure 1-1: California total and per capita GHG emissions[25]**




Recognizing both California's early successes in achieving GHG emissions reductions while growing the economy, as well as the worsening impacts of climate change, our governors and legislators have continued to enact ambitious goals. California's unwavering commitment to address climate change is based on indisputable science and data. This commitment is also informed by our collective efforts to address environmental justice and advance racial equity, such that race will no longer be a predictor for disproportionate environmental burdens faced by low-income communities and communities of color. As the Office of Environmental Health Hazard Assessment's

[25] Due to the global pandemic, 2020 is an outlier year and should not be considered indicative of a trend; emissions are likely to increase as economies recover from the impacts of the pandemic.

(OEHHA's) recent analysis of race/ethnicity and air pollution vulnerability and CalEnviroScreen 4.0 scores demonstrate, much work remains to be done.[26]

Many of California's environmental policies have served as models for similar policies in other U.S. states, and at national and international levels. Moving forward, California will continue its pursuit of collaborations and advocacy for action to address climate change at all levels of government. While California is responsible for just one percent of global GHG emissions, and we must do our part, we also play an important role in exporting both political will and technical solutions to address the climate crisis globally.

Today, we have a chance to re-envision California's future and set the state on a path to be carbon neutral no later than 2045 while advancing equity, addressing environmental justice, and continuing to grow our economy. This Scoping Plan provides a roadmap outlining key policies we can implement to achieve our climate goals while improving the health and welfare of Californians and addressing disparities in health outcomes to create a more equitable future. It will enable us to turn the corner in our efforts to protect and preserve our critical natural and public resources, all while providing unparalleled opportunities for clean, pollution-free economic growth.

## Severity of Climate Change Impacts

With the increasing severity and frequency of drought, wildfire, extreme heat, and other impacts, Californians just have to look out their windows to know that climate change is real and rapidly getting worse. The impacts we thought we would see in the decades to come are happening now. We must act decisively to both reduce our GHG emissions and build resilience to these impacts for ourselves, future generations, and our iconic landscapes.

### Wildfires

Of the twenty largest wildfires ever recorded in California, nine occurred in 2020 and 2021. The worst wildfire season in California's recorded history was in 2018, with over 24,226 structures damaged or destroyed and over 100 lives lost. The largest wildfire season ever recorded in state history was in 2020, where more than 4.3 million acres burned, albeit at different intensity and with varying ecological impacts, and over 112 million metric tons of

[26] OEHHA and CalEPA. 2021. Analysis of Race/Ethnicity and CalEnviroScreen 4.0 Scores. https://oehha.ca.gov/media/downloads/calenviroscreen/document/calenviroscreen40raceanalysisf2021.pdf.

carbon dioxide ($CO_2$) emitted into the atmosphere.[27] The economic damage of these fires was estimated to be over $10 billion in property damage and over $2 billion in fire suppression costs.[28] The Camp Fire, which destroyed much of Paradise, California, was the world's costliest natural disaster in 2018, with overall damages of $16.5 billion.[29] It was also the deadliest fire in California history, with 85 civilian fatalities. Wildfires have always been part of California's natural ecology and will continue to be. However, changes to the state's climate and precipitation expands the footprint of wildfire threat, severity, and intensity, with one quarter of California—more than 25 million acres—now classified as being under very high or extreme fire threat.[30]

The impacts of wildfire smoke have been linked to respiratory infections, cardiac arrests, low birth weight, mental health conditions, and exacerbated asthma and chronic obstructive pulmonary disease.[31] In 2020, with all of California covered by wildfire smoke for over 45 days—and 36 counties for at least 90 days—maximum fine particulate ($PM_{2.5}$) levels persisted in the "hazardous" range of the Air Quality Index for weeks in several areas of the state.[32,33]

Catastrophic wildfire damages extend beyond human health and the economy. The Castle Fire in 2020 and the KNP Complex and Windy Fires in 2021 led to the loss of an unprecedented number of giant sequoias: an estimated 13 to 19 percent of the giant

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[27] CARB. 2020. Public Comment Draft Greenhouse Gas Emissions of Contemporary Wildfire, Prescribed Fire, and Forest Management Activities. https://ww3.arb.ca.gov/cc/inventory/pubs/ca_ghg_wildfire_forestmanagement.pdf.

[28] News18. 2021. San Francisco Bay Area Receives its First Wildfire Warning of 2021, After California Concludes its Driest Year. https://www.news18.com/news/buzz/san-francisco-bay-area-receives-its-first-wildfire-warning-of-2021-after-california-concludes-its-driest-year-3722897.html.

[29] Munich RE. 2019. Extreme Storms, Wildfires and Droughts Cause Heavy Nat Cat Losses In 2018. https://www.munichre.com/en/company/media-relations/media-information-and-corporate-news/media-information/2019/2019-01-08-extreme-storms-wildfires-and-droughts-cause-heavy-nat-cat-losses-in-2018.html#-1808457171.

[30] CARB. No date. Wildfires. https://ww2.arb.ca.gov/our-work/programs/wildfires/about.

[31] Reid, C. E., M. Brauer, F. H. Johnston, M. Jerrett, J. R. Balmes, and C. T. Elliott. 2016. "Critical Review of Health Impacts of Wildfire Smoke Exposure." *Environmental Health Perspectives* http://dx.doi.org/10.1289/ehp.1409277.

[32] Vargo J. A. 2020 (updated in 2021 using the NOAA Hazard Mapping System). "Time Series of Potential US Wildland Fire Smoke Exposures." *Frontiers in Public Health* https://doi.org/10.3389/fpubh.2020.00126.

[33] CalFire. 2020 *Fire Siege Report.* https://www.fire.ca.gov/media/hsviuuv3/cal-fire-2020-fire-siege.pdf.

sequoia population in the Sierra Nevada. An iconic species, giant sequoias are the largest trees on earth, with exceptional longevity outside of climate extremes.[34,35]

It is clear that we must take drastic measures to prepare for future wildfires, which is why California invested $2.7 billion in wildfire resilience from fiscal years 2020 to 2023. The exponential increase in funding launched more than 552 wildfire resilience projects in less than a year, and CAL FIRE met its 2025 goal of treating 100,000 acres a full three years ahead of schedule. Since Fiscal Year 2019–20, treatment work has significantly increased, and CAL FIRE has averaged 100,000 acres treated each fiscal year.

Although we are making progress, we have a lot more work to do in order to achieve our goal of treating one million acres annually by 2025. The Governor's Wildfire and Forest Resilience Strategy details 99 actions needed to address the key drivers of catastrophic wildfires, ramp up the pace and scale of forest management, and make threatened communities more resilient to catastrophic fires. It is also important to note that natural wildfire cycles are a part of a sustainable forest ecosystem and will continue to play a role in a healthy forests' future. We should not expect wildfires to cease, but we must manage our lands to address catastrophic wildfires that result from buildup of carbon stocks due to our interventions to suppress wildfires and from climate change resulting from fossil fuel combustion.

## Drought

Drought is a recurring feature of the California climate that has been intensified by increasingly warmer average temperatures. Anthropogenic climate trends have exacerbated drought conditions; human-caused climate change accounts for 19 percent of drought severity and 42 percent of the soil moisture deficit in this region since 2000. The governor declared a drought state of emergency in October 2021, and as of September 2022, 94 percent of California was in severe drought, and 99.8 percent[36] of the state was in at least moderate drought. The first three months of 2022 were the driest January, February, and March on record in California.[37] The harsh drought conditions affecting California are part of a larger megadrought—a drought lasting more than two

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[34] Shive, K., C. Brigham, T. Caprio, and P. Hardwick. 2021. 2021 Fire Season Impacts to Giant Sequoias. The Nature Conservancy and National Park Service. *https://www.nps.gov/articles/000/2021-fire-season-impacts-to-giant-sequoias.htm*.

[35] Shive, K. L., A. Wuenschel, L. J. Hardlund, S. Morris, M. D. Meyer, and S. M. Hood. 2022. "Ancient Trees and Modern Wildfires: Declining Resilience to Wildfire in the Highly Fire-adapted Giant Sequoia." *Forest Ecology and Management* 511, 120110. *https://doi.org/10.1016/j.foreco.2022.120110*.

[36] Drought.gov. California. National Oceanic and Atmospheric Administration (NOAA) and the National Integrated Drought Information System. *https://www.drought.gov/states/california*.

[37] Drought.ca.gov. September 26, 2022. California Drought Update. *https://drought.ca.gov/media/2022/09/Weekly-CA-Drought-Update-09262022-FINAL.pdf*.

decades—that has been ongoing in the Southwestern region of North America since 2000. The past 22 years have been the region's driest period since at least 800 CE.[38]

While large urban water districts with diversified sources of water supply have maintained water deliveries to customers through the drought, hundreds of individual well owners and some small water systems have suffered disruption. The state is providing funding for water system consolidation and modernization projects in small communities, emergency repairs and replacements for dry wells, and bottled and hauled water deliveries. A 2021 law requires small suppliers to create drought contingency plans. During the drought of the last three years the state has delivered emergency drinking water assistance to nearly 10,000 households and 150 water systems.

California agriculture is responsible for more than half of all U.S. domestic fruit and vegetable production, and in 2021 drought resulted in the fallowing of nearly 400,000 acres of fields.[39] Direct crop revenue losses were approximately $962 million, and total economic impacts were more than $1.7 billion, with over 14,000 full- and part-time job losses.[40] During the 2011–2017 drought, California's agricultural industry suffered at least $5 billion in losses.[41] The 2022–23 budget includes $100 million to support agricultural water conservation practices, provide on-farm technical assistance, and provide direct relief to small farm operators.

Though native California species are adapted to drought, human engineering has altered most streams and wetlands in the state, making drought increasingly stressful to fish and wildlife. The state has conducted hundreds of fish and amphibian rescues in this drought to move creatures from diminished habitat, upgraded hatcheries, and boosted hatchery production, and has hauled millions of young hatchery salmon to San Francisco Bay to avoid adverse river conditions. State biologists monitor dozens of streams statewide and have negotiated voluntary agreements with landowners and water users to improve stream flows and temperatures.

California has started to implement major policies to build resilience to combat drought—such as the Sustainable Groundwater Management Act of 2014, the governor's Water Resilience Portfolio (2020), the governor's Water and Supply Strategy (August 2022), and

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[38] Williams, A. P., B. I. Cook, and J. E. Smerdon. 2022. "Rapid Intensification of The Emerging Southwestern North American Megadrought in 2020–2021." *Nature Climate Change* https://doi.org/10.1038/s41558-022-01290-z.

[39] Medellín-Azuara, J. 2022. *Economic Impacts of the 2021 Drought on California Agriculture.* University of California Merced. https://wsm.ucmerced.edu/wp-content/uploads/2022/02/2021-Drought-Impact-Assessment_20210224.pdf.

[40] Medellín-Azuara. *Economic Impacts of the 2021 Drought*.

[41] National Resources Defense Council (NRDC). 2019. Climate Change and Health in California. Issue Brief. https://www.nrdc.org/sites/default/files/climate-change-health-impacts-california-ib.pdf.

new standards for indoor, outdoor, and industrial water use. However, it is crucial that we take further actions to minimize the impacts of drought in the years to come.

## Extreme Heat

California's hottest summer on record was 2021.[42] Death Valley recorded the world's highest reliably measured temperature (130°F) in July 2021, breaking its own record (129°F) from summer 2020.[43] Meanwhile, Fresno also broke one of its own records, with 64 days over 100°F in 2021.[44] This is part of a trend: the daily maximum average temperature, an indicator of extreme temperature shifts, is expected to rise 4.4°F–5.8°F by 2050 and 5.6°F–8.8°F by 2100.[45] Heat waves that result in public health impacts are also projected to worsen throughout the state. By 2050, these heat-related health events are projected to last two weeks longer in the Central Valley and occur four to ten times more often in the Northern Sierra region.[46]

Heat ranks among the deadliest of all climate hazards in California, and heat waves in cities are projected to cause two to three times more heat-related deaths by mid-century.[47] Climate vulnerable communities[48] will experience the worst of these effects, as heat risk is associated and correlated with physical, social, political, and economic factors. Aging populations, infants and children, pregnant people, and people with chronic illness are especially sensitive to heat exposure.[49,50] Combining these characteristics and existing health inequities with additional factors such as poverty, linguistic isolation,

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[42] NOAA. 2022. Climate at a Glance. https://www.ncdc.noaa.gov/cag/statewide/time-series/4/tavg/3/8/1895-2021?base_prd=true&firstbaseyear=1901&lastbaseyear=2000.

[43] Masters, J. 2021. Death Valley, California, breaks the all-time world heat record for the second year in a row. Yale Climate Connections. https://yaleclimateconnections.org/2021/07/death-valley-california-breaks-the-all-time-world-heat-record-for-the-second-year-in-a-row/.

[44] NOAA. Climate Data Online Search. Accessed on 16 March 2022. https://www.ncdc.noaa.gov/cdo-web/search.

[45] Governor's Office of Planning and Research (OPR), CEC, and CNRA. 2018. *California's Fourth Climate Change Assessment*. Page 23. https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-013_Statewide_Summary_Report_ADA.pdf.

[46] OPR, CEC, and CNRA. *California's Fourth Climate Change Assessment - Statewide Summary Report.* https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-013_Statewide_Summary_Report_ADA.pdf.

[47] Ostro, B., S. Rauch, and S. Green. 2011. "Quantifying the health impacts of future changes in temperature in California." National Library of Medicine. https://pubmed.ncbi.nlm.nih.gov/21975126/.

[48] CARB. Priority Populations. California Climate Investments. https://www.caclimateinvestments.ca.gov/priority-populations.

[49] Basu, R. 2009. "High Ambient Temperature and Mortality: A Review of Epidemiologic Studies from 2001 to 2008." National Library of Medicine. https://pubmed.ncbi.nlm.nih.gov/19758453/.

[50] Basu, R., and B. Malig. 2011. "High Ambient Temperature and Mortality in California: Exploring the Roles of Age, Disease, and Mortality Displacement." National Library of Medicine. https://pubmed.ncbi.nlm.nih.gov/21981982/.

housing insecurity, and the legacy of racist redlining practices, can put individuals at a disproportionately high risk of heat-related illness and death.[51,52] Rising temperatures will also speed up smog-forming chemical reactions, leading to worse asthma, reduced lung function, cardiac arrest, and cognitive decline. African American, American Indian/Alaskan Native, and Puerto Rican Californians are particularly sensitive to smog, as they are between 28.6 and 132.5 percent more likely to be diagnosed with asthma than white Californians.[53]

In addition to the dangers to public health, California's September 2022 heat wave is particularly illustrative of how more frequent extreme heat strains the state's infrastructure we depend on to adapt to a changing climate. For example, as all-time high temperature records were broken in Sacramento, San Jose, Santa Rosa and Fairfield, electricity demand for air conditioning threatened to overwhelm the state power supply.[54]

California has taken major steps to protect communities from the impacts of extreme heat. Our recent budgets invest $800 million to cool our schools and neighborhoods, including projects to reduce urban overheating. The Extreme Heat Action Plan, released in April 2022, outlines the all-of-government approach California is taking to reduce urgent risks and build long-term resilience to the impacts of extreme heat. In September 2022, Governor Newsom signed multiple bills addressing extreme heat, including AB 2238 (Rivas, Chapter 264, Statutes of 2022), which will create the nation's first extreme heat advance warning and ranking system to better prepare communities ahead of heat waves. The Administration is committed to addressing extreme heat, but we still have a lot of work to do.

Wildfires, drought, and extreme heat are some of the most pronounced climate impacts California is experiencing, but they are not the only ones. Sea level rise, rising ocean temperatures, ocean acidification, and inland flooding are also already having devastating impacts on our communities, ecosystems, and economy, and will continue to do so in the years and decades to come. The decisions and actions that we take today will determine how strongly we will feel the impacts of climate change in the future.

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[51] Hoffman, J. S., V. Shandas, and N. Pendleton. 2020. "The Effects of Historical Housing Policies on Resident Exposure to Intra-Urban Heat: A Study of 108 US Urban Areas." MDPI. *https://www.mdpi.com/2225-1154/8/1/12/htm*.

[52] U.S. Climate Resilience Toolkit. No date. Heat and Social Inequity in the United States. *https://toolkit.climate.gov/tool/heat-and-social-inequity-united-states*.

[53] NRDC. 2019. Climate Change and Health. Issue Brief. *https://www.nrdc.org/sites/default/files/climate-change-health-impacts-california-ib.pdf*.

[54] Samenow, Jason. 2022. No September on record in the West has seen a heat wave like this. *The Washington Post.* September 9. *https://www.washingtonpost.com/climate-environment/2022/09/08/western-heatwave-records-california-climate/*.

# Imperative To Act

## Consequences of Further Warming

The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) found that it will not be possible to keep global warming within the threshold of 1.5°C to avoid the most severe impacts of climate change unless we make immediate and large-scale reductions in GHG emissions. It finds that atmospheric concentrations of $CO_2$ have increased by 50 percent since the industrial revolution, and that they continue to increase at a rate of two parts per million each year.[55] Without immediate action, the world will exceed 1.5°C (or 2.7°F) warming by the 2030s, and no later than 2040.

While every tenth of a degree matters—every incremental increase in warming brings additional negative impacts—climate-related risks to human health, livelihoods, and biodiversity are projected to increase further under 2°C (or 3.6°F) warming, compared to 1.5°C.[56] To remain below 1.5°C with limited or no overshoot of that threshold, global net anthropogenic $CO_2$ emissions need to be cut by about half by 2030 and reach net-zero by 2050.

If we fail to make rapid changes, we may not be able to limit global warming to 2°C,[57] and the consequences of inaction would be catastrophic. Our planet is already 1.2°C warmer than pre-industrial times due to human-induced warming, and many impacts we are already experiencing, such as sea level rise, are "irreversible" for centuries to millennia.[58] Californians with the fewest resources, who are disproportionately low-income communities and communities of color, are the most vulnerable to the impacts of climate change. While the human costs associated with health impacts can never be fully monetized, a recent report finds that the health costs of climate and air pollution in the U.S. are well over $800 billion today and will continue to grow in the coming years.[59]

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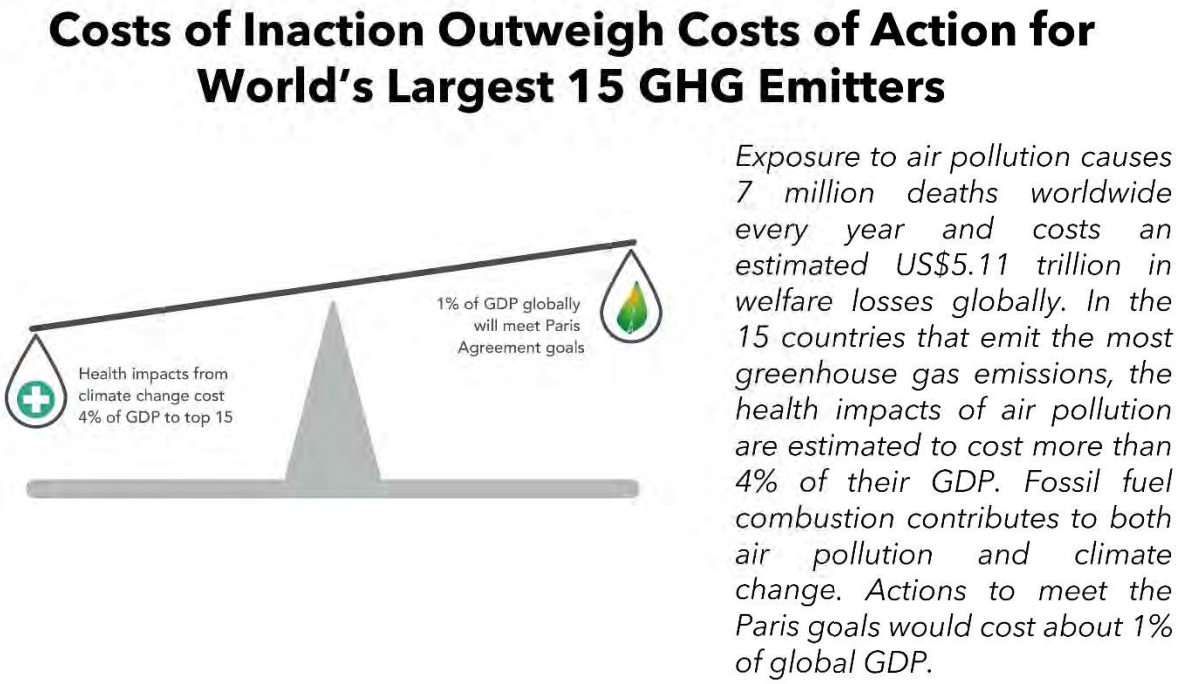
[55] IPCC. 2021. *Climate Change 2021: The Physical Science Basis.* https://www.ipcc.ch/report/ar6/wg1/.
[56] IPCC. 2018. *Special Report: Global Warming of 1.5°C.* World Meteorological Organization. https://www.ipcc.ch/sr15/.
[57] IPCC. 2021. Summary for Policymakers. In: *Climate Change 2021: The Physical Science Basis.* Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. In Press. https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM_final.pdf.
[58] United Nations. 2021. IPCC report: 'Code red.' https://news.un.org/en/story/2021/08/1097362#:~:text=%27Code%20red%20for%20humanity%27&text=We%20are%20at%20imminent%20risk,%2C%20to%20keep%201.5%20alive.%22.
[59] Alwis, D. D., and V. S. Limaye. No date. *The Costs of Inaction*. https://www.nrdc.org/sites/default/files/costs-inaction-burden-health-report.pdf.

Any delays in action or insufficient action are a threat to public health and the environment. The impacts to our economy would be devastating as well. While not specific to California, a 2022 report from Deloitte Economics Institute finds that failing to take sufficient action to reduce emissions could result in economic losses to the U.S. of more than $14.5 trillion over the next 50 years.[60] On a hopeful note, however, the report finds that if the country invests now and in the coming years in a net-zero economy, $3 trillion could be added to the economy over the next 50 years. The U.S. annual gross domestic product (GDP) would be 2.5 percent higher in 2070 in this fast-action scenario than in the delayed action scenario. The lessons for California from these analyses are clear: invest now or pay the price later. As shown in Figure 1-2, inaction can lead to negative consequences for individuals, communities, the economy, and society as a whole. As discussed later, Governor Newsom and the Legislature have accepted this imperative and made significant investments in climate action. This Scoping Plan combined with the historic investments and policy direction from the governor and Legislature, will result in unprecedented action to address the climate crisis.

[60] Deloitte. 2022. *The Turning Point.* *https://www2.deloitte.com/content/dam/Deloitte/us/Documents/about-deloitte/us-the-turning-point-a-new-economic-climate-in-the-united-states-january-2022.pdf?id=us:2el:3dp:wsjspon:awa:WSJSBJ:2021:WSJFY22*.

**Figure 1-2: The real costs of inaction[61]**




# Scoping Plan Overview

## Previous Scoping Plans

The Scoping Plan is a strategy the California Air Resources Board (CARB) develops and updates at least one every five years, as required by AB 32. It lays out the transformations needed across our society and economy to reduce emissions and reach our climate targets. This Scoping Plan is the third update to the original plan that was adopted in 2008. The initial Scoping Plan laid out a path to achieve the AB 32 2020 limit of returning to 1990 levels of GHG emissions, a reduction of approximately 15 percent below business as usual.[62] The 2008 Scoping Plan included a mix of incentives, regulations, and carbon pricing, laying out the portfolio approach to addressing climate change and clearly making the case for using multiple tools to meet California's GHG targets. The 2013 Scoping Plan assessed progress toward achieving the 2020 limit and made the case for addressing

[61] Katowice, P. 2018. *Health benefits far outweigh the costs of meeting climate change goals.* WHO. https://www.who.int/news/item/05-12-2018-health-benefits-far-outweigh-the-costs-of-meeting-climate-change-goals.

[62] CARB. 2008. *Climate Change Scoping Plan.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/document/adopted_scoping_plan.pdf.

short-lived climate pollutants (SLCPs).[63] The most recent update, the 2017 Scoping Plan,[64] also assessed the progress toward achieving the 2020 limit and provided a technologically feasible and cost-effective path to achieving the Senate Bill 32 (SB 32, Pavley, Chapter 249, Statutes of 2016) target of reducing GHGs by at least 40 percent below 1990 levels by 2030.

## Overview of this Scoping Plan

It is paramount that we continue to build on California's success by taking effective actions and doubling down on implementation of the strategies outlined here. As such, this Scoping Plan builds on and integrates efforts already underway to reduce the state's GHG, criteria pollutant, and toxic air contaminant emissions by identifying the clean technologies and fuels that should be phased in as the state transitions away from combustion of fossil fuels. By selecting and pursuing a sustainable and clean economic path, the state will continue to successfully execute existing programs, work to eliminate air pollution inequities, demonstrate the coupling of economic growth and environmental progress, and enhance new opportunities for engagement within the state to address and prepare for climate change.

The 2022 Scoping Plan for Achieving Carbon Neutrality (Scoping Plan) is the most comprehensive and far-reaching Scoping Plan developed to date. It identifies a technologically feasible and cost-effective path to achieve carbon neutrality by 2045 while also assessing the progress California is making toward reducing its GHG emissions by at least 40 percent below 1990 levels by 2030, as called for in SB 32 and laid out in the 2017 Scoping Plan.[65] The 2030 target is an interim but important stepping stone along the critical path to the broader goal of deep decarbonization by 2045. Modeling for this Scoping Plan shows that this decade must be one of transformation on a scale never seen before to set us up for success in 2045.

The relatively longer path assessed in this Scoping Plan incorporates, coordinates, and leverages many existing and ongoing efforts to reduce GHGs and air pollution, while identifying new clean technologies and energy. Given the focus on carbon neutrality, this Scoping Plan also includes discussion for the first time of the Natural and Working Lands (NWL) sectors as both sources of emissions and carbon sinks. Chapter 2 of this document

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[63] CARB. 2014. *First Update to the Climate Change Scoping Plan.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf.
[64] CARB. 2017. *California's 2017 Climate Change Scoping Plan.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/scoping_plan_2017.pdf.
[65] CARB. 2017. *California's 2017 Climate Change Scoping Plan.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/scoping_plan_2017.pdf.

includes a description of a suite of specific actions to drastically reduce GHGs across all sectors. Chapter 3 provides the air quality and economic evaluations of the actions. Chapter 4 provides a broader description of the many actions needed across all sectors to achieve carbon neutrality. Chapter 5 provides an overview of the next steps and partnerships needed to implement this Scoping Plan. Guided by legislative direction, the actions identified in this Scoping Plan reduce overall GHG emissions in California and deliver policy signals that will continue to drive investment and certainty in a low carbon economy. This Scoping Plan builds upon the successful framework established by the Initial Scoping Plan and subsequent updates while identifying new, technologically feasible, and cost-effective strategies.

## Principles That Inform Our Approach to Addressing the Climate Challenge

California has decades of experience addressing the climate challenge. Through this experience, and based on extensive engagement with stakeholders through our regulatory and program development processes, we have developed a set of principles to inform our approach.

### Unprecedented Investments in a Sustainable Future

The scale of transformation needed over this decade to avoid the worst impacts of climate change and meet our ambitious climate goals is extraordinary. This is why Governor Newsom and the Legislature invested over $15 billion in climate action through the 2021–2022 California Comeback Plan, and why the 2022–2023 budget marks the beginning of the California Climate Commitment—the governor's multi-year plan to invest $54 billion in climate action. The enacted budgets (Figure 1-3) and the California Climate Commitment represent investments of a historic scale and will advance precisely the type of all-of-government approaches necessary to create the whole-of-society changes described in this Scoping Plan that will enable us to avert the worst impacts of climate change.

**Figure 1-3: Comprehensive California climate change investments**

The *California Climate Commitment* includes the following game-changing elements:

- $10 billion for zero-emission vehicles (ZEVs), including $1.5 billion for electric school buses to protect students' health and $3 billion to build an accessible charging network. ZEV investments will particularly focus on programs such as heavy-duty vehicle and port electrification that will reduce emissions and protect public health in low-income communities.
- $2.1 billion for clean energy investments, such as long duration storage, offshore wind, green hydrogen,[66] and industrial decarbonization.
- $13.8 billion for programs that reduce emissions from the transportation sector, such as improving public transportation while also funding walking, biking, and adaptation projects.
- Over $720 million for California's higher education institutions and research that will support the next generation of climate innovations.

[66] For the purposes of this Scoping Plan, "renewable hydrogen" and "green hydrogen" are interchangeable and are not limited to only electrolytic hydrogen produced from renewables.

- Nearly $1 billion to build sustainable, affordable housing and over $1 billion to help low-income Californians realize energy cost savings through building decarbonization.
- Nearly $9 billion for wildfire risk reduction, drought mitigation, extreme heat resilience, and nature-based solutions.

These investments are incredibly important in the context of this Scoping Plan in that they accompany and help support implementation of the many policies and regulations that will continue to be necessary to achieve our 2030 and carbon neutrality targets. In addition, these incentive programs jump-start emission reduction strategies for priority sectors, sources, and technologies, leveraging private-sector investment and building sustainable, growing markets for clean and efficient technologies. Many of California's incentive programs work in concert with federal and other state programs to drive emission reductions. As an example, as California pushes to move to 100% sales of new zero emission-vehicles, including plug-in hybrid vehicles, the Newsom Administration continues to invest heavily in incentive programs that allow families, communities, and businesses to choose zero-emission vehicles. This is done while simultaneously working with the federal government, other states, and jurisdictions around the world to align policies, regulations, and incentives, creating market certainty for the automakers that serve our markets.

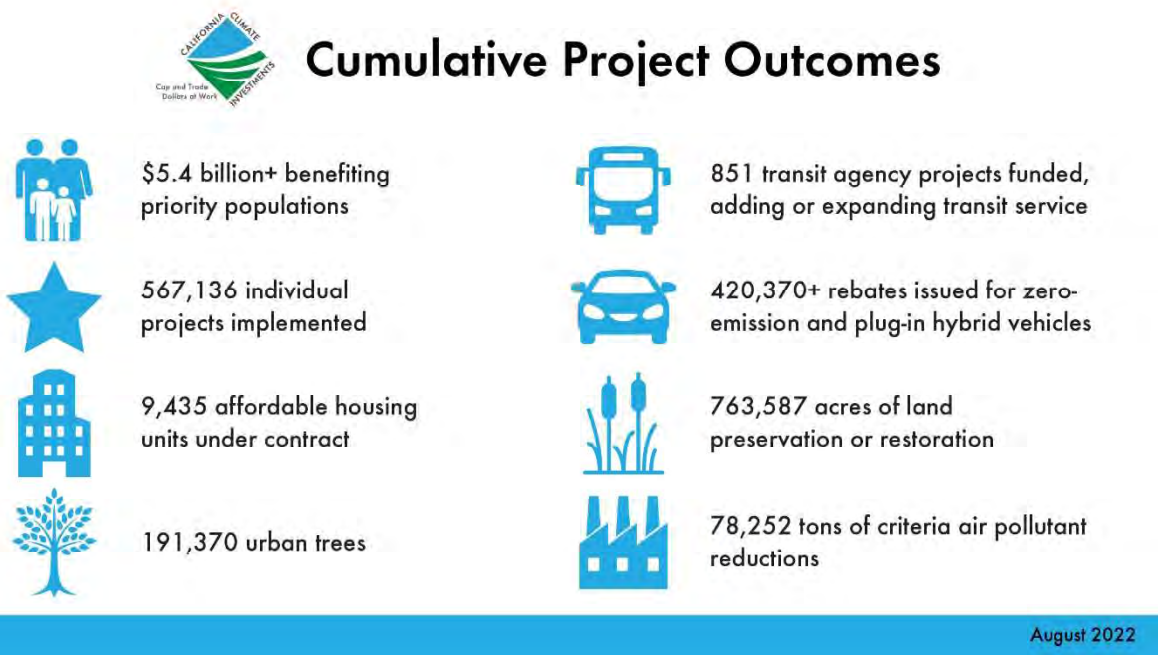
## Centering Equity

Prioritizing equity is just as important as the magnitude of the climate investments California is making. Addressing climate change and advancing our equity and economic opportunity goals cannot be decoupled. In line with the governor's Executive Order[67] to take additional actions to embed equity analysis and considerations, this plan works to center equity by addressing disparities for historically underserved and marginalized communities. California strives to ensure that our climate and air research, regulations, investments, and plans include provisions that specifically address and advance equity. This includes reducing and eliminating air pollution disparities, removing barriers that can prevent frontline communities from accessing benefits, lowering costs for low-income Californians, and promoting high-quality jobs. CARB's incentive programs regularly surpass their mandated equity targets, and CARB has incorporated equity-focused provisions in our research, planning, and regulatory efforts. For instance, statute requires that a minimum of 35 percent of California Climate Investments benefit low-income households along with disadvantaged and low-income communities (referred to as *priority*

[67] Executive Department. State of California. 2022. Executive Order N-16-22. *GSS_9320_2-20220912152941 (ca.gov)*.

*populations*). However, 48 percent—over $5.4 billion—of implemented California Climate Investments project funding is benefiting priority populations, greatly exceeding the statutory minimums (see Figure 1-4). Senate Bill 535 (De León, Chapter 830, Statutes of 2012) and AB 1550 (Gomez, Chapter 369, Statutes of 2016) direct state and local agencies to make significant investments using auction proceeds to assist California's most vulnerable communities. Under these laws, a minimum of 25 percent of the total investments are required to be located within and provide benefits to disadvantaged communities, and at least 10 percent of the total investments must benefit low-income communities and households. Moving forward, the state will continue to devote a greater share of incentive funding to priority populations, with the light-duty vehicle incentive program as just one example. We can simultaneously confront the climate crisis and build a more resilient, just, and equitable future for all communities.

**Figure 1-4: California climate investments cumulative outcomes[68,69]**




## Role of the Environmental Justice Advisory Committee

To inform the development of the Scoping Plan, AB 32 calls for the convening of an Environmental Justice Advisory Committee (EJ Advisory Committee) to advise CARB in developing the Scoping Plan, and any other pertinent matter in implementing AB 32. It requires that the Committee be comprised of representatives from communities with the most significant exposure to air pollution, including communities with minority populations and/or low-income populations. On January 25, 2007, CARB appointed the first

[68] CARB. 2022. California Climate Investments program implements $10.5 billion in greenhouse gas-reducing programs, expected to reduce 76 million metric tons of emissions. April 11. *https://ww2.arb.ca.gov/news/california-climate-investments-program-implements-105-billion-greenhouse-gas-reducing-projects*.

[69] SB 535 and AB 1550 require investments located in and benefiting low-income communities and households, which are termed *priority populations. Disadvantaged communities* are currently defined by CalEPA as the top 25 percent of communities experiencing disproportionate amounts of pollution, environmental degradation, and socioeconomic and public health conditions according to the Office of Environmental Health Hazard Assessment's *CalEnviroScreen tool,* plus certain additional communities including federally recognized Tribal Lands. Low-income communities and households are defined by statute as those with incomes either at or below 80 percent of the statewide median or below a threshold designated as low-income by the Department of Housing and Community Development.

Environmental Justice Advisory Committee to advise it on the Initial Scoping Plan and other climate change programs.

For this Scoping Plan, CARB reconvened the EJ Advisory Committee in May 2021. The committee is currently comprised of 14 environmental justice and disadvantaged community representatives, including the EJ Advisory Committee's first tribal representative, who was appointed in February 2022. In October 2021, the EJ Advisory Committee formally created eight workgroups. These workgroups are a space for EJ Advisory Committee members to better understand specific sectors of the Scoping Plan and to assist the EJ Advisory Committee in the development of recommendations on this Scoping Plan. In December 2021, the EJ Advisory Committee provided scenario input responses to help shape the modeling for this Scoping Plan. In February 2022, San Joaquin Valley EJ Advisory Committee members hosted their first community workshop, with over 100 attendees. In March 2022, the CARB Board held a joint public meeting with the EJ Advisory Committee to discuss their draft preliminary recommendations for this Scoping Plan. In June 2022, over 165 attendees participated in a statewide community workshop held by EJ Advisory Committee members. The full schedule of EJ Advisory Committee Meetings and meeting materials are available on CARB's website.[70] This Scoping Plan includes references where EJ Advisory Committee Final Recommendations[71] are included in the document. The final recommendations were discussed at a joint CARB and EJ Advisory Committee Hearing on September 1, 2022.

The integration of environmental justice is critical to ensure that certain communities are not left behind. The AB 32 EJ Advisory Committee provided recommendations on September 30 in advance of the final Scoping Plan. There are footnotes to indicate where there is alignment between the AB 32 EJ Advisory Committee's recommendations and this Scoping Plan. While the language in the text may not fully incorporate the specific EJ Advisory Committee's recommendation, the footnotes do acknowledge the places in the text where there is general alignment with the spirit of the EJ Advisory Committee's recommendation.

## Partnering with Tribes

[70] CARB. Environmental Justice Advisory Committee Meetings and Events. https://ww2.arb.ca.gov/environmental-justice-advisory-committee-meetings-and-events.
[71] Environmental Justice Advisory Committee. September 30, 2022. 2022 Scoping Plan Recommendations. https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2022/090122/finalejacrecs.pdf.

There are 109 federally recognized tribes and over 60 non-federally recognized tribes in California.[72] In 2011, Governor Brown issued Executive Order B-10-11, recognizing and reaffirming the inherent right of tribes to exercise sovereign authority over their members and territory and directing state agencies to engage in government-to-government consultation with tribe and to work to develop partnerships and consensus.[73] In 2019, Governor Newsom issued Executive Order N-15-19, which acknowledges and apologizes on behalf of the state for the historical "violence, exploitation, dispossession and the attempted destruction of tribal communities."[74] Establishing partnerships with tribal leaders to incorporate their priorities, traditional expertise, and knowledge will be important to achieving California's climate goals. The Scoping Plan includes actions that tribal partners can voluntarily implement for sources under their jurisdiction (e.g., transitioning to zero emission fleets, installing infrastructure and control technologies, conducting climate smart land management). The Scoping Plan also uplifts the importance of having our tribal partners help guide actions that may impact tribal cultural resources and of benefitting from tribal input.

We also need alignment between state and local partners and tribes on actions related to land-use decisions. This means respecting and reinforcing tribal sovereignty and self-determination. As tribes do not always draw clear lines between the "natural" and "cultural" resources of a place, taking a holistic perspective will result in positive impacts in ability to address the complex issues of land management and regulatory undertakings.

Tribes have an intimate and historical knowledge of places and should be engaged early on to inform planning and future management related to activities that may impact tribal resources and areas including potential funding opportunities, technical assistance, and capacity building, where appropriate. Additionally, tribes should be involved in the identification of their own significant resources and areas of use. As decisions are made related to Scoping Plan undertakings, agencies should recognize and appropriately consider cultural resources and management from the beginning, not as an afterthought; and consider how the project could impact tribes.

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[72] These numbers are subject to change depending on determinations made by the Bureau of Indian Affairs (BIA) and the Native American Heritage Commission (NAHC). Please consult the most current Federal Register for a list of federally recognized tribes and the NAHC for a list of non-federally recognized tribes in California. As of the date of the Scoping Plan, the current list for federally recognized tribes is located at 87 Fed. Reg. 4636 (Jan. 28, 2022).

[73] Executive Order B-10-11. *https://www.ca.gov/archive/gov39/2011/09/19/news17223/index.html#:~:text=EXECUTIVE%20ORDER%20B-10-11%20Published%3A%20Sep%2019%2C%202011%20WHEREAS,and%20affirmed%20in%20state%20and%20federal%20law%3B%20and*.

[74] Executive Order N-15-19. *https://tribalaffairs.ca.gov/wp-content/uploads/sites/10/2020/02/Executive-Order-N-15-19.pdf*.

Finally, to the extent allowed by law, traditional ecological knowledge and culturally sensitive information should be protected, as this is information that may not be common knowledge and may not be known outside the tribe, as each tribe is unique and influenced by its local environment and cultural practices. Protection of this information will help foster productive relationships with tribes and should be included as part of the process. CARB and other agencies should continue to foster relationships with tribal partners.

## Maximizing Air Quality and Health Benefits

The state has over 50 years of experience successfully cleaning the air in California by addressing criteria pollutants and toxic air contaminants from mobile and stationary sources. CARB has been a leader in measuring, evaluating, and reducing sources of air pollution that impact public health. Its air pollution programs have been adapted for national programs and emulated in other countries. Significant progress has been made in reducing diesel particulate matter (PM), which is a designated toxic air contaminant, and many other hazardous air pollutants. CARB partners with local air districts to address stationary source emissions and adopts and implements state-level regulations to address sources of criteria and toxic air pollution, including mobile sources. CARB also collaborates with federal agencies to address air pollution from sources primarily under federal jurisdiction. In many instances, actions to reduce fossil fuel combustion and achieve federal air quality standards also help to reduce GHG emissions.

However, air pollution disparities still exist, and more must be done to ensure the most vulnerable populations have safe air to breathe. California must continue to evaluate opportunities to harmonize our climate and air quality programs through innovative policymaking and by building on existing programs like the Low Carbon Fuel Standard (LCFS) and Community Air Protection Program. The LCFS includes a provision that allows electric utilities to opt-in and generate residential electric vehicle (EV) charging credits, where some of the revenues are invested back into rebate programs that address air quality and climate pollution.[75] The Community Air Protection Program[76] is the first of its kind in the country and brings together diverse stakeholders, including CARB, local air districts, and residents of environmental justice communities to increase local air monitoring and develop community-led plans to improve air quality in the communities most impacted by air pollution.

This Scoping Plan identifies actions that will deliver near-term air quality benefits to communities with the highest exposures and provide long-term GHG benefits. Many of the actions in this Scoping Plan are key elements of the 2022 State Strategy for the State

[75] CARB. LCFS Utility Rebate Programs. *https://ww2.arb.ca.gov/resources/documents/lcfs-utility-rebate-programs*.
[76] CARB. Community Air Protection Program. *https://ww2.arb.ca.gov/capp*.

Implementation Plan to meet federal air quality standards,[77] which has a primary focus of reducing harmful air pollution and achieving federal air quality targets. California's approach of leveraging air quality and GHG policies together has yielded results. A 2022 report by the Office of Environmental Health and Hazard Assessment (OEHHA)[78] that evaluated GHG and harmful air pollution emissions from the heavy-duty vehicle (HDV) and large stationary source sectors found declines in emissions in both sectors, with the greatest declines in disadvantaged communities. Both sectors are subject to state GHG and air quality policies, in addition to federal and local rules on harmful air pollution. Because of historically racist and discriminatory practices such as redlining, both types of sources are disproportionately located adjacent to vulnerable communities, which are predominantly communities of color.[79] The key findings from the OEHHA report are as follows:

- Both HDVs and facilities subject to the Cap-and-Trade Program have reduced emissions of co-pollutants, with HDVs showing a clearer downward trend when compared to stationary sources. These emission reductions have major health benefits, including a reduction in premature pollution-related deaths.
- The greatest beneficiaries of reduced emissions from both HDVs and facilities subject to the Cap-and-Trade Program have been in communities of color and in disadvantaged communities in California, as identified by CalEnviroScreen (CES). This has reduced the emission gap between disadvantaged and non-disadvantaged communities, but a wide gap still remains.
- The transition to zero-emission HDVs will expedite further emissions reductions.
- While the progress observed is encouraging, inequities persist, and federal, state, and local climate and air quality programs must do more to reduce emissions of GHGs and co-pollutants to reduce the burden of emissions on disadvantaged communities and communities of color.

It will take all tools at all levels of government, with robust enforcement, to ensure that vulnerable communities continue to see improvements in air quality until no disparities exist in air pollution across the state.

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[77] CARB. 2022 State Strategy for the State Implementation Plan. *https://ww2.arb.ca.gov/resources/documents/2022-state-strategy-state-implementation-plan-2022-state-sip-strategy*.
[78] OEHHA. 2022. *Impacts of Greenhouse Gas Emission Limits within Disadvantaged Communities: Progress Toward Reducing Inequities. https://oehha.ca.gov/environmental-justice/report/ab32-benefits*.
[79] CalEPA. 2021. Pollution and Prejudice. *https://storymaps.arcgis.com/stories/f167b251809c43778a2f9f040f43d2f5*.

## Economic Resilience

The state's efforts to tackle the climate crisis will create economic and workforce development opportunities in the clean energy economy in communities across the state. Transitioning existing skills and expanding workforce training opportunities in climate-related fields are critical for reducing harmful emissions and supporting workers in transitioning to new, high-quality jobs. The Administration's recent budgets acknowledge the challenges facing workers in industries most affected by the state's response to climate change—especially those in the fossil fuel industry. It will invest $1 billion in regional partnerships and economic diversification to create new jobs and support a local tax base and workforce transition and development once opportunities are identified. It also will invest in safety nets to protect, and support impacted communities as part of the transition to a carbon neutral economy. Specifically, the Community Economic Resilience Fund Program[80] (CERF) supports communities and regional groups in producing regional roadmaps for economic recovery and transition that prioritize the creation of accessible, high-quality jobs in sustainable industries. The budget investments create the opportunity to future-proof and increase economic resilience in the face of more frequent climate impacts and shifting economic conditions. For these investments and implementation of the Scoping Plan to be successful in supporting the transition to a carbon neutral economy, workers and affected communities must be included in ongoing dialogue to ensure a high-road transition for regional economies.

That state also recognizes it can play a more direct role in supporting a sustainable work force through its incentive programs. In 2021, Assembly Bill 680 (AB 680) (Burke, Chapter 746, Statutes of 2021) was signed into law, requiring CARB to work with the California Labor and Workforce Development Agency to update the Funding Guidelines to include new workforce standards. CARB's Funding Guidelines currently include requirements for administering agencies to, wherever possible, foster job creation within California, provide employment opportunities or job training tied to employment, and target these opportunities to priority populations. The Funding Guidelines also recommend administering agencies prioritize investments in projects that directly support jobs or a job training and placement program, and that they report the estimated employment benefits and employment outcomes for projects that meet specified criteria. These new requirements apply to agencies administering certain California Climate Investments

[80] Office of Planning and Research. Community Economic Resilience Fund. *https://opr.ca.gov/economic-development/cerf/*.

programs that receive continuous appropriations from the Greenhouse Gas Reduction Fund and fall into the following six categories of standards:

- fair and responsible employer standards,
- inclusive procurement policies,
- prevailing wage for construction work,
- community workforce agreements for construction projects over one million dollars,
- preference for projects with educational institutions or training programs, and
- creation of high-quality jobs. CARB will be updating the Funding Guidelines through a public process over the next year to operationalize these new requirements.

## Partnering Across Government

The Scoping Plan is an actionable plan to identify and align programs and policies to achieve California's climate targets. To realize the outcomes and deliver results in any Scoping Plan, action is critical. For this Scoping Plan, there are also actions that rely on our federal partners to take on sources primarily under their jurisdiction (such as aviation, and federally owned/managed lands) while they also continue to develop national programs for GHG reductions. The federal government is already taking major steps to advance these types of programs. The Inflation Reduction Act of 2022[81] includes $369 billion for domestic energy production and manufacturing and is expected to lead to U.S. GHG emission reductions of roughly 40 percent by 2030. Direct incentives will include those for clean vehicles and ENERGY STAR appliances, as well as improving transportation and clean energy in underserved communities.

We also need our local partners to align on actions related to land-use decisions that support sustainable, resilient, low-carbon communities and permitting for clean energy production facilities and infrastructure; diversion of organics from landfills; and other climate-related projects. State agencies also should use the Scoping Plan to review and update their own programs and policies to support the actions identified in this Scoping Plan. Importantly, the Scoping Plan also can serve as a resource as the Legislature considers new legislative direction and funding to support the state's path to carbon neutrality and continue action to address near-term air pollution disparities.

## Partnering with the Private Sector

Government cannot achieve our climate targets alone. The scale of investment needed requires both private-sector investment and partnerships with philanthropies. Public

[81] Pub.L. No. 117-169 (August 16, 2022).

sector dollars, accompanied by strong and steady policy signals, must be a catalyst for deeper and broader investments by the private sector in both reducing emissions and building the resilience of our communities. Governor Newsom is committed to working collaboratively with businesses, including small businesses, to deploy the technologies, capital, and ingenuity that are hallmarks of the private sector.

California structures our climate policies and regulations to create market signals and certainty that spur private sector investment. For example, the Governor's Executive Order on Zero-Emission Vehicles[82] set 2035 as the target year for 100 percent zero-emission vehicle sales, creating a time horizon that allows automakers to scale up zero-emission fleets and sending a clear signal to the companies and utilities that would deploy charging infrastructure. The Executive Order has been followed by development and adoption of the Advanced Clean Cars II regulation. CARB convened auto manufacturers, environmental justice groups, labor organizations, and many other stakeholders to provide input into development of the regulation in a robust and transparent manner; again, with the aim of providing certainty for producers and consumers.

California also pursues public-private partnerships (PPP) as a mechanism to advance our collective climate goals. We know these vehicles can be effective at increasing the impact of public sector dollars and helpful in moving markets in a direction aligned with state policy. A new PPP the Administration is advancing is the Climate Catalyst Revolving Loan Fund, housed at the state's Infrastructure and Economic Development Bank (IBank). The fund offers a range of financial instruments—including flexible credit and credit support—to help bridge financing gaps currently preventing advanced climate solutions from scaling in the marketplace. The Catalyst Fund's initial areas of investment include forest biomass management and utilization (unlocking innovation to reduce wildfire threats), climate-smart agriculture, and clean energy transmission. The fund leverages public sector investments by mobilizing private finance for shovel-ready projects that are stuck in the deployment phase. As such, IBank is ideally positioned as the state's all-purpose "Green Bank," with increasing connection to federal financing programs such as US DOE's Loan Programs Office and the United States Environmental Protection Agency's (U.S. EPA) Greenhouse Gas Reduction Fund.

The Catalyst Fund builds from existing IBank financing programs that are themselves increasingly focused on the climate imperative. The IBank's Infrastructure State Revolving Fund provides supportive capital to climate-aligned projects promoted by local governments and certain nonprofit entities, and will be refining its criteria and market outreach strategies to increase its level of service. IBank's bonds program has supported

[82] Executive Department. State of California. Executive Order N-79-20. *https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf.*

multiple large environmental projects, including more than $2 billion in "green bonds," and is poised to help expand access to the state's deep and liquid bond capital market. Within IBank's Small Business Finance Center, the new Climate Tech Loan Guarantee program encourages commercial banks to back climate-focused small businesses, leveraging federal capital to insure a portion of the private bank's loan. And through IBank's Expanding Venture Capital Access Fund program, the state is promoting greater diversity in the venture capital community, including climate equity and climate justice.

All of these financing programs exist to leverage private capital in support of the state's climate goals, and to partner with state policy agencies driving the transition. IBank will also continue to collaborate closely with the State Treasurer's Office in its provision of capital support to climate solutions, ensuring that funding flows to programs best positioned to deliver success. This partnership of public and private capital, responsive to and in communication with the climate policy community, will ensure that California gets the maximum possible benefit from its allocation of scarce resources.

## Supporting Innovation

Reaching our ambitious, deep decarbonization goals will require continued technological innovation. Investment in research, development, and deployment of clean technologies has never been more critical. Sending clear and sustained market and policy signals will encourage large and small companies alike to pursue innovation that can be scaled up and deployed here and beyond our borders. The full suite of AB 32 policies[83] has touched nearly every sector of California's economy and spurred technology innovation in the state, including the growth of technology developers, manufacturers, processors, and assemblers in many areas. Specifically, AB 32 policies and programs support both the supply side and the demand side to build new markets in California. On the supply side, AB 32 policies support businesses to demonstrate and refine technologies, and to help establish critical supply chains. On the demand side, AB 32 policies and programs provide outreach, education, and incentives—as well as disincentives—to motivate everyone from consumers to institutional purchasers to utility planners to adopt new, climate smart technologies. Innovations resulting directly from the state's climate policies include the following:

- In the past 10 years, a growing market for heavy-duty zero-emission vehicles (HD ZEVs) was established in California, and this market now represents the largest single share of North American supply and demand for HD ZEVs. Vehicle

[83] CARB. Climate Change Programs. *https://ww2.arb.ca.gov/our-work/topics/climate-change*.

and component manufacturers are making long-term investments to develop and produce HD ZEVs within California.

- Total consumption of renewable diesel in the California LCFS market has skyrocketed from approximately 1.8 million gallons in 2011 to nearly 589 million gallons in 2020. The LCFS is a key driver of market development for renewable diesel and its coproducts. While the federal renewable fuel standard (RFS) and blenders tax credit also benefit producers, an analysis of their respective contributions to market development, and interviews with industry representatives and independent experts, point to LCFS as a more important factor in market development, at least in recent years.
- In the past five years, a market for small-scale energy storage in California was created where none previously existed. As of 2020, 185 megawatts (MW) of small-scale energy storage projects have been interconnected to the grid. The significant increase in deployment in the last five years is a result of the Self-Generation Incentive Program (SGIP), which significantly reduces the upfront costs to purchase and install small-scale energy storage devices, and of growing customer interest in disaster resiliency in the face of increasing risk from wildfire and related utility outages. These systems have already provided disaster resiliency benefits for residential and non-residential customers.

We have seen how quickly market barriers can be overcome in response to strong policy signals, as occurred in the solar panel and electric vehicle battery space. Government-stated priorities have a significant role in guiding private and public research, development, and deployment. This Scoping Plan unequivocally puts the marker down on the need for innovation to continue in non-combustion technologies, clean energy, $CO_2$ removal options, and alternatives for SLCPs. The five-year update to the Scoping Plan allows for a periodic evaluation of new tools to add to the state's toolkit.

## Engagement with Partners to Develop, Coordinate, and Export Policies

California works closely with other states, tribal governments, the federal government, and international jurisdictions to identify the most effective strategies and methods to reduce GHGs, manage GHG control programs, and facilitate the development of integrated and cost-effective regional, national, and international GHG reduction programs. For example, the state's Cap-and-Trade Program has been linked with Québec's since 2014, and CARB staff regularly engage with jurisdictions throughout the world on the design features of our Cap-and-Trade Program through memoranda of understanding (MOUs) and venues such as the International Climate Action

Partnership.[84] Low carbon fuel mandates similar to California's LCFS have been adopted by the U.S. EPA and by other jurisdictions, including Oregon, Washington, British Columbia, the European Union, and the United Kingdom. Many other jurisdictions from Japan to New Zealand, Australia, and the European Commission also continue to seek information and technical experience on our LCFS. California has and will continue to share information and encourage ambitious emissions reductions with interested jurisdictions, with a focus on China, India, Mexico, Canada, and the European Union. California's early action to reduce super-pollutants such as methane and other SLCPs was reaffirmed by the 2021 Global Methane Pledge signed by the U.S. and over 100 other countries at the 26th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC).[85]

In addition, under the Clean Air Act, the federal government is authorized to allow California to set more stringent vehicle emissions regulations than federal standards. California's goals and regulations to transition to 100 percent sales of new zero-emission passenger vehicles by 2035 (including plug-in hybrid vehicles), to drayage trucks by 2035, and other trucks and buses where feasible by 2045 are being emulated by partner states across the U.S. and in jurisdictions around the world. CARB's Advanced Clean Cars II regulation, [86] which codifies these targets, was approved in August 2022, and already at least four other states have announced their plans to adopt this regulation. Earlier in June 2020 CARB adopted the Advanced Clean Truck regulation, which requires truck manufacturers to meet increasing sale targets of zero-emission trucks in California through 2035. Since adoption, at least five other states—20 percent of the U.S. truck market—have adopted this regulation. These kinds of coordinated policies help signal to vehicle manufacturers a widespread and growing demand for zero-emissions technology, which in turn helps scale production and lower costs for consumers.

With the Mexican Secretariat for Environment and Natural Resources (SEMARNAT), California has engaged in a technical exchange on clean vehicle policies and helped to establish Mexico's Emissions Trading System (being piloted in 2022). A 2019 MOU signed between California and Environment and Climate Change Canada enables in-depth collaboration on policies and programs to decarbonize vehicles, engines, and fuels. This partnership has led to tangible emissions reductions, from aligning vehicle emissions targets and policies to collaborating on emissions testing and research critical to enforcing

[84] International Carbon Action Partnership (ICAP). Homepage. *https://icapcarbonaction.com/en?msclkid=dac30cb7b4f511ec94ccd0f1ae323e98*.
[85] Global Methane Pledge. Homepage. *https://www.globalmethanepledge.org/*.
[86] Cal. Code Regs., tit. 13, §§ 1900,1961.2, 1961.3, 1962.2, 1962.3, 1962.4, 1962.5, 1962.6, 1962.7, 1962.8, 1965, 1968.2, 1969, 1976, 1978, 2037, 2038, 2112, 2139, 2140, 2147, and 2903; and Test Procedures located here: *https://ww2.arb.ca.gov/rulemaking/2022/advanced-clean-cars-ii*.

emissions limits for vehicle manufactures. At the national level, China has looked to California for cutting-edge requirements for car diagnostics and policies that promote zero-emissions vehicles. At a local level, Beijing has adopted California's vehicle emissions standards and several other progressive environmental regulations. California will continue and renew such efforts across China, including through a 2022 MOU signed with China's Ministry of Ecology and Environment.

Between 2021 and 2023, California also will serve as president of the Transport Decarbonisation Alliance, a global network of countries, regions, cities, and companies that come together to share experiences and technical expertise, and to increase the ambition and accelerate the deployment of targeted transportation decarbonization policies across freight, electric vehicle infrastructure, and active mobility. Throughout its presidency, California will focus its leadership on decarbonizing the cross-jurisdiction network of medium- and heavy-duty vehicles, both to ensure cleaner air in freight-adjacent communities and to stem the effects of climate change.

Over the years, California has also asserted the importance of and supported the ongoing efforts of state and local clean air and climate leadership. Through our participation in the Pacific Coast Collaborative alongside British Columbia, Washington, and Oregon,[87] the Under2 Coalition,[88] the U.S. Climate Alliance,[89] the International ZEV Alliance,[90] the Transportation Decarbonisation Alliance, and many more organizations, California has and will continue to build climate partnerships with state and local governments.

California also recognized the need to address the substantial emissions caused by the deforestation and degradation of tropical and other forests, and continues its work alongside other subnational governments as part of the Governors' Climate and Forests Task Force (GCF).[91] Founded in 2008, there are currently 39 GCF members, including states and provinces in Brazil, Colombia, Ecuador, Indonesia, Ivory Coast, Mexico, Nigeria, Peru, Spain, and the United States—all of whom are considering or operating programs to reduce emissions from deforestation, land-use, and rural development, and to benefit local and indigenous communities. CARB's California Tropical Forest Standard provides a rigorous methodology to assess jurisdiction-scale programs that reduce deforestation and to incentivize responsible action and investment.[92] The standard

[87] Pacific Coast Collaborative. Homepage. *https://pacificcoastcollaborative.org/*.
[88] Under2 Coalition. Homepage. *https://www.theclimategroup.org/under2-coalition*.
[89] United States Climate Alliance (USCA). Homepage. *https://www.usclimatealliance.org/*.
[90] ZEV Alliance. Homepage. Accelerating the Adoption of Zero-Emission Vehicles. *https://zevalliance.org/*.
[91] Governors' Climate and Forests Task Force. University of Colorado Boulder: Colorado Law. *https://www.gcftf.org/*.
[92] CARB. California Tropical Forest Standard. *https://ww2.arb.ca.gov/our-work/programs/california-tropical-forest-standard*.

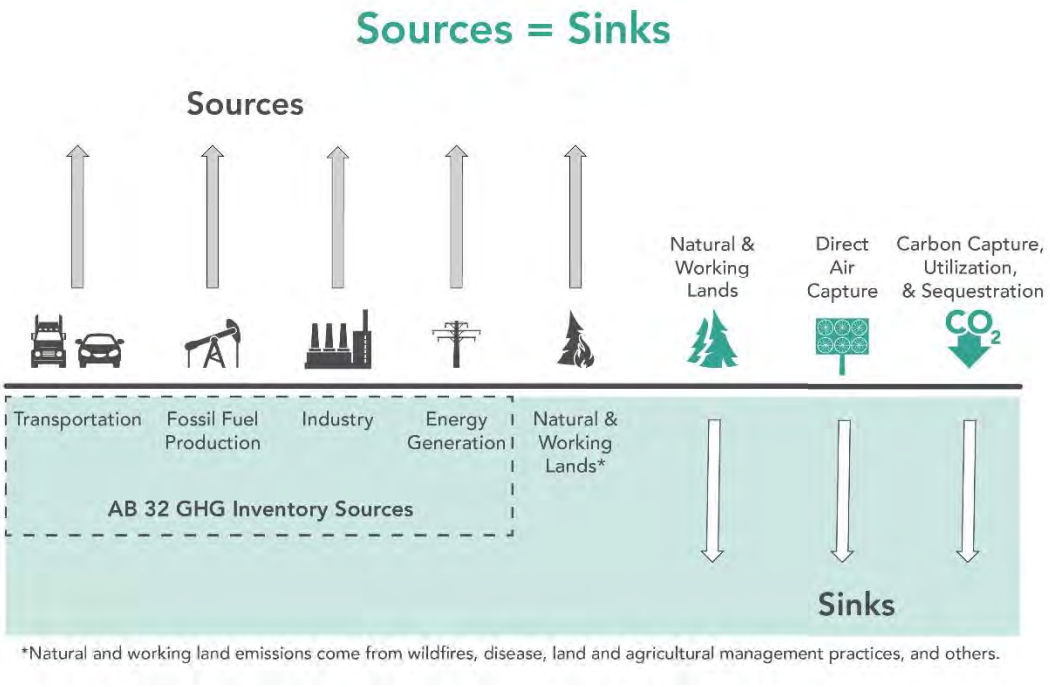
provides a strong signal to value the preservation of tropical forests over continued destructive activities such as oil exploration and extraction and ensures rigorous social and environmental safeguards for indigenous peoples and local communities.

## Working Toward Carbon Neutrality

To date, California and many other regions have focused on reducing GHG emissions from the industrial, energy, and transportation sectors. As defined in statute, the state's 2020 and 2030 targets include all in-state sources of GHG emissions—and those emissions associated with imported power that is consumed in the state. By moving to a framework of carbon neutrality, the scope for accounting is expanded to include all sources and sinks. As such, carbon neutrality is achieved when the GHG fluxes are at equilibrium—when sources equal sinks. Figure 1-5 depicts the sources included in the AB 32 GHG Inventory and the new sources and sinks added in this Scoping Plan under the framework of carbon neutrality. Natural and working lands are able to sequester carbon and therefore play an increasingly important role in this framework. However, modeling for this plan shows that carbon sequestration in our natural and working lands alone will be insufficient to achieve carbon neutrality no later than 2045. Therefore, this plan also considers the role of carbon capture and sequestration, as well as biological and mechanical carbon sequestration processes that are included in the IPCC Sixth Assessment Report,[93] as necessary tools for climate change mitigation.

[93] IPCC. 2021. *Climate Change 2021: The Physical Science Basis.* https://www.ipcc.ch/report/ar6/wg1/.

**Figure 1-5: Carbon neutrality: Balancing the net flux of GHG emissions from all sources and sinks**




## Supporting Healthy and Resilient Lands

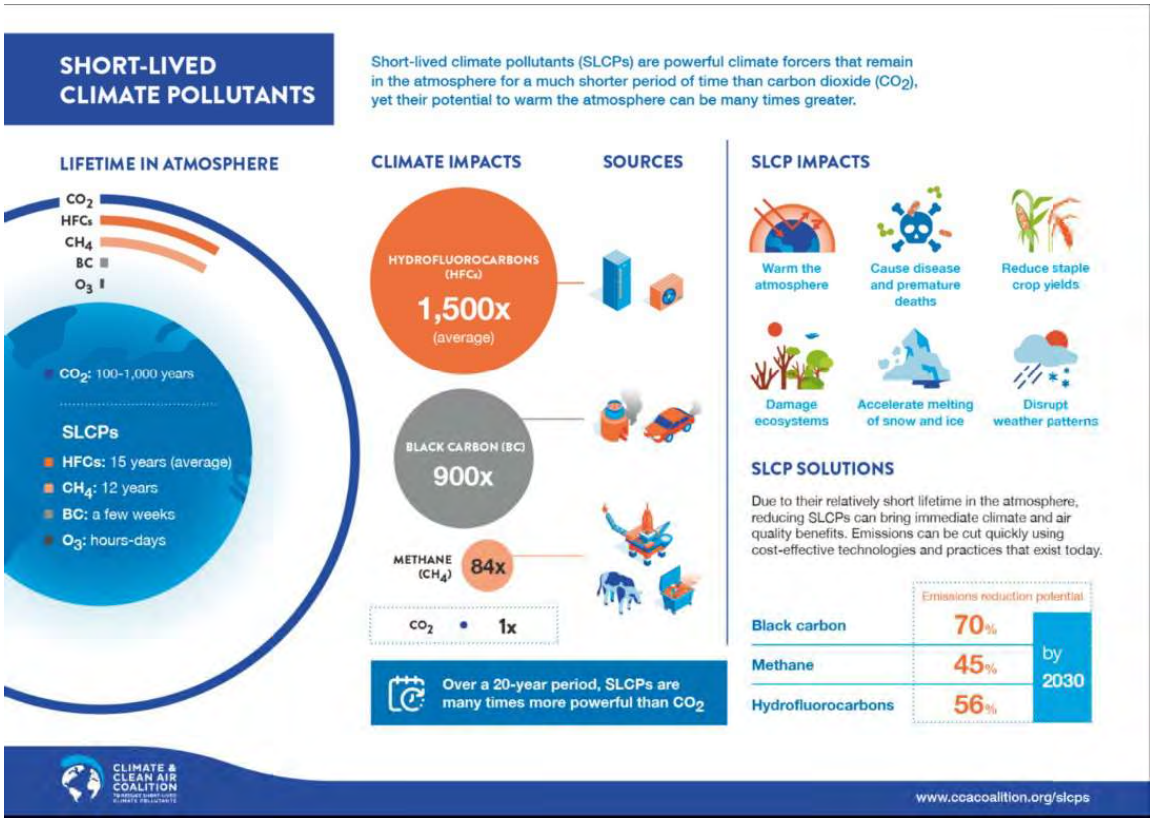
Our natural and working lands are an important piece in California's fight to achieve carbon neutrality and build resilience to the impacts of climate change. Healthy land can sequester and store atmospheric carbon dioxide in forests, grasslands, soils, and wetlands. Healthy lands can also reduce emissions of powerful short-lived climate pollutants, limit the release of future GHG emissions, protect people and nature from the impacts of climate change, and build our resilience to future climate risks. Unhealthy lands have the opposite effect—they release more GHGs than they store and are more vulnerable to future climate change impacts. Through climate smart land management that focuses on supporting healthy living systems, we can support our carbon neutrality goals, reduce emissions, advance sequestration, and support healthy and more climate-resilient lands.

## Maintaining the Focus on Methane and Short-Lived Climate Pollutants

Given the urgency of climate change, the often-disproportional impacts already being felt by underserved populations across California and the world, and the need to rapidly decarbonize and avoid climate tipping points as identified in the most recent IPCC assessment, efforts to reduce short-lived climate pollutants are especially important. SLCPs include methane ($CH_4$), black carbon (soot), and fluorinated gases (F-gases,

including hydrofluorocarbons, or HFCs), and they are among the most harmful pollutants to both human health and the global climate. SLCPs are more potent than $CO_2$ in terms of their impact on climate change (and subsequently, global warming) and have a much shorter lifetime in the atmosphere than $CO_2$ does. That means they have an outsized impact on climate change in the near term—they are responsible for up to 45 percent of current climate forcing. It also means that targeted efforts to reduce short-lived climate pollutant emissions can provide outsized climate and health benefits, within weeks to about a decade (see Figure 1-6).

**Figure 1-6: Short-lived climate pollutant impacts[94]**




California has been a leader in addressing SLCP emissions. As part of the 2014 Scoping Plan,[95] CARB committed to developing a dedicated strategy to reduce SLCP emissions.

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[94] Climate and Clean Air Coalition. Short-Lived Climate Pollutants (SLCPs). https://www.ccacoalition.org/en/content/short-lived-climate-pollutants-slcps.

[95] CARB. 2014. *First Update.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf.

The resulting SLCP Reduction Strategy,[96] adopted by CARB in 2017, implements targets codified in SB 1383 (Lara, Chapter 395, Statutes of 2016) to reduce methane and HFC emissions by 40 percent by 2030 and anthropogenic black carbon emissions by 50 percent. California worked with several other states through the U.S. Climate Alliance to establish a similar goal to reduce SLCP emissions in line with the requirements of the Paris Agreement,[97] identifying the potential to reduce SCLPs by 40 to 50 percent by 2030 across the U.S. Climate Alliance.[98]

## Process for Developing the Scoping Plan

This Scoping Plan was developed in coordination with the Governor's Office and state agencies, in accordance with direction from the Chair and Members of CARB, through engagement with the Legislature, with advice from the EJ Advisory Committee, in consultation with tribes, and with open and transparent opportunities for stakeholders and the public to engage in workshops and other meetings. Appendix A (Public Process) includes details of the public workshops, and Chapter 5 includes details of the EJ Advisory Committee's role in the Scoping Plan update process.

## Guidance from the Administration and Legislature

This Scoping Plan reflects existing and recent direction in the Governor's Executive Orders and Statutes. Table 1-1 provides a summary of major climate legislation and executive orders issued since the adoption of the 2017 Scoping Plan.

[96] CARB. 2017. *Short-Lived Climate Pollutant Reduction Strategy.* https://ww2.arb.ca.gov/sites/default/files/2020-07/final_SLCP_strategy.pdf.
[97] UNFCCC. 2015. Paris Agreement. https://unfccc.int/sites/default/files/english_paris_agreement.pdf.
[98] USCA. 2018. *From SLCP Challenge to Action: A Roadmap for Reducing Short-Lived Climate Pollutants to Meet the Goals of the Paris Agreement.* http://www.usclimatealliance.org/slcp-challenge-to-action.

**Table 1-1: Major climate legislation and executive orders enacted since the 2017 Scoping Plan**

| Bill/Executive Order | Summary |
|---|---|
| **Assembly Bill 1279 (AB 1279) (Muratsuchi, Chapter 337, Statutes of 2022)**<br><br>*The California Climate Crisis Act* | AB 1279 establishes the policy of the state to achieve carbon neutrality as soon as possible, but no later than 2045; to maintain net negative GHG emissions thereafter; and to ensure that by 2045 statewide anthropogenic GHG emissions are reduced at least 85 percent below 1990 levels. The bill requires CARB to ensure that Scoping Plan updates identify and recommend measures to achieve carbon neutrality, and to identify and implement policies and strategies that enable $CO_2$ removal solutions and carbon capture, utilization, and storage (CCUS) technologies.<br><br>This bill is reflected directly in this Scoping Plan. |
| **Senate Bill 905 (SB 905) (Caballero, Chapter 359, Statutes of 2022)**<br><br>*Carbon Capture, Removal, Utilization, and Storage Program* | SB 905 requires CARB to create the Carbon Capture, Removal, Utilization, and Storage Program to evaluate, demonstrate, and regulate CCUS and carbon dioxide removal (CDR) projects and technology.<br><br>The bill requires CARB, on or before January 1, 2025, to adopt regulations creating a unified state permitting application for approval of CCUS and CDR projects. The bill also requires the Secretary of the Natural Resources Agency to publish a framework for governing agreements for two or more tracts of land overlying the same geologic storage reservoir for the purposes of a carbon sequestration project.<br><br>The Scoping Plan modeling reflects both CCUS and CDR contributions to achieve carbon neutrality. |
| **Senate Bill 846 (SB 846) (Dodd, Chapter 239, Statutes of 2022)**<br><br>*Diablo Canyon Powerplant: Extension of Operations* | SB 846 extends the Diablo Canyon Power Plant's sunset date by up to five additional years for each of its two units and seeks to make the nuclear power plant eligible for federal loans. The bill requires that the California Public Utilities Commission (CPUC) not include and disallow a load-serving entity from including in their adopted resource plan, the energy, capacity, or any attribute from the Diablo Canyon power plant.<br><br>The Scoping Plan explains the emissions impact of this legislation. |
| **Senate Bill 1020 (SB 1020) (Laird,** | SB 1020 adds interim renewable energy and zero carbon energy retail sales of electricity targets to California end-use customers set at 90 percent in 2035 and 95 percent in 2040. |

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| **Chapter 361, Statutes of 2022)**<br><br>*Clean Energy, Jobs, and Affordability Act of 2022* | It accelerates the timeline required to have 100 percent renewable energy and zero carbon energy procured to serve state agencies from the original target year of 2045 to 2035. This bill requires each state agency to individually achieve the 100 percent goal by 2035 with specified requirements. This bill requires the CPUC, California Energy Commission (CEC), and CARB, on or before December 1, 2023, and annually thereafter, to issue a joint reliability progress report that reviews system and local reliability.<br><br>The bill also modifies the requirement for CARB to hold a portion of its Scoping Plan workshops in regions of the state with the most significant exposure to air pollutants by further specifying that this includes communities with minority populations or low-income communities in areas designated as being in extreme federal non-attainment.<br><br>The Scoping Plan describes the implications of this legislation on emissions. |
| **Senate Bill 1137 (SB 1137) (Gonzales, Chapter 365, Statutes of 2022)**<br><br>*Oil & Gas Operations: Location Restrictions: Notice of Intention: Health protection zone: Sensitive receptors* | SB 1137 prohibits the development of new oil and gas wells or infrastructure in health protection zones, as defined, except for purposes of public health and safety or other limited exceptions. The bill requires operators of existing oil and gas wells or infrastructure within health protection zones to undertake specified monitoring, public notice, and nuisance requirements. The bill requires CARB to consult and concur with the California Geologic Energy Management Division (CalGEM) on leak detection and repair plans for these facilities, adopt regulations as necessary to implement emission detection system standards, and collaborate with CalGEM on public access to emissions detection data. |
| **Senate Bill 1075 (SB 1075) (Skinner, Chapter 363, Statutes of 2022)**<br><br>*Hydrogen: Green Hydrogen: Emissions of Greenhouse Gases* | SB 1075 requires CARB, by June 1, 2024, to prepare an evaluation that includes: policy recommendations regarding the use of hydrogen, and specifically the use of green hydrogen, in California; a description of strategies supporting hydrogen infrastructure, including identifying policies that promote the reduction of GHGs and short-lived climate pollutants; a description of other forms of hydrogen to achieve emission reductions; an analysis of curtailed electricity; an estimate of GHG and emission reductions that could be achieved through deployment of green hydrogen through a variety of scenarios; an analysis of the potential for opportunities to integrate hydrogen production and applications with drinking water supply treatment needs; policy recommendations for regulatory and permitting processes |

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| | associated with transmitting and distributing hydrogen from production sites to end uses; an analysis of the life-cycle GHG emissions from various forms of hydrogen production; and an analysis of air pollution and other environmental impacts from hydrogen distribution and end uses.<br><br>This bill would inform the production of hydrogen at the scale called for in this Scoping Plan. |
| **Assembly Bill 1757 (AB 1757) (Garcia, Chapter 341, Statutes of 2022)**<br><br>*California Global Warming Solutions Act of 2006: Climate Goal: Natural and Working Lands* | AB 1757 requires the California Natural Resources Agency (CNRA), in collaboration with CARB, other state agencies, and an expert advisory committee, to determine a range of targets for natural carbon sequestration, and for nature-based climate solutions, that reduce GHG emissions in 2030, 2038, and 2045 by January 1, 2024. These targets must support state goals to achieve carbon neutrality and foster climate adaptation and resilience.<br><br>This bill also requires CARB to develop standard methods for state agencies to consistently track GHG emissions and reductions, carbon sequestration, and additional benefits from natural and working lands over time. These methods will account for GHG emissions reductions of $CO_2$, methane, and nitrous oxide related to natural and working lands and the potential impacts of climate change on the ability to reduce GHG emissions and sequester carbon from natural and working lands, where feasible.<br><br>This Scoping Plan describes the next steps and implications of this legislation for the natural and working lands sector. |
| **Senate Bill 1206 (SB 1206) (Skinner, Chapter 884, Statutes of 2022)**<br><br>*Hydrofluorocarbon gases: sale or distribution* | SB 1206 mandates a stepped sales prohibition on newly produced high- global warming potential (GWP) HFCs to transition California's economy toward recycled and reclaimed HFCs for servicing existing HFC-based equipment. Additionally, SB 1206 also requires CARB to develop regulations to increase the adoption of very low-, i.e., GWP < 10, and no-GWP technologies in sectors that currently rely on higher-GWP HFCs. |
| **Senate Bill 27 (SB 27) (Skinner, Chapter 237, Statutes of 2021)** | SB 27 requires CNRA, in coordination with other state agencies, to establish the Natural and Working Lands Climate Smart Strategy by July 1, 2023. This bill also requires CARB to establish specified $CO_2$ removal targets for 2030 and beyond as part of its Scoping Plan. Under SB 27, CNRA is to establish and maintain a registry to identify projects in the state |

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| *Carbon Sequestration: State Goals: Natural and Working Lands: Registry of Projects* | that drive climate action on natural and working lands and are seeking funding.<br><br>CNRA also must track carbon removal and GHG emission reduction benefits derived from projects funded through the registry.<br><br>This bill is reflected directly in this Scoping Plan as $CO_2$ removal targets for 2030 and 2045 in support of carbon neutrality. |
| **Senate Bill 596 (SB 596) (Becker, Chapter 246, Statutes of 2021)**<br><br>*Greenhouse Gases: Cement Sector: Net-zero Emissions Strategy* | SB 596 requires CARB, by July 1, 2023, to develop a comprehensive strategy for the state's cement sector to achieve net-zero-emissions of GHGs associated with cement used within the state as soon as possible, but no later than December 31, 2045. The bill establishes an interim target of 40 percent below the 2019 average GHG intensity of cement by December 31, 2035. Under SB 596, CARB must:<br>• Define a metric for GHG intensity and establish a baseline from which to measure GHG intensity reductions.<br>• Evaluate the feasibility of the 2035 interim target (40 percent reduction in GHG intensity) by July 1, 2028.<br>• Coordinate and consult with other state agencies.<br>• Prioritize actions that leverage state and federal incentives.<br>• Evaluate measures to support market demand and financial incentives to encourage the production and use of cement with low GHG intensity.<br><br>The Scoping Plan modeling is designed to achieve these outcomes. |
| **Executive Order N-82-20** | Governor Newsom signed Executive Order N-82-20 in October 2020 to combat the climate and biodiversity crises by setting a statewide goal to conserve at least 30 percent of California's land and coastal waters by 2030. The Executive Order also instructed the CNRA, in consultation with other state agencies, to develop a Natural and Working Lands Climate Smart Strategy that serves as a framework to advance the state's carbon neutrality goal and build climate resilience. In addition to setting a statewide conservation goal, the Executive Order directed CARB to update the target for natural and working lands in support of carbon neutrality as part of this Scoping Plan, and to take into consideration the NWL Climate Smart Strategy. |

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| | Executive Order N-82-20 also calls on the CNRA, in consultation with other state agencies, to establish the California Biodiversity Collaborative (Collaborative). The Collaborative shall be made up of governmental partners, California Native American tribes, experts, business and community leaders, and other stakeholders from across the state. State agencies will consult the Collaborative on efforts to:<br>• Establish a baseline assessment of California's biodiversity that builds upon existing data and can be updated over time.<br>• Analyze and project the impact of climate change and other stressors in California's biodiversity.<br>• Inventory current biodiversity efforts across all sectors and highlight opportunities for additional action to preserve and enhance biodiversity.<br><br>CNRA also is tasked with advancing efforts to conserve biodiversity through various actions, such as streamlining the state's process to approve and facilitate projects related to environmental restoration and land management. The California Department of Food and Agriculture (CDFA) is directed to advance efforts to conserve biodiversity through measures such as reinvigorating populations of pollinator insects, which restore biodiversity and improve agricultural production.<br><br>The Natural and Working Lands Climate Smart Strategy informs this Scoping Plan. |
| **Executive Order N-79-20** | Governor Newsom signed Executive Order N-79-20 in September 2020 to establish targets for the transportation sector to support the state in its goal to achieve carbon neutrality by 2045. The targets established in this Executive Order are:<br>• 100 percent of in-state sales of new passenger cars and trucks will be zero-emission by 2035.<br>• 100 percent of medium- and heavy-duty vehicles will be zero-emission by 2045 for all operations where feasible, and by 2035 for drayage trucks.<br>• 100 percent of off-road vehicles and equipment will be zero-emission by 2035 where feasible.<br><br>The Executive Order also tasked CARB to develop and propose regulations that require increasing volumes of zero-electric passenger vehicles, medium- and heavy-duty |

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| | vehicles, drayage trucks, and off-road vehicles toward their corresponding targets of 100 percent zero-emission by 2035 or 2045, as listed above.<br><br>The Scoping Plan modeling reflects achieving these targets. |
| **Executive Order N-19-19** | Governor Newsom signed Executive Order N-19-19 in September 2019 to direct state government to redouble its efforts to reduce GHG emissions and mitigate the impacts of climate change while building a sustainable, inclusive economy. This Executive Order instructs the Department of Finance to create a Climate Investment Framework that:<br>• Includes a proactive strategy for the state's pension funds that reflects the increased risks to the economy and physical environment due to climate change.<br>• Provides a timeline and criteria to shift investments to companies and industry sectors with greater growth potential based on their focus of reducing carbon emissions and adapting to the impacts of climate change.<br>• Aligns with the fiduciary responsibilities of the California Public Employees' Retirement System, California State Teachers' Retirement System, and the University of California Retirement Program.<br><br>Executive Order N-19-19 directs the State Transportation Agency to leverage more than $5 billion in annual state transportation spending to help reverse the trend of increased fuel consumption and reduce GHG emissions associated with the transportation sector. It also calls on the Department of General Services to leverage its management and ownership of the state's 19 million square feet in managed buildings, 51,000 vehicles, and other physical assets and goods to minimize state government's carbon footprint. Finally, it tasks CARB with accelerating progress toward California's goal of five million ZEV sales by 2030 by:<br>• Developing new criteria for clean vehicle incentive programs to encourage manufacturers to produce clean, affordable cars.<br>• Proposing new strategies to increase demand in the primary and secondary markets for ZEVs.<br>• Considering strengthening existing regulations or adopting new ones to achieve the necessary GHG reductions from within the transportation sector. |

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| | The Scoping Plan modeling reflects efforts to accelerate ZEV deployment. |
| **Senate Bill 576 (SB 576) (Umberg, Chapter 374, Statutes of 2019)**<br><br>*Coastal Resources: Climate Ready Program and Coastal Climate Change Adaptation, Infrastructure and Readiness Program* | Sea level rise, combined with storm-driven waves, poses a direct risk to the state's coastal resources, including public and private real property and infrastructure. Rising marine waters threaten sensitive coastal areas, habitats, the survival of threatened and endangered species, beaches, other recreation areas, and urban waterfronts. SB 576 mandates that the Ocean Protection Council develop and implement a coastal climate adaptation, infrastructure, and readiness program to improve the climate change resiliency of California's coastal communities, infrastructure, and habitat. This bill also instructs the State Coastal Conservancy to administer the Climate Ready Program, which addresses the impacts and potential impacts of climate change on resources within the conservancy's jurisdiction. |
| **Assembly Bill 65 (AB 65) (Petrie-Norris, Chapter 347, Statutes of 2019)**<br><br>*Coastal Protection: Climate Adaption: Project Prioritization: Natural Infrastructure: Local General Plans* | This bill requires the State Coastal Conservancy, when it allocates any funding appropriated pursuant to the California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access For All Act of 2018, to prioritize projects that use natural infrastructure in coastal communities to help adapt to climate change. The bill requires the conservancy to provide information to the Office of Planning and Research on any projects funded pursuant to the above provision to be considered for inclusion into the clearinghouse for climate adaption information. The bill authorizes the conservancy to provide technical assistance to coastal communities to better assist them with their projects that use natural infrastructure. |
| **Executive Order B-55-18** | Governor Brown signed Executive Order B-55-18 in September 2018 to establish a statewide goal to achieve carbon neutrality as soon as possible, and no later than 2045, and to achieve and maintain net negative emissions thereafter. Policies and programs undertaken to achieve this goal shall:<br>• Seek to improve air quality and support the health and economic resiliency of urban and rural communities, particularly low-income and disadvantaged communities.<br>• Be implemented in a manner that supports climate adaptation and biodiversity, including protection of the state's water supply, water quality, and native plants and animals. |

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| | This Executive Order also calls for CARB to:<br>• Develop a framework for implementation and accounting that tracks progress toward this goal.<br>• Ensure future Scoping Plans identify and recommend measures to achieve the carbon neutrality goal.<br><br>This Scoping Plan is designed to achieve carbon neutrality no later than 2045 and the modeling includes technology and fuel transitions to achieve that outcome. |
| **Senate Bill 100 (SB 100) (De León, Chapter 312, Statutes of 2018)**<br><br>*California Renewables Portfolio Standard Program: emissions of greenhouse gases* | SB 100 mandates that the CPUC, CEC, and CARB plan for 100 percent of total retail sales of electricity in California to come from eligible renewable energy resources and zero-carbon resources by December 31, 2045. This bill also updates the state's Renewables Portfolio Standard (RPS) to include the following interim targets:<br>• 44% of retail sales procured from eligible renewable sources by December 31, 2024.<br>• 52% of retail sales procured from eligible renewable sources by December 31, 2027.<br>• 60% of retail sales procured from eligible renewable sources by December 31, 2030.<br><br>Under SB 100, the CPUC, CEC, and CARB shall use programs under existing laws to achieve 100 percent clean electricity. The statute requires these agencies to issue a joint policy report on SB 100 every four years. The first of these reports was issued in 2021.<br><br>This Scoping Plan reflects the SB 100 Core Scenario resource mix with a few minor updates. |
| **Assembly Bill 2127 (AB 2127) (Ting, Chapter 365, Statutes of 2018)**<br><br>*Electric Vehicle Charging Infrastructure: Assessment* | This bill requires the CEC, working with CARB and the CPUC, to prepare and biennially update a statewide assessment of the electric vehicle charging infrastructure needed to support the levels of electric vehicle adoption required for the state to meet its goals of putting at least 5 million zero-emission vehicles on California roads by 2030 and of reducing emissions of GHGs to 40% below 1990 levels by 2030. The bill requires the CEC to regularly seek data and input from stakeholders relating to electric vehicle charging infrastructure.<br><br>This bill supports the deployment of ZEVs as modeled in this Scoping Plan. |

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| **Senate Bill 30 (SB 30) (Lara, Chapter 614, Statutes of 2018)**<br><br>*Insurance: Climate Change* | This bill requires the Insurance Commissioner to convene a working group to identify, assess, and recommend risk transfer market mechanisms that, among other things, promote investment in natural infrastructure to reduce the risks of climate change related to catastrophic events, create incentives for investment in natural infrastructure to reduce risks to communities, and provide mitigation incentives for private investment in natural lands to lessen exposure and reduce climate risks to public safety, property, utilities, and infrastructure. The bill requires the policies recommended to address specified questions. |
| **Assembly Bill 2061 (AB 2061) (Frazier, Chapter 580, Statutes of 2018)**<br><br>*Near-zero-emission and Zero-emission Vehicles* | Existing state and federal law sets specified limits on the total gross weight imposed on the highway by a vehicle with any group of two or more consecutive axles. Under existing federal law, the maximum gross vehicle weight of that vehicle may not exceed 82,000 pounds. AB 2061 authorizes a near-zero-emission vehicle or a zero-emission vehicle to exceed the weight limits on the power unit by up to 2,000 pounds.<br><br>This bill supports the deployment of cleaner trucks as modeled in this Scoping Plan. |

## Consideration of Relevant State Plans and Regulations

Development of this Scoping Plan also included careful consideration of, and coordination with, other state agency plans and regulations, including the SB 100 Joint Agency Report,[99] the 2022 State Strategy for the State Implementation Plan,[100] Climate Action Plan for Transportation Infrastructure,[101] AB 74 Studies on Vehicle Emissions and Fuel Demand and Supply,[102,103,104] Short-Lived Climate Pollutant Strategy (SLCP Strategy),[105]

[99] CPUC, CEC, and CARB. 2021. *SB 100 Joint Agency Report.* https://www.energy.ca.gov/sb100.
[100] CARB. January 31, 2022. Draft 2022 State Strategy for the State Implementation Plan. https://ww2.arb.ca.gov/sites/default/files/2022-01/Draft_2022_State_SIP_Strategy.pdf.
[101] CalSTA. 2021. *Climate Action Plan.* https://calsta.ca.gov/subject-areas/climate-action-plan.
[102] CalEPA. 2021. Carbon Neutrality Studies. https://calepa.ca.gov/climate/carbon-neutrality-studies/.
[103] Brown, A. L., et. al. 2021. *Driving California's Transportation Emissions.* https://escholarship.org/uc/item/3np3p2t0.
[104] Deschenes, O. 2021. *Enhancing equity*. https://zenodo.org/record/4707966#.YKPiaKhKi73.
[105] CARB. Short-Lived Climate Pollutants. https://ww2.arb.ca.gov/our-work/programs/slcp.

CARB's Achieving Carbon Neutrality Report,[106] Climate Smart Strategy,[107] and draft Natural and Working Lands Implementation Plan,[108] among others.

### Input from Partners and Stakeholders

CARB also collaborated with other state agencies, held consultations with tribes, and solicited comments and feedback from affected stakeholders, including labor organizations and the public. The process to update the Scoping Plan began with kickoff workshops in early June 2021,[109] followed by over a dozen public workshops, including engagement with tribes,[110] and featured a series of EJ Advisory Committee and environmental justice community meetings.[111] The June 2021 workshop and several others were a joint agency effort, as there are many agencies with direct authority or jurisdiction over different sectors of the economy. Consultation with agencies also included bi-weekly, monthly, and weekly meetings.

During the summer of 2022 CARB held three community listening sessions, hosted by the CARB Chair and Board, in communities around the state, along with one virtual community listening session and one tribal listening session specifically for tribes. Many tribes provided written feedback, which was incorporated into this Scoping Plan. In addition, CARB respects tribal sovereignty and also engaged in a consultation campaign with tribes, which resulted in government-to-government consultations, and this Scoping Plan is reflective of this process.[112]

## Emissions Data That Inform the Scoping Plan

### Greenhouse Gas Emissions

AB 32 includes which GHGs are to be regulated, reduced, and included in the state's targets and goals. That list includes seven GHGs: carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), sulfur hexafluoride ($SF_6$), hydrofluorocarbons (HFCs),

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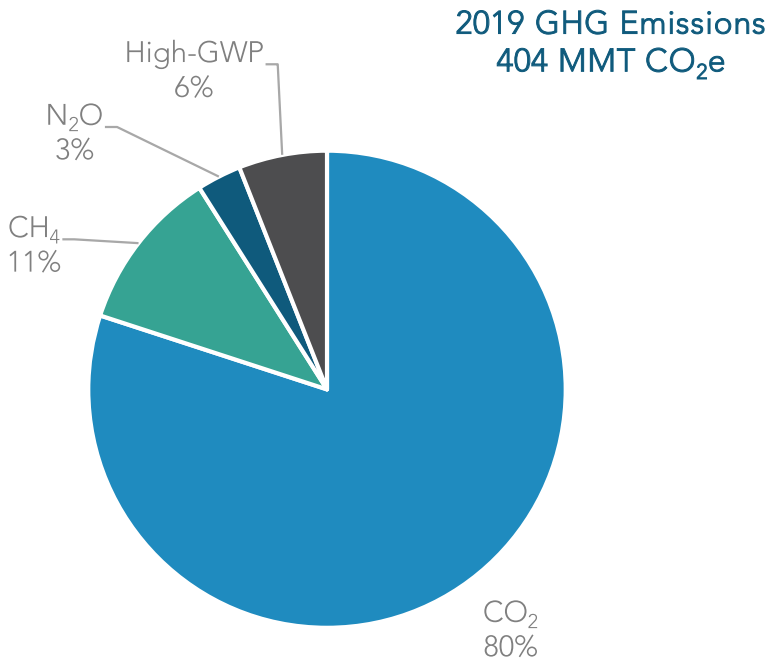
[106] Energy and Environmental Economics, Inc. 2020. *Achieving Carbon Neutrality.* https://ww2.arb.ca.gov/sites/default/files/2020-10/e3_cn_final_report_oct2020_0.pdf.
[107] CNRA. 2022. Natural and Working Lands Climate Smart Strategy. https://resources.ca.gov/Initiatives/Expanding-Nature-Based-Solutions.
[108] CARB. 2019. *Draft California 2030 Natural and Working Lands Climate Change Implementation Plan.* https://ww2.arb.ca.gov/resources/documents/nwl-implementation-draft.
[109] Appendix A (Public Process).
[110] CARB. Scoping Plan Meetings & Workshops. https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/scoping-plan-meetings-workshops.
[111] CARB. Environmental Justice Advisory Committee Meetings and Events. https://ww2.arb.ca.gov/environmental-justice-advisory-committee-meetings-and-events.
[112] CARB. 2018. Tribal Consultation Policy. October. https://www.arb.ca.gov/regact/nonreg/2018/california_air_resources_board_tribal_consultation_policy.pdf.

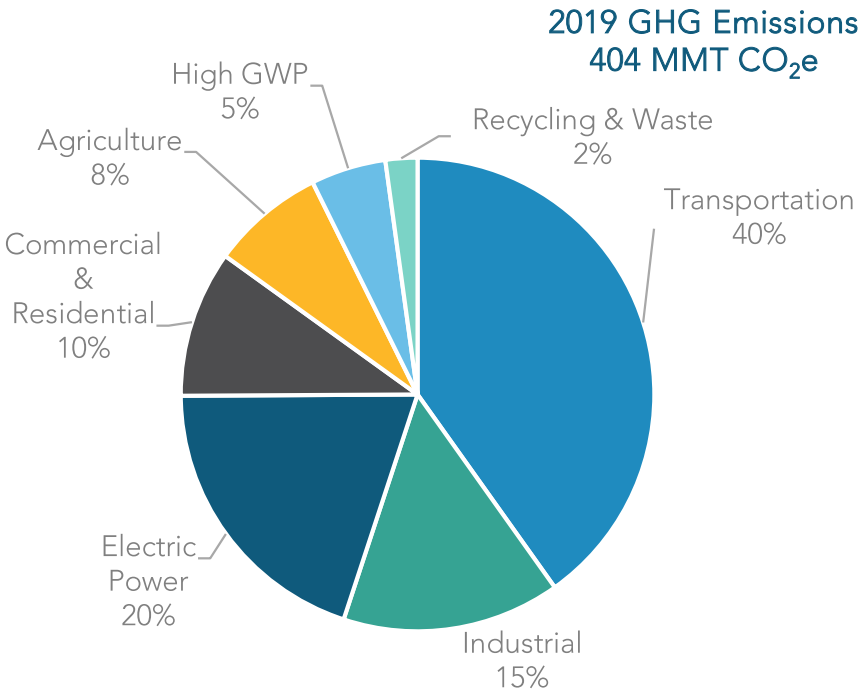
perfluorocarbons (PFCs), and nitrogen trifluoride ($NF_3$). Carbon dioxide is the primary GHG emitted in California, accounting for 83 percent of the total GHG emissions in 2019, as shown in Figure 1-7 below. Figure 1-8 illustrates that transportation (primarily on-road travel) is the single largest source of $CO_2$ emissions in the state. Upstream transportation emissions from the refinery and oil and gas sectors are categorized as $CO_2$ emissions from industrial sources and constitute about 50 percent of the industrial source emissions. When including these emissions, the transportation sector accounts for approximately half of statewide GHG emissions. Other significant sources of $CO_2$ include electricity production, industrial sources like refineries and cement plants, and residential sources like fossil gas. Figures 1-7 and 1-8 show state GHG emission contributions by GHG and sector based on the 2020 Greenhouse Gas Emission Inventory; GHG emissions for 2019 are shown because 2020 was an outlier due to the global pandemic. Emissions in Figure 1-8 are depicted by Scoping Plan sector, which includes separate categories for high-global warming potential (GWP) and recycling/waste emissions that are otherwise typically included within other economic sectors.

**Figure 1-7: 2019 State GHG emission contributions by GHG[113]**




[113] CARB. 2022. *California Greenhouse Gas Emissions for 2000 to 2020: Trends of Emissions and Other Indicators.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf.

**Figure 1-8: 2019 State GHG emission contributions by Scoping Plan sector[114]**




The scope of the AB 32 GHG Inventory encompasses emission sources within the state's borders, as well as imported electricity consumed in the state. This construct for the inventory is consistent with IPCC practices to allow for comparison of statewide GHG emissions with those at the national level and with other international GHG inventories. Statewide GHG emissions calculations use many data sources, including data from other state and federal agencies. However, a significant source of data comes from reports submitted to CARB through the Regulation for the Mandatory Reporting of GHG Emissions (MRR). The MRR requires facilities and entities with more than 10,000 metric tons of carbon dioxide equivalent ($MTCO_2e$) of combustion and process emissions, all facilities belonging to certain industries, and all electric power entities to submit an annual GHG emissions data report directly to CARB. Furthermore, this regulation requires that reports from entities that emit more than 25,000 $MTCO_2e$ be verified by a CARB-

[114] The High GWP sector includes high global warming potential gas emissions from releases of ozone depleting substance (ODS) substitutes, $SF_6$ emissions from the electricity transmission and distribution system, and gases that are emitted in the semiconductor manufacturing process. ODS substitutes, which are primarily HFCs, are used in refrigeration and air conditioning equipment, solvent cleaning, foam production, fire retardants, and aerosols.

accredited third-party verification body. More information on MRR emissions reports can be found at CARB's Mandatory Greenhouse Gas Emissions Reporting website.[115]

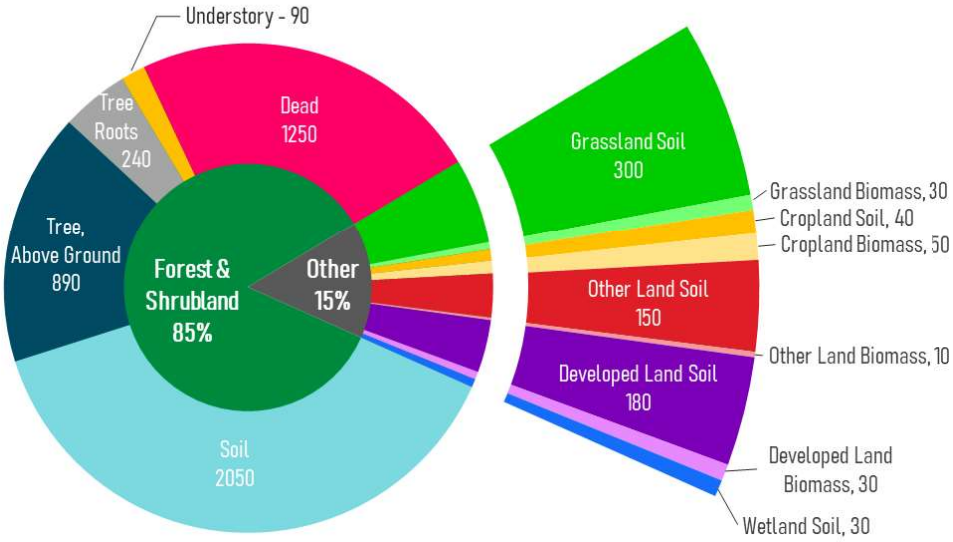
All data sources used to develop the GHG Emission Inventory are listed in CARB's inventory supporting documentation.[116]

## Natural and Working Lands

For natural and working lands, the 2018 ecosystem carbon inventory (NWL Inventory)[117] shows there are approximately 5,340 million metric tons (MMT) of carbon in the carbon pools[118] (reservoirs of carbon that have the ability to both take in and release carbon) that CARB has quantified (see Figure 1-9). For purposes of comparison, 5,340 MMT of ecosystem carbon stock is equivalent to 19,600 MMT of atmospheric $CO_2$. Forests and shrublands contain the majority of California's carbon stock because they cover the majority of California's landscape and have the highest carbon density of any land cover type. All other land categories combined comprise over 35 percent of California's total acreage, but only 15 percent of carbon stocks. Roughly half of the 5,340 MMT of carbon resides in soils and half in plant biomass.

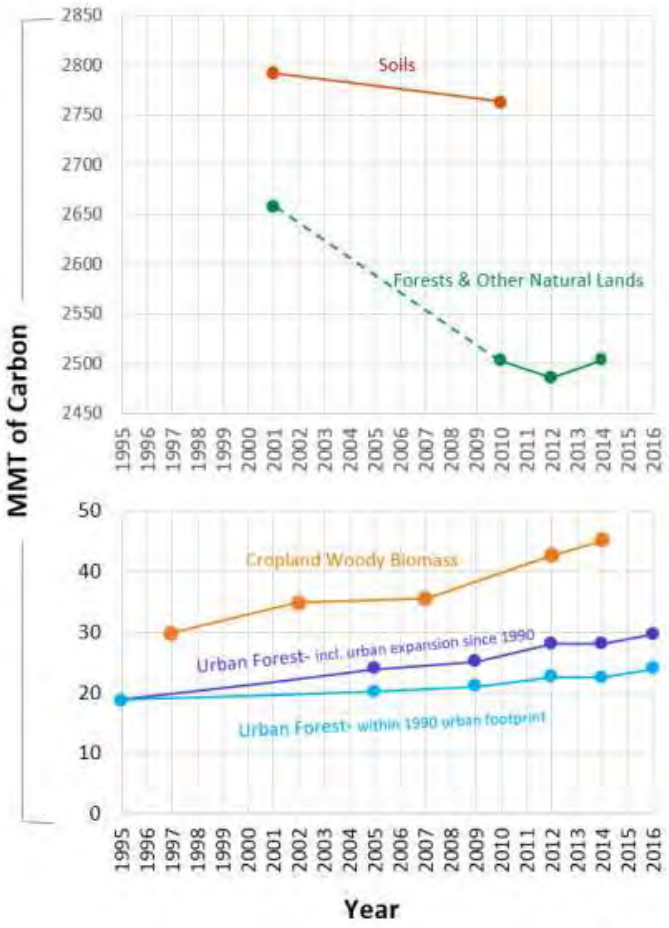
[115] CARB. Mandatory Greenhouse Gas Emissions Reporting. https://ww2.arb.ca.gov/our-work/programs/mandatory-greenhouse-gas-emissions-reporting.
[116] CARB. Current California GHG Emission Inventory Data. www.arb.ca.gov/cc/inventory/data/data.htm.
[117] CARB. 2018. *An Inventory of Ecosystem Carbon in California's Natural and Working Lands.* https://ww3.arb.ca.gov/cc/inventory/pubs/nwl_inventory.pdf.
[118] "Carbon pools" are Above-Ground Live Biomass (boles, stems, and foliage in shrubs, trees, grasses, and herbaceous vegetation), Below-Ground Live Biomass (roots in shrubs, trees, grasses, and herbaceous vegetation), Dead Organic Matter (standing or downed dead wood and litter), Harvested Wood Products (all wood and bark material that leaves harvest sites regardless of whether it is eventually incorporated into merchandisable products), and Soil Organic Matter (organic carbon in the top 30 centimeters of soil).

**Figure 1-9: Carbon stocks in natural and working lands (MMT carbon)**




In addition to providing an estimate of the ecosystem carbon that exists on California's landscape, the NWL Inventory also shows how those carbon stocks are changing (see Figure 1-10). The inventory attributes stock change to human activity, such as land use change, or to disturbances, such as wildfire. CARB's inventory shows these lands were a source of GHG emissions from 2001 to 2011, releasing more carbon than they stored, and then they returned to be a slight carbon sink from 2012 to 2014. These trends highlight the interannual and interdecadal variability of lands and their ability to be both a source and a sink of carbon.

**Figure 1-10: Changes in carbon stock by landscape type**




For natural and working lands, California's inventory is also based on IPCC methods for tracking ecosystem carbon over time, providing for comparability with other national and subnational inventories and carbon accounting. As such, the NWL Inventory is an important tool for tracking both carbon stock changes in California over time and the impacts that interventions such as those identified in this Scoping Plan, actions identified in the Climate Smart Land Strategy, and others have on NWL carbon stocks.

All data sources used to develop the NWL Inventory are listed in the technical support documentation at CARB's California Natural & Working Lands Inventory website.[119]

[119] CARB. California Natural & Working Lands Inventory. https://ww2.arb.ca.gov/nwl-inventory.

## Black Carbon

In addition, CARB has developed a statewide emission inventory for black carbon in support of the SLCP Strategy. The inventory is reported in two categories: non-forestry (anthropogenic) sources and forestry sources.[120] The black carbon inventory is calculated using existing $PM_{2.5}$ emission inventories combined with speciation profiles that define the fraction of $PM_{2.5}$ that is black carbon. The black carbon inventory helps support implementation of the SLCP Strategy, but it is not part of California's GHG Inventory that tracks progress toward the state's climate targets under AB 32 or SB 32. The state's major anthropogenic sources of black carbon include off-road transportation, on-road transportation, residential wood burning, fuel combustion, and industrial processes. CARB estimated 2017 black carbon emissions to be approximately 8 $MTCO_2e$.[121] The majority of anthropogenic sources come from transportation—specifically, heavy-duty vehicles. The share of black carbon emissions from transportation is dropping rapidly and is expected to continue to do so between now and 2030 as a result of California's air quality programs. The remaining black carbon emissions will come largely from woodstoves/fireplaces, off-road applications, and industrial/commercial combustion. The forestry category includes non-agricultural prescribed burning and wildfire emissions.

## Tracking Life-Cycle and Out-of-State Emissions

In recent years there has been increased interest in the embedded carbon in products, also known as *life-cycle emissions.* A life-cycle accounting framework refers to all of the GHG emissions generated from the sourcing, production, and transportation of products to an endpoint. In doing such assessments for a product, emissions may be associated with sourced materials and production activity outside a jurisdiction's borders. While life-cycle emissions can provide a more comprehensive picture of the emissions associated with the goods we consume and ongoing demand, life-cycle inventories are inconsistent with IPCC standards, as they would result in double counting of emissions across jurisdictions. Other countries and regions do produce their own inventory reports consistent with IPCC methods and are taking action to reduce emissions within their jurisdictions. In addition, jurisdictions often lack legal authority to regulate sources outside of their borders. Finally, it is difficult to obtain accurate data for sources and production activities outside of a region's border that would impact the accuracy of such an inventory. For these reasons, the inventory used in the Scoping Plan does not use a life-cycle

[120] SB 1383. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB1383.
[121] This is a preliminary estimate developed for this Scoping Plan. Official Black Carbon emissions estimates are provided in the SLCP inventory here: https://ww2.arb.ca.gov/ghg-slcp-inventory.

approach and remains consistent with international accounting standards and consistent with how other countries and regions track emissions within their jurisdictions.

However, GHG mitigation action may cross geographic borders as part of subnational and international collaboration, or as a natural result of implementation of regional policies. In addition to the state's existing GHG inventory, CARB will develop an accounting framework that reflects the benefits of our policies accruing outside of the state. This accounting framework will be important to better understand the true impact of the state's policies on what is emitted into the atmosphere. For example, the LCFS incentivizes GHG reductions along the entire supply chain for the production and delivery of transportation fuel imported for use in the state. However, our inventory only captures the change in emissions from the tailpipe of when that fuel is used in California and does not capture any GHG reductions that occur in the production process if the fuel is produced out of state.

Natural and working lands forestry actions are another example, where California's policies are inspiring forest management actions in other states that result in increased permanent carbon sequestration. California's NWL inventory does not capture the increased carbon stocks resulting from forestry projects happening outside of California, and the $CO_2$ removals resulting from these projects are not applied in either CARB's NWL inventory or CARB's AB 32 GHG Emissions Inventory. For GHG reductions outside of the state to be attributed to our programs, those reductions must be real, quantifiable, verifiable, and permanent.

It also will be important to avoid any double counting (including claims to those reductions by other jurisdictions) and to transparently indicate whether any extra-jurisdictional emissions reductions might be included in another region's inventory. CARB is collaborating with other jurisdictions to ensure GHG accounting rules are consistent with international best practices, as robust accounting rules instill confidence in the reductions claimed and maintain support for joint action across jurisdictions. The policy goals of consistency and transparency are critical as we work together with other jurisdictions on our parallel paths to achieve our GHG targets with real benefits to the atmosphere.

## Tracking Progress

Historically, the AB 32 GHG Inventory has been the primary metric to track progress toward achieving climate targets.[122] However, we must now deploy clean technology at unprecedented rates. The emissions modeling underpinning this Scoping Plan and

[122] Starting with the 2022 Edition of the AB 32 GHG inventory, the inventory development now relies more directly on the annually reported and third-party verified emissions from the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions.

targets for clean technology in statute can serve as leading indicators across the economy on how our actions compare to the pace of action needed to be on track to achieve carbon neutrality. The California Climate Dashboard[123] was launched in 2022 and provides high-level metrics for clean energy production and technology deployment. Statistics such as the deployment of zero emission vehicles and clean electricity generation are just some of the examples of metrics across the economy that can be tracked, in addition to GHG emissions, to understand if the state is on track to meet its climate goals. A key indicator to track will be building of new energy infrastructure and deployment of clean technology as evaluated in the uncertainty analysis in Chapter 2. CARB will coordinate with state agencies to establish and make public similar metrics across all economic sectors to help provide transparency on the state's progress in deploying clean technology at the pace and scale needed to achieve carbon neutrality no later than 2045.

[123] CalEPA. California Climate Dashboard. *https://calepa.ca.gov/climate-dashboard/*.

# Chapter 2: The Scoping Plan Scenario

This chapter describes the Scoping Plan Scenario, which for the first time includes sources in both the AB 32 GHG Inventory and Natural and Working Lands (NWL). It begins with a short description of the alternatives evaluated. Four scenarios for the AB 32 GHG Inventory and NWL were considered separately and helped to inform the Scoping Plan Scenario. Each of the alternatives were considered in terms of the important criteria and priorities that the state's comprehensive climate action must deliver, including the need for GHG reductions that are not only technologically feasible and cost-effective, but also can deliver health and economic benefits for the state. All the scenarios were set against what is called the *Reference Scenario*—that is, what the GHG emissions would look like if we did nothing at all beyond the existing policies that are required and already in place to achieve the 2030 target of at least 40 percent below 1990 levels, or those expected with no new actions in the NWL sector. For this Scoping Plan, two sets of modeling tools were used to evaluate the AB 32 GHG Inventory and NWL sectors because no single model can assess both AB 32 sectors and NWL together. As a result, two different sets of scenarios were developed for each sector type. While this chapter breaks out discussion separately for the two sector types, the Scoping Plan Scenario reflects the combined actions across both sectors by choosing an alternative from each sector type. The modeling provides point estimates; however, that does not imply precision. As discussed in the uncertainty section, several types of uncertainties are associated with any outcomes projected by the modeling results. There will be ranges of estimates associated with each point that are not shown in the graphs or results.

## Scenarios for the AB 32 GHG Inventory Sectors

The Reference Scenario for the AB 32 GHG Inventory sectors shows continuing but modest GHG reductions beyond 2030 that level off toward mid-century. The comprehensive analysis of all four alternatives indicates that the Scoping Plan Scenario is the best choice to achieve California's climate and clean air goals while balancing the legislative direction on prioritizing direct emissions reductions, reducing anthropogenic emissions by at least 85 percent by 2045, being technologically feasible, and being cost-effective. It also protects public health, provides a solid foundation for continued economic growth, and drastically reduces the state's dependence on fossil fuel combustion and does not disproportionately impact disadvantaged communities. Each of the alternative scenarios was the product of a process of development informed by public input, the

governor,[124] CARB, legislative direction, and input by the EJ Advisory Committee.[125,126] Future updates to the Scoping Plan may consider new clean technologies and fuels beyond those included in this Scoping Plan.

The four scenarios evaluated shared many similarities. They each embodied the following characteristics:

- Drastic reduction in fossil fuel dependence, with some remaining in-state demand for fossil fuels for aviation, marine, and locomotion applications, and for fossil gas for buildings and industry
- Ambitious deployment of efficient non-combustion technologies such as zero emission vehicles and heat pumps
- Rapid growth in the production and distribution of clean energy such as zero carbon electricity and hydrogen
- Progressive phasedown of fossil fuel production and distribution activities as part of the transition to clean energy
- Remaining emissions of fugitive SLCPs such as refrigerants and fugitive methane
- Strong consumer adoption of clean technology and fuel options
- Removal of remaining $CO_2$ emissions to achieve carbon neutrality
- Some reliance on carbon capture and sequestration (CCS)

While the four scenarios had a lot in common, they also had some differences:

- Year in which carbon neutrality is achieved (2035 or 2045)
- Rate of deployment of clean technology and production and distribution of zero carbon energy
- Remaining amount of demand for fossil energy in the year carbon neutrality is achieved
- Constraints on technology and fuels deployed in certain sectors
- Consumer adoption rates of clean technologies and fuels
- Degree of reliance on $CO_2$ removal
- Degree of reliance on CCS

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[124] Newsom, Gavin. July 22, 2022. Letter from Governor Newsom to CARB Chair Liane Randolph. Retrieved from *https://www.gov.ca.gov/wp-content/uploads/2022/07/07.22.2022-Governors-Letter-to-CARB.pdf*.

[125] EJ Advisory Committee. December 2, 2021. EJ Advisory Committee Responses for the CARB Scenario Inputs. *https://ww2.arb.ca.gov/sites/default/files/2021-12/EJAC%20Final%20Responses%20to%20CARB%20Scenario%20Inputs_12_2_21.pdf*.

[126] CARB. January 25, 2022. Update on PATHWAYS Scenario Modeling Assumptions. *https://ww2.arb.ca.gov/sites/default/files/2022-01/Scenario%20Slides%20for%20Jan25%20EJAC%20Mtg_01242022.pdf*.

The summary below provides an overview of the alternatives designed and considered for the energy and industrial sectors in this update. Full details of each scenario considered can be found in the *Draft 2022 Scoping Plan Update*

**Scoping Plan Scenario (modeling scenario Alternative 3 from the Draft):** carbon neutrality by 2045, deploy a broad portfolio of existing and emerging fossil fuel alternatives and clean technologies, and align with statutes, Executive Orders, Board direction, and direction from the governor

**Alternative 1:** carbon neutrality by 2035, nearly complete phaseout of all combustion, limited reliance on carbon capture and sequestration and engineered carbon removal, and restricted applications for biomass-derived fuels

**Alternative 2:** carbon neutrality by 2035 and aggressive deployment of a full suite of technology and energy options, including engineered carbon removal

**Alternative 4:** carbon neutrality by 2045, deployment of a broad portfolio of existing and emerging fossil fuel alternatives, slower deployment and adoption rates than the Scoping Plan Scenario, and a higher reliance on $CO_2$ removal

Other considerations for the AB 32 GHG Inventory sectors include the following:

- To what extent does an alternative meet the statewide targets and any sector targets, and also deliver clean air benefits (especially in the near term) to address ongoing healthy air disparities, prioritize reductions for mobile and large stationary sources, and emphasize continued investment in disadvantaged communities?
- Does an alternative support California in building on efforts to collaborate with other jurisdictions and include exportable policies based on robust science?
- Does an alternative provide for compliance options and a cost-effective approach to reduce GHG emissions?
- Does the alternative present a realistic and ambitious path forward consistent with statute and science, and support economic opportunities, particularly in anticipated growth sectors?

## Scenarios for Natural and Working Lands

For the natural and working lands sector, the Reference Scenario shows that NWL will continue to emit GHGs and lose carbon stocks into the future as the combined effects of past unhealthy management practices and climate change impact our lands. Relative to the Reference Scenario, the four NWL scenarios represent different scales of land management on seven landscapes (forests, shrublands/chaparral, grasslands, croplands, developed lands, wetlands, and sparsely vegetated lands) to support carbon neutrality.

The analysis of the four NWL scenarios shows that the Scoping Plan Scenario is the preferred choice because it prioritizes sustainable land management to sequester carbon over the long term, GHG and air pollution reductions, ecosystem health and resilience, and implementation and technological feasibility and cost-effectiveness. The Scoping Plan Scenario reduces catastrophic wildfire risk to the state; increases the health and resilience of California's forests, shrublands, and grasslands; increases soil health; and protects, restores, and enhances California's natural and working lands for future generations. The Scoping Plan Scenario takes into consideration the priority landscapes and nature-based strategies identified in California's Climate Smart Strategy[127] and reflects the state's priorities to manage lands in ways that support the multiple benefits they provide. The Scoping Plan Scenario, as well as each of the alternative NWL scenarios, were informed by input from other agencies, the public, and the EJ Advisory Committee. Additional landscapes and land management activities will be added and evaluated in future Scoping Plan updates and in response to AB 1757.

Each of the NWL scenarios have several similarities, including the following:

- Prioritizing NWL management actions on forests, shrublands, grasslands, croplands, developed lands, wetlands, and sparsely vegetated lands. These actions can reduce GHG emissions from these lands, protect ecosystems against future climate change, protect communities, and enhance the ecosystem benefits they provide to nature and society.
- Exploring the potential impacts of different levels of NWL management actions that are designed to achieve the objective associated with each scenario.
- Analyzing the carbon impacts of land management actions, climate change, wildfire, and water use on California's diverse natural and working lands through 2045.

There are also differences across the four NWL scenarios. These include:

- The level of NWL management actions taken on each landscape, such as varying the acres of healthy soils practices for croplands.
- The types of NWL management actions taken on each landscape, such as prescribed burning or thinning for forests, grasslands, and shrublands.

[127] CNRA. 2022. Natural and Working Lands Climate Smart Strategy. *https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Expanding-Nature-Based-Solutions/CNRA-Report-2022---Final_Accessible_Compressed.pdf*.

The summary below provides an overview of the alternatives designed and considered for the NWL sectors in this Scoping Plan. Full details of each scenario considered can be found in the *Draft 2022 Scoping Plan Update*.

**Scoping Plan Scenario (NWL Alternative 3 from the Draft):** land management activities that prioritize restoration and enhancement of ecosystem functions to improve resilience to climate change impacts, including more stable carbon stocks

**NWL Alternative 1:** land management activities that prioritize short term carbon stocks in our forests and through increased climate smart agricultural practices on croplands

**NWL Alternative 2:** land management activities representative of California's current commitments and plans

**NWL Alternative 4:** land management activities that prioritize reducing catastrophic wildfires in forests, shrublands, and grasslands

## Evaluation of Scoping Plan Alternatives

CARB staff solicited feedback from topical experts, affected stakeholders, and the EJ Advisory Committee, including a tribal representative, at public meetings to assemble input assumptions for four carbon neutrality scenarios to model using PATHWAYS. Revisions to the Draft Scoping Plan were informed by direction in statute, the Governor's Executive Orders, public comments, and the recommendations of the EJ Advisory Committee. The three alternative scenarios were designed to explore the potential speed, magnitude, and impacts of transitioning California's energy demand away from fossil fuels. The modeling assumptions listed below identify the primary fossil fuel alternative that is commercially available and technically feasible for widespread use by 2045 for each sector. CARB assumes that any energy demand that remains after the alternative technology or fuel is applied—such as on-road internal combustion engines, industrial processes, and gas use in existing buildings that have not yet decarbonized—will continue to be met by fossil fuels, resulting in residual GHG emissions.

## NWL Scoping Plan Alternatives

For the NWL sectors, staff significantly expanded the scale of the scientific analysis for NWL from previous Scoping Plan efforts. CARB staff utilized modeling tools for this expanded analysis to assess both the carbon and other ecological, public health, and economic outcomes of management actions on forests, shrublands, grasslands, croplands, developed lands, wetlands, and sparsely vegetated lands. CARB staff aligned the scenarios with both the landscape types and actions identified in other efforts called for in Governor Newsom's Executive Order N-82-20 (e.g., California's Climate Smart Strategy and Pathways to 30x30). As part of this Scoping Plan, CARB staff modeled as many of the management actions identified in the Natural and Working Lands Climate

Smart Strategy as were feasible. The management actions that were included in the model were selected because of the State of California's previous work to quantify these actions' impacts. It was not feasible to model every land management strategy for NWL, and so it is possible that larger volumes of sequestration (e.g., in soils or in oceans) could result from additional non-modeled activities. California's Natural and Working Lands Climate Smart Strategy includes a more comprehensive listing of priority nature-based solutions and management actions. It is important to note that the absence of a particular management action or its climate benefit in the modeling is not an indication of its importance or potential contributions toward meeting the target or toward supporting the carbon neutrality target for California.

**Forests:** Management strategies were modeled for forests: biological/chemical/ herbaceous treatments (e.g., herbicide application), clearcut, various timber harvests (e.g., variable retention, seed tree / shelterwood, selection harvesting), mastication, other mechanical treatments (e.g., piling of dead material, understory thinning), prescribed burning, and thinning. Avoided land conversion to another land use was also included in the modeling. Wildfire was modeled and is responsive to management strategies and climate conditions.

**Shrublands and chaparral:** Management strategies were modeled for shrublands and chaparral: biological/chemical/herbaceous treatments, prescribed burning, mechanical treatment (e.g., mastication, crushing, mowing, piling), and avoided conversion from shrubland to another land use. Wildfire was modeled and is responsive to management strategies and climate conditions.

**Grasslands:** Management strategies were modeled for grasslands: biological/chemical/herbaceous treatments, prescribed burning, and avoided land conversion from grasslands to another land use. Wildfire was modeled and is responsive to management strategies and climate conditions.

**Croplands:** Management strategies were modeled for row crops: cover cropping, no till, reduced till, compost amendment, transition to organic[128] farming, avoided conversion of annual crop agricultural land through easements, establishing riparian forest buffers, alley cropping, establishing windbreaks/shelterbelts, establishing tree and shrubs in croplands, and establishing hedgerows. For perennial crops, windbreaks/shelterbelts, hedgerows, conversion from annual crops to perennial crops, and avoided conversion to other land uses were modeled.

[128] Note: $N_2O$ reductions from decreases in synthetic fertilizer application in organic farming were not modeled.

**Developed lands:** Management strategies were modeled for developed lands: Increasing tree canopy cover through planting trees and improved management of existing trees, and removing vegetation surrounding structures in accordance with the CAL FIRE Defensible Space PRC 4291.

**Wetlands:** Management strategies were modeled for wetlands: Restoring wetlands through submerging cultivated land in the Sacramento-San Joaquin Delta and avoided land conversion in the Sacramento-San Joaquin Delta.

**Sparsely vegetated lands:** Management strategies were modeled for sparsely vegetated lands: Avoided conversion of sparsely vegetated lands to another land use.

## Scoping Plan Scenario

The Scoping Plan Scenario achieves GHG emission reductions that exceed the levels expected based on existing policies represented in the Reference Scenario, keeping California on track to achieve the SB 32 GHG reduction target for 2030 and become carbon neutral no later than 2045. Actions that reduce GHG emissions and transition AB 32 GHG Inventory sources away from fossil fuel combustion affect each economic sector. Actions that lead to improved carbon stocks affect each landscape.

### AB 32 GHG Inventory Sectors

The AB 32 GHG Inventory Sector Reference scenario is the forecasted statewide GHG emissions through mid-century, with existing policies and programs but without any further action to reduce GHGs beyond those needed to achieve the 2030 limit. The Reference Scenario was developed based on other projections of business-as-usual conditions. Sources of data and policies included are:

- California Energy Demand Forecast[129]
- The two transportation carbon neutrality studies required by AB 74[130]
- The Mobile Source Strategy[131]
- SB 100 60 percent Renewables Portfolio Standard
- A Low Carbon Fuel Standard carbon intensity reduction target of 20 percent

Policies that are under study or design, such the Advanced Clean Fleets regulation, are not included. The Reference Scenario reflects current trends and expected performance of policies identified in the 2017 Scoping Plan—some of which are performing better (such as the RPS and LCFS) and others that may not meet expectations (such as vehicle miles traveled [VMT] reductions and methane capture). Figure 2-1 provides the modeling results for a Reference Scenario for the AB 32 GHG Inventory sectors compared to the Scoping Plan Scenario.

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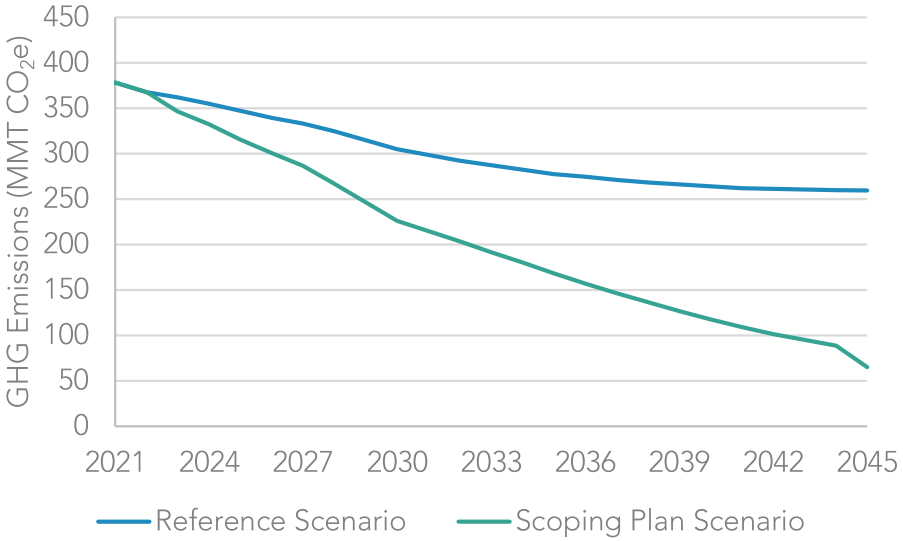
[129] California Energy Commission (CEC). 2020. *2019 Integrated Energy Policy Report.* https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2019-integrated-energy-policy-report.

[130] Brown et al. 2021. *Driving California's Transportation Emissions.* https://escholarship.org/uc/item/3np3p2t0 and Deschenes et al. 2021. *Enhancing equity.* https://zenodo.org/record/4707966#.Yl72RNrMKUn.

[131] CARB. 2021. 2020 *Mobile Source Strategy*. https://ww2.arb.ca.gov/sites/default/files/2021-12/2020_Mobile_Source_Strategy.pdf.

**Figure 2-1: Reference and Scoping Plan Scenario GHG emissions**[132]




The Scoping Plan Scenario is summarized in Table 2-1. The table shows the types of technologies and energy needed to drastically reduce GHG emissions from the AB 32 Inventory sectors. It also includes references to relevant statutes and Executive Orders, although it is not comprehensive of all existing new authorities for directing or supporting the actions described. Each action is expected to both reduce GHGs and help improve air quality, primarily by transitioning away from combustion of fossil fuels. The Scoping Plan Scenario achieves the AB 1279 target of 85 percent below 1990 levels by 2045 and identifies a need to accelerate the 2030 target to 48 percent below 1990 levels.

[132] The drop in emissions in 2045 reflects both the need to achieve an 85% reduction below 1990 levels in anthropogenic emissions per AB 1279 and Governor Newsom's request for a 100 MMT CO2e carbon removal and capture target in 2045. This was modeled by extending CCS to electric sector emissions.

**Table 2-1: Actions for the Scoping Plan Scenario: AB 32 GHG Inventory sectors**

| Sector | Action | Statutes, Executive Orders, Other Direction, Outcome |
|---|---|---|
| GHG Emissions Reductions Relative to the SB 32 Target[133] | 40% below 1990 levels by 2030 | SB 32: Reduce statewide GHG emissions.<br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory |
| Smart Growth / Vehicle Miles Traveled (VMT) | VMT per capita reduced 25% below 2019 levels by 2030, and 30% below 2019 levels by 2045 | SB 375: Reduce demand for fossil transportation fuels and GHGs, and improve air quality.<br>In response to Board direction and EJ Advisory Committee recommendations |
| Light-duty Vehicle (LDV) Zero Emission Vehicles (ZEVs) | 100% of LDV sales are ZEV by 2035 | EO N-79-20: Reduce demand for fossil transportation fuels and GHGs, and improve air quality.<br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory<br>2035 target aligns with the EJ Advisory Committee recommendation. |

[133] While the SB 32 GHG emissions reduction target is not an Action that is analyzed independently, it is included in this table for reference.

| Sector | Action | Statutes, Executive Orders, Other Direction, Outcome |
|---|---|---|
| Truck ZEVs | 100% of medium-duty (MDV)/HDV sales are ZEV by 2040 (AB 74 University of California Institute of Transportation Studies [ITS] report) | EO N-79-20: Reduce demand for fossil transportation fuels and GHGs, and improve air quality.<br><br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory |
| Aviation | 20% of aviation fuel demand is met by electricity (batteries) or hydrogen (fuel cells) in 2045.<br><br>Sustainable aviation fuel meets most or the rest of the aviation fuel demand that has not already transitioned to hydrogen or batteries. | Reduce demand for petroleum aviation fuel and reduce GHGs.<br><br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory<br><br>In response to Governor Newsom's July 2022 letter to CARB Chair Liane Randolph |
| Ocean-going Vessels (OGV) | 2020 OGV At-Berth regulation fully implemented, with most OGVs utilizing shore power by 2027.<br><br>25% of OGVs utilize hydrogen fuel cell electric technology by 2045. | Reduce demand for petroleum fuels and GHGs, and improve air quality.<br><br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory |
| Port Operations | 100% of cargo handling equipment is zero-emission by 2037.<br><br>100% of drayage trucks are zero emission by 2035. | Executive Order N-79-20:<br><br>Reduce demand for petroleum fuels and GHGs, and improve air quality.<br><br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory |

| Sector | Action | Statutes, Executive Orders, Other Direction, Outcome |
|---|---|---|
| Freight and Passenger Rail | 100% of passenger and other locomotive sales are ZEV by 2030.<br><br>100% of line haul locomotive sales are ZEV by 2035.<br><br>Line haul and passenger rail rely primarily on hydrogen fuel cell technology, and others primarily utilize electricity. | Reduce demand for petroleum fuels and GHGs, and improve air quality.<br><br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory |
| Oil and Gas Extraction | Reduce oil and gas extraction operations in line with petroleum demand by 2045. | Reduce GHGs and improve air quality.<br><br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory |
| Petroleum Refining | CCS on majority of operations by 2030, beginning in 2028<br><br>Production reduced in line with petroleum demand. | Reduce GHGs and improve air quality.<br><br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory |

| Sector | Action | Statutes, Executive Orders, Other Direction, Outcome |
|---|---|---|
| Electricity Generation | Sector GHG target of 38 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) in 2030 and 30 $MMTCO_2e$ in 2035<br><br>Retail sales load coverage[134]<br><br>20 gigawatts (GW) of offshore wind by 2045<br><br>Meet increased demand for electrification without new fossil gas-fired resources. | SB 350 and SB 100: Reduce GHGs and improve air quality.<br><br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory<br><br>In response to Governor Newsom's July 2022 letter, Board direction, and EJ Advisory Committee recommendation |
| New Residential and Commercial Buildings | All electric appliances beginning 2026 (residential) and 2029 (commercial), contributing to 6 million heat pumps installed statewide by 2030 | Reduce demand for fossil gas and GHGs, and improve ambient and indoor air quality.<br><br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory<br><br>In response to Governor Newsom's July 2022 letter |

[134] SB 100 speaks only to retail sales and state agency procurement of electricity. The *2021 SB 100 Joint Agency Report* reflects the agency authors' understanding that other loads—wholesale or non-retail sales and losses from storage and transmission and distribution lines—are not subject to the law.

| Sector | Action | Statutes, Executive Orders, Other Direction, Outcome |
|---|---|---|
| Existing Residential Buildings | 80% of appliance sales are electric by 2030 and 100% of appliance sales are electric by 2035.<br><br>Appliances are replaced at end of life such that by 2030 there are 3 million all-electric and electric-ready homes—and by 2035, 7 million homes—as well as contributing to 6 million heat pumps installed statewide by 2030. | Reduce demand for fossil gas and GHGs, and improve ambient and indoor air quality.<br><br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory<br><br>In response to Governor Newsom's July 2022 letter |
| Existing Commercial Buildings | 80% of appliance sales are electric by 2030, and 100% of appliance sales are electric by 2045.<br><br>Appliances are replaced at end of life, contributing to 6 million heat pumps installed statewide by 2030. | Reduce demand for fossil gas and GHGs, and improve ambient and indoor air quality.<br><br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory<br><br>In response to Governor Newsom's July 2022 letter |
| Food Products | 7.5% of energy demand electrified directly and/or indirectly by 2030; 75% by 2045 | Reduce demand for fossil gas and GHGs, and improve air quality.<br><br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory |

| Sector | Action | Statutes, Executive Orders, Other Direction, Outcome |
|---|---|---|
| Construction Equipment | 25% of energy demand electrified by 2030 and 75% electrified by 2045 | Reduce demand for fossil energy and GHGs, and improve air quality.<br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory |
| Chemicals and Allied Products; Pulp and Paper | Electrify 0% of boilers by 2030 and 100% of boilers by 2045.<br>Hydrogen for 25% of process heat by 2035 and 100% by 2045<br>Electrify 100% of other energy demand by 2045. | Reduce demand for fossil energy and GHGs, and improve air quality.<br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory |
| Stone, Clay, Glass, and Cement | CCS on 40% of operations by 2035 and on all facilities by 2045<br>Process emissions reduced through alternative materials and CCS | SB 596: Reduce demand for fossil energy, process emissions, and GHGs, and improve air quality.<br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory |
| Other Industrial Manufacturing | 0% energy demand electrified by 2030 and 50% by 2045 | Reduce demand for fossil energy and GHGs, and improve air quality.<br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory |

| Sector | Action | Statutes, Executive Orders, Other Direction, Outcome |
|---|---|---|
| Combined Heat and Power | Facilities retire by 2040. | Reduce demand for fossil energy and GHGs, and improve air quality.<br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory |
| Agriculture Energy Use | 25% energy demand electrified by 2030 and 75% by 2045 | Reduce demand for fossil energy and GHGs, and improve air quality.<br>AB 197: direct emissions reductions |
| Low Carbon Fuels for Transportation | Biomass supply is used to produce conventional and advanced biofuels, as well as hydrogen. | Reduce demand for petroleum fuel and GHGs, and improve air quality.<br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory |
| Low Carbon Fuels for Buildings and Industry | In 2030s biomethane[135] blended in pipeline<br>Renewable hydrogen blended in fossil gas pipeline at 7% energy (~20% by volume), ramping up between 2030 and 2040<br>In 2030s, dedicated hydrogen pipelines constructed to serve certain industrial clusters | Reduce demand for fossil energy and GHGs, and improve air quality.<br>AB 197: direct emissions reductions for sources covered by the AB 32 Inventory |

[135] *Biomethane* is also known as renewable natural gas (RNG).

| Sector | Action | Statutes, Executive Orders, Other Direction, Outcome |
|---|---|---|
| Non-combustion Methane Emissions | Increase landfill and dairy digester methane capture.<br><br>Some alternative manure management deployed for smaller dairies<br><br>Moderate adoption of enteric strategies by 2030<br><br>Divert 75% of organic waste from landfills by 2025.<br><br>Oil and gas fugitive methane emissions reduced 50% by 2030 and further reductions as infrastructure components retire in line with reduced fossil gas demand | SB 1383: Reduce short-lived climate pollutants. |
| High GWP Potential Emissions | Low GWP refrigerants introduced as building electrification increases, mitigating HFC emissions | SB 1383: Reduce short-lived climate pollutants. |

## Natural and Working Lands

The Reference Scenario for NWL represents the amount of land management that occurred between 2001 and 2014, and projects the outcomes from maintaining the 2001–2014 levels of land management until 2045. The management and land use practices that occur within the Reference Scenario were derived from empirical data used by staff. For forests, shrublands/chaparral, and grasslands, the Reference Scenario constitutes approximately 250,000 acres of annual statewide treatments. For croplands, the Reference Scenario represents no healthy soil practices because during this period the healthy soil program did not yet exist. For land use change within all land types that consider land use change, historical rates of land conversion from 2001–2014 also were taken from empirical data and modeled into the future for the Reference Scenario.

Table 2-2 summarizes the Scoping Plan Scenario. The table also includes references to relevant statutes and Executive Orders where available.

**Table 2-2: Actions for the Scoping Plan Scenario: NWL sectors**

| Sector | Action | Statutes, Executive Orders, Outcome |
|---|---|---|
| Natural and Working Lands | Conserve 30% of the state's NWL and coastal waters by 2030.<br><br>Implement near- and long-term actions to accelerate natural removal of carbon and build climate resilience in our forests, wetlands, urban greenspaces, agricultural soils, and land conservation activities in ways that serve all communities—and in particular low-income, disadvantaged, and vulnerable communities. | EO N-82-20 and SB 27: CARB to include an NWL target in the Scoping Plan.<br><br>AB 1757: Establish targets for carbon sequestration and nature-based climate solutions.<br><br>SB 1386: NWL are an important strategy in meeting GHG reduction goals. |

| Sector | Action | Statutes, Executive Orders, Outcome |
|---|---|---|
| Forests and Shrublands | At least 2.3 million acres[136] treated statewide annually in forests, shrublands/chaparral, and grasslands, comprised of regionally specific management strategies that include prescribed fire, thinning, harvesting, and other management actions. No land conversion of forests, shrublands/chaparral, or grasslands. | Restore health and resilience to overstocked forests and prevent carbon losses from severe wildfire, disease, and pests. Improve air quality and reduce health costs related to wildfire emissions. Improve water quantity and quality and improve rural economies. Provide forest biomass for resource utilization.<br><br>EO B-52-18: CARB to increase the opportunity for using prescribed fire.<br><br>AB 1504 (Skinner, Chapter 534, Statutes of 2010): CARB to recognize the role forests play in carbon sequestration and climate mitigation. |

[136] The 2.3 million acre target is what the Scoping Plan modeling shows would be needed to realize the carbon stock target called for in this Scoping Plan by 2045.

| Sector | Action | Statutes, Executive Orders, Outcome |
|---|---|---|
| Grasslands | At least 2.3 million acres[137] treated includes increased management of grasslands interspersed in forests to reduce fuels surrounding communities using management strategies appropriate for grasslands. No land conversion of forests, shrublands/chaparral, or grasslands. | Help to achieve climate targets, improve air quality, and reduce health costs. |
| Croplands | Implement climate smart practices for annual and perennial crops on ~80,000 acres annually. Land easements/ conservation on annual crops at ~5,500 acres annually. Increase organic agriculture to 20% of all cultivated acres by 2045 (~65,000 acres annually). | Reduce short-lived climate pollutants. Increase soil water holding capacity. Increase organic farming and reduce pesticide use.<br><br>SB 859: Recognizes the ability of healthy soils practices to reduce GHG emissions from agricultural lands.<br><br>Target increased in response to Governor Newsom's direction to prioritize sustainable land management. |

[137] The 2.3 million acre target is what the Scoping Plan modeling shows would be needed to realize the carbon stock target called for in this Scoping Plan by 2045.

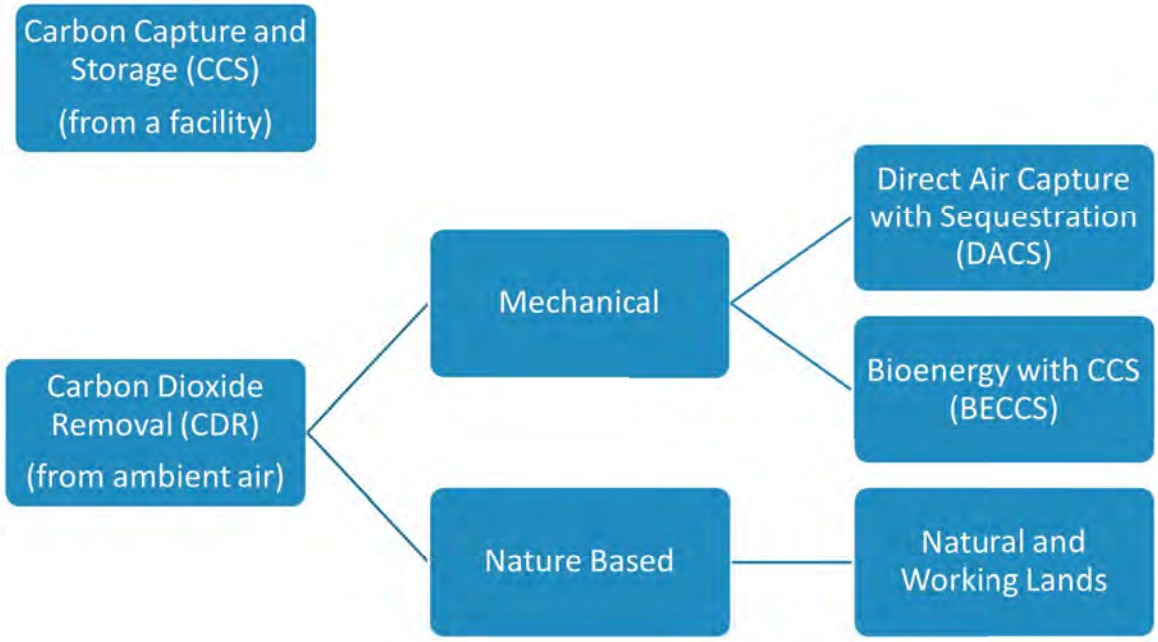
| Sector | Action | Statutes, Executive Orders, Outcome |
|---|---|---|
| Developed Lands | Increase urban forestry investment by 200% above current levels and utilize tree watering that is 30% less sensitive to drought. Establish defensible space that accounts for property boundaries. | Increase urban tree canopy and shade cover. Reduce heat island effects and support water infrastructure. Reduce fire risk via defensible space.<br><br>AB 2251 (Calderon, Chapter 186, Statutes of 2022): Increase urban tree canopy 10% by 2035.<br><br>Target increased in response to AB 2251 and Governor Newsom's direction on $CO_2$ removal targets in his July 2022 letter. |
| Wetlands | Restore 60,000 acres of Delta wetlands. | Increase carbon sequestration and reduce short-lived climate pollutants. Helps to reverse land subsidence while improving flood protection and providing critical habitat. |
| Sparsely Vegetated Lands | Land conversion at 50% of the Reference Scenario land conversion rate. | Reduce the rate of land conversion to more GHG-intensive land uses. |

## Strategies for Carbon Removal and Sequestration

To achieve carbon neutrality, any remaining emissions must be compensated for using carbon removal and sequestration tools. The following discussion presents more detail

on the options available to capture and sequester carbon. Carbon removal and sequestration will be an essential tool to achieve carbon neutrality, and the modeling clearly shows there is no path to carbon neutrality without carbon removal and sequestration. Governor Newsom also recognized the importance of $CO_2$ removal strategies and directed CARB to establish $CO_2$ removal and carbon capture targets of 20 $MMTCO_2$ and 100 $MMTCO_2$ by 2030 and 2045, respectively, as well as signing 2022 legislation on carbon removal and sequestration, including: AB 1279, SB 905, SB 1137, and AB 1757. Carbon removal and sequestration can take different forms. Figure 2-2 illustrates the types of carbon removal and sequestration included in this Scoping Plan. There are numerous other carbon removal options undergoing research, development, and pilot deployment. As these options mature and new approaches emerge, they can be considered in future Scoping Plan updates.

**Figure 2-2: Forms of carbon removal and sequestration considered in this Scoping Plan**




## The Role of Carbon Capture and Sequestration

Carbon capture and sequestration (CCS) will be a necessary tool to reduce GHG emissions and mitigate climate change while minimizing leakage and minimizing emissions where no technological alternatives may exist. CCS is a process by which large amounts of $CO_2$ are captured, compressed, transported, and sequestered. CCS projects are paired with a source of emissions, as the CCS project captures $CO_2$ as it leaves a facility's smokestack. CCS projects are often paired with large GHG-emitting facilities such as energy, manufacturing, or fuel production facilities. The sequestration component

of CCS includes $CO_2$ injection into geologic formations (such as depleted oil and gas reservoirs and saline formations), as well as use in industrial materials (e.g., concrete). CCS is distinct from biological sequestration, which is typically accomplished through NWL management and conservation practices that enhance the storage of carbon or reduce $CO_2$ emissions with nature-based approaches. CCS is also distinct from mechanical $CO_2$ removal technologies, where $CO_2$ is removed directly from the atmosphere using mechanical and/or chemical processes.

CARB adopted a CCS Protocol in 2018 as part of amendments to the Low Carbon Fuel Standard.[138] At this time, no CCS projects have been implemented or have generated any credits under that protocol. However, CCS projects have been implemented elsewhere since the 1970s, largely on coal-fired power plants, with over two dozen projects operational around the world. Over 100 are at the stages of advanced or early development and are expanding beyond coal-fired plants to fossil gas, fuel production, and electricity generation facilities.[139] CCS projects are in development for addressing emissions from fuel, gas, energy production, and chemical production. As of November 2019, more than half of global large-scale CCS facilities (representing approximately 22 $MMTCO_2$/yr in capacity[140]) were in the U.S., mostly as a result of sustained governmental support for these technologies.[141] This support includes the federal 45Q tax credit for CCS[142,143] and research and deployment grants from federal agencies.[144,145] California's deep sedimentary rock formations in the Central Valley represent world-class

[138] CARB. 2022. Carbon Capture & Sequestration. https://ww2.arb.ca.gov/our-work/programs/carbon-capture-sequestration.
[139] Global CCS Institute. 2021. *Global Status of CCS 2021*. https://www.globalccsinstitute.com/wp-content/uploads/2021/11/Global-Status-of-CCS-2021-Global-CCS-Institute-1121.pdf.
[140] IHS Markit. August 2021. Carbon Removal Potential: An Overview. https://ww2.arb.ca.gov/sites/default/files/2021-08/ihsmarkit_presentation_sp_engineeredcarbonremoval_august2021.pdf.
[141] Beck, Lee. 2019. *Carbon capture and storage in the USA: The role of US innovation leadership in climate-technology commercialization*. https://academic.oup.com/ce/article/4/1/2/5686277.
[142] Congressional Research Service. 2021. Carbon Storage Requirements in the 45Q Tax Credit. IF11639. https://crsreports.congress.gov/product/pdf/IF/IF11639.
[143] The Inflation Reduction Act of August 2022 expands and enhances the 45 Q tax credit for CCS. Pub.L. No. 117-169 (August 16, 2022).
[144] U.S. Department of Energy. 2020. U.S. Department of Energy Announces $131 Million for CCUS Technologies. https://www.energy.gov/articles/us-department-energy-announces-131-million-ccus-technologies.
[145] U.S. Department of Energy. 2021. Funding Opportunity Announcement 2515, Carbon Capture R&D for Natural Gas and Industrial Point Sources, and Front-End Engineering Design Studies for Carbon Capture Systems at Industrial Facilities and Natural Gas Plants. https://www.energy.gov/fecm/articles/funding-opportunity-announcement-2515-carbon-capture-rd-natural-gas-and-industrial.

$CO_2$ storage sites that would meet the highest standards, with storage capacities of at least 17 billion tons of $CO_2$.[146,147]

In this Scoping Plan, CCS is included to address emissions from limited sectors, including electricity generation, cement production facilities, and refineries, to ensure anthropogenic emissions are reduced by at least 85 percent below 1990 levels in 2045, as directed in AB 1279. While the modeling outputs show CCS not being applied to the electricity sector until 2045, CCS could be implemented earlier on the electricity sector with a similar ramp up over time as that for refineries and cement plants. An earlier application of CCS in the electricity sector would yield additional reductions in years prior to 2045. In addition, CCS can support hydrogen production until such time as there is sufficient renewable power for electrolysis and an abundant water source.

Cement plants have emissions associated with combustion and process-related activities. Combustion emissions account for approximately 40 percent of the total emissions at cement plants. The remaining emissions are related to process-related activities. Due to the high heat content needed to produce cement, there is currently no technically feasible alternative to combustion. SB 596 calls for a 40 percent reduction in GHG intensity in cement emissions from 2019 levels by 2035, and then net zero emissions by 2045. To meet in-state demand, the state relies on cement both produced in state and imported. There are seven cement plants operating in California.[148] To minimize emissions leakage and address emissions from cement plants, the Scoping Plan Scenario includes CCS for cement plants. Additional reductions will need to be pursued and considered as part of implementation of SB 596, which calls for CARB to develop a comprehensive strategy by July 1, 2023, for the state's cement sector to achieve net-zero emissions of GHGs associated with cement used within the state as soon as possible, but no later than December 31, 2045. This effort began in the summer of 2022 and included sector specific workshops.

Even with implementation of EO N-79-20, and despite all of the ambitious efforts in the Scoping Plan Scenario, there will remain some demand for petroleum fuels for legacy vehicles on road applications, and in aviation, rail, and marine applications. Petroleum refineries will need to implement technology to decarbonize their operations and reduce their emissions. This Scoping Plan also assumes CCS at petroleum refineries as one of those potential strategies. Currently, there are seventeen petroleum refineries operating

[146] For comparison purposes, California's emitted 418.2 million metric tons of $CO_2e$ in 2019.
[147] Lawrence Livermore National Laboratory. 2020. *Getting to Neutral: Options for Negative Carbon Emissions in California.* Revision 1. https://www-gs.llnl.gov/content/assets/docs/energy/Getting_to_Neutral.pdf.
[148] CARB. Mandatory GHG Reporting – Reported Emissions. https://ww2.arb.ca.gov/mrr-data

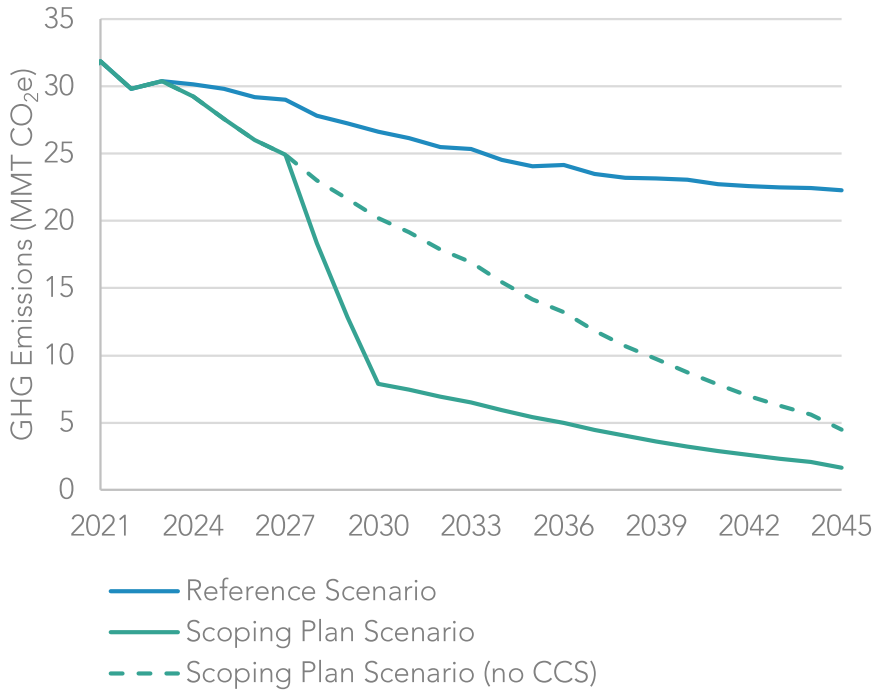
in the state.[149] On the supply side, the modeling assumes all in-state demand is met through some very limited refining activities in California. Figure 2-3 shows the emissions from the refining sector with and without CCS. If CCS is not deployed, the emissions would be directly emitted into the atmosphere, and $CO_2$ removal by NWL or direct air capture would need to increase to compensate for the sector's emissions.

Refineries can have a variety of point sources that emit $CO_2$—such as steam methane reformers for producing hydrogen, combined heat and power units, and catalytic crackers—that are best suited for CCS. Each configuration of a refinery can be unique to its footprint, onsite operations, and the types of crude oils processed. There are newer technologies with smaller footprints[150] that can be deployed in modular configurations to capture $CO_2$ in space-constrained and multiple-point-source facilities such as refineries. CCS can provide a path to reducing GHG emissions from these facilities to meet petroleum demand while avoiding leakage and until such time as some refineries can be transitioned to produce clean energy to support the transition away from fossil fuels.

While the Scoping Plan modeled deployment of CCS on refineries and identifies significant emissions reductions that can be achieved, the refineries in California are large and complex. The actual deployment of CCS at these facilities as modeled in the Scoping Plan is uncertain. It will be important to closely monitor the evolution of CCS deployment in the refinery sector and, in the next Scoping Plan update, to evaluate the progress toward use in this sector to determine whether the projected reductions will be achieved.

[149] CARB. Mandatory GHG Reporting. *https://ww2.arb.ca.gov/mrr-data*.
[150] Carbon Clean. Modular Carbon Capture Systems for Industry. https://www.carbonclean.com/modular-systems?hsLang=en.

**Figure 2-3: Petroleum refining emissions with and without carbon capture and sequestration**




This Scoping Plan also calls for accelerating the transition from combustion of fossil fuels to hydrogen. Hydrogen can be produced through electrolysis with renewable electricity or through steam methane reformation of biomethane. There is a high degree of uncertainty around the availability of solar to support both electrification of existing sectors and the production of hydrogen through electrolysis. Producing hydrogen required under the Scoping Plan Scenario with electrolysis would require about 10 gigawatts (GW)[151] of additional solar capacity. If steam methane reformation is paired with CCS, the hydrogen produced could potentially be low carbon. Additionally, the biomethane used to generate hydrogen could be sourced from gasification of forest or agricultural waste resulting from forest management and other NWL management practices, which could also lead to net negative carbon outcomes. Steam methane reformation paired with CCS can thus ensure a rapid transition to hydrogen and increase hydrogen availability until such time as

[151] The Draft Scoping Plan included an estimate for solar capacity (40 GW) to support only electrolysis to produce all hydrogen in the Proposed Scenario. The Scoping Plan now includes steam methane reformation of biomethane and biomass gasification with CCS to produce hydrogen, along with electrolysis from off-grid solar. See Appendix H (AB 32 GHG Inventory Sector Modeling) for additional details.

electrolysis with renewables can meet the ongoing need, assuming there is also sufficient water supply. Additional background and next steps for CCS can be found in Chapter 4.

The EJ Advisory Committee has raised multiple concerns related to the inclusion of CCS and mechanical CDR in the Scoping Plan. Concerns range from potential negative health and air quality impacts in communities from operation of facilities utilizing CCS that continue to emit other emissions, to safety concerns related to potential leaks, to the viability of the current technology. Additionally, the EJ Advisory Committee has policy concerns about the strategy and wants to ensure that engineered carbon removal is not used as a substitute for strategies to achieve emissions reductions onsite and that it does not result in delays in phasing out fossil fuel use. Given these and other concerns and the importance of building public awareness, CARB recognizes the need for a multi-stakeholder process including other state, federal, and local agencies; tribes; independent experts; and community residents to further understand and address community concerns related to CCS. CARB hosted a CCS Symposium with U.S. EPA Region 9 and the Stanford Doerr School of Sustainability to discuss some of these critical issues with community members and other participants. As CARB begins the process of implementing SB 905 in 2023, that will provide an opportunity for further engagement.

In the context of CCS deployment, the Council of Environmental Quality (CEQ) also highlighted the need to further assess and quantify potential impacts on local criteria air pollutants and other emissions resulting from carbon capture retrofits at industrial facilities in response to concerns regarding potential cumulative emissions from single and/or multiple sources.[152] An October 2020 Stanford report[153] discussed how the potential post-combustion capture for $CO_2$ could also reduce emissions of criteria air pollutant emissions from certain facilities. Exploring these potential outcomes will be important to ensure deployment of CCS does not exacerbate air pollution impacts in communities and maximizes any air pollution benefits. The need for these types of evaluations is also included in SB 905.

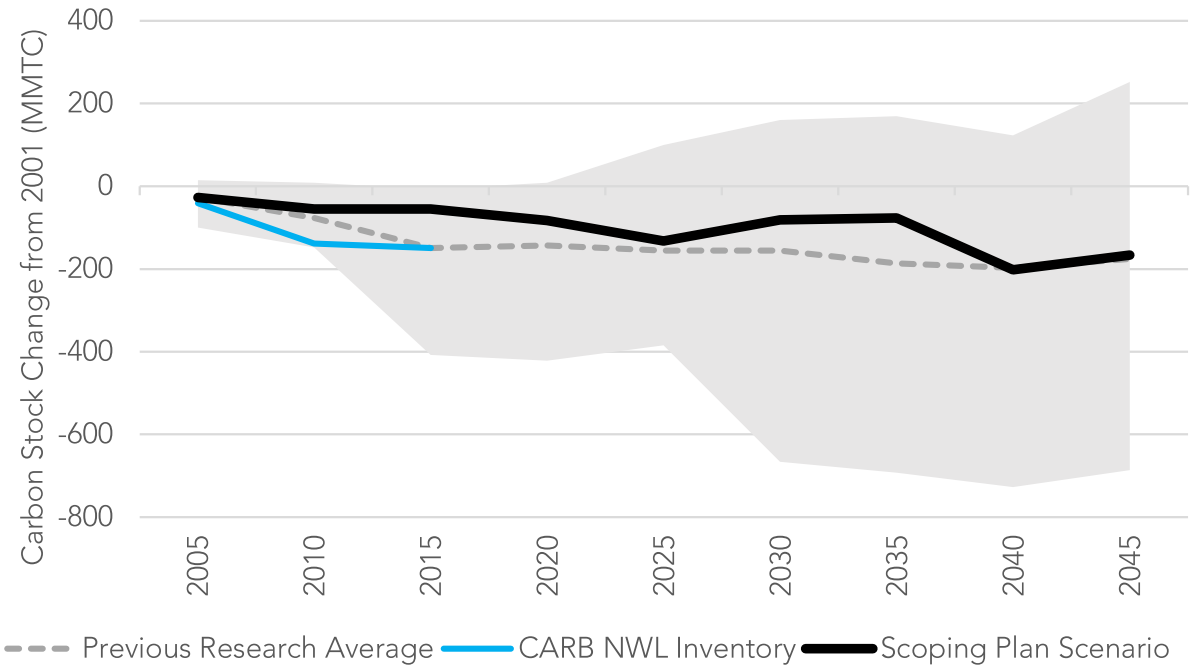
## The Role of Natural and Working Lands Emissions and Sequestration

California's NWL assessments highlight the importance of increasing the pace and scale of NWL actions to ensure that our ecosystems are better equipped to withstand future climate change so they continue to provide the benefits that nature and society depend

[152] Carbon Capture, Utilization, and Sequestration Guidance. 87 Fed. Reg. 8808 (Feb. 16, 2022), *2022-03205.pdf (govinfo.gov)*.
[153] Stanford Center for Carbon Storage. 2020. *An Action Plan for Carbon Capture and Storage in California: Opportunities, Challenges, and Solutions.* October. *https://sccs.stanford.edu/ccs-in-ca/full-report-form?msclkid=6f9177f6c57811ecbebc473e75203b21*.

upon for survival. As climate change increases the likelihood of extreme wildfires, drought, heat, and other impacts, carbon stocks in California's NWL will face increased risks and impacts. We know from previous climate change and Scoping Plan work[154] that lands can be a net source of GHG emissions or a net sink, and that the magnitude of carbon stock changes and GHG emissions and sequestration from NWL are dependent on the effects of climate change and land management. The expanded modeling conducted for this Scoping Plan shows that NWL are projected to be a net source of emissions through 2045 and indicates a probable decrease of carbon stocks into the future. This projection is further corroborated by previous, independent research that has reached the same conclusion, showing a range of varying levels of carbon stock loss. Figure 2-4 shows the modeling results of the Scoping Plan Scenario overlaid with the NWL inventory and findings from independent research.

**Figure 2-4: Comparison of the Scoping Plan Scenario (NWL) with existing research**




The modeling indicates that immediate and aggressive climate action can reduce the environmental impacts that would occur in the absence of this action. The results of the modeling demonstrate that regular NWL management over the next two decades can

[154] CARB. 2019. January 2019. *Draft California 2030 Natural and Working Lands Climate Change Implementation Plan*. https://ww2.arb.ca.gov/sites/default/files/2020-10/draft-nwl-ip-040419.pdf.

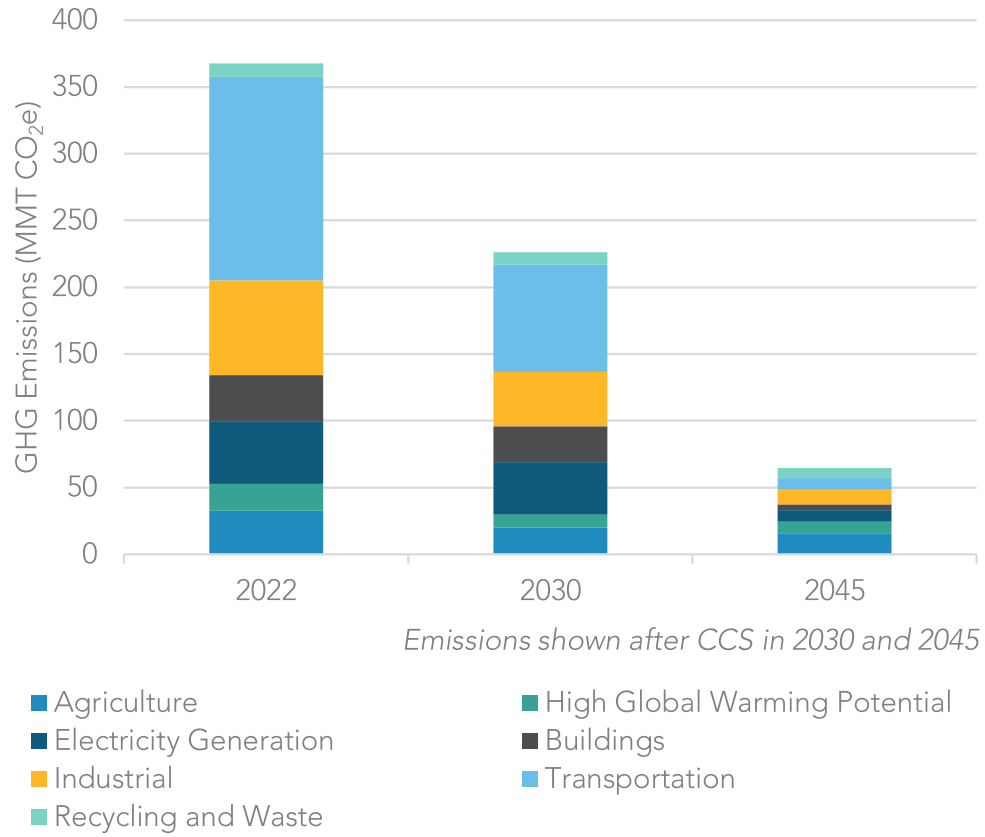
increase carbon stocks from the Reference Scenario trajectory, reduce GHG emissions from lands, and improve ecosystem and public health. This effort is the most comprehensive scientific effort taken by any government to include NWL within its overall climate strategy. Even so, we know that uncertainty exists about future climate and economic forces and the impacts they may have on our ecosystems, so it is important that the state take decisive and aggressive action to improve and diversify ecosystem structures and management.

The effects of climate change, including increased drought, wildfire, and extreme heat, play a significant role in determining the future of California's carbon stocks. And while management actions will help to reduce the impact that climate change will have on California, it is clear from the analysis that NWL sinks and sources are highly variable from year to year, and short time frames do not adequately demonstrate the impact that climate and management are having on ecosystems. For the purposes of climate planning, therefore, it is best to focus on carbon stock changes over longer periods rather than focusing on sequestration or emissions on shorter time frames. The Scoping Plan Scenario is estimated to result in additional NWL emissions of 7 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) annually from 2025–2045. The Reference Scenario is estimated to result in annual emissions of 9 $MMTCO_2e$ over the same time period, and so the Scoping Plan Scenario slows the rate of emissions and provides an approximate 2 $MMTCO_2e$ in additional annual sequestration relative to the Reference Scenario. Because NWL are projected to be a net emissions source, the annual NWL emissions of approximately 7 $MMTCO_2e$ from the Scoping Plan Scenario will need to be compensated by additional $CO_2$ removal approaches to ensure California can achieve carbon neutrality by 2045.

## The Role for Carbon Dioxide Removal (Direct Air Capture)

Even if anthropogenic emissions are reduced to at least 85 percent below 1990 levels by 2045 as called for by AB 1279, there will still be residual emissions in the AB 32 GHG Inventory sectors in 2045 that must be addressed in order to achieve the California's carbon neutrality target. Figure 2-5 includes the emissions by sector for the AB 32 GHG Inventory Sectors in 2022, 2030, and 2045 for the Scoping Plan Scenario.

**Figure 2-5: Residual emissions in 2022, 2030, and 2045 for the Scoping Plan Scenario[155]**




To achieve carbon neutrality, mechanical CDR will therefore need to be deployed. Because NWL management is not estimated to be a significant carbon removal path in the near term, additional CDR options will be needed. *Mechanical CDR* refers to a range of technologies that capture and concentrate ambient $CO_2$. Direct air capture (DAC) is one available option that is under development today and could be widely deployed. Note that, unlike CCS, DAC technologies are not designed to be attached to a specific source or smokestack. These technologies include chemical scrubbing processes that capture $CO_2$ through absorption or adsorption separation processes. Another carbon removal

[155] The High GWP sector includes high global warming potential gas emissions from releases of ozone depleting substance (ODS) substitutes, $SF_6$ emissions from the electricity transmission and distribution system, and gases that are emitted in the semiconductor manufacturing process. ODS substitutes, which are primarily hydrofluorocarbons (HFCs), are used in refrigeration and air conditioning equipment, solvent cleaning, foam production, fire retardants, and aerosols.

option that involves rapid mineralization of $CO_2$ at the Earth's surface is called *mineral carbonation.*[156] As is the case with CCS, mechanical CDR technologies will need governmental or other incentive support to overcome technology and market barriers. In the United States, the U.S. Department of Energy announced financing specifically for DAC in March 2020[157] and March 2021.[158] Additionally, almost $9 billion in CCS support was included in the $ 1 trillion Infrastructure Investment and Jobs Act of 2021.[159] This includes funding to establish four DAC hubs. The Inflation Reduction Act of 2022[160] increases the value of the 45Q tax credit to USD 85 per metric ton of $CO_2$ captured and stored in geologic formations from some industrial applications and USD 180 per metric ton for DAC with storage in geologic formations. In 2021, there were approximately 19 DAC facilities globally.[161]

Ultimately, the role for mechanical CDR will depend on the success of reducing emissions directly at the source in the AB 32 GHG Inventory sectors and the ability of the NWL to sequester carbon. However, mechanical CDR also provides an opportunity to not just achieve carbon neutrality, but also remove legacy GHG emissions from the atmosphere. As such, increased deployment of DAC can help achieve net negative emissions. This would further help avoid the most damaging impacts of climate change. While the federal incentives for DAC provide some support for this technology, the only California program that recognizes this technology is the LCFS program. Permitting must also happen across different levels of government and across multiple state agencies. Energy availability must also be addressed if DAC is to be implemented in remote areas. Additional information and next steps on DAC can be found in Chapter 4.

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[156] The National Academies Press. 2018. Direct Air Capture and Mineral Carbonation Approaches for Carbon Dioxide Removal and Reliable Sequestration: Proceedings of a Workshop–in Brief. *https://nap.nationalacademies.org/catalog/25132/direct-air-capture-and-mineral-carbonation-approaches-for-carbon-dioxide-removal-and-reliable-sequestration#:~:text=National%20Academies%20of%20Sciences%2C%20Engineering%2C%20and%20Medicine%3B%20Division,concentrate%20carbon%20dioxide%20%28CO%202%29%20from%20ambient%20air*.

[157] U.S. Department of Energy. 2020. Department of Energy to Provide $22 Million for Research on Capturing Carbon Dioxide from Air. *https://www.energy.gov/articles/department-energy-provide-22-million-research-capturing-carbon-dioxide-air*.

[158] U.S. Department of Energy. 2021. DOE Invests $24 Million to Advance Transformational Air Pollution Capture. *https://www.energy.gov/articles/doe-invests-24-million-advance-transformational-air-pollution-capture*.

[159] Pub.L. No. 117-58 (November 15, 2021). *https://www.congress.gov/bill/117th-congress/house-bill/3684/text*.

[160] Pub.L. No. 117-169 (August 16, 2022). *https://www.congress.gov/bill/117th-congress/house-bill/5376/text*.

[161] International Energy Agency (IEA). 2022. Direct Air Capture – Analysis. *https://www.iea.org/reports/direct-air-capture*.

## Carbon Dioxide Removal and Capture Targets for 2030 and 2045

Recognizing the importance of $CO_2$ removal, Governor Newsom and the Legislature identified the need for targets to send policy and regulatory signals to pilot, deploy, and scale action for those efforts. Governor Newsom requested that CARB set a $CO_2$ removal and capture target of 20 MMT for 2030 and 100 MMT for 2045, first prioritizing sequestration in NWL. And while this Scoping Plan prioritizes and recommends significant increased climate-smart action on all NWL to support carbon neutrality and healthy and resilient lands, the modeling indicates that, across all NWL, lands will be a net source of emissions when accounting for both carbon sequestration and GHG ($CO_2$, $CH_4$, and $N_2O$) emissions from lands.

Some landscapes, however, are projected to have a net increase in carbon stocks under the Scoping Plan Scenario between 2025 and 2045 relative to the reference case, indicating that NWL actions can help California achieve Governor Newsom's $CO_2$ removal targets. Carbon stocks in urban forests and grasslands are projected to increase relative to historical levels from implementation of the 2022 Scoping Plan. To support the governor's $CO_2$ removal targets, CARB estimates that lands would contribute an average of 1.5 MMT of $CO_2$ removals each year between 2025 and 2045. Any carbon sequestration contributions from lands need to reflect both long-term storage and an overall net increase in carbon stocks over time to ensure these NWL actions are contributing toward California's achievement and maintenance of carbon neutrality over time.

CARB will work to update and revise these estimates as part of implementation of AB 1757, which was signed by the governor in September 2022 and requires that CARB and the California Natural Resources Agency (CNRA) work with an expert advisory committee to determine an ambitious range of carbon sequestration targets by January 1, 2024, for the years 2030, 2038, and 2045.

For the AB 32 GHG Inventory sectors, the Scoping Plan Scenario modeling indicates that the scenario would meet or exceed the 2030 SB 32 target through GHG reduction policies without the need for CDR. CDR will, however, be necessary to increase ambition for an accelerated 2030 target and in increasing amounts over the following decades to achieve carbon neutrality by 2045.[162] Given the likelihood of NWL to be a net source of emissions, and the need for CDR to compensate for residual emissions to achieve carbon neutrality

[162] The modeled scenarios assume that residual emissions will be compensated using DAC technologies by including the direct cost in terms of dollars per ton $CO_2$ removed. The energy source for DAC is not modeled, but renewable electricity and/or hydrogen produced from electrolysis are zero carbon options consistent with the carbon neutrality targets in this Scoping Plan.

by 2045, California will need increasing deployment of mechanical CDR over the coming decades. In the immediate future, scaling nature-based CDR approaches also can help to provide some $CO_2$ removal quickly while mechanical CDR is scaled up between now and 2045. Table 2-3 provides estimates of $CO_2$ removal and capture needed in 2030[163] and 2045.

[163] As identified in Chapter 1, SB 27 (Skinner, Chapter 237, Statues of 2021) directed CARB to "establish carbon dioxide removal targets for 2030 and beyond" as part of this Scoping Plan. CARB is establishing these targets to satisfy both the requirements of SB 27 and the directive from Governor Newsom to establish $CO_2$ removal targets for 2030 and 2045.

**Table 2-3: GHG emissions and removals needed to achieve carbon neutrality and meet the 20 MMTCO$_2$ removal and capture target in 2030 and the 100 MMTCO$_2$ removal and capture target in 2045.**[164]

| | 2030 (MMTCO$_2$e) | 2045 (MMTCO$_2$e) |
|---|---|---|
| GHG Emissions | 233 | 72 |
| AB 32 GHG Inventory Sector Emissions | 226 | 65 |
| Net NWL GHG Emissions Across All Landscapes (annual average from 2025–2045) | 7 | 7 |
| Carbon Capture and Sequestration (CCS): Avoided GHG Emissions from Industry and Electric Sectors | (13) | (25) |
| Carbon Dioxide Removal (CDR) including natural and working lands carbon sequestration,[165] Direct Air Capture, and Bioenergy with CCS (BECCS). | (7) | (75) |
| Net Emissions (GHG Emissions + CDR) | 226 | (3) |

In 2030, the $CO_2$ removal and capture target is 20 MMT, but because the SB 32 target only encompasses the AB 32 GHG Inventory sectors, only CCS that reduces GHG emissions on AB 32 sources count toward achieving more ambitious GHG emission reductions in 2030. In 2045, the $CO_2$ removal and capture must compensate for any residual emissions from the AB 32 Inventory sectors and NWL emissions to support achieving carbon neutrality while also totaling at least 100 MMT. It is important to note that NWL, particularly forests, need a natural wildfire cycle to remain healthy. While the modeling projected wildfires, and implementing the Scoping Plan will result in a reduction in future wildfire emissions, getting to zero wildfires in the sector is not the goal, nor the

[164] Modeled estimates from the Scoping Plan Scenario indicate the relative quantity of emissions and removals to achieve carbon neutrality and meet carbon removal and capture targets. These estimates are not intended to imply precision, as the required policies are yet to be implemented and all models have some uncertainty in their forecasts.

[165] For the purposes of quantifying how to achieve the governor's 20 MMT and 100 MMT $CO_2$ removal and capture target, CARB included 1.5 MMTCO$_2$e sequestration from NWL, which is the sequestration from urban forests. This is included as $CO_2$ removal because it is this sequestration that CARB can consider as having some permanence. Permanence is necessary for incorporating NWL into carbon neutrality. The net NWL emissions of 7 MMTCO$_2$e, identified in the second row of Table 2-3, includes *all* emissions and sinks from all NWL landscapes, which is inclusive of the 1.5 MMTCO$_2$e sequestration. CARB will develop an accounting framework to accommodate NWL carbon stocks.

right approach to a sustainable forestry sector. In contrast in 2045, the reductions from programs and policies are estimated to reduce emissions by 169 $MMTCO_2e$ from business as usual.

The 2030 target for engineered CDR also provides a near term milestone for California and can serve as an important marker for progress in deploying CDR to support California's carbon neutrality goal. Preliminary estimates indicate that, globally, capacity from already announced projects will range from about 2 million metric tons per year ($MMTCO_2/y$) to 8 $MMTCO_2/y$ from bioenergy paired with CCS, and from about 2,000 metric tons per year ($MTCO_2/y$) to 1 $MMTCO_2/y$ from DACs by 2027,[166] which indicates that California's 2030 target is an ambitious, but achievable, goal.

# Scenario Uncertainty

## Greenhouse Gas Emissions Modeling

Several types of uncertainty are important to understand in both forecasting future emissions and estimating the benefits of emission reduction actions. In developing this Scoping Plan we forecasted a reference scenario and estimated the GHG emissions outcome of the AB 32 GHG Inventory sectors using the PATHWAYS[167] model. Inherent in the reference scenario modeling is the expectation that many of the existing programs will continue in their current form, and that the expected drivers for GHG emissions, such as energy demand, population growth, and economic growth, will match our current projections.

However, there is also the expectation that each of the policies included and implemented to achieve the 2030 target in the 2017 Scoping Plan will deliver their exact outcomes. It is unlikely the future will precisely match our projections, and this will lead to uncertainty in the forecast. For example, we never could have foreseen and forecasted economic and emissions impacts related to the extended disruptions from the COVID-19 pandemic. Thus, the single "reference" or "forecast" line should be understood to represent one possible future in a range of possible predictions. For this Scoping Plan, PATHWAYS utilized inputs that reflect technically feasible levels of deployment or adoption of low- or zero-carbon fuels and technologies. Each of the input assumptions provided to PATHWAYS has some uncertainty, which also contributes to uncertainty in the resulting reference scenario.

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[166] IHS Markit. August 2021. Carbon Removal Potential. *https://ww2.arb.ca.gov/sites/default/files/2021-08/ihsmarkit_presentation_sp_engineeredcarbonremoval_august2021.pdf*.
[167] See Appendix H (AB 32 GHG Inventory Sector Modeling).

Similarly, for the NWL modeling, CARB used a mix of individual modeling tools[168] to estimate the carbon and other ecological, public health, and economic outcomes. The Reference scenario assumes that the level of land management actions that occurred between 2001 and 2014 for forests, shrublands, grasslands, croplands, developed lands, wetlands, and sparsely vegetated lands continues into the future. Alternative scenarios assessed the effect of increasing levels of management actions from the reference scenario beginning in 2025. There is a great deal of uncertainty about exactly how lands are currently managed, and a larger uncertainty about how they may be managed in the future. For NWL, it is unlikely that the future will precisely match the carbon stock outcomes CARB has projected, particularly given the uncertainties around current and future land management and the effects climate change will have on our lands. For any modeling exercise these uncertainties exist; however, this modeling effort brings together the best available science, data, and models to quantify the impact our actions may have on the landscape under an unknown future.

## Implementation

As this Scoping Plan is designed to chart a path to achieving carbon neutrality, additional work will be required to fully design and implement any policies and actions identified in this plan. During the subsequent development of policies, the Legislature, CARB, and other state agencies will learn more about the technologies and their costs, as well as how each industry works, as a more comprehensive evaluation is conducted in coordination with stakeholders, including community engagement. Significant areas of uncertainty include permitting wait times[169] and local ordinances that might limit or slow the build-out of utility scale renewables.[170,171] In another example, times to reach commercial operations for solar projects after securing an interconnection agreement also have increased in recent years, to 3.5 to 5.5 years.[172]

The level of natural and working lands climate action identified in this Scoping Plan is ambitious. Achieving the level of action needed to result in the quantified carbon,

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[168] See Appendix I (Natural and Working Lands Technical Support Document).
[169] CEC. 2021. *SB 100 Joint Agency Report.* https://www.energy.ca.gov/sb100#anchor_report.
[170] Roth, Sammy. 2019. "California's San Bernardino County slams the brakes on big solar projects." *Los Angeles Times.* https://www.latimes.com/business/la-fi-san-bernardino-solar-renewable-energy-20190228-story.html?fbclid=IwAR2qHGq3bahHme6SFErLsnyFi9UPIfBHIhvnOh3dU3OM7kUTMcEqYfN3pQA.
[171] Chediak, Mark. 2021. "California NIMBYs Threaten Biden's Clean Energy Goals." *BNN Bloomberg.* https://www.bnnbloomberg.ca/california-nimbys-threaten-biden-s-clean-energy-goals-1.1634351?msclkid=668c9ae9c11311ec92e34035ea157ad4.
[172] Rand, Joseph, et al. 2022. Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection as of the End of 2021. Power Point Presentation. Lawrence Berkeley National Laboratory. https://emp.lbl.gov/sites/default/files/queued_up_2021_04-13-2022.pdf.

emissions, health, and economic outcomes within this Scoping Plan requires coordination, investment, and partnerships across all levels of government and sectors of the economy. It is possible that not all of the actions at the identified level will begin in 2025. This uncertainty will result in diminished levels of beneficial outcomes quantified in the Scoping Plan Scenario. The levels of NWL action identified in this Scoping Plan represent CARB's assessment of the pace and scale of action needed to achieve the carbon stock targets and $CO_2$ removal targets identified in this Scoping Plan.

The Scoping Plan Scenario identifies that 2.3 million acres of forests, shrubland, and grassland management annually would achieve substantial levels of fire emissions reductions and the concomitant health and economics benefits. Currently, 1 million acres of forest treatment annually is the joint federal and state government goal (500,000 acres each). This target of one million acres annually by 2025 is for the purposes of increasing forest health and wildfire resilience in the near term, whereas the 2.3 million acre target is what the Scoping Plan modeling shows would be needed to realize the carbon stock target called for in this Scoping Plan by 2045. By identifying 2.3 million acres of climate action annually in forests, shrublands, and grasslands, this Scoping Plan emphasizes the importance of that 1 million acre annual goal as a milestone on the way to even more action and improved fire and air quality outcomes. The modeling indicates that substantial improvements to statewide fire emissions will occur at levels of action greater than 1 million acres per year. If these levels of action do not occur starting in 2025, the Scoping Plan has quantified climate benefits that will still occur, but to a lesser extent. In terms of fire emissions, compared to the Reference Scenario, 2.3 million acres of forest, shrubland and grassland management will result in a 10% reduction in wildfire emissions. At 1 million acres per year, this decreases to a 2.5% reduction. If 1 million acres per year is also not accomplished, then the emissions and health benefits are even lower.

Climate action in other NWL sectors also generates many co-benefits. Climate action identified in this Scoping Plan is aimed at not only fighting climate change but also improving air quality and public health. The climate action identified in the agricultural sector, for example, should result in decreased pesticide and synthetic fertilizer use. This decrease of synthetic chemical use in agriculture across California also should result in improved public health, especially for communities that work and live in and around agricultural lands. However, as with the forestry sector, the benefits of climate action in agricultural lands and in any other land are dependent on how much implementation takes place. Ramping up increased healthy soils practices and increasing organic agriculture in California will require continued and sustained implementation by private industry and public agencies. For example, achieving the carbon stock outcomes for the annual crops called for in this Scoping Plan would require deployment and maintenance of healthy soils practices on 80,000 additional acres of croplands in California every year between 2025 and 2045. For context, CDFA's Healthy Soils Program, which is an incentive program

supporting healthy soils practices, took almost four years of sustained funding to achieve approximately 50,000 acres total under healthy soils practices.[173]

Given the uncertainty around the modeling assumptions, and performance uncertainty as specific policies are fully designed and implemented, estimates associated with the Scoping Plan Scenario are certain to be different than what is ultimately implemented. One way to mitigate for this is to develop policies that can adapt and increase certainty in GHG emissions reductions. Periodic reviews of progress toward achieving the 2030 target and longer term deeper decarbonization, as well as performance of specific policies, also provide opportunities for the state to consider any changes to ensure we remain on course to achieve the 2030 target and carbon neutrality. The need for this periodic review process was anticipated in AB 32, as it calls for updates to the Scoping Plan at least once every five years. For this Scoping Plan, the metrics provided on the rate of deployment of clean fuels and technologies, along with the annual AB 32 GHG Inventory, provide additional information that can be used to assess progress on sectors and aggregate emissions. This is also true of CARB's NWL carbon inventory. An uncertainty analysis for achieving an accelerated 2030 target is provided toward the end of this chapter.

## Targeted Evaluations for the Scoping Plan: Oil and Gas Extraction and Refining

To achieve California's air quality and climate goals, we must end our dependence on petroleum. This will not happen overnight. There are about 28 million combustion engine heavy- and light-duty trucks and passenger vehicles in California, and these are almost always replaced at their end of life. The ZEV Executive Order (EO N-79-20) calls for 100 percent new ZEV car sales beginning in 2035 and a 100 percent ZEV medium- and heavy-duty fleet sales by 2045 where feasible. The result is an ongoing, albeit shrinking, pool of vehicles that will continue to require petroleum fuels. To avoid leakage, as called for in AB 32, and to meet that remaining demand for petroleum fuel, a complete phaseout of oil and gas extraction and refining is not possible by 2045. This Scoping Plan assumes a phasedown in both oil and gas extraction as well as petroleum refining in line with the reduction in demand for in-state on-road petroleum fuel demand. Since the transportation sector is the largest source of GHG emissions and harmful local air pollution, we must continue to research and invest in efforts to deploy zero emissions technologies and clean fuels, and to reduce VMT. An assessment of ongoing progress and efforts to reduce

[173] California Department of Food and Agriculture. 2021. *Incentives Program 2017–2020 Summary by the Numbers.* https://www.cdfa.ca.gov/oefi/healthysoils/docs/HSP_Incentives_program_level_data_funded_projects.pdf.

demand for petroleum fuels and of opportunities to phase down oil and gas extraction and refining will be included in the next Scoping Plan update.

In addition to supplying in-state demand, California is a net exporter of gasoline, diesel, and jet fuel. California pipelines supply the Nevada and Arizona regions[174] with approximately 87 million barrels gasoline equivalent of refined products annually.[175] California pipelines deliver approximately 85% of Nevada's and 40% of Arizona's refined product. Most finished fuels flowing from California to Nevada and Arizona are currently produced by California refineries. To manage the phasedown of oil and gas extraction and petroleum refining in California, exports of finished fuels must be considered and factored into that process, in addition to the declining in-state demand. The authorities and considerations related to supply and demand of petroleum fuels span federal, state, and local agencies. If supply of fossil fuels is to decline along with demand, a multi-agency discussion is needed to systematically evaluate and plan for the transition to ensure that it is equitable.

This inter-agency work should also consider related topics, such as the following:

- Direct and indirect job and economic impacts
- Demand for other liquid fuel types such as renewable fuels, and expected volumes
- Legal considerations
- Public health benefits
- Demand and supply strategies for petroleum fuels, including how to avoid short term supply constraints that may impact low-income consumers

Some of these topics were also discussed as part of two studies[176] supported by the California Environmental Protection Agency, which can serve as a starting point for a working group to analyze these questions and develop policy recommendations.

## Oil and Gas Extraction

On April 23, 2021,[177] Governor Newsom directed CARB to evaluate the phaseout of oil and gas extraction no later than 2045 as part of this Scoping Plan. As noted above, this Scoping Plan still has some California demand for finished fossil fuels (gasoline, diesel,

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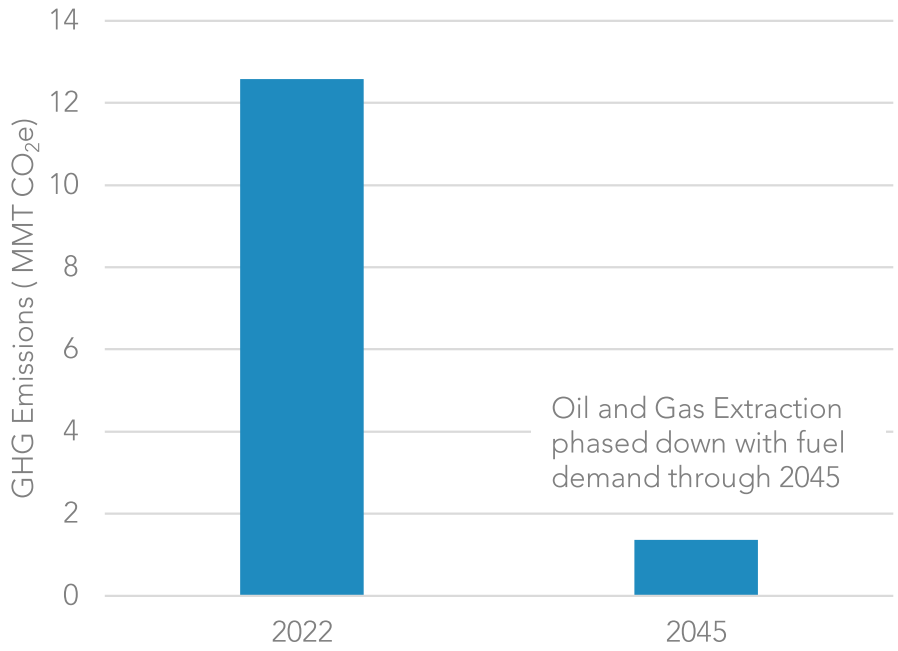
[174] CEC. August 2021. A Primer on California's Pipeline Infrastructure. *Petroleum Watch.* https://www.energy.ca.gov/sites/default/files/2021-08/August_Petroleum_Watch_ADA.pdf.
[175] CEC. March 2020. *Petroleum Watch.* https://www.energy.ca.gov/sites/default/files/2020-03/March_2020_Petroleum_Watch.pdf.
[176] CalEPA. 2021. Carbon Neutrality Studies: https://calepa.ca.gov/climate/carbon-neutrality-studies/.
[177] Governor Newsom. April 23, 2021. Governor Newsom Takes Action to Phase Out Oil Extraction in California. Press Release. https://www.gov.ca.gov/2021/04/23/governor-newsom-takes-action-to-phase-out-oil-extraction-in-california/.

and jet fuel) in 2045. This demand is primarily for transportation, including for sectors that are directly regulated by the state and some that are subject to federal jurisdiction, such as interstate locomotives, marine, and aviation. As discussed more fully below, while significant GHG reductions from oil and gas extraction could be achieved as demand for fossil fuels is reduced due to strategies in this Scoping Plan, it is not feasible to phase out oil and gas production fully by 2045 given this remaining demand.

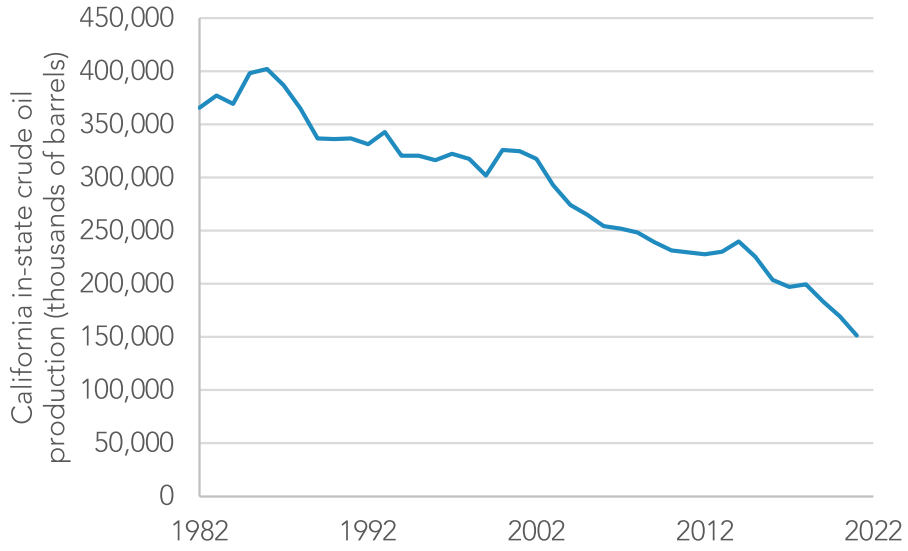
In the Scoping Plan Scenario, with successful deployment of zero carbon fuels and non-combustion technology to phase down petroleum demand, GHG emissions from oil and gas extraction could be reduced by approximately 89 percent in 2045 from 2022 levels if extraction decreases in line with in-state finished fuel demand. If in-state extraction were to be phased out fully, the future petroleum demand by in-state refineries would be met through increased crude imports to the state relative to the Scoping Plan Scenario. AB 32 defines leakage as, "a reduction in emissions in greenhouse gases within the state that is offset by an increase in emissions of greenhouse gases outside the state." AB 32 also requires any actions undertaken to reduce GHGs to "minimize leakage." Increases in imported crude could result in increased activity outside California to extract and transport crude into California. Therefore, our analysis indicates that a full phaseout of in-state extraction could result in GHG emissions leakage and in-state impacts to crude oil imported into the state. Figure 2-6 compares the 2022 emissions from this sector with the modeled results when the sector is phased down with in-state petroleum demand.

**Figure 2-6: Oil and gas extraction sector GHG emissions in 2022 and 2045 when activity is phased down with in-state fuel demand**



According to California Energy Commission (CEC) data used in Figure 2-7, the total oil extracted in California peaked at 402 million barrels in 1986. Since then, California crude oil production has decreased by an average of 6 million barrels per year, to about 200 million barrels in 2020. This steadily decreasing production of crude in California is expected to continue as the state's oil fields deplete.

**Figure 2-7: California in-state crude oil production[178]**



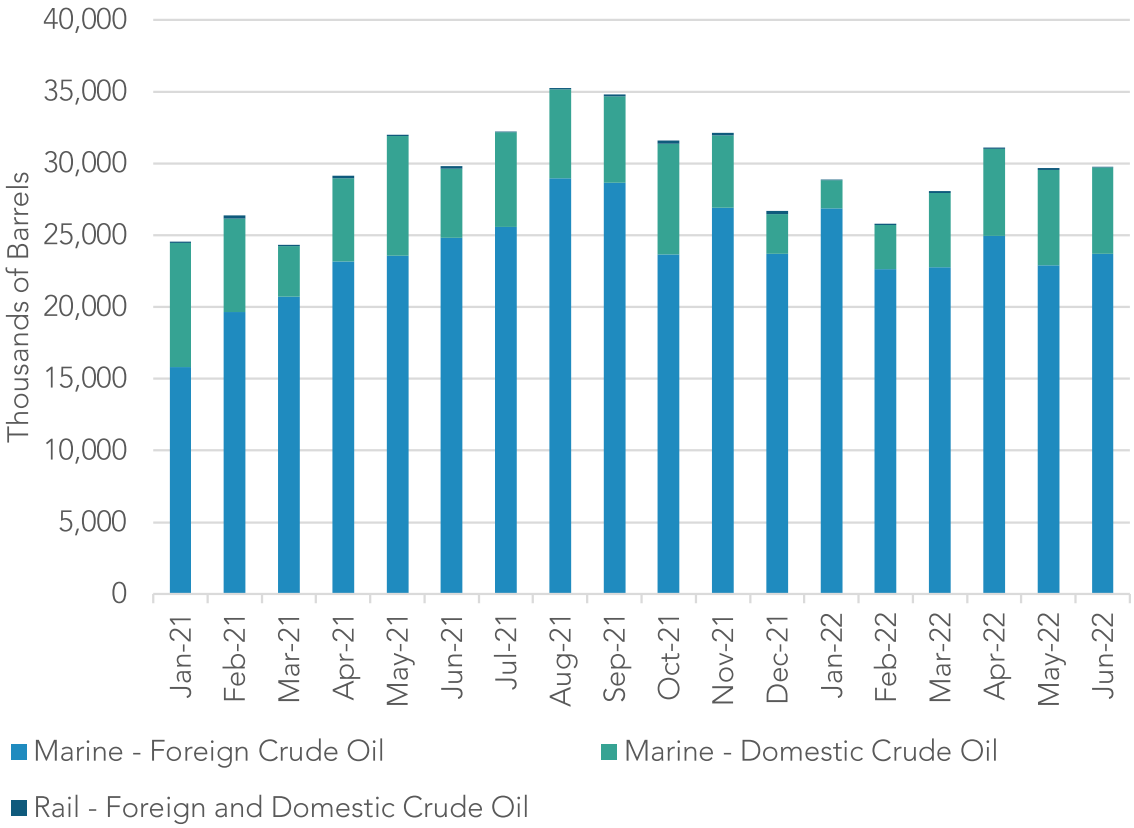

A UC Santa Barbara report estimated that, under business-as-usual conditions, California oil field production would decrease to 97 million barrels in 2045.[179] The business-as-usual model assumed no additional regulations limiting oil extraction in California.

Any crude oil demand by California refineries not met by California crude oil will be met by marine imports of Alaskan and foreign crude.[180] As shown in Figure 2-8, approximately 99 percent of crude imports into California are delivered by marine transportation. The

[178] CEC. No date. Oil Supply Sources to California Refineries. Accessed April 21, 2022. https://www.energy.ca.gov/data-reports/energy-almanac/californias-petroleum-market/oil-supply-sources-california-refineries.
[179] University of California, Santa Barbara. 2021. Enhancing Equity While Eliminating Emissions in California's Supply of Transportation Fuels.
[180] CEC. 2020. *Petroleum Watch: How Petroleum Products Move.* March. https://www.energy.ca.gov/sites/default/files/2020-03/March_2020_Petroleum_Watch.pdf, and CEC. 2020. *Petroleum Watch: What Types of Crude Oil Do California Refineries Process?* February. https://www.energy.ca.gov/sites/default/files/2020-02/2020-02_Petroleum_Watch_ADA_0.pdf.

remaining imports occur by rail.[181] There are no pipelines that bring crude oil into California from out of state.[182]

**Figure 2-8: Crude oil imports by transportation type[183]**




Crude oil delivered by marine tankers is delivered to onshore storage tanks and subsequently to refineries via pipeline. Most crude oil produced in California is delivered to California refineries by pipeline. Using historical trends, any increases in imported crude above historic levels would result in increased deliveries through the marine ports. This increased activity could require more infrastructure to store and move larger volumes of crude to the refineries in state.

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[181] CEC. June 2021. Crude Oil Imports by Transportation Type. Accessed March 16, 2022. https://www.energy.ca.gov/data-reports/energy-almanac/californias-petroleum-market/crude-oil-imports-source.
[182] CEC. 2020. *Petroleum Watch: How Petroleum Products Move.* March. https://www.energy.ca.gov/sites/default/files/2020-03/March_2020_Petroleum_Watch.pdf.
[183] CEC. June 2021. Crude Oil Imports. https://www.energy.ca.gov/data-reports/energy-almanac/californias-petroleum-market/crude-oil-imports-source.

California refineries import a variety of crude oils to meet refinery needs. California petroleum refineries are generally designed to process relatively heavy crude relative to other U.S. refineries. In 2018, crude inputs to California refineries had an average American Petroleum Institute (API) gravity of 26.18 and an average sulfur content of 1.64 percent. Processing significantly lighter or heavier crude blends would require significant changes to a refinery.[184] Most crude imported from Alaska and the Middle East is relatively light (API gravity > 30) compared to California crude (API gravity < 20).[185] If California crude production is insufficient to meet the demand at California refineries, then California refineries will need access to a similarly heavy source of crude so that the average API gravity of crude remains within their established operating window. South American crude oil imports into California are the heaviest relative to other regions, and therefore they may be the most likely to replace decreased California crude oil supply.[186]

In summary, the modeling indicates that demand for petroleum will persist due to legacy fleets that will not be replaced until end of life. The modeling also shows what the GHG emissions reductions would be if oil and gas extraction activities were phased down in line with the reduction of in-state petroleum demand. Trend data shows that oil and gas extraction already has been on the decline and will continue to decline. It is possible to anticipate the likely regions and types of crude that would be imported to meet in-state petroleum demand if in-state extraction was fully phased out by 2045. Importantly, activity at the ports would increase, and new infrastructure would be needed to store and deliver crude to in-state refineries. And while GHG emissions from this sector would go to zero in our AB 32 GHG Inventory with a full phaseout, emissions related to the production and transport of crude to California might increase elsewhere, resulting in emissions leakage.

As the state continues to reduce demand for petroleum, efforts to protect public health for communities located near oil and gas extraction sites must also continue. In October 2021, Governor Newsom directed action to prevent new oil drilling near communities and

[184] CEC. 2020. *Petroleum Watch: What Types of Crude?* February. https://www.energy.ca.gov/sites/default/files/2020-02/2020-02_Petroleum_Watch_ADA_0.pdf.
[185] CEC. 2020. *Petroleum Watch: What Types of Crude?* February. https://www.energy.ca.gov/sites/default/files/2020-02/2020-02_Petroleum_Watch_ADA_0.pdf.
[186] CEC. 2020. *Petroleum Watch: What Types of Crude?* February. https://www.energy.ca.gov/sites/default/files/2020-02/2020-02_Petroleum_Watch_ADA_0.pdf.

expand health protections.[187,188] In 2022, the Legislature passed, and the governor signed, SB 1137 to protect communities from existing and any new oil and gas extraction activities through 3,200 foot setbacks.

## Petroleum Refining

In the Scoping Plan Scenario CARB modeled a phasedown of refining activity in line with petroleum demand. Meeting petroleum demand means sufficient availability of finished fuel (gasoline, diesel, and jet fuel). Crude is processed at in-state refineries to produce finished fuel. In response to stakeholder requests,[189] this evaluation focuses on the Scoping Plan Scenario, but with an evaluation of a complete phasedown of refinery operations in state.

The Scoping Plan Scenario results in California petroleum refining emissions of 4.5 $MMTCO_2e$ in 2045; a reduction of approximately 85 percent relative to 2022 levels, which is in line with the decline in in-state finished fuel demand.[190] Emissions from refining can be reduced further through the application of CCS technology, as shown in Figure 2-9. If in-state refining is phased down to zero and the demand for the finished fuels produced by that refining persists, imported finished fuels may be needed to meet the remaining in-state demand.[191] The current data shows unmet demand for liquid petroleum transportation fuels would most likely be met by marine imports. A CEC report notes, "The only way for California to receive large amounts of crude and refined products is by marine."[192]

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[187] Office of Governor Gavin Newsom. 2021. California Moves to Prevent New Oil Drilling Near Communities, Expand Health Protections. *https://www.gov.ca.gov/2021/10/21/california-moves-to-prevent-new-oil-drilling-near-communities-expand-health-protections-2/?msclkid=6c0da86bc58e11ecb81cf596d4d8a735*.

[188] California Department of Conservation Geologic Energy Management Division. October 2021. Draft Rule for Protection of Communities and Workers from Health and Safety Impacts from Oil and Gas Production Operations. *https://www.conservation.ca.gov/calgem/Pages/Public-Health.aspx?msclkid=45660232cf2511ecb1c56119097e3b0c*.

[189] California Environmental Justice Alliance. October 22, 2021. Comment on 2022 Scoping Plan Update - Scenario Inputs Technical Workshop. *https://www.arb.ca.gov/lists/com-attach/68-sp22-inputs-ws-WzhdPlI5AjACW1Qx.pdf*.

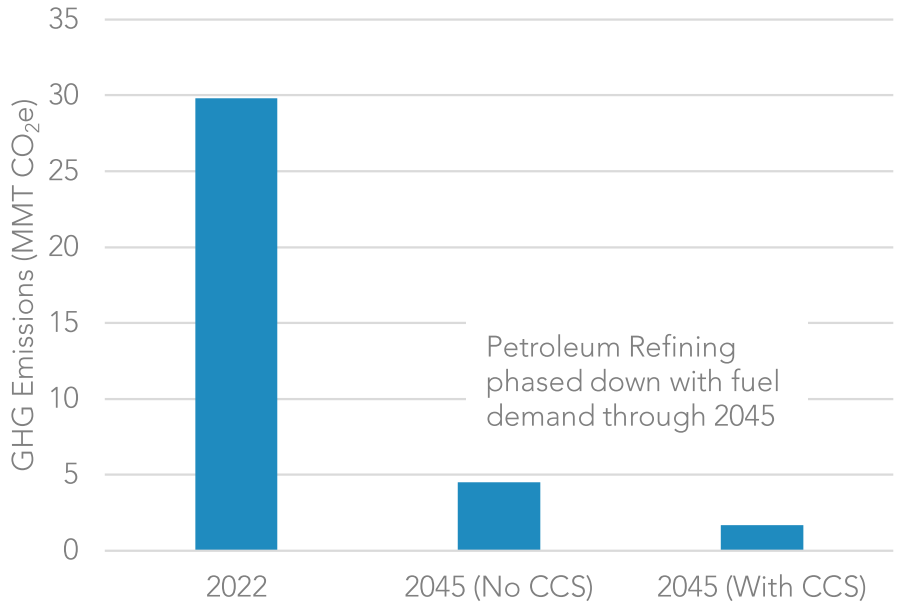
[190] This reduction in demand does not assume any need for ongoing operations to support exports to neighboring states.

[191] If demand assumes an ongoing need to support exports to neighboring states, the residual demand would require a five-fold increase in finished fuel imports.

[192] CEC. 2020. *Petroleum Watch: How Petroleum Products Move.* March. *https://www.energy.ca.gov/sites/default/files/2020-03/March_2020_Petroleum_Watch.pdf*.

There are currently no pipelines capable of bringing refined products to the state, and rail imports of refined products have historically made up less than 1 percent of all imports.[193] Significant increases in marine imports would likely require significant reconfiguring, retrofitting, or replacement of crude pipelines and storage tanks at current marine terminals, and possible reconfiguring of existing finished fuel infrastructure to account for changes in volumes and locations of supply points.

**Figure 2-9: Petroleum refining sector GHG emissions in 2022 and 2045 (with and without CCS) when activity is phased down with fuel demand**




If California's finished fuel demand is not met by continued refining activity in California, the state would need to import finished fuels to meet the ongoing demand. This would likely result in a two- to five-fold increase in the number of finished fuel ship deliveries to marine terminals. Marine tankers delivering refined products are often much smaller than crude oil tankers, so changes in fuel use and emissions cannot be easily estimated from the change in both the type and the number of ship deliveries.[194]

[193] CEC. 2020. *Petroleum Watch: How Petroleum Products Move.* March. https://www.energy.ca.gov/sites/default/files/2020-03/March_2020_Petroleum_Watch.pdf.
[194] Personal communication with CEC staff, March 2022; U.S EIA. 2017. *World Oil Transit Chokepoints*. 3. https://www.eia.gov/beta/international/regions-topics.php?RegionTopicID=WOTC.

If refining ceased in California, the rail and marine deliveries currently needed to support both refining processes and the export of waste products, such as petroleum coke, would cease.

In summary, the modeling indicates that demand for petroleum will persist through 2045. The modeling also shows what the GHG emissions reductions would be if refining activities were phased down in line with the reduction in in-state petroleum demand. CCS can further reduce emissions for this sector. Importantly, activity at the ports would increase, and new infrastructure would be needed to store and deliver finished fuel across the state, if in-state refining were fully phased down by 2045. And while GHG emissions from this sector would go to zero in our AB 32 GHG Inventory with a full phaseout, emissions related to the refining and transport of finished fuel to California might increase elsewhere, resulting in emissions leakage.

## Progress Toward Achieving the Accelerated 2030 Target

The 2017 Scoping Plan laid out a path to achieving the SB 32 target of at least a 40 percent reduction of GHG emissions below 1990 levels by 2030 that focused on reducing emissions in the state and was technologically feasible and cost-effective, reflecting statutory direction. Many of the programs to achieve the 2030 target increased in stringency beginning January 1, 2021. However, the 2030 target must be increased to help achieve the deeper reductions needed to meet the state's statutory carbon neutrality target specified in AB 1279 and Executive Order B-55-18.

Starting in 2020 and extending into 2022, the COVID-19 pandemic impacts reverberated across the globe in a multitude of ways, including the devastating loss of millions of lives. The pandemic also had a significant impact on GHG emissions by virtue of its impact on global economies and lifestyle changes for Californians, with extended work and school disruptions. Thus, assessing our progress toward meeting our SB 32 target is confounded by the unprecedented nature of the pandemic. Nevertheless, an assessment of progress toward the 2030 target is critical, in particular the accelerated 2030 target called for in this Scoping Plan, since achieving the accelerated 2030 target would make the state well positioned to achieve its carbon neutrality goals and bring critical near-term air quality benefits to address historical and ongoing disparities in access to healthy air. Because there is only one year of data available for this decade, the analysis takes a prospective look using projected emissions over the remainder of this decade.

Estimating GHG emissions in 2030 requires projecting the effect of policies or measures that are currently deployed and undergoing implementation. Table 2-4 shows three distinct estimates of GHG emissions in 2030 that were created at different times and used different modeling approaches.

**Table 2-4: Estimates of 2030 GHG emissions**

| Scenario Description | 2030 GHG Emissions ($MMTCO_2e$) |
|---|---|
| 2017 Scoping Plan: the projected outcome from implementing policies identified in the 2017 Scoping Plan that was approved by the CARB Board in December 2017. | 320 |
| Reference Scenario: the assessment of current trends and expected performance of policies identified in the 2017 Scoping Plan, as of February 2022, using the PATHWAYS model (E3). | 305 |
| Reference Scenario (Rhodium): the analysis of projected emissions from 2021 to 2030 from state and federal policies implemented as of July 2022, including the estimated impact of the Inflation Reduction Act and Advanced Clean Cars II using RHG-NEMS and other Rhodium Taking Stock 2022 methods (https://rhg.com/wp-content/uploads/2022/07/Taking-Stock-2022_US-Emissions-Outlook.pdf). | 324 |

These three estimates of 2030 GHG emissions differ, which is expected. The estimates reflect different outcomes of the current and future impact of policies and measures. They also vary due to fundamental differences in the way these models work. For example, PATHWAYS is an economy-wide, scenario-based GHG accounting tool that tracks energy demands and supplies in line with scenario assumptions and is benchmarked to historical values. RHG-NEMS optimizes both the supply and demand sides of the energy system while factoring in consumer constraints and dynamic economic and energy systemwide feedback. Importantly, while these point estimates give the appearance of certainty and accuracy, there is significant uncertainty in future emissions projections that is documented thoroughly in each of the three emissions scenarios described above. No model can predict the future given unforeseen factors such as notable economic swings and implementation delays for programs. However, the range of emissions estimates provides a useful indication of possible outcomes from successful implementation of policies and measures.

An important source of uncertainty is the impact of delayed implementation of policy measures and market actions. The successful rate of deployment of clean technology and fuels—including consumer adoption patterns, economic recovery from the pandemic, and the permitting and build-out of necessary new assets and reuse of existing assets to produce and deliver clean energy—is essential to reach GHG emission reduction targets. Any delays will only increase GHG emissions in 2030.

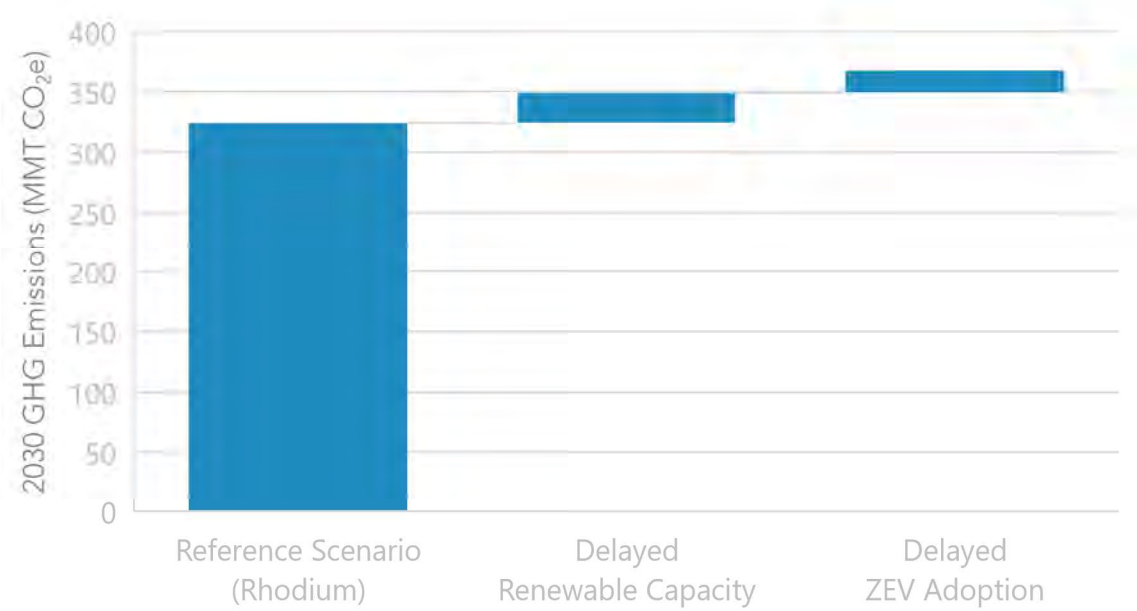
It is important to note that incentives, carbon pricing, and regulations all can result in similar types of responses including, but not limited to:

- Build-out of clean energy and infrastructure
- Deployment of clean technology
- Reduced demand for fossil energy
- Efficiency improvements

As such, the uncertainty analysis discussion focuses on implementation (technology and infrastructure deployment), and not any specific programs or policies. It is successful implementation that must ultimately happen for emissions reductions to be realized.

The uncertainty analysis described in Appendix J (Uncertainty Analysis) quantifies the impact of delayed permitting and building of renewable generation and transmission in the power sector and delayed adoption of ZEVs across all vehicle fleets in the transportation sector. The Reference Scenario (Rhodium) estimates emissions in 2030 to be 324 MMTCO2e. A five-year delay in renewable capacity would increase emissions by 8 percent in 2030 (25 MMTCO2e) relative to the Reference Scenario. If similar delays in clean energy production and deployment occur in other sectors, a larger increase in emissions relative to the reference scenario would be expected, jeopardizing the state's ability to achieve the 2030 target. Similarly, a delay in consumer adoption of zero emission vehicles (LDV, MDV, HDV) would increase emissions by 6 percent in 2030 (19 MMTCO2e) relative to the Reference Scenario. Delays in transitioning to electric equipment and appliances in homes and businesses would also lead to increased emissions in 2030. Figure 2-10 illustrates the impact on projected emissions in 2030 associated with delayed renewable capacity and delayed transportation vehicle electrification.

**Figure 2-10: Impact of delayed implementation on 2030 GHG emissions[195]**




Appendix J (Uncertainty Analysis) includes additional details on the assumptions and model used for the uncertainty analysis and the risks to achieve the emissions reductions from 2022 to 2030 that are anticipated in the Scoping Plan Reference Scenario. While the analysis focuses on renewable capacity and transportation, the analysis identifies a common set of themes that can impact emissions reductions across economic sectors, including permitting, technology availability, and consumer adoption. The impact of delayed emissions reductions will vary by sector and by the specific policy at risk of delay.

We give these quantitative examples of the impact implementation delays can have on GHG reductions, but almost every economic sector will have the need for permitting to enable at least a 40 percent reduction below 1990 levels. If we consider the increased ambition of the Scoping Plan Scenario, which identifies an accelerated 2030 target, the same types of uncertainty manifest themselves in successful implementation of the Scoping Plan Scenario, with the added need for CCS and CDR and a need to grow other energy sectors such as hydrogen.

[195] The implementation delay scenarios were modeled separately and do not necessarily reflect the combined impact of delayed renewable capacity and transportation vehicle electrification.

## Cap-and-Trade Program Update

Since the adoption of the first Scoping Plan in 2008, carbon pricing in the form of a Cap-and-Trade Program has been part of the portfolio to achieve the state's GHG reduction targets, and it will remain critical as we work toward carbon neutrality. This section provides an update on the program and its role in achieving the 2030 target.

The Cap-and-Trade Program first came into effect in 2012, under AB 32, and included declining allowance caps through 2020. In 2017, AB 398[196] was passed by a supermajority in the Legislature and included prescriptive direction on the design of the program from 2021 through 2030. The AB 398 Cap-and-Trade Program came into effect on January 1, 2021, and it included the following changes:

- Doubling of stringency with an annual cap decline of 4 percent per year from 2021–2030
- AB 398 price ceiling
- AB 398 redesigned allowance price containment reserve with two tiers
- AB 398 100 percent leakage assistance factor for industry
- AB 398 lower offset limits: Usage limit cut from 8 percent to 4 percent, and half of offsets must provide direct benefits to California

The reduction in the role of offsets in the program was in recognition of ongoing concerns raised by environmental justice advocates regarding the ability of companies to use offsets for compliance instead of investing in actions on site to reduce GHG emissions that could also potentially reduce criteria or toxic emissions.[197,198] Note that data show the relationship between facility emissions of GHGs and co-pollutants is highly variable by sector and pollutant.[199] Changes to the allowance price containment reserve and the addition of the price ceiling were included to ensure protections against price spikes in the program, while the changes to the leakage assistance factors were to ensure the maximum protection against leakage in the program. The original design of the program included an auction floor price that increases by 5 percent plus inflation each year, and

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[196] Assembly Bill 398 (Garcia, Chapter 135, Stats. of 2017). California Global Warming Solutions Act of 2006: market-based compliance mechanisms: fire prevention fees: sales and use tax manufacturing exemption. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB398.

[197] OEHHA. 2022. *Impacts of Greenhouse Gas Emission Limits Within Disadvantaged Communities*. https://oehha.ca.gov/media/downloads/environmental-justice/impactsofghgpoliciesreport020322.pdf.

[198] The OEHHA report also found that companies that use the most offsets often own the facilities that contribute to local $PM_{2.5}$ exposure. However, there was no causal relationship found to indicate that implementation of the Cap-and-Trade Program was contributing to increases in local air pollution. Also see: CARB. FAQ Cap-and-Trade Program. https://ww2.arb.ca.gov/resources/documents/faq-cap-and-trade-program.

[199] OEHHA. 2022. *Impacts of Greenhouse Gas Emission Limits Within Disadvantaged Communities*. https://oehha.ca.gov/media/downloads/environmental-justice/impactsofghgpoliciesreport020322.pdf.

that escalation factor is retained in the post-2020 program and is also applied to the allowance price containment reserve and price ceiling. These features, combined with the self-ratcheting mechanism for unsold allowances at auctions,[200] help to ensure the program is able to handle periods of high and low demand for allowances while continuing to ensure a steadily increasing price signal for regulated entities to invest in GHG reduction technologies.

As a result of achieving the 2020 target several years earlier than mandated by law, there are unused allowances in circulation. CARB estimated the amount to be approximately 310 million allowances after the conclusion of the third compliance period (2018–2020).[201] AB 398 had also called for a similar analysis, which was completed in 2018.[202] This bank represents approximately 5 percent of the total number of vintage 2013–2030 allowances issued within the joint market. This bank of allowances can only remain banked if year-over-year the covered emissions are declining by 14 MMT. If the annual decline in actual emissions is less than 14 MMT, regulated entities will need to use the banked allowances to cover their compliance obligations. It is likely that the existing bank of 310 million allowances will be needed over the early part of this decade and will be exhausted by the end of the decade. During the same period, prices for allowances will continue to increase at least 5 percent plus inflation year-over-year, sending a steadily increasing price signal to spur investment in onsite reductions for covered entities.

With the passage of AB 1279, the state has a statutory target to achieve carbon neutrality no later than 2045. This Scoping Plan demonstrates that planning on a longer time frame for the new carbon neutrality target means we must accelerate our near-term ambition for 2030 in order to be on track to achieve our longer-term target. CARB will use the modeling for this Scoping Plan to assess what changes may be warranted to the Cap-and-Trade or other programs to ensure we are on track to achieve an accelerated 2030 target. Since the original adoption of the Cap-and-Trade regulation, the program has been amended eight times through a robust public process. Moreover, then-California Environmental Protection Agency Secretary Jared Blumenfeld testified at a Senate hearing in 2022 that CARB will report back to the Legislature by the end of 2023 on the status of the allowance supply with any suggestions on legislative changes to ensure the number of allowances

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[200] The self-ratcheting mechanism temporarily removes unsold allowances from the market until either sufficient demand manifests for two consecutive auctions and they are incrementally reintroduced at future auctions, or they are permanently removed from general circulation if demand remains low.
[201] CARB. 2022. BR 18-51 Cap-and-Trade Allowance Report. Attachment A. *https://ww2.arb.ca.gov/sites/default/files/cap-and-trade/Allowance%20Report_Reso18_51.pdf*.
[202] CARB. 2018. Staff Report: Initial Statement of Reasons: Proposed Amendments to the Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation. September 4. *https://www.arb.ca.gov/regact/2018/capandtrade18/ct18398.pdf?_ga=2.134288305.1735610122.1664813952-1100516233.1657841496*.

is appropriate to help the state achieve its 2030 target of at least 40% below 1990 levels. As part of that status update, CARB will also provide information on any potential program changes that may be needed to allowance supply to help achieve an accelerated target for 2030 identified in this Scoping Plan as necessary to achieve carbon neutrality no later than 2045. Engaging in this process in 2023 will allow for the consideration of this Scoping Plan, inclusion of additional data points for the second year of operation of the AB 398-designed program (which only came into force in January 2021), and an opportunity to hold public workshops.

It is also worth noting that the COVID-19 pandemic had significant impacts on economic activity in California and elsewhere.[203] Emissions were significantly lower in 2020 due to the impacts of the global pandemic. There is an expectation that emissions will increase as the economy recovers and behaviors continue to shift from the impacts of the ongoing pandemic. As a result, 2020 should be regarded as an outlier in the emissions trends. This scenario of increasing emissions is similar to what happened in the first compliance period for Cap-and-Trade, where the state economy was recovering from the Great Recession and does not correlate to a problem with the structure of this program or other programs that cover emissions related to the manufacturing or transportation sectors. In any assessment of this and other programs, it is essential to consider external factors such as economic activity and availability of zero carbon energy such as hydropower, among others.

To better understand the role of the Cap-and-Trade Program in achieving the 2030 target, Table 2-5 compares the 2030 GHG emissions estimates from the three reference scenarios described in Table 2-4. The 2017 Scoping Plan projection is from the PATHWAYS model for the Scoping Plan Scenario approved by the Board in late 2017. It excludes the contribution of the Cap-and-Trade Program, without any consideration of uncertainty factors (i.e., a characterization of the uncertainty that a given GHG reduction measure included in the 2017 Scoping Plan will actually achieve the GHG reductions it is projected to deliver). The Reference Scenario represents what GHG emissions would look like if we did nothing beyond the existing policies that are required and already in place to achieve the 2030 target; this scenario is based on the recent PATHWAYS modeling, excluding the contribution of the Cap-and-Trade Program, and without any consideration of uncertainty factors. It indicates that GHG emissions will be lower over this decade than originally projected when the 2017 Scoping Plan was approved. The

[203] CARB. November 4, 2021. Mandatory Greenhouse Gas Reporting - 2020 Emissions Year Frequently Asked Questions. *https://www.arb.ca.gov/cc/reporting/ghg-rep/reported-data/2020mrrfaqs.pdf?_ga=2.264251343.1760432228.1650736660-1644197524.1577749754*.

Reference Scenario (Rhodium) which also does not include uncertainty bounds, is the modeling used for the uncertainty analysis above.

Importantly, PATHWAYS is not able to explicitly model a carbon pricing policy, and therefore the Cap-and-Trade Program is not represented in the 2017 Scoping Plan or the Reference Scenario. Carbon pricing is included in RHG-NEMS, which reflects state and federal policies included in the U.S. Energy Information Administration (EIA) Annual Energy Outlook 2022 and the National Energy Systems Model (NEMS), which is the basis for RHG-NEMS.[204]

As detailed in EIA's documentation, California's Cap-and-Trade Program is represented through increased energy prices, which flow across economic sectors.[205] However, many of the emissions covered by the California Cap-and-Trade Program are not energy- and fuel-related emissions. Given that, the energy systems model RHG-NEMS was used to model the impact of California Cap-and-Trade on the energy system. However, RHG-NEMS does not explicitly model the entire program, which includes non-energy related emissions from the industrial, agricultural, waste, and transportation sectors.

[204] U.S. EIA. 2022. *Summary of Legislation and Regulations Included in the Annual Energy Outlook 2022.* March. *https://www.eia.gov/outlooks/aeo/assumptions/pdf/summary.pdf*.
[205] U.S. EIA. 2022. Electricity Market Module. *https://www.eia.gov/outlooks/aeo/assumptions/pdf/electricity.pdf*.

**Table 2-5: Comparison of 2017 Scoping Plan and two Reference Scenarios**

| | 2030 GHG Emissions ($MMTCO_2e$) (2017 Scoping Plan) | 2030 GHG Emissions ($MMTCO_2e$) (Reference Scenario) | 2030 GHG Emissions ($MMTCO_2e$) (Reference Scenario-Rhodium) |
|---|---|---|---|
| **Reference Scenarios** | 320 | 305 | 324 |
| **Gap to Accelerated 2030 Target under the Scoping Plan Scenario (226)**[206] | 94 | 79 | 98 |

Under the Scoping Plan Scenario, in 2030 California emissions are anticipated to be 48% below 1990 levels. This represents an acceleration of the current SB 32 target of a 40% reduction below 1990 levels. Table 2-5 includes the gap between the different reference scenarios and the accelerated 2030 target achieved under the Scoping Plan Scenario. It also shows that depending on the modeling, there are a range of potential emissions levels in 2030 prior to accounting for the full impact of the Cap-and-Trade Program on emissions. That range is from 305 to 324 $MMTCO_2e$ in 2030. That represents a 19 $MMTCO_2e$ spread, or about 8.4 percent of the accelerated 2030 target of 226 $MMTCO_2e$. Importantly, none of these scenarios includes all of the actions identified in the Scoping Plan Scenario for this Scoping Plan; many of those actions, such as SB 596, CCS, and a more stringent LCFS program, will only begin to happen in this decade, and their contributions toward meeting the accelerated 2030 target are therefore not included in the reference scenarios. The actual emissions for the remainder of this decade will therefore likely be lower than in each of the scenarios in Table 2-5 once policies and regulations are in place to support an accelerated 2030 target. However, the degree of this difference between actual and projected emissions will differ across the modeled reference scenarios.

[206] Table 3 from the 2017 Scoping Plan included a range of 34 to 79 $MMTCO_2e$ for reductions needed from the Cap-and-Trade Program to achieve a 2030 target of 40 percent below 1990 levels.

Regardless of the uncertainty and differences in the models, it is clear additional GHG reductions must happen over this decade to achieve an accelerated 2030 target. This will require an evaluation of all major programs to assess the need to increase their stringency between now and 2030. As the actual reductions from non-Cap-and-Trade Program measures increase, California will be less reliant on the Cap-and-Trade Program to "fill the gap" to meet an accelerated 2030 reduction target. For example, CARB is developing a proposal to increase the stringency of the LCFS program for 2030, the recently adopted Advanced Clean Cars II regulation is more stringent than modeled for the 2030 40 percent target in the 2017 Scoping Plan, and SB 596 requires specific reductions in the cement sector over this decade and beyond. However, we also know we are not on track to achieve the VMT reduction called for in the 2017 Scoping Plan and will need to double down to achieve the even more ambitious target called for in the Scoping Plan Scenario. Also, we will need additional actions over the coming years to reduce short-lived climate pollutants to meet the emission reductions called for in SB 1383.

Collectively, any additional legislation or prescriptive policies for sectors, delays in successful implementation of non-Cap-and-Trade programs and policies, increases in incentive program funding, and delays in economic recovery from the pandemic will continue to affect the role the Cap-and-Trade Program will need to play over this decade to meet the state's GHG reduction obligations. In summary, the Cap-and-Trade Program must continue to be able to scale across a range of possibilities. With passage of AB 1279 and the need to accelerate the 2030 target, CARB will initiate a public process to utilize the modeling results from this Scoping Plan, specifically the Scoping Plan Scenario, to evaluate and potentially propose changes to the design of the Program, including the annual caps. This process will ensure that the Program supports an increased ambition for 2030 while retaining the ability to scale as other factors, such as changing economic conditions and implementation of non Cap-and-Trade programs, impact the actual emissions at the sources covered by the Program. Any changes to the Program must continue to support a well-designed system that continues to send a steadily increasing price signal, minimizes for leakage, reduces emissions in the covered sectors toward the state's targets, is cost-effective and technologically feasible, and avoids energy rate spikes. Importantly, the Program should support air quality benefits, especially in overly burdened communities, and not exacerbate existing air quality disparities.

# Chapter 3: Economic and Health Evaluations

This chapter provides two approaches for quantifying the economic and health outcomes of the Scoping Plan Scenario. One approach is to consider the combined impact of all measures[207] in a scenario. The other approach is required by AB 197, where each measure within a scenario is evaluated independently. In addition to these two evaluation approaches, this chapter also includes a discussion of the Public Health implications for the Scoping Plan Scenario, an overview of the Climate Vulnerability Metric, and the Environmental Analysis conducted in accord with the California Environmental Quality Act (CEQA).

It is important to note that all of the analyses in this chapter use a variety of data sources, but because the modeling is economy-wide at the state level, none of them produce community specific detail outputs. The AB 32 GHG Inventory Sector analysis relies on PATHWAYS data at the state level that is proportionally applied across all regions of the state to translate changes in state level fuel combustion to local level changes. The NWL analysis similarly utilizes a variety of data sources and a suite of models that produce data that are scaled up to the statewide level. All of the models, except the Wildland Urban Interface (WUI) defensible space model, which is conducted at the county level, create aspatial projections that are not applicable at the community level.

## Economic Analysis

As part of the process to develop this Scoping Plan, alternative scenarios that transition energy needs away from fossil fuels and achieve carbon neutrality no later than 2045 were developed. Alternative scenarios that assess the impact of different land management strategies on carbon stocks in NWL were also developed. These alternatives are described in Appendix C (AB 197 Measure Analysis). The following sections describe the Scoping Plan Scenario in terms of direct cost, the economy, employment, and health outcomes.[208]

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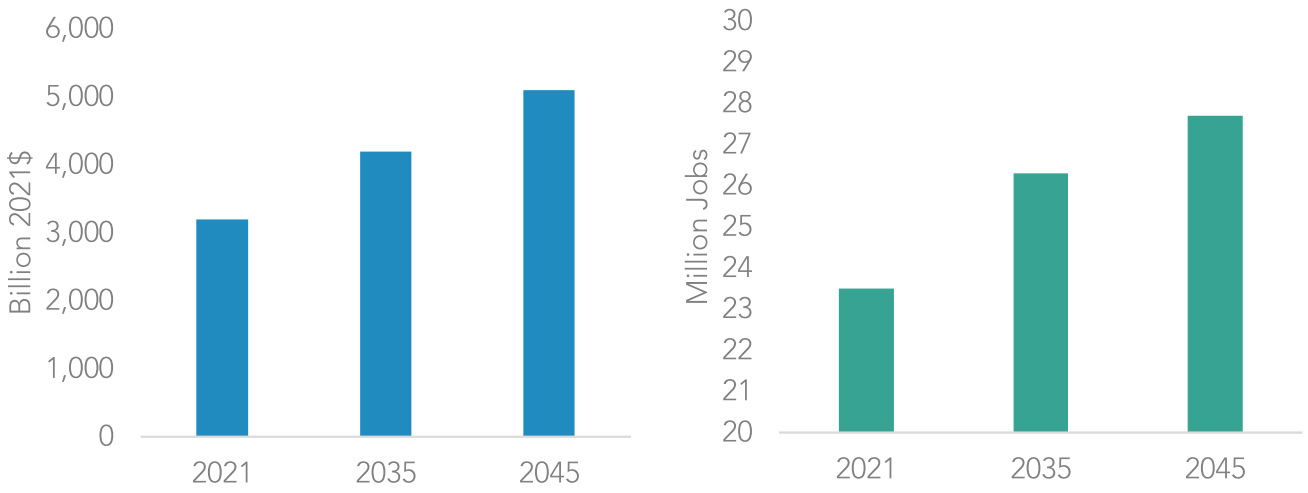
[207] AB 197 calls for the evaluation of "measures." This Scoping Plan treats each action and its variants on stringency as measures for the purposes of this chapter. Appendix C (AB 197 Measure Analysis) lists the measures and corresponding modeling assumptions for each alternative and the Scoping Plan Scenario. The modeling assumptions for the Scoping Plan Scenario are summarized in Table 2-1.

[208] For the Draft 2022 Scoping Plan Update, achieving carbon neutrality in 2035 and 2045 was evaluated. The AB 32 GHG Inventory sector direct cost, the economy, employment, and health outcomes were assessed in those years. Similarly, the Scoping Plan Scenario assessments that are presented in this chapter were made for years 2035 and 2045.

The California economy is growing, and it is projected to continue to grow about 2 percent each year, from $3.2 trillion in 2021 to $5.1 trillion in 2045, as shown in Figure 3-1. Similarly, employment in California is anticipated to grow 0.7 percent per year, from 23.5 million jobs in 2021 to 27.7 million jobs in 2045. It is in this context, termed the *Reference Scenario,* that CARB evaluates the Scoping Plan Scenario in terms of its impact on economic growth and employment. The projections shown in Figure 3-1 were produced by CARB to evaluate the incremental impact of regulations.

**Figure 3-1: Projected California gross state product (left) and employment growth (right) from 2021 to 2035 and 2045**




*Source: California Air Resources Board*

Transitioning away from fossil fuels to alternatives and increasing action on NWL will affect employment opportunities, household spending, businesses, and other economic aspects of our lives. Sectors expected to see growth include renewable electricity and hydrogen production, while other sectors may shrink. The deployment of clean technology may require higher upfront costs for things like heat pumps and induction stoves, but those could be offset by energy efficiency savings. Employment and economic development in NWL-related industries and sectors are expected to increase as land management actions increase, especially for the Forestry sector (in which a significant increase is called for under the Scoping Plan Scenario). The net impact of these actions on employment and jobs is presented in this chapter.

## Estimated Direct Costs

One key metric is the direct cost, or net investment, reflecting any savings that result from actions. Similar approaches were used to estimate direct costs for the AB 32 GHG Inventory sectors and for the NWL, as described in this section.

## AB 32 GHG Inventory Sectors

Transitioning away from fossil fuels requires investment in new equipment and infrastructure throughout the economy. It involves developing the capacity to produce fuels and electricity from renewable sources rather than producing fossil energy. This transition also takes time. One approach is to eliminate combustion of fossil fuels by replacing all equipment in a specified year. Another approach is to establish a future point at which all sales of new equipment rely on alternative energy sources and allow the transition to occur over time as equipment is replaced upon its end of life.

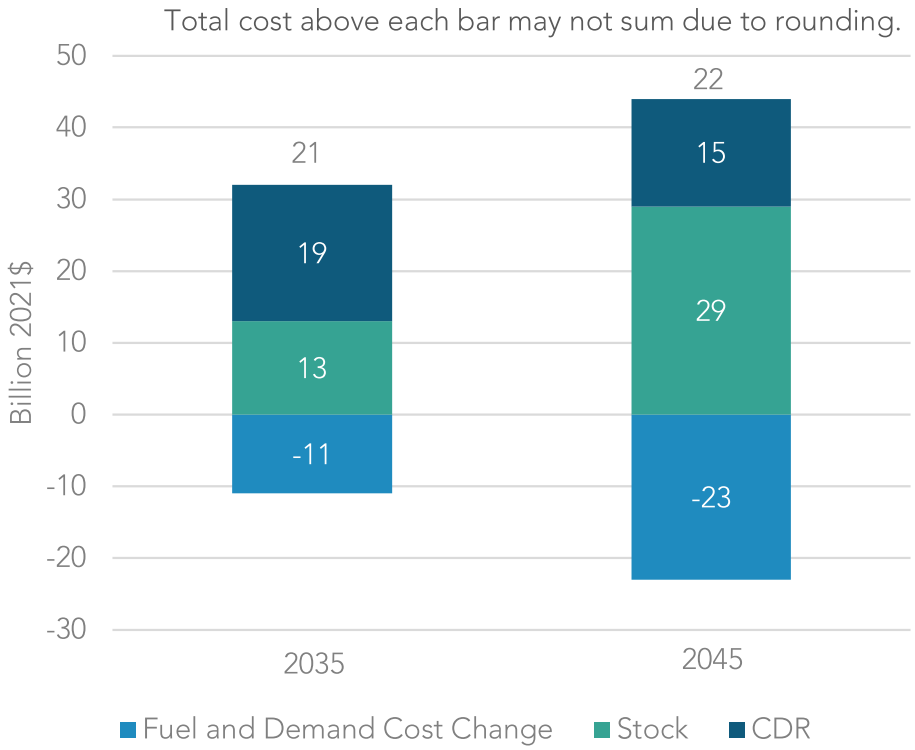
To evaluate the investment required through 2045, the PATHWAYS model was used to represent equipment stock and its turnover to non-fossil fuel alternatives over time. The annualized, incremental cost of infrastructure in excess of the annualized cost of the Reference Scenario[209] was computed for each year from 2022 through 2045. These costs were computed by first taking the absolute cost in each year—which includes both new equipment investment and also expenditures on energy, operations, and maintenance in each year—and then levelizing the costs (in the same way car or house payments are annualized or spread out over time) to arrive at an annualized cost. Fuel savings, and resulting cost savings, associated with changing energy demand—from gasoline to electricity for vehicles, for example—are included as a result of this methodology. Carbon dioxide removal includes DAC technology powered primarily by off-grid solar, BECCS to produce hydrogen or other fuels, and NWL sequestration, as discussed in Chapter 2.[210]

Figure 3-2 shows the stock investment cost, fuel/efficiency savings, and CDR cost. The Scoping Plan Scenario allows end-of-life transition of equipment. The cost of investing in new equipment is partially offset by savings associated with efficiency gains and reduced demand for fuels like gasoline. This is particularly relevant in the transportation sector, which leads to the majority of savings in 2045 in the Scoping Plan Scenario, which models near complete electrification of transport relying only on end-of-life replacement of vehicles. Appendix H (AB 32 GHG Inventory Sector Modeling) includes additional detail on direct costs in each sector and how costs change over time.

[209] The Reference Scenario described in Chapter 2 and in Appendix H (AB 32 GHG Inventory Sector Modeling) was the basis for the direct cost comparison.

[210] The energy source for DAC is not modeled, but renewable electricity and/or hydrogen produced from electrolysis are zero-carbon options consistent with the carbon neutrality targets in this Scoping Plan. The economic analysis associated the investment in DAC with the solar industry for consistency with the carbon neutrality targets.

**Figure 3-2: Cost and savings relative to the growing California economy for the Scoping Plan Scenario in 2035 and 2045 (AB 32 GHG Inventory sectors)**




## Natural and Working Lands

For NWL, the direct costs of each management strategy were estimated using available academic literature, monitoring and reporting data, survey data, and cost data from existing subsidy programs on the per acre cost of implementing the management strategy. These cost data, in combination with the acreage of each management strategy under the scenarios, provided estimates of the overall direct cost to either the government or the private sector. The direct costs are independent of the policy lever used to implement the action and do not include many important benefits and externalities of the actions. They are assumed to be constant for each scenario and into the future. Avoided or secondary costs, such as those from reductions in wildfire suppression expenses, are not included. Appendix I (NWL Technical Support Document) includes additional direct cost details.

Table 3-1 includes the direct cost estimates for the Scoping Plan Scenario compared to the Reference Scenario.[211] Direct costs for the NWL sector are expected to be significant due to the ambitious level of action for each land type.

**Table 3-1: Cost and savings relative to a growing California economy for the Scoping Plan Scenario (NWL)**

| Measure | Scoping Plan Scenario: Average Direct Annual Cost, 2025–2045 (millions $/year) |
|---|---|
| **Forests / Shrublands / Grasslands** | 1,780 |
| **Annual Croplands** | 284 |
| **Perennial Croplands** | 4 |
| **Urban Forest** | 4,230 |
| **Wildland Urban Interface (WUI)** | 114 |
| **Wetlands** | 28 |
| **Sparsely Vegetated Lands** | 4 |
| **Totals** | 6,460 |
| Note: Table values may not add to total due to rounding. | |

CARB estimates that all jurisdictions, including private landowners, currently spend approximately $4 billion dollars annually on planting, maintenance, sidewalk repair, tree removal, and other expenses related to urban forests, and that reaching the theoretical maximum tree cover would require increasing that spending by a factor of 20. The cost of the Scoping Plan Scenario is predominantly a mix of urban forests and forests, shrubland, and grasslands spending.

[211] The Reference Scenario described in Chapter 2 and in Appendix I (NWL Technical Support Document) was the basis for the direct cost comparison.

## Economy and Employment

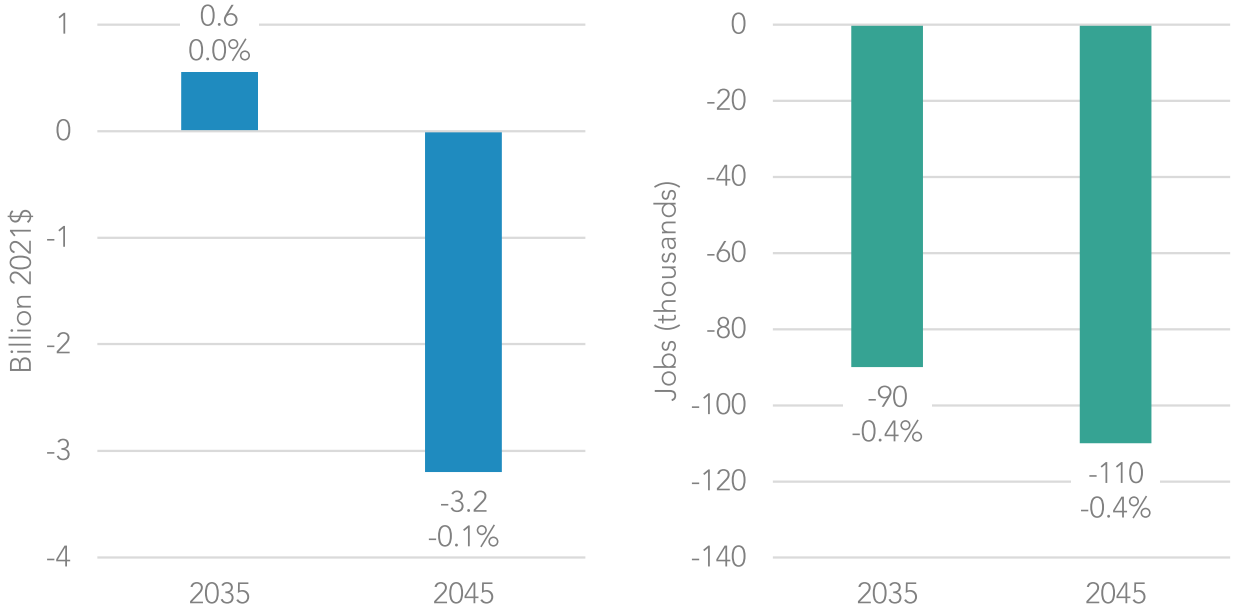
Two different models were used to estimate the overall impact that investing in a transition away from fossil fuels and in our NWL may have on the growing California economy. The transition away from fossil fuels was evaluated using the IMPLAN economic analysis model. The NWL investments were evaluated using the REMI PI+ economic model. These models provide similar outputs relative to the same economic and employment forecasts used to develop a Reference Scenario for use in each model.

### AB 32 GHG Inventory Sectors

To estimate the overall impact that investing in a transition away from fossil fuels may have on the California economy, CARB used the IMPLAN model. Additional detail regarding the model, assumptions, and methodology are included in Appendix H (AB 32 GHG Inventory Sector Modeling). The IMPLAN model is a multisector representation of private industries in the U.S. economy that maps economic relationships across industries, households, and governments. This model translates direct costs and savings associated with transitioning away from fossil fuels with indirect effects such as wages, purchases of goods and services, business tax impacts, and supply chain effects. In addition, the induced effects of household purchases, local and import purchases, wages paid, and household tax impacts are estimated. This comprehensive assessment of the interactions between capital investment in fossil fuel alternatives and household purchases provides an indication of the response of the California economy to the Scoping Plan Scenario.

The Scoping Plan Scenario results in a small impact on the Gross State Product (GSP) and employment relative to the Reference Scenario, as shown in Figure 3-3. Economic growth is largely unaffected by the Scoping Plan Scenario in 2035 and slowed by 0.1 percent in 2045. Employment growth is also slowed a small amount, 0.4 percent in 2035 and in 2045, and employment still grows. Assuming annual growth rates of 0.7 percent means there would be more than 193,000 additional jobs in 2045.

**Figure 3-3: Gross state product (left) and employment (right) relative to a growing California economy for the Scoping Plan Scenario in 2035 and 2045 (AB 32 GHG Inventory sectors)**




California households will see increased costs from the purchase of new capital stock and savings from reduced spending on fuel, as shown in Figure 3-2. Households also will face increased costs associated with CDR, costs associated with energy efficiency measures, and commercial stock purchases—all of which are assumed to be passed directly to consumers. The impact to California households, however, is not limited to these direct costs, as changes in relative prices, employment, and wages can affect household well-being. Personal income, which captures the direct, indirect, and induced impacts, is a metric commonly used to evaluate the impact of policies on households.

Personal income in California is projected to grow from $2.7 trillion in 2021 to $3.6 trillion in 2035 and $4.4 trillion in 2045. Household projections are based on California Department of Finance population projections, which estimate the state's population to grow an average of 0.3 percent each year from 2021 to 2045.[212] California households are projected to increase from 13.3 million in 2020 to 14.6 million in 2035 and 15.0 million in 2045.

[212] California Department of Finance. Population Projections (Baseline 2019). https://dof.ca.gov/forecasting/demographics/projections/.

While the transition away from combustion of fossil fuels will improve air quality for all Californians (and even, more so in overly burdened communities), the economic impacts of the Scoping Plan Scenario are unlikely to be equal among Californians. Table 3-2 presents the change in income by household income group relative to the Reference Scenario in 2035 and 2045. While in 2035 there is a net decrease in personal income of $600 million, total income for households that make less than $100,000 per year is estimated to decline by $4.1 billion dollars, and the total income for households that make more than $100,000 per year will increase by $3.5 billion under the Scoping Plan Scenario. In 2045, although there is no net change in personal income across all California households, results vary by income level. Total income for households that make less than $100,000 per year are estimated to decline by $5.3 billion dollars, while the total income for households that make more than $100,000 per year will increase by $5.3 billion under the Scoping Plan Scenario.

**Table 3-2: Income Impacts by California household income group in 2035 and 2045 for the Scoping Plan Scenario (AB 32 GHG Inventory Sectors)**

| Household Income Group ($2021) | Percentage of 2021 California Households[213] | Change in Income (Billion $2021) | |
|---|---|---|---|
| | | 2035 | 2045 |
| Less than $50,000 | 30 | -2.9 | -3.9 |
| $50,000 to $100,000 | 27 | -1.2 | -1.4 |
| $100,000 to $200,000 | 28 | 2.5 | 4.0 |
| More than $200,000 | 15 | 1.0 | 1.3 |
| Total | 100 | -0.6 | 0.0 |

[213] U.S. Census Bureau. 2021. Household Income. California. https://data.census.gov/cedsci/table?q=california%20income.

In addition to income level, there is likely to be an impact to California personal income that varies based on race/ethnicity.[214] Table 3-3 shows the percentage of households within each income group based on eight race/ethnicity categories identified in the American Community Survey 2021. As shown in Table 3-2, households in lower income groups are anticipated to see negative impacts, while households in higher income groups are anticipated to see positive impacts from the Scoping Plan Scenario in both 2035 and 2045. Because more than 60% of households in the race/ethnicity categories of Hispanic, Black alone, Native Hawaiian (HI) or Pacific Islander, American Indian or Alaskan Native, Other, and Two or More make less than $100,000 per year, these populations generally are likely to experience reduced income. White and Asian households will generally experience both increased and decreased income because these households are distributed more evenly across all four income groups.

The state recognizes the need to ensure that accessibility to clean technology and energy do not further exacerbate health and opportunity gaps for low-income households and communities of color. The Climate Change Investments program exceeds the statutory minimums to invest in projects to benefit disadvantaged communities.[215] Utilities implement programs for reduced energy bills for qualifying low-income customers.[216] There are also resources for waste and water bills that leverage federal funds.[217] CARB also coordinated with the CPUC to ensure that the Climate Credit[218] funded from the sale of Cap-and-Trade allowances provided to utilities on behalf of ratepayers is credited equally to households and not based on how much energy is used. These are just a few examples of how the state is designing and implementing programs to avoid increasing existing disparities. The state must continue to find ways to relieve economic burdens on low-income households.

[214] The number of households in each bracket and the race/ethnicity categories are from American Community Survey 2021 results. Population changes through 2035 and 2045 are not forecast. U.S. Census Bureau. 2021. Household Income. California. *https://data.census.gov/cedsci/table?q=california%20income*.
[215] CARB. Priority Populations — California Climate Investments. *https://www.caclimateinvestments.ca.gov/priority-populations*.
[216] CPUC. CARE/FERA Program. *https://www.cpuc.ca.gov/lowincomerates/*.
[217] California Department of Community Services and Development. Low Income Household Water Assistance Program. *https:/www.csd.ca.gov/lihwap*.
[218] CPUC. California Climate Credit - FAQ. *https://www.cpuc.ca.gov/industries-and-topics/natural-gas/greenhouse-gas-cap-and-trade-program/california-climate-credit/california-climate-credit---faq*.

**Table 3-3: Percentage of households in each race/ethnicity category by household income group**

| Household Income Group ($2021) | Households in Income Group (%) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | White Not Hispanic | Hispanic | Black Alone | Asian Alone | Native HI or Pacific Islander | American Indian or Alaskan Native | Other | Two or More |
| **Less than $50,000** | 26 | 35 | 45 | 25 | 30 | 35 | 37 | 32 |
| **$50,000 to $100,000** | 25 | 32 | 27 | 21 | 31 | 33 | 33 | 30 |
| **$100,000 to $200,000** | 29 | 25 | 21 | 30 | 30 | 26 | 24 | 27 |
| **More than $200,000** | 19 | 7 | 7 | 24 | 9 | 7 | 5 | 11 |

## Natural and Working Lands

The macroeconomic impact of the NWL scenario was evaluated separately in the REMI PI+ model. For the Scoping Plan Scenario, the macroeconomic impact was modeled by assuming that economic activity in the relevant industries grows in proportion to the proposed implementation spending in that industry. All funds for implementing the actions were assumed to be sourced from within the state. For urban forests, the funds were modeled as being sourced from a combination of state government and private property owners in proportion to the current estimated private/public spending ratio. For all other actions, funds were assumed to be sourced from the state government. In each modeled scenario, government spending and income to property owners were reduced relative to the Reference Scenario in proportion to the annual costs of implementation. None of the proposed spending was modeled as being sourced from increased taxes. Additional details on the methodology for evaluating macroeconomic impacts are in Appendix I (NWL Technical Support Document).

While the macroeconomic model does count the increased economic activity in the affected industries as part of GSP, it does not quantify many of the important economic, health, and environmental benefits that would occur if these actions were implemented. While these benefits—like the reduced use of pesticides, value of urban trees, and increased recreational opportunities—would be very significant, they are outside the scope of the macroeconomic model.

The macroeconomic model also makes projections about the total level of employment in the state. The model forecasts that the Scoping Plan Scenario, which greatly increases the level of NWL management actions, channels economic activity toward related industries and would lead to a slight increase in total employment. (Table 3-4). While the model does aim to accurately represent many labor market dynamics, including adjustments of wages and migration rates, it does not account for many costs that might be associated with dramatically scaling up employment in a particular industry, such as the cost of job training.

**Table 3-4: Gross state product and employment relative to a growing California economy for the Scoping Plan Scenario in 2035 / 2045 (NWL)**

| | Scoping Plan Scenario (%) |
|---|---|
| **Gross State Product** | 0.00 / 0.01 |
| **Employment** | 0.12 / 0.10 |
| **Personal Income** | -0.04 / -0.04 |
| **Personal Income per Capita** | -0.04 / -0.14 |

## Health Analysis

Air quality is affected by pollutant emissions from various processes associated with energy systems, including the combustion of fossil fuels, as well as the combustion of vegetation biomass from NWL during wildfires. Pollutants that are important contributors to degraded air quality in California include nitrogen oxides ($NO_x$), particulate matter (PM), reactive organic gases (ROG), and others. Further, in the atmosphere these pollutants are transported away from the locations of the emissions by wind and other phenomena, and undergo chemical reactions that result in the formation of new pollutants such as ground-level ozone and fine particulate matter ($PM_{2.5}$). Both primary (emitted) and secondary (formed) pollutants are important from a public health standpoint and contribute to the incidence of air pollution-related mortality and disease within California populations. Measures focused on GHGs do not incorporate specific targets to reduce emissions of $PM_{2.5}$ or air toxics like benzene. These co-pollutants, which are emitted from many of the same pollution sources as GHGs, affect local air quality and pose known risks to public health, such as the risk of asthma and cardiovascular disease. Generally, for stationary sources, certain harmful pollutants are regulated via local rules and regulations that are reflected in permits for stationary sources and are enforced by local air districts, with CARB also regulating air toxics contaminants from stationary sources with the air districts.

## AB 32 GHG Inventory Sectors

To assess health impacts for the AB 32 GHG Inventory sectors, an integrated modeling approach was used to quantify and value the air pollution-related public health benefits of the Scoping Plan Scenario relative to the Reference Scenario. Additional details about the models, assumptions, and methodology are included in Appendix H (AB 32 GHG Inventory Sector Modeling). Using output from the PATHWAYS model, projections of pollutant emissions to 2045 were developed for stationary, area, and mobile source emissions using a detailed base year CARB pollutant emissions inventory. Further, the emissions are processed, including for where and when they occur in California, using the Sparse Matrix Operator Kernels Emissions (SMOKE) model. For example, on-road vehicle emissions were allocated along existing roadways, and refining emissions were assigned to the locations of existing refineries. It should be noted that the emissions projections represent statewide average reductions associated with high-level assumptions about alternative fuels and technologies. For example, emissions occurring from refineries to produce liquid fuels are reduced in line with petroleum demand. This reduction is applied equally to all refineries in the Scoping Plan Scenario and does not specify individual facility responses to changing demand. Similarly, the Scoping Plan Scenario does not specify which refineries transition to biofuel production or where new electricity generation facilities are built.

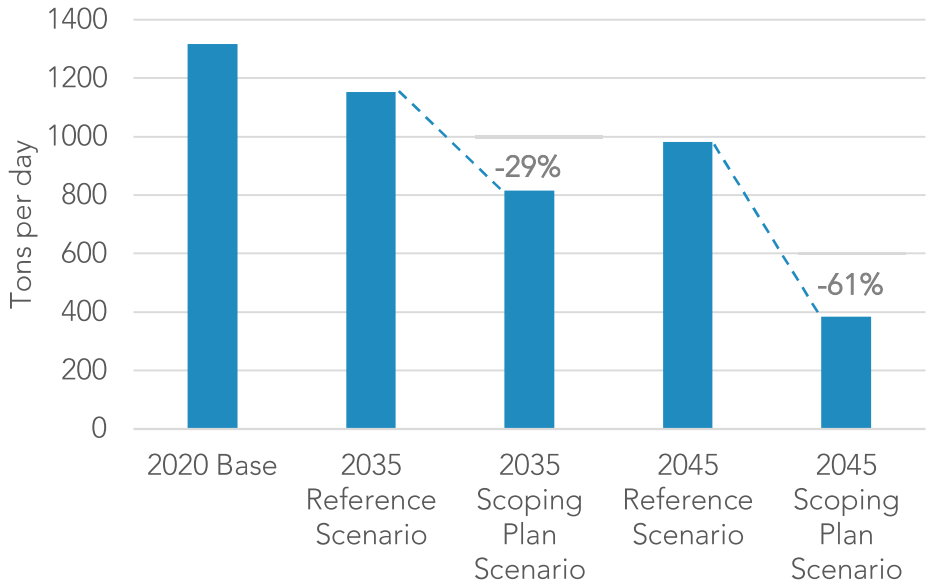
Next, emission changes were translated into impacts on atmospheric pollution levels, including ground-level ozone and $PM_{2.5}$, via an advanced photochemical air quality model called the Community Multiscale Air Quality (CMAQ) model, which accounts for atmospheric chemistry and transport. A comprehensive assessment of how pollutant concentrations are impacted throughout the year was achieved by simulating all months in 2035 and 2045 for the Scoping Plan Scenario.[219] Health benefits were estimated using the U.S. EPA's environmental Benefits Mapping and Analysis Program (BenMAP) model to translate pollutant changes into avoided incidence of mortality, hospital admissions, emergency room visits, and other outcomes as a result of reduced exposure to ozone and $PM_{2.5}$. These outcomes are associated with an economic value in order to aggregate health impacts.

The Scoping Plan Scenario shows a substantial reduction in pollutant emissions relative to the Reference Scenario, including $NO_x$, $PM_{2.5}$, and ROG. Reductions in $NO_x$ are shown in Figure 3-4. Even under a business-as-usual trajectory, emissions are reduced from present levels by 26 percent in 2045 in the Reference Scenario, demonstrating the impact of current regulations and trends in energy sectors. The Scoping Plan Scenario further reduces $NO_x$

[219] This annual approach differs from the episodic modeling approach applied to the Proposed Scenario and Alternatives in the Draft 2022 Scoping Plan Update. Appendix H (AB 32 GHG Inventory Sector Modeling) describes both approaches.

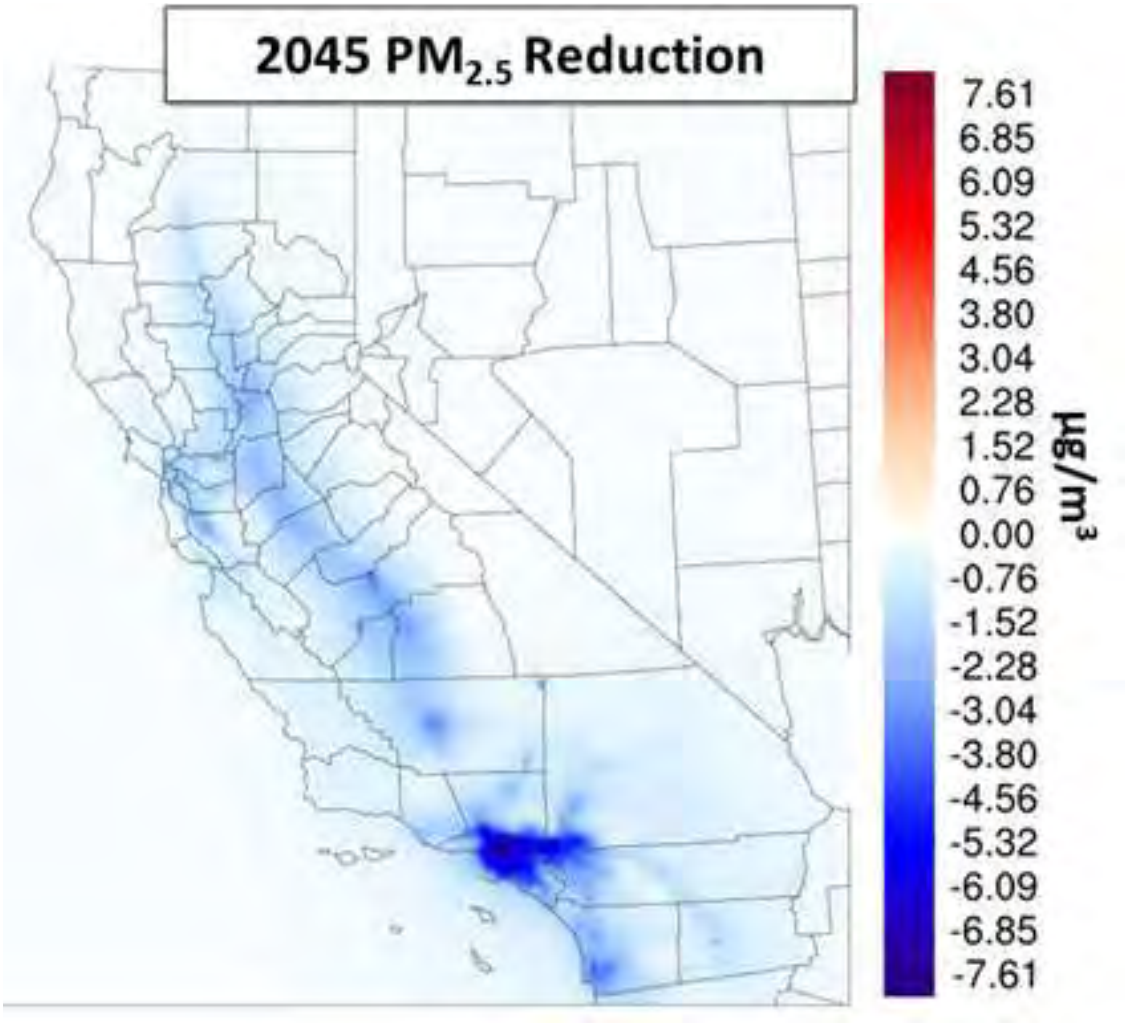
emissions from the Reference Scenario by 29% in 2035 and 61% in 2045. Emission reductions occur throughout the state with particular prominence in urban areas, including the South Coast Air Basin, due to the large presence and activity of emission sources. Appendix H (AB 32 GHG Inventory Sector Modeling) contains additional information about the pollutant emissions modeling and results.

**Figure 3-4: Illustration of NOx emission reductions from current levels for the Reference Scenario and the Scoping Plan Scenario (AB 32 GHG Inventory sectors)**



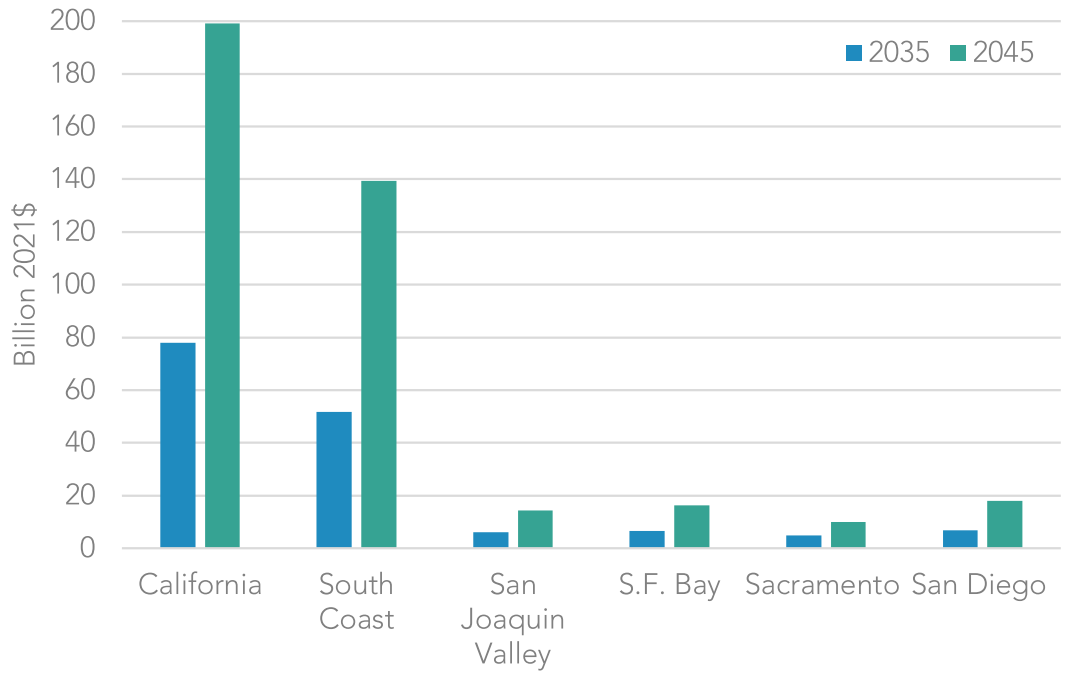

The emission reductions achieve important improvements in air quality throughout California, including reductions in the levels of ozone and $PM_{2.5}$. Reductions in annual $PM_{2.5}$ levels are shown in Figure 3-5. The greatest reductions are evident in Southern California, the San Joaquin Valley, the San Francisco Bay area, and the Greater Sacramento area due to the large presence and activity of emission sources, meteorology, topography, and others. To highlight the extent of the air quality improvements: reductions reach nearly 8 micrograms per cubic meter ($\mu g/m^3$) in 2045 and lead to 76% fewer exceedances of the health-based National Ambient Air Quality $PM_{2.5}$ standard of 12 $\mu g/m^3$. Similarly, ozone improvements reach 19 parts per billion (ppb) and yield 62% fewer exceedance events. Furthermore, the locations of improvements carry important implications for human health as these areas support large urban populations and generally experience the most degraded ozone and $PM_{2.5}$ pollution. Appendix H (AB 32 GHG Inventory Sector Modeling) provides details regarding the atmospheric modeling and results, including differences in ozone and $PM_{2.5}$.

**Figure 3-5: Difference in annual average $PM_{2.5}$ ($\mu g/m^3$) in the Scoping Plan scenario relative to the Reference scenario in 2045 (AB 32 GHG Inventory sectors)**



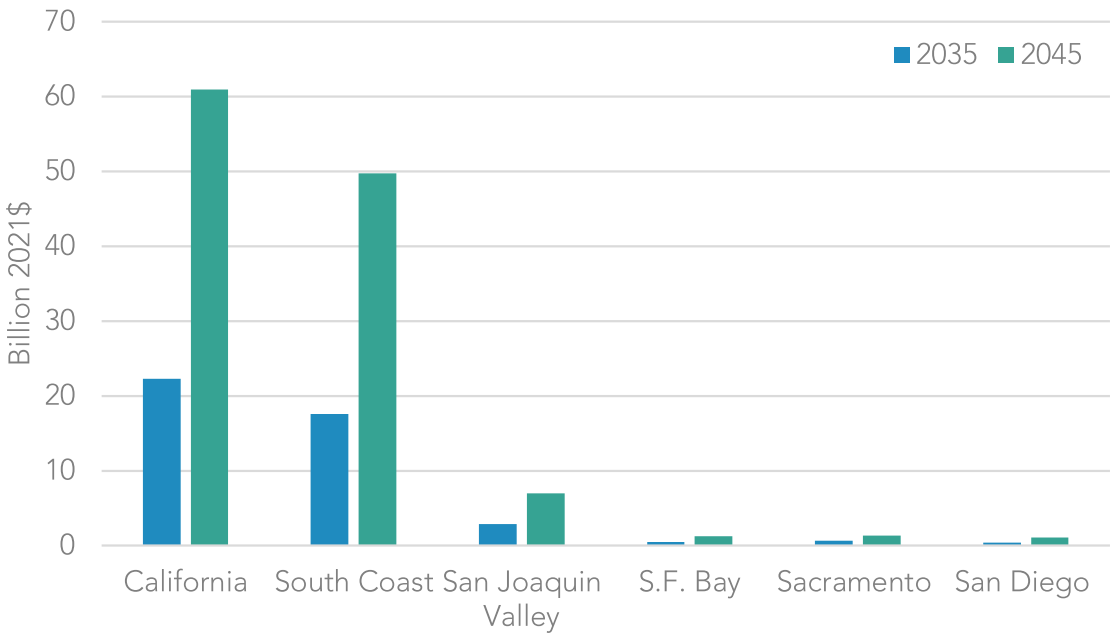

Notable health benefits representing the economic value of the avoided incidence of health effects are associated with the Scoping Plan Scenario. In total, the benefits reach $78 billion in 2035 and $199 billion in 2045, as shown in Figure 3-6. Populations in Southern California benefit the most due to preexisting air quality challenges, significant emission sources and activity, and the presence of a large, dense urban population. Additional details regarding the health impact assessment are provided in Appendix H (AB 32 GHG Inventory Sector Modeling).

**Figure 3-6: Total health benefits estimated from air quality improvements in the Scoping Plan Scenario (AB 32 GHG Inventory sectors)**




Furthermore, these benefits accrue within socially and economically disadvantaged communities identified by CalEnviroScreen, where they are most needed. Total health benefits within census tracts identified as disadvantaged communities using CalEnviroScreen 4.0 reach $22 billion in 2035 and $61 billion in 2045, as shown in Figure 3-7. Similarly to the statewide health benefits, the largest share of benefits occurs within disadvantaged communities in Southern California. Additional information on the health benefits within disadvantaged communities can be found in Appendix H (AB 32 GHG Inventory Sector Modeling).

**Figure 3-7: Disadvantaged community health benefits relative to the Reference Scenario for the Scoping Plan Scenario (AB 32 GHG Inventory sectors)**

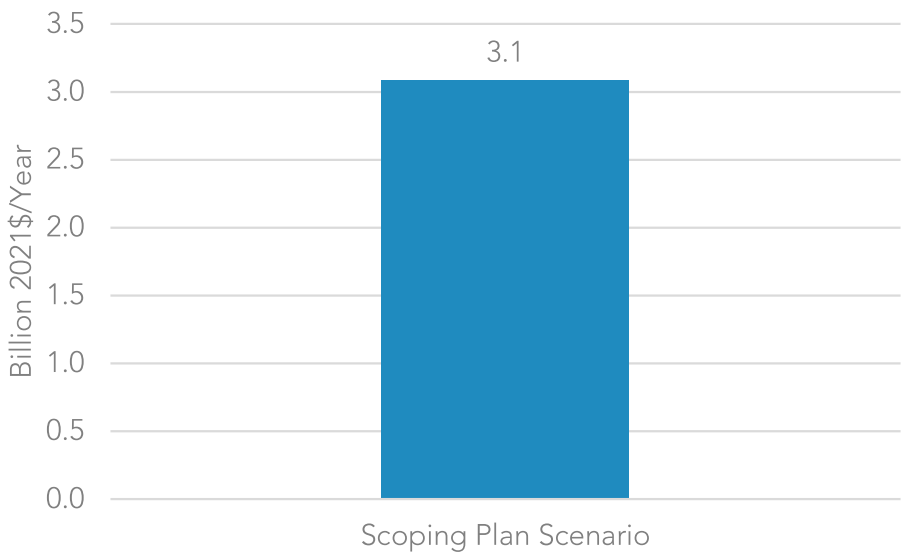



## Natural and Working Lands

For NWL, health benefits were evaluated based on projected $PM_{2.5}$ wildfire emissions on forests, shrublands, and grasslands, discussed in the AB 197 Measure Analysis section of the chapter that follows.[220] The health endpoints for the Scoping Plan Scenario and in Appendix I (NWL Technical Support Document) for the alternative scenarios were the basis for the estimated health benefits shown in Figure 3-8. Health benefits were derived from the preliminary University of California, Los Angeles (UCLA) study that estimated annual health impacts and associated costs from California's wildfires from 2008–2018. Additional details are included in Appendix I (NWL Technical Support Document). These costs were applied to the health endpoints discussed in the AB 197 Measure Analysis section of the chapter.

[220] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N11, N14. *finalejacrecs.pdf (arb.ca.gov)*.

**Figure 3-8: Total average annual health benefits relative to the Reference Scenario for the Scoping Plan Scenario (NWL)**




As health impacts analyzed here are driven by wildfire emissions, the health benefits for the Scoping Plan Scenario are directly related to the amount of forest, shrubland, and grassland management action. These management actions reduce vegetation fuels and, as a result, wildfire activity. The Scoping Plan Scenario increases the amount of these management actions, reducing wildfire emissions and avoiding incidence of emission-related health effects. The health benefits, or economic value of the avoided incidence of health effects, correspondingly increase with an increasing management implementation rate. Additional details are included in Appendix I (NWL Technical Support Document).

Estimated health benefits do not include the direct impact of wildfires on injuries, deaths, or mental health, nor the indirect costs of lost ecosystem benefits to wildfire. Additional direct health costs may result from wildfire that would likely increase the health benefits from increased forest, shrubland, and grassland management to reduce wildfire activity. Nonetheless, the conservative health benefits under the Scoping Plan Scenario are estimated to be $3.1 billion per year relative to the Reference Scenario for all NWL actions identified in the Scoping Plan Scenario.

## AB 197 Measure Analysis

This section provides estimates for information associated with GHG emissions reduction measures evaluated in this Scoping Plan.[221] These estimates, which were developed as part of the process for meeting the requirements of AB 197 (E. Garcia, Chapter 250, Statutes of 2016), provide information on the relative impacts of the evaluated measures when compared to each other. To support the design of a suite of policies that result in GHG reductions, air quality co-benefits, and cost-effective measures, it is important to understand if a measure will increase or reduce criteria pollutants or toxic air contaminant emissions, or if increasing stringency at additional costs yields few additional GHG reductions. To this end, AB 197 requires the following for each potential emissions reduction measure evaluated in any Scoping Plan update:

- The range of projected GHG emissions reductions that result from the measure;
- The range of projected criteria pollutant emission reductions that result from the measure; and
- The cost-effectiveness, including avoided social costs, of the measure.

The following sections describe the evaluation of measures for the AB 32 GHG Inventory sectors and NWL. For the purposes of this Scoping Plan, the identified emissions reduction measures for the analysis required by AB 197 are actions grouped by sectors where several policies and programs are expected to overlap. This approach reflects the most granular feasible analysis given the modeling tools available,[222] the overlap and interaction effects among policies and incentive programs, the longer planning horizon used for this Scoping Plan compared to previous efforts, and the scale of transition needed to achieve carbon neutrality. To implement this Scoping Plan, dozens of individual regulations, policies, and incentive programs are anticipated that work together to drive down emissions across all economic sectors and support actions. Every specific policy or incentive program that could contribute to the deployment of clean technology and energy called for in this plan may overlap in ways that make it infeasible to tease out those policies and programs' individual effects with any reasonable degree of certainty. For example, in the transportation sector, deploying ZEVs and reducing driving demand may be achieved through a combination of the implementation of new or existing regulations, fuels programs, incentive programs, and VMT reduction initiatives that can each contribute to reductions in emissions for the sector. It is not feasible to isolate each sub action from each other at this time in terms of the share of contribution to total reductions. The estimated emission

[221] AB 197 calls for the evaluation of "emission reduction measures." This Scoping Plan treats each action and its variants on stringency as emission reduction measures for the purposes of this chapter. Appendix C (AB 197 Measure Analysis) lists the measures and corresponding modeling assumptions for each alternative.
[222] See Appendix H (AB 32 GHG Inventory Sector Modeling and Appendix I (NWL Technical Support Document).

reductions, health endpoints, and costs by measure for the Scoping Plan Scenario are presented in this chapter, and the corresponding estimates for the Proposed Scenario and Alternatives 1, 2, and 4 are included in Appendix C (AB 197 Measure Analysis).

Because many of the measures and underlying assumptions interact with each other, isolating the GHG emission reductions, corresponding changes to fuel combustion, and associated cost of an individual measure is analytically challenging. Each measure is evaluated by examining the change in fuel combustion, cost, and emissions associated with just that measure using the PATHWAYS model. The difference between the Scoping Plan Scenario and the Reference Scenario is estimated for each measure. Starting from the Scoping Plan Scenario, the modeling assumptions for an individual measure are reverted to the Reference Scenario values, resulting in GHG reductions, changes to fuel combustion, and costs (or savings). This approach does not reflect interactions between sectors in PATHWAYS that influence the results for each complete alternative, presented earlier. As such, the values associated with each measure should not be added to obtain an overall scenario estimate.

To arrive at the 2045 target for NWL, CARB modeled the ecological impact that climate smart land-based management strategies (suites of on-the-ground actions, or *treatments,* that are used across the landscape to manipulate an ecosystem) will have on ecosystem carbon; and whenever possible, additional co-benefits from those actions. The Scoping Plan Scenario incorporates a set of land management actions at varying scales of implementation for each land type to achieve the GHG emission reductions. Each land type, and its associated management actions, was considered a measure for this analysis. For modeling individual landscapes and management actions, CARB used a suite of models. The complexity of these models varies by land type, depending on the existing science, data, and availability of existing models to use. Appendix I (NWL Technical Support Document) provides detailed modeling assumptions for each NWL type. The estimated emission reductions, health endpoints, and costs by measure under the Scoping Plan Scenario for each NWL type are presented in this chapter, and the corresponding estimates for the Proposed Scenario and NWL Alternatives 1, 2, and 4 are included in Appendix C (AB 197 Measure Analysis).

## Estimated Emissions Reductions

Both GHG emissions reductions and emissions of criteria air pollutants were evaluated for the AB 32 GHG Inventory sectors and for NWL. The methods and results are described in this section.

### AB 32 GHG Inventory Sectors

In the absence of having direct modeling results for criteria pollutant estimates from PATHWAYS, CARB estimated criteria pollutant emissions impacts by using changes in fuel combustion in units of exajoules from PATHWAYS and emission factors in units of tons per exajoule to estimate the change in emissions in tons per year. Emission factors from a variety

of sources for each sector were utilized, including but not limited to CARB's mobile source emissions models,[223] U.S. EPA's AP 42 Emissions Factors,[224] and the South Coast Air Quality Management District's (AQMD's) District Rules.[225] These emission factors were applied to fuel burn change by fuel type, sector, equipment type, and process, where applicable. Statewide annual average emissions were estimated for three criteria pollutants: $NO_x$, $PM_{2.5}$, and ROG.

Table 3-5 provides the estimated GHG and criteria pollutant emission reductions for the measures in the Scoping Plan Scenario in 2035 and 2045. The other alternatives are presented in Appendix C (AB 197 Measure Analysis). Based on the estimates below, these measures are expected to provide air quality benefits. The estimates provided in this chapter and Appendix C (AB 197 Measure Analysis) are appropriate for comparing across alternatives considered for the development of this Scoping Plan, but they are not precise estimates.

[223] CARB. MSEI - Modeling Tools. *https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools*.
[224] U.S EPA. AP-42: Compilation of Air Emissions Factors. *https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors*.
[225] South Coast AQMD. South Coast AQMD Rule Book. *https://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book*.

**Table 3-5: Estimated GHG and criteria pollutant emission reductions relative to the Reference Scenario for the Scoping Plan Scenario in 2035/2045 (AB 32 GHG Inventory sectors)**

| Measure | GHG Reductions ($MMTCO_2$) | NOx Reductions (Short Tons/Year) | $PM_{2.5}$ Reductions (Short Tons/ Year) | ROG Reductions (Short Tons/Year) |
|---|---|---|---|---|
| **Deploy ZEVs and reduce driving demand** | -46 / -84 | -51,620 / -122,806 | -2,008 / -6,506 | -18,967 / -30,410 |
| **Coordinate supply of liquid fossil fuels with declining California fuel demand** | -25 / -30 | -1,601 / -2,707 | -978 / -1,705 | -747 / -1,323 |
| **Generate clean electricity** | -8 / -31 | -92 / -1,555 | -177 / -1,382 | -41 / -425 |
| **Measure** | **GHG Reductions ($MMTCO_2$)** | **NOx Reductions (Short Tons/Year)** | **$PM_{2.5}$ Reductions (Short Tons/ Year)** | **ROG Reductions (Short Tons/Year)** |
| **Decarbonize industrial energy supply** | -9 / -22 | -21,172 / -34,876 | -1,188 / -2,527 | -3,710 / -6,298 |
| **Decarbonize buildings** | -14 / -35 | -8,105 / -94,455 | -826 / -6,877 | -1,093 / -8,109 |
| **Reduce non-combustion emissions[a]** | -0.41 / -0.52 ($MMTCH_4$) | N/A | N/A | N/A |
| **Compensate for remaining emissions** | -25 / -64 | N/A | N/A | N/A |

[a] Methane emissions reductions are reported for this measure.

The measures related to reducing non-combustion emissions and compensating for the remaining emissions do not include changes to fuel combustion, and therefore are not

associated with changes to air pollutants. Biomethane combustion is captured in measures that reduce combustion of fossil gas, such as decarbonizing industrial energy supply and buildings.

## Natural and Working Lands

NWL ecosystems naturally vary between being a source and a sink for carbon over time. The NWL ecosystem carbon stock changes projected through mid-century by the suite of models were used to estimate net emissions or emissions reductions relative to the Reference Scenario. These changes in carbon stocks were affected by projected climate change, the implementation of management actions under the various scenarios, land conversion, and (for forests, shrublands, grasslands) wildfire. Each NWL type was evaluated, and an overview of all NWL is presented in Table 3-6. More detailed results for each NWL type can be found in Appendix C (AB 197 Measure Analysis).

**Table 3-6: Estimated average annual GHG and criteria pollutant emission reductions relative to the Reference Scenario for the Scoping Plan Scenario from 2025–2045 (NWL)**

| Measure | GHG Reductions ($MMTCO_2e$/year) | $PM_{2.5}$ Reductions (MT/Year) |
|---|---|---|
| **Forests/Shrublands/Grasslands** | -0.12 | -17,500 |
| **Annual Croplands** | -0.25 | N/A |
| **Perennial Croplands** | -0.01 | N/A |
| **Urban Forest** | -1.29 | N/A |
| **Wildland Urban Interface (WUI)** | 0.75 | N/A |
| **Wetlands** | -0.43 | N/A |
| **Sparsely Vegetated Lands** | <-0.01 | N/A |

Fine particulate wildfire emissions were evaluated for forests, shrublands, and grasslands only. Wildfire emissions decreased under the Scoping Plan Scenario compared to the Reference Scenario. The Scoping Plan Scenario's higher level of management actions that reduce tree or shrub densities, protect large trees, reintroduce fire to the landscape, and diversify species and structures result in greater reductions in wildfire emissions.

## Estimated Health Endpoints

Climate change mitigation will result in both environmental and health benefits. This section provides information about the potential health benefits of the Scoping Plan Scenario. Health benefits are primarily the result of reduced $PM_{2.5}$ pollution, both from stationary and mobile sources, as well as wildfire in forests, shrublands, and chaparral.

### AB 32 GHG Inventory Sectors

CARB used the criteria pollutant emissions in Table 3-5 to understand potential health impacts. Similar to the air quality estimates, this information should be used to understand the relative health benefits of the various measures and should not be taken as absolute estimates of health outcomes. CARB used the incidence-per-ton (IPT) methodology to quantify the health benefits of emission reductions. The IPT methodology is based on a methodology developed by the U.S.

EPA.[226,227,228,229] Under the IPT methodology, changes in emissions are approximately proportional to the resulting changes in health outcomes. IPT factors are derived by calculating the number of health outcomes associated with exposure to $PM_{2.5}$ for a baseline scenario using measured ambient concentrations and dividing that number by the emissions of $PM_{2.5}$ or a precursor. To estimate the reduction in health outcomes, the emission reductions are multiplied by the IPT factor. For future years, the number of outcomes is adjusted to account for population growth. IPT factors were computed for the two types of $PM_{2.5}$: primary $PM_{2.5}$ and secondary $PM_{2.5}$ of ammonium nitrate aerosol formed from precursors.

For this AB 197 analysis, CARB calculated the health benefits associated with the five key measures that are represented by changes to fuel combustion. The health benefits associated with emission reductions for the Scoping Plan Scenario were estimated for each air basin and then aggregated for the entire state of California. CARB assumed that the statewide emission reductions distribution among the air basins is proportional to the baseline emissions in that air basin.

Calculated health endpoints include premature mortality, cardiovascular emergency department (ED) visits, acute myocardial infarction, respiratory ED visits, lung cancer incidence, asthma onset, asthma symptoms, work loss days, hospitalizations due to cardiopulmonary illnesses, hospitalizations due to respiratory illnesses, hospital admissions for Alzheimer's disease, and hospital admissions for Parkinson's disease.[230,231,232] These health endpoints were calculated using the IPT method for estimated emission reductions. Table 3-7 compares the health benefits of emission reductions associated with each measure for the Scoping Plan Scenario in the year

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[226] CARB. CARB's Methodology for Estimating the Health Effects of Air Pollution. Retrieved February 9, 2021. https://ww2.arb.ca.gov/resources/documents/carbs-methodology-estimating-health-effects-air-pollution.

[227] Fann, N., C. M. Fulcher, and B. J. Hubbell. 2019. "The influence of location, source, and emission type in estimates of the human health benefits of reducing a ton of air pollution." *Air Quality, Atmosphere & Health* 2:169–176. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2770129/.

[228] Fann, N., K. R. Baker, and C. M. Fulcher. 2012. "Characterizing the $PM_{2.5}$-related health benefits of emission reductions for 17 industrial, area and mobile emission sectors across the U.S." *Environ Int*. 49:141–51. November 15. https://www.sciencedirect.com/science/article/pii/S0160412012001985.

[229] Fann, N., K. Baker, E. Chan, A. Eyth, A. Macpherson, E. Miller, and J. Snyder. 2018. "Assessing Human Health $PM_{2.5}$ and Ozone Impacts from U.S. Oil and Natural Gas Sector Emissions in 2025." *Environ. Sci. Technol.* 52 (15), 8095–8103. https://pubs.acs.org/doi/abs/10.1021/acs.est.8b02050.

[230] CARB. CARB's Methodology. https://ww2.arb.ca.gov/resources/documents/carbs-methodology-estimating-health-effects-air-pollution.

[231] CARB. 2022. Updated Health Endpoints in CARB's Health Benefits Methodology. Evaluating New Health Endpoints for Use in CARB's Health Analyses.

[232] Cardio-pulmonary mortality, hospitalizations due to cardiopulmonary illnesses, and hospital admissions due to respiratory illnesses endpoints utilize studies documented in CARB's methodology document. For future assessments, CARB will use more recent studies to estimate cardiovascular hospital admissions and respiratory hospital admissions, as documented in CARB's updated health endpoints memo.

specified (2035 or 2045). The other alternatives are presented in Appendix C (AB 197 Measure Analysis).

**Table 3-7: Estimated avoided incidence of mortality, cardiovascular and respiratory disease onset, work loss days and hospital admissions relative to the Reference Scenario for the Scoping Plan Scenario (AB 32 GHG Inventory sectors)**

| Measure | Mortality | Cardiovascular ED Visits | Acute Myocardial Infarction | Respiratory ED Visits | Lung Cancer Incidence | Asthma Onset | Asthma Symptoms | Work Loss Days | Hospital Admissions, Cardiovascular | Hospital Admissions, Respiratory | Hospital Admissions, Alzheimer's Disease | Hospital Admissions, Parkinson's Disease |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Deploy ZEVs and reduce driving demand in 2035** | 635 | 170 | 70 | 400 | 45 | 1,475 | 128,930 | 92,510 | 95 | 115 | 245 | 40 |
| **Deploy ZEVs and reduce driving demand in 2045** | 1,820 | 475 | 200 | 1,115 | 135 | 3,995 | 343,095 | 255,800 | 295 | 350 | 745 | 125 |
| **Coordinate supply of liquid fossil fuels with declining CA fuel demand in 2035** | 115 | 30 | 15 | 70 | 10 | 275 | 23,530 | 16,880 | 20 | 20 | 50 | 10 |

| Measure | Mortality | Cardiovascular ED Visits | Acute Myocardial Infarction | Respiratory ED Visits | Lung Cancer Incidence | Asthma Onset | Asthma Symptoms | Work Loss Days | Hospital Admissions, Cardiovascular | Hospital Admissions, Respiratory | Hospital Admissions, Alzheimer's Disease | Hospital Admissions, Parkinson's Disease |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Coordinate supply of liquid fossil fuels with declining CA fuel demand in 2045** | 215 | 55 | 25 | 130 | 15 | 490 | 40,860 | 30,445 | 35 | 40 | 95 | 15 |
| **Generate clean electricity in 2035** | 20 | 5 | 0 | 10 | 0 | 45 | 3,930 | 2,820 | 5 | 5 | 10 | 0 |
| **Generate clean electricity in 2045** | 170 | 45 | 20 | 105 | 15 | 385 | 32,065 | 23,890 | 25 | 30 | 75 | 10 |
| **Decarbonize industrial energy supply in 2035** | 300 | 80 | 35 | 190 | 20 | 695 | 60,660 | 43,520 | 45 | 55 | 115 | 20 |
| **Decarbonize industrial energy supply in 2045** | 595 | 155 | 65 | 365 | 45 | 1,310 | 111,925 | 83,435 | 95 | 115 | 245 | 40 |

| Measure | Mortality | Cardiovascular ED Visits | Acute Myocardial Infarction | Respiratory ED Visits | Lung Cancer Incidence | Asthma Onset | Asthma Symptoms | Work Loss Days | Hospital Admissions, Cardiovascular | Hospital Admissions, Respiratory | Hospital Admissions, Alzheimer's Disease | Hospital Admissions, Parkinson's Disease |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Decarbonize buildings in 2035** | 155 | 40 | 15 | 95 | 10 | 360 | 31,130 | 22,335 | 25 | 30 | 60 | 10 |
| **Decarbonize buildings in 2045** | 1,610 | 420 | 175 | 985 | 120 | 3,550 | 303,830 | 226,500 | 260 | 310 | 665 | 115 |
| Note: All values are rounded to the nearest 0 or 5. | | | | | | | | | | | | |

The measures related to reducing non-combustion emissions and compensating for remaining emissions do not include changes to fuel combustion and therefore are not associated with changes to air pollutants or health endpoints. Biomethane combustion is captured in measures that reduce combustion of fossil gas, such as decarbonizing industrial energy supply and buildings.

Although the estimated health outcomes presented are based on a well-established methodology, they are subject to uncertainty. For instance, future population estimates are subject to increasing uncertainty as they are projected further into the future, and baseline incidence rates can experience year-to-year variation. Also, the relationship between changes in pollutant concentrations and changes in pollutant or precursor emissions is assumed to be approximately proportional.

In addition, emissions are reported at an air basin level and do not capture local variations. These estimates also do not account for impacts from global climate change, such as temperature rise, and are only based on the scenarios in this Scoping Plan.

The fuel changes for each AB 197 measure are estimated based on the impact of each measure compared to the Reference Scenario for the years 2035 and 2045. Therefore, aggregating the effect of each measure would overestimate the impacts of the Scoping Plan Scenario because the implementation of each measure would affect the level of benefits of the other measures. This measure-by-measure analysis uses a different methodology for calculating health endpoints than does the health analysis for the complete Scoping Plan Scenario provided earlier.

## Natural and Working Lands

Implementation of NWL management strategies to mitigate and adapt to climate change will result in both environmental and health benefits. This section provides information about the potential health benefits of measures evaluated for the Scoping Plan Scenario. For this analysis, health benefit estimates were focused on increases or decreases to $PM_{2.5}$ resulting from wildfire emissions on forests, shrublands, and grasslands.[233] Other health benefits resulting from NWL management actions in the Scoping Plan Scenario are not quantified here but are important for all Californians. This includes, but is not limited to, reductions in exposure to synthetic pesticides when switching to organic agricultural systems, improvements in shade availability and mental health with increasing urban forest cover, improved mental health from opportunities for recreation in resilient and healthy environments, and protection from floods and rising sea levels.

[233] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N11, N14. finalejacrecs.pdf (arb.ca.gov).

These examples are by no means exhaustive, as our natural and working lands provide immense health benefits to everyone.

For this analysis, CARB used the $PM_{2.5}$ emissions in Table 3-6 to understand potential health impacts. This information should be used to understand the relative health endpoints of the various measures and should not be taken as absolute estimates of health outcomes of this Scoping Plan statewide or within a specific community. The IPT methodology was used to calculate health endpoints, similar to the AB 32 GHG Inventory Sector analysis. CARB calculated the annual health endpoints associated with the wildfire emissions changes resulting from the implementation of management strategies on forests, shrublands, and grasslands under each alternative. The annual health endpoints associated with emission reductions for the Scoping Plan Scenario were estimated for the entire state. Calculated health endpoints include emissions-caused mortality, hospital admittance, and emergency room visits from asthma; hospital admittance from chronic obstructive pulmonary disease; and emergency room visits from respiratory and cardiovascular outcomes. Table 3-8 compares the average annual health endpoints of wildfire emission reductions associated with the Scoping Plan Scenario over the period 2025–2045. The other alternatives are presented in Appendix C (AB 197 Measure Analysis).

**Table 3-8: Estimated average annual avoided incidence of hospital admissions, emergency room visits, and mortality relative to the Reference Scenario for the Scoping Plan Scenario resulting from forest, shrubland, and grassland wildfire emissions (NWL)**

| Health Endpoints from Forest, Shrubland, and Grassland Wildfire Emissions | Average Annual Avoided Incidence |
|---|---|
| Hospital admissions from asthma | 22 |
| Hospital admissions from chronic obstructive pulmonary disease without asthma | 19 |
| Hospital admissions from all respiratory outcomes | 63 |
| Emergency room visits from asthma | 155 |
| Emergency room visits from all respiratory outcomes | 419 |
| Emergency room visits from all cardiovascular outcomes | 156 |
| All causes of mortality | 394 |

## Estimated Social Cost

*Social costs* are generally defined as the cost of an action on people, the environment, or society and are widely used to understand the impact of regulatory actions. One tool, the social cost of greenhouse gases (SC-GHG), is an estimate of the present value of the costs associated with the emission of GHGs in future years. It combines climate science and economics to help understand the benefits of reducing GHG emissions. The estimates of the social cost of carbon ($SC\text{-}CO_2$) and social cost of methane ($SC\text{-}CH_4$), two types of SC-GHGs presented here, estimate the value of the net harm to society associated with adding GHGs to the atmosphere in a given year; they do not represent the cost of actions taken to reduce GHG emissions (known as the *cost of abatement*) nor the cost of GHG emissions reductions. In principle, the SC-GHG includes the value of climate change impacts, including but not limited to, changes in net agricultural productivity, human health effects, property damage from increased flood risk and other natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services. It reflects the societal value of reducing emissions

of the gas in question by one metric ton.[234] Many of these damages from GHG emissions today will affect economic outcomes throughout the next several centuries.

In 2008, federal agencies began incorporating SC-$CO_2$ estimates into the analysis of their regulatory actions. U.S. EPA has used various models and discount rates to determine the value of future impacts. Generally, these models begin with assumptions to predict economic activity over time, along with projected GHG emissions. The modeled emissions are input into a model of the global climate system, which then translates into estimates of surface temperature, sea level rise, and other impacts. These outputs are used to estimate economic damages per ton of GHG emitted in a given year in the future. Since the models are calculating the present value of future damages, a discount rate is applied. For example, the SC-$CO_2$ for the year 2045 represents the value of climate change damages from a release of $CO_2$ in 2045 discounted back to today. The present value is significantly affected by the discount rate used; a higher discount rate results in a lower present value. For example, in 2021 dollars the SC-$CO_2$ in 2045 is $31 using a 5 percent discount rate, $88 using a 3 percent discount rate, and $122 using a 2.5 percent discount rate. Additional detail is included in Appendix C (AB 197 Measure Analysis).

The 2017 Scoping Plan utilized SC-$CO_2$ and SC-$CH_4$ Obama Administration-era values developed by the Council of Economic Advisors and the Office of Management and Budget-convened Interagency Working Group on the Social Cost of Greenhouse Gases (IWG)[235] to consider the social costs of actions to reduce GHG emissions. The Biden Administration reinstated these values in February 2021,[236] after they had been rescinded and significantly revised by the Trump Administration. The reinstatement was considered an interim step, and the Biden Administration also reconvened the IWG to continue its work to evaluate and incorporate the latest climate science and economic research and

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[234] U.S. Government. Interagency Working Group on Social Cost of Greenhouse Gases. February 2021. Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide – Interim Estimates under Executive Order 13990. *https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf*

[235] Originally titled the "Interagency Working Group on the Social Cost of Carbon," the IWG was renamed in 2016. 82 Fed. Reg. 16093, 16095-96 (Mar. 28, 2017). *https://www.govinfo.gov/content/pkg/FR-2017-03-31/pdf/2017-06576.pdf*.

[236] Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis, Executive Order 13990 (Jan. 20, 2021), 86 Fed. Reg. 7037 (Jan. 25, 2021). *https://www.energy.gov/sites/default/files/2021/02/f83/eo-13990-protecting-public-health-environment-restoring.pdf*. IWG, Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates Under Executive Order 13990 (February 2021), *https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf* See also, The White House. 2021. A Return to Science: Evidence-Based Estimates of the Benefits of Reducing Climate Pollution. *https://www.whitehouse.gov/cea/written-materials/2021/02/26/a-return-to-science-evidence-based-estimates-of-the-benefits-of-reducing-climate-pollution/*.

respond to the National Academies' recommendations from 2017 as it develops a more complete revision of the estimates.

It is important to note that the models used to produce SC-GHG estimates do not include all of the important physical, ecological, and economic impacts of climate change recognized in the climate literature. There are additional costs to society, including the costs associated with changes in co-pollutants and costs that cannot be included due to modeling and data limitations. The IWG has stated that the range of the interim SC-GHG estimates likely underestimates societal damages from GHG emissions.[237] The revised estimates were originally slated to be released in early 2022 but were stalled.[238] CARB staff is applying the interim values presented in the IWG February 2021 Technical Support Document (TSD), which reflect the best available science in the estimation of the socioeconomic impacts of GHGs.[239] This Scoping Plan utilizes the TSD standardized range of discount rates, from 2.5 to 5 percent, to represent varying valuation of future damages.

## AB 32 GHG Inventory Sectors

Table 3-9 presents the estimated social cost, in terms of avoided economic damages, for each measure of the Scoping Plan Scenario. For each measure, Table 3-9 includes the range of the SC-$CO_2$ and SC-$CH_4$ that results from the GHG emissions reductions in 2035 and 2045 at 2.5 and 5 percent discount rates. Additional background on the SC-GHG and methodology for calculating the SC-$CO_2$ and SC-$CH_4$ estimates in this Scoping Plan, as well as estimates for the alternatives, are provided in Appendix C (AB 197 Measure Analysis).

[237] Interagency Working Group on Social Cost of Greenhouse Gases. 2021. Technical Support Document. https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf

[238] See *Louisiana v. Biden* (W.D. La. 2022) 585 F.Supp.3d 840, stayed pending review (5th Cir. Mar. 16, 2022) 2022 WL 866282. A federal district court ruling issued in early February 2022 had granted a preliminary injunction blocking the Biden Administration from using the interim IWG SC-GHG estimates. However, a federal appeals court overturned the lower court's preliminary injunction in March 2022, which allows the Biden Administration to continue using the policy as legal proceedings continue. CARB will continue to monitor the litigation. However, the federal action does not prohibit CARB from using social cost of carbon and CARB will use the best available science regardless of politics. A separate federal appeals court upheld the Biden administration's use of the IWG SC-GHG estimates in October 2022. *Missouri v. Biden* (8th Cir. 2022) ____ F.4th ____.

[239] Interagency Working Group on Social Cost of Greenhouse Gases. 2021. Technical Support Document. https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf

**Table 3-9: Estimated social cost (avoided economic damages) of measures considered in the Scoping Plan Scenario (AB 32 GHG Inventory sectors)**

| Measure | Social Cost of Carbon in 2035, 5%–2.5% Discount Rate<br>Billion USD (2021 dollars) | Social Cost of Carbon in 2045, 5%–2.5% Discount Rate<br>Billion USD (2021 dollars) |
|---|---|---|
| **Deploy ZEVs and reduce driving demand** | 1.12–4.87 | 2.64–10.23 |
| **Coordinate supply of liquid fossil fuels with declining California fuel demand** | 0.61–2.63 | 0.95–3.67 |
| **Generate clean electricity** | 0.20-0.88 | 0.97–3.75 |
| **Decarbonize industrial energy supply** | 0.23–1.01 | 0.69–2.67 |
| **Decarbonize buildings** | 0.35–1.52 | 1.11–4.32 |
| **Reduce non-combustion emissions** | 0.51–1.29 (SC-$CH_4$) | 0.86–2.01 (SC-$CH_4$) |
| **Compensate for remaining emissions** | 0.61–2.66 | 2.03–7.84 |
| **Scoping Plan Scenario SC-$CO_2$** | 2.4–10.4 | 5.6–21.9 |
| **Scoping Plan Scenario SC-$CH_4$** | 0.51–1.3 | 0.86–2.0 |
| **Scoping Plan Scenario (Total)[a]** | 2.9–11.7 | 6.5–23.9 |

[a] CARB staff could not precisely separate some $CO_2$ and $CH_4$ from other GHGs from PATHWAYS outputs, but the contribution is believed to be small for purposes of calculating the social cost of carbon. The approach used to estimate GHG emissions reductions for individual measures in PATHWAYS does not reflect cross-sector interactions. Therefore, the GHG values for each measure do not sum to the overall scenario total. The total GHG emissions reduction used in this calculation is 97 $MMTCO_2e$ in 2035 and 180 $MMTCO_2e$ in 2045.

## Natural and Working Lands

The SC-$CO_2$ estimates for the NWL measures shown in Table 3-10, in terms of avoided economic damages, reflect 2021 IWG interim values, updated for inflation, similar to the AB 32 GHG Inventory Sector analysis. This analysis utilizes the 2.5 percent and 5 percent

discount rate and the average annual emissions reductions from each NWL type from 2025–2045. Estimates for all alternatives are included in Appendix C (AB 197 Measure Analysis).

**Table 3-10: Estimated social cost (avoided economic damages) of measures considered in the Scoping Plan Scenario (NWL)**

| Measure | Social Cost of Carbon in 2035, 5%–2.5% Discount Rate<br>Billion USD (2021 dollars) | Social Cost of Carbon in 2045, 5%–2.5% Discount Rate<br>Billion USD (2021 dollars) |
|---|---|---|
| **Forests/Shrublands/Grasslands** | 0.003–0.012 | 0.004–0.014 |
| **Annual Croplands** | 0.006–0.027 | 0.008–0.031 |
| **Perennial Croplands** | <0.001–0.001 | 0.000–0.001 |
| **Urban Forest** | 0.032–0.138 | 0.041–0.157 |
| **Wildland Urban Interface (WUI)** | (0.018) – (0.080)[a] | (0.023) – (0.090) |
| **Wetlands** | 0.011–0.046 | 0.014–0.053 |
| **Sparsely Vegetated Lands** | <0.001 | <0.001 |

[a] Parentheses indicate an increase in estimated social cost, i.e., an increase in economic damages. This is only the case for WUI measures where emissions are increased, shown in Table 3-6. The estimated social cost does not account for the decrease in wildfire risk or decrease in wildfire damages resulting from the WUI measures.

## Social Costs of GHGs in Relation to Cost-Effectiveness

AB 32 includes a requirement that rules and regulations "achieve the maximum technologically feasible and cost-effective" greenhouse gas emissions reductions.[240] Under AB 32, *cost-effectiveness* means the relative cost per metric ton of various GHG reduction strategies,[241] which is the traditional cost metric associated with emission control. In contrast, the SC-$CO_2$, SC-$CH_4$, and social cost of nitrous oxide (SC-$N_2O$), because they are estimates of the cost to society of additional GHG emissions, can be used to estimate of the economic benefits of reducing emissions, but do not take into account the cost of the actions that must be taken to achieve those GHG emissions reductions.

There may be technologies or policies that do not appear to be cost-effective when compared to the SC-$CO_2$, SC-$CH_4$, and SC-$N_2O$ associated with GHG reductions. However, these technologies or policies may result in other benefits that are not reflected in the IWG social costs. Examples include the evaluation of social diversification of the portfolio of transportation fuels (a goal outlined in the Low Carbon Fuel Standard) and reductions in criteria pollutant emissions from power plants (as in the Renewables Portfolio Standard). Additionally, costs for new technology may be higher early on in a technology's development cycle and may drop over time as use of the technology is scaled up.

## Estimated Cost per Metric Ton

AB 197 requires an estimation of the cost-effectiveness of the measures evaluated for this Scoping Plan. The cost (or savings)[242] per metric ton of $CO_2e$ reduced for each measure is one metric for comparing the performance of the measures. Additional factors beyond the cost per metric ton that could be considered include continuity with existing laws and policies, implementation feasibility, contribution to fuel diversity and technology transformation goals, and health and other benefits to California. These considerations are not reflected in the cost per metric ton estimates presented below. It is important to understand the relative cost-effectiveness of individual measures as presented in this section. However, the economic analysis presented earlier in this chapter, in Appendix H

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[240] AB 32 Air pollution: greenhouse gases: California Global Warming Solutions Act of 2006. (AB 32, Nuñez, Chapter 488, Statutes of 2006). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200520060AB32.

[241] Health & Saf. Code § 38505(d).

[242] Similarly, to the direct costs reported earlier, the cost per metric ton of a measure reflects the stock costs and any fuel or efficiency savings associated with a measure divided by the GHG emission reduction achieved by the measure. Costs are reported as positive values, and savings are reported as negative values.

(AB 32 GHG Inventory Sector Modeling), and in Appendix I (NWL Technical Support Document) provides a more comprehensive analysis of how the Scoping Plan Scenario and alternative scenarios affect the state's economy and jobs.

## AB 32 GHG Inventory Sectors

The cost per metric ton for the AB 32 GHG Inventory sectors was computed for each measure independently relative to the Reference Scenario using the sensitivity calculations based on PATHWAYS and RESOLVE outputs. The difference in the annualized cost between the Scoping Plan Scenario and the Reference Scenario was computed for each measure in 2035 and in 2045. The incremental cost was divided by the incremental GHG emissions impact to calculate the cost per metric ton in each year. To capture the fuel and GHG impacts of investments made from 2022 through 2035, or from 2022 through 2045, CARB computed an average annual cost per metric ton. The incremental cost in each year was averaged over the period. This value is divided by the corresponding annual, incremental GHG impact averaged over the same period.

The cost metric includes the annualized incremental cost of energy infrastructure, such as zero-emission vehicles, electric appliances, and required revenue to support all electric assets. A residual value for equipment such as vehicles or appliances that are retired early is included. The annual fuel cost or avoided fuel cost that results from efficiency improvements or changes to demand for fuels associated with transitioning to alternative fuels is included. Not included in this cost metric are costs that represent transfers within the state, such as incentive payments for early retirement of equipment.

It is important to note that this cost per metric ton does not represent an expected market price value for carbon mitigation associated with these measures. In addition, the values do not capture fuel savings or GHG reductions associated with the full economic lifetime of measures that have been implemented by the target date of 2035 or 2045 but whose impacts extend beyond the target date.

Table 3-11 includes the cost per metric ton and annual average cost per metric ton estimates for the Scoping Plan Scenario. The other alternatives are presented in Appendix C (AB 197 Measure Analysis). Measures that are relatively less costly in 2035 or 2045 are also less costly over the extended period. As noted earlier, incremental costs of new vehicles are generally offset by gains in efficiency and avoided fuel consumption resulting in negative cost per metric ton.

**Table 3-11: Estimated cost per metric ton of reduced $CO_2e$ relative to the Reference Scenario for measures considered in the Scoping Plan Scenario (AB 32 GHG Inventory sectors)**

| Measure | Annual Cost, 2035 ($/ton) | Average Annual Cost, 2022–2035 ($/ton) | Annual Cost, 2045 ($/ton) | Average Annual Cost, 2022–2045 ($/ton) |
|---|---|---|---|---|
| **Deploy ZEVs and reduce driving demand** | -171 | -99 | -103 | -122 |
| **Coordinate supply of liquid fossil fuels with declining CA fuel demand** | 60 | 109 | -50 | 39 |
| **Generate clean electricity[a]** | 101 | 156 | 145 | 161 |
| **Decarbonize industrial energy supply** | 290 | 217 | 257 | 274 |
| **Decarbonize buildings** | 235 | 230 | 112 | 213 |
| **Reduce non-combustion emissions** | 93 | 94 | 106 | 99 |
| **Compensate for remaining emissions** | 745 | 823 | 236 | 485 |

[a] Note: The denominator of this calculation (2045) does not include GHG reductions occurring outside of California resulting from SB 100. If these reductions were included, this number would be lower.

## Natural and Working Lands

The cost per metric ton for NWL measures were computed for the Scoping Plan Scenario relative to the Reference Scenario using the projected carbon stock/sequestration data from the NWL modeling and the direct cost estimates for each management action, described earlier. Direct costs represent the cost of implementing a certain management action. The projected emissions reductions take into account the loss of carbon that results from the management action, such as fuels reduction treatments in forests, as well as climate change effects on growth. The direct cost for each NWL measure was divided by the average annual emission reductions presented in Table 3-6 to produce the cost

per metric ton. The increasing effect of climate change on diminished future growth reduces the ability of the land to sequester or store carbon, driving up the cost per ton.

It is important to note that this cost per metric ton does not represent an expected market price value for carbon mitigation associated with these measures. In addition, emissions benefits of NWL management actions often take longer time periods to accrue, and these values only capture GHG reductions up to 2045.

Table 3-12 includes the average cost per metric ton estimates for the average annual $CO_2e$ reductions from 2025 through 2045 for the Scoping Plan Scenario. The other alternatives are presented in Appendix C (AB 197 Measure Analysis).

**Table 3-12: Estimated average cost per metric ton of reduced $CO_2e$ relative to the Reference Scenario for measures considered in the Scoping Plan Scenario (NWL)**

| Measure | Average Cost per Reduced Ton $CO_2e$ ($/Ton) |
|---|---|
| **Forests/Shrublands/Grasslands** | 15,500 |
| **Annual Croplands** | 1,100 |
| **Perennial Croplands** | 412 |
| **Urban Forest** | 3,270 |
| **Wildland Urban Interface (WUI)** | N/A |
| **Wetlands** | 64 |
| **Sparsely Vegetated Lands** | 451,000 |

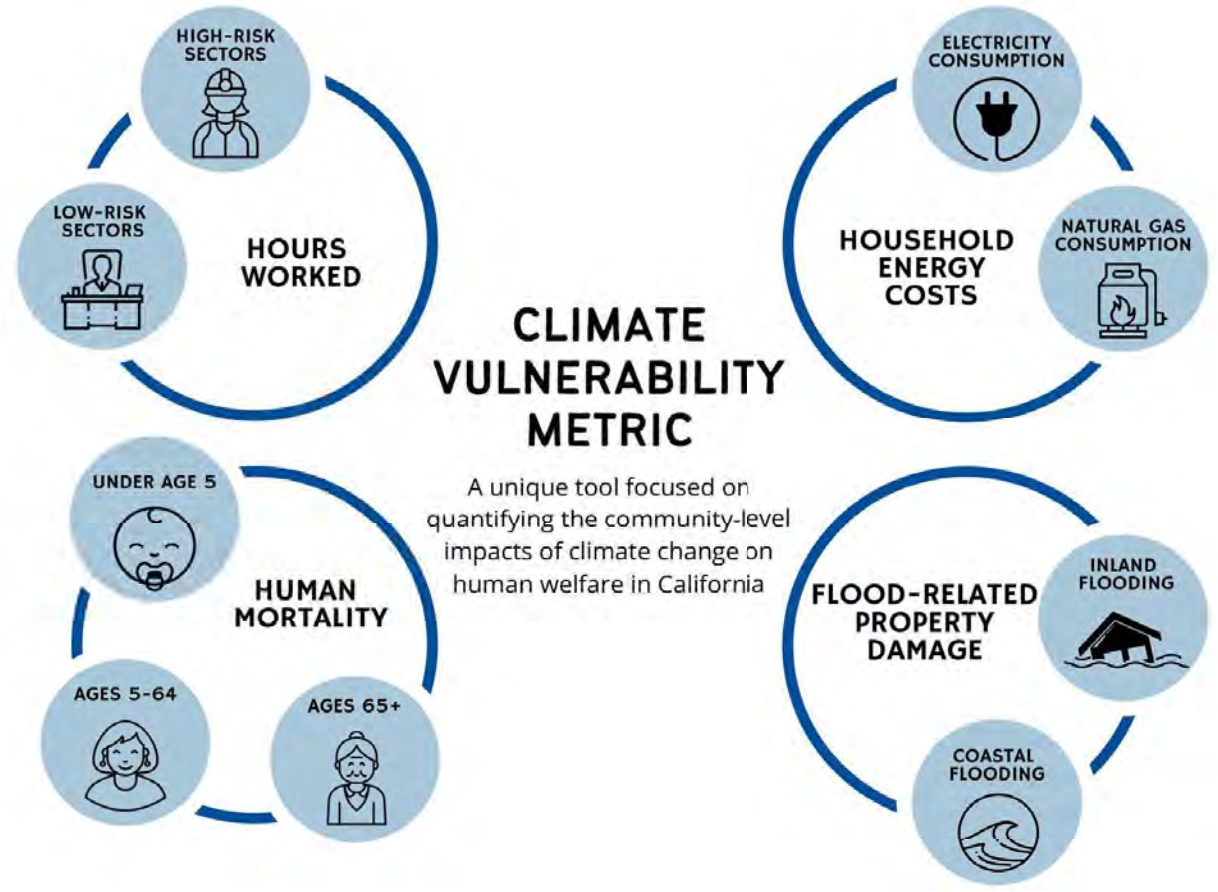
## Climate Vulnerability Metric

As California invests in climate mitigation and adaptation, it is essential to understand that the relative impact of climate change will vary across the state's communities. Due to persisting health and opportunity gaps, not all communities are equally resilient in the face of climate impacts. A global metric such as the Social Cost of Carbon cannot adequately capture the incremental additional economic impact faced by overly burdened communities. The Climate Vulnerability Metric (CVM) is specifically focused on quantifying the community-level impacts of a warming climate on human welfare and the additional costs. Additional details and results are included in Appendix K (Climate Vulnerability Metric).

The CVM aggregates the impacts of climate change that can be quantified at the census tract level using robust and currently available research. The CVM includes the projected impacts of climate change on human welfare across four categories (hours worked, household energy costs, human mortality, and flood-related property damage) through midcentury. The CVM identifies nine components of the four climate impacts as shown in Figure 3-9 and aggregates the data to generate a total CVM result for each census tract. To ensure that the CVM represents the diversity of California communities, it is reported as the aggregate monetized impact of climate change as a percentage of census tract-specific incomes.[243] For example, a CVM value of 3 implies that by 2050, a census tract is projected to experience human welfare impacts of climate change that amount to 3% of annual income in that tract.

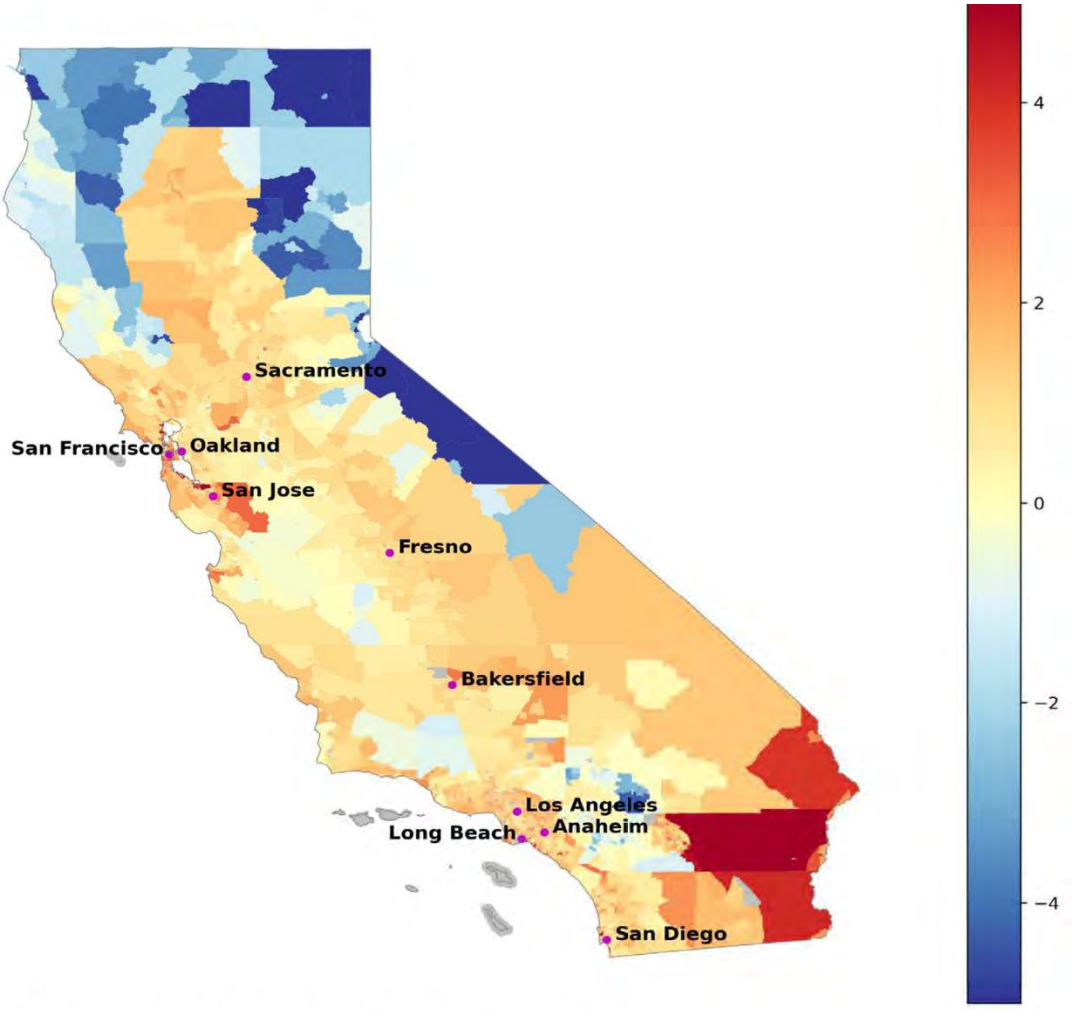
[243] Per capita income in 2019 for census tracts across California ranges from $633 to $176,388, with a median of $32,181 ($2019). Source: American Community Survey.

**Figure 3-9: Categories of climate change impacts on human welfare included in the Climate Vulnerability Metric.**




The CVM shows that climate change will have highly unequal impacts across California. While some southeastern regions of California are estimated to suffer damages that exceed 5% of annual income, other high-elevation northeastern regions of California are estimated to see benefits of up to 10%. Some low-lying urban areas, such as the San Francisco Bay Area, are estimated to be particularly vulnerable, while much of the Central Valley is estimated to suffer at least moderate economic damages relative to the rest of the state. It is important to note that the CVM does not set a threshold for vulnerability. Instead, it shows relative impacts across census tracts. The CVM is limited to the impacts that can currently be quantified at the census tract level.

**Figure 3-10: Combined impacts of climate change in 2050 under a moderate emissions scenario; damages as share of 2019 tract income (%)**




*The map shows combined impacts of climate change in 2050 under a moderate emissions scenario (RCP 4.5), reported as a share of 2019 census tract income. For example, a CVM value of 3 implies that by 2050, a census tract is projected to experience human welfare impacts of climate change that amount to 3% of annual income. Impacts are combined across the categories shown in Figure 3-9. The higher the CVM for a given census tract, the more damaging the projected impacts of climate change on human welfare. Census tracts with high CVMs are represented by positive percentages in orange and red. A lower CVM is associated with lower projected impacts of climate change, shown in yellow, while a negative CVM value represents a projected beneficial impact of climate change (e.g., through reductions in deaths caused by extremely cold winter weather). Negative CVMs are represented by negative percentages in blue.*

By providing information about how climate vulnerability varies across California (Figure 3-10), the CVM results can be used to direct resources to enhance resiliency in the state's

most vulnerable communities based on the specific impacts, such as heat or flooding, they are experiencing. The CVM may be used in combination with existing screening tools, such as CalEnviroScreen 4.0, to identify communities that face environmental and health hazards that contribute to disproportionate economic impacts in addition to climate vulnerability. The CVM can become an essential source of information to implement this Scoping Plan and build a more resilient, just, and equitable future for all communities.

# Public Health

## Health Analysis Overview

This section focuses on a broader evaluation of public health and climate change. Science demonstrates that taking action to address climate change presents one of the most significant opportunities to improve public health outcomes.[244] Transitioning to clean energy and technology and improving land and ecosystem management will lead to a much healthier future. Many actions to reduce GHG emissions also have health co-benefits that can improve the health and well-being of populations across the state, as well as address climate change. This section and the accompanying Appendix G (Public Health) provide a qualitative analysis of health benefits to accompany the quantitative health analysis included in this chapter, in Appendix C (AB 197 Measure Analysis), and in Appendix H (AB 32 GHG Inventory Sector Modeling). Together the qualitative and quantitative analyses of benefits are demonstrating the many ways that climate action and health improvements go hand in hand.

Climate change can lead to a wide range of direct health impacts such as increased heat-related illnesses (i.e., heat exhaustion and heat stroke), and injuries and deaths from extreme weather events or disasters (e.g., severe storms, flooding, wildfires). Indirect impacts include:

- more air pollution-related exacerbations of cardiovascular and respiratory diseases (e.g., due to increased smog, wildfire smoke)
- increased vector-borne and fungal diseases due to changes in the distribution and geographic range of disease-carrying species (e.g., mosquitoes, ticks, fungi in dust)
- negative nutritional consequences related to decreases in agricultural food yields
- stress and mental trauma due to extreme weather-related catastrophes
- anxiety, depression, and other mental health impacts associated with gradual changes in the climate (e.g., prolonged drought or temperature shifts affecting jobs and industries) that result in unemployment and income loss

[244] Watts, N., W. N. Adger, P. Agnolucci, et al. 2015. “Health and climate change: Policy responses to protect public health.” *Lancet* 386, 1861–1914.

- residential displacement and home loss (e.g., sea level rise impacting coastal communities)

Wildfires and wildfire smoke are one area where we have already seen and expect to see even further drastic impacts on the health of Californians. According to CalFire, since 1932 the top eight largest wildfires in California have occurred in the past five years (2017–2022), with 151 deaths due directly to fires during that period.[245] Researchers estimate that wildfire smoke during fall 2020 may have led to as many as 3,000 excess deaths, with at least 95% of Californians suffering unhealthy levels of particle pollution due to wildfires in 2020.[246] Continued climate change is projected to further increase smoke exposure from wildfires through the end of the century.[247] Wildfires also create a high-risk environment for outdoor workers, including agricultural workers. While the direct medical and physical health impacts are often most noticeable, the psychological impacts can develop and persist well after the event. Estimates indicate that 20%–65% of survivors of extreme weather events have mental health issues following the event.[248]

Extreme heat, drought, and associated worsened air quality impacts are among the most serious climate-related exposures affecting the health of Californians. Numerous studies find a wide range of adverse health effects accompanying extreme heat, including heat stroke and adverse birth outcomes, and find that extreme heat can harm most body systems. Climate change exacerbates air pollution problems that cause difficulty breathing and can lead to serious illness and death in many parts of California. Increasing temperatures cause increases in ozone and other pollution concentrations, including for California's most polluted regions, and heighten health risks for the vulnerable and marginalized populations living in these areas.[249] In 2020, there were 157 ozone polluted days across Los Angeles, Orange, Riverside, and San Bernardino Counties—the most days since 1997. In addition, particulate matter exposure is a heightened problem during

[245] California Department of Forestry and Fire Protection (CAL FIRE). "Stats and Events." *Cal Fire Department of Forestry and Fire Protection*, https://www.fire.ca.gov/stats-events/.
[246] G-FEED. 2020. Indirect mortality from recent wildfires in CA. *http://www.g-feed.com/2020/09/indirect-mortality-from-recent.html*.
[247] M. D. Hurteau, A. L. Westerling, C. Wiedinmyer, and B. P. Bryant. 2014. "Projected effects of climate and development on California wildfire emissions through 2100." *Environ. Sci. Technol.* 48, 2298–2304.
[248] American Public Health Association. 2019. Addressing the Impacts of Climate Change on Mental Health and Well-Being. Policy No: 20196. *https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2020/01/13/addressing-the-impacts-of-climate-change-on-mental-health-and-well-being*.
[249] American Lung Association. State of the Air 2021. *https://www.lung.org/research/sota*.

droughts, which are expected to increase over this century.[250,251] Worse air quality leads to illnesses, emergency room visits, and hospitalizations for chronic health conditions, including chronic obstructive pulmonary disease (COPD), asthma, chronic bronchitis, and other respiratory and cardiovascular conditions, as well as increased risk for respiratory infections, which all result in greater health costs to the state.[252,253,254] These and other climate-related health impacts are discussed in more detail in Appendix G (Public Health).

## Health Analysis Components

This Scoping Plan health analysis focuses on the contrast between a California that is still dependent on a fossil fuel-based economy and a California that is transitioned to a carbon-neutral, clean energy future. This qualitative analysis evaluates and demonstrates the broad range of benefits of a dramatic reduction in fossil fuels by 2045 combined with healthier ecosystem management, comparing health outcomes for a "no-action" scenario (Reference) to a "take-action" decarbonization scenario. As this is a qualitative analysis, it looks more broadly at the public health benefits of a drastic reduction in fossil fuel combustion. While this analysis provides scientific evidence for Scoping Plan benefits based on achieving carbon neutrality by 2045, it does not analyze a specific scenario.

The key areas of focus for the analysis are: heat impacts, children's health and development, economic security, food security, mobility and physical activity, urban greening, wildfires and smoke impacts, and housing affordability. For each area of focus, the analysis covers the scientific evidence and compares expected health effects between the Reference and decarbonization scenarios. This analysis looks at the major health outcomes, provides directional effects for each health outcome, and where possible provides information on the strength and scale of health impacts. Some areas include quantitative information where tools are available to measure health outcomes. While the analysis is focused on health outcomes statewide, it also includes discussion

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[250] Cvijanovic, I., B. D. Santer, C. Bonfils, et al. 2017. "Future Loss of Arctic Sea-ice Cover Could Drive a Substantial Decrease in California's Rainfall." 8 *Nat. Commun.* 1947. https://doi.org/10.1038/s41467-017-01907-4.

[251] Williams, A. P., R. Seager, J. T. Abatzoglou, B. I. Cook, J. E. Smerdon, and E. R. Cook. 2015. "Contribution of anthropogenic warming to California drought during 2012–2014." *Geophysical Research Letters* 42(16), 6819–6828.

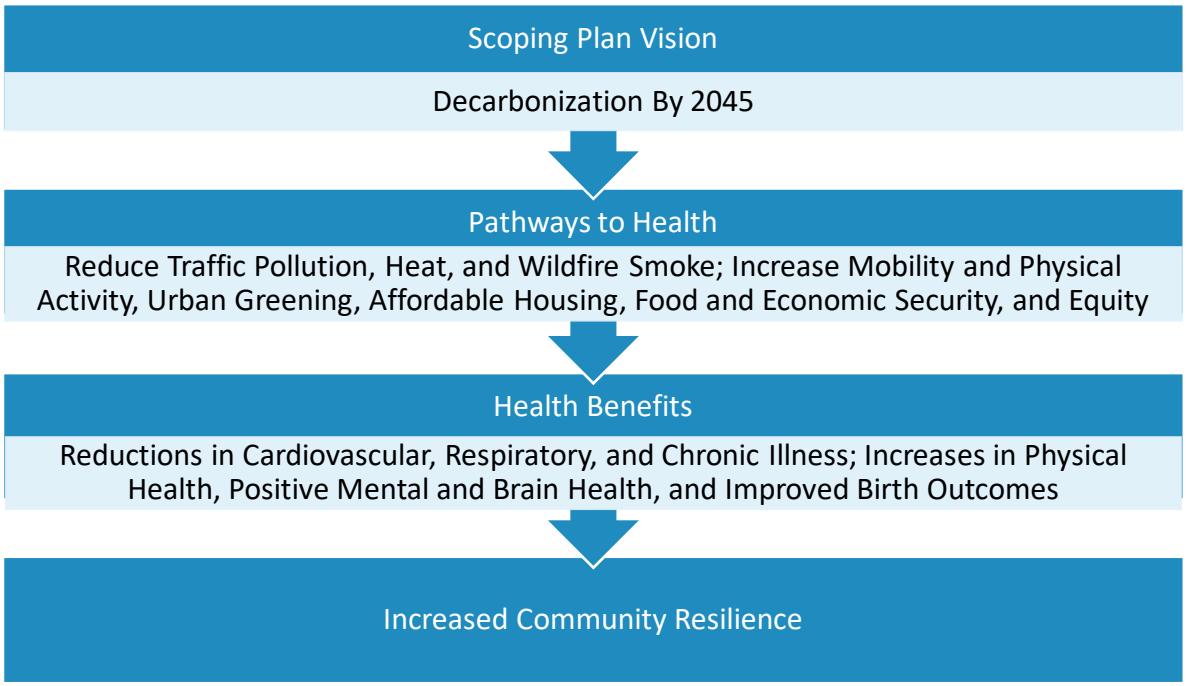
[252] Romley, J. A., A. Hackbarth, and D. P. Goldman. 2010. Cost and Health Consequences of Air Pollution in California. Santa Monica, California. RAND Corp. https://www.rand.org/pubs/research_briefs/RB9501.html.

[253] Wang, M., C. P. Aaron, J. Madrigano, E. A. Hoffman, E. Angelini, J. Yang, A. Laine, et al. 2019. "Association between long-term exposure to ambient air pollution and change in quantitatively assessed emphysema and lung function." *JAMA* 322(6), 546–556.

[254] Inserro, A. 2018. "Air Pollution Linked to Lung Infections, Especially in Young Children." *Am. J. Managed Care* (May 6). https://www.ajmc.com/view/air-pollution-linked-to-lung-infections-especially-in-young-children.

of benefits to community health and climate resilience, as well as potential inequities experienced at a community level. Figure 3-11 shows the co-benefit areas covered in this Scoping Plan and the path to health improvements and increased community resilience.

**Figure 3-11: Scoping Plan outcome and the path to health improvements**

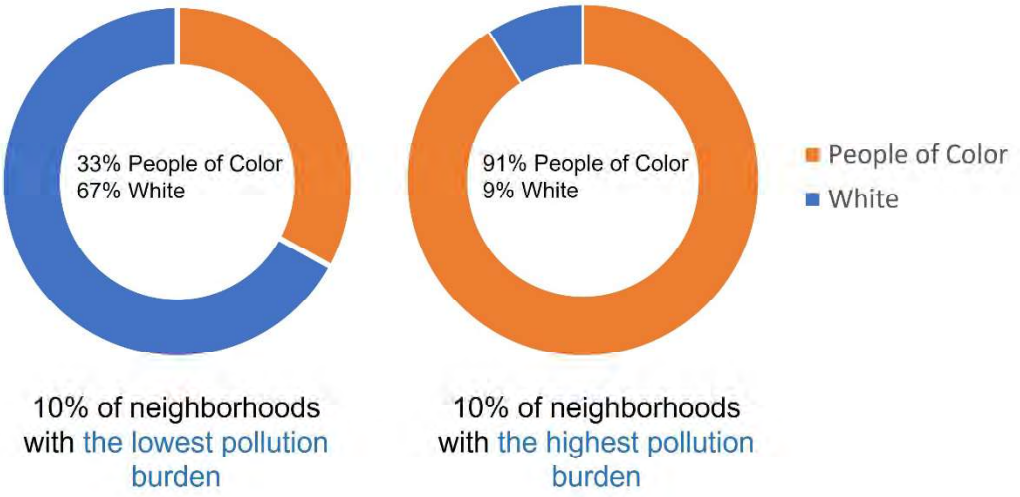


## Social and Environmental Determinants of Health Inequities

Communities across the state do not experience exposure to pollution sources and the resulting effects equally. Low-income communities and communities of color (including Black, Latino and Indigenous communities) consistently experience significantly higher rates of pollution and adverse health conditions than others due to factors including historic marginalization rooted in systemic racism. As shown in Figure 3-12, the most impacted neighborhoods according to CalEnviroScreen (CES) are home to very high percentages of people of color while the least impacted neighborhoods are predominantly white. Recent findings show that Black Californians have 19% higher $PM_{2.5}$ exposure from vehicle emissions than the state average, and the census tracts with the highest $PM_{2.5}$ pollution burden from vehicle emissions have a high proportion of people of color.[255] Air pollutant emissions from mobile sources have disproportionate impacts on low-income communities and communities of color due to their proximity.[256] Diesel-fueled vehicles traveling on California's freeways and major roads expose nearby residents to pollution that is linked to lung cancer, hospitalizations and emergency department visits for chronic heart and lung disease, and premature death.[257,258] A combination of historical and social inequities are evident in communities of color disproportionately living close to freeways and other major sources of vehicle pollution. Environmental exposures and contaminants are one component of a broader set of social, economic, and environmental factors that can amplify health conditions, and the combination of all these factors can compound the health effects of individual exposures. This broader set of community factors can be referred to as "cumulative impacts." In addition, specific populations are more sensitive to pollution and face greater susceptibility. This includes young children, older adults, and individuals with existing health conditions.

[255] Reichmuth, D. 2019. *Inequitable exposure to air pollution from vehicles in California.* https://www.ucsusa.org/resources/inequitable-exposure-air-pollution-vehicles-california-2019.
[256] CARB. 2017. *California's 2017 climate change scoping plan.* https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf.
[257] CARB. 2020. Overview: Diesel exhaust & health. https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health.
[258] Kagawa, J. 2002. "Health effects of diesel exhaust emissions—a mixture of air pollutants of worldwide concern." *Toxicology* 181–182:349–353.

**Figure 3-12: Least and most impacted neighborhoods from CalEnviroScreen[259]**




### Social Determinants of Health Inequities

The physical and mental health of individuals and communities is shaped, to a great extent, by the social, economic, and environmental circumstances in which people live, work, play, and learn. According to the World Health Organization, these same circumstances—or social determinants of health—are "mostly responsible for health inequities: the unfair and avoidable differences in health status seen within and between countries." In fact, a strong body of research demonstrates that more than 50 percent of long-term health outcomes are the result of social determinants affecting an individual.[260] Race/ethnicity and socioeconomic status, for example, have been found to amplify impacts from long- and short-term environmental exposures for several health outcomes,

[259] The figure represents the top and bottom decile scoring of CalEnviroScreen census tracts for pollution burden. This chart is modified from Figure 2. Race in the Least and Most Impacted Census Tracts of CalEnviroScreen 4.0 in the Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. Analysis of Race/Ethnicity and CalEnviroScreen 4.0 Scores. 2021. https://oehha.ca.gov/media/downloads/calenviroscreen/document/calenviroscreen40raceanalysisf2021.pdf.

[260] California Department of Public Health (CDPH). 2015. *The Portrait of Promise: The California Statewide Plan to Promote Health and Mental Health Equity.* A Report to the Legislature and the People of California by the Office of Health Equity. Sacramento, California. California Department of Public Health, Office of Health Equity.

such as mortality and birth outcomes.[261,262,263,264] Social factors combine in low-income communities and communities of color to create levels of toxic chronic stress and limit opportunities for healthy food and healthy lifestyles. Social factors also can cause health disparities through psychosocial pathways such as discrimination and social exclusion.[265] While the importance of social determinants is well known, measuring the specific and cumulative impacts of social determinants is challenging.

There are several important tools to evaluate and map cumulative impacts and factors contributing to the results of historical practices such as redlining, and these tools have been used for air quality and climate planning, community protection, and investments. CalEnviroScreen is a tool that maps cumulative pollution burdens and vulnerabilities on a statewide basis and ranks census tracts based on environmental, exposure, population, and socioeconomic indicators. An analysis using CES shows a direct, persistent relationship between exposure to environmental burdens and socioeconomic and health vulnerabilities affecting communities of color and historical redlining practices. OEHHA has evaluated health impacts of certain climate change policies on disadvantaged communities and communities of color utilizing CES rankings.[266] The Healthy Places Index (HPI) maps indicators that affect life expectancy on a statewide basis. In the future, these and other tools can be helpful to prioritizing investments and informing implementation efforts for GHG emission reductions policies.

## Environmental Determinants of Health Inequities

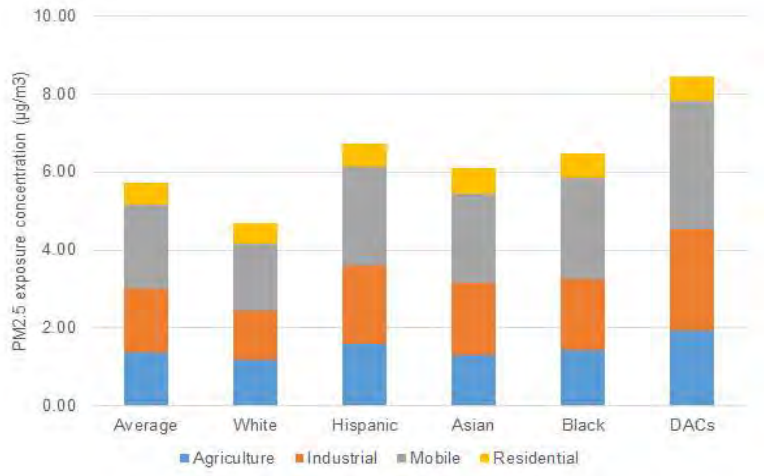
Communities with large percentages of Black and other socially vulnerable and marginalized groups are disproportionately located near pollution sources, such as traffic

[261] O'Neill, M. S., M. Jerrett, I. Kawachi, J. I. Levy, A. J. Cohen, N. Gouveia, et al. 2003. "Health, wealth, and air pollution: Advancing theory and methods." *Environ Health Perspect.* 111 (16): 1861–70.
[262] Ponce, N. A., K. J. Hoggatt, M. Wilhelm, and B. Ritz. 2005. "Preterm birth: The interaction of traffic-related air pollution with economic hardship in Los Angeles neighborhoods." *Am J Epidemiol.* 162 (2): 140–8.
[263] Morello-Frosch, R., B. Jesdale, J. Sadd, and M. Pastor. 2010. "Ambient air pollution exposure and full-term birth weight in California." *Environ Health.* 9: 44.
[264] Finkelstein, M. M., M. Jerrett, P. DeLuca, N. Finkelstein, D. K. Verma, K. Chapman, et al. 2003. "Relation between income, air pollution, and mortality: A cohort study." *CMAJ.* 169 (5): 397–402.
[265] Clougherty, J., and L. Kubzansky. 2009. "A framework for examining social stress and susceptibility in air pollution and respiratory health." *Environ Health Perspect.* 117 ( 9 ): 1351–8.
[266] OEHHA. 2022. *Impacts of Greenhouse Gas Emission Limits Within Disadvantaged Communities.* https://oehha.ca.gov/media/downloads/environmental-justice//impactsofghgpoliciesreport020322.pdf.

and freight facilities, industrial facilities, and hazardous waste sites.[267,268,269,270] Research shows large disparities in exposure to pollution between white and non-white populations in California, and between low-income and communities of color (Figure 3-13). The research also shows Black and Latino populations experience significantly greater air pollution impacts than white populations in California.[271] Additionally, Native Americans are disproportionately impacted by air pollution with high rates of exposure to industrial, diesel, and residential pollution sources and higher rates of diseases linked to air pollution.[272, 273]

[267] Mohai. P., P. M. Lanz, J. Morenoff, J. S. House, and R. P. Mero. 2009. "Racial and socioeconomic disparities in residential proximity to polluting industrial facilities: Evidence from the Americans' Changing Lives Study." *Am J Public Health.* 99 (Suppl 3): S649–56.
[268] Mohai, P., and R. Saha. 2007. "Racial inequality in the distribution of hazardous waste: A national-level reassessment." *Soc Probl.* 54 (3): 343–70.
[269] Morello-Frosch, R., M. Pastor, C. Porras, and J. Sadd. 2002. "Environmental justice and regional inequality in southern California: Implications for future research." *Environ Health Perspect.* 110 (Suppl 2): 149–54.
[270] Gunier, R. B., A. Hertz, J. von Behren, and P. Reynolds. 2003. "Traffic density in California: Socioeconomic and ethnic differences among potentially exposed children. *J Expo Anal Environ Epidemiol.* 13 (3): 240–6.
[271] Apte, J. S., S. E. Chambliss, C. W. Tessum, and J. D. Marshall. 2019. *A Method to Prioritize Sources for Reducing High $PM_{2.5}$ Exposures in Environmental Justice Communities in California.* CARB Research Contract Number 17RD006.
[272] Indigenous People and Air Pollution in the United States. A Report from the National Tribal Air Association and Moms Clean Air Force. 2021. *https://7vv611.a2cdn1.secureserver.net/wp-content/uploads/2021/04/indigenousairpollution_041421.pdf*
[273] National Tribal Air Association. 2022. Status of Tribal Air Report. Pg. 66. *https://7vv611.a2cdn1.secureserver.net/wp-content/uploads/2022/10/2022-NTAA-Status-of-Tribal-Air-Report.pdf*.

**Figure 3-13: Top sources of $PM_{2.5}$ and their contribution to $PM_{2.5}$ exposures by race and in disadvantaged communities**




These disparities in exposure to pollution sources generate health inequities. Communities located near major roadways are at increased risk of asthma attacks and other respiratory and cardiac effects. Studies consistently show that mobile source pollution exposure near major roadways or freight sources contributes to and exacerbates asthma, impairs lung function, and increases cardiovascular mortality.[274] The exposure to mixtures of gaseous and particulate pollutants in mobile sources (including PM, $NO_x$, and benzene) is associated with higher rates of heart attacks, strokes, lung cancer, autism, and dementia.[275]

Environmental hazards found in communities also can include exposures to toxic substances and emissions, as well as occupational exposures. Due to historical inequities, under-resourced communities and communities of color are often located close to sources of toxic pollution, including chrome platers; metal recycling facilities; oil and gas operations; agricultural burning; railyards; facilities transporting, managing, or disposing of hazardous waste; and areas impacted by pesticides, among others. Some populations may be at increased risk of exposure to pollutants, both at work and home.

Children are more susceptible to environmental pollutants for many reasons, including the ongoing development of their nervous, immune, digestive, and other bodily systems. Moreover, children eat more food, drink more fluids, and breathe more air relative to their

[274] U.S. Environmental Protection Agency website. How Mobile Source Pollution Effects Your Health. https://www.epa.gov/mobile-source-pollution/how-mobile-source-pollution-affects-your-health.
[275] USC Environmental Health Centers. 2018. Living Near Busy Roads or Traffic Pollution. https://envhealthcenters.usc.edu/wp-content/uploads/2016/10/living-near-bus_19696172.pdf.

body weight, as compared to adults.[276] Exposure to high levels of air pollutants, including indoor air pollutants, increases the risk of respiratory infections, heart disease, and asthma.[277] Children living in low-income communities near industrial operations, rail yards, and heavily trafficked freeways and streets in urban areas are at especially high risk of chronic respiratory conditions. Black children are four times more likely to be hospitalized for asthma compared with white children, and urban Black and Latino children are two to six times more likely to die from asthma than white children.[278] Native American children also experience more impacts from asthma and Native American children, along with Black children, have the highest prevalence of asthma.[279]

For older adults, increased vulnerability is linked to respiratory, cardiovascular, and immune systems weakened by aging.[280] Preexisting health conditions interact with environmental pollutants to enhance risks of adverse health outcomes.[281,282] The recent COVID-19 pandemic has highlighted the heightened vulnerability of older adults as well as communities of color to respiratory disease, as hospital admissions and mortality data linked to COVID-19 cases for these groups have been higher than other groups. Research has also underscored the important link between COVID-19 mortality and morbidity and air pollution, demonstrating significantly higher mortality and morbidity for COVID-19 in areas of elevated $PM_{2.5}$ pollution.

## Climate Vulnerabilities

Climate change is expected to exacerbate the existing disparities of health conditions and worsen climate vulnerability, which is the degree to which natural systems and people or

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[276] Blaisdell, R. J. Air Toxics Hot Spots Program Risk Assessment Guidelines. 2012. Technical Support Document for Exposure Assessment and Stochastic Analysis. Oakland, California: California Environmental Protection Agency, Office of Environmental Health Hazard Assessment. August.
[277] Woodruff, T. J., D. A. Axelrad, A. D. Kyle, O. Nweke, and G. G. Miller. 2003. *America's Children and the Environment: Measures of Contaminants, Body Burdens, and Illness.* 2nd ed. Washington, D.C.: United States Environmental Protection Agency. February.
[278] California Department of Public Health. Asthma Inequities in California Children. 2021. https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHIB/CPE/CDPH%20Document%20Library/CA_Asthma_Inequities_Children_2021-Infographic.pdf.
[279] Meng, Y., S. H. Babey, T. A. Hastert, and E. Brown. 2007. California's Racial and Ethnic Minorities More Adversely Affected by Asthma. UCLA: Center for Health Policy Research. Retrieved from https://escholarship.org/uc/item/4k45v3xt.
[280] Sandström, T., A. J. Frew, M. Svartengren, and G. Viegi. 2003. "The need for a focus on air pollution research in the elderly." *Eur Respir J Suppl.* 40: 92s–5s.
[281] Zanobetti, A., and J. Schwartz. 2001. "Are diabetics more susceptible to the health effects of airborne particles?" *Am J Respir Crit Care Med.* 164 (5): 831–3. https://www.atsjournals.org/doi/pdf/10.1164/ajrccm.164.5.2012039.
[282] Zanobetti, A., J. Schwartz, and D. Gold. 2000. "Are there sensitive subgroups for the effects of airborne particles?" *Environ Health Perspect.* 108 (9): 841–5.

communities are at risk of experiencing the negative impacts of climate change.[283] A report from the California Climate Change Center warned that the impacts of climate change will likely create especially heavy burdens on low-income and other vulnerable populations: "*Without proactive policies to address these equity concerns, climate change will likely reinforce and amplify current as well as future socioeconomic disparities, leaving low-income, minority, and politically marginalized groups with fewer economic opportunities and more environmental and health burdens*."[284]

In the U.S. Environmental Protection Agency's "Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts,"[285] investigators analyzed risks of six primary climate change impacts disproportionately affecting communities across income, educational attainment, race/ethnicity, and age groups. Four socially vulnerable populations—low income, communities of color, no high school diploma, and age 65 and older—were identified as having a higher likelihood of experiencing the greatest impacts of a changing climate (according to the projected 2°C of global warming or 50 centimeters of global sea level rise). Disproportionate impacts were projected for climate events, including air quality, extreme temperature, coastal flooding, and other impacts, leading to increased risk of health and other adverse outcomes. The study projected significant health impacts for low-income communities, certain racial and ethnic subgroups, and those with lower educational attainment.

Several climate vulnerability tools have been developed or are under development to better understand and map areas at higher risk of climate impacts. The Climate Change and Health Vulnerability Indicators (CCHVIs) for California helps state and local health officials prepare for and reduce adverse health impacts due to a changing climate.[286] For example, Los Angeles County shows higher than state average climate vulnerability overall, particularly for those who are linguistically isolated (more than twice the state average).

In summary, there are many environmental, social, individual, and economic factors affecting health and equity in California and contributing to worsening health outcomes from climate change impacts. This section and Appendix G (Public Health) reference a substantial and growing body of research documenting the different social and

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[283] OPR. 2018. Defining Vulnerable Communities in the Context of Climate Adaptation. *https://opr.ca.gov/docs/20180723-Vulnerable_Communities.pdf*.

[284] Shonkoff, S., R. Morello-Frosch, M. Pastor, and J. Sadd. 2011. "The climate gap: environmental health and equity implications of climate change and mitigation policies in California—A review of the literature." *Climatic Change* 109 (Suppl 1): S485–S503.

[285] U.S. EPA. 2021. Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts. U.S. Environmental Protection Agency. EPA 430-R-21-003.

[286] CDPH. 2022. Climate Change and Health Vulnerability Indicators for California. California Department of Public Health. *https://www.cdph.ca.gov/Programs/OHE/Pages/CC-Health-Vulnerability-Indicators.aspx*.

environmental factors affecting health outcomes and the many groups that are vulnerable to increased effects or that experience health inequities in California (see Table 3-13).

**Table 3-13: Examples of vulnerable groups due to socioeconomic, environmental, developmental, and climate change factors**

| Examples of Vulnerable Groups Due to Socioeconomic, Environmental, Developmental, and Climate Change Factors | | |
|---|---|---|
| Older People | People with Existing Chronic Illness | People Impacted Due to Working Conditions |
| Tribal Groups | Infants and Children | Low-Income People |
| People with Disabilities | People Experiencing Homelessness | Pregnant People |
| Communities of Color | Marginalized People | Immigrants/Refugees |
| People with Less Educational Options | Linguistically Isolated Households | People Impacted Due to Poor Housing Conditions |

## Summary of the Qualitative Health Analysis

CARB has developed a detailed health analysis that covers eight social and environmental co-benefit areas that impact public health (listed below). These co-benefit areas were selected due to ongoing research in these areas as well as discussion in a public workshop on climate change and health impacts held in summer 2018. For each social and environmental area, the analysis includes:

- a discussion of health impacts and disparities,
- key health metrics or epidemiological research on this topic,
- a discussion of how these areas would be affected by "no-action" (i.e., Reference) scenario compared to a "take-action" (i.e., Scoping Plan) scenario
- a discussion of where there are actions to consider for further success, and
- the types of mitigation actions that can help reduce or eliminate disparities and promote greater health equity and resilience.

All co-benefit areas are interconnected, and pursuing benefits in all areas has the potential to multiply positive results and further support building community resilience. *Community resilience* is the ability of a community to reduce harm and maintain an acceptable quality of life in the face of climate-induced stresses, which vary depending on that community's circumstances and location. Below is a brief description of the areas evaluated for public health co-benefits. The specific health outcomes impacted by each

area, as well as the directional health benefits, are included in the Summary of Health Benefits section of the chapter and covered in more detail in Appendix G (Public Health).

## Heat Impacts

Globally, increased GHG concentrations in the atmosphere are causing a continuing increase of the planet's average temperature. California temperatures have risen since records began in 1895, and the rate of increase is accelerating. Recent heat waves have broken heat records and caused serious illness across the state, and these events are becoming more frequent. Heat waves have a particularly high impact in Southern California, where they have become more intense and longer lasting. In the past two years, Los Angeles recorded 121°F, and the Coachella Valley had its hottest year ever, with temperatures reaching 123°F. Heat island effects in urbanized areas can elevate heat effects and disproportionately affect low-income communities and communities of color. Heat events exacerbate respiratory and cardiac illness and cause emergency room visits to soar. Strategies that reduce the impacts of heat exposure promote improved health outcomes.

## Wildfires and Smoke

California's NWL cover more than 90 percent of California and include rangeland, forests, woodlands, grasslands, and urban green space. They provide biodiversity and ecosystem benefits, including their ability to sequester carbon from the atmosphere. Protecting and managing California's forests and other natural lands and maintaining their ecosystem health are key practices for maximizing GHG benefits and minimizing negative climate change impacts. Vegetation plays an important role in storing carbon; however, it can also release $CO_2$ back into the atmosphere when it dies or is burned by fires. California's wildfires are getting worse with increased fire risks, higher frequency of occurrence, larger burn areas, more costly damage, and a longer fire season due to climate change. Strategies that promote healthy ecosystem management of natural and working lands and increased urban greening promote improved health outcomes. Healthy ecosystems provide many health and environmental benefits and can maximize carbon sequestration.

## Children's Health and Development

There are a wide range of interconnected environmental, social, biological, and community factors associated with climate change that are adversely affecting children's health. This section focuses on air pollution and near-roadway or traffic pollution as environmental impacts that have a profound effect on children's health. Children's bodies and lungs are still developing, and they take in more air per body weight than adults do. Many low-income communities and communities of color in California experience disproportionately high levels of air pollution, as well as high levels of traffic and freight that impact children. This excess exposure harms children's development and

predisposes them to increased risk of illness throughout their lives. Strategies that reduce air pollution and traffic emissions promote improved health outcomes for children.

## Economic Security

Climate change is expected to result in serious adverse socioeconomic effects across many sectors. Economic factors, such as income inequality (among geographic regions), poverty, wealth, debt, unemployment rate, and job security are among the strongest determinants of health. Along the entire income spectrum, higher income is associated with increased life expectancy and improved health outcomes in the United States. Additionally, economic insecurity and negative health impacts are more pronounced in low-income communities and communities of color. Economic strategies, such as the promotion of clean energy and other green jobs and investments in low-income communities and communities of color, and promoting a transition to high road jobs in economic sectors tied to the current fossil fuel economy, can promote improved health outcomes.[287]

## Food Security

The food system is under pressure from numerous factors, and climate change is a key concern. Climate change can affect food production and agricultural yield, impact culturally significant plants and animals for Native American tribes, and exacerbate factors that limit food availability, such as supply chain disruption. Food security is defined as stable access to affordable, sufficient food for an active, healthy life. Many Californians routinely experience food insecurity, and while that impacts Californians of all races and groups, low-income communities and communities of color and children are disproportionately affected by food insecurity. Many Native Americans depend on resources from the land, such as animals and plants for consumption and cultural practices. Strategies that promote sustainable agriculture, access to healthy foods, and reduced organic food waste promote improved health outcomes.

## Mobility and Physical Activity

Physical activity is one of the most important factors for a healthy lifestyle, and lack of activity increases the risk of chronic illness and premature death. Research shows that regular physical activity improves health in people of all ages by improving heart and lung

[287] According to the California Labor and Workforce Development Agency's High Road Training Partnership program, high road jobs are considered "Quality jobs [that] provide family-sustaining wages, health benefits, a pension, worker advancement opportunities, and collective worker input and are stable, predictable, safe and free of discrimination." *https://cwdb.ca.gov/wp-content/uploads/sites/43/2020/08/OneSheet_Job-Quality_ACCESSIBLE.pdf*.

function, muscle fitness, mental health and brain function, and sleep quality. A sedentary lifestyle contributes to chronic illnesses, including obesity, heart disease, and Type 2 diabetes among other chronic illnesses. Promoting community design that supports sustainable patterns of land use and transportation enables active transportation choices like walking, biking, and public transit over driving, and can significantly increase physical activity, leading to many valuable health benefits.

## Affordable Housing

Housing is an important social determinant of health. The stability of housing, housing quality, conditions inside and outside the home, the cost of housing, and the environmental and social characteristics of the places people live all affect health (including energy efficiency and insulation, cooler building material, tree canopy, home size). Housing affordability is a key factor, and this section highlights how housing affordability supports not only improved health but also more sustainable land use and transportation patterns. A lack of affordable housing is increasing commute distances for low-income renters and creating health burdens. Strategies that support sustainable transportation and housing patterns, together with increased housing affordability, promote improved health outcomes.

## Urban Greening

Urban Greening is well recognized as an important amenity, but the inherent health benefits are not always well understood. Under-resourced and vulnerable areas consistently show a lack of urban greening and higher percentages of concrete, asphalt, and impervious surfaces. Under-resourced communities have a greater proportion of concrete and heat-trapping surfaces and a lower amount of tree cover in the neighborhoods in which they live. Areas with reduced urban greening have the potential to create areas of higher temperatures as heat is reflected from pavements and buildings. By contrast, increasing urban greening can provide air pollution buffers and promote physical activity. Strategies that preserve and create urban parks, green space, natural infrastructure, and sustainable agricultural practices support improved physical and mental health outcomes.

## No Action Scenario (Reference)

In a no-action scenario, California would remain dependent on fossil fuels and other GHG emitting technologies. Fossil-fuel powered mobile sources including cars, trucks, trains, tractors, and a myriad of other on-road and off-road vehicles and equipment are the largest source of criteria pollutants and toxic air contaminants that directly affect

community health and contribute the largest portion of GHG emissions.[288] Other key GHG emission sources include buildings, natural and working lands, and power production and industry. The no-action scenario reflects a continued reliance on fossil fuels in mobile and stationary sectors, including buildings. The continued production and use of fossil fuels; ongoing dependence on gasoline and diesel cars, trucks, buses, and equipment; continued releases of short-lived climate pollutants; and decreased emphasis on forest and ecosystem health will impact communities by reducing climate resilience and health benefits. Green space will likely remain at the same levels or degrade, and urban heat islands will likely increase. With continued growth of vehicle miles traveled, physical activity and the accompanying health benefits will not increase.

Exposure to wildfire smoke will increase, and air quality is expected to worsen as rising temperatures will increase levels of harmful air pollution. Jobs and economic security will be affected by the continuing potential for price spikes in fossil fuels, impacts to the economy from climate change, and fewer job opportunities in green technologies such as solar and electric vehicles. Food security in California will decrease due to the effects of accelerating climate impacts to agriculture; and without increased recovery of organic waste, including food products, food security will continue to decline under a no action scenario. All these impacts can be linked to worse health outcomes. Adverse health impacts are often most felt by Black, Latino, Native American, and other people of color and in low-income communities. These groups are affected more intensely by the physical stress of environmental pollution, social inequities, and the psychological stress of extreme weather events and food and economic insecurity.

## Take Action Scenario

In the Take Action scenario, California will drastically reduce reliance on fossil fuels for motor vehicles, freight, buildings, electricity, or other sectors. This scenario is not a specific scenario within this Scoping Plan but examines the broad outcomes of actions to achieve carbon neutrality in 2045. Implementation of this Scoping Plan would achieve a transition to ZEVs, with 100% sales of light-duty ZEVs by 2035 and 100% sales of zero emission trucks by 2040, along with 30% VMT reductions below 2019 levels by 2045. State and local action that supports sustainable land use and transportation patterns and enables more transit and active transportation will lead to substantial health benefits from physical activity, including reduced illness and deaths.

[288] CARB. 2022. *California Greenhouse Gas Emissions for 2000 to 2020.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf.

The economic benefits of improved health through active transportation can be modeled using the Healthy Mobility Options Tool (HMOT).[289] In order to demonstrate the important health and economic benefits of VMT reduction, CARB and CDPH used the HMOT to analyze an illustrative trip reduction scenario for 2050 from the California Transportation Plan (CTP). The CTP has a goal of increasing active modes of travel and transit from the current level of 13 percent to a level of 23 percent of all travel trips. While the CTP goal of 23 percent for active modes of travel is not a VMT reduction target, the scenario increases active transportation through a mix of changes in land use planning for increased transportation options, including increases in biking, walking, and transit use, and it helps to show the health benefits of increased active transportation. By achieving the CTP 2050 goals, nearly 8,000 deaths would be avoided in 2050 alone (see Figure 3-14), along with significant reductions in chronic diseases. Achieving this would rank among the top public health accomplishments (see Appendix G [Public Health] for additional modeling results and detailed discussion).

The dramatic reduction in fossil fuel combustion, combined with reductions in VMT and freight and traffic emissions projected in this Scoping Plan will significantly reduce air pollution and its associated health impacts on a statewide basis and in communities near freight sources. Coordinated action strategies will emphasize natural and working lands management changes, including healthy forests, increased vegetative cover, and increased organic farming. Wildfire smoke exposure will reduce significantly with healthy ecosystem management strategies. Since many communities in California are disproportionately impacted by high levels of traffic pollution, the reduction in petroleum fueled vehicles will reduce the additional impacts of living or going to school near historically highly polluting sources. Indoor air quality is also likely to improve through a shift to non-fossil fuel appliances. Concerted state and local action to support sustainable land use and transportation patterns can enable more active transportation with health benefits from physical activity.

[289] ITHIM California. 2020. Transportation Planning for Health, Equity, and Climate Change. *https://skylab.cdph.ca.gov/HealthyMobilityOptionTool-ITHIM/*.

**Figure 3-14: Quantified health benefits of active transportation from increased physical activity**

*Calculated by the Healthy Mobility Options Tool, active transportation (including walking, rolling, cycling, and taking public transit) from the California Transportation Plan 2050 compared to business as usual for 2050.

Overall community resilience is expected to increase as physical activity and green space increases—potentially decreasing urban heat islands. Efforts to support VMT reduction will include coordination across state agencies on affordable housing measures. Reduced fossil fuel dependence will reduce economic pressure from wildfires, droughts, and price spikes in fossil fuels, especially as more jurisdictions implement plans with similar actions. Investment in sustainable agriculture, healthy forests, urban greening, and clean energy technologies will add sustainable jobs and further promote economic security. More sustainable agriculture and food recovery efforts will add to food security. All these impacts can be linked to wide ranging health benefits, including positive respiratory and cardiovascular effects, healthier birth and brain outcomes, improved mental health indicators, improved life expectancy, reductions in chronic illness and cancers, improved children's health and development, reduced depression, and other benefits. The magnitude of the possible co-benefits is extremely large, especially in areas that are currently the most affected.

## Summary of Health Benefits

Below, Tables 3-14 and 3-15 show overall summaries of the directional benefits by co-benefit area estimated for this Scoping Plan. The supporting epidemiological studies used for qualitative or quantitative analysis of each co-benefit area are included in Appendix G (Public Health). Another section of Chapter 3, together with Appendix C (AB 197 Measure Analysis) and Appendix H (AB 32 GHG Inventory Sector Modeling), also includes the quantitative analysis of air pollution related health impacts, including recently added health endpoints for CARB's ongoing analysis.

**Table 3-14: Scoping Plan directional benefits for health co-benefit areas (heat, affordable housing, food security, economic security, and urban greening)**

| Health Co-benefit Areas* | | | | | |
|---|---|---|---|---|---|
| **Quantitative vs. Qualitative** | **Reduced Heat Impacts** | **Increased Affordable Housing** | **Increased Food Security** | **Increased Economic Security** | **Increased Urban Greening** |
| **Research was used for Qualitative Analysis** | ↓ Mortality<br>↓ Emergency Room Visits for cardiovascular and respiratory causes and intestinal infections<br>↓Hospitalization for cardiovascular, respiratory causes<br>↓ Preterm Birth<br>↓ Mental Illness | ↓ Infectious Disease<br>↓ Chronic Illness<br>↓ Asthma<br>↓ Injuries<br>↓ Mental Illness<br>↑ Children's Performance in Schools<br>↑ Children's Health<br>↓ Children's Behavioral Problems | ↓ Mental Illness<br>↓ Iron Deficiency<br>↓ Chronic Diseases<br>↑ Life Expectancy<br>↓ Children's Mental Illness<br>↓ Children's Cognitive Problems<br>↓ Children's Behavioral Health Problems<br>↓ Children's Iron Deficiency<br>↓ Children's Oral Health Problems | ↑ Life Expectancy<br>↑ Health Status<br>↑ Mental Health | ↓ Mortality<br>↓ Asthma Prevalence<br>↓ Depression<br>↓ Adverse Birth Outcomes including low birth weight and small for gestational age<br>↑ Life Expectancy |

*See Appendix G (Public Health) for a table with references to research for each health outcome listed.

**Table 3-15: Scoping Plan directional benefits for health co-benefit areas (traffic pollution, wildfire, and active transportation)**

| Health Co-benefit Areas* | | | |
|---|---|---|---|
| **Quantitative vs. Qualitative** | **Reduced Traffic Pollution** | **Reduced Wildfire Smoke** | **Increased Active Transportation** |
| **Research was used for Quantitative Analysis** | ↓ Children's Respiratory Outcomes, Hospital Admissions<br>↓ Children's Respiratory Outcomes, Emergency Room Visits<br>↓ Children's Asthma Onset<br>↓ Children's Asthma Symptoms | ↓ All-Cause Mortality<br>↓ Asthma, Hospital Admissions<br>↓ COPD, Hospital Admissions<br>↓ All Respiratory Outcomes, Hospital Admissions<br>↓ Asthma, Emergency Room Visits<br>↓ All Respiratory Outcomes, Emergency Room Visits<br>↓ All Cardiac Outcomes, Emergency Room Visits | ↓ Cardiovascular Diseases<br>↓ Colon Cancer<br>↓ Breast Cancer<br>↓ Diabetes<br>↓ Dementia<br>↓ Lung Cancer<br>↓ Respiratory Disease<br>↓ Depression<br>↑ Traffic Accidents |
| **Research was used for Qualitative Analysis** | ↑ Children's Lung Function Growth<br>↓ Children's Bronchitic Symptoms<br>↓ Children's Impaired Cognitive Development<br>↓ Children's Adverse Birth Outcomes, including low birth weight and preterm birth | | |

*See Appendix G (Public Health) for a table with references to research for each health outcome listed.

In summary, the qualitative health analysis of the No-Action versus Take-Action scenarios for this Scoping Plan shows an overwhelming benefit for the state by taking action to move forward to carbon neutrality while continuing efforts to increase health equity and resilience in individual communities. Taking action can improve physical and mental health for adults and children, reduce a range of chronic illnesses, and promote improvements in life expectancy. Development and implementation of actions to achieve the outcomes called for in this Scoping Plan should consider how to engage affected communities in implementation, address the existing health and opportunity gaps, and pursue equitable implementation statewide and locally. This Scoping Plan deployment of clean technology and fuels, together with improved land management, will reduce GHGs and air pollution and create more resilient communities that are better able to prepare for and recover from extreme climate events.

## Environmental Analysis

In May 2022, CARB, as the lead agency for the Scoping Plan, released for public review the Draft Environmental Analysis (Draft EA) for this Scoping Plan; it assessed the potential environmental impacts of implementing the Scoping Plan. CARB circulated the Draft EA for public review and comment for a period of 45 days that began on May 10, 2022, and ended on June 24, 2022. CARB held a public hearing on June 23, 2022 to provide the opportunity for public comment. During the review period, written and oral comments were received on the Draft EA. CARB reviewed the comments to identify environmental topics and began preparation of responses to those comments.

After the end of the Draft EA public review period, CARB identified potential revisions to certain aspects of this Scoping Plan that merit revisions to the project description. This new information results from, among other things, revisions to the project description regarding energy sector goals (including offshore wind), revised carbon removal targets, and additional strategies for natural and working lands. CARB released a Recirculated Draft EA for a written public comment period that started September 9, 2022, and ended on October 24, 2022. See Chapter 2 of the Recirculated Draft EA[290] for further information regarding the changes. The Recirculated Draft EA assesses the potential for significant adverse and beneficial environmental impacts associated with all proposed actions in this Scoping Plan, and provides a programmatic environmental analysis of the reasonably foreseeable compliance responses that could result from implementation of the Scoping

[290] CARB. 2022. Recirculated Draft EA. *https://ww2.arb.ca.gov/sites/default/files/2022-09/2022-draft-sp-appendix-b-draft-ea-recirc.pdf*.

Plan.[291] The Recirculated Draft EA concluded implementation of this Scoping Plan could result in the following:

- Beneficial impacts to: air quality (long-term operational-related) and GHG emissions (short-term construction-related and long-term operational-related)
- Less than significant impacts to: energy demand, mineral resources, population and housing, public services, recreation (short-term construction-related), and wildfire (short-term construction-related)
- Potentially significant and unavoidable adverse impacts to: aesthetics, agriculture and forest resources, air quality (construction-related and operational odors), biological resources, cultural resources, geology and soils, hazards and hazardous materials, hydrology and water quality, land use and planning, noise, recreation (long-term operational-related), transportation and traffic, tribal cultural resources, utilities and service systems, and wildfire (long-term operational-related

Before the public meeting at which the Board will consider this Scoping Plan Update, CARB will publish the Final EA as Appendix B (Final Environmental Analysis) to this Scoping Plan, along with written responses to timely submitted comments raising significant environmental issues received on the Draft EA and the Recirculated Draft EA, which will be presented to the Board for consideration.

[291] The Recirculated Draft EA is available at *https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents*.

# Chapter 4: Key Sectors

Chapter 4 provides an overview of the major energy sources and technology in use today, and of alternative clean technology and fuels to support decarbonization based on the latest information available. Every sector of the economy will need to begin to transition in this decade to meet our GHG reduction goals and achieve carbon neutrality no later than 2045. AB 32 requires climate change mitigation policies to be considered in the context of the sector's contribution to the state's total GHG emissions. The transportation, electricity (in-state and imported), and industrial sectors are the largest contributors of GHGs in the state and present the largest opportunities for GHG reductions. Actions to reduce fossil fuel combustion in these sectors also can provide critical air pollution reductions in low-income communities and communities of color, which are often located adjacent to these sources. A carbon neutrality framework also elevates the role of $CO_2$ removal through natural and working lands and mechanical capture and storage. Actions that support energy efficiency, reduced VMT, alternative fuels, and renewable power also can provide benefits by reducing both criteria and toxic air pollutants.

What sets this plan apart from previous Scoping Plans is the focus on the accelerated rate of deployment of clean technology and energy within every sector. As a result, specific actions, including accelerated rates of deployment of clean technology and fuels identified within this Scoping Plan, will need to be translated into both new and amended regulations, policies, and incentive programs. State agencies will need to evaluate current authority to align existing policies or develop new ones to achieve outcomes called for in this Scoping Plan. Legislative support may be needed in some cases to ensure authority and funding is sufficient to ensure this Scoping Plan is translatable to action on the ground. Most regulations, or change to existing regulations, ultimately considered by the Board or other state agencies for adoption will be subject to administrative procedure requirements. Accordingly, they must rely on specific subsequent supporting analysis and extensive public processes and consultations with interested tribes to develop and identify appropriate proposals for effective implementation. For example, any proposal to strengthen the LCFS regulations through amendments increasing the stringency of the carbon intensity (CI) targets would be considered on the basis of a public process, including workshops, and focused environmental, economic, and public health analyses.

Policies that ensure economy-wide investment or program decisions that incorporate consideration of GHG emissions are particularly important. As we pursue GHG reduction targets, we must acknowledge the manner in which built and natural environments are connected, how changes in one may impact the other, and how policy choices in one sector can and do impact other sectors. For example, fostering more compact, transportation-efficient development in infill areas and increasing transportation choices with the goal of reducing VMT not only reduces demand for transportation fuel but also requires less energy for buildings and helps to conserve natural and working lands that

sequester carbon. Therefore, the multiple and often interwoven actions that reduce VMT both reduce emissions from the transportation sector and support reductions needed in other sectors.

Legislation, such as SB 350[292] (De León and Leno, Chapter 457, Statutes of 2015), has recognized the need for CARB, the CEC, and the CPUC to work together to ensure the state's energy and climate goals are integrated in procurement decisions by load serving entities as part of Integrated Resource Plans. Moving forward, it is especially critical that similar approaches are adopted to break down silos across state agencies to ensure policies and programs are aligned with multiple state priorities outlined in this plan. Finally, supportive legislative direction, such as SB 905 that requires CARB to create the Carbon Capture, Removal, Utilization, and Storage Program, may also benefit emerging areas of policy to provide express agency authority and roles for these nascent efforts, including streamlining of permitting, while ensuring that protections for communities are in place.

Unlike previous Scoping Plans that separated out individual economic sectors, this Scoping Plan approaches decarbonization from two perspectives: (1) managing a phasedown of existing energy sources and technology and (2) ramping up, developing, and deploying alternative clean energy sources and technology over time. This approach supports a more comprehensive consideration of our energy infrastructure, the ability to repurpose existing assets, and the need to build new assets. It also provides multiple metrics beyond just the annual AB 32 GHG Inventory to better enable tracking progress. For example, it clearly demonstrates the production and distribution rates of specific types of clean energy, such as adding 4.3 GW of utility solar and 2.5 GW of storage year-over-year between now and 2035 to be on track to achieve carbon neutrality no later than 2045, and does the same for technology deployment, such as 11 million ZEVs in 2035.

The sections below include key actions to support success in the necessary transition away from fossil combustion, which is an overriding goal of this plan. The wide array of complementary and supporting actions being contemplated or to be undertaken across state government are detailed here. The broad view of actions described in this chapter thus provides context for the specific deployment of clean technology and fuels identified in the Scoping Plan Scenario described in Chapter 2. Actions identified in this Scoping Plan are based on currently known options and the latest science. As part of future Scoping Plan updates, additional clean technology and fuels may be identified and added to the mix of needed tools to continue to reduce the state's GHG emissions, support air quality co-benefits, and remove carbon from the atmosphere.

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[292] California Air Resources Board. SB 350 Electricity Sector Greenhouse Gas Planning Targets. https://ww2.arb.ca.gov/our-work/programs/sb350.

## Transportation Sustainability

The transportation sector has long relied on liquid petroleum fuels as the primary energy source for internal combustion engine (ICE) vehicles, including cars, trucks, locomotives, marine equipment, and aircraft. Combustion of fossil fuels in vehicles emits significant amounts of GHGs, criteria pollutants, and toxic air contaminants. In 2019,[293] the transportation sector accounted for approximately 50 percent of statewide GHG emissions[294] and thus was by far the single largest source of carbon pollution in the state. In addition, the transportation sector accounted for over 80 percent of statewide NOx emissions and 30% of fine particulate matter emissions, including toxic diesel particulate matter.[295]

Communities adjacent to congested roadways, including ports and distribution centers, are exposed to the highest concentration of toxic pollutants from vehicles and equipment consuming fossil fuels, leading to a number of demonstrated health impacts such as respiratory illnesses, higher likelihood of cancer development, and premature death. In addition, communities located near oil extraction operations or crude oil refineries often experience higher exposure to poor air quality. While CARB's programs, along with local action, have made substantial progress over the past few decades, it is clear that California must transition away from fossil fuels to zero-emission technologies with all possible speed and pursue policies that result in less driving, in order to meet our GHG and air quality targets.

The transportation sector can be divided into three general categories: Technology, Fuels, and Vehicle Miles Traveled.

- *Technology* refers to the vehicles themselves, as well as the associated refueling infrastructure for those vehicles.
- *Fuels* refers to the energy source used to power vehicles and the facilities that produce them.
- Vehicle travel is measured as *vehicle miles traveled* (VMT), and is a product of development patterns and available transportation options.

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[293] In 2020 the state experienced shelter-in-place orders in response to the COVID-19 pandemic. The orders, and the effects of the pandemic, led to a significant year-over-year decline in transportation emissions in 2020. This means 2019 is likely a more representative year for overall transportation emissions and 2020 a likely outlier in the historical transportation emissions trend data.
[294] CARB. 2022. *California Greenhouse Gas Emissions for 2000 to 2020.* *https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf*. This includes upstream oil extraction and refining emissions.
[295] CARB. California Greenhouse Gas Emission Inventory Program. *https://ww2.arb.ca.gov/our-work/programs/ghg-inventory-program*.

## Sector Transition

### Technology

Vehicles must transition to zero emission technology to decarbonize the transportation sector. Executive Order N-79-20[296] reflects the urgency of transitioning to zero emission vehicles (ZEVs) by establishing target dates for reaching 100 percent ZEV sales or fleet transitions to ZEV technology. The primary ZEV technologies available today are battery-electric and hydrogen fuel cell electric vehicles (FCEVs), both of which emit zero tailpipe GHGs, criteria pollutants, and toxic air contaminants, as they do not burn fuel. These vehicles are rapidly growing in performance, affordability, and popularity.[297] Plug-in hybrid electric vehicles also offer a limited but increasing range of zero emission operation and will play a role in the transition to ZEVs.

Light-duty passenger vehicles consume the majority of gasoline in the state—12.9 billion gallons in 2019[298]—and are well-suited for transitioning to ZEVs. EO N-79-20 calls for 100 percent ZEV sales of new light-duty vehicles by 2035, and this target is reflected in this Scoping Plan.[299] The Advanced Clean Cars II regulation fulfills the goal in the Executive Order and serves as the primary mechanism to help deploy ZEVs. A number of existing incentive programs also support this transition, including the Clean Cars 4 All Program.[300] Heavy-duty trucks are the largest source of diesel particulate matter, a toxic air contaminant that is directly linked to a number of adverse health impacts, and EO N-79-20 also sets targets for transitioning the medium- and heavy-duty fleet to zero emissions: by 2035 for drayage trucks and by 2045 for buses and heavy-duty long-haul trucks where feasible. Replacing heavy-duty vehicles with ZEV technology will significantly reduce GHG emissions and diesel PM emissions in low-income communities and communities of color adjacent to ports, distribution centers, and highways. The existing Advanced Clean Trucks regulation, paired with the proposed Advanced Clean Fleets regulation, are designed to transition a significant amount of the

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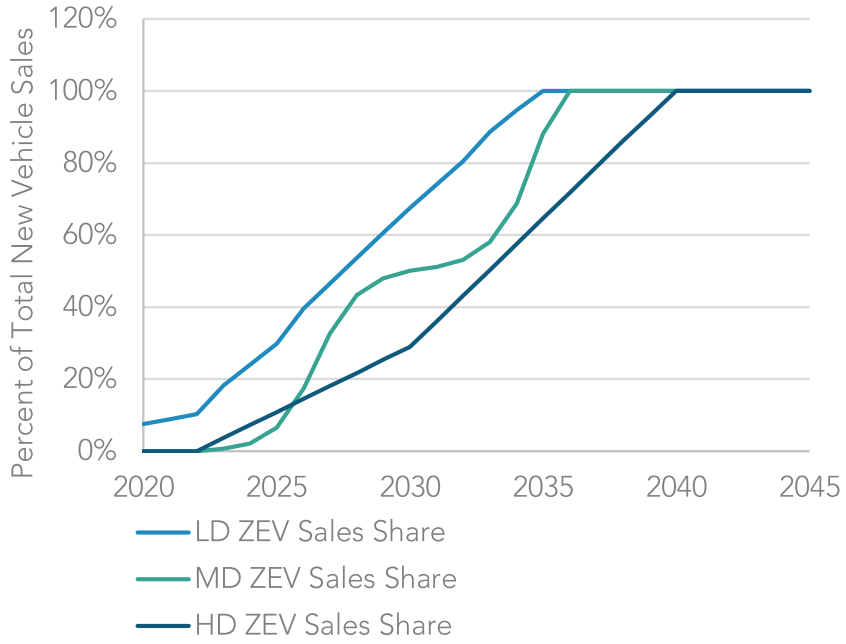
[296] Executive Department. State of California. Executive Order N-79-20. https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf.
[297] CARB. 2021. Public Workshop for Advanced Clean Cars II. May 6. https://ww2.arb.ca.gov/sites/default/files/2021-05/acc2_workshop_slides_may062021_ac.pdf.
[298] CARB. 2022. *Fuel Activity for California's Greenhouse Gas Inventory by Sector and Activity.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/fuel_activity_inventory_by_sector_all_00-20.xlsx.
[299] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1A, with reference to the date at which all new vehicle sales are ZEVs. finalejacrecs.pdf (arb.ca.gov).
[300] CARB. Clean Cars 4 All. https://ww2.arb.ca.gov/our-work/programs/clean-cars-4-all. The Clean Vehicle Rebate Project (CVRP) also supports the transition to ZEVs. https://cleanvehiclerebate.org/en.

California truck fleet to ZEV technology. As with the LDV sector, a number of incentive programs support this transition, such as the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP).[301]

Figure 4-1 below illustrates the pace of transition in vehicle technology needed to drastically reduce GHG emissions from vehicles. All vehicle classes reach 100 percent ZEV sales before 2045, with some achieving this well before. The ZEV technology across the vehicle classes is assumed to be primarily battery electric and hydrogen fuel cell (reflecting the primary ZEV technologies available today).[302]

**Figure 4-1: Transition of on-road vehicle sales to ZEV technology in the Scoping Plan Scenario**




Today, off-road vehicles also rely heavily on ICE technology. Executive Order N-79-20 sets an off-road equipment target of transitioning the entire fleet to ZEV technology by 2035, where feasible. There is a great need for both investment and innovation in the off-road space in order to develop and commercialize zero emission equipment types that meet or exceed the performance of existing equipment. A number of funding sources currently support this transition, including programs such as FARMER, Carl Moyer, and

[301] California HVIP. Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project. https://californiahvip.org/?msclkid=efaf65f2c26f11eca6bdd08ecc323864.

[302] The light-duty fleet includes more than 11 million battery electric and hydrogen fuel cell vehicles in 2035 and over 23 million battery electric and hydrogen fuel cell vehicles in 2045.

the Community Air Protection Incentives—as well as Low Carbon Transportation Incentives, including the Clean Off-Road Equipment (CORE) program. In addition, the 2021–22 California budget provided record-high allocations for funding ZEVs, including off-road equipment, and the 2022–23 budget is similarly ambitious.[303] Several regulations focused on transitioning to zero emission off-road equipment have recently been adopted or are in the works, and apply to locomotives,[304] forklifts, ocean-going vessels at berth,[305] commercial harbor craft,[306] small off-road engines,[307] and more.

Intrastate aviation relies on ICE technology today, but battery-electric and hydrogen fuel cell aviation applications are in development, along with sustainable aviation fuel. The Scoping Plan Scenario includes a transition of 20% of aviation fuel demand to ZEV technologies by 2045 and sustainable aviation fuel for the rest.

Refueling infrastructure is a crucial component of transforming transportation technology. Electric vehicle chargers and hydrogen refueling stations must become easily accessible for all drivers to support a wholesale transition to ZEV technology. Deployment of ZEV refueling infrastructure is currently supported by a number of existing local and state public funding mechanisms, the new National Electric Vehicle Infrastructure (NEVI) federal funding mechanism, California's electric utilities, the Electrify America initiative that was established in response the Volkswagen ZEV commitment, and by numerous companies, such as EVgo, ChargePoint, Tesla, Ford, FirstElement Fuel, Chevron, Shell, and Iwatani, who are investing substantial private resources into developing these networks. Private investment in reliable, affordable and ubiquitous refueling infrastructure must drive the transition as the business case for ZEVs continues to strengthen.

**Strategies for Achieving Success**

- Achieve 100 percent ZEV sales of light-duty vehicles by 2035[308] and medium-heavy-duty vehicles by 2040.
- Achieve a 20% zero emission target for the aviation sector.

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[303] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1C. CARB and the Administration are committed to increasing focus on transportation equity investment as was reflected in the governor's 2022–23 budget. *finalejacrecs.pdf (arb.ca.gov)*.
[304] CARB. Reducing Rail Emissions in California. *https://ww2.arb.ca.gov/our-work/programs/reducing-rail-emissions-california*.
[305] CARB. Ocean-Going Vessels At Berth Regulation. *https://ww2.arb.ca.gov/our-work/programs/ocean-going-vessels-berth-regulation*.
[306] CARB. CARB passes amendments to commercial harbor craft regulation. *https://ww2.arb.ca.gov/news/carb-passes-amendments-commercial-harbor-craft-regulation*.
[307] CARB. Small Off-Road Engines (SORE). *https://ww2.arb.ca.gov/our-work/programs/small-off-road-engines-sore*.
[308] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1A. *finalejacrecs.pdf (arb.ca.gov)*.

- Develop a rapid and robust network of ZEV refueling infrastructure to support the needed transition to ZEVs.
- Ensure that the transition to ZEV technology is affordable for low-income households and communities of color, and meets the needs of communities and small businesses.[309]
- Prioritize incentive funding for heavy-duty ZEV technology deployment in regions of the state with the highest concentrations of harmful criteria and toxic air contaminant emissions.[310]
- Promote private investment in the transition to ZEV technology, undergirded by regulatory certainty such as infrastructure credits in the Low Carbon Fuel Standard for hydrogen and electricity[311] and hydrogen station grants from the CEC's Clean Transportation Program[312] pursuant to Executive Order B-48-18.[313]
- Evaluate and continue to offer incentives similar to those through FARMER,[314] Carl Moyer,[315] the Clean Fuel Reward Program,[316] the Community Air Protection Program,[317] and Low Carbon Transportation,[318] including CORE.[319] Where feasible, prioritize and increase funding for clean transportation equity programs.[320]
- Continue and accelerate funding support for zero emission vehicles and refueling infrastructure through 2030 to ensure the rapid transformation of the transportation sector.

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[309] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF6, in the context of communities. *finalejacrecs.pdf (arb.ca.gov)*.
[310] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF7. *finalejacrecs.pdf (arb.ca.gov)*.
[311] CARB. LCFS ZEV Infrastructure Crediting. *https://ww2.arb.ca.gov/resources/documents/lcfs-zev-infrastructure-crediting*.
[312] CEC. Clean Transportation Program. *https://www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program*.
[313] EO B-48-18 calls for 200 hydrogen refueling stations by 2025. *https://www.library.ca.gov/wp-content/uploads/GovernmentPublications/executive-order-proclamation/39-B-48-18.pdf*.
[314] CARB. FARMER program. *https://ww2.arb.ca.gov/our-work/programs/farmer-program*.
[315] CARB. Carl Moyer program. *https://ww2.arb.ca.gov/our-work/programs/carl-moyer-memorial-air-quality-standards-attainment-program*.
[316] California Clean Fuel Reward Program. *https://cleanfuelreward.com/*.
[317] CARB. Community Air Protection Program. *https://ww2.arb.ca.gov/capp*.
[318] CARB. Low Carbon Transportation Investments and Air Quality Improvement Program. *https://ww2.arb.ca.gov/our-work/programs/low-carbon-transportation-investments-and-air-quality-improvement-program*.
[319] Clean Off-Road Equipment (CORE) Voucher Incentive Program. *https://californiacore.org/*.
[320] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1C. *finalejacrecs.pdf (arb.ca.gov)*.

- Evaluate and align with this Scoping Plan relevant CARB policies such as Advanced Clean Cars II,[321] Innovative Clean Transit,[322] Zero Emission Airport Shuttle,[323] California Phase 2 GHG Standards,[324] Advanced Clean Trucks, Advanced Clean Fleets, Zero Emission Forklifts,[325] In-use Locomotives,[326] the Off-Road Zero-Emission Targeted Manufacturer rule, Clean Off-Road Fleet Recognition Program, In-use Off-Road Diesel-Fueled Fleets Regulation,[327] Commercial Harbor Craft,[328] Off-Road Zero-Emission Targeted Manufacturer rule, Clean Off-Road Fleet Recognition Program, Amendments to the In-use Off-Road Diesel-Fueled Fleets Regulation,[329] carbon pricing through the Cap-and-Trade Program,[330] and the Low Carbon Fuel Standard.[331]
- Identify and address permitting and market barriers to successful rapid ZEV technology deployment while protecting public health and the environment.

## Fuels

Transitioning away from conventional ICE vehicles is part of the solution, but we must ensure that an adequate supply of zero-carbon alternative fuel and distribution is available to power these vehicles. Electricity and hydrogen are currently the primary fuels for ZEVs,

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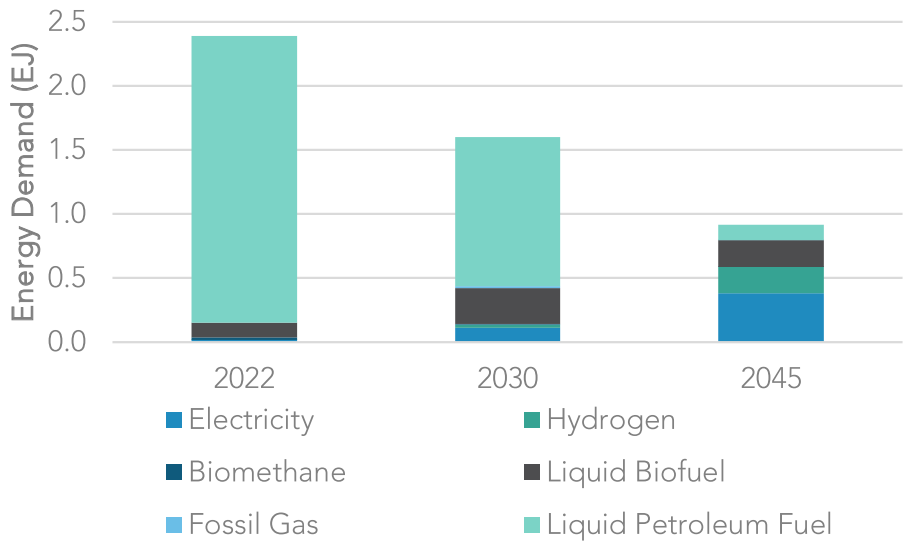
[321] CARB. Advanced Clean Cars Program. https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program. Cal. Code Regs., tit. 13, §§ 1900, 1961.2, 1961.3, 1961.4, 1962.2, 1962.3, 1962.4, 1962.5, 1962.6, 1962.7, 1962.8, 1965, 1968.2, 1969, 1976, 1978, 2037, 2038, 2112, 2139, 2140, 2147, 2317, 2903.
[322] CARB. Innovative Clean Transit. https://ww2.arb.ca.gov/our-work/programs/innovative-clean-transit. Cal. Code Regs., tit. 13, §§ 2023—2023.11.
[323] CARB. Zero-Emission Airport Shuttle. https://ww2.arb.ca.gov/our-work/programs/zero-emission-airport-shuttle. Cal. Code Regs., tit. 17, §§ 95690.1—95690.8.
[324] CARB. California Phase 2 Greenhouse Gas Standards. https://ww2.arb.ca.gov/our-work/programs/greenhouse-gas-standards-medium-and-heavy-duty-engines-and-vehicles/phase2. Cal. Code Regs., tit. 13, §§ 1956.8 and 2036; and Cal. Code Regs., tit. 17, §§ 95301, 95302, 95303, and 95663.
[325] CARB. Zero-Emission Forklifts. https://ww2.arb.ca.gov/our-work/programs/zero-emission-forklifts. Cal. Code Regs., tit. 17, §§ 95690.1—95690.8.
[326] CARB. Reducing Rail Emissions. https://ww2.arb.ca.gov/our-work/programs/reducing-rail-emissions-california. Proposed Cal. Code Regs., tit. 13, §§ 2478—2478.16.
[327] CARB. In-use Off-Road Diesel-Fueled Fleets Regulation. https://ww2.arb.ca.gov/our-work/programs/use-road-diesel-fueled-fleets-regulation. Cal. Code Regs., tit. 13, §§ 2449, 2449.1, 2449.2.
[328] CARB. Commercial Harbor Craft. https://ww2.arb.ca.gov/our-work/programs/commercial-harbor-craft. Cal. Code Regs., tit. 13, § 2299.5.
[329] CARB. In-use Off-Road Diesel-Fueled Fleets Regulation. https://ww2.arb.ca.gov/our-work/programs/use-road-diesel-fueled-fleets-regulation.
[330] CARB. Cap-and-Trade Program. https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program. Cal. Code Regs., tit. 17, §§ 95801 et seq.
[331] CARB. Low Carbon Fuel Standard. https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard. Cal. Code Regs., tit. 17, §§ 95480 et seq.

and both fuels must be produced using low-carbon technology and feedstocks to minimize upstream emissions.

The transition to complete ZEV technology will not happen overnight. Conventional ICE vehicles from legacy fleets will remain on the road for some time, even after all new vehicle sales have transitioned to ZEV technology. In addition, some equipment types are only now in the initial stages of development of ZEV technology for propulsion, such as commercial aircraft or ocean-going vessels. In addition to building the production and distribution infrastructure for zero-carbon fuels, the state must continue to support low-carbon liquid fuels during this period of transition and for much harder sectors for ZEV technology such as aviation, locomotives, and marine applications. Biomethane currently displaces fossil fuels in transportation and will largely be needed for hard-to-decarbonize sectors but will likely continue to play a targeted role in some fleets while the transportation sector transitions to ZEVs. Figure 4-2 provides the detail on fuels used in 2020 and the fuel mix under the Scoping Plan Scenario for 2035 and 2045.

**Figure 4-2: Transportation fuel mix in 2022, 2030, and 2045 in the Scoping Plan Scenario[332]**




Private investment in alternative fuels will play a key role in diversifying the transportation fuel supply away from fossil fuels. The Low Carbon Fuel Standard is the primary mechanism for transforming California's transportation fuel pool with low-carbon

[332] See https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-PATHWAYS-data-E3.xlsx for transportation fuels by year.

alternatives and has fostered a growing alternative fuel market. Partially as a result of the powerful market signals from the LCFS, fuels like renewable diesel, sustainable aviation fuel, biomethane, and electricity have all gained significant market shares and continue to displace gasoline and diesel in both on- and off-road vehicles. In addition, Executive Order N-79-20 calls on state agencies to support the transition of existing fuel production facilities away from fossil fuels and directs that this transition also protect and support workers, public health, safety, and the environment. In line with this direction, existing refineries could be repurposed to produce sustainable aviation fuel, renewable diesel, and hydrogen. This trend has already begun, and continuing to develop fuel production capacity in-state to support the energy transition while making the most efficient use of existing assets is critical to avoiding emissions leakage. If fuel demand persists after fuel production facilities have ceased operations, fuel demand will have to be met through imports.

As we transition or build new energy production facilities and infrastructure, it will be important to ensure low-income communities, tribes, and communities of color do not experience increases in existing air pollution disparities and continue to experience a reduction in the air pollution disparities that exist today. California must use the best available science to ensure that raw materials used to produce transportation fuels do not incentivize feedstocks with little to no GHG reductions from a life cycle perspective. A dramatic increase in alternative fuel production must not come at the expense of global deforestation, unsustainable land conversion, or adverse food supply impacts, to name a few examples. CARB will continue to monitor scientific findings on these topics to ensure that California policies, such as the LCFS, send the appropriate market signals and do not result in unintended consequences.[333]

**Strategies for Achieving Success**

- Accelerate the reduction and replacement of fossil fuel production and consumption in California.[334]
- Incentivize private investment in new zero-carbon fuel production in California.
- Incentivize the transition of existing fuel production and distribution assets to support deployment of low- and zero-carbon fuels while protecting public health and the environment.
- Invest in the infrastructure to support reliable refueling for transportation such as electricity and hydrogen refueling.

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[333] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1E. *finalejacrecs.pdf (arb.ca.gov)*.
[334] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F3. *finalejacrecs.pdf (arb.ca.gov)*.

- Evaluate and propose, as needed, changes to strengthen the Cap-and-Trade Program.
- Initiate a public process focused on options to increase the stringency and scope of the LCFS:
    - Evaluate and propose accelerated carbon intensity targets pre-2030 for LCFS.
    - Evaluate and propose further declines in LCFS post-2030 carbon intensity targets to align with this 2022 Scoping Plan.
    - Consider integrating opt-in sectors into the program.
    - Provide capacity credits for hydrogen and electricity for heavy-duty fueling.
- Monitor for and ensure that raw materials used to produce low-carbon fuels or technologies do not result in unintended consequences.[335]

## Vehicle Miles Traveled

Transforming the transportation sector goes beyond phasing out combustion technology and producing cleaner fuels. Managing total demand for transportation energy by reducing the miles people need to drive on a daily basis is also critical as the state aims for a sustainable transportation sector in a carbon neutral economy. Though GHG emissions are declining due to cleaner vehicles and fuels, rising VMT can offset the effective benefits of adopted regulations.

Even under full implementation of Executive Order N-79-20 and CARB's Advanced Clean Cars II Regulations, with 100 percent ZEV sales in the light-duty vehicle sector by 2035, a significant portion of passenger vehicles will still rely on ICE technology, as demonstrated in Figure 4-2 above. Accordingly, VMT reductions will play an indispensable role in reducing overall transportation energy demand and achieving the state's climate, air quality, and equity goals. After a significant pandemic-induced reduction in VMT during 2020, passenger VMT has steadily climbed back up and is now closing in on pre-pandemic levels.[336] Driving alone with no passengers remains the primary mode of travel in California, amounting to 75 percent of the mode share for daily commute trips. Conversely, the transit industry, which was significantly impacted during

[335] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1E. *finalejacrecs.pdf (arb.ca.gov)*.
[336] U.S. Department of Transportation. 2021. December 2021 Traffic Volume Trends. Figure 3 - Seasonally Adjusted Vehicle Miles Traveled by Month. *https://www.fhwa.dot.gov/policyinformation/travel_monitoring/21dectvt/figure3.cfm*.

the lockdown months, and has struggled to recover; ridership only averages two-thirds of pre-pandemic levels,[337] [338] and service levels also lag behind.

Sustained VMT reductions have been difficult to achieve for much of the past decade, in large part due to entrenched transportation, land use, and housing policies and practices. Specifically, historic decision-making favoring single-occupancy vehicle travel has shaped development patterns and transportation policy, generating further growth in driving (and making transit, biking and walking less viable alternatives). These policies have also reinforced long-standing racial and economic injustices that leave people with little choice but to spend significant time and money commuting long distances, placing a disproportionate burden on low-income Californians, who pay the highest proportion of their wages on housing and transportation. While CARB has included VMT reduction targets and strategies in the Scoping Plan and appendices, these targets are not regulatory requirements, but would inform future planning processes. CARB is not setting regulatory limits on VMT in the 2022 Scoping Plan; the authority to reduce VMT largely lies with state, regional, and local transportation, land use, and housing agencies, along with the Legislature and its budgeting choices.

Appendix E (Sustainable and Equitable Communities) elaborates on reasons for reducing VMT and identifies a series of policies that, if implemented by various responsible authorities, could help to achieve the recommended VMT reduction trajectory included in this Scoping Plan (and related mode share increases for transit and active transportation). These policies aim to advance four strategic objectives:

1. Align current and future funding for transportation infrastructure with the state's climate goals, preventing new state-funded projects from inducing significant VMT growth and supporting an ambitious expansion of transit service and other multimodal alternatives.
2. Move funding for transportation beyond the gasoline and diesel taxes and implement fuel-agnostic pricing strategies that accomplish more productive uses of the roadway network and generate revenues to further improve transit and other multimodal alternatives.
3. Deploy autonomous vehicles, ride-hailing services, and other new mobility options toward high passenger-occupancy and low VMT-impact service models that complement transit and ensure equitable access for priority populations.
4. Encourage future housing production and multi-use development in infill locations and other areas in ways that make future trip origins and destinations

[337] U.S. Government Accountability Office. January 25, 2022. During COVID-19, Road Fatalities Increased and Transit Ridership Dipped. *https://www.gao.gov/blog/during-covid-19-road-fatalities-increased-and-transit-ridership-dipped*.
[338] American Public Transportation Association. APTA - Ridership Trends. *https://transitapp.com/APTA*.

closer together and create more viable environments for transit, walking, and biking.

The pace of change to reduce VMT must be accelerated. Certainly, structural reform will be challenging, but California has demonstrated time and again that it possesses the collective leadership and commitment to break away from ideas that no longer represent Californians' values and their aspirations for the many generations to come.

**Strategies for Achieving Success**

- Achieve a per capita VMT reduction of at least 25 percent below 2019 levels by 2030 and 30 percent below 2019 levels by 2045. [339]
- Reimagine new roadway projects that decrease VMT in a way that meets community needs and reduces the need to drive.
- Invest in making public transit a viable alternative to driving by increasing affordability, reliability, coverage, service frequency, and consumer experience.[340]
- Implement equitable roadway pricing strategies based on local context and need, reallocating revenues to improve transit, bicycling, and other sustainable transportation choices.[341]
- Expand and complete planned networks of high-quality active transportation infrastructure.[342]
- Channel the deployment of autonomous vehicles, ride-hailing services, and other new mobility options toward high passenger-occupancy and low VMT-impact service models that complement transit and ensure equitable access for priority populations.
- Streamline access to public transportation through programs such as the California Integrated Travel Project.
- Ensure alignment of land use, housing, transportation, and conservation planning in adopted regional plans, such as regional transportation plans (RTP)/ sustainable communities strategies (SCS), regional housing needs assessments (RHNA), and local plans (e.g., general plans, zoning, and local transportation plans), and develop tools to support implementation of these plans.

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[339] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1D. finalejacrecs.pdf (arb.ca.gov).
[340] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1D. finalejacrecs.pdf (arb.ca.gov).
[341] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1D. finalejacrecs.pdf (arb.ca.gov).
[342] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1F. finalejacrecs.pdf (arb.ca.gov).

- Accelerate infill development and housing production at all affordability levels in transportation-efficient places, with a focus on housing for lower-income residents.

## Clean Electricity Grid

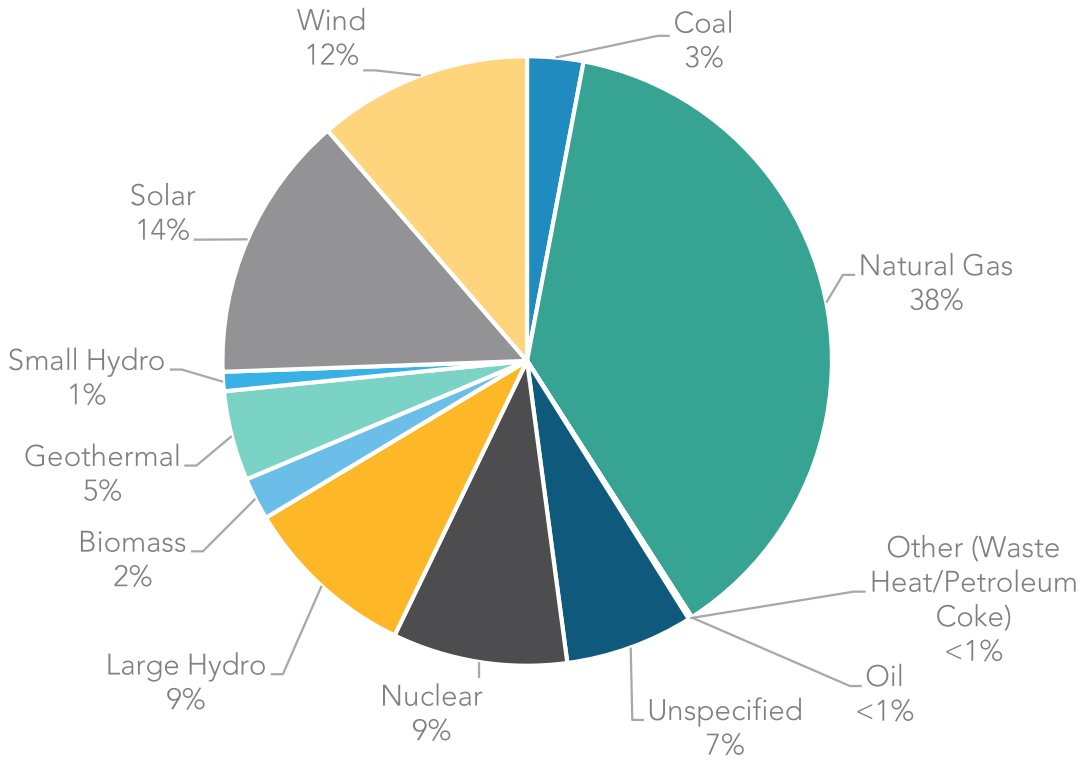
Much of the state's success to date in reducing GHGs is due to decarbonization of the electricity sector as a result of the RPS, SB 100 implementation, and the Cap-and-Trade Program. Moving forward, a clean, affordable, and reliable electricity grid will serve as a backbone to support deep decarbonization across California's economy. Under this Scoping Plan, the role of electricity in powering the economy will grow in almost every sector.

In 2021, 70 percent of California electricity demand was served by in-state power plants totaling about 82 GW, with the rest coming from out-of-state imports.[343] Additionally, approximately 8 GW of customer solar photovoltaic capacity has been installed to date to help with in-state demand.[344] Figure 4-3 shows the breakdown of in-state and imported sources of electricity.

[343] CEC. 2021. Electric Generation Capacity and Energy. Data available at: https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/electric-generation-capacity-and-energy and CEC. 2021. Total System Electric Generation. Data available at: https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2021-total-system-electric-generation. Capacity values are nameplate capacity from sources 1 MW and larger.

[344] CEC. 2021. *SB 100 Joint Agency Report Summary: Achieving 100% Clean Electricity in California, An Initial Assessment.* 10. https://www.energy.ca.gov/publications/2021/2021-sb-100-joint-agency-report-achieving-100-percent-clean-electricity.

**Figure 4-3: 2021 total system electric generation (based on GWh)[345]**




*Note: Imports contributing to total system generation are comprised of 58% zero-carbon energy and 42% non-renewable and unspecified energy. Percentages do not add to exactly 100 due to rounding.*

In 2021, about 48 percent of electricity generation serving California came from non-renewable and unspecified[346] resources, while 52 percent came from renewable and zero-carbon resources. The state's Strategic Reliability Reserve, established in AB 205 to provide additional reliability insurance during extreme events, may make three of the fossil gas-fired OTC plants planned for retirement available to support the grid on a limited basis after 2023. The state also adopted legislation to facilitate extension of the Diablo Canyon Nuclear Power Plant for five years beyond its 2025 planned closure.[347] At the

[345] *Total system generation* is the sum of all utility-scale, in-state generation, plus net electricity imports. CEC. 2021 Total System Electricity Generation. https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2021-total-system-electric-generation.

[346] *Unspecified power* refers to electricity that is not traceable to a specific generating facility, such as electricity traded through open market transactions. It typically consists of a mix of resources and may include renewables.

[347] In accordance with SB 846 (Dodd, Chapter 239, Statutes of 2022).

same time, the state continues to rapidly expand deployment of clean energy generation and storage resources and plan for increased electrification.[348] This is critical to reducing GHG emissions and addressing the long-term impacts of climate change.

Climate change is causing unprecedented stress on California's energy system—driving high demand and constraining supply. Heat, drought, and wildfires can both reduce electricity supply from reductions in hydropower generation and impacts on generation and transmission performance, and increase demand, especially in the evening hours when solar generation is declining.

California has experienced three straight years of energy reliability challenges, including a multi-day extreme heat event across the western United States with temperatures up to 20 degrees above normal in California, resulting in rotating outages in August 2020. In 2021, heat waves in June prompted a Grid Warning and the onset of emergency conditions, and the Bootleg Fire caused the loss of one transmission line, reducing import capability by 3,000 megawatts into the California Independent System Operator (CAISO) balancing authority area. And from August 31–September 9, 2022, a 10-day extreme heat event resulted in an unprecedented, sustained period of high peak loads in the CAISO system, averaging 47,000 MW and maxing at an all-time record of over 52,000 MW on September 6. The Western region also hit its record peak load on September 6, at 167.5 GW.

Reliable electricity service was maintained throughout the 10-day September 2022 heat wave in spite of the record breaking load levels. Factors that contributed to this outcome include the installation of over 3,500 MW of lithium-ion battery storage since summer 2020, enhanced coordination and communication within and outside of California, engagement with customer groups and other stakeholders, state actions to reduce load during critical times, and the additional capacity provided through the Strategic Reliability Reserve and other new state programs authorized in the 2022 Budget to provide load reduction and support the grid in extreme events. CEC, CPUC, CAISO, and the California Department of Water Resources will continue to build out strategies to enhance reliability in light of the increasing and compounding impacts of climate change on the electricity system.

[348] In June 2021, the CPUC adopted D.21-06-035 directing procurement of 11,500 MW of new capacity between 2023 and 2026 to ensure systemwide electric reliability as Diablo Canyon and several OTC facilities retire. It requires that, out of the 11,500 MW, 2,500 MW must be from zero-emission resources. Additionally, 2,000 MW must be long lead-time resources, with at least 1,000 MW of long-duration storage and 1,000 MW of firm capacity with zero on-site emissions or that qualifies under the RPS eligibility requirements.

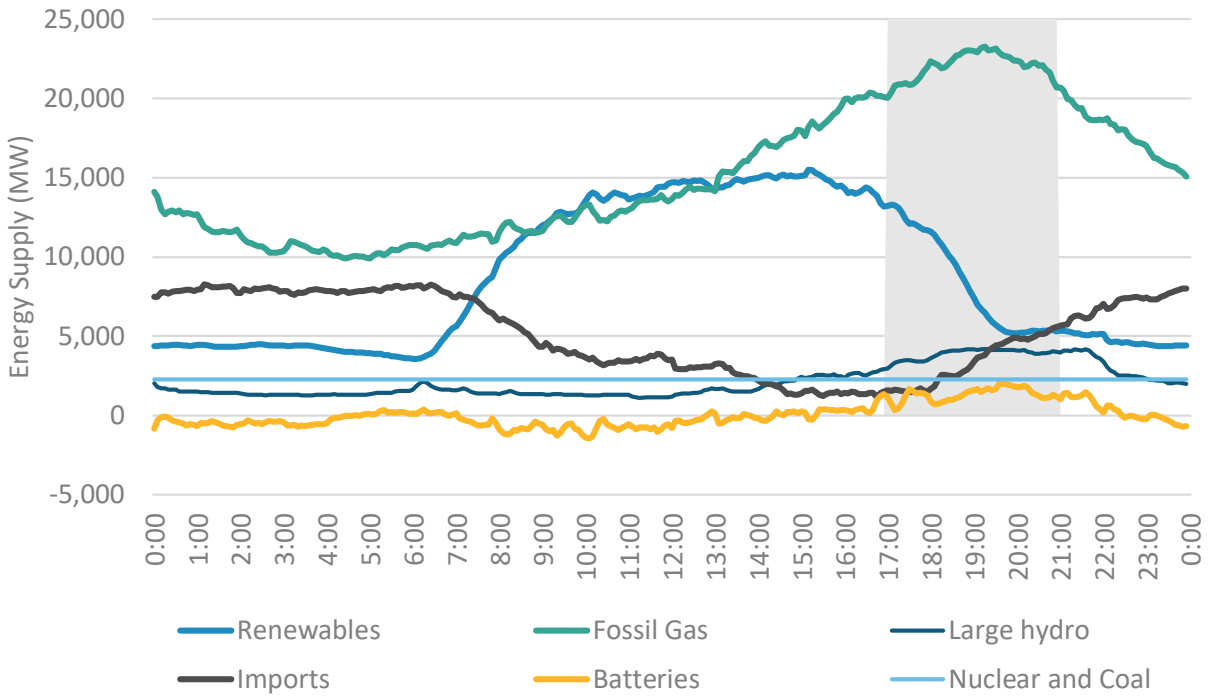
While the electricity sector is using less fossil fuel due to increasing amounts of renewables,[349] existing fossil gas generation will continue to play a critical role in grid reliability until other clean, dispatchable alternatives can be deployed at scale. The integration of greater amounts of variable renewable generation resources[350] is changing power system planning and operations, and system operators need resources with flexible attributes to balance shifting supply and demand.

High levels of solar generation can lead to instances of oversupply during the middle of the day, when the sun is brightest.[351] In the evening hours, as the sun is setting, solar generation declines to zero and customers with solar generation shift back to the electric grid. In hot weather, customer demand remains high well into the summer evening period to power air conditioning, which can lead to reliability challenges.[352]

Figure 4-4 shows the energy sources used throughout one summer day in July. Renewable energy is consistent during the middle of the day, but it cannot meet all of the evening demand in the gray area. As illustrated in the figure, fossil gas generation is currently a resource that is typically ramped up to meet this evening demand as solar production begins to drop and electrical loads increase To help address this challenge, resource installations that pair solar with batteries, as well as a greater amount of battery build-out, are coming online currently and over the next five years. Nevertheless, the state's electricity grid is expected to be stressed further in the coming years by heat waves, drought, wildfires, and the growing intermittent power supply from renewables. California must accelerate deployment of diverse clean energy resources to maintain reliability and affordability in the face of climate change.

[349] CARB. 2022. *California Greenhouse Gas Emissions for 2000 to 2020.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf.
[350] A *variable renewable generation resource* is a renewable source of electricity that is non-dispatchable due to its fluctuating nature and only produces electricity when weather conditions are right, such as when the sun is shining or the wind is blowing. Renewable resources that can be controlled and are dispatchable include geothermal, biomass, and dam-based hydroelectric power.
[351] *Brightness* is used colloquially here; solar energy depends on insolation (e.g., sun-hours), which is the measurement of cumulative solar energy that reaches an area over a period of time.
[352] CAISO, CPUC, and CEC. 2021. *Final Root Cause Analysis: Mid-August 2020 Extreme Heat Wave.* http://www.caiso.com/Documents/Final-Root-Cause-Analysis-Mid-August-2020-Extreme-Heat-Wave.pdf.

**Figure 4-4: Electricity supply trend by resource for a California summer day, July 2022**




## Sector Transition

Decarbonizing the electricity sector is a crucial pillar of this Scoping Plan. It depends on both using energy more efficiently and replacing fossil-fueled generation with renewable and zero carbon resources, including solar, wind, energy storage,[353] geothermal, biomass, and hydroelectric power. The RPS Program[354] and the Cap-and-Trade Program continue to incentivize dispatch of renewables over fossil generation to serve state demand. SB 100 increased RPS stringency to require 60 percent renewables by 2030 and for California to provide 100 percent of its retail sales[355] of electricity from renewable and zero-carbon resources by 2045. Furthermore, SB 1020 has added interim targets to

[353] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF1, NF2. finalejacrecs.pdf (arb.ca.gov).

[354] The CEC estimates that 36 percent of California's 2019 retail electricity sales was served by RPS-eligible renewable resources (see CPUC. 2021. CPUC Perspectives on Electric Sector Decarbonization. https://ww2.arb.ca.gov/sites/default/files/2021-11/CPUC-sp22-electricity-ws-11-02-21.pdf).

[355] SB 100 speaks only to retail sales and state agency procurement of electricity. The *2021 SB 100 Joint Agency Report* interprets this to mean that other loads—wholesale or non-retail sales and losses from storage and transmission and distribution lines—are not subject to the law.

SB 100's policy framework to require renewable and zero-carbon resources to supply 90 percent of all retail electricity sales by 2035 and 95 percent of all electricity retail sales by 2040; the governor has asked the CEC to establish a planning goal of at least 20 GW of offshore wind by 2045; and the governor directed that state agencies plan for an energy transition that avoids the need for new fossil gas capacity to meet California's long-term energy goals.[356] In addition to grid-level resources, state efforts have supported rapid growth of the distributed solar industry through key actions like the California Solar Initiative (SB 1, Murray, Chapter 132, Statues of 2006).[357] Steps to commercialize microgrids powered by clean resources[358] are also being examined as part of SB 1339 (Stern, Chapter 566, Statutes of 2018).[359]

California also continues to advance its appliance and building energy efficiency standards to reduce growth in electricity consumption and meet the SB 350 goal to double statewide energy efficiency savings in electricity and fossil gas end uses[360] by 2030. In 2018, the CEC adopted a building energy efficiency code requiring most new homes to have solar photovoltaic systems[361] (or be powered by a solar array nearby) starting January 1, 2020. In 2019, California reached the milestone of 1 million solar rooftop installations.

Increased transportation and building electrification and continued policy commitment to behind-the-meter solar and storage will continue to drive growth of microgrids and other distributed energy resources (DER).[362] The CPUC's High-DER proceeding is examining how to prepare the electric grid for a high DER future by determining how to integrate

[356] Newsom, Gavin. July 22, 2022. Letter from Governor Newsom to CARB Chair Liane Randolph. *https://www.gov.ca.gov/wp-content/uploads/2022/07/07.22.2022-Governors-Letter-to-CARB.pdf*.
[357] More information on the program, which closed in 2016, can be found on the CPUC website, including annual program assessment reports, at: *https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/california-solar-initiative*.
[358] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, In part (NF2, NF13). *finalejacrecs.pdf (arb.ca.gov)*.
[359] CPUC. Resiliency and Microgrids. *https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/infrastructure/resiliency-and-microgrids*.
[360] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF1, ES1. *finalejacrecs.pdf (arb.ca.gov)*.
[361] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF2. *finalejacrecs.pdf (arb.ca.gov)*.
[362] Distributed energy resources include rooftop solar and other distributed renewable generation resources, energy storage, electric vehicles, time variant and dynamic electric rates, flexible load management, demand response, and energy efficiency technologies.

millions of DERs within the distribution grid to maximize societal and ratepayer benefits from DERs while ensuring grid reliability and affordable rates.[363]

SB 350 also aims to connect long-term planning for electricity needs with the state's climate targets. This is primarily accomplished through CARB's establishment of 2030 GHG emissions targets for the electricity sector in general and for each electricity provider, which inform the CPUC and publicly owned utilities' integrated resource planning. A GHG planning target range of 30 to 53 MMT$CO_2$e—informed by the 2017 Scoping Plan—was originally developed and adopted by CARB in 2018. In its 2021 IRP planning cycle, the CPUC adopted a 38 MMT GHG target for the electricity sector in 2030, which drops to 35 MMT in 2032.[364]

The Scoping Plan Scenario incorporates SB 350's energy efficiency doubling goal, aligns with the CPUC's IRP 2030 GHG target and latest GHG emissions benchmarks through 2035,[365] the governor's 20 GW offshore wind and no new gas generation[366] goals, and SB 100's 2030 RPS and 2045 zero-carbon retail sales targets to reduce dependence on fossil fuels in the electricity sector by transitioning substantial energy demand to renewable and zero-carbon resources.[367] As described in Chapter 2, CCS is applied in limited sectors, including on 16.7 MMT of $CO_2$ from existing fossil gas electricity generation in 2045, to ensure the state achieves the 85 percent reduction in anthropogenic emissions required by AB 1279. Continued transition to renewable and

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[363] The High-DER proceeding is one of four "anchor" proceedings in the CPUC's DER Action Plan 2.0 and is within the Action Plan's infrastructure track. Information on the High-DER proceeding is available at: *https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/infrastructure/distribution-planning*. The Action Plan can be accessed at: *https://www.cpuc.ca.gov/about-cpuc/divisions/energy-division/der-action-plan*.

[364] The February 10, 2022, Decision 22-02-004 by the CPUC adopts the 2021 Preferred System Plan, completing the 2019–21 IRP cycle. *https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M451/K412/451412947.PDF*. The Decision requires load serving entities to submit plans in the next IRP cycle detailing how they will meet their proportionate share of a 30 MMT electric sector target, as well as a 38 MMT GHG target.

[365] June 15, 2022, Administrative Law Judge's Ruling for 2022 integrated resource plan filings specifies the need for GHG targets to plan for in 2035 to continue progress toward the 2045 goal. The ruling proposes a straight-line projection from the GHG planning target for 2030. Corresponding to the adopted Preferred System Plan in D.22-02-004, 38 MMT in 2030 leads to a target of 30 MMT in 2035. *https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M485/K625/485625915.PDF*.

[366] The governor's July 22, 2022, letter specifies no new gas generation but does not place any constraints on existing gas resources. Therefore, for purposes of RESOLVE electricity sector modeling, existing gas capacity is an available resource that is able to be reduced over time based on announced retirements or if selected for retirement by the model.

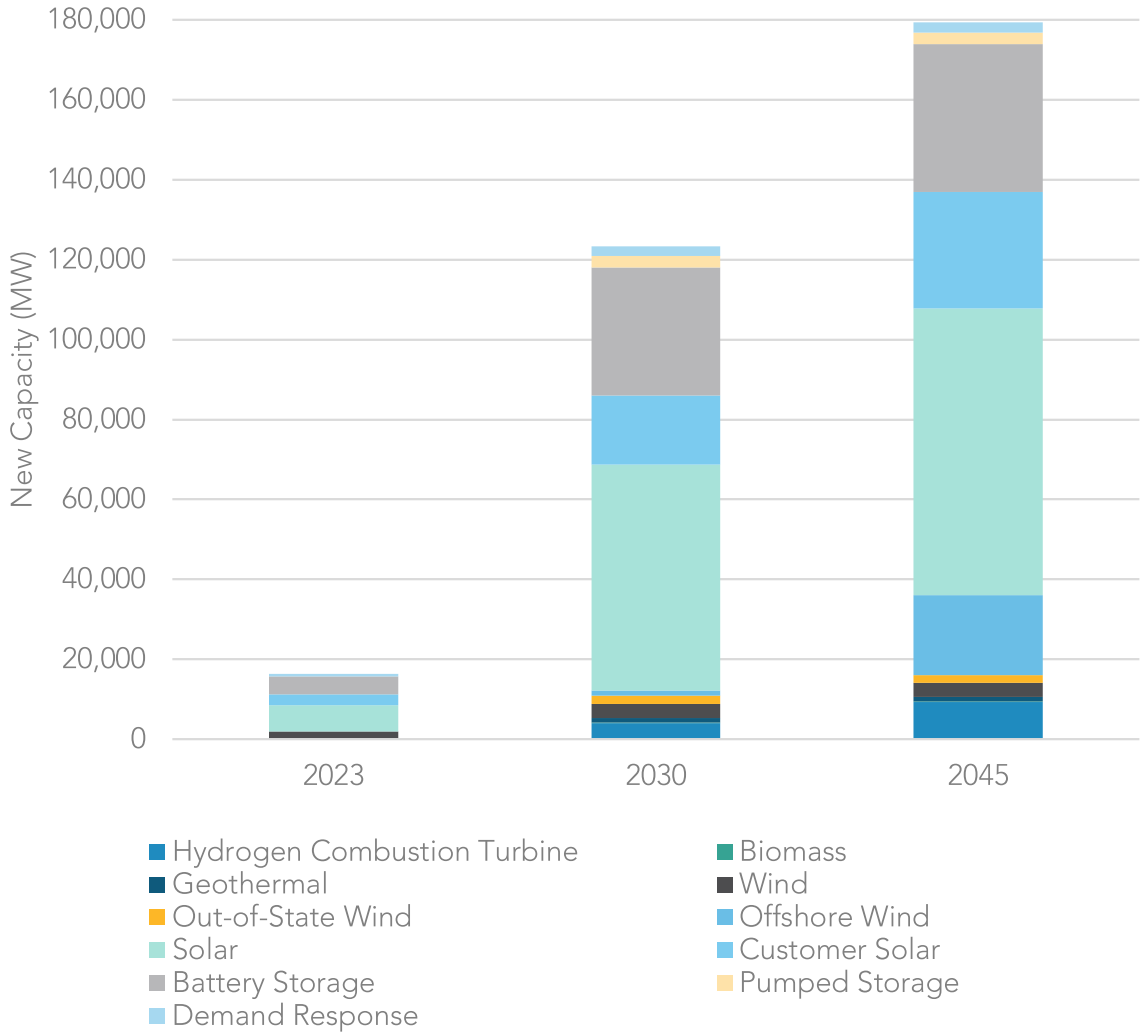
[367] CARB. 2021. PATHWAYS Scenario Modeling: 2022 Scoping Plan Update – Attachment B: Generation Technologies to be included in Modeling. *https://ww2.arb.ca.gov/sites/default/files/2021-12/Revised_2022SP_ScenarioAssumptions_15Dec.pdf*.

zero-carbon electricity resources will enable electricity to become a zero-carbon substitute for fossil fuels across the economy.

Figure 4-5 shows the modeled resource capacity to meet the SB 100 retail sales target.[368] Energy efficiency moderates some of the need for additional electricity generation. However, that is quickly surpassed by growing electricity demand of 26 percent by 2030 and 76 percent by 2045 compared to today (2022) from increased population and electrification of other sectors, as shown in Figure 4-6. The estimated resource build needed to meet this level of demand amounts to approximately 72 GW of utility solar[369] and 37 GW of battery storage by 2045. Annual build rates (over the 2022–2035 period) for the Scoping Plan Scenario will need to increase by about 60 percent and over 700 percent for utility solar and battery storage, respectively, compared to historic maximum rates.[370] To reach the 2045 target, the state will need to quadruple its current level of wind and solar capacity. This does not include capacity associated with hydrogen production nor mechanical CDR, which was modeled off-grid; assuming hydrogen production via electrolysis, this would roughly be equivalent to an additional 10 GW[371] of solar generation needed in 2045, and an additional 64 GW of solar generation for direct air capture in 2045. The scale of solar and battery build rates needed could be reduced through the commercialization of new zero-carbon technologies.

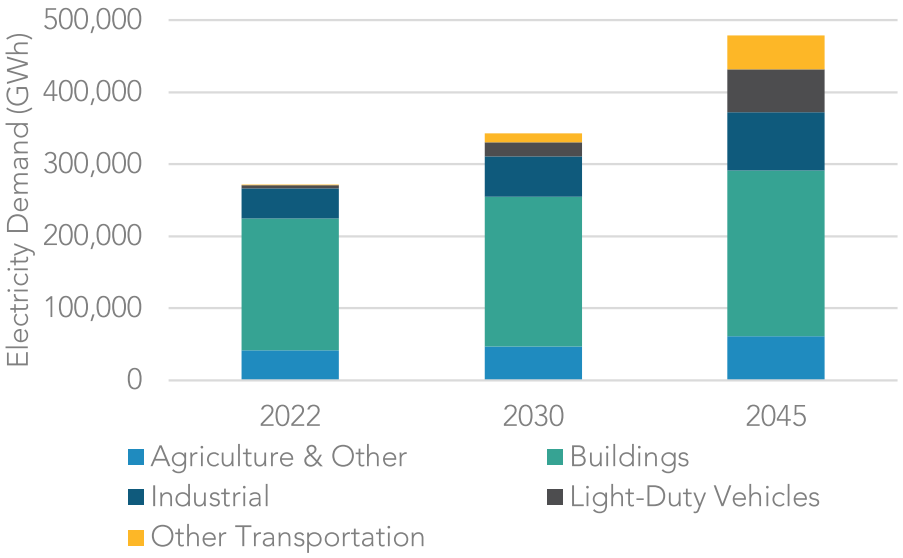
[368] SB 846 requires that load-serving entities exclude energy, capacity, or any attribute from the Diablo Canyon power plant in their resource plans. The Scoping Plan Scenario excludes energy, capacity, or any attribute from the Diablo Canyon power plant after the prior planned retirement date of 2025.
[369] The amount of additional customer solar included in the Scoping Plan Scenario is 29,208 MW by 2045.
[370] E3. 2022. CARB Scoping Plan: AB32 Source Emissions Final Modeling Results. PowerPoint. *https://ww2.arb.ca.gov/sites/default/files/2022-11/SP22-MODELING-RESULTS-E3-PPT.pdf*. Build rates are from EIA data historical builds in the 2011–2021 time frame.
[371] The estimate does not include hydrogen production assumed to be produced with bioenergy with carbon capture and storage (BECCS) and steam methane reforming (SMR).

**Figure 4-5: Projected new electricity resources needed by 2045 in the Scoping Plan Scenario[372]**




[372] See https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-PATHWAYS-data-E3.xlsx for the capacity build-out by resource type.

**Figure 4-6: Electric loads in 2022, 2030 and 2045 for the Scoping Plan Scenario[373]**




This transformation will drive investments in a large fleet of generation and storage resources but will also require significant transmission to accommodate these new capacity additions. Transmission needs include high-voltage lines to access out-of-state resources and major in-state generation pockets. In consideration of typical 8- to 10-year lead times for many projects, the CAISO published its first 20-Year Transmission Outlook to inform transmission planning focused on meeting the needs identified through the 2021 SB 100 Joint Agency Report process. The outlook calls for significant transmission development to access offshore wind and out-of-state wind and reinforce the existing CAISO footprint at an estimated cost of $30.5 billion.[374]

Presently, fossil gas power plants provide about 75 percent of the flexible capacity for grid reliability as more renewable power enters the system. Moving forward, other resources such as storage and demand-side management are essential to maintain reliability with high concentrations of renewables. Hydrogen produced from renewable resources and renewable feedstocks can serve a dual role as a low-carbon fuel for existing combustion turbines or fuel cells, and as energy storage for later use. Reliability

[373] *Other Transportation* includes all non-light-duty vehicles and reflects electrification of modes like passenger and freight rail, aviation, and ocean-going vessels.
[374] CAISO. 2022. *20 Year Transmission Outlook.* http://www.caiso.com/InitiativeDocuments/20-YearTransmissionOutlook-May2022.pdf.

also can be supported through increased coordination and markets in the interconnected western power grid; this is already helping to better integrate renewables.[375]

**Strategies for Achieving Success**

- Use long-term planning processes (Integrated Energy Policy Report, IRP, CAISO Transmission Planning Process, AB 32 Climate Change Scoping Plan) to support grid reliability and expansion of renewable and zero-carbon resource and infrastructure deployment.
- Complete systemwide and local reliability assessments across CAISO and other balancing authority areas, using realistic assumptions for land use, build rates, statewide and distribution system level constraints, and energy needs. Such assessments should be completed before state agencies update their electricity sector GHG targets.
- Prioritize actions to mitigate impacts to electricity reliability and affordability and provide sufficient flexibility in the state's decarbonization roadmap for adjustments as may be needed.
- Facilitate long lead-time resource development through the IRP and the SB 100 interagency process and through technology development and demonstration funding[376] that includes resources such as long-duration energy storage and hydrogen production.
- Continue coordination between energy agencies and energy proceedings to maximize opportunities for demand response.
- Continue to explore the benefits of regional markets to enhance decarbonization, reliability, and affordability.
- Address resource build-out challenges, including permitting, interconnection, and transmission network upgrades.
- Explore new financing mechanisms and rate designs to address affordability.[377]
- Per SB 350, double statewide energy efficiency savings in electricity and fossil gas end uses by 2030, through a combination of energy efficiency and fuel substitution actions.[378]
- Per SB 100 and SB 1020, achieve 90 percent, 95 percent, and 100 percent

[375] CEC. 2021. *2021 SB 100 Joint Agency Report – Achieving 100 Percent Clean Electricity in California: An Initial Assessment.* Publication Number: CEC-200-2021-001.
[376] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, ES2. The committee recommendation speaks specifically to offshore wind production. *finalejacrecs.pdf (arb.ca.gov)*.
[377] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF30. *finalejacrecs.pdf (arb.ca.gov)*.
[378] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF1, NF2. *finalejacrecs.pdf (arb.ca.gov)*.

renewable and zero-carbon retail sales by 2035, 2040, and 2045, respectively.

- Evaluate and propose, as needed, changes to strengthen the Cap-and-Trade Program.
- Target programs and incentives to support and improve access to renewable and zero-carbon energy projects (e.g., rooftop solar, community owned or controlled solar or wind, battery storage, and microgrids) for communities most at need, including frontline, low-income, rural, and indigenous communities.[379]
- Prioritize public investments in zero-carbon energy projects to first benefit the most overly burdened communities affected by pollution, climate impacts, and poverty.[380]

## Sustainable Manufacturing and Buildings

Fossil gas is the primary gaseous fossil fuel used to produce heat at industrial facilities, as well as in residential and commercial buildings. In buildings, space and water heating, cooking, and clothes drying all rely on gaseous fuels today. Industrial processes that require heat for conventional boilers and other processes also rely on gaseous fuels. Refineries rely on fossil gas and other gaseous fossil fuels, like liquefied petroleum gas and refinery fuel gas, and fossil gas is also used to generate electricity, as discussed earlier.

Gaseous fossil fuel use can be displaced by four primary alternatives: zero-carbon electricity, solar thermal heat, hydrogen, and biogas/biomethane. Displacing gaseous fossil fuel use can yield indoor air quality benefits, protect public health and property from unexpected fossil gas leaks, and reduce short-lived climate pollutants, which are many times more potent in affecting climate change than $CO_2$. The Scoping Plan Scenario reduces dependence on fossil gas in the industrial and building sectors by transitioning substantial energy demand to alternative fuels. Reducing fossil gas combustion also will help toward achieving our air quality and equity goals by reducing pollution in neighboring areas and communities. In addition, reduced dependence on gasoline and diesel in the transportation sector diminishes the need for gaseous fossil fuels to support oil and gas production and petroleum refining operations as those are phased down relative to the demand.

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[379] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF2, NF9, NF11, NF12, NF13. finalejacrecs.pdf (arb.ca.gov).

[380] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF14. finalejacrecs.pdf (arb.ca.gov).

## Sector Transition

### Industry

California's industrial sector contributes significantly to the state's economy, with a total output from manufacturing in 2019 of $324 billion (10.4 percent of the state total)[381] and employment of 1,222,000 manufacturing jobs (7.6 percent of the total state workforce).[382] California industry includes a diverse range of facilities, including cement plants, refineries, glass manufacturers, oil and gas producers, paper manufacturers, mining operations, metal processors, and food processors. Combustion of fossil gas, other gaseous fossil fuels, and solid fossil fuels provide energy to meet three broad industry needs: electricity, steam, and process heat. Non-combustion emissions result from fugitive emissions and from the chemical transformations inherent to some manufacturing processes. About 20 percent of the GHG emissions from the industrial sector are non-combustion emissions.

Decarbonizing industrial facilities depends upon displacing fossil fuel use with a mix of electrification, solar thermal heat, biomethane, low- or zero-carbon hydrogen, and other low-carbon fuels to provide energy for heat and reduce combustion emissions. Emissions also can be reduced by implementing energy efficiency measures and using substitute raw materials that can reduce energy demand and some process emissions. Some remaining combustion emissions and some non-combustion $CO_2$ emissions can be captured and sequestered. The strategy employed will depend on the industrial subsector and the specific processes utilized in production. The left side of Figure 4-7 illustrates the fuels used to meet industrial manufacturing energy demand in 2020. Industrial manufacturing energy demand needs to transition to the fuel mix shown for 2035 and 2045. The right side of Figure 4-7 illustrates the fuel mix needed to meet the energy demand of oil and gas extraction and petroleum refining operations for the same years. Energy demand in this portion of the industrial sector declines along with decreased demand for gasoline and diesel in the transportation sector. In both figures there is a continuing demand for fossil gas due to lack of non-combustion technologically feasible or cost-effective alternatives for certain industrial sectors. Policies that support decarbonization strategies like electrification, use of renewable energy, and transition to alternative fuels are needed.

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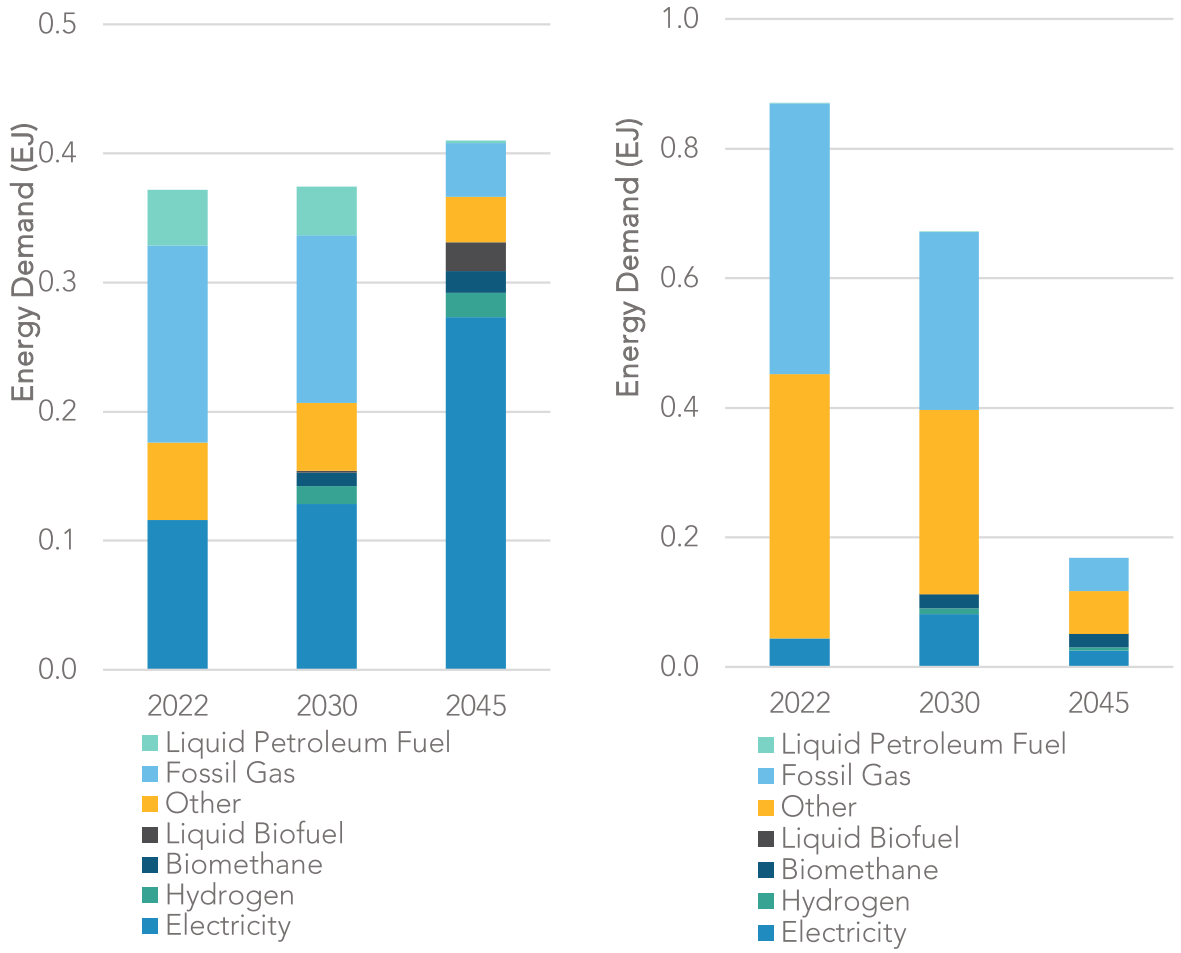
[381] National Association of Manufacturers (NAM). 2021 California Manufacturing Facts. https://www.nam.org/state-manufacturing-data/2021-california-manufacturing-facts/.
[382] NAM. 2021 California Manufacturing Facts. https://www.nam.org/state-manufacturing-data/2021-california-manufacturing-facts/.

**Figure 4-7: Final energy demand in industrial manufacturing (left) and in oil and gas extraction and petroleum refining (right) in 2022, 2030, and 2045 in the Scoping Plan Scenario[383]**




Electrification and solar thermal heat are best-suited to industrial processes that have relatively low heat requirements, such as food processors, paper mills, and industries that use low-pressure steam in their processes. Approaches could include replacing fossil gas boilers with electric boilers, process heaters with industrial electric heat pumps, steel forging furnaces with induction heaters, and implementing other sector-specific process electrification. Under current rate structures for industrial electricity and fossil gas in

[383] *Other* fuel in the industrial manufacturing sector is primarily coke and coal for cement production. *Other* fuel in the petroleum refining sector is primarily fossil gas associated with refining petroleum products.

California, most projects to electrify a fossil gas-powered industrial process will face operating cost barriers and potential reliability concerns. Microgrids powered by renewable resources and with battery storage are emerging as a key enabler of electrification and decarbonization at industrial facilities.

There are fewer commercially available and economically viable electrification options to replace industrial processes that require higher-temperature heat. For these processes, onsite combustion may continue to be needed, and decarbonization will require fuel substitution to hydrogen,[384] biomethane, or other low-carbon fuels. Fuel substitution and continued combustion will require monitoring and mitigation of any potential air quality impacts, especially in low-income and communities of color which already face disproportionate air pollution burdens. Industries in California with high heat needs include steel forging, glass manufacturing, and industries with calcination processes, such as manufacturing lime and cement.

Onsite emissions from cement manufacturing derive from two main sources: (1) fuel combustion to heat the kiln to a very high temperature and (2) process $CO_2$ emissions from the chemical transformation of limestone. Over 60 percent of emissions from the sector are process emissions unrelated to fuel use, and most emissions related to fuel use are from coal and petroleum coke combustion. Process emissions from cement manufacturing are significant and will continue even if the sector were to operate using only zero-carbon fuels; thus carbon capture and use/sequestration will be a likely component of any strategy to fully decarbonize cement manufacturing. There are additional opportunities to reduce GHG emissions from cement manufacturing via the combination of fuel-switching to low-carbon fuels (e.g., biomethane, municipal solid waste, biochar), increased blending of non-clinker materials, and efficiency improvements. High technological and economic barriers exist to electrifying kiln process heat at cement plants, as clinker production requires temperatures in excess of 1,500°C. There are potential decarbonization opportunities throughout the value chain of cement use, including in cement manufacturing, concrete mixing, and construction practices.[385] SB 596 (Becker, Chapter 246, Statutes of 2021), which was signed by Governor Newsom in September 2021, requires CARB to develop a comprehensive strategy for cement use in California to achieve a GHG intensity 40 percent below 2019 levels by 2035, and net-zero emissions by 2045.

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[384] Griffiths, Steve, Benjamin K. Sovacool, Jinsoo Kim, Morgan Bazilian, and Joao M. Uratani. 2021. "Industrial decarbonization via hydrogen: A critical and systematic review of developments, socio-technical systems and policy options." *Energy Research & Social Science* 80. 102208, ISSN 2214-6296. https://doi.org/10.1016/j.erss.2021.102208.

[385] California Nevada Cement Association. Achieving Carbon Neutrality in the California Cement Industry. https://cncement.org/attaining-carbon-neutrality.

Oil and gas extraction and refining make up over half of California's industrial GHG emissions. Reduced demand for transportation fossil fuels corresponds to reduced supply of fossil gas and other gaseous fossil fuels for refineries to produce these fuels. Some refining operations will continue to operate to produce fossil fuel for the remaining transportation energy demands, along with renewable diesel and sustainable aviation fuel, as discussed in the Transportation Sustainability section of this chapter.

Across industrial subsectors and processes, California facilities also could realize significant reductions in GHG emissions and energy-related costs by implementing advanced energy efficiency projects and tools.[386] While enhanced operation and maintenance practices are typical at industrial facilities, additional strategic energy management practices offer greater efficiency gains by focusing on setting goals, tracking progress, and reporting results.

**Strategies for Achieving Success**

- Maximize air quality benefits using the best available control technologies for stationary sources in communities most in need, including frontline, low-income, disadvantaged, rural, and tribal communities.[387]
- Prioritize alternative fuel transitions first in communities most in need, including frontline, low-income, disadvantaged, rural, and tribal communities.[388]
- Invest in research and development and pilot projects to identify options to reduce materials and process emissions along with energy emissions in California's industrial manufacturing facilities, leveraging programs like the CEC's Electric Program Investment Charge (EPIC).[389]
- Evaluate and propose, as needed, changes to strengthen the Cap-and-Trade Program.
- Support electrification with changes to industrial rate structures.
- Develop infrastructure for CCS and hydrogen production to reduce GHG emissions where cost-effective and technologically feasible non-combustion alternatives are not available.
- Implement SB 905.

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[386] Therkelsen, Peter, Aimee McKane, Ridah Sabouini, and Tracy Evans. 2013. *Assessing the Costs and Benefits of the Superior Energy Performance Program.* U.S Department of Energy. https://www.osti.gov/servlets/purl/1165470.

[387] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, JT14. finalejacrecs.pdf (arb.ca.gov).

[388] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, JT15. finalejacrecs.pdf (arb.ca.gov).

[389] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, M20. finalejacrecs.pdf (arb.ca.gov).

- Establish markets for low-carbon products and recycled materials using Buy Clean California Act and other mechanisms relying on robust data
- Develop a net-zero cement strategy to meet SB 596 targets for the GHG intensity of cement use in California.
- Continue to leverage energy-efficiency programs, including the U.S. DOE's ENERGY STAR program,[390] U.S. DOE's Superior Energy Performance program,[391] and ISO 50001.[392]
- Evaluate and continue to offer incentives to install energy efficiency and renewable energy technologies through programs such as CPUC decisions as part of rulemaking R.19-09-009[393] and the CEC's Food Production Investment Program (FPIP) and EPIC programs.[394]
- Leverage low-carbon hydrogen programs, including the Bipartisan Infrastructure Law, for regional hydrogen hubs, hydrogen electrolysis, and hydrogen manufacturing and recycling.
- Evaluate the role of hydrogen in meeting GHG emission reductions, including policy recommendations regarding the use of hydrogen in California as required by SB 1075.
- Address cost barriers to promote low-carbon fuels for hard-to-electrify industrial applications.

## Buildings

Buildings have cross-sector interactions that influence our public health and well-being and affect land use and transportation patterns, energy use, water use, and indoor and outdoor environments.[395] There are about 14 million existing homes and over 7.5 billion square feet of existing commercial buildings[396] in California. Fossil gas supplies about half of the energy consumed by end uses in these buildings. In addition to GHG emissions, fossil gas usage in buildings also produces $CO_2$, NOx, $PM_{2.5}$, and

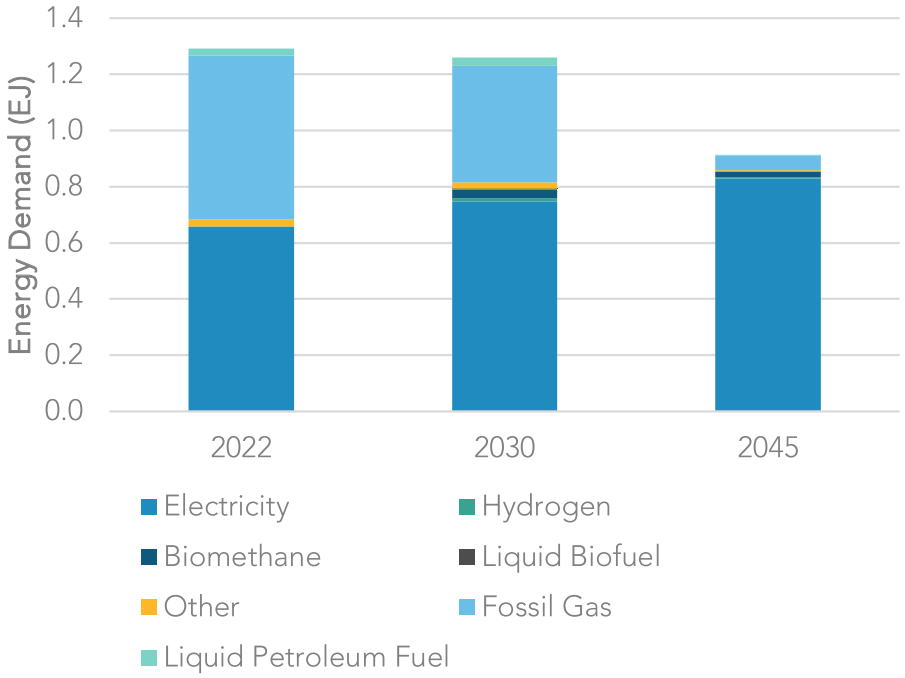
[390] ENERGY STAR. ENERGY STAR Guidelines for Energy Management. https://www.energystar.gov/buildings/tools-and-resources/energy-star-guidelines-energy-management.
[391] Energy.gov. Superior Energy Performance 50001. https://www.energy.gov/eere/amo/superior-energy-performance.
[392] ISO. ISO 50001 Energy Management. https://www.iso.org/iso-50001-energy-management.html.
[393] CPUC. January 14, 2021. CPUC Adopts Strategies to Help Facilitate Commercialization of Microgrids Statewide. https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M360/K370/360370887.PDF.
[394] Bailey, Stephanie, David Erne, and Michael Gravely. 2021. *Final 2020 Integrated Energy Policy Report Update, Volume II: The Role of Microgrids in California's Clean and Resilient Energy Future, Lessons Learned From the California Energy Commission's Research.* California Energy Commission. Publication Number: CEC-100-2020-001-V2-CMF.
[395] See Appendix F (Building Decarbonization).
[396] CEC. 2021. California Building Decarbonization Assessment. https://efiling.energy.ca.gov/GetDocument.aspx?tn=239311&DocumentContentId=72767.

formaldehyde.[397] Each year, about 120,000 new homes[398] and more than 100 million-square feet[399] of commercial buildings are newly constructed across California. These new buildings will represent between a third to half of the total building stock by mid-century.

Achieving carbon neutrality must include transitioning away from fossil gas in residential and commercial buildings, and will rely primarily on advancing energy efficiency while replacing gas appliances with non-combustion alternatives. This transition must include the goal of trimming back the existing gas infrastructure so pockets of gas-fueled residential and commercial buildings do not require ongoing maintenance of the entire limb for gas delivery. Blending low-carbon fuels such as hydrogen and biomethane into the pipeline further displaces fossil gas. Pipeline safety and reliability must be evaluated to accommodate low-carbon fuels. Figure 4-8 illustrates the energy Californians use in buildings at present compared with the Scoping Plan Scenario, which introduces alternatives to fossil gas. In that scenario almost 90 percent of energy demand is electrified by 2045, and the remaining energy demand is met with combustion of hydrogen, biomethane, and fossil gas.

[397] Zhu, Yifang, et al. 2020. *Effects of Residential Gas Appliances on Indoor and Outdoor Air Quality and Public Health in California.* UCLA Fielding School of Public Health Department of Environmental Health Sciences.
[398] Construction Industry Research Board. 2018. Annual Building Permit Summary. *http://www.cirbreport.org*.
[399] Delforge, Pierre. August 11, 2021. California Forging Ahead on Zero Emission Buildings. Blog. NRDC. *https://www.nrdc.org/experts/pierre-delforge/california-forging-ahead-zero-emission-buildings*.

**Figure 4-8: Final energy demand in buildings in 2022, 2030, and 2045 in the Scoping Plan Scenario[400]**

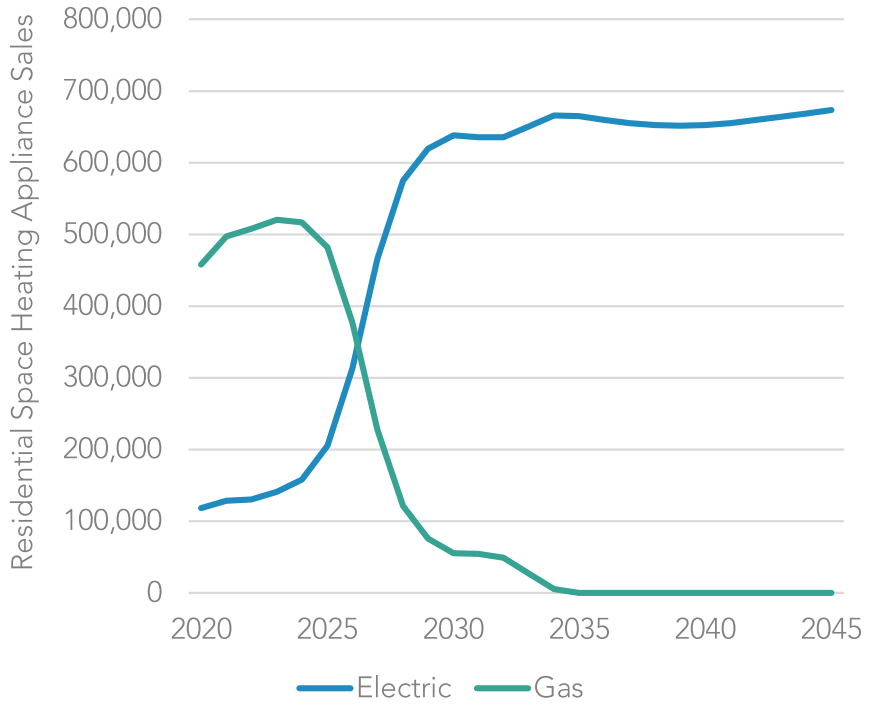



This transition is achieved when all new buildings constructed include non-combustion appliances, and appliances in existing buildings are replaced at the end of their useful life with non-combustion alternatives. Currently, electric alternatives, combined with the decarbonizing of California's grid, are the most effective alternatives, and the Scoping Plan Scenario modeled these alternatives. The Scoping Plan Scenario assumes three million all-electric and electric-ready homes by 2030 and seven million by 2035. Figure 4-9 illustrates the pace at which electric space heating appliance sales increase and gas space heating appliance sales decrease in residences in the Scoping Plan Scenario, such that by 2035 100 percent of residential home appliance sales are electric. By 2030 over six million electric heat pumps are installed statewide. The residential electric space heating appliance sales increases rapidly in the near term as new all-electric buildings are constructed and as existing buildings are renovated to utilize electric appliances. A similar transition is envisioned for other home appliances. Commercial buildings also will undergo a transition away from gas appliances to electric appliances, achieving 80 percent sales of all-electric appliances by 2035 and 100 percent by 2045. Appendix F (Building Decarbonization) describes a holistic policy approach to rapidly grow the

[400] *Other* fuel in the buildings sector is primarily liquid petroleum gas and waste heat.

number of zero emission appliances and buildings, to surmount the market barriers, and to prioritize an equitable transition for vulnerable communities.

**Figure 4-9: Residential space heating appliance sales in the Scoping Plan Scenario**




**Strategies for Achieving Success**

- Prioritize California's most vulnerable residents with the majority of funds in the new $922 million Equitable Building Decarbonization program, created through the 2022–2023 state budget. This would include residents in frontline, low-income, disadvantaged, rural, and tribal communities. This program is dedicated to a statewide direct-install building retrofit program for low-income households to replace fossil fuel appliances with electric appliances, energy-efficient lighting, and building insulation and sealing while also coordinating reductions in gas infrastructure in specific geographic areas.
- Achieve three million all-electric and electric-ready homes by 2030 and seven million by 2035 with six million heat pumps installed statewide by 2030.
- Expand incentive programs to support the holistic retrofit of existing buildings, especially for vulnerable communities.
- Ensure that incentive programs prioritize energy affordability and tenant protections, promote affordable and low-income household retrofits that improve habitability and reduce expenses, protect and empower small landlords and homeowners, address overlooked consumer groups, and pair decarbonization

with other critically needed renovation efforts to ensure that buildings support human health and are climate- and weather-resistant.[401]

- End fossil gas infrastructure expansion for newly constructed buildings.[402]
- Evaluate and propose, as needed, changes to strengthen the Cap-and-Trade Program.
- Strengthen California's building standards to support zero-emission new construction.
- Develop building performance standards for existing buildings.
- Adopt a zero-emission standard for new space and water heaters sold in California beginning in 2030, as specified in the 2022 State Strategy for the State Implementation Plan.
- Expand use of low-GWP refrigerants within buildings.
- Support electrification with changes to utility rate structures and by promoting load management programs.
- Increase funding for incentive programs and expand financing assistance programs focused on existing buildings and appliance replacements.
- Expand consumer education efforts to raise awareness and stimulate the adoption of decarbonized buildings and appliances, especially in vulnerable communities.
- Implement biomethane procurement targets for investor-owned utilities as specified in SB 1440 (Hueso, Chapter 739, Statutes of 2018) to reduce GHG emissions in remaining pipeline gas and reduce methane emissions from organic waste.

[401] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF23, NF24, NF25, NF26, NF28. *finalejacrecs.pdf (arb.ca.gov)*.
[402] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF22. *finalejacrecs.pdf (arb.ca.gov)*.

## Carbon Dioxide Removal and Capture

*Climate Change 2022: Mitigation of Climate Change,*[403] a report by the IPCC released in early 2022, states "The deployment of CDR to counterbalance hard-to-abate residual emissions is unavoidable if net zero $CO_2$ or GHG emissions are to be achieved. The scale and timing of deployment will depend on the trajectories of gross emission reductions in different sectors. Upscaling the deployment of CDR depends on developing effective approaches to address feasibility and sustainability constraints especially at large scales." In line with that report, this Scoping Plan considers CDR as a complement to technologically feasible and cost-effective GHG emissions mitigation, and the size of its role will depend on the degree of success in reducing GHG emissions at the source across the economy. [404] The modeling shows that emissions from the AB 32 GHG Inventory sources will continue to persist even if all fossil related combustion emissions are phased out. These residual emissions must be compensated for to achieve carbon neutrality. Options for CDR include both sequestration in natural and working lands and mechanical approaches like direct air capture. Chapter 2 provides estimates on how much $CO_2$ removal is possible by our natural and working lands and how much must be removed by mechanical CDR.

CCS, which is carbon capture from anthropogenic point sources, is described in Chapter 2 and involves capturing carbon from a smokestack of an emitting facility. Direct air capture, on the other hand, captures carbon directly from the atmosphere. Direct air capture technologies, unlike CCS, are not associated with any particular point source.

For this section, *carbon management* refers to the capture, movement, and sequestration of $CO_2$ through mechanical solutions for both capture at point sources and direct removal from the atmosphere through direct air capture.[405] Enabling policies and regulations across each of these steps are necessary for individual projects, and on a broader scale, for delivering reductions in support of the state's carbon neutrality and long-term carbon-negative goals. Figure 4-10 provides a graphic of the typical carbon management infrastructure.

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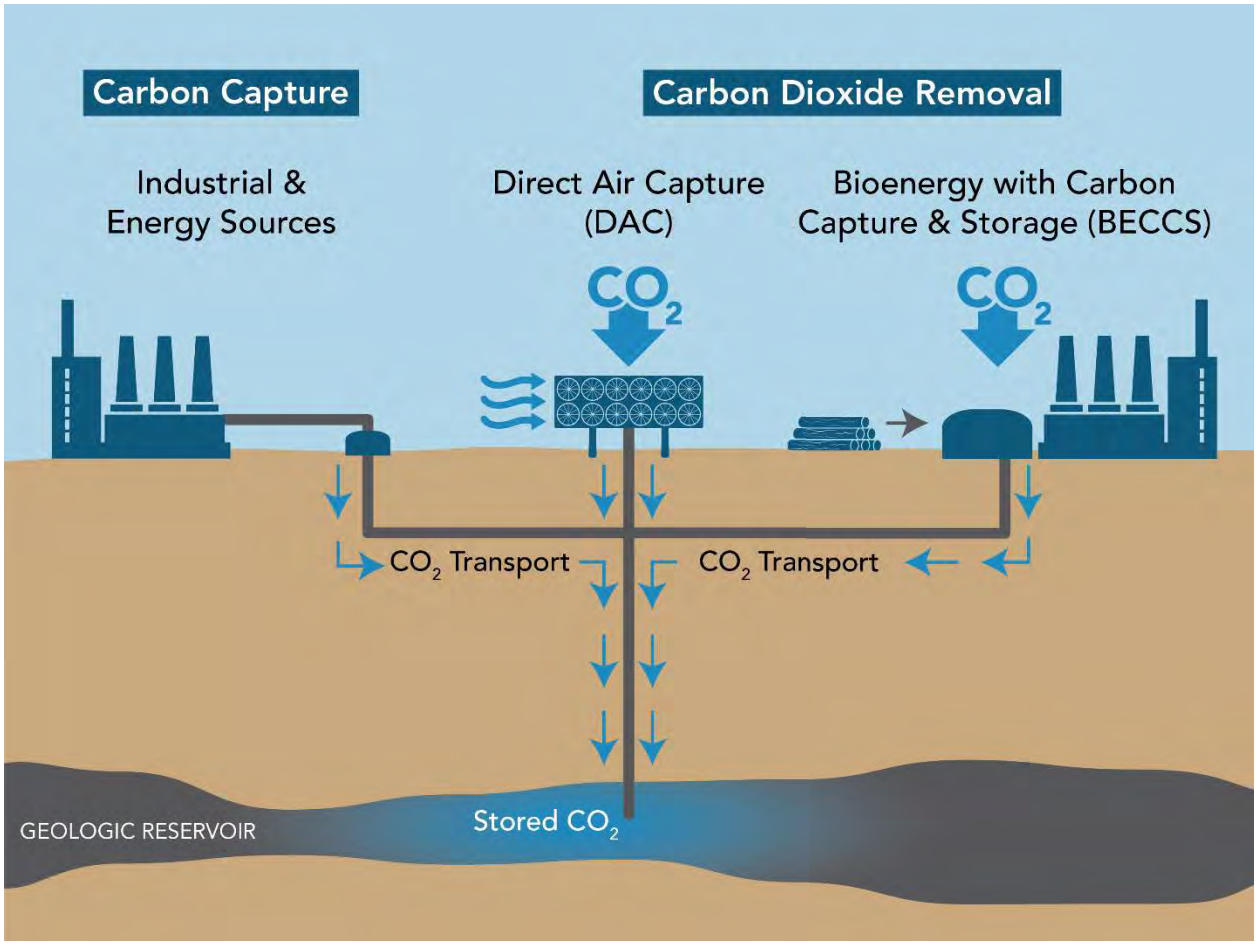
[403] IPCC. 2022. *Climate Change 2022: Mitigation of Climate Change.* https://www.ipcc.ch/report/sixth-assessment-report-working-group-3/.
[404] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F4.7. finalejacrecs.pdf (arb.ca.gov).
[405] CDR through natural and working lands is discussed in Chapter 2 and later in this chapter.

**Figure 4-10: Carbon management infrastructure**




Carbon dioxide removal directly from the atmosphere itself refers to a suite of carbon negative technologies that can be used to draw down ongoing and historical carbon emissions already in the atmosphere. Some $CO_2$ removal technologies leverage the abilities of both natural photosynthesis and mechanical removal by using biomass wastes as inputs to make low- or zero-carbon energy or fuels, all while capturing and storing produced $CO_2$.

Captured $CO_2$ from point sources or from the atmosphere is permanently stored in specialized geologic formations, typically half a mile or more underground. A recent Stanford University study estimated the state's commercial storage potential is nearly 70,000 million metric tons of $CO_2$, even when excluding oil and gas reservoirs.[406] California is well-positioned because few other places on the West Coast are suitable for

[406] Stanford Center for Carbon Storage. Opportunities and Challenges for CCS in California. https://sccs.stanford.edu/california-projects/opportunities-and-challenges-for-CCS-in-California.

geologic storage at scale. To inform discussion around $CO_2$ removal, CARB held two full-day workshops exploring the types of options for carbon capture and geologic storage and utilization in products.[407,408,409]

The modeling results provided in Chapter 2 demonstrate the targeted need for CCS on large facilities such as refineries and cement. The CCS numbers do not include the potential additional applications for producing hydrogen with biomethane, other manufacturing, electricity, or other bioenergy. If CCS is not deployed, those emissions would be released directly into the atmosphere and instead need to be addressed through CDR to achieve carbon neutrality. Although a study finds California has 76 existing electricity and industrial facilities that are suitable candidates for CCS retrofit,[410] this Scoping Plan proposes a targeted role for this technology such that it would only be used to address sectors where non-combustion options are not technologically feasible or cost-effective at this time, to the extent needed to achieve the 85 percent reduction in anthropogenic emissions as called for in AB 1279. In future updates to the Scoping Plan, there may be additional options for technologically feasible or cost-effective technologies that may be deployed, which would further reduce the need for CCS and CDR except in situations to address historical GHG emissions.

Recognizing the need for carbon capture and utilization sequestration and removal, the Legislature passed, and the governor signed, SB 905. It includes several key requirements in the development of the state's Carbon Capture Removal, Utilization, and Storage Program. The following is a summary of the work to be completed to establish and administer this program. Many of these steps will address the need to evaluate the safety and efficacy of actions to support carbon removal, sequestration, and transfer via pipelines. Note that not all of these actions are under CARB's authority.

- Review technology to evaluate efficacy, safety, viability of CCUS/CDR methodologies.
- Develop monitoring and reporting requirements and schedules.
- Develop a unified permit application.
- Develop financial responsibility requirements.
- Develop a centralized public database for project status.

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[407] CARB. December 11, 2019. Carbon Neutrality Meetings & Workshops. https://ww2.arb.ca.gov/our-work/programs/carbon-neutrality/carbon-neutrality-meetings-workshops.
[408] CARB. August 2, 2021 Scoping Plan Meetings & Workshops. https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/scoping-plan-meetings-workshops.
[409] *Carbon utilization* refers to the use of captured carbon to produce products such as plastics and concrete.
[410] Glenwright, Kara. 2020. *Roadmap for carbon capture and storage in California.* Precourt Institute for Energy. https://earth.stanford.edu/news/roadmap-carbon-capture-and-storage-california#gs.ysj78g.

- Consult with CNRA on pore space requirements as CNRA develops a framework for pore space governing agreements.
- Establish a Geologic Carbon Sequestration Group to identify suitable injection well locations, subsurface monitoring, and potential hazards that may require suspension of injection.

SB 905 also has requirements for project developers such as to develop monitoring plans and to avoid any adverse health and environmental impacts at the carbon capture location—or mitigation of unavoidable impacts as required under existing requirements. For the site of injection, there are requirements for site stability, monitoring, and reporting plans. SB 905 also bans CCS with enhanced oil recovery in California and prohibits the transfer of $CO_2$ via pipeline until the U.S. Department of Transportation's Pipelines and Hazardous Materials Safety Administration (PHMSA) completes its current rulemaking to update existing $CO_2$ pipeline safety requirements.

An often-cited example of pipeline concerns involves a $CO_2$ pipeline in Mississippi. On February 22, 2020, a $CO_2$ pipeline operated by Denbury Gulf Coast Pipelines LLC (Denbury) ruptured in proximity to the community of Satartia, Mississippi. The rupture followed heavy rains that resulted in a landslide, creating excessive axial strain on a pipeline weld (DOT 2022). The combination of weather and topography resulted in a slower dissipation of the gas. The pipeline was also carrying hydrogen sulfide, a flammable and toxic gas. The pipeline failed on a steep embankment, which had recently subsided. Heavy rains are believed to have led to a landslide, which created axial strain on the pipeline and resulted in a full circumferential girth weld failure. The PHMSA investigation also revealed several contributing factors to the accident, including but not limited to: Denbury not addressing the risks of geohazards in its plans and procedures, underestimating the potential affected areas that could be impacted by a release in its $CO_2$ dispersion model, and not notifying local responders to advise them of a potential failure.

As the Satartia example highlights, appropriate pipeline safety and environmental standards in California are critical to minimize any risks from $CO_2$ transport in the future. As such, SB 905 also tasks CNRA, in consultation with the Public Utilities Commission, to, no later than February 1, 2023, provide a proposal to the Legislature to establish a state framework and standards for the design, operation, siting, and maintenance of intrastate pipelines carrying $CO_2$ fluids of varying composition and phase to minimize the risk posed to public and environmental health and safety. The recommended framework shall be designed to minimize risk to public health and environmental health and safety, to the extent feasible. Because SB 905 prohibits the transfer of $CO_2$ via pipeline until the PHMSA completes its current rulemaking to update existing $CO_2$ pipeline safety requirements, CCS or CDR projects that would require a pipeline to transfer $CO_2$ are not feasible at this time within California.

Ultimately, and in accordance with SB 905, the merits of each CCS or CDR project must be evaluated on a case-by-case basis.[411] Deployment of CCS and CDR could support skilled jobs and workforces, including those in traditional fossil energy communities. Other co-benefits could include criteria air pollutant reductions and water production. It will be important to design projects that do not exacerbate community health impacts, include early and ongoing community engagement, and are in compliance with local, state, and federal public health and environmental protection laws. It also should be noted that, as these types of projects are an emerging area of governance, additional coordination and discussion will be needed among the various levels of authorities involved. SB 905 has already initiated this process by assigning specific agencies with tasks related to their expertise and authority.

Chapter 2 includes a more detailed discussion about the proposed role of $CO_2$ removal in this Scoping Plan.

## Sector Transition

State,[412] national,[413,414] and global decarbonization analyses[415] indicate a significant role for carbon management infrastructure, yet relatively few projects are operational. Around the world, about two dozen large CCS projects are capturing tens of millions of metric tons of $CO_2$ each year, with about a dozen operating in the United States.[416] The vast majority of capacity is at industrial facilities, such as ethanol and fertilizer plants, that would otherwise vent nearly pure $CO_2$ into the atmosphere as a by-product of normal, non-combustion processes. Future research, development, and demonstration projects must refine and commercialize capture systems for more complex applications, especially

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[411] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F4.5. *finalejacrecs.pdf (arb.ca.gov)*.

[412] E3. October 2020. Achieving Carbon Neutrality in California Report: Final Presentation. *https://ww2.arb.ca.gov/sites/default/files/2020-10/e3_cn_final_presentation_oct2020_2.pdf*.

[413] World Resources Institute. January 31, 2020. CarbonShot: Federal Policy Options for Carbon Removal in the United States. Working paper. *https://www.wri.org/research/carbonshot-federal-policy-options-carbon-removal-united-states*.

[414] C2ES. No date. Getting to Zero: A U.S. Climate Agenda — Center for Climate and Energy Solutions. *https://www.c2es.org/getting-to-zero-a-u-s-climate-agenda-report/*.

[415] IPCC. Mitigation Pathways Compatible with 1.5°C in the Context of Sustainable Development. Chapter 2. *https://www.ipcc.ch/sr15/chapter/chapter-2/*. All analyzed pathways limiting warming to 1.5°C with no or limited overshoot use CDR to some extent to neutralize emissions from sources for which no mitigation measures have been identified and, in most cases, also to achieve net negative emissions to return global warming to 1.5°C following a peak (high confidence). The longer the delay in reducing $CO_2$ emissions toward zero, the larger the likelihood of exceeding 1.5°C, and the heavier the implied reliance on net negative emissions after mid-century to return warming to 1.5°C (high confidence).

[416] Congressional Research Service. 2021. Carbon Capture and Sequestration (CCS) in the United States. R44902. *https://crsreports.congress.gov/product/pdf/R/R44902?msclkid=e45e0012c25911ec8085ca575cb61e82*.

for those with limited decarbonization options. It has only been in the last few years that attention has seriously turned to mechanical CDR. As new information and modeling on climate change have been made available, the science has become clearer that avoiding the most catastrophic impacts of climate change requires both reducing emissions and deploying mechanical CDR.

California is paving a path forward on a science-based carbon management infrastructure policy that can serve as an example for other jurisdictions. The LCFS, which reduces the carbon intensity of transportation fuels, includes a protocol for select carbon management projects to become certified and generate LCFS credits.[417] CCS is not a new concept or technology. Twenty years of CCS testing show it is a safe and reliable tool.[418] As mentioned in Chapter 2, while no new CCS projects have been implemented or generated any credits under the CARB CCS protocol, CCS projects have been implemented elsewhere since the 1970s. Moreover, there has been a U.S. Department of Energy CCS research program underway for more than two decades. These all form a foundation of information for future efforts. Certified projects must successfully demonstrate adherence to rigorous pre-construction, operational, and site closure standards designed to strengthen environmental performance, as described in CARB's CCS Protocol. The protocol is designed to layer on top of existing federal carbon sequestration regulations designed to protect the environment. The protocol would need to be reevaluated if CCS were to be more broadly applied across sectors beyond transportation fuel production.

Direct air capture and carbon mineralization have high potential capacity for removing carbon, but direct air capture is currently limited by high cost. Carbon mineralization may also have high potential for removing carbon from the atmosphere, but understanding of the technology is still limited.[419] Direct air capture could also be deployed at higher rates to remove legacy GHG emissions from the atmosphere. Chapter 2 contains additional information on the current status of CCS and mechanical CDR projects globally, as well as federal support of such technologies.

**Strategies for Achieving Success**

- Implement SB 905.

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[417] CARB. 2018. Carbon Capture and Sequestration Protocol under the Low Carbon Fuel Standard. August 13. *https://ww2.arb.ca.gov/sites/default/files/2020-03/CCS_Protocol_Under_LCFS_8-13-18_ada.pdf*.

[418] National Energy Technology Laboratory. Permanence and Safety of CCS. *https://netl.doe.gov/coal/carbon-storage/faqs/permanence-safety*.

[419] Aines, Roger. No date. Options for Removing $CO_2$ from California's Air. Lawrence Livermore National Laboratory. *https://ww2.arb.ca.gov/sites/default/files/2021-08/llnl_presentation_sp_engineeredcarbonremoval_august2021.pdf*.

- Convene a multi-agency Carbon Capture and Sequestration Group comprised of federal, state, and local agencies to engage with environmental justice advocates, tribes, academics, researchers, and community representatives to identify the current status, concerns, and outstanding questions concerning CCS, and develop a process to engage with communities to understand specific concerns and consider guardrails to ensure safe and effective deployment of CCS.[420]
- Iteratively update the CARB CCS Protocol with the best available science and implementation experience.
- Incorporate CCS into other sectors and programs beyond transportation where cost-effective and technologically feasible options are not currently available and to achieve the 85 percent reduction in anthropogenic sources below 1990 levels as called for in AB 1279.
- Evaluate and propose, as appropriate, financing mechanisms and incentives to address market barriers for CCS and CDR.
- Evaluate and propose, as appropriate, the role for CCS in cement decarbonization (SB 596) and as part of hydrogen production pathways (SB 1075).
- Support carbon management infrastructure projects through core CEC research, development, and demonstration (RD&D) programs.
- Continue to explore carbon capture applications for producing or leveraging zero-carbon power for reliability needs as part of SB 100.
- Consider carbon capture infrastructure when developing hydrogen roadmaps and strategy, especially for non-electrolysis hydrogen production.
- Evaluate and streamline permitting barriers to project implementation while protecting public health and the environment.
- Explore options for how local air quality benefits can be achieved when CCS is deployed.
- Explore opportunities for CCS and CDR developers to leverage existing infrastructure, including subsurface infrastructure.
- Explore permitting options to allow for scaling the number of sources at carbon sequestration hubs.

## Short-Lived Climate Pollutants (Non-Combustion Gases)

Short-lived climate pollutants (SLCPs) include black carbon (soot), methane ($CH_4$), and fluorinated gases (F-gases, including hydrofluorocarbons [HFCs]). They are powerful climate forcers and harmful air pollutants that have an outsized impact on climate change

[420] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F4.9. finalejacrecs.pdf (arb.ca.gov).

in the near term, compared to longer-lived GHGs, such as $CO_2$. According to the IPCC's *Climate Change 2021: The Physical Science Basis,* in the near-term (i.e., 10- to 20-year time scale) the warming influence of all SLCPs combined will be at least as large as that of $CO_2$.[421] The United Nations Environment Programme's Global Methane Assessment[422] advises that achieving the least-cost pathways to limit warming to 1.5°C requires global methane emission reductions of 40–45 percent by 2030 alongside substantial simultaneous reductions of all climate forcers, including $CO_2$ and SLCPs. Action to reduce these powerful emissions sources today will provide immediate benefits—both to human health locally and to reduce warming globally—as the effects of our policies to transition to low carbon energy systems and achieve carbon neutrality further unfold.

In 2017, the Board approved the comprehensive Short-Lived Climate Pollutant Reduction Strategy (Strategy).[423] This strategy explained how the state would meet the following SB 1383-established targets:

- 40 percent reduction in total methane emissions[424] (including a separate 40 percent reduction in dairy and livestock emissions)
- 40 percent reduction in hydrofluorocarbon gas emissions
- 50 percent reduction in anthropogenic black carbon emissions
- 50 percent reduction of organic waste disposal from 2014 levels by 2020, and 75 percent by 2025, including recovery of at least 20 percent of edible food for human consumption

The state is expected to achieve roughly half of the SB 1383 targeted emissions reductions by 2030 through strategies currently in place (See Figure 4-11). As directed by the Legislature under SB 1383, state agencies focused on voluntary, incentive-based mechanisms to reduce SLCP emissions in the early years of implementation to overcome technical and market barriers. Under this "carrot-then-stick" strategy, incentives are replaced with requirements as the solutions become increasingly feasible and cost-effective. To meet legislated targets, more aggressive action is needed.

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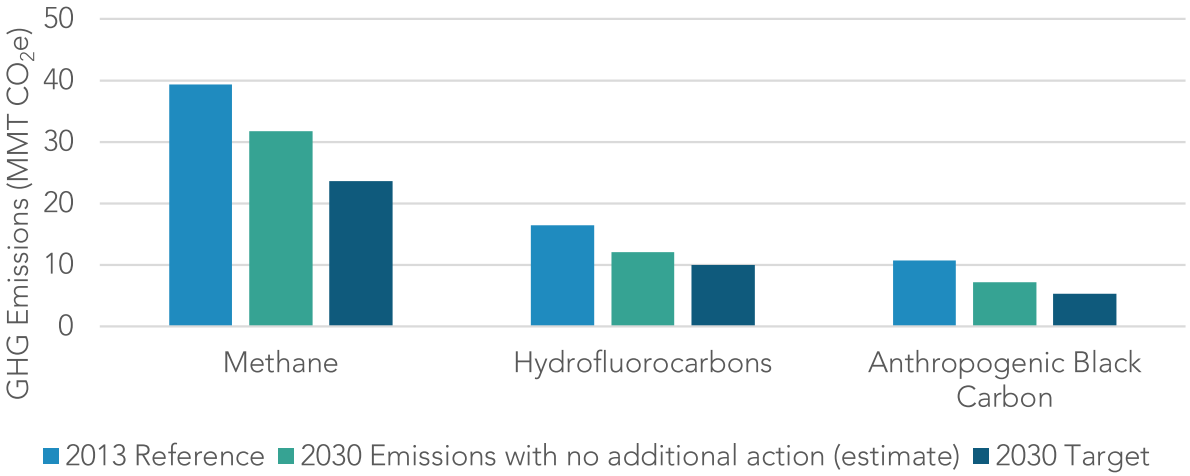
[421] IPCC. 2021. *Climate Change 2021:The Physical Science Basis.* https://www.ipcc.ch/report/ar6/wg1/.
[422] United Nations. Global Methane Assessment. Summary for Policymakers. https://wedocs.unep.org/bitstream/handle/20.500.11822/35917/GMA_ES.pdf.
[423] CARB. 2017. Short-Lived Climate Pollution Reduction Strategy. https://ww2.arb.ca.gov/sites/default/files/2020-07/final_SLCP_strategy.pdf.
[424] All SB 1383 emissions reductions are mandated to be realized by 2030 and are relative to 2013 levels.

**Figure 4-11: Expected progress toward SB 1383 targeted emissions reductions by 2030 through strategies currently in place**




While the state's overall GHG emissions have declined by 9 percent over the past decade, SLCP emissions reductions have not kept pace with broader progress toward decarbonization. After growing steadily in the preceding decade, methane emissions have remained relatively flat since 2013.

HFCs are the fastest growing source of GHG emissions, primarily driven by their use to replace ozone-depleting substances and an increased demand for cooling and refrigeration.[425] Since 2005, statewide HFC emissions have more than doubled. While the rate of increase has slowed in recent years due to the state's measures, HFC emissions are still on the rise in California, and have grown by over 50 percent since 2010.[426] Globally, as temperatures rise, adoption of cooling technologies (and refrigerants) is increasing rapidly. If no measures are taken, it is estimated that HFCs will account for 9 to 19 percent of the total global GHG emissions by 2050.[427]

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[425] CARB. 2022. *California Greenhouse Gas Emissions for 2000 to 2020: Trends of Emissions and Other Indicators.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf.

[426] CARB. 2022. *California Greenhouse Gas Emissions for 2000 to 2020.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf.

[427] Velders, G. J., D. W. Fahey, J. S. Daniel, M. McFarland, and S. O. Andersen. 2009. "The large contribution of projected HFC emissions to future climate forcing." *Proceedings of the National Academy of Sciences* 106(27), 10949–10954.

## Methane

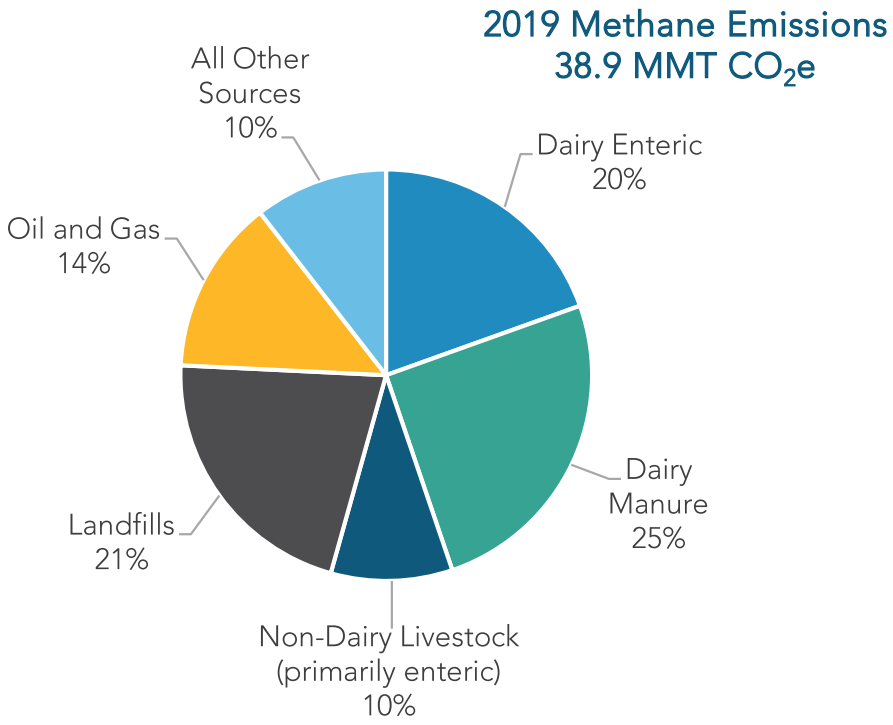
Human sources of methane emissions are estimated to be responsible for up to 25 percent of current warming.[428] Fortunately, methane's short atmospheric lifetime of ~12 years[429] means that emissions reductions will rapidly reduce concentrations in the atmosphere, slowing the pace of temperature rise in this decade. Further, a substantial portion of the targeted reductions can be achieved at low cost and will provide significant human health benefits. For example, the UN's *Global Methane Assessment* (2021)[430] found that over half of the available targeted measures have mitigation costs below $21/MTCO$_2$e, and that each million metric tons of methane reduced would prevent 1,430 premature deaths annually due to ozone pollution caused by methane.

Following the Twenty Sixth Conference of Parties (COP26) (the United Nations Convention on Climate Change in 2021), over 110 nations have signed onto the Global Methane Pledge (Pledge)[431] to limit methane emissions by 30 percent relative to 2020 levels. The Pledge covers countries that emit nearly half of all methane and make up 70 percent of global GDP. The UN's Global Methane Assessment[432] shows that human-caused methane emissions can be reduced by up to 45 percent this decade, which would avoid nearly 0.3°C of global warming by 2045.

As shown in Figure 4-12, the three largest sources of California's methane emissions are the dairy and livestock industry, landfills, and oil and gas systems.

[428] IPCC. 2021. *Climate Change 2021:The Physical Science Basis.* https://www.ipcc.ch/report/ar6/wg1/.
[429] In contrast, the lifetime of $CO_2$ is hundreds of years. The IPCC Third Assessment Report concluded that no single lifetime can be defined for $CO_2$ because of the different rates of uptake by different removal processes. According to IPCC Fourth Assessment Report, the majority of an increase in $CO_2$ will be removed from the atmosphere within decades to a few centuries, while the remaining 20 percent may stay in the atmosphere for many thousands of years.
[430] United Nations. 2021. Global Methane Assessment. https://wedocs.unep.org/bitstream/handle/20.500.11822/35917/GMA_ES.pdf.
[431] Global Methane Pledge. https://www.globalmethanepledge.org/.
[432] United Nations Environment Programme. 2021. Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions. https://www.unep.org/resources/report/global-methane-assessment-benefits-and-costs-mitigating-methane-emissions?msclkid=00661370c85811eca078eb8fdbd603d1.

**Figure 4-12: Sources of California methane emissions (2019)**




Emissions from dairy and livestock operations come from two main sources: (1) enteric fermentation and (2) manure management operations, especially at dairies that employ open anaerobic lagoons that allow methane to escape into the atmosphere. Landfills, the second largest source of methane emissions, produce methane from the decomposition of organic waste. Although approximately 95 percent of all the waste that has been disposed of in the state has been deposited in a landfill that is equipped with a gas collection and control system, as required by California's Landfill Methane Regulation,[433] a portion of the methane still escapes into the atmosphere. Fugitive methane emissions can be intermittent and highly variable, both seasonally and spatially, particularly at landfills. Research has shown that landfills are complex systems and a wide range of conditions (e.g., atmospheric, operational, biological, chemical, and physical) may contribute to variability in rates of organic waste degradation, methane generation, and capture efficiency, so reducing the amount of organics deposited in landfills is critical to reducing overall landfill methane emissions. And despite the variability in individual landfill emissions, landfill gas collection and control systems remain the most effective strategy

[433] CARB. Landfill Methane Regulation. https://ww2.arb.ca.gov/our-work/programs/landfill-methane-regulation.

for reducing methane emissions from waste once it is placed in a landfill. Non-combustion methane emissions from the oil and gas sector are the third largest source of methane emissions in California. Almost three-quarters of the methane emissions from this sector come from leaks and venting from fossil gas transmission and distribution pipelines and equipment.

## Hydrofluorocarbons

HFCs are synthetic GHGs that are powerful climate forcers. They are used mainly as refrigerants or heat transfer fluids in refrigeration, space conditioning, and heat pump equipment. Refrigerants are ubiquitous and are used everywhere from supermarkets, convenience stores, cold storage warehouses and wineries, to vending machines and residential and motor vehicle air-conditioners. Additionally, HFCs are also used as foam-blowing agents, solvents, aerosol-propellants, and fire suppressants. While HFCs remain in the atmosphere for a much shorter time than $CO_2$, the relative global warming potential (GWP) values of HFCs can be hundreds to thousands of times greater than $CO_2$. The mix of HFCs currently in use in California, weighted by usage (tonnage), have an average 100-year GWP of 1,700.[434] The average atmospheric lifetime of the mix of HFCs in use is 15 years.[435] Given the short average lifetimes, rapid reductions in HFC emissions can translate into near-term reductions in climate change effects.

As the global temperatures increase, the demand for cooling and refrigerants will continue to grow, as will the use of electric heat pumps to replace conventional fossil gas heating options. Unless addressed, continued use of high-GWP HFCs will perpetuate a feedback loop, where the cooling agents themselves cause additional warming.

In 2016, representatives from 197 nations signed the Kigali Amendment, which amended the existing Montreal Protocol (to reduce ozone-depleting substance production and consumption) to include a global phasedown in the production and consumption of HFCs beginning in 2019.[436] As of September 2022, 137 nations have either accepted, approved, or ratified the Kigali Amendment. On September 21, 2022, the U.S. Senate approved ratification of the Kigali Amendment, and it is expected that the United States

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[434] CARB. 2020. *Initial Statement of Reasons: Public Hearing to Consider the Proposed Amendments to the Prohibitions on Use of Certain Hydrofluorocarbons in Stationary Refrigeration, Chillers, Aerosols-Propellants, and Foam End-Uses Regulation.* October 20. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2020/hfc2020/isor.pdf?_ga=2.164659835.592460318.1646664679-912670513.1542398285.

[435] Zhongming, Z., et al. 2011. *HFCs: A Critical Link in Protecting Climate and the Ozone Layer: A UNEP Synthesis Report.*

[436] United Nations Treaty Collection. Chapter XXVII, Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer. https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=XXVII-2-f&chapter=27&clang=_en.

will soon join the 137 nations that have already ratified.[437] In the United States, Congress enacted the federal *American Innovation and Manufacturing (AIM) Act* in December 2020.[438] The AIM Act authorizes the U.S. EPA to address HFCs in several ways, including a national HFC phasedown that nearly mirrors the schedule of the global phasedown under the Kigali amendment.[439]

Nearly 90 percent of HFC emissions in California come from their use as refrigerants in the commercial, industrial, residential, and transportation sectors. The timescales over which the HFC emissions occur vary, depending on the type of application. Thus, strategies to reduce HFC emissions must be tailored by equipment type. CARB has several measures in place to tackle HFC emissions from the various sources shown in Figure 4-13 below. This includes the Refrigerant Management Program[440] that tracks and manages emissions from large commercial, industrial, and cold storage refrigeration facilities in the state. CARB has adopted regulations to reduce HFC emissions from consumer product aerosol propellants, semiconductor manufacturing, and small cans of automotive refrigerant.[441]

In 2018, California adopted HFC prohibitions via regulation and legislation for several sectors, including stationary refrigeration and foam end uses to backstop the partially vacated federal Significant New Alternatives Policy (SNAP) program.[442] Most recently, in 2020, CARB adopted additional measures that place GWP limits on refrigerants used in refrigeration and air conditioning equipment, which are the largest sources of HFC emissions, and are commonly used in residential, commercial, and industrial buildings. Additionally, CARB adopted a unique pilot program requiring the use of reclaimed refrigerant: the Refrigerant Recovery, Reclaim, and Reuse (R4) Program. The newly adopted HFC rules for the refrigeration and air conditioning sectors are the first of their kind in the nation.

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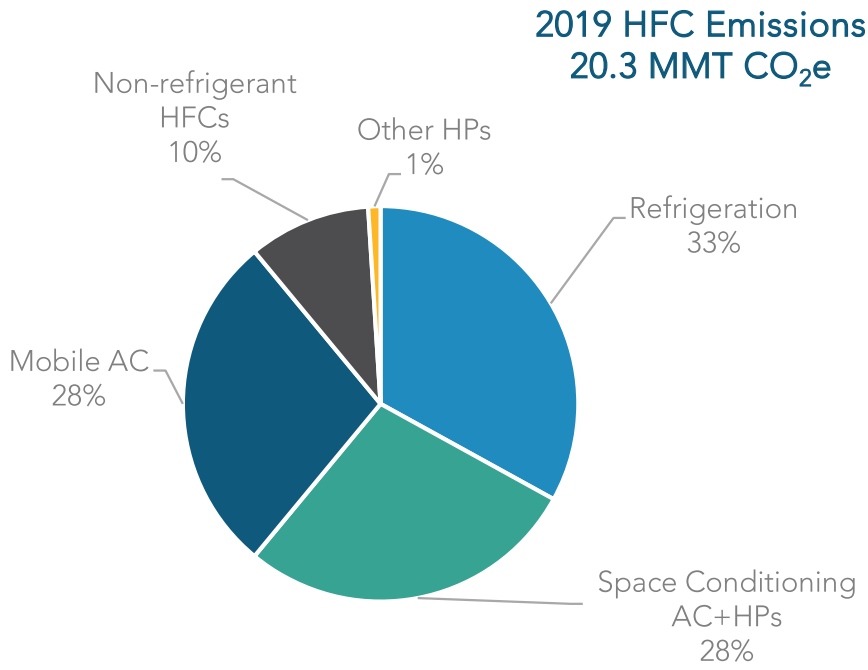
[437] U.S. Ratification of the Kigali Amendment - United States Department of State. *https://www.state.gov/u-s-ratification-of-the-kigali-amendment/*.
[438] 42 U.S.C § 7675, Pub. L. 116-260, § 103. *https://www.epa.gov/sites/default/files/2021-03/documents/aim_act_section_103_of_h.r._133_consolidated_appropriations_act_2021.pdf*.
[439] 42 U.S.C § 7675, Pub. L. 116-260, § 103.
[440] Cal. Code of Regs., tit. 17, §§ 95380, et seq.
[441] Contained in various sections, commencing with Cal. Code of Regs., tit. 13, §§ 1900 et seq.
[442] Cal. Code of Regs., tit. 17, §§ 95371, et seq.; California Cooling Act, Senate Bill 1013 (Lara, Stats. of 2018, Ch. 375, Health & Saf. Code § 39764).

**Figure 4-13: Sources of hydrofluorocarbon (HFC) emissions (2019)**

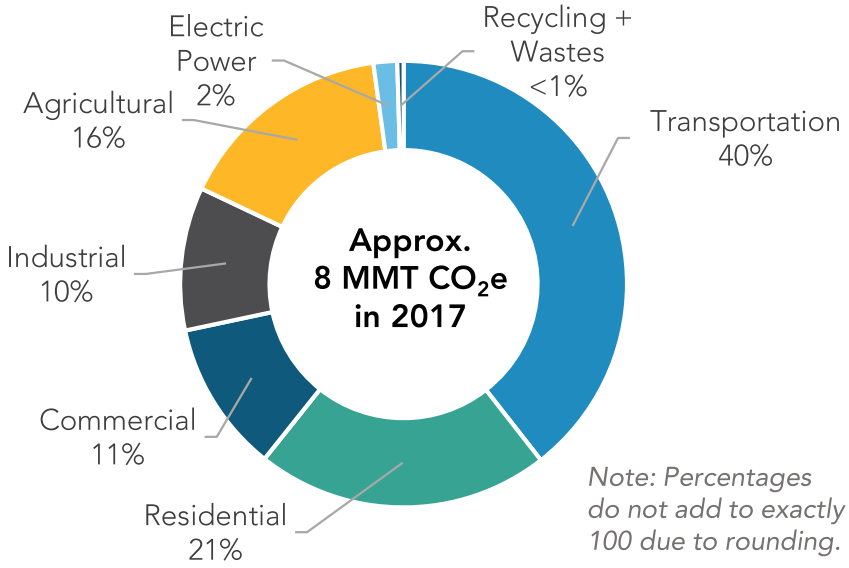



## Anthropogenic Black Carbon

Black carbon is not included in AB 32 or the state's AB 32 GHG inventory that tracks progress toward the state's climate targets; however, it has been identified as a powerful climate forcer and is included California's Short-Lived Climate Pollutant Reduction Strategy. The majority of anthropogenic black carbon emissions come from transportation, specifically heavy-duty vehicles, and they have decreased since 2013 due to engine certification standards and in-use rules for on-road and off-road fleets, along with clean fuel requirements and incentives, including California Climate Investments and LCFS credits. Additionally, fuel combustion for residential, commercial, and industrial applications contribute significantly to overall black carbon emissions. Approximately 95 percent of residential black carbon emissions are due to wood combustion; these emissions are being reduced through programs like the Woodsmoke Reduction Program established by SB 563 (Lara, Chapter 671, Statutes of 2017). Alternatives to agricultural burning and policies that phase out agricultural burning will also result in agricultural black carbon emissions reductions. In 2021 CARB provided a preliminary estimate of 2017

black carbon emissions (Figure 4-14).[443] This estimate will be finalized as part of a future update to the Short-Lived Climate Pollutant Inventory.

**Figure 4-14: Sources of anthropogenic black carbon (preliminary 2017 estimates; AR5 100-yr GWP 900)**




## Sector Transition

California has long recognized the importance of mitigating non-combustion SLCPs and took several early action measures as part of a comprehensive, ongoing program to reduce in-state GHG emissions under AB 32. The early action measures included CARB's Landfill Methane Regulation,[444] Refrigerant Management Program,[445] and Oil and Gas Methane Regulation.[446]

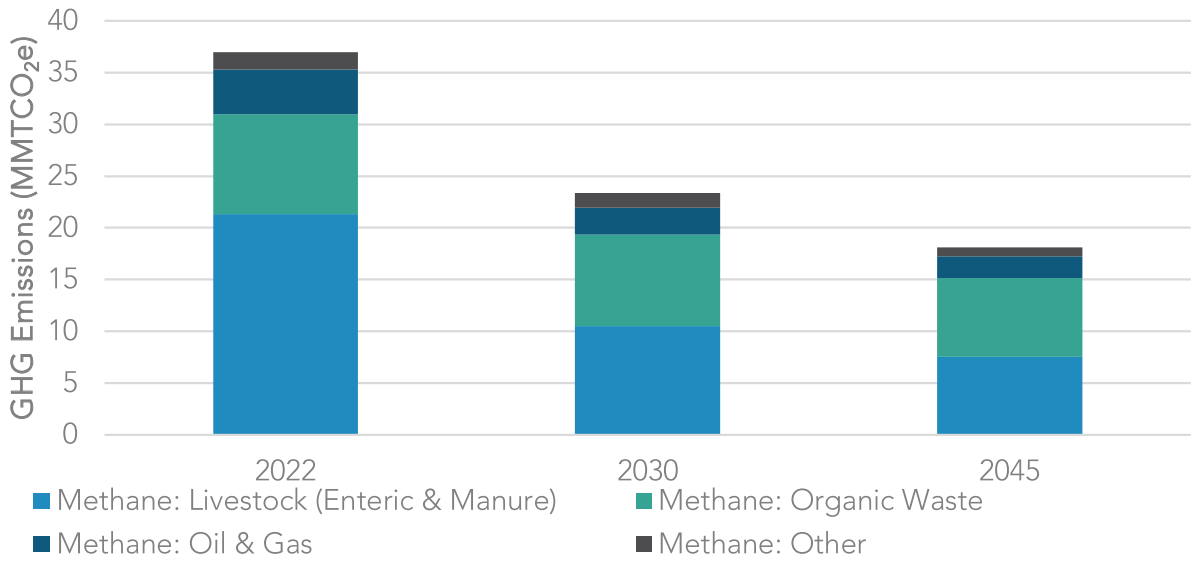
### Methane

The methane abatement strategies currently in place are projected to achieve half of the methane emissions needed to meet the overall methane reduction target of SB 1383 (40 percent reduction by 2030). The reduction target translates to a limit of less than 24 MMT$CO_2e$ in 2030 (Figure 4-15). It is anticipated that, since some sectors have fewer

[443] CARB. 2021. 2022 Scoping Plan Update – Short-Lived Climate Pollutants Workshop Presentation, September 8. https://ww2.arb.ca.gov/sites/default/files/2021-09/carb_presentation_sp_slcp_september2021_1.pdf.
[444] Cal. Code of Regs., tit. 17, §§ 95460, et seq.
[445] Cal. Code of Regs., tit. 17, §§ 95380, et seq.
[446] Cal. Code of Regs., tit. 17, §§ 95665–77.

strategies that can be implemented to reduce methane in the near-term, other sectors will need to go beyond the 40 percent reduction to meet the target.

**Figure 4-15: Methane emissions in 2022, 2030, and 2045 in the Scoping Plan Scenario[447]**




## Dairy and Livestock Methane

California is the largest dairy-producing state, home to one in five U.S. dairy cows. To date, methane emissions reductions from the dairy and livestock sector have mainly been driven by a decreasing animal population and the growing adoption of manure management strategies, including anaerobic digesters and conversion to dry manure systems and pasture systems. CARB recently completed a detailed analysis of the emission reductions expected by 2030 and the estimated additional investment needed to reach the dairy and livestock sector methane reduction target. [448]

Assuming no adoption of additional manure management and enteric mitigations strategies beyond the projects that have committed funding, and a continued annual animal population decrease of 0.5 percent per year through 2030, further reductions of approximately 4.4 $MMTCO_2e$ will be needed to achieve the 2030 methane emissions reduction target for the sector set by SB 1383. If the remaining reductions are met through

[447] The *Organic Waste* category includes methane from landfills, wastewater treatment, and compost facilities.
[448] CARB. 2021. Analysis of Progress toward Achieving the 2030 Dairy and Livestock Sector Methane Emissions Target. June. https://ww2.arb.ca.gov/sites/default/files/2021-06/draft-2030-dairy-livestock-ch4-analysis.pdf.

a mix of dairy projects in which half are dairy digesters and half are alternative manure management projects, then it is estimated that at least 420 additional projects will be necessary. Additional emissions reductions beyond this level will likely be necessary to ensure that the overall state methane emissions reduction targets are met.

Despite the considerable methane emissions mitigation potential of enteric strategies like feed additives, little progress has been made, as few products with proven mitigation potential have become commercially available, and unlike manure management strategies, there is a lack of financial incentives for their adoption.

Market conditions favoring farm consolidation and improved production efficiencies have driven reductions in the California and U.S. dairy population over the past decade. [449] These efficiency gains have allowed California to maintain production levels despite the decreasing population. If demand for dairy and beef products remains steady or increases, continued improvements in production efficiency and adoption of effective manure management and enteric mitigation strategies will be important to support dairy and livestock methane emission reductions.

**Strategies for Achieving Success**

- Install state of the art anaerobic digesters that maximize air and water quality protection, maximize biomethane capture, and direct biomethane to sectors that are hard to decarbonize or as a feedstock for energy.
- Increase alternative manure management projects, including but not limited to conversion to "solid," "dry," or "scrape" manure management; installation of a compost-bedded pack barn; an increase in the time animals spend on pasture; and implementation of solid-liquid separation technology into flush manure management systems.
- Implement enteric fermentation strategies that are cost-effective, scientifically proven, safe for animal and human health, and acceptable to consumers, and that do not impact animal productivity. Provide financial incentives for these strategies as needed.
- Accelerate demand for dairy and livestock product substitutes such as plant-based or cell-cultured dairy and livestock products to achieve reductions in animal populations.
- In consideration of pace of deployment of methane mitigation strategies and the scale of complimentary incentives, consider regulation development to ensure that the 2030 target is achieved, assuming the conditions outlined in SB 1383 are met.

[449] MacDonald, James M., Jonathan Law, and Roberto Mosheim. 2020. *Consolidation in U.S. Dairy Farming.* ERR-274. July. https://www.ers.usda.gov/webdocs/publications/98901/err-274.pdf.

## Landfill Methane

Achieving the 75 percent organic waste disposal reduction target[450] of SB 1383, and maintaining that level of disposal in subsequent years, would bring annual landfill emissions in 2030 to just below the 2013 baseline. Annual methane emissions will be higher through 2030 than originally anticipated by the SLCP Strategy because the state did not achieve the anticipated reductions in organic waste disposal of 50 percent below 2014 levels by 2020. SB 1383 prohibited the organic disposal regulations from taking effect until 2022,[451] and, as a result, emissions have continued to increase.

Due to the multidecadal time frame required to break down landfilled organic material, the emissions reductions from diverting organic material in one year are realized over the course of several decades. For example, one year of waste diversion in 2030 is expected to avoid 8 $MMTCO_2e$ of landfill emissions, cumulatively, over the lifetime of that waste's decomposition.[452] Near-term diversion efforts are critical to avoid locking in future landfill methane emissions.

CalRecycle's 2020 report, *Analysis of the Progress Toward the SB 1383 Waste Reduction Goals,*[453] estimated that 8 million short tons of composting and anerobic digestion capacity will be needed to manage organic wastes, above the existing and new capacity expected to be available by 2025. The 2019 report, *Co-Digestion Capacity in California,*[454] from the State Water Resources Control Board estimated that at least 2.4 million tons of digester capacity is available at urban wastewater treatment plants if sufficient incentives or funding for collection, receiving, and processing operations are provided to enable utilization of this capacity. The CPUC approved a decision in February 2022 implementing the biomethane procurement program, which will require investor-owned utilities by 2025 to procure 17.6 billion cubic feet (BCF) of biomethane produced from organic wastes to support the landfill disposal reduction and SLCP target and reduce fossil gas reliance for

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[450] The target is from 2014 levels by 2025.
Public Resources Code, § 42652.5. CalRecycle approved the SLCP: Organic Waste Reductions regulations (*https://calrecycle.ca.gov/organics/slcp/*) in 2020 and began implementing them in January 2022. These regulations are designed to achieve the 2025 disposal reduction and edible food recovery targets.

[452] The life cycle emissions reduction is based on anticipated diversion of 27 million short tons of organic waste from CalRecycle (2020) Analysis of the Progress Toward the SB 1383 Organic Waste Reduction Goals (*https://www2.calrecycle.ca.gov/Publications/Details/1693*). Under CalRecycle's SLCP regulations, an alternative to landfill disposal must achieve a life cycle GHG reduction of 0.3 $MTCO_2e$ per short ton of waste diverted.

[453] CalRecycle. 2020. *Analysis of the Progress Toward the SB 1383 Waste Reduction Goals.* *https://www2.calrecycle.ca.gov/Publications/Details/1693*.

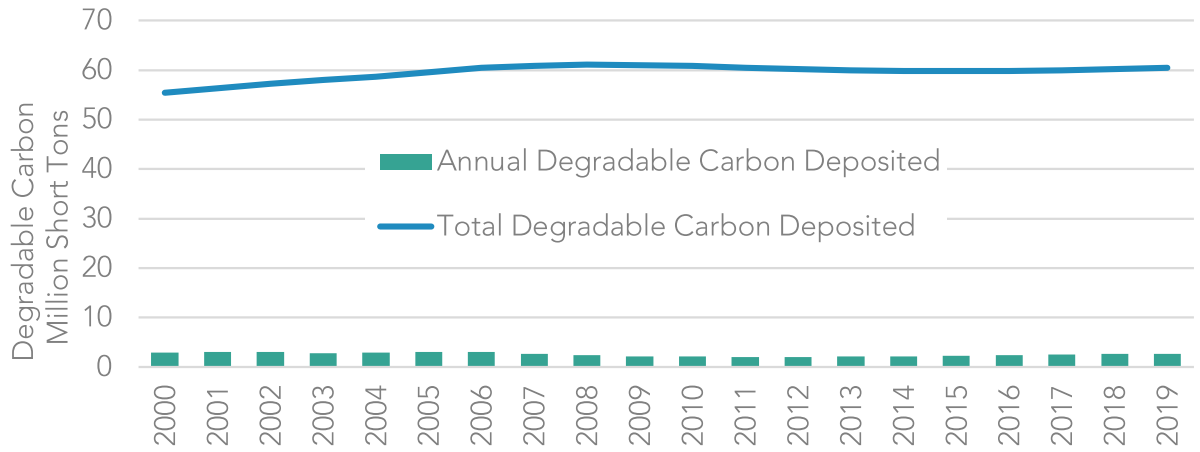
[454] State Water Resources Control Board. 2019. *Co-Digestion Capacity in California.* *https://www.waterboards.ca.gov/water_issues/programs/climate/docs/co_digestion/final_co_digestion_capacity_in_california_report_only.pdf*.

residential and commercial customers.[455] Additionally, the organic waste stream includes more than one million tons of edible food that could be recovered before it enters the waste stream through food rescue programs that combat hunger in communities throughout California.

While reducing organic waste disposal is the most effective means of achieving reductions in waste sector methane, strategies to reduce emissions from waste already in place in landfills also will play a role in achieving near-term reductions. As Figure 4-16 shows, the total degradable carbon (a measure of the amount of waste with potential to generate methane) that is accumulated from waste deposited in previous years is over 20 times greater than the amount added each year. This illustrates that even if we were able to entirely phase out landfilling of organic waste today, the existing waste in place at landfills would continue to generate methane for decades into the future.

Through a combination of improvements in operational practices, use of lower permeability covers, advanced landfill gas collection systems, and increased monitoring to detect and repair leaks, it is estimated that a direct emission reduction of 10 percent is achievable across the state's landfills by 2030. Technologies to utilize landfill gas efficiently can contribute further emission reductions in the energy sector.

**Figure 4-16: Degradable carbon deposited in landfills**




**Strategies for Achieving Success**

- Maximize existing infrastructure and expand it to reduce landfill disposal, with strategies including composting, anaerobic digestion, co-digestion at wastewater treatment plants, and other non-combustion conversion technologies.

[455] CPUC. 2022. Decision 22-02-025.

- Expand markets for products made from organic waste, including through recognition of the co-benefits of compost, biochar, and other products.[456]
- Recover edible food to combat food insecurity.
- Invest in the infrastructure needed to support growth in organic recycling capacity.
- Utilize existing digesters at wastewater treatment facilities to rapidly expand food waste digestion capacity.
- Direct biomethane captured from landfills and organic waste digesters to sectors that are hard to decarbonize.
- Implement improved technologies and best management practices at composting and digestion operations.
- Reduce emissions from landfills through improvements in operational practices, lower permeability covers, advanced collection systems, and technologies to utilize landfill gas.
- Leverage advances in remote sensing capabilities to quickly pinpoint large methane sources and mitigate leaks, improve understanding of the factors that lead to better capture efficiency, and explore new technologies and practices that can reliably improve methane control at landfills.

## Upstream Oil and Gas Methane Reduction

For oil and gas production, processing, and storage, California is currently on track to achieve a 41 percent reduction in methane emissions by 2025 relative to 2013. The additional reductions needed to meet the 2030 target may be achieved by implementing additional regulatory requirements to further reduce intentional venting of fossil gas from equipment. If necessary, additional reductions from transmission and distribution facilities may be achieved by requiring the utilities to increase inspection and repair activities or further reduce emissions from pipeline blowdowns by implementing methods such as using portable compressors, using plugs to isolate sections of pipelines, flaring vented gas, routing gas to fuel gas systems, and installing static seals on compressor rods. Advances in methane detection technologies (e.g., satellites equipped to detect large methane sources) may also help to identify and mitigate methane emissions quickly across the oil and gas sector.

As California transitions away from fossil fuels, in-state oil and gas production will likely decline. This could result in an increase over time in the number of long-term idle and orphan wells (idle wells lacking a financially solvent, responsible owner) in the state. While California has regulations aimed at helping ensure operators manage their idle wells,

[456] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F4.4. finalejacrecs.pdf (arb.ca.gov).

there could likely be an increase in California's orphan well population. Plugging all orphan wells, of which there are currently over 5,000, could take decades due to the limited resources California has for orphan well plugging. The benefits from plugging wells include methane emission reductions and job creation; employment gains from well plugging and site remediation activities could help temporarily offset job losses from the oil and gas industry. The California Council on Science and Technology's 2018 report on orphan wells, *Orphan Wells in California: An Initial Assessment of the State's Potential Liabilities to Plug and Decommission Orphan Oil and Gas Wells,*[457] found that the potential cost to the state of plugging current orphan wells could be approximately $500 million, and the cost of plugging all active and idle wells could total over $9.1 billion. As oil and gas production in California declines due to reduced demand for fossil fuels, additional funding will likely be needed to cover the costs of plugging wells that have no viable operator.

**Strategies for Achieving Success**

- Mitigate emissions from leaks by regular leak detection and repair (LDAR) surveys at all facilities.
- Replace high emitting equipment with zero emission alternatives wherever feasible.[458]
- Have CARB and CalGEM lead a Task Force to identify and address methane leaks from oil infrastructure near communities.
- Pursuant to SB 1137, develop leak detection and repair plans for facilities in health protection zones, implement emission detection system standards, and provide public access to emissions data.
- Minimize emissions from equipment that must vent fossil gas by design (e.g., fossil gas powered compressors).
- Install vapor collection systems on high emitting equipment.
- Phase out venting and routine flaring of associated gas (gas produced as a by-product during oil production).
- Continuous ambient monitoring at fossil gas underground storage facilities to quickly detect large methane sources.
- Reduce pipeline and compressor blowdown emissions.

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[457] The California Council on Science and Technology. 2018. *Orphan Wells in California: An Initial Assessment of the State's Potential Liabilities to Plug and Decommission Orphan Oil and Gas Wells.* https://ccst.us/wp-content/uploads/CCST-Orphan-Wells-in-California-An-Initial-Assessment.pdf.

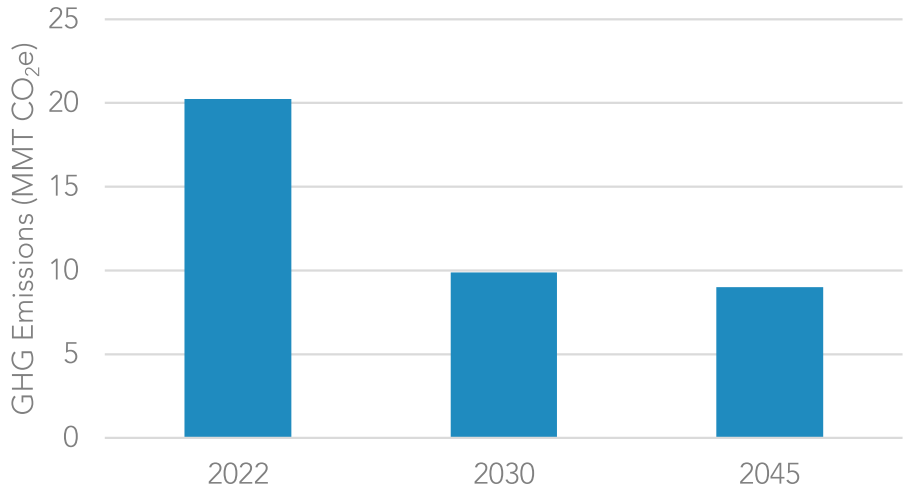
[458] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, P5. finalejacrecs.pdf (arb.ca.gov).

- Leverage advances in remote sensing capabilities to quickly pinpoint large methane sources and mitigate leaks.[459]

## Hydrofluorocarbons

In California, all the HFC measures currently in place will help achieve more than 70 percent of the reductions needed to achieve the 2030 HFC goal and provide very significant emissions reductions by 2045 and beyond. However, new targeted measures will be needed to maintain the pace of reductions, as demand for technologies that currently predominantly use high-GWP refrigerants is anticipated to grow. Despite decarbonization efforts, high-GWP HFCs are expected to be among the last remaining persistent GHG emission sources, as shown in Figure 4-17.[460]

**Figure 4-17: Hydrofluorocarbon emissions in 2022, 2030, and 2045 in the Scoping Plan Scenario**




HFC emissions from new and existing sources should be addressed in tandem with building decarbonization efforts to maximize reductions.[461] As buildings are electrified in an effort to decarbonize them, the use of heat pumps for space conditioning, water heaters, and clothes dryers is expected to increase significantly. Heat pumps, while using

[459] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, CC17. finalejacrecs.pdf (arb.ca.gov).
[460] Energy and Environmental Economics, Inc. 2020. *Achieving Carbon Neutrality.* https://ww2.arb.ca.gov/sites/default/files/2020-10/e3_cn_final_report_oct2020_0.pdf.
[461] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF26. finalejacrecs.pdf (arb.ca.gov).

electricity, not fossil gas, currently rely predominantly on high-GWP refrigerants. Very low- or no-GWP technologies and solutions are either available or emerging for various heat pump technologies, and likely to develop further as international efforts to mitigate HFCs continue. However, most of these technologies are still nascent in the United States. In addition, some of the alternatives cannot be used until California building codes are updated, which is currently expected at the earliest in mid-2024 for some technologies based on the recently adopted provisions in AB 209[462] requiring the California Building Standards Commission to adopt the latest safety standards for refrigerant containing equipment into California's building codes. The current updates to the building codes will allow the use of many refrigerants with lower GWPs than HFCs currently in use. However, additional building code updates are needed to expand the choices of ultra-low-GWP alternatives, and that will need to happen in the next few years. The adoption of low-GWP refrigerants must occur in parallel with building decarbonization efforts; without such efforts, the vast GHG benefits of the latter will be partially offset, and the proportion of HFC emissions from buildings will continue to grow.

Leaks from existing air conditioning and refrigeration equipment are a major source of statewide and global HFC emissions. Once installed, refrigeration and air conditioning equipment can stay in place for decades, while leaking refrigerants into the atmosphere. This makes it very important that new installed equipment use refrigerants with a GWP as low as possible. The refrigerants inside existing equipment are sometimes collectively referred to as the *installed base* or *banks* of potential HFC emissions. If released spontaneously, the existing HFC banks would equal 60 percent of all annual statewide GHG emissions in California, as illustrated in Figure 4-18.[463]

The sales prohibitions on newly produced refrigerants set forth in SB 1206 (2022) and the national/international HFC phasedown will help in reducing HFC emissions from existing equipment by restricting the supply of and increasing the value of existing high-GWP HFCs, thus enabling a circular economy. In the 2022–2023 state budget, CARB received $45 million in incentive funding for climate-friendly refrigerant technologies; this funding will be critical in shifting the market toward the best available refrigerant technologies in various sectors.

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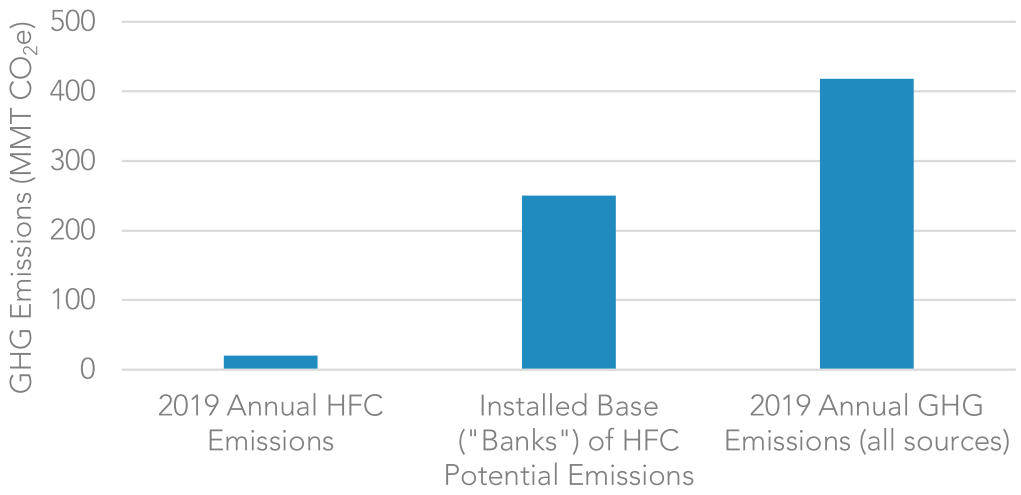
[462] AB 209: Energy and climate change. *https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB209.*

[463] CARB. 2021. 2022 Scoping Plan Update – Short-Lived Climate Pollutants Workshop Presentation. September 8. *https://ww2.arb.ca.gov/sites/default/files/2021-09/carb_presentation_sp_slcp_september2021_1.pdf*.

**Figure 4-18: Potential emissions from refrigerants in existing equipment**




**Strategies for Achieving Success**

- Expand the use of very low- or no-GWP technologies in all HFC end-use sectors, including emerging sectors, like heat pumps for applications other than space conditioning, to maximize the benefits of building decarbonization.[464]
- Convert large HFC emitters such as existing refrigeration systems to the lowest practical GWP technologies.[465]
- Prioritize small-scale and independent grocers serving priority populations in addressing existing "banks" of high-GWP refrigerants.[466]
- Improve recovery, reclamation, and reuse of refrigerants by limiting sales of new or virgin high-GWP refrigerants and requiring the use of reclaimed refrigerants where appropriate.[467]
- Assist low-income and disadvantaged communities in obtaining low-GWP space conditioning units to protect vulnerable communities from heat stress and wildfire smoke.[468]

[464] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF26. finalejacrecs.pdf (arb.ca.gov).
[465] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF22. finalejacrecs.pdf (arb.ca.gov).
[466] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, JT5 and JT6. finalejacrecs.pdf (arb.ca.gov).
[467] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, JT1. finalejacrecs.pdf (arb.ca.gov).
[468] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF28, JT5, and JT6. finalejacrecs.pdf (arb.ca.gov).

- Accelerate technology transitions in California and the U.S. overall by collaborating with international partners committed to taking action on HFCs under the Kigali Amendment to the Montreal Protocol; this includes addressing barriers to adoption of very low- or no-GWP refrigerant technologies such as high upfront costs, shortage of trained technicians, and lag in updating safety standards and building codes.

## Anthropogenic Black Carbon

Significant progress has been made since 2013 to reduce anthropogenic black carbon emissions, primarily from decreased combustion of distillate fuels in the agricultural sector, as well as improvements to provide cleaner, on-road combustion technologies. Under current strategies, anthropogenic black carbon from transportation is expected to be reduced by over 60 percent in 2030. Continued reductions in combustion emissions across all sectors from both the state's climate and air quality programs will also help reduce anthropogenic black carbon emissions going forward.

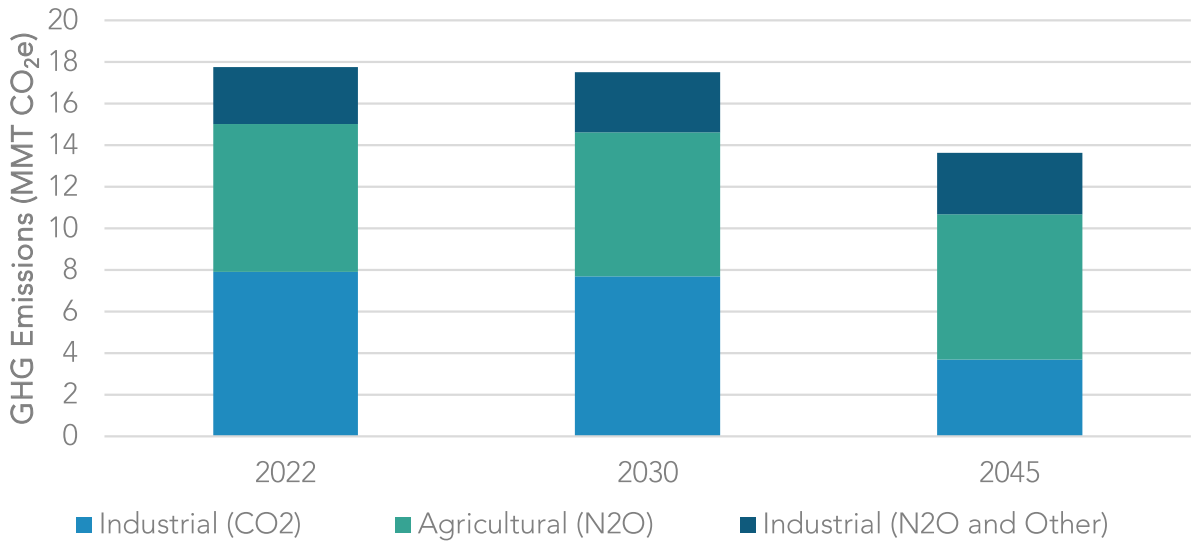
**Strategies for Achieving Success**

- Reduce fuel combustion commensurate with state's climate and air quality programs, particularly from reductions in transportation emissions and agricultural equipment emissions.[469]
- Invest in residential woodsmoke reduction.

In addition to SLCP emissions, some remaining non-combustion emissions are anticipated to persist in the coming decades, as shown in Figure 4-19. These include $CO_2$ from industrial processes such as cement manufacturing, oil and gas extraction, and geothermal electric power; $N_2O$ from wastewater treatment, fertilizers, and livestock manure applied to agricultural soils; and other industrial, non-HFC GHG emissions.

[469] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1A and Appendix A (Table Summary of Direct Emission Reduction Strategies). "Emissions reductions from energy consumed by California's agricultural sector, including post-harvest processing, use of tractors and other farm equipment, and water import and irrigation." finalejacrecs.pdf (arb.ca.gov).

**Figure 4-19: Remaining non-combustion emissions in 2022, 2030, and 2045 in the Scoping Plan Scenario**




## Natural and Working Lands

California's natural and working lands (NWL) cover approximately 90 percent of the state's 105 million acres,[470] and include forests, grasslands, shrublands and chaparral, croplands, wetlands, sparsely vegetated lands, and the green spaces in urban and built environments. These lands include California Native American tribes' ancestral and cultural lands, parks and green spaces in our cities and communities, and the waters and the iconic landscapes we know and love. The diverse landscapes and biodiversity found throughout California's NWL provide a multitude of benefits to the people of California, including clean water, clean air, biodiversity, food, economic prosperity, recreational opportunities, continuation of traditional tribal ways of life, mental health benefits, and many others.

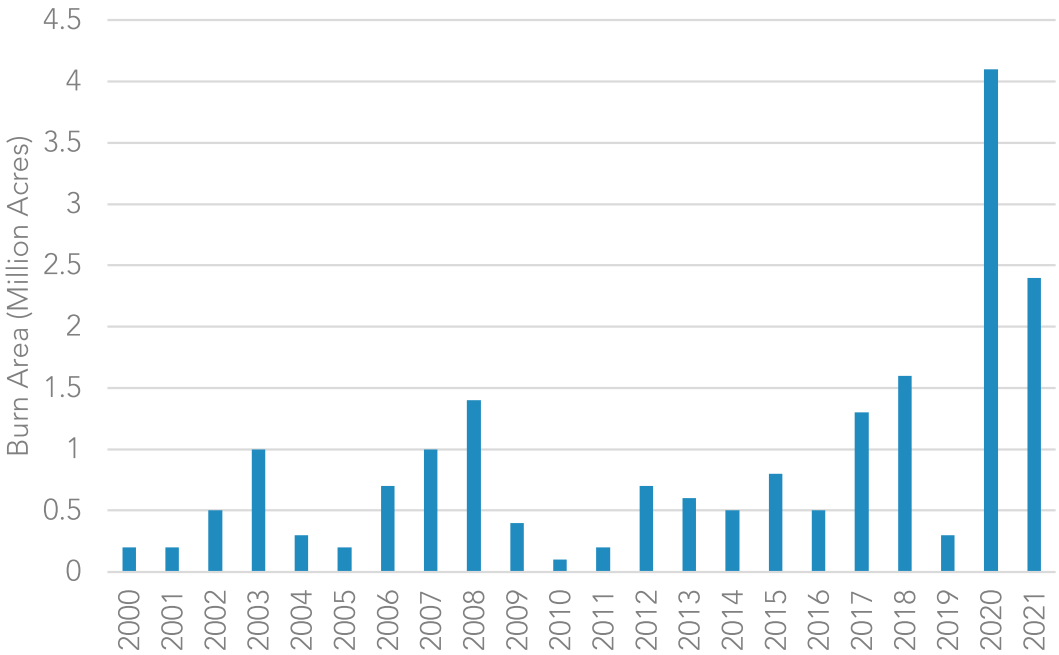
Our lands are a critical sector in California's fight to achieve carbon neutrality and build resilience to the impacts of climate change. Healthy land can sequester and store atmospheric $CO_2$. Healthy lands also can reduce emissions of powerful SLCPs, limit the release of future GHG emissions, protect people and nature from the impacts of climate change, and build our resilience to future climate risks. Creation of healthy lands through

[470] CNRA. 2022. Natural and Working Lands Climate Smart Strategy. *https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Expanding-Nature-Based-Solutions/CNRA-Report-2022---Final_Accessible_Compressed.pdf*.

multi-benefit and mitigation measures can also support tribal and local traditional lifeways. Unhealthy lands have the opposite effect—they release more GHGs than they store and are more vulnerable to future climate change impacts.

Climate change impacts have become more apparent in recent years and are having significant effects on communities throughout the state. One of these impacts is the much more frequent occurrence of unusually large, high-severity wildfires, which are being driven by climate change and by a recent history of fire-exclusion and land management practices that have resulted in forests with high levels of biomass. These recent large and high-severity wildfires have resulted in a significant amount of burned acreage and emissions in California (Figure 4-20).[471]

**Figure 4-20: Acreage of burned wildland vegetation area**




These wildfires deviate from the lower-severity fires that previously occurred at frequent intervals, around which California's forests evolved. As climate change accelerates, these large, uncharacteristic wildfires are likely to become more common and impact more of our landscapes. Climate change is also expected to have other significant effects on our lands, including more extreme droughts, floods, extreme heat, and the spread of invasive aquatic and terrestrial species, pests, diseases, and parasites. These impacts can lead

[471] CARB. 2022. Wildfire Emission Estimates for 2021. https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/Wildfire%20Emission%20Estimates%202000-2021.pdf.

to negative feedback loops on human and ecological health; for example, increasing the spread of invasive species can lead to increases in pesticide use, if not managed through regulation or mitigation, which can pose risks to human health and the environment.

California's approach to climate action in the NWL sector is not solely focused on maximizing carbon stocks but instead on supporting carbon management that holistically fosters ecosystem health, resilience, provision of overall climate function, and other co-benefits.

Natural systems operate on a longer timescale than the energy and industrial sectors, and benefits from climate action on our lands can take decades to accrue. Scaling climate smart land management in California requires taking action now and playing the "long game" by establishing and maintaining consistent, patient approaches and programs.

## Landscapes

For the first time, this Scoping Plan includes modeling for the NWL sector. The focus of the initial modeling is limited to seven land types that align with the those in the NWL Climate Smart Strategy.[472] Work will continue to incorporate more landscapes and management practices into the modeling over time. The initial landscapes included in the modeling for this Scoping Plan are:

- Forests
- Shrublands and Chapparal
- Grasslands
- Croplands
- Wetlands
- Developed Lands
- Sparsely Vegetated Lands

Each of these land types are a key component to the state's approach to increasing climate action in the NWL sector, as called for in Executive Order N-82-20 and AB 1757.[473] The Executive Order directs CARB to update the target for this sector in support of carbon neutrality by 2045 as part of this Scoping Plan, and to take into consideration the NWL Climate Smart Strategy. AB 1757 calls for the development of an

[472] CNRA. 2022. *Natural and Working Lands Climate Smart Strategy. Appendix B.* *https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Expanding-Nature-Based-Solutions/Appendix-B_04132022_ada.pdf*.

[473] AB 1757 California Global Warming Solutions Act of 2006: Climate Goal: Natural and Working Lands. *https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220AB1757*.

ambitious range of targets for the NWL sector to be integrated into the Scoping Plan and other state policies. It directs CARB and CNRA to work closely together to update the NWL Climate Smart Strategy, and establish an expert advisory committee to inform and advise on NWL modeling, targets, and implementation strategies.[474] Additionally, in 2021, the governor signed SB 27[475] (Skinner, Chapter 237, Statutes of 2021) into law. It directed CARB to establish $CO_2$ removal targets for 2030 and beyond and take into consideration the NWL Climate Smart Strategy. The governor's Executive Order, AB 1757, and SB 27 go beyond previous direction from the Legislature and past administrations. These directives emphasize the importance of quantifying land-based carbon both statewide,[476] and in programs and policies,[477] setting targets[478] for NWL to support the state's climate objectives, and advancing land management actions[479] that support the health and resiliency of these lands.

Blue carbon (also known as carbon captured and held in coastal vegetation and soils, such as seagrasses, seaweeds, and wetlands)—is also important to consider as we look at long-term climate goals. While this landscape is not currently covered by IPCC inventory guidelines or included in California's NWL Inventory, the United States was the first nation to include blue carbon in its national GHG emissions inventory. California's Ocean Protection Council and San Francisco Estuary Institute are partnering to create a new coastal wetlands, beaches, and watersheds inventory. CARB staff will utilize information from this effort and assess other available data to evaluate how this landscape may be integrated into our efforts in the future as more data become available.[480]

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[474] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N20. *finalejacrecs.pdf (arb.ca.gov)*.
[475] SB 27 Carbon sequestration: state goals: natural and working lands: registry of projects. *https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220SB27*.
[476] SB 859 Public resources: greenhouse gas emissions and biomass (SB 859, Committee on Budget and Fiscal Review, Chapter 368, Statutes of 2016). *https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB859*.
[477] SB 1386. Resource conservation: working and natural lands. (SB 1386, Chapter 545, Statutes of 2016). *https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB1386*.
[478] CARB. 2017. 2017 Climate Change Scoping Plan Update. Board Resolution 17-46. *https://ww2.arb.ca.gov/sites/default/files/barcu/board/res/2017/res17-46.pdf*.
[479] Executive Department. State of California. EO B-52-18. *https://www.ca.gov/archive/gov39/wp-content/uploads/2018/05/5.10.18-Forest-EO.pdf*.
[480] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N2. *finalejacrecs.pdf (arb.ca.gov)*.

## Trends of Carbon on Landscapes

CARB currently tracks the carbon stock changes though the Inventory of Ecosystem Carbon in California's Lands[481] (NWL Inventory), which is summarized in Chapter 1. The NWL Inventory is a key tool for tracking changes in carbon stocks across the state, and it will serve as the inventory of record for this sector, tracking sector-wide progress toward the target. The NWL Inventory provides a retrospective snapshot of the status of California's lands, and captures the gains or losses of carbon stocks that occur over time. In addition to tracking carbon stock changes, the NWL Inventory is an important tool for understanding the impacts of our efforts to increase climate action in this sector (such as those identified in this Scoping Plan and the NWL Climate Smart Strategy) on NWL carbon stocks. The inventory is also used as the foundation for Scoping Plan scenario modeling and target setting.

CARB's inventory shows that carbon stocks decreased in NWL lands from 2001 to 2011, releasing more carbon than they were storing, and then increased slightly from 2012 to 2014.[482] These trends highlight the interannual and interdecadal variability of lands and their ability to be both a source and a sink of carbon, and the importance of looking at NWL data and trends over multiyear and multidecadal time periods, as opposed to looking only at annual changes. This movement is part of the Earth's carbon cycle, where carbon transfers between the land, ocean, and atmosphere. As part of the carbon cycle, over decades or centuries, fire and plant respiration and decomposition move carbon from the land to the atmosphere, while plant growth and other processes move carbon from the atmosphere to the land. Emissions from fossil-fuel combustion are contributing to putting this cycle out of balance.

Additionally, some historic land management practices that have resulted in the loss of carbon from the soil are also contributing to the atmospheric rise of $CO_2$ while simultaneously exacerbating the imbalance of the water cycle, which is influenced by and linked to the carbon cycle. These emissions are also contributing to a feedback loop for California's lands: as $CO_2$ emissions accumulate in the atmosphere—and California experiences more warming, extreme heat events, and droughts—the risk and intensity of carbon losses also increases, which in turn transfers more carbon from the land to the atmosphere. And because forests and shrublands comprise approximately 85 percent of the carbon stocks in California, management strategies and disturbances in forest and

[481] CARB. *An Inventory of Ecosystem Carbon in California's Natural & Working Lands.* 2018 Edition. nwl_inventory.pdf (ca.gov). Accessed 3/2/2022.
[482] These trends are consistent estimates in the most recent AB 1504 reporting period.

shrubland carbon play an important role in determining whether California's lands are providing either net carbon sequestration or net emissions on an annual basis.

The gains and losses of carbon on our lands will fluctuate in the future; what is important is to restore carbon in places where it has been lost and reduce large carbon losses on our NWL through active, attentive, and adaptive management. For additional details on the nexus between NWL and GHGs, see pages 5–6 of the NWL Climate Smart Strategy.

## Goals and Accelerating Nature-Based Solutions

The state's climate mitigation targets are traditionally identified by individual years, (i.e., tons of GHG emissions in 2020 or 2030). However, because NWL processes fluctuate year to year and because it can sometimes take decades for climate action to fully impact carbon in NWL, it is important to consider the statewide, long-term trends of carbon stock change when identifying how this sector contributes to California's pathway to achieving carbon neutrality. Tracking carbon stock change over a multi-decadal period is the best way to assess the full direct impact climate action has on carbon storage. Such an approach filters out fluctuations from year-to-year weather variations and multi-year natural climate cycles, such as El Niño patterns.

Current data sources and methods allow us to track only certain carbon stocks that exist on NWL. For target tracking to be successful, each carbon pool must be inventoried using a methodology that can detect changes due to management and climate change. Certain carbon pools lack the scientific data and methodologies necessary for target-setting and tracking. For example, soils in forests, shrublands, and grasslands are not included in the Scoping Plan carbon stock target because, currently, there is no way to track statewide soil carbon through time in a way that would capture the effects of increased climate action and climate change.

When considering how NWL contribute to the state's goal of carbon neutrality, all lands' carbon stock gains and losses must be considered, and the Scoping Plan target is set in these terms. It is not sufficient to aggregate climate benefits only within areas where projects, management, or climate action occur. Much of the state does not receive active or quantifiable management, but these areas still contribute to the state's overall carbon stock change and GHG emissions. To incorporate the entire carbon balance toward true carbon neutrality, the Scoping Plan target is set in terms of carbon stock change across the entire state. This incorporates all lands that both receive and do not receive active management, and includes the end result of all sequestration, emissions, and other changes to carbon on the landscape.

However, carbon stock change is not equivalent to emissions. Currently, the data and emission quantification science is not sufficient to enable inventories to comprehensively track all NWL emissions in a way that would enable us to set an NWL target in terms of

statewide emissions and sequestration. There is a great need, across the entire NWL sector statewide, for more empirical data, science, and tools to track all carbon stocks across each carbon pool, and to begin to track emission and sequestration rates. As California implements AB 1757, there is an opportunity to update the data, science, and tools to enable this level of tracking and target setting in the future.

As outlined in Chapter 2, California is projected to lose carbon stocks over the coming decades, but this Scoping Plan analysis also shows that increasing the pace and scale of climate smart land management in California will reduce the carbon stock losses and GHG emissions from the NWL sector. In response to EO N-82-20 and AB 1757, the proposed target for NWL is shown in Table 4-1.

**Table 4-1: Scoping Plan modeled target for NWL, based on increasing action on NWL**

| | Total Carbon Stock % Change from 2014 |
|---|---|
| **2045** | -4 |

Achieving this target will require significant expansion of the pace and scale of climate action on California's NWL, including the following:

- Increasing climate smart forest, shrubland, and grassland management to at least 2.3 million acres a year—an approximate 10x increase in management from current levels.
- Increasing climate smart agricultural practices by at least 78,000 acres adopted a year, annually conserving at least 8,000 acres a year of croplands, and increasing organic agriculture to comprise at least 20 percent of cultivated acres in California by 2045—an approximate 7.5x increase in healthy soils practices from previous levels and a 2x increase in total acres of organic agriculture.
- Increasing annual investment in urban trees in developed lands by at least 200 percent above historic levels and establishing defensible space on all parcels by 2045.
- Restoring at least 60,000 acres, or approximately 15 percent of all Sacramento–San Joaquin River Delta (Delta) wetlands, by 2045.
- Cutting land conversion of deserts and sparsely vegetated landscapes by at least 50 percent annually from current levels, starting in 2025.

If the carbon stock target above is met, and the management actions above are implemented, the modeling for NWL indicates that California's lands will be a net source of emissions, producing approximately 7 $MMTCO_2e$ of average annual emissions.

Additional climate smart management practices and additional landscapes, such as those included in the Climate Smart Strategy and discussed below in Additional Management Strategies, have the potential to increase carbon stocks and reduce GHG emissions from NWL beyond the levels modeled for this Scoping Plan.

The purpose of the NWL target and the above estimated outcomes is to provide a numerical guide that can support the state's efforts to accelerate both near-term and long-term climate action on California's lands, prioritizing durable solutions that deliver multiple outcomes. Taking these actions over the coming decades will reduce the potential carbon losses from NWL, reduce GHG emissions from some landscape types (such as croplands and Delta wetlands), and support sequestration of GHGs from NWL between 2025 and 2045. These actions will also deliver significant benefits to Californians beyond advancing our climate goals, such as reducing wildfire emissions and their associated health impacts, increasing habitat for biodiversity, reducing urban heat island effects, reducing harmful pesticide exposure, expanding economic opportunities, and others. Additional information on several economic and health outcomes from the Scoping Plan Scenario is included in Chapters 2 and 3.

Statewide planning and target setting for the NWL sector will only create meaningful change if followed by effective on-the-ground implementation. State government cannot accomplish this implementation alone. Effective large scale climate action is dependent on partnerships among tribal, federal, state, regional, and local partners, and across governmental, private, nonprofit, and commercial sectors. The NWL sector of the Scoping Plan sets a carbon target with climate action recommendations that can be used to achieve the quantified carbon, health, and economic outcomes. Implementation of these actions must be led by local or regional partnerships that plan and execute projects appropriate to the specific conditions. The technical expertise and local knowledge of land managers and stewards in all sectors must be elevated to ensure relevant, efficient, and effective climate action.

Implementation of climate action should contribute to state targets, maximize local benefits, and alleviate environmental injustices and other social inequities. On-the-ground action is largely executed and managed by local and regional actors, but state government agencies must support communities across the state in implementing nature-based climate solutions that address statewide objectives, such as the Scoping Plan carbon target. This includes providing resources and developing frameworks, while greatly increasing capacity and technical assistance to assist and empower local partners. Examples of how this can be done are the Regional Forest and Fire Capacity Program within the forestry sector, the UC Cooperative Extension in the agricultural and forestry sectors—as well as the work of the state's 10 regional Conservancies. These programs provide strong examples to emulate as they facilitate statewide coordination, and information and resource transfer from the state to the regional and local levels. The Regional Forest and Fire Capacity Program provides funding for local and regional groups

to build their organizational capacity to plan and implement wildfire and forest management projects that are informed by their own local expertise. The UC Cooperative Extension is an example of how the state provides technical assistance to local landowners and community organizations, helping them apply the latest science-based management strategies to their lands. California's regional Conservancies play a pivotal role in implementing regional conservation, restoration, and land management efforts through activities such as grant funding, science generation, and planning assistance.

The state also has identified the need to incorporate and elevate traditional indigenous knowledge into climate action on the regional and local scales. Accomplishing this requires close partnerships with tribes for mutual knowledge and resource sharing, while protecting culturally sensitive knowledge and resources. As Tribes are sovereign nations with specialized cultural knowledge and experience in managing lands, climate action on these lands that contribute to the State of California's climate targets can only be accomplished with the full participation and under the leadership of the Tribes that govern those lands.

## Strategies for Achieving Success: Crosscutting Items for all NWL

- Implement AB 1757 and SB 27.
- Implement the Climate Smart Strategy.
- Accelerate the pace and scale of climate smart action, consistent with the management levels identified above, as part of a collective effort between federal, state, private, nonprofit, and individual land managers.
- Prioritize and practice equity, including through meaningful community engagement and prioritizing implementation of nature-based solutions that benefit the communities most vulnerable to climate change.[483]
- Advance multi-benefit, collaborative, landscape-level approaches that engage communities and landowners, and incorporate adaptive managements.
- Consult and partner with California Native American tribes to increase co-management and tribal management authority; restore, protect, and enhance natural cultural resources, traditional foods, and cultural landscapes; respect tribal sovereignty; and support tribes' implementation of tribal expertise and Traditional Ecological Knowledge and cultural easements.[484]

[483] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N8. finalejacrecs.pdf (arb.ca.gov).
[484] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N1, N6, N16, N17, N18. finalejacrecs.pdf (arb.ca.gov).

- Leverage existing innovative financial and market mechanisms, and explore new ones, between the public, private, and philanthropic sectors to secure funding of climate smart land management.
- In partnership with communities, tribes, and the private sector, expand and develop new infrastructure for manufacturing and processing of climate smart agricultural and biomass products.
- Leverage and support technical assistance providers: such as the UC Cooperative Extension and California's 98 Resource Conservation Districts, that have track records of providing technical assistance to local landowners and implementing agriculture, forestry, natural resource management, and restoration projects across the state.
- Establish and expand mechanisms that ensure NWL are protected from land conversion and parcelization (e.g., conservation easements or Williamson Act), in line with the strategies outlined in CNRA's Pathways to 30x30 California.[485,486] Pair land conservation projects with management plans that increase carbon sequestration, where feasible.
- Increase opportunities for private and philanthropic investments in nature-based climate solutions, utilizing existing voluntary and compliance carbon markets, existing state and local programs, and the California Carbon Sequestration and Climate Resiliency Project Registry established pursuant to SB 27.
- Expand monitoring and tracking of management actions and outcomes consistent with the tracking and monitoring recommendations of the Climate Smart Strategy.

## Forests, Shrublands, and Chaparral

At roughly 29 million acres, forests cover 27 percent of California. Shrublands and chaparral cover 31 percent of the state; roughly 33 million acres. Both types are distinct, with their own ecological dynamics and management strategies, and are modeled within a single model that is calibrated to treat them uniquely.

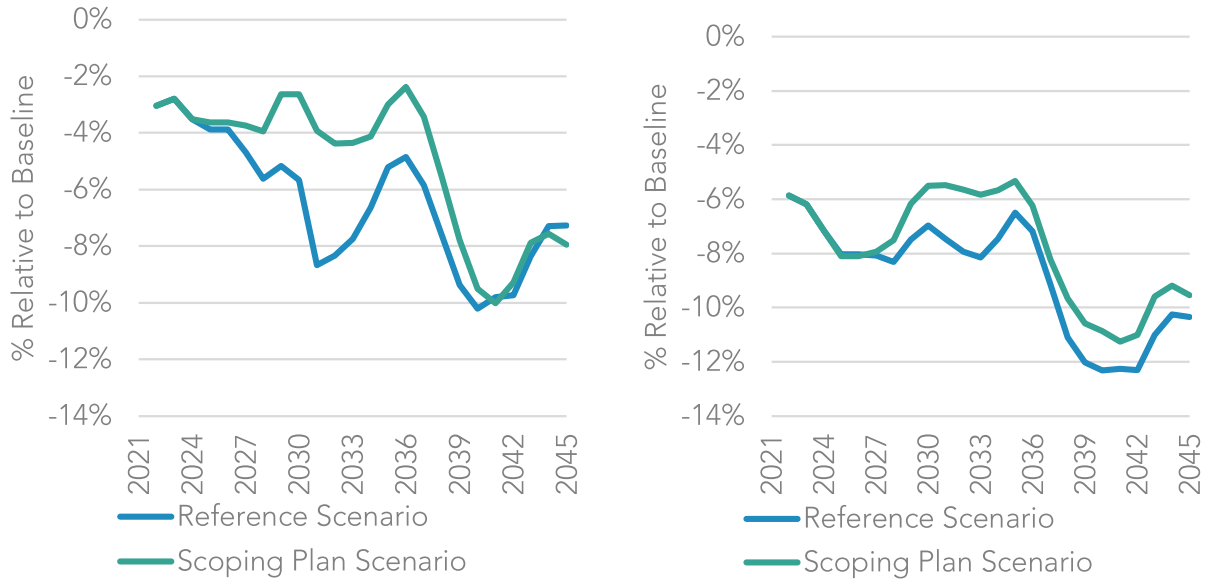
Together, forests, shrublands, and chaparral support a high biodiversity of plants and animals, in addition to high levels of carbon stocks. They provide important air and water quality benefits to all Californians, as well as recreational opportunities and, for forests, harvested wood products for the state. These landscapes are fire-adapted, and historical tribal management of these lands has fostered ecosystem health and resilience. Over the past century, these lands have been impacted severely by fire exclusion, including

[485] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N5, N26, N27. finalejacrecs.pdf (arb.ca.gov).
[486] CNRA. 2022. *Pathways to 30x30 California*. https://www.californianature.ca.gov/pages/30x30.

exclusion of indigenous people's management and past management practices, which has resulted in less resilient ecosystems and communities and more destructive wildfires today. This, along with drought induced stress and mortality, has changed these landscapes from a carbon sink to a carbon source. Climate smart management can help make forests more resilient to climate change and less prone to catastrophic wildfire. Climate-smart management in shrublands and chaparral face additional challenges and uncertainty, but can still provide protection for threatened communities and natural resources. This management, if conducted on a regular basis to maintain forest health, can help reduce emissions from forests, shrublands, and chaparral, and help strengthen and maintain the co-benefits that Californians experience from them.

Under all management levels, forests and shrublands are expected to lose carbon over the next two decades due to climate change and wildfire (Figure 4-21).

**Figure 4-21: Forest (left) and shrubland (right) carbon stocks by 2045[487,488]**




While this decrease in carbon stocks may be inevitable, forest management under the Scoping Plan Scenario can help direct where and how carbon loss occurs. By proactively managing forests and shrublands, the loss of carbon from wildfire can be lessened as the risk of high severity fire is decreased, with the removed biomass going toward a more

[487] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N13. *finalejacrecs.pdf (arb.ca.gov)*.

[488] This analysis is the aggregation of all forests and shrublands from all ownerships across the entire state of California.

useful purpose such as harvested wood products, bioenergy, and engineered carbon removal. Managing for a diverse and resilient forest landscape also can help forests recover more quickly so that when climate change and wildfire impacts occur, forests will be less affected and can continue to thrive and sequester carbon. Additional details on the climate benefit potential of forests and shrublands/chapparal can be found in Section 2 of the NWL Climate Smart Strategy.

**Strategies for Achieving Success**

- Accelerate the pace and scale of climate smart forest management to at least 2.3 million acres annually by 2025, in line with the climate smart management strategies identified in this Scoping Plan, the NWL Climate Smart Strategy, and the Wildfire and Forest Resilience Action Plan.[489]
- Establish and expand mechanisms that ensure forests, shrublands, and grasslands are protected from land conversion and that support ongoing, rather than one-time, management actions.
- In collaboration with state and local agencies, accelerate the deployment of long-term carbon storage from waste woody biomass residues resulting from climate smart management, including storage in durable wood products, underground reservoirs, soil amendments, and other mediums.
- Expand infrastructure to facilitate processing of biomass resulting from climate smart management.
- Expand permit streamlining in collaboration with state and local agencies to accelerate implementation of climate smart forest management while protecting natural resources.

## Grasslands

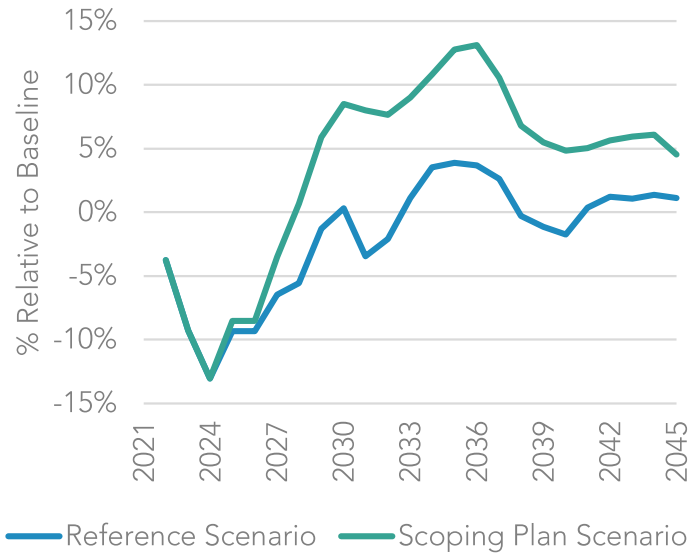
Grasslands cover 9 percent of California, roughly 10 million acres, and are found throughout the state in various landscapes, with concentrations in the foothills surrounding the Sacramento and San Joaquin Valleys. In addition to carbon storage (primarily in the soil), grasslands provide open space, wild habitat, grazing land, and important water filtration and recharge benefits. The protection of grasslands provides an opportunity to reduce sprawl and complement VMT reduction strategies. As grasslands are susceptible to invasive species, climate smart strategies can increase grassland

[489] Forest Management Task Force. 2021. *California's Wildfire and Forest Resilience Action Plan: Recommendations of the Governor's Forest Management Task Force.* https://www.fire.ca.gov/media/ps4p2vck/californiawildfireandforestresilienceactionplan.pdf.

resilience to climate change by improving species diversity and maintaining or increasing soil carbon stocks.

Modeling results show that increased fuels treatments and avoided land conversion can increase carbon stocks on grasslands by 2045, but sequestration rates fluctuate annually. Grasslands are capable of high carbon sequestration rates but are susceptible to carbon losses from wildfire and land conversion. Soil carbon is the major carbon pool on these lands, and continued future improvement of the monitoring and modeling of soil carbon is needed. Similar to forests and shrubland/chaparral, modeling alternatives that include fuels treatments resulted in greater carbon stocks compared to no management, and had lower wildfire emissions. Unlike forests and shrubland/chaparral, which have a general declining carbon stocks trend, the modeling results (Figure 4-22) show grasslands can maintain or increase carbon stocks with active management. Details on the climate benefit potential of grasslands can be found in Section 2 of the NWL Climate Smart Strategy.

**Figure 4-22: Grassland carbon stocks by 2045**




**Strategies for Achieving Success**

- Establish and expand mechanisms that ensure grasslands are protected from land conversion/parcelization and that support ongoing, rather than one-time, management actions that improve carbon sequestration.
- Deploy grassland management strategies, like prescribed grazing, compost application, and other regenerative practices, to support soil carbon sequestration, biodiversity, and other ecological improvements.

- Increase adoption of compost production on farms and application of compost in appropriate grassland settings for improved vegetation and carbon storage, and to deliver waste diversion goals through nature-based solutions.

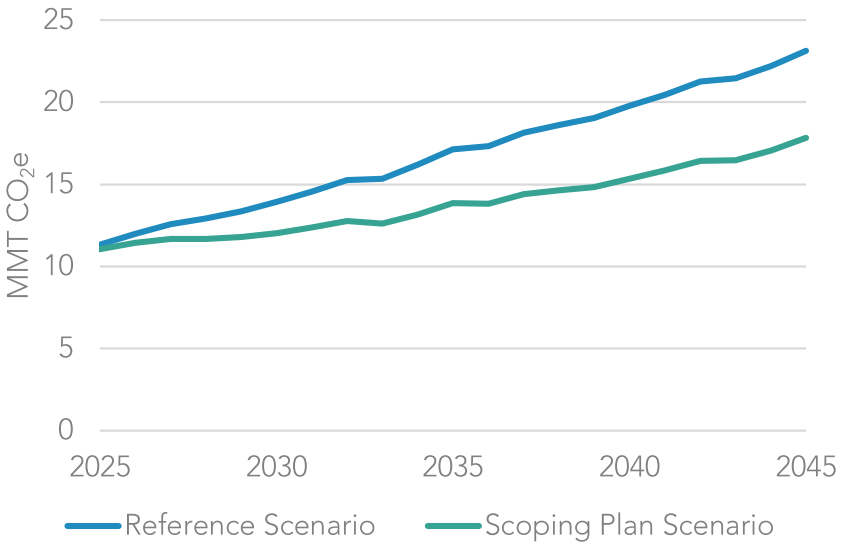
## Croplands

Croplands cover 9 percent of the state, roughly 9.5 million acres. This land is some of the most productive agricultural land in the world, and enables California to be a global leader in agriculture. Aside from developed lands, croplands are the most intensively managed landscapes in the state, and are closely tied to society through the food they produce and the constant, direct contact that people have with croplands through the course of management. In addition to food security, croplands provide considerable carbon storage in the soil and, in perennial croplands, in aboveground biomass. Climate smart practices can improve public health; for example, by reducing synthetic fertilizer and pesticide use. They also help to maintain or increase the climate resilience of cropland productivity through improved soil conditions and increased pollinator habitat.

There is also significant potential to transform this sector to increase soil carbon storage, reduce GHG emissions (Figure 4-23), and reduce pesticide exposure and health impacts. Moving to an agricultural system that improves soil health and water holding capacity reduces over-application of nitrogen, reduces the use of pesticides and fumigants, and increases biodiversity and pollinator habitat, supporting California's pathway to carbon neutrality while simultaneously improving the lives of those who live and work in the agricultural community. Croplands are intricately tied to people, communities, and their health, and through climate smart practices and cropland conservation, these lands have the potential to contribute more to society than just food.[490] The implementation of climate smart agricultural practices and diversified organic agriculture can help California achieve social and environmental benefits, like improving water use efficiency, increasing pollinator habitat, and reducing synthetic fertilizer and pesticide use.[491] Additional details on the climate benefit potential of croplands can be found in Section 2 of the NWL Climate Smart Strategy.

[490] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations In-part (N3, N4, N22), N5, N21. finalejacrecs.pdf (arb.ca.gov).
[491] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N11. finalejacrecs.pdf (arb.ca.gov).

**Figure 4-23: Cumulative $CO_2e$ emissions from annual croplands in 2045[492]**




CARB recognizes the complex nature of croplands, cross-sector relationships, and the need to build on this analysis to further our understanding of cropland dynamics. Many more aspects of cropland management need to be explored for potential climate benefits, such as water and nutrient use management, pest control methods, crop rotations, and other management practices. The impacts of climate change on water availability, annual/perennial crop growth, and future carbon sequestration trends are uncertain, and recent policies such as the Sustainable Groundwater Management Act may also influence cropland management in unforeseen ways. Nonetheless, it is clear that greater climate smart practice implementation can prepare California for the future and yield tangible benefits for the state.

**Strategies for Achieving Success**

- Accelerate the pace and scale of healthy soils practices to 80,000 acres annually by 2025, conserve at least 8,000 acres of annual crops annually, and increase organic agriculture to 20 percent of all cultivated acres by 2045.

[492] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N11. *finalejacrecs.pdf (arb.ca.gov)*.

- Utilize the recommendations included in CDFA's Farmer and Rancher-Led Climate Change Solutions[493] report to accelerate deployment of healthy soils practices, organic farming, and climate smart agriculture practices.
- Establish or expand financial mechanisms that support ongoing deployment of healthy soils practices and organic agriculture.[494]
- Support strategies that achieve co-benefits of safer, more sustainable pest management practices and the health and preservation of ecosystems, such as implementing the California Department of Pesticide Regulation's (DPR's) Sustainable Pest Management Work Group recommendations.[495]
- Conduct research on the intersection of pesticides, soil health, GHGs, and pest resiliency via a multi-agency effort with DPR, CDFA, and CARB.[496]
- Conduct outreach and education to develop and facilitate the increased adoption of safer, more sustainable pest management practices and tools; reduce the use of harmful pesticides; promote healthy soils; improve water and air quality; and reduce public health impacts.
- In collaboration with state and local agencies, accelerate the deployment of alternatives to agricultural burning that increase long-term carbon storage from waste agricultural biomass, including storage in durable wood products, underground reservoirs, soil amendments, and other mediums.
- Work across state agencies to reduce regulatory and permitting barriers around some healthy soils practices (e.g., composting), where appropriate.
- Utilize innovative agriculture energy use and carbon monitoring and planning tools to reduce on-farm GHG emissions from energy and fertilizer application or to increase carbon storage, as well as to promote on-farm energy production opportunities.

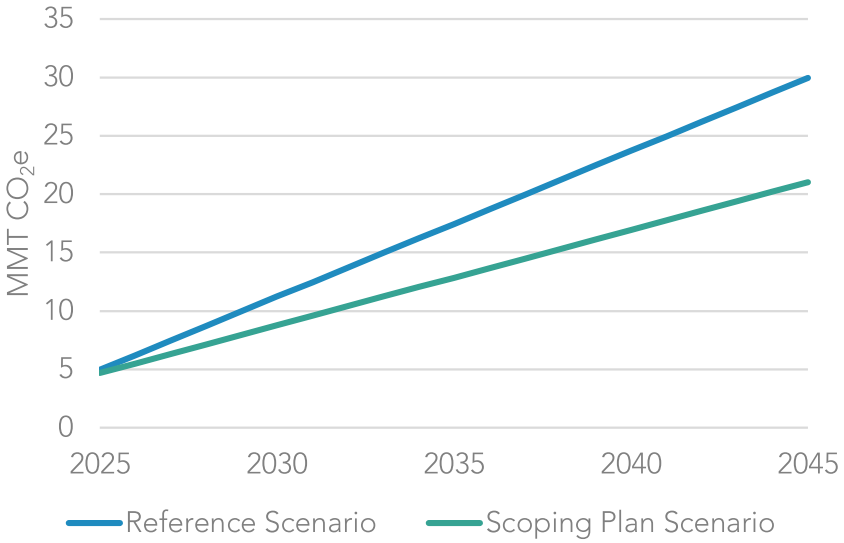
[493] California Department of Food and Agriculture. 2021. Farmer and Rancher Led Climate Change Solutions. *https://www.cdfa.ca.gov/oefi/climate/docs/cdfa_farmer_and_rancher-led_climate_solutions_meetings_summary.pdf*.
[494] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N5, N7. *finalejacrecs.pdf (arb.ca.gov).*
[495] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations N3, N4, N5, N7, N22. *finalejacrecs.pdf (arb.ca.gov)*.
[496] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N11. *finalejacrecs.pdf (arb.ca.gov)*.

## Wetlands

Wetlands cover 2 percent of the state (roughly 1.7 million acres) and include inland and coastal wetlands, such as vernal pools, peatlands, mountain meadows, salt marshes, and mudflats. These lands are essential to California's communities as they serve as hotspots for biodiversity, contain considerable carbon in the soil, are critical to the state's water supply, and protect upland areas from flooding due to sea level rise and storms. Wetlands have been severely degraded through reclamation, diking, draining, and dredging practices in the past, resulting in the emissions of the carbon stored in the soils and the loss of ecosystem benefits. Climate smart strategies to restore and protect all the types of wetlands can reduce emissions while simultaneously improving the climate resilience of surrounding areas and improving the water quality and yield for the state. Restored wetlands also can reduce pressure on California's aging water infrastructure. These benefits beyond emissions reductions will help in the future, as climate change is predicted to negatively affect water supply.

Avoided conversion and restoration of Delta wetlands reduces $CO_2$ and methane emissions from wetlands, with GHG reductions scaling with implementation rates (Figure 4-24). Expansion of conservation and restoration efforts will generate benefits such as the conservation of biodiversity, improved water quality and supply, and reduced flood risk. Additional details on the climate benefit potential of wetlands can be found in Section 2 of the NWL Climate Smart Strategy.

**Figure 4-24: Cumulative $CO_2e$ emissions from Delta wetlands by 2045**




### Strategies for Achieving Success

- Restore 60,000 acres of Delta wetlands annually by 2045 to reduce methane emissions from wetlands and reverse the resulting subsidence.

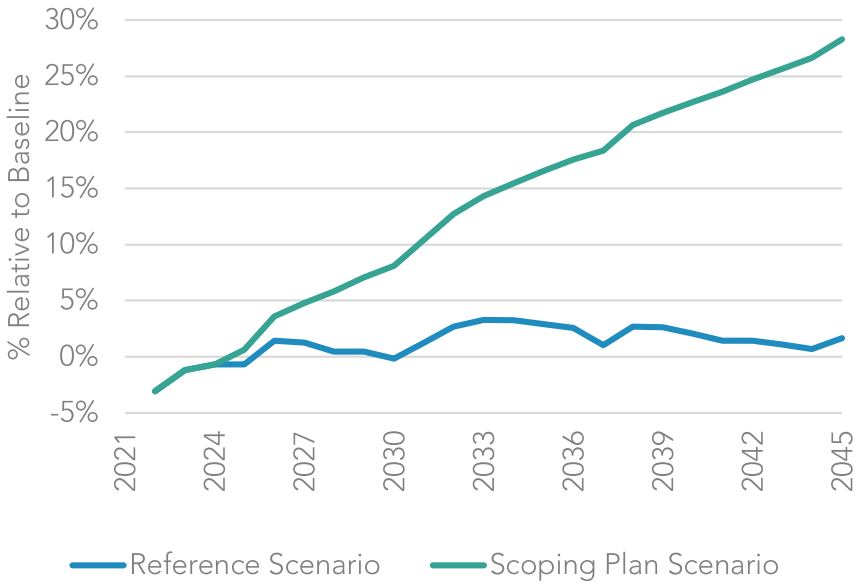
- Identify and prioritize wetland restoration efforts around climate vulnerable communities.
- Leverage other funding and institutions to support wetland restoration projects, including land trusts, local funding (e.g., San Francisco Measure AA), federal funding, and private and philanthropic funding to support wetlands restoration projects.
- Work across state agencies to reduce regulatory and permitting barriers around wetland restoration projects, where appropriate.

## Developed Lands

Developed lands cover 6 percent of the state (roughly 6.8 million acres) and include urban, suburban, and rural areas, as well as transportation and supporting infrastructure throughout California. This area encapsulates the land on which the vast majority of Californians reside and call home. The vegetation within cities and communities, and along infrastructure, are all part of developed lands. This vegetation provides numerous benefits to surrounding areas, including carbon storage, air and water filtration, reduced urban heat island effect, and access to nature, aesthetics, and mental health, among others. These areas are susceptible to climate change as well, and climate smart strategies to protect and expand the urban forests, landscaping, green spaces, parks, and associated vegetation can increase their climate resilience and the benefits Californians derive from them. These strategies also have a significant opportunity to benefit disadvantaged communities, who may not have equitable access to these practices or the benefits they provide. Additional details on the climate and equity benefit potential of developed lands can be found in Section 2 and the Introduction of the NWL Climate Smart Strategy.

Urban forests have a significant potential to sequester carbon (Figure 4-25). They are vastly different from wildland forests, as they require investments to maintain and irrigate. This results in the need for a significant increase in investment to increase urban forest carbon. As urban forests become denser and management difficulty increases, the carbon stock returns on investment diminish, making it expensive to maximize carbon in urban forests. Water availability and irrigation efficiency are also an important consideration for increasing urban forest cover. As water becomes scarcer, the prioritization of irrigating trees over lawns or gardens may be required to achieve increases in urban forest carbon.

**Figure 4-25: Carbon stocks in urban forests by 2045**




Within wildland-urban interface (WUI) areas, defensible space can protect urban and rural communities from wildfire. Analysis results show that 48 percent of parcels are currently fully compliant with defensible space requirements. This highlights how much work needs to be done to protect communities and homes. Defensible space results in a decrease in carbon stocks, as expected when reducing fuels for wildfire.

**Strategies for Achieving Success**

- Increase urban forestry investment annually by 200 percent, relative to business as usual.
- Increase public awareness of urban forest benefits and, where appropriate, prioritizing irrigation of trees over lawns.
- Provide technical assistance and resources to disadvantaged communities to implement community urban greening projects to provide equitable access to the benefits of urban greening projects.[497]
- Work with state and local agencies to expand technical assistance for and enforcement of the defensible space requirements of PRC 4291 to reduce wildfire risk to homes and structures.

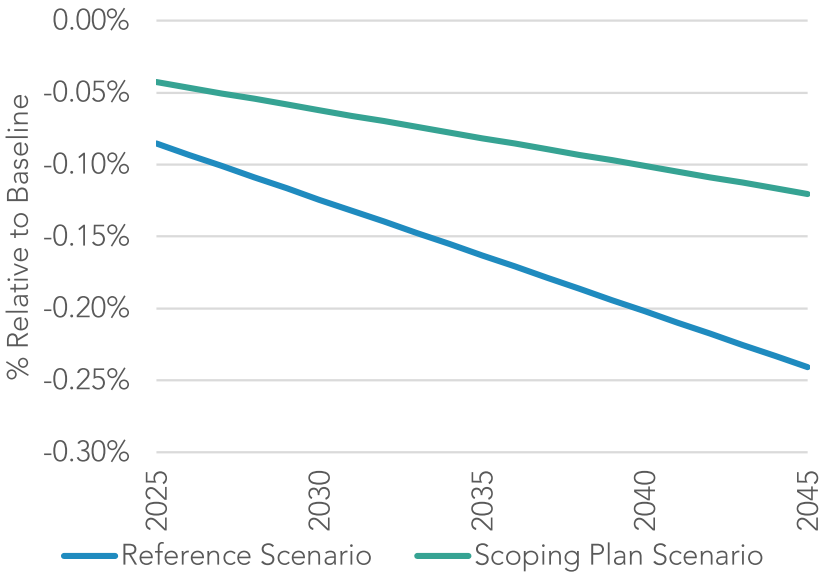
[497] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N8. finalejacrecs.pdf (arb.ca.gov).

## Sparsely Vegetated Lands

Sparsely vegetated lands cover 10 percent of the state, roughly 10.2 million acres, primarily in the east and southern parts of California. These lands include deserts, beaches, dunes, bare rock, and areas covered in ice and snow (e.g., higher mountain elevations). The limited carbon storage of these lands varies from bare rock and mineral soil to more vegetated areas, though severe climate limits the amount of biomass. Nonetheless, sparsely vegetated lands are important for open space and provide rare and unique habitats for endemic species and a diversity of wildlife. These lands present important recreational opportunities for Californians and serve as important protective buffers in coastal and low-lying areas. Land use change threatens these lands, and conservation efforts are important for protecting these unique areas of California.[498]

Avoided conversion of sparsely vegetated lands reduces the organic carbon lost from the soil, which is the major carbon pool in this land type (Figure 4-26). In identifying the outcomes for sparsely vegetated lands, CARB modeled avoided land conversion to another land use.

**Figure 4-26: Carbon stocks in sparsely vegetated lands by 2045**




### Strategies for Achieving Success

- Establish and expand mechanisms that ensure sparsely vegetated lands are

[498] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N26. finalejacrecs.pdf (arb.ca.gov).

protected from land conversion, prioritizing those areas most vulnerable to climate change and loss.

## Additional Management Strategies

Additional nature-based climate solutions beyond those management strategies modeled for this Scoping Plan are available for implementation, but either cannot currently be modeled and/or affect carbon and the landscape in ways that cannot currently be tracked. Nevertheless, it is important to take action even where these technical gaps exist. Some of these actions, such as cultural burning and indigenous farming practices, have been used on large scales for decades or even centuries, while others are relatively new concepts. The state nevertheless recommends implementing the additional solutions listed here to achieve potential additional climate benefits, as well as other co-benefits. These additional solutions were drawn from the NWL Climate Smart Strategy and stakeholder, tribal government, and interagency feedback.[499]

### Considerations

Although these practices are recommended, because of the lack of in-depth modeling and analysis available, several considerations must be addressed when implementing them. These considerations also apply to the management strategies included in the Scoping Plan Scenario.

- Future climate change impacts are uncertain: The negative impact that climate change can have on the ability of these practices to maintain expected climate benefits is uncertain and may significantly change in the future. Climate change is expected to further diminish the already constricting growing conditions in California, with increasing droughts, more extreme weather events, and expanding disturbances from fire, insects, and disease. It is estimated that suitable habitat for many native plant and animal species could shift, creating novel ecosystems without historical precedent. Close monitoring of all practices, including no management, across our NWL will be critical to understand if and how future climate change affects outcomes and how to adapt management to meet the needs of the system under climate change.[500]

[499] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N24. *finalejacrecs.pdf (arb.ca.gov)*.
[500] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N15. *finalejacrecs.pdf (arb.ca.gov)*.

- Local conditions: Not every practice is applicable, feasible, or even desirable in every location across California. Implementation of these practices should account for local conditions and needs that may affect the appropriateness of that practice.
- Long-term carbon storage: The ability to sequester additional carbon into NWL is only beneficial to the climate if that carbon stays out of the atmosphere. Many of the additional practices listed here may require continual incentives or interventions to ensure permanence of carbon storage in the soil and biomass. For example, in croplands, it is difficult to estimate how much of the carbon stored by no-tillage can be released by a single subsequent tillage, but a return to conventional tillage would usually be expected to erase most gains.[501,502]
- Scaling actions: There are uncertainties on how these practices may impact both the environment and communities when significantly expanded. For this reason, it is best to take a cautious and measured approach to ramping up actions to a larger scale.
- Infrastructure and operational needs: Scaling up the implementation of some of these practices demands transformational change in the supporting infrastructure and operational frameworks. For example, increasing forest management to the degree included in the Scoping Plan Scenario will require significant changes to wood-processing infrastructure, workforce capacity, permitting processes, technical assistance, and other operational constraints. The increased application of compost to croplands, and potentially to rangelands, will require a significant increase in organic waste and dairy manure collection to increase compost supply, in line with SB 1383. This will also require additional compost production facilities as well as compost/organic waste transportation and application methods.
- Co-benefits: Many co-benefits from these practices exist beyond the climate benefits. These co-benefits include improved public and worker health; improved microbial, insect, and wildlife habitat; enhanced biodiversity; greater labor demand in the nature-based economy; and improved climate resilience.
- Labor and Economics: Many of these practices require additional labor, and an evaluation of how many more jobs are needed to carry out many of these practices

[501] Muñoz-Romero, V., R. J. Lopez-Bellido, P. Fernandez-Garcia, R. Redondo, S. Murillo, and L. Lopez-Bellido. 2017. “Effects of tillage, crop rotation and N application rate on labile and recalcitrant soil carbon in a Mediterranean Vertisol.” *Soil Tillage Res.* 169, 118–123.
[502] Mitchell, J. P., A. Shrestha, W. R. Horwath, R. J. Southard, N. Madden, J. Veenstra, and D. S. Munk. 2015. “Tillage and cover cropping affect crop yields and soil carbon in the San Joaquin Valley.” *California. Agron. J.* 107, 588–596.

is currently unknown. There will also be the need to explore the costs and economic benefits of implementing these additional practices.

- Retreatments: All of these practices have limits on how long they can enhance carbon sequestration. Many of these practices need to be periodically repeated, followed by complementary practices, or maintained through time. This increases costs and requires diligence and long-term stewardship.

## Additional NWL Actions and Strategies

Below is a set of additional actions that should be taken on California's natural and working lands. Again, these practices were not modeled for this Scoping Plan, and all of the considerations listed above should be taken into account before implementing the following actions.

- Conservation of all NWL types (in line with the NWL Climate Smart Strategy and CNRA's Pathways to 30x30 California) is critical to ensuring continued carbon sequestration and provision of co-benefits from these lands for all Californians.[503]
- Reforestation following disturbance, using appropriate species, is an impactful practice that can help prevent conversion away from forestland and establish new trees to sequester carbon. The number of acres that may need reforestation following high severity wildfires is estimated to continue to increase into the future.
- Restoration of shrublands, chaparral, riparian zones, and oak woodlands across California includes a variety of practices to alter their structure and return endemic species to the areas. These unique habitats provide multiple co-benefits to the state, such as clean water, reduced wildfire risk, and biodiverse habitats for flora and fauna.
- Conservation and restoration of wetlands, beyond the Delta wetlands included in the NWL modeling, can protect these unique habitats and the climate benefits they provide. These wetland types can include but are not limited to coastal wetlands, mountain meadows, vernal pool complexes, alkali sinks and meadows, and floodplains.
- Conservation and restoration of seagrasses and seaweeds provide a number of benefits, including carbon storage and sequestration, habitat provision for many culturally and commercially important species of fishes and invertebrates, shoreline protection, and tourism opportunities.[504]

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[503] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N26, N27. *finalejacrecs.pdf (arb.ca.gov)*.
[504] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N2. *finalejacrecs.pdf (arb.ca.gov)*.

- Prescribed herbivory utilizes various livestock to consume vegetation to reduce fuel loads across an area. This fuel management practice can be used in forests, grasslands, and shrublands as an effective alternative to herbicide use, and should be considered wherever local conditions allow.
- Urban and community greening efforts such as green schoolyards, urban farms, rain gardens, community gardens, community composting, and many more provide numerous health benefits to communities.
- Additional Healthy Soils Program practices on annual croplands such as conservation cover and crop rotation, biomass planting for borders, wind barriers, riparian areas, and improved nutrient management can improve soil health, water retention, and increase carbon stocks.
- Healthy Soils Program practices on perennial croplands and rangelands, such as compost application and alley cropping/cover cropping to improve soil health, water retention, erosion control, and biomass growth.[505]
- Stacking of these Healthy Soils Program practices, where appropriate, in perennial and annual systems, can synergistically improve soil health and provide multiple benefits.
- Mulching adds high carbon materials to croplands or fallowed lands to reduce competing vegetation and retain moisture. This practice can support other benefits such as reduced water use and reduced synthetic pesticide and fertilizer use, as well as provide a use for suitable forest and agricultural waste biomass.
- Reductions in the use of synthetic fertilizers in cropland management, generally supported by the implementation of new management tools or technologies, can lead to reductions in GHG emissions from the production and application of fertilizers. This benefit is in addition to the co-benefits of reduced chemical runoff into waterways and reduced exposure of human populations to their harmful effects.

[505] Various types of organic amendments are being researched for application to particular landscape types. For example, compost application to rangelands is a relatively new practice that has been shown to improve soil health and increase carbon sequestration in the short term, though the science on the long-term impacts of this practice is still developing and the supply of available compost may be limiting.

# Chapter 5: Challenge Accepted

This chapter provides an overview of the next steps and partnerships that will be needed to successfully implement this Scoping Plan. The path forward is not dependent on one agency, one state, or even one country. It will take action on a global level to address the threat climate change poses. But, the work begins at home.[506] The state can lead by engaging Californians and demonstrating how action at the state, regional, and local levels of government, as well as action at community and individual levels, can contribute to addressing the challenge before us. We must build partnerships with academic institutions, private industry, and others to support and accelerate the transition to carbon neutrality. Ultimately, the success of this Scoping Plan will be measured by our ability to implement the actions modeled in the Scoping Plan Scenario at all levels of government and society. This will depend on a mix of legislative action, regulatory program development, incentives, institutional support, workforce and business development, education and outreach, community engagement, and research and development and deployment. Optimizing this mix will help to ensure that clean energy and other climate mitigation strategies are clear, winning alternatives in the marketplace and in communities—to promote equity, drive innovation, and encourage consumer adoption. Bold institutional action will catalyze continued research and push private investment to create jobs and bring innovative ideas to reality.

## State-level Action

Achieving the targets described in this Scoping Plan will require continued commitment to and successful implementation of existing policies and programs and identification of new policy tools and technical solutions to go further, faster. California's Legislature and state agencies will continue to collaborate to achieve the state's climate, clean air, equity, and broader economic and environmental protection goals. It will be necessary to maintain and strengthen this collaborative effort, and to draw upon the assistance of the federal government, regional and local governments, tribes, communities, academic institutions, and the private sector to achieve the state's near-term and longer-term emission reduction goals and a more equitable future for all Californians.

[506] This "polycentric" approach to climate challenges, engaging many levels of government, was articulated in leading papers by Nobel laureate Elinor Ostrom. See, for example, Ostrom, E. 2014. "A Polycentric Approach to Coping with Climate Change." *Annals of Economics and Finance* 15-1, 97–134.

## Regulations and Programmatic Development

Meeting the AB 32 2020 GHG emissions reduction target several years earlier than mandated demonstrated that developing mitigation strategies through a public process, where all stakeholders have a voice, leads to effective actions that address climate change and yields a series of additional economic and environmental co-benefits to the state. Following adoption of this Scoping Plan, state agencies will continue to update and implement new and existing programs to align with the outcomes in the plan. Community, tribal, and stakeholder engagement will be a critical part of this work. Several state agencies, including CARB, the CEC, the California State Transportation Agency (CalSTA), the CPUC, and others will need to be part of various subsequent rulemaking processes. Each of these agencies' leadership and technical staff will engage with the public through public meetings, written and oral comment, and other methods of engagement. This work will be informed by evaluations of the health, air quality, environmental, equity, and economic benefits and impacts of regulations, including an assessment of the societal cost of carbon, as required under AB 197.

## Incentive Programs

As described in Chapter 1, incentive programs are one of the most important tools the state has in advancing our low carbon future, especially for climate vulnerable communities. The programs ensure clean technology and energy are accessible and are critical to closing ongoing opportunity gaps. These programs also leverage private-sector investment and build sustainable, growing markets for clean and efficient technologies, and they are particularly necessary to support GHG emission reduction strategies for priority sectors, sources, and technologies. Clean technologies are often already the best and lowest cost option over their lifetimes but incentive funding is critical to ensure that they are broadly available, especially in climate vulnerable communities. Incentives also build on California's long track record of driving innovative technology developments, and creating new industries, with targeted investment. The Inflation Reduction Act also provides a new source of funding and tax incentives that must be leveraged to help achieve the state's climate goals.

Many state funding programs are designed to achieve multiple objectives simultaneously: reduce emissions from GHGs, criteria pollutants, and toxic air contaminants; manage natural and working lands for carbon sequestration; and address health and opportunity gaps in disadvantaged communities. California's incentive programs focused on jump-starting the transition to a zero emission transportation future are a good example of this "stacked" approach. The state is investing billions of dollars through programs such as the On-Road Heavy-Duty Voucher Incentive Program and Clean Cars 4 All in order to replace the light- and heavy-duty vehicles most responsible for the state's GHG emissions and poor air quality, all while bolstering the nascent ZEV market. Further strategies aid in developing new technologies, in ramping up access for all, and in shifting to cleaner

modes of transport; for instance, by supporting investments in walkable, bikeable communities and transit, as well as in vehicles. This funding strategy is, of course, paired with the regulatory approach described above.

## Local Action

Local action by cities can support and amplify efforts to reduce GHGs. For example, the City of Oakland requires all new construction to be all-electric and is currently working on electrifying existing buildings.[507] In addition, starting in 2023, the City of Sacramento will require all new buildings under three stories to be all-electric, and it extends the mandate to all new construction by 2026 with some limited exemptions. The City of Sacramento also requires levels of EV charging infrastructure in new construction starting in 2023, higher than the minimum state requirements, and provides parking incentives for zero-emission carsharing and EV charging.[508] Local governments asserting this type of leadership are critical partners in supporting state-level measures to contain the growth of GHG emissions associated with the transportation system and the built environment.

California must accommodate population and economic growth in a far more sustainable and equitable manner than in the past. Good climate policy can and should create affordable and pleasant places to live, with effective transport and clean air for all—a future in which local governments and communities are central partners. Local governments have the primary authority to plan, zone, approve, and permit how and where land is developed to accommodate population growth, economic growth, and the changing needs of their jurisdictions. They also make critical decisions on how and when to deploy transportation infrastructure, and can choose to support transit, walking, bicycling, and neighborhoods that do not force people into cars. Local governments also have the option to adopt building ordinances that exceed statewide building code requirements, and play a critical role in facilitating the rollout of ZEV infrastructure. As a result, local government decisions play a critical role in supporting state-level measures to contain the growth of GHG emissions associated with the transportation system and the built environment—the two largest GHG emissions sectors over which local governments have authority.

Local governments are also frequently the source of innovative and practical climate solutions that can be replicated in other areas. Their efforts to reduce GHG emissions within their jurisdictions are vital to achieving the state's near-term air quality and long-term climate goals. Local governments must continue to take action that affirmatively

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[507] City of Oakland. Building Electrification. *https://www.oaklandca.gov/projects/building-electrification*.

[508] City of Sacramento. Electrification of New Construction. *http://www.cityofsacramento.org/SacElectrificationOrdinance*.

builds the projects and expend the funds needed to further the state's collective path toward equitable emissions reductions. As such, aligning local jurisdiction action with state-level priorities to tackle climate change and the outcomes called for in this Scoping Plan is critical to achieving the statutory targets for 2030 and 2045. Local governments can implement climate strategies that can effectively engage residents by addressing local conditions and issues that also deliver local economic benefits.

## Local Climate Action Planning and Permitting

California encourages local jurisdictions to take ambitious, coordinated climate action at the community scale; action that is consistent with and supportive of the state's climate goals.[509] As discussed in more detail in Appendix D (Local Actions), local jurisdictions can do much to enable statewide priorities, such as taking local action to help the state develop the housing, transport systems, and other tools we all need. Indeed, state tools—such as the Cap-and-Trade Program or zero-emission vehicle programs—do not substitute for these local efforts. Multiple legal tools are open to local jurisdictions to support this approach, including development of a climate action plan (CAP), sustainability plan, or inclusion of a plan for reduction of GHG emissions and climate actions within a jurisdiction's general plan. Any of these can help to align zoning, permitting, and other local tools with climate action.

Once adopted, the GHG emissions reductions plans detailed in CAPs can provide local governments with a valuable tool for coordinated climate planning in their community. When a local CAP complies with CEQA requirements, individual projects that comply with the CAP are allowed to streamline the project-specific GHG analysis.[510,511] Effectively, local governments that adopt a CEQA-compliant CAP enable project developers to use this streamlined approach. This saves time and resources and provides more consistent expectations for how GHG reduction measures are applied across projects in the jurisdiction. While the state encourages local governments to follow this approach, we acknowledge not all jurisdictions have the resources to develop a CAP that meets the CEQA requirements.

In addition to being required for a local CAP to comply with CEQA, local GHG reduction targets have long been recommended as part of the process of developing a climate

[509] This plan provides more detailed guidance and tools to local governments in Appendix D (Local Actions).
[510] Cal. Code of Regs., tit. 14, § 15183.5.
[511] California Governor's Office of Planning and Research. n.d. "General Plan Guidelines - Chapter 8 Climate Change."

action plan.[512] One challenge local jurisdictions have faced is how to evaluate and adopt quantitative, locally appropriate goals that align with statewide goals. An effective response to this challenge is to focus on goals that can help implement overall state priorities—enabling the key transformations California needs.

There are many ways that local governments can make key contributions to this transformation, depending on the characteristics of their jurisdiction and community. For example, some jurisdictions will inherently have more land capacity to remove and store carbon, whether through natural and working lands or by other means. Other jurisdictions will be host to GHG-emitting facilities that serve necessary functions and will take time to transition to clean technology (e.g., municipal wastewater treatment plants, landfills, and energy generation and transmission facilities). It is important to recognize that we will need to build new energy production and distribution infrastructure, and repurpose existing ones, for clean technology and energy before we are able to phase down existing fossil sources. There also will be a need to handle the significant amount of biomass resulting from sustainable forest management for catastrophic wildfire prevention, agricultural waste, and landfill diversion.

Regional efforts can support change too: energy and transportation systems that serve Californians do not stop at jurisdictional boundaries, and some local decisions can have ramifications for other communities. For instance, Metropolitan Planning Organizations (MPOs) can help to integrate local efforts by planning consistent with the Scoping Plan and Climate Action Plan for Transportation Infrastructure, including by removing polluting roadway capacity expansions from project pipelines and instead focusing on climate-friendly solutions. These varied capabilities and needs should be taken into account in setting targets for local climate plans. For instance, although net zero targets can often be valuable and achievable, and mitigation is important, targets should be considered in the larger context of these goals. This all means any GHG targets on a local scale should take into consideration the actions and outcomes included in this Scoping Plan. Jurisdictions considering “net zero” targets should carefully consider the implications such targets may have on emissions in neighboring communities and the ability of the state to meet our collective targets.

Jurisdictions without formal CAPs also have important opportunities within this context. These jurisdictions can still take actions that effectively translate key state plans, goals, and targets, including those articulated in this Scoping Plan for local action. For instance, state ZEV targets can advance local efforts to promote broad and equitable access to charging and fueling. Similarly, local jurisdictions can enable reduced dependence on

[512] Climate Smart Communities. 2014. Climate Action Planning Guide. https://cdrpc.org/wp-content/uploads/2015/05/CAP-Guide_MAR-2014_FINAL.pdf.

single-occupancy vehicles by supporting dense infill housing and transit, among other actions. Such actions can be reflected in particular project plans, in general plans, or through other local policies. Regional partnerships among these jurisdictions can also help tap resources and provide for more effective overall action.

## Unlocking CEQA Mitigation for Local Success

The California Environmental Quality Act also provides important tools for lead agencies to support the achievement of the state's GHG and VMT reduction goals. Although many climate-friendly local government actions already fall into categories that may not require a full CEQA analysis, thanks to streamlining or other tools, and although certain product types (such as affordable infill housing) are generally clearly consistent with state climate goals, CEQA analyses may still sometimes be required. CEQA can be a powerful and useful tool to engage the public, identify additional opportunities to support climate efforts, and localize change. It is important that lead agencies look for ways to use CEQA to support these core purposes, ensuring that these processes do not become sources of delay but instead unlock more opportunities. The uncertainty analysis in Chapter 2 evaluates how project implementation delays can lead to missed state climate targets and continued dependence on fossil energy. Mitigation measures applied in the communities affected by projects subject to CEQA have the added benefit of improving health, social, and economic resiliency as climate impacts worsen.

Appendix D (Local Actions) explores the role of local government action and CEQA in detail. As discussed there, an important CEQA-related tool is mitigation—which can be used to further drive local action consistent with state climate goals. When a lead agency determines that a proposed project would result in potentially significant GHG impacts due to its GHG emissions or a conflict with state climate goals, the lead agency must impose feasible mitigation measures to minimize the impact. Appendix D (Local Actions) provides suggestions for prioritizing the various types of mitigation, starting with on-site GHG-reducing design features[513] and mitigation measures, such as methods to reduce VMT and support building decarbonization, access to shared mobility services or transit, and EV charging. After exhausting all the on-site GHG mitigation measures, CARB recommends prioritizing local, off-site GHG mitigation measures, including both direct investment and voluntary GHG reduction or sequestration projects, in the neighborhoods impacted by the project. This could include, for example, development of a neighborhood green space, investment in street trees, or expansion of transit services. Implementing GHG mitigation measures in the project's vicinity would allow the project proponent and the lead agency to work directly with the affected community to identify and prioritize the

[513] Cal. Code of Regs., tit. 14, § 15126.4(c)(2) and (3).

mitigation measures that meet their needs while minimizing multiple environmental and societal impacts.

Once all potential on-site and local off-site GHG mitigation measures have been incorporated to the extent feasible, Appendix D (Local Actions) provides further suggestions for prioritizing other mitigation types, including non-local off-site mitigation, and voluntary offsets issued by a recognized and reputable voluntary carbon registry (as listed on CARB's website[514]) may be appropriate. Additional in-state mitigation also may be available in the upcoming SB 27[515] (Skinner, Chapter 237, Statues of 2021) registry, which will serve as a database of projects in the state that drive climate action on natural and working lands. Lead agencies should use substantial evidence to demonstrate that the project proponent explored and prioritized investments in feasible, local mitigation prior to moving mitigation to a geography located farther away from the project.

## Communities and Environmental Justice

As noted in Board Resolution 20-33,[516] it is incumbent on CARB to function as an agent of responsible social change, especially when it is clear that environmental injustices continue to persist for low-income communities, tribes, and communities of color.

State law defines *environmental justice* as the fair treatment of all people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies.[517] Government Alliance for Race and Equity (GARE)[518] defines *racial equity* as when race can no longer be used to predict life outcomes and outcomes for all groups are improved.

For this Scoping Plan to be successful, it must address environmental justice and advance racial equity. Implementation of the plan needs to address the needs of those communities that are disproportionately burdened by climate impacts and continue to face significant health and opportunity gaps. Now, we need to ensure our actions allow these communities to not only have a seat at the table, but also inform and shape the policies

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[514] CARB. 2022. Offset Project Registries. https://ww2.arb.ca.gov/our-work/programs/compliance-offset-program/offset-project-registries.

[515] SB 27. Carbon sequestration: state goals: natural and working lands: registry of projects. (SB 27, Skinner, Chapter 237, Statutes of 2021). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB27.

[516] CARB. 2020. Resolution 20-33: A Commitment to Racial Equity and Social Justice. October 22. https://ww2.arb.ca.gov/sites/default/files/barcu/board/res/2020/res20-33.pdf.

[517] Gov. Code, § 65040.12, subd. (e).

[518] Local and Regional Government Alliance on Race and Equity. 2015. *Advancing Racial Equity and Transforming Government: A Resource Guide to Put Ideas into Action.* Page 9. https://racialequityalliance.org/wp-content/uploads/2015/02/GARE-Resource_Guide.pdf.

to ensure their communities thrive. With this Scoping Plan, the state also adds a new tool to identify which communities will be the least resilient in the face of selected climate impacts and will see disproportionate economic impacts as a result. As described in Chapter 3, the CVM will enable the state to target programs and policies to build resiliency in the specific regions that will feel climate impacts more acutely due to existing health and opportunity disparities leading to disproportionate economic impacts. This tool will be critical in the state's efforts to address climate impacts while accounting for environmental injustices and racial inequities. CARB will incorporate the CVM into its work as it moves forward and will share this new tool with other agencies to align our efforts. The goal is to keep expanding the CVM to incorporate additional climate impacts to better identify disproportionate economic impacts as community level data becomes available.

AB 617 is another important tool for both Air Districts and CARB to bring resources to communities that have long been disproportionately burdened by poor air quality. While AB 617 does not require local agencies to participate in the Community Air Protection Program, several AB 617 communities are finding ways to bring local land use agencies to the table to respond to community priorities. We look forward to more opportunities to foster relationships with local authorities and continued collaboration between state and air district programs.

In alignment with AB 32, and to ensure environmental justice and racial equity were integrated into this Scoping Plan, CARB reconvened the AB 32 Environmental Justice Advisory Committee (EJ Advisory Committee) to advise CARB on the development of this Scoping Plan. Since reconvening in May 2021, the EJ Advisory Committee has engaged in the following activities:

- In October 2021, the EJ Advisory Committee sent a letter to the governor requesting a timeline extension for the Scoping Plan process. In response to the EJ Advisory Committee's letter, CARB modified this Scoping Plan process[519] and committed to an active engagement with the EJ Advisory Committee following the approval of this Scoping Plan. The EJ Advisory Committee also presented to the CARB Board[520] at its October 2021 Board meeting, reiterating its request for a timeline extension, as well as sharing additional concerns about process.

[519] Randolph, L. M. 2021. LMR October 19 response to Environmental Justice Advisory Committee Letter. *https://ww2.arb.ca.gov/sites/default/files/2021-10/LMR%20October%2019%20response%20to%20EJAC%20Letter%20Final.pdf*.

[520] Argüello, M. D., K. Hamilton, S. Taylor, and P. Torres. 2021. EJ Advisory Committee Co-Chair Informational Presentation to CARB Board. October 28. *https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2021/102821/21-11-4pres.pdf*.

- In December 2021, the EJ Advisory Committee shared its responses to Scenario Input Questions,[521] as well as a narrative document outlining their concerns[522] around the process, the need for evaluation, and the need for a tribal representative. In response to the EJ Advisory Committee Scenario Input Questions, CARB incorporated the EJ Advisory Committee responses into the Scenario Assumptions document,[523] and modeled results from PATHWAYS.[524] In response to the EJ Advisory Committee's concerns, CARB worked diligently to appoint a tribal representative[525] in February 2022, and to outline additional opportunities for the EJ Advisory Committee to engage in the Scoping Plan process.[526]
- In March 2022, the EJ Advisory Committee presented at the joint EJ Advisory Committee / CARB Board meeting[527] and walked through their preliminary draft recommendations to inform this Scoping Plan. In April, the EJ Advisory Committee shared its revised preliminary draft recommendations[528] to inform this Scoping Plan.
- In September 2022, the EJ Advisory Committee presented at the joint EJ Advisory Committee / CARB Board meeting[529] and engaged in discussion about priority items as they relate to incorporating environmental justice into the Scoping Plan. By the end of September, the EJ Advisory Committee shared its final

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[521] EJ Advisory Committee. 2021. EJ Advisory Committee Final Responses to CARB Scenario Inputs. December 2. *https://ww2.arb.ca.gov/sites/default/files/2021-12/EJAC%20Final%20Responses%20to%20CARB%20Scenario%20Inputs_12_2_21.pdf*.

[522] EJ Advisory Committee. 2021. EJ Advisory Committee Responses to Scenario Input Questions. EJ Advisory Committee narrative document regarding scenario input recommendations. December 1. *https://ww2.arb.ca.gov/sites/default/files/2021-12/EJAC%20Narrative%20Document%20re%20Scenario%20Input%20Recommendations%2012_1_2021.pdf*.

[523] CARB. 2021. PATHWAYS Scenario Modeling. *https://ww2.arb.ca.gov/sites/default/files/2021-12/Revised_2022SP_ScenarioAssumptions_15Dec.pdf*.

[524] E3. 2022. CARB Draft Scoping Plan AB32 Source Emissions Initial Modeling Results. March 15. *https://ww2.arb.ca.gov/sites/default/files/2022-03/SP22-Model-Results-E3-ppt.pdf*.

[525] CARB. AB32 EJ Advisory Committee Meeting, February 28, 2022 CARB Update. *https://ww2.arb.ca.gov/sites/default/files/2022-02/CARB%20EJAC022822presentation.pdf*.

[526] Fletcher, C. 2021. CARB Response to EJ Advisory Committee Narrative. CARB. December 15. *https://ww2.arb.ca.gov/sites/default/files/2021-12/CARB%20response%20to%20EJAC%20Narrative.pdf*.

[527] EJ Advisory Committee. 2022. EJ Advisory Committee Presentation: Preliminary Draft Recommendations. March 10. *https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2022/031022/ejacpres.pdf*.

[528] AB 32 EJ Advisory Committee. Draft Recommendations. *https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2022/031022/ejacrecsrevised.pdf*.

[529] EJ Advisory Committee. 2022. EJAC Presentation. September 1. *https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2022/090122/ejacpres.pdf*

recommendations[530] to inform this Scoping Plan. To the extent possible, CARB has incorporated and cited these recommendations through this Scoping Plan.

In addition to the activities listed above, Central Valley EJ Advisory Committee members hosted a successful community engagement workshop[531] in San Joaquin Valley in February 2022 with over 100 attendees. Members of EJ Advisory Committee hosted a statewide community engagement workshop[532] in June 2022 with more than 165 attendees. Throughout the EJ Advisory Committee's process, members of the Committee continued to work with their communities to ground truth their recommendations to inform the development of the Scoping Plan. The EJ Advisory Committee worked hard to ensure the voices of those communities most burdened by climate impacts were reflected in the plan. The EJ Advisory Committee will continue to play an ongoing role in the implementation of this Scoping Plan to ensure environmental justice and racial equity are prioritized in our effort to address the climate challenge before us.

To the extent possible, the EJ Advisory Committee's recommendations were integrated throughout the plan. This plan directly cites instances where there is alignment between the plan and the EJ Advisory Committee recommendations. This approach seeks to ensure there is more transparency and identify consensus that exists, as well as relevant ways equity and environmental justice are addressed in this plan and in the planning for future related implementation activities. CARB is dedicated to its efforts to ensure this plan does not leave communities behind.

As this Scoping Plan moves into the implementation phase, there will be a need to better understand how to address EJ Advisory Committee recommendations on the following topics:

- Actions under the jurisdiction of other agencies: there are certain EJ Advisory Committee recommendations that are outside of CARB's jurisdiction. As the EJ Advisory Committee continues to convene, it would be helpful to understand the

[530] EJ Advisory Committee. 2022. EJAC 2022 Scoping Plan Recommendations. September 30. https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2022/090122/finalejacrecs.pdf

[531] San Joaquin Valley Climate Justice & the Scoping Plan. 2022. https://ww2.arb.ca.gov/sites/default/files/2022-07/SJV%20Climate%20Justice%20%26%20the%20Scoping%20Plan%20Workshop%20Report%20out%20%26%20Recommendations_5.2022.pdf

[532] EJAC. 2022. *EJAC/Community Engagement Synthesis Report '22.* https://ww2.arb.ca.gov/sites/default/files/2022-07/EJAC-CommunityEngagement-SynthesisReport-2022-English%26Spanish.pdf.

role that CARB can play as it relates to the EJ Advisory Committee's recommendations for actions outside CARB's jurisdiction and coordinates with sister agencies.

- Actions that require legislative direction: there are certain EJ Advisory Committee recommendations that would require legislative action. As the EJ Advisory Committee continues to convene, it will be helpful to understand how CARB can work with the EJ Advisory Committee to share these recommendations with the appropriate members of the Legislature.
- Actions directly tied to implementation activities: This Scoping Plan is not an implementation document; it is a plan to chart a course to continue to reduce GHG emissions and achieve carbon neutrality. Once the Scoping Plan is approved, there will be follow-up action at CARB, as well as at other agencies. In these follow-up efforts, there will be a role for ongoing EJ Advisory Committee engagement.
- Actions to implement recent legislation, such as SB 905.

CARB proposes to continue to work with the EJ Advisory Committee to better understand how to move forward on EJ Advisory Committee recommendations that fall into the topics listed above and any other recommendations that were not included in this plan. It is also important to note that there are numerous recommendations where CARB shares the goals of the EJ Advisory Committee and can assist in implementation steps. Examples include the following:

- CARB shares the goal of prioritizing non-fossil energy generation and supports non-fossil projects and opportunities to locate behind-the-meter clean resources in communities of concern in programs such as the Solar on Multifamily Affordable Housing program.
- CARB will engage with agencies and academic institutions to further workforce development.
- Many other recommendations related to financial support for various energy projects, such as microgrids, are within the purview of the CPUC or local publicly owned utilities. Similarly, utility scale projects are within the jurisdiction of other agencies. However, CARB supports strategies identified in the recommendations such as offshore wind to reduce the reliance on fossil fuel generation.
- CARB is supportive of rooftop solar, although it is not within CARB's jurisdiction to determine how incentives for those projects are structured.
- CARB is supportive of strong energy decarbonization goals, recognizing that increased reliance on electrification in transportation and other sectors will create significant demand for electricity, and therefore ensuring reliability of a decarbonized grid is a critical need for the state.
- In the transportation sector, CARB is supportive of the EJ Advisory Committee's recommendations to maintain aggressive zero emission vehicle goals consistent

with its statutory mandate to ensure regulations are technologically feasible and in alignment with Governor Newsom's ZEV Executive Order (EO N-79-20). CARB looks forward to continued engagement on rulemakings that will implement these goals.

- As noted elsewhere in this plan, CARB is supportive of the Caltrans California Transportation Plan 2050 and the California Climate Action Plan for Transportation Infrastructure.
- CARB is supportive of additional public support for transit. CARB is supportive of locating EV charging in low-income communities and communities of color.
- CARB is supportive of prioritizing funding incentives for transit and heavy- and medium-duty vehicles, although CARB does believe there is an important role for incentives that support adoption of light-duty vehicles for the time being. CARB will also be opening a rulemaking on the Low Carbon Fuel Standard to ensure it continues to support clean fuels that will displace petroleum fuels and will consider the EJ Advisory Committee recommendations on this program.
- In the industrial sector, in addition to the strategies discussed more fully in this Scoping Plan, CARB continues to work with the Legislature, local agencies, and air districts to support, implement, and enforce effective reductions in emissions of GHGs and air pollutants in stationary sources. The air districts have the authority to directly issue permits addressing a facility's criteria pollutant and toxics emissions levels. These levels are set after careful permit review, under district regulation and statute. However, AB 617 directs and authorizes CARB to take several actions to improve data reporting from facilities, air quality monitoring, and pollution reduction planning for communities affected by a high cumulative exposure burden. CARB will continue to implement AB 617 and look for ways to strengthen the Community Air Protection Program.
- Considerations around the phaseout of oil and gas extraction and refining, and the role of carbon capture are discussed more thoroughly in Chapter 2.

As CARB continues to engage with the EJ Advisory Committee—in addition to the EJ Advisory recommendations that have been integrated throughout this plan—below are the following commitments that CARB is making to ensure that environmental justice is integrated in this plan and its implementation:

- Building decarbonization is a pillar of this Scoping Plan and CARB commits to working closely with state and local agencies to implement the EJ Advisory Committee recommendations that call for prioritization for residents in low-income communities and communities of color in this transition.
- CARB commits to sharing the EJ Advisory Committee's recommendations with the CEC, CPUC, and other agencies administering funds to support building

decarbonization, and to work closely with those agencies as they engage in public processes to further building decarbonization.

- CARB has committed to review the Cap-and-Trade program and determine what potential legislative or regulatory amendments could be necessary to ensure the program continues to deliver GHG reductions needed to achieve the statutory climate goals. In that process, CARB will consider the recommendations of the EJ Advisory Committee[533] and Independent Emissions Market Advisory Committee,[534] as well as others.

Critically, the EJ Advisory Committee makes numerous recommendations centered around tracking progress of the various strategies in this Scoping Plan. Currently, progress is tracked and reported in numerous ways, including the annual GHG inventory and reports to the Legislature. Part of the ongoing work of implementation, however, will include consideration of ways to provide more data and information to the public, such as rates of deployment of clean energy and technology as described in Chapter 1. CARB will also continue to collaborate with CDPH and OEHHA on health metrics to track cumulative benefits of air pollution and climate programs, especially in low-income communities and communities of color.

As noted earlier in this document, the EJ Advisory Committee will continue to play a vital role in the Scoping Plan and its implementation to ensure environmental justice and racial equity are prioritized in our effort to address the climate challenge before us. This includes ongoing EJ Advisory Committee engagement to advise CARB on the development of the Scoping Plan and any other pertinent matters in implementing AB 32. The ongoing EJ Advisory Committee will help to ensure integration of environmental justice in implementation efforts as it relates to AB 32, and also help CARB as we work toward a future where race is no longer a predictor for life outcomes.

## Academic Institutions and the Private Sector

Academic institutions produce and present the latest science on both the impacts of, and actions to reduce, climate change damages. They are also leading the way by

[533] California Legislative Information. Bill Text – AB 32. Air pollution: greenhouse gases: California Global Warming Solutions Act of 2006. (AB 32, Nuñez, Chapter 488, Statutes of 2006). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200520060AB32.

[534] California Legislative Information. Bill Text – AB 398. California Global Warming Solutions Act of 2006: market-based compliance mechanisms: fire prevention fees: sales and use tax manufacturing exemption. (AB 398). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB398.

establishing their own climate goals and GHG emissions reductions targets.[535,536,537] They are incubators for innovation and knowledge in clean energy and technology and play an important role in adding to the wealth of robust information to inform policies and programs. Academic institutions have the ability to fill knowledge gaps and push us toward new frontiers. As we move forward, we will continue to see these institutions as partners and resources that can help CARB look for ways to accelerate and introduce actions to reduce GHG emissions and remove and store carbon.

As such, it will be important to maintain and enhance relationships with academic institutions, including community colleges. Community colleges are more likely to have a large proportion of first generation students or students that come from low-income communities or communities of color. The perspective of this diverse student body will be critical to inform discussions on climate change damages and mitigation efforts. This student body is also a future workforce, and courses to teach the skills for a sustainable economy are a chance to close historical opportunity gaps. Importantly, many of the students at community colleges are local residents and community members. This engagement provides another way to invest in communities across our state. The Foundation for California Community Colleges is already leading the way through innovate programs such as their Good Jobs Challenge - California Resilient Careers in Forestry.[538] These types of programs could be replicated across other sectors. CARB will evaluate how to leverage the requirements in AB 680 on workforce development in the California Climate Investments programs with the work at the Foundation for California Community Colleges.

As noted in Chapter 1, public and private partnerships will be important as we move forward in the great energy transition. But the private sector is also important in the context of research and development and deployment. Many of these companies have the resources and expertise to build and produce the clean technology and energy we will need. It was through the efforts of several private companies (Bell, Exxon, Telecom

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[535] University of California. Our Commitment. *https://www.universityofcalifornia.edu/initiative/carbon-neutrality-initiative/our-commitment*.

[536] California State University. Energy, Sustainability, & Transportation. *https://www.calstate.edu/csu-system/doing-business-with-the-csu/capital-planning-design-construction/operations-center/Pages/energy-sustainability.aspx*.

[537] California Community Colleges Chancellor's Office. Climate Action and Sustainability. *https://www.cccco.edu/About-Us/Chancellors-Office/Divisions/College-Finance-and-Facilities-Planning/Facilities-Planning/Climate-Action-and-Sustainability?msclkid=4a72350ec4f511ecaf292c6b14ac9a4f*.

[538] Foundation for California Community Colleges. 2022. Good Jobs Challenge. Developing Resilient Careers in Forestry for Californians. *https://foundationccc.org/What-We-Do/Workforce-Development/Good-Jobs-Challenge*.

Australia) that the photovoltaic solar panels in use today were developed.[539] Similarly, it was companies such as General Electric and Texas Instruments that contributed to the development of hydrogen fuel cells.[540] This Scoping Plan includes the known and emerging clean technologies and fuels available today. The private sector spirit of invention, improvement, and innovation must continue to deliver new tools in the fight against climate change.

## Individuals

This Scoping Plan not only projects ambitious availability of clean technology and energy, but also includes aggressive assumptions about consumer adoption of ZEVs, heat pumps, and other energy efficiency practices, among others. When it comes to climate change mitigation, the sum of the parts matters. Only when we add up the impacts of the choices we make do we understand the true impact on GHG emissions. Today, many Californians have opportunities to choose between driving a car, taking a bus, biking, or walking. Many can choose to install a heat pump or buy an electric cooktop. Together, we can increase these opportunities and pick the future we want. We can start or transform businesses that create clean jobs, innovate new technologies, or introduce new systems. We can engage with fellow workers to support durable paths for labor in a clean economy. And we can choose to engage with our community, tribes, and our governments to advocate for change, call out challenges, and propose solutions. Our choices will help determine California's climate future. Down one path is a future of climate impacts that will continue to worsen and further increase disparities across communities. Down the other is a future that avoids the worst impacts of climate change, improves air quality—especially for the most burdened communities—and fosters new economic and job opportunities to support a sustainable economy.

Importantly, we must acknowledge that historical decisions have resulted in health and opportunity gaps for residents in low-income communities and communities of color. Not everyone has the resources or access to make these choices—to buy a ZEV, install a heat pump, or use public transit to get to work. It is here that government can help. Government, at multiple levels, can fund programs and structure policies to provide consumers with more choice and to support them in adopting cleaner technology options. Whether through affordable energy rates or assistance in purchasing zero emission vehicles and appliances, we can use the transition to a carbon neutral economy as an opportunity to close some of these persisting opportunity gaps. By acting now, we can

[539] Californiasolarcenter.org. Passive Solar History. http://californiasolarcenter.org/old-pages-with-inbound-links/history-pv/.
[540] Fuel Cell Store. History of Fuel Cells. https://www.fuelcellstore.com/blog-section/history-of-fuel-cells?msclkid=04a19450c50211ec8d20f2afff4039fe.

change our planet’s fate and build a more resilient, healthier, and equitable future for all Californians.

# APPENDIX E
# SUSTAINABLE AND EQUITABLE COMMUNITIES

## Policy Framework to Advance Sustainable and Equitable Communities

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# 1. Introduction

Californians deserve great places to live – inclusive urban, suburban, and rural communities throughout the many regions of California – that provide a range of affordable housing and transportation options, efficient access to a variety of jobs and services, clean air, opportunities to safely walk and bike, and open space and recreational opportunities. Current and future generations have the right to healthy environments, protected natural and working lands that support carbon sequestration and enhance climate resilience, and reduced overall demand for energy and other natural resources. These are the core characteristics of sustainable and equitable communities, and are achieved, in part, through the combination of more compact development and enhanced transportation options that together reduce individuals' need to drive.

Building more sustainable and equitable communities in this way can help California address two of its greatest challenges. The first is meeting the State's goal to achieve carbon neutrality no later than 2045 to prevent the most adverse impacts of climate change and provide Californians healthier air to breathe. The second challenge is building more inclusive and equitable places that prioritize providing low-income and Black, Indigenous, and People of Color (BIPOC) communities all the necessary opportunities to thrive and repairing the harms caused by decades of discriminatory transportation, land use, and housing policies and practices to people of low-income and BIPOC communities.

The next section of the appendix discusses impactful opportunities California can unlock by moving away from a cars-first model and building communities and infrastructure that enable a wider range of access and mobility choices. The third section of the appendix presents a policy framework across four strategy areas – transportation planning and funding, transportation system management, new mobility, and land use and development – for the State to create more sustainable and equitable communities that reduce driving. Each strategy area includes a vision, objectives, and potential actions developed by CARB and its State government partners, with the intent that the further development and implementation of each action would be subject to additional public processes and collaboration with key stakeholders. The framework of strategies discussed in this document does not and cannot mandate any specific action or create any legal obligations. This planning document provides a menu of critical potential actions and approaches that would need to be further developed through appropriate public processes.

While the State has taken steps in each of these strategy areas, this appendix presents ways to build on that work.

# 2. The Need for Sustainable and Equitable Communities

Many of California's cities, towns, suburbs, and rural areas were designed and built primarily around car travel, and the legacy of that vision has been codified in public policies, business practices, and cultural expectations. For most communities in California, choices made in the past and bolstered for decades have delivered land use

patterns that place daily needs far from each other along streets designed for high-speed driving. For decades, California has widened highways and roadways in an effort to address traffic congestion. By doing so, it has facilitated more car dependence and, ironically, more congestion, with resulting increases in vehicle miles traveled (VMT) and greenhouse gas (GHG) emissions.

Efforts to advance more sustainable and equitable communities that reduce the need to drive have been ongoing in California for many years, most prominently under the State's 2008 Sustainable Communities and Climate Protection Act or Senate Bill (SB) 375 (Steinberg, Chapter 728, Statutes of 2008), under which Metropolitan Planning Organizations (MPOs) must show coordinated land use and transportation strategies to meet regional passenger vehicle GHG reduction targets. However, as CARB's recent progress report on implementation of SB 375 indicates, individuals are driving more miles per day than ever before, and California is not on track to meet its associated climate goals under SB 375.[1]

Beyond reducing driving, far too often in California's history, new highway and major roadway infrastructure displaced BIPOC communities, increased divisions in communities, and intensified noise, traffic, and air pollution in already impacted communities. California can advance inclusive and efficient places to live if it breaks away from an entrenched policy and cultural status quo that has perpetuated car dependence and caused a significant share of California's climate-changing GHG emissions.

## 2.1 Zero-emission vehicles are not enough to solve the climate crisis.

Contrary to popular belief, zero-emission vehicles (ZEV) alone are not enough to solve the climate crisis. The 2022 Scoping Plan illustrates that despite cleaner vehicles and low-carbon fuels, the path to carbon neutrality by 2045 also depends on reducing per capita VMT (the total passenger vehicle miles driven by an average person in California on any given day). To meet the carbon neutrality goal, the Scoping Plan proposes reducing VMT from 24.6 miles per day in 2019 to 18.4 miles by 2030 (a 25 percent reduction) and to 17.2 miles per day by 2045 (a 30 percent reduction).

Approximately 30 percent of light-duty vehicles on the road in 2045 will still burn fossil fuels even with all new car sales being ZEVs by 2035 through implementation of CARB's Advanced Clean Cars II regulations.[2] Additionally, driving, regardless of vehicle technology, will also continue to produce particulate emissions from brake and tire wear.

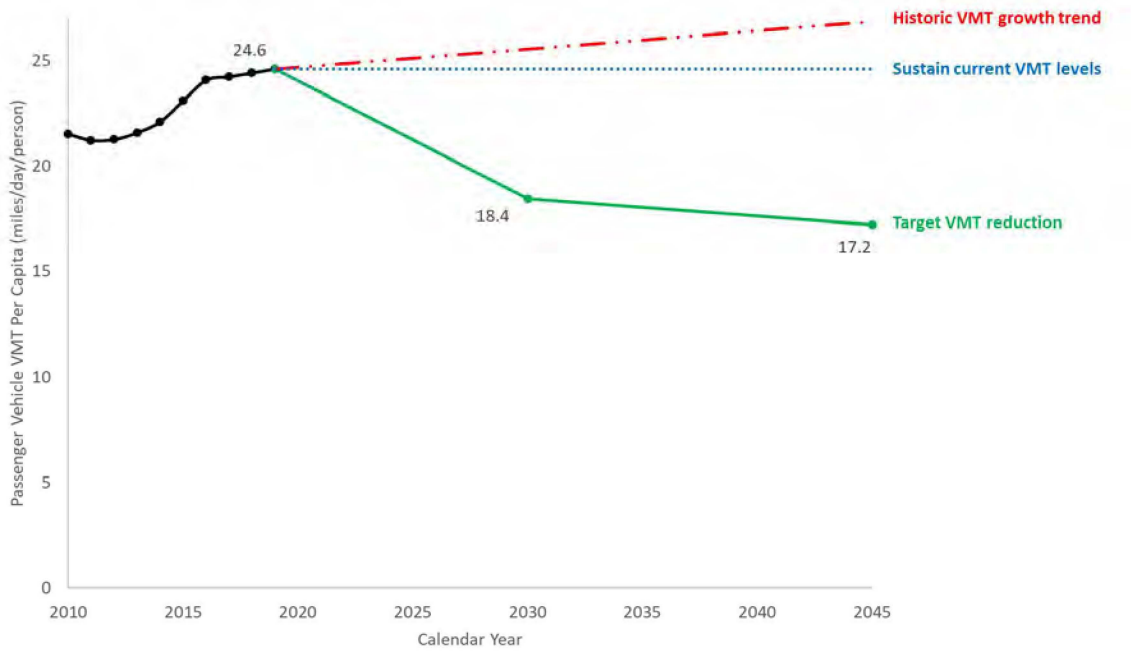
Figure W depicts the reduction in VMT identified by the Scoping Plan as necessary to help achieve the State's GHG reduction goals (green solid line), accompanied by a

[1] For more information on progress made toward achieving climate goals under SB 375 see: *https://ww2.arb.ca.gov/resources/documents/tracking-progress*

[2] For more information on the Advanced Clean Cars II regulations adopted by CARB's board on August 25, 2022, see: https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-ii

trajectory whereby average per capita daily driving continues to increase at its historic average growth rate (red line with dashes and dots).[3] The blue dotted line shows a trajectory where average per capita daily driving remains unchanged from 2019 levels. Substantial and immediate action is needed to reverse current trends in order to reduce VMT to support achieving carbon neutrality by 2045.

**Figure W. VMT trajectories and California's GHG goal**




## 2.2 Sustainable and equitable communities reduce GHG emissions beyond the transportation sector, too.

Beyond having a direct impact on GHG emissions from cars, reducing individuals' need to drive to fulfill daily needs can also support emissions reductions in other sectors. For example, more compact infill development generally generates lower emissions because attached building types and smaller residential unit sizes require fewer emissions to construct and less energy to heat and cool.[4,5] Studies have estimated that infill development uses 10 to 20 percent less residential energy due to changes in unit types, sizes, and locations. Additional benefits include reduced heat island effects from paved

[3] There is considerable range in potential future VMT based on many exogenous, socioeconomic, and technological factors. This line represents historical VMT trends from 2001-2019 extended to 2045, normalized by the future forecasted population.

[4] Elkind, E. N., Galante, C., Decker, N., Chapple, K., Martin, A., & Hanson, M. 2017. "Right Type, Right Place: Assessing the Environmental and Economic Impacts of Infill Residential Development through 2030." Available at: https://ternercenter.berkeley.edu/research-and-policy/right-type-right-place/

[5] Ewing, Reid & Rong, Fang. 2008. "The impact of urban form on U.S. residential energy use." *Housing Policy Debate, 19(1), 1-30.* Available at: https://www.tandfonline.com/doi/abs/10.1080/10511482.2008.9521624

surfaces like parking lots, which lowers long-term building energy use, and reduced emissions from the construction of infrastructure.[6]

In contrast, the conversion of natural and working lands to residential or commercial development causes emissions from loss of carbon stored in these systems, as well as reduces the capacity of these lands to sequester carbon from the atmosphere.[7]

The 2022 Scoping Plan Update calls for reductions in GHG emissions from these sectors. More sustainable and equitable development patterns and transportation choices will support these reductions.

## 2.3 Departing from the status quo would ease inequitable burdens on California's low-income and BIPOC communities.

California can offer accessible, safe, and healthy communities for all by moving away from a legacy of transportation and land use decision-making that has marginalized all too many, but to a much greater extent BIPOC communities. California's transportation agencies have acknowledged that racist policies and decisions made when building and expanding the transportation system divided communities of color and primarily benefited white suburban commuters.[8] Discriminatory land use, lending, and real estate practices and policies also excluded and harmed BIPOC households and led to lasting inequality.

Some of these impacts have included less access to jobs and services, reduced household income and wealth generation, reduced social mobility, the burden of vehicle ownership, and the risk of job loss if a vehicle breaks down.

Rather than continuing these practices, California can make decisions that allow for integrated communities that are rich with services and culture. Shifting California's development patterns and transportation systems is critical to address existing injustices by making livable, affordable homes with multi-modal connections to jobs, services, open space, and education available to all Californians, not just the white and the wealthy.

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[6] Ford, Jonathan. 2010. "Smart Growth & Conventional Suburban Development: An infrastructure case study completed for the EPA." Adapted from "Comparative Infrastructure & Material Analysis" under EPA contract EP-W-05-25. Available at: *https://archive.epa.gov/epa/sites/production/files/2014-07/documents/mbd-epa-infrastructure.pdf*

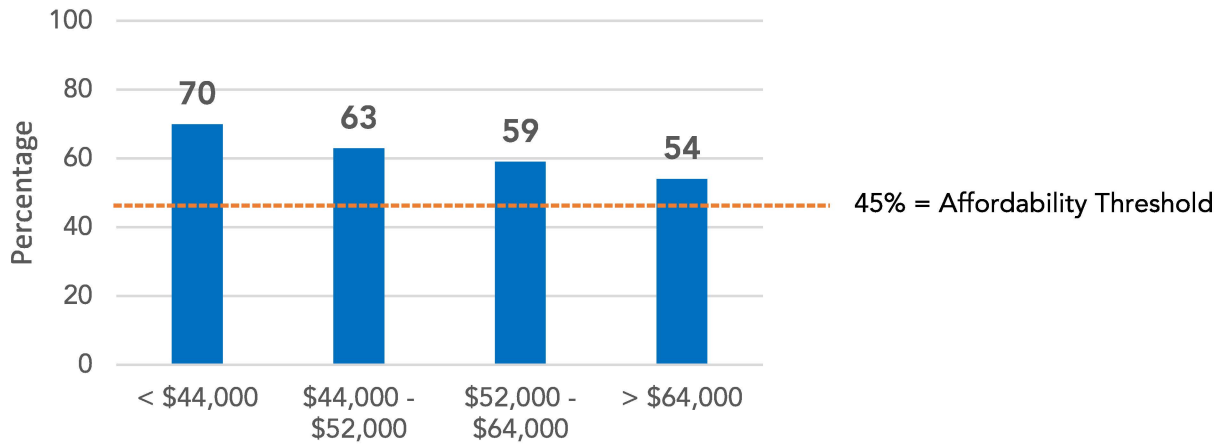
[7] California Air Resources Board. Accessed May 5, 2022. California Natural & Working Lands Inventory. Available at: *https://ww2.arb.ca.gov/nwl-inventory*.

[8] See the equity and VMT policy discussion beginning on page 107 of the California Air Resources Board's *2020 Mobile Source Strategy*, available at: https://ww2.arb.ca.gov/sites/default/files/2021-12/2020_Mobile_Source_Strategy.pdf.

**The Burden of Housing and Transportation Costs**

An example of these racial and social inequities is the unequal impact of housing and transportation costs. Low-income households pay a significantly higher portion of household income for housing and transportation. In California counties that have a median household income of $44,000 or less, housing and transportation cost the average household over 70 percent of their income, when the recommended affordability threshold is 45 percent (Figure X).[9] Given the high cost of car ownership and operation, this housing and transportation cost burden has the highest impact on communities where people have few options but to drive.

Figure X. Percentage of Income Spent on Housing and Transportation in California by Median County Household Income




Source: H+T Index 2017, ACS 2015

## 2.4 Reducing the need to drive advances other quality of life outcomes and opportunities.

Communities with shorter driving distances and more options for active travel produce benefits beyond the environment and equity, including reduced financial burden, better access to opportunities, and improved public health.

- **Reduced financial burden:** Reducing the need to drive saves households substantial sums of money. U.S. households spent an average of nearly $10,000 in 2019 on vehicles and fuel.[10] Driving fewer miles reduces fuel and maintenance expenses and may even allow a household to reduce the number of vehicles owned.

[9] Center for Neighborhood Technology. Accessed May 5, 2022. Housing + Transportation Index. Available at: https://cnt.org/tools/housing-and-transportation-affordability-index.

[10] U.S. Department of Transportation, Bureau of Transportation Statistics. Accessed May 5, 2022. Transportation Economic Trends. Available at: https://www.bts.gov/product/transportation-economic-trends.

- **Better access to opportunities:** Changes to the built environment that increase alternatives to driving give households more and affordable options to access services, jobs, and other activities, and thus expand economic and social opportunities.[11] These changes empower people who do not own cars and people who cannot drive, such as seniors, children, and people with disabilities, protecting their ability to hold a job, run errands, or connect with others.
- **Economic efficiency:** A development pattern that enables the same level of economic interaction with less dependence on driving can sustain the economy at a far lower cost to the public by decreasing highway maintenance costs, which have ballooned to over $500 million per year in California.[12] Infill development can also reduce road and utility line lengths, as well as the travel distances needed to provide public services like police, garbage collection, and emergency response.[13,14,15] Across the U.S., congestion cost the equivalent of $190 billion in 2019 in fuel costs and lost time.[16] Being able to access destinations more efficiently will reduce these effects on the economy.

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[11] Lucas, K. 2012. "Transport and social exclusion: Where are we now?" *Transport Policy, 20, 105-113.* Available at: *https://www.sciencedirect.com/science/article/pii/S0967070X12000145*

[12] U.S. Department of Transportation. Accessed May 5, 2022. Highway Statistics 2015. Available at: *https://www.fhwa.dot.gov/policyinformation/statistics/2015/sf12.cfm*

[13] Burchell, Robert W., & Mukherji, Sahan. 2003. "Conventional Development Versus Managed Growth: The Costs of Sprawl." *American Journal of Public Health, 93 (9), 1534-1540.* Available at: *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1448006/*

[14] Busch, Chris, Lew, Erika, & DiStefano, Joe. 2015. "Moving California Forward: How Smart Growth Can Help California Reach Its 2030 Climate Target While Creating Economic and Environmental Co-Benefits." Joint report by Energy Innovation Policy and Technology LLC, and Calthorpe Analytics. Available at: *https://energyinnovation.org/wp-content/uploads/2015/11/Moving-California-Forward-Full-Report.pdf*

[15] Litman, Todd. 2016. "Understanding Smart Growth Savings: Evaluating Economic Savings and Benefits of Compact Development." Victoria Transport Policy Institute. Available at: *https://trid.trb.org/view/1685041*

[16] Texas A&M Transportation Institute. *2021 Urban Mobility Report.* Available at: *https://mobility.tamu.edu/umr/report/*

**People want to drive less!**

While many Californians find traveling by car a necessity, many would in fact prefer to drive less. A survey in Santa Clara County in 2020,[17] before the COVID-19 pandemic, showed that 89 percent of people believed they had to drive for daily needs, but fully half wanted to drive less. Twenty percent of respondents said owning a car was a financial strain, creating a burden on disadvantaged groups. Cars also created higher levels of stress, with 41 percent of drivers reporting that they find their daily travel stressful, but only 35 percent of bicyclists and 28 percent of transit riders feeling the same.

Furthermore, Public Policy Institute of California polls in 2019 and 2020 found that fully three quarters of respondents favored encouraging local governments to change land use and transportation planning so that people could drive less.[18]

## 3. Framework for Action

California's predominant development patterns and transportation systems are not conducive to building sustainable and equitable communities with low VMT. Reversing the current VMT growth trend to achieve carbon neutrality requires immediate and decisive steps to address the core issues that give individuals no choice but to drive. Accordingly, the framework for action detailed in this section aims to offer a set of key policy objectives and actions that can be attained within the planning horizon of the 2022 Scoping Plan Update to effectively support more compact development and increase transportation options that reduce VMT no later than 2045.

There is no single or immediate solution to transform the ways California builds and connects communities; instead, as all available models demonstrate, reducing VMT requires a broad range of actions across all levels of government that achieve multisectoral synergies in transportation, land use, and housing.[19,20]

This framework is structured around the following four strategy areas:

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[17]Fang, Kevin. 2020. "Surveying Silicon Valley on Cycling, Travel Behavior, and Travel Attitudes." Mineta Transportation Institute. Available at: *https://transweb.sjsu.edu/research/1947-Survey-Silicon-Valley-Cycling*

[18] Baldassare, Mark, Bonner, Dean, Dykman, Alyssa, & Lawler, Rachel. 2019 and 2020. "Californians and the Environment." Public Policy Institute of California. Available at: *https://www.ppic.org/publication/ppic-statewide-survey-californians-and-the-environment-july-2019/* and *https://www.ppic.org/publication/ppic-statewide-survey-californians-and-the-environment-july-2020/*

[19] California Department of Transportation. *California Transportation Plan 2050*, pages 97-98. Available at: *https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/ctp-2050-v3-a11y.pdf*

[20] Brown, A. L., Sperling, D., Austin, B., DeShazo, JR, Fulton, L., Lipman, T., et al. 2021. "Driving California's Transportation Emissions to Zero." UC Office of the President: University of California Institute of Transportation Studies. Available at: *https://escholarship.org/uc/item/3np3p2t0*

1. **Plan and invest in a sustainable transportation system.** Identify policies to address the way California plans, invests in, and funds its transportation system to reduce the need to drive and provide high-quality alternatives that are more convenient, efficient, and low-cost than driving.
2. **Manage the use of the transportation system to advance climate and equity goals.** Consider policies to optimize the use of California's transportation infrastructure by prioritizing the movement of people over vehicles.
3. **Shape the deployment of new mobility options**. Explore policies to leverage the potential of new mobility options to increase transportation choices, enable car-light lifestyles, and mitigate inherent risks that could increase car travel.
4. **Improve alignment of land use planning and development with climate and equity goals.** Consider policies to accelerate infill development, affirmatively further fair housing, and increase natural and working lands protection, in furtherance of the State's planning priorities.

For each strategy area, this framework offers: i) a vision for the year 2045 that would be consistent with meeting California's carbon neutrality goal while advancing equity; ii) policy objectives that should be achieved to deliver the vision for that strategy area; and iii) selected actions that should be taken as quickly as possible, especially by the State, to implement those policy objectives.

## 3.1 Strategy Area 1: Plan and Invest in a Sustainable Transportation System

The institutional framework for planning and funding California's transportation system has reflected and perpetuated a car-centric bias. For many decades, the majority of federal, State, and local transportation investments has been devoted to building, operating, and maintaining a network of highways, roads, and streets. While more recently other modes of transportation have received increased funding, the dominance of car-centric investments remains unchanged.[21]

In order to help meet the State's climate goals, the California Transportation Plan 2050 identifies the need to achieve a significant shift toward non-auto modes, amounting to 23 percent of trips occurring by bicycling, walking, transit, or other non-auto modes by 2050.[22] Achieving carbon neutrality no later than 2045 requires a transportation system that works more efficiently for all Californians, regardless of their income, race, ability, or where they live. This vision offers a future in which most individuals have access to high-

[21] Considering new capacity, operations, maintenance, and rehabilitation investments. For a historic review, see California Air Resources Board, *2018 Progress Report: California's Sustainable Communities and Climate Protection Act*, available at https://ww2.arb.ca.gov/sites/d89efault/files/2018-11/Final2018Report_SB150_112618_02_Report.pdf. The more recent data is documented in the California Transportation Assessment (pursuant to AB 285), specifically Barbour, Elisa, et al, *MPO Planning and Implementation of State Policy Goals,* UC Berkeley: Institute of Transportation Studies at UC Berkeley, page 4, available at https://escholarship.org/uc/item/7p8096mh.

[22] California Department of Transportation. *California Transportation Plan 2050*, page 96. Available at: https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/ctp-2050-v3-a11y.pdf

quality rail and public transit services and high-quality active transportation infrastructure, so that driving is a choice and not the only option.

However, this vision will not be possible without effecting a structural realignment of the State's framework for planning and funding transportation to prioritize investing in rail, transit, active transportation, and building more sustainable communities.[23] The quality of rail, public transit services, and active transportation infrastructure needs to be improved so that these modes become more time- and cost-competitive to driving.

### 3.1.1 Vision

To help meet the State's carbon neutrality goal no later than 2045 and advance equity, the vision is for California to have:

A. Transportation planning and funding frameworks that are clearly aligned and prioritize the State's climate, air quality, and equity goals at all levels of government.
B. Affordable, accessible, and integrated rail and transit networks that deliver equal or higher levels of accessibility to key destinations as private cars.
C. Complete networks of safe and accessible bicycle and pedestrian infrastructure that make active transportation the preferred travel mode for short distances.

### 3.1.2 Objectives

To achieve this vision, the State should lead efforts to:

1. **Reimagine roadway projects that increase VMT in a way that meets community needs and reduces the need to drive.** The most critical step of this realignment of the structure for planning and investing in the transportation system will be reimagining roadway projects that increase VMT in a way that meets community needs and reduces the need to drive. It has been long proven that adding highways, interchanges, and major roadways in densely populated, suburban, and rapidly growing areas only alleviates congestion in the short-term, while increasing VMT, congestion, low-density and car-oriented development, and GHG emissions in the long-term.[24,25] Another reason to re-envision investments in highway and major roadway projects that induce VMT is that such investments take away

[23] Governor Newsom's Executive Order N-19-19 and the subsequent development of the Climate Action Plan for Transportation Infrastructure (CAPTI) call for this change and provide a general framework to achieve it, respectively. See California State Transportation Agency, *Climate Action Plan for Transportation Infrastructure*, available at: https://calsta.ca.gov/-/media/calsta-media/documents/capti-july-2021-a11y.pdf

[24] California Department of Transportation. *Transportation Analysis Framework, First Edition*, pages 28-29. Available at: https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/sb-743/2020-09-10-1st-edition-taf-fnl-a11y.pdf

[25] Handy, Susan, & Boarnet, Marlon G. 2014. "Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions." California Air Resources Board Policy Brief. Available at: https://ww2.arb.ca.gov/sites/default/files/2020-06/Impact_of_Highway_Capacity_and_Induced_Travel_on_Passenger_Vehicle_Use_and_Greenhouse_Gas_Emissions_Policy_Brief.pdf

resources from investments in high-quality rail, transit, bicycling, and walking in both the short- and the long-term.[26] In other words, beyond the direct impact of inducing VMT, such projects can limit government's ability to improve transportation options that facilitate mode shift and help reduce VMT.

**Actions**:

- Adjust the present project pipeline of State transportation investments and reconfigure the California Department of Transportation's (Caltrans) planning processes to rescope VMT and GHG-increasing projects. Caltrans and other State agencies have committed to working with stakeholders to evolve projects in their design and suite of investments to address access and connectivity challenges while ensuring their alignment with the State's climate and equity goals and other key outcomes.
- Implement all the recommendations in the Climate Action Plan for Transportation Infrastructure (CAPTI)[27] and apply the CAPTI framework to other transportation investments to prioritize allocation of transportation funding based on projects' climate, equity, and safety impacts. This includes reviewing program eligibility criteria accordingly and advocating for legislation to support the CAPTI vision when necessary.
- Increase funding for State programs that are well-aligned with climate and equity goals, such as the Active Transportation Program (ATP), the Transit and Intercity Rail Capital Program (TIRCP), and the Low Carbon Transit Operations Program (LCTOP), as recommended in the Strategic Growth Council's California Transportation Assessment.

2. **Double local transit capacity and service frequencies by 2030**. The CTP 2050 determined that, to reach the target mode shifts that deliver the State's carbon neutrality goal, California needs to double the capacity and service frequencies of the existing local public transit networks. This type of expansion of transit services would be a massive undertaking in any time, but it is more so now given the loss of ridership and associated revenue during the COVID-19 pandemic, which forced transit service to contract. Transit's fiscal crisis has only exacerbated the adverse equity impacts of the pandemic, considering people with low-income, people with disabilities, and BIPOC communities are all commonly transit dependent populations and the services available to them are now more limited. Accordingly, securing the necessary funding to return transit operations to pre-pandemic levels in the short term needs to be considered both a priority climate and equity action for the State. Increasing equitable transit investment should serve as the

[26] Considering the budgetary impact of developing new highway infrastructure and the ensuing lifespan of operation and maintenance costs.

[27] California State Transportation Agency. *Climate Action Plan for Transportation Infrastructure*. Available at: https://calsta.ca.gov/-/media/calsta-media/documents/capti-july-2021-a11y.pdf

foundation for building a broader transit program that delivers the requisite doubling of capacity and frequencies by 2030. This type of improvement will amount to having transit stops much closer to where people need to go and offering (on average) 15-minute frequencies in urban areas, 30-minute frequencies in suburban areas, and 60-minute frequencies in rural areas for all services.

**Actions**:

- Secure the necessary funding to return transit operations to pre-pandemic levels in the short-term.
- Complete a new update of the State's Transit Strategic Plan by 2023, fleshing out how the proposed transit service expansion would be implemented to optimize efficiency, accessibility, climate, and equity outcomes. This Plan should be developed in close collaboration with underserved communities across local jurisdictions to prioritize improvements where needs are greatest. Beyond increasing service, additional investments will need to be made to ensure affordability for low-income and other disadvantaged populations.
- Reduce the voter approval threshold for future locally funded transportation sales tax measures that exclusively fund investments in transit or active transportation.
- Explore the feasibility of introducing consultation and reporting requirements that enhance transparency and clarity around local tax measure climate and equity impacts and mitigation strategies prior to a ballot vote.
- Remove California Constitution Article XIX restrictions on using gas tax monies for transit operational funding or other sustainable transportation-related uses.

3. **Complete the High-Speed Rail (HSR) System and other elements of the intercity rail network by 2040.** Providing efficient, high-quality alternatives to the car for intercity travel is another important element for enabling car-free and car-light lifestyles that reduce VMT and advance equity for those who do not have the means to own a car and for those who can use their car less. The California Transportation Plan 2050 (CTP 2050) identified the completion of the full 2018 State Rail Plan[28] vision by 2040 as a requirement to achieve the State's carbon neutrality goal.[29] This vision includes: the main HSR line connecting San Francisco, the Central Valley, and Los Angeles, and HSR extensions to Sacramento, the Inland Empire, and San Diego; the San Francisco Downtown Extension and a new Transbay tube; key corridor investments in the Los Angeles Basin; new regional

[28] California Department of Transportation. *California State Rail Plan*. Available at: https://dot.ca.gov/programs/rail-and-mass-transportation/california-state-rail-plan

[29] California Department of Transportation. *California Transportation Plan 2050*, page 86. Available at: https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/ctp-2050-v3-a11y.pdf

services in the Central Valley, on the Central Coast, and in the North Bay; and an overall intensification of services, with more frequencies and higher speeds.[30]

4. **Expand and complete planned networks of high-quality active transportation infrastructure.** The other piece of the puzzle to achieve the target mode shift away from car travel is supporting active transportation mode users, such as bicyclists and pedestrians. The vision is to ensure every city has fully realized networks of active transportation infrastructure that ensure coverage, connectivity, accessibility, and safety to all travelers, making active transportation the preferred choice for short distance travel, and improving access to public transit services. These improvements should be developed in collaboration with community-based organizations and local leaders to address the needs and priorities of historically marginalized and underserved communities.

   **Actions:**

   - Require complete street enhancements, including minimum space allocations for bicycle and pedestrian infrastructure, in all State-funded transportation investments.
   - Expand State funding for active transportation projects to support a broader set of project types and investments than currently funded through the Active Transportation Program.

5. **Increase availability and affordability of bikes, e-bikes, scooters, and other alternatives to light-duty vehicles, prioritizing needs of underserved communities.** One key action to increase access to opportunities and overcome the financial burden of driving or using transit and new mobility services is to increase low-income people's direct access to bikes, e-bikes, scooters, and other alternatives to light-duty vehicles. Similar to existing rebate programs for electric vehicles, the State and other levels of government could do more to subsidize discounts or the full purchase of these alternatives to light-duty vehicles, considering their potential contributions to both reducing VMT and advancing equity goals. As is the case with other objectives shared above, these programs should be developed in close collaboration with community-based organizations and community members to prioritize specific needs and priorities of low-income and disadvantaged communities at the local level.

   **Actions:**

   - Increase funding and expand eligibility of bikes, e-bikes, scooters, and other alternatives to light-duty vehicles in State incentive/rebate programs.

[30] The 2040 Vision projects 88 million daily passenger miles diverted to rail from highways, and an increase of 92 million daily passenger miles on rail as a result of the investments outlined in the California Department of Transportation's California State Rail Plan, page 14, available at: https://dot.ca.gov/programs/rail-and-mass-transportation/california-state-rail-plan

6. **Shift revenue generation for transportation projects away from the gas tax into more durable sources by 2030.** The need to implement a replacement to the gas tax was identified by the Legislature in 2014 through SB 1077 (DeSaulnier, Chapter 835, Statutes of 2014), which described the gas tax as an "ineffective mechanism for meeting California's long-term revenue needs."[31] SB 1077 appointed the CTC in consultation with CalSTA to form a technical advisory committee to study mileage-based fees, a system in which all drivers, regardless of the fuel used by their vehicles, pay their fair share for the road maintenance and repair needs associated with their VMT, as an alternative to the gas tax. Since then, the technical advisory committee has developed recommendations and implemented a first pilot; more pilot and demonstration work is scheduled for implementation in 2023. Implementing an alternative to the gas tax by 2030 is imperative to ensuring the viability of transportation funding that can be reinvested in sustainable transportation options.

   **Actions**:

   - Complete mileage-based fee pilots by 2025.

## 3.2 Strategy Area 2: Manage Use of the Transportation System to Advance Climate, Air Quality, and Equity Goals

In California, most of the highways, roads, and streets are utilized by single-occupancy vehicles (SOV),[32] which take up the highest amount of road space of any transportation mode relative to the amount of people moved.[33] Accordingly, the outcomes of this SOV-centric travel pattern are ever-growing levels of congestion, increasing VMT, economic inefficiency, and inequity in terms of who has easier access to jobs, services, and key destinations.[34]

As detailed in Strategy Area 1, building more roadway lanes is not an answer to these problems. Instead, the solution requires reframing the use of California's transportation infrastructure, and primarily its roadways, to maximize and prioritize getting more people where they need to go rather than prioritizing moving cars. For example, implementing

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[31] Because over half of vehicles on the road by 2040 will be zero-emission vehicles that need not buy any gasoline, the Standardized Regulatory Impact Assessment (SRIA) for the Advanced Clean Cars II Regulations estimated cumulative losses through 2040 of $13.4 billion to local governments and $17.7 billion to the State. See Tables 55 and 56 on page SRIA-113 and SRIA-116 of the Advanced Clean Cars 2 SRIA (January 26, 2022).

[32] California Air Resources Board. *2018 Progress Report: California's Sustainable Communities and Climate Protection Act.* Available at: *https://ww2.arb.ca.gov/sites/default/files/2018-11/Final2018Report_SB150_112618_02_Report.pdf*

[33] This concept is best demonstrated through images comparing road space usage by mode. See a popular example developed by i-SUSTAIN for downtown Seattle, available at: *https://www.i-sustain.com/i-impact*. The National Association of City Transportation Officials makes a similar case comparing the carrying capacity of 10-foot lane by mode, as seen in their Transit Street Design Guide, available at: *https://nacto.org/publication/transit-street-design-guide/introduction/why/designing-move-people/*.

[34] Namely, those who can afford cars for all members of the household or the cost of housing in high accessibility locations.

dedicated bus lanes, transit signal priority schemes, and other measures could enhance transit operations on major thoroughfares and other key corridors. Likewise, it is essential to prioritize the expansion of bike lanes, sidewalks, and other active transportation pathways to increase system capacity and improve accessibility for all, including people using wheelchairs and other types of mobility devices. This shift would be effectuated by leveraging the existing infrastructure to optimize for accessibility, equity, and climate outcomes through prioritizing the needs of more efficient modes of transportation, such as transit, bicycling, and walking.

### 3.2.1 Vision

To help meet the State's carbon neutrality no later than 2045 and advance equity, the vision is for California to have:

A. A transportation system that clearly prioritizes the movement of people over cars.
B. Restructured pricing for all modes to clearly represent the costs and benefits that each mode represents to California.
C. The necessary road space for transit and active transportation to thrive and offer high-quality services.

### 3.2.2 Objectives

To achieve this vision, the State should lead efforts to:

1. **Authorize and implement roadway pricing strategies and reallocate revenues to equitably improve transit, bicycling, and other sustainable transportation choices.** Pricing strategies take many forms and can include fees for miles driven, cordon fees for operating vehicles in designated areas, parking fees, fees on congestion impact of ride-hailing services, and dynamic fees on highway lanes and other strategic roads to manage congestion.

   Authorizing transportation pricing strategies is essential to promote more efficient use of cars and to further transit and active transportation improvements. Pricing strategies present an opportunity to fund the transportation system in a more equitable and fiscally sustainable way than current funding sources, promote more efficient functioning of existing infrastructure, and fund new transportation options, especially for those who do not own a vehicle or do not drive. Some recent analyses indicate California will not meet its climate goals without implementing equitable roadway pricing strategies as these strategies are projected to achieve up to 27 to 37 percent of the needed per capita VMT reduction.[35] The four largest MPOs have included multiple pricing strategies in

[35] See Brown, A. L., Sperling, D., et al, 2021, "Driving California's Transportation Emissions to Zero," pages 237-253, UC Office of the President: University of California Institute of Transportation Studies, available at: https://escholarship.org/uc/item/3np3p2t0 and California Department of Transportation, *California Transportation Plan 2050*, page 86, available at: https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/ctp-2050-v3-a11y.pdf.

their adopted sustainable communities strategies (SCSs) to reduce regional GHG emissions.[36]

Pricing strategies would need to be implemented with an emphasis to ensure equitable outcomes, and in accordance with local needs and context. In particular, pricing strategies need to consider the potential travel options available for low-income and other disadvantaged populations to ensure they are not unduly impacted by the strategy.

**Actions**:

- Permit implementation of a suite of roadway pricing strategies by 2025 in support of adopted SCSs.

2. **Prioritize addressing key transit bottlenecks and other infrastructure investments to improve transit operational efficiency over investments that increase VMT.** Offering high-quality transit services that represent a viable alternative to driving will require multiple coordinated efforts. The proposed investments to expand service capacity and increase frequencies (described in Strategy Area 1) will be ineffective if those transit vehicles end up stuck in traffic or have limited space to operate efficiently. Transit agencies and local jurisdictions across California should come together to identify, plan, and implement strategies to prioritize transit speeds and reliability over general roadway level of service and private car needs. Those strategies, which include capital investments in the strategic redistribution of the right-of-way, signaling, and supportive traffic regulations, should be prioritized in federal and State funding programs and local investment plans.

   **Actions**:

   - Permit the conversion of general-purpose lanes to transit-only lanes or toll lanes and full facility tolling of state-owned facilities.
   - Establish requirements to demonstrate that addressing transit bottlenecks and other transit efficiency investments are a priority in local jurisdiction and transit agency investment plans, such as a prerequisite for overall transportation project funding eligibility.

3. **Develop and implement a statewide transportation demand management (TDM) framework with VMT mitigation requirements for large employers and large developments.** The goal of TDM is to provide people with information, incentives, and other support programs that help them utilize sustainable

[36] These metropolitan planning organizations are the Metropolitan Transportation Commission (MTC), the Sacramento Area Council of Governments (SACOG), the San Diego Association of Governments (SANDAG), and the Southern California Association of Governments (SCAG).

transportation options such as transit, ridesharing, bicycling, and walking and rely less on cars. A strategic point of focus for TDM program implementation could be large employers (more than 100 employees), which often incentivize driving alone by offering free parking, gas stipends, and similar perks, and do not offer similar levels of support to employees to take transit, ride their bicycle, or walk. Employer-based TDM strategies are needed to achieve widespread implementation for the State to meet its climate goals, including commute trip reduction programs, ride-sharing programs, on-site bicycle facilities, vanpool and shuttle services, transit fare subsidies, and parking cash-out. Another strategic point of focus for TDM programs could be large developments, particularly new ones, that through decisions such as their location, design, transportation, parking infrastructure, and their treatment and general interaction with their surrounding environment ingrain high or low VMT travel patterns for decades to come.

**Actions**:

- End the State's subsidies for employee parking and take additional actions to move away from subsidizing public spaces for car parking more generally while expanding efforts to promote pedestrian, bicycle, and transit travel. As the State of California employs over 200,000 people, it can expand its TDM programs, which currently vary by agency and employee union.
- Build on existing resources to further support the development and enforcement of local TDM ordinances and help begin developing a statewide TDM framework.[37]

## 3.3 Strategy Area 3: Shape the Deployment of New Mobility Options

In the last 20 years, California has been a hub for the development of new mobility services, new technologies, and new business models for how local transportation services can be both provided and consumed. These include, among others: shared-use mobility services such as car-share, ride-hailing, and micro-mobility services; app-based services for integrated trip planning, booking, and payment; and new travel technologies such as automated vehicles (AVs) and delivery robots and drones. These services have significantly improved mobility and access to opportunities for some people who do not own or want to rely on cars. However, without additional State actions these services could also increase VMT and GHG emissions and exacerbate equity issues related to access and costs.

Achieving carbon neutrality no later than 2045 will require leveraging the benefits of new mobility to offer high-quality alternatives to driving that reduce overall VMT, while

[37] Such as: California Air Pollution Control Officers Association. *Quantifying Greenhouse Gas Mitigation Measures - A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures.* Available at: http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

mitigating its risks and negative impacts. For example, rather than competing with public transit, new mobility services should complement transit services, providing flexible options in locations and times of the day where and when fixed-route transit is not efficient, and facilitating trip planning, booking and payment for multimodal trips. No single mobility service alone is the answer for the diverse needs of any given community or individual; instead, the goal is to foster a rich ecosystem of strategically integrated mobility services, with transit playing the role of anchor mode, that together deliver high-quality solutions in accordance with travelers' needs.

Another critical step is ensuring equitable access and equitable impact of new mobility options. So far, new mobility's track record on equity is mixed. On the one hand, new mobility has made new forms of travel more readily available for numerous people, increasing access to key destinations for communities with limited transportation options. On the other hand, new mobility services have catered to more affluent customers and have been slow to offer special provisions for low-income customers, people with disabilities, and low-English proficiency populations, leaving many people unable to benefit.

### 3.3.1 Vision

To help meet the State's carbon neutrality goal no later than 2045 and advance equity, the vision is for California to have:

A. A transportation system that leverages the combined potential of new mobility, transit, and active transportation to offer high-quality travel alternatives that enable car-free or car-light lifestyles for all.
B. Seamless integration in trip planning, booking, and payment systems across all mobility providers, both public and private.
C. A new mobility ecosystem that, as a whole, offers equitable access to all Californians regardless of race, income, age, disability, or language proficiency to live, work, and play with ease.

### 3.3.2 Objectives

To achieve this vision, the State should lead efforts to:

1. **Prevent uncontrolled growth of autonomous vehicle (AV) VMT, particularly zero-passenger miles.** A critical objective of achieving this vision will be managing and regulating the use of private AVs and AV-based taxi services. AVs could offer important access, safety, and network performance benefits, such as opening the use of cars for people who cannot drive. However, according to modeling conducted for the CTP 2050 and the University of California's "Driving California's Transportation Emissions to Zero" report, the arrival of AVs will be one of the main sources of VMT increase in California during the next 25 years – the only question is by how much. Because AVs eliminate the need for a dedicated driver, they eliminate the labor costs of taxis and ride-hail services and enable individuals to conduct any number of activities (from working to resting) while traveling. This could make car travel more convenient for those with access to AVs, cause people

to shift away from public transit and non-motorized modes, and encourage people to live further from their destinations. Whether privately owned or as taxi services, AVs will have the ability to drop off passengers and either return to their owner's garage or roam around with zero occupants looking for new passengers, further increasing congestion and its adverse impacts. In response to this risk, the CTP 2050 recommends channeling the deployment of AVs to ensure that they are shared, electric, supportive of efficient land use, and aligned with key principles for healthy and sustainable communities.[38] This will require decisive action by the State, working with industry, to implement regulations and policies, including pricing policies, that drive a more efficient use of AVs and limit their potential negative impacts.

**Actions**:

- Authorize pricing of empty/zero-passenger miles at higher rates than for other levels of occupancy.

2. **Channel new mobility services towards pooled use models, transit complementarity, and lower VMT outcomes.** The State has demonstrated leadership in this area by implementing Senate Bill 1014 (SB 1014) (Skinner, Chapter 369, Statutes of 2018) and its associated Clean Miles Standard and Incentive Program,[39] which encourage ride-hail services to provide pooled services[40] and enable connections to transit. Additional funding and synergistic policy initiatives could help strengthen those use cases through lower rates, integrated fares, and strategic fleet deployments. Providers of other new mobility options, such as carshare and micro-mobility services, among others, could also be encouraged to pursue partnerships with transit providers as well as to curb the VMT impact of their operations. Similarly, there could also be opportunities to optimize the VMT impact of delivery service providers while upholding service quality.

**Actions**:

- Develop and adopt regulations and incentive programs that encourage new mobility providers to prioritize higher occupancy use, transit partnerships, and lower VMT impact.

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[38] California Department of Transportation. *California Transportation Plan 2050*, page 120. Available at: https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/ctp-2050-v3-a11y.pdf

[39] California Air Resources Board. Accessed May 5, 2022. Clean Miles Standard. Available at: https://ww2.arb.ca.gov/our-work/programs/clean-miles-standard

[40] Pooled is an industry term used to refer to when multiple passengers that are not traveling together share a ride-hail vehicle.

3. **Establish an integrated statewide system for trip planning, booking, payment, and user accounts that enables efficient and equitable multimodal systems.** While the arrival of new mobility services has increased access to destinations for certain populations, their potential to reduce VMT relies on their ability to operate in an integrated manner with public transit services as well as with each other. The foundation for this integration is customers' ability to review schedules and availability, plan multimodal trips, book rides, pay fares, and access discounts in integrated platforms that bring together the universe of mobility services in any given region. Caltrans, through the California Integrated Travel Project (Cal-ITP),[41] aims to develop a statewide system that enables those multimodal connections, while some transit agencies are also conducting their own pilots on this front.

   **Actions**:

   - Provide adequate resources to support State and transit agency initiatives to continue building integrated systems to ultimately break down existing silos between providers and regions, create a consistent statewide structure, and ensure easy access to a multimodal ecosystem of mobility services for all.

4. **Provide financial support for low-income and disadvantaged Californians' use of transit and new mobility services.** Transit agencies throughout California offer reduced fares for low-income and other disadvantaged populations. However, no matter the location or the quality of the local public transit system, transit services cannot offer an efficient solution to all travel needs for every individual. This is particularly true for low-income people who often have less traditional work schedules or work or reside in places that do not have high-quality public transit services, and it commonly forces people to travel by car even though they cannot easily afford to. New mobility could be the solution for many of these people, given its extended service hours and potentially larger geographic reach. Unfortunately, the cost of new mobility services can be prohibitive, especially if used frequently. The key to unlocking this potential will be to develop and scale up programs to subsidize free or reduced costs for new mobility services for low-income and disadvantaged Californians. Some jurisdictions in California are already piloting this idea by creating a "mobility wallet," which provides a monthly budget that eligible users can apply to transit and new mobility services.

   **Actions**:

   - Increase funding to support low-income and disadvantaged Californians' use of transit and new mobility services and streamlining its operational support for "mobility wallet" programs.

[41] California Department of Transportation. Accessed May 5, 2022. CAL-ITP: A modern and consistent transportation experience throughout California. Available at: https://www.calitp.org/

5. **Expand universal design features for new mobility services.** There is a large community of Californians with disabilities who cannot drive, enter the passenger seat of a regular car without assistance, operate a regular bike, or use conventional smart phone applications, yet the new mobility industry, with some exceptions, seems to be growing without addressing the needs of these persons. For example, micro-mobility services lack inclusive alternatives such as tricycles, hand-pedaled cycles, or recumbent bicycles; ride-hail services do not offer equivalent quality of service on wheelchair accessible vehicles; and mobile phone apps may not be Americans with Disabilities Act (ADA) compliant. Addressing these issues and more is a crucial goal to advance equity and a more inclusive society and may also reduce reliance on often-strained paratransit services and costly private vehicles. New regulations, incentive programs, and pricing strategies could elevate universal design standards for new mobility providers, including support of and access to adaptive modes that are designed for people with disabilities and that can carry equipment like wheelchairs.

   **Actions**:

   - Require all new mobility providers to meet minimum fleet percentages of adaptive devices and placement requirements.

## 3.4 Strategy Area 4: Improve Alignment of Land Use Planning and Development with Climate and Equity Goals

Achieving carbon neutrality no later than 2045 requires land use planning and development activities that are consistent with and advance State planning priorities[42] by significantly augmenting growth in transportation-efficient, resource-rich, accessible, and inclusive communities for all Californians. This vision is aligned with the CTP 2050's and University of California researchers' latest modeling and analyses,[43] which indicated that California would not meet its climate goals without future growth in population and employment happening primarily within the state's most densely populated areas and improving the balance of housing, employment, shopping, and other key services within

[42] The State Planning Priorities generally include (1) promoting infill development, (2) protecting natural and working lands, and (3) encouraging efficient development patterns and investments that are consistent with adopted plans in areas appropriately planned for growth. The State Planning Priorities are "intended to promote equity, strengthen the economy, protect the environment, and promote public health and safety in the state, including in urban, suburban, and rural communities" The full text of the State Planning Priorities is defined in California Government Code, § 65041.1. "Statewide Environmental Goals and Policy Report." Available at: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=GOV&sectionNum=65041.1

[43] See Brown, A. L., Sperling, D., Austin, B., DeShazo, JR, Fulton, L., Lipman, T., et al. 2021. "Driving California's Transportation Emissions to Zero." UC Office of the President: University of California Institute of Transportation Studies, page 236. Available at: *https://escholarship.org/uc/item/3np3p2t0* and California Department of Transportation. *California Transportation Plan 2050*, page 287. Available at: *https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/ctp-2050-v3-a11y.pdf*

any given community. Although MPOs create SCSs that identify how each region may accommodate its growth in patterns that help meet GHG reduction targets set by CARB, these plans are not being fully implemented.[44]

Implementing the land use strategies in SCSs and moving towards improved planning frameworks would address the fact that local land use policies and development practices across California have often favored low-density, single-family zoning, and car-oriented development patterns and carry the legacy of racist government policies, covenants, and lending practices from the past.[45,46,47] These historic policies and practices have resulted in restricted infill development, limited access to opportunity, and disinvestment in existing neighborhoods for decades.[48,49,50] As such, they have played a key role in furthering car dependence, rising GHG emissions, and growing inequity in California's communities.

Barriers to infill development have been one factor fueling California's housing crisis, now a half century in the making. After decades of underproduction, supply is far behind need, and purchase and rental costs are soaring. Today, more than a third of households in the state cannot afford their housing costs,[51] forcing a growing number of households to either move to more remote locations with more affordable housing but more limited access to jobs, shopping, and other regular destinations, or to live in overcrowded conditions.

### 3.4.1 Vision

To help meet State's carbon neutrality goal no later than 2045 and advance equity, the vision is for California to have:

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[44] California Air Resources Board. *2018 Progress Report: California's Sustainable Communities and Climate Protection Act.* Available at: https://ww2.arb.ca.gov/sites/default/files/2018-11/Final2018Report_SB150_112618_02_Report.pdf

[45] Florida, R. 2016. "How Zoning Restrictions Make Segregation Worse." *Bloomberg*. Available at: https://www.bloomberg.com/news/articles/2016-01-04/how-zoning-restrictions-make-segregation-worse.

[46] California Environmental Protection Agency. 2021. Pollution and Prejudice: Redlining and Environmental Injustice in California. Available at: https://storymaps.arcgis.com/stories/f167b251809c43778a2f9f040f43d2f5.

[47] Rothstein, R. 2017. *The Color of Law: A Forgotten History of How Our Government Segregated America.*

[48] California Air Resources Board. *2020 Mobile Source Strategy*, page 107. Available at: https://ww2.arb.ca.gov/sites/default/files/2021-12/2020_Mobile_Source_Strategy.pdf.

[49] Jaffe, E. 2016. "Where Sprawl Makes It Tougher to Rise Up the Social Ranks." Bloomberg. Available at: https://www.bloomberg.com/news/articles/2016-01-27/where-urban-sprawl-makes-it-tougher-for-the-poor-to-rise-up-the-social-and-economic-ranks.

[50] Lucas, K. 2012. "Transport and social exclusion: Where are we now?" *Transport Policy*, 20, 105-113.

[51] One in three households in the state doesn't earn enough money to meet their basic needs, per the Statewide Housing Plan. California Department of Housing and Community Development. 2022. *Statewide Housing Plan.* Available at: https://www.hcd.ca.gov/docs/statewide-housing-plan.pdf

A. Future growth focused on infill sites and other climate-friendly, transportation-efficient areas appropriately planned for growth.[52]
B. The ability for every Californian to live, work, and play in climate-smart, transportation-efficient communities that provide travel choices and access to opportunity.[53]

### 3.4.2 Objectives

To achieve this vision, the State should:

1. **Accelerate infill development in existing transportation-efficient places and deploy strategic resources to create more transportation-efficient locations.** Notwithstanding the recent passage of laws that expand property owners' ability to create multiple units on single-family lots and limit local governments' ability to block new housing in certain circumstances, many barriers to infill development remain in place, discouraging this important development type in ways that need to be addressed. One critical barrier is the high cost of infill development, including the high cost of urban land, parking requirements, construction costs, and the necessary infrastructure upgrades to make sites development-ready.[54] Since the elimination of redevelopment agencies in California,[55] there is often not the fiscal capacity to take on these costs at the required scale. Also, insufficient land may be zoned for housing, and developers may have to navigate numerous and opaque regulatory hurdles and fees in the local approval process.[56] Implicit biases in real estate practices and deliberate action from current residents who are resistant to the addition of new residents and to neighborhood change also represent important obstacles to infill development and perpetuate present-day neighborhood disparities rooted in historic discriminatory housing and land use practices such as redlining.[57,58]

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[52] Building on the State's Planning Priorities as defined in California Government Code, § 65041.1. "Statewide Environmental Goals and Policy Report." Available at: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=GOV&sectionNum=65041.1

[53] Building on California Department of Housing and Community Development's vision statement. Available at: https://www.hcd.ca.gov/about/mission.shtml.

[54] California Department of Housing and Community Development. 2022. *Statewide Housing Plan.* Available at: https://www.hcd.ca.gov/docs/statewide-housing-plan.pdf

[55] There are replacements to redevelopment, such as Enhanced Infrastructure Financing Districts (EIFDs), the Infill Infrastructure Grant Program (IIG), and impact fees; they are just much smaller, not widely utilized, and may offer their own barriers.

[56] California Department of Housing and Community Development. 2022. *Statewide Housing Plan.* Available at: https://www.hcd.ca.gov/docs/statewide-housing-plan.pdf

[57] Rothstein, R. 2017. *The Color of Law: A Forgotten History of How Our Government Segregated America.*

[58] California Environmental Protection Agency. 2021. Pollution and Prejudice: Redlining and Environmental Injustice in California. Available at: https://storymaps.arcgis.com/stories/f167b251809c43778a2f9f040f43d2f5.

To increase investment in under-resourced communities and expand access to high-resource neighborhoods, the State should pursue a combination of the following actions: i) providing financial and educational tools, resources, and incentives; ii) streamlining review processes; iii) strengthening protections for natural and working lands; iv) facilitating collaboration with key partners; and v) providing and requiring anti-displacement protections for existing residents and businesses.

**Actions**:

- Continue to commit State funding for existing and new programs supporting predevelopment work and infrastructure improvements that accelerate climate-smart and equitable infill development.
- Eliminate State funding of infrastructure, development, or leases outside of infill areas in locations that do not demonstrate clear alignment with State guidelines on VMT, climate, and equity outcomes. (For examples of this, see Appendix D on Local Actions).
- Expand tax increment financing options and other financing tools for infill-supportive infrastructure (e.g., water, sewer, electrical, telecommunications, active transportation, urban greening, and parks). Direct these financing tools to support affordable housing, local businesses, neighborhood services and amenities, and other community-identified priority projects with a focus on under-resourced and disinvested communities.
- Continue to encourage the utilization of underutilized public sites for mixed-use development, and expand opportunities for multi-modal transportation facilities.
- Establish guidance for regional and local agencies on how to administer SB 743 mitigation banking or exchanges and how revenue should be spent to support projects that reduce VMT.

2. **Encourage alignment in land use, housing, transportation, and conservation planning in adopted regional plans (RTP/SCS and RHNA) and local plans (e.g., general plans, zoning, and local transportation plans).** SCSs illustrate future land use and transportation changes that would lead to reductions in VMT and GHG emissions to meet the regional GHG emission reduction targets set by CARB. However, as noted earlier, SCS implementation is lagging significantly across the state. As detailed in the California Transportation Assessment Report (pursuant to AB 285 (Friedman, Chapter 605, Statutes of 2019)), MPOs, which develop the SCS plans, do not have adequate instruments to implement them and do not have the authority to ensure alignment of local land use decisions – as reflected in cities and counties' general plans – with the SCSs. The goal of this objective is to strengthen regional plan implementation and funding and the ability of regional plans to achieve regional GHG targets. Advancing California regions' visions for accelerating infill development and climate-smart housing production will require a collective discussion about establishing more coordinated MPO-local

government relationships that lead to codifying those regional visions into land use plans and ordinances at the local level.[59]

**Actions**:

- Establish a requirement that all local general plans demonstrate consistency with the assumptions and growth allocations in regional RTP/SCSs at least every 8 years consistent with existing RHNA and housing element update timelines.
- Explore measures to ensure or require greater consistency and alignment between regional RHNA allocations, SCSs, and regional plans such as strategic planning that prioritizes green space and conservation and encourage greater integration of state housing and conservation policy priorities to minimize/prevent conflict.

3. **Accelerate production of affordable housing in forms and locations that reduce VMT and affirmatively further fair housing policy objectives.** Another critical objective is to accelerate production of a greater diversity of housing types in climate-smart locations. According to the latest Statewide Housing Plan (SHP), California must build at least 2.5 million new homes in the current eight-year housing need cycle and no fewer than one million of those homes must meet the needs of lower-income households.[60] The State's vision, as articulated in the SHP, is to provide these homes in climate-smart areas, areas with high access to opportunities and services that reduce the need to drive and mitigate climate change while also reducing costs to government in infrastructure development, operations, and maintenance. Efforts to accelerate housing production should be complemented with bold initiatives to preserve existing affordable housing and protect vulnerable residents through continuation of expiring affordability covenants, anti-displacement and tenant protection services and resources, and climate adaptation upgrades to existing affordable housing.[61]

   Key actions are needed across multiple fronts including easing local and State barriers to increasing density and encouraging greater diversity of housing types in existing neighborhoods. Although research has shown that the California

[59] This type of coordination would also address the need for continued accountability in existing housing laws regarding additional density, affordability, and infill under the purview of California Housing and Community Development Department's Housing Accountability Unit or the Department of Justice.

[60] California Department of Housing and Community Development. 2022. *Statewide Housing Plan*. Available at: https://www.hcd.ca.gov/docs/statewide-housing-plan.pdf

[61] Potential conversion of affordable housing to market-rate housing is an ongoing and critical statewide problem. In California, there are approximately 149,000 units of privately owned, federally assisted, multifamily rental housing, plus additional tax-credit and mortgage-revenue bond properties, many with project-based rental assistance. A large percentage of these units may convert to market rate as subsidy contracts or regulatory agreements expire. These at-risk units are home to seniors and families with lower incomes who cannot afford to pay market-rate rents and who could be displaced if the developments convert. More info: https://www.hcd.ca.gov/policy-research/preserving-existing-affordable-housing.shtml.

Environmental Quality Act (CEQA) is not a primary barrier to infill housing relative to other challenges, further attention to issues in its implementation can help resolve any challenges it does pose.[62] Affordable housing should be prioritized in many types of communities, including those that are already resource-rich and transportation-efficient. Additionally, affordable housing should be coordinated with supportive community investments in under-resourced communities.

**Actions**:

- Further ease local regulatory and California Environmental Quality Act (CEQA) barriers to increasing density and affordable housing development, especially in transportation-efficient areas, and establish protections in the law against tactics to obstruct developments that advance State equity and climate goals.
- Increase funding for affordable housing and infill-supportive developments that accelerate VMT-reducing housing production in alignment with the SCS through programs such as Regional Early Action Planning of 2021 (REAP 2.0), Affordable Housing and Sustainable Communities (AHSC), and Transformative Climate Communities (TCC).
- Scale up factory-built housing production, including investing in workforce development, boosting participation in the construction industry, and establishing labor standards, to reduce the time and cost of delivering multifamily infill housing and accelerate the infill housing pipeline.
- Leverage the State's Prohousing designation by expanding incentives in State funding programs – including transportation and other non-housing programs – for local jurisdictions to adopt pro-housing policies, especially in ways that increase infill housing and reduce VMT.
- Support programs and policies to enable different housing ownership models to expand housing access such as through community land trusts, mutual housing, and cooperative ownership models.
- Incentivize conversion of a broader array of opportunity sites for affordable housing construction including redevelopment of aging malls, office parks, and other major reuse sites.

4. **Reduce or eliminate parking requirements (and/or enact parking maximums, as appropriate) and promote redevelopment of excess parking, especially in infill locations.** Building parking for infill development makes construction costs more prohibitive, considering parking can cost up to $100,000 per stall, which takes away both physical space and budget from the construction of housing and other needed services and amenities. Yet minimum requirements for parking in new developments are regularly set by local jurisdictions, financers, or others.

[62] O'Neill, Moira and Biber, Eric and Gualco-Nelson, Giulia and Marantz, Nicholas and Marantz, Nicholas. (September 18, 2021). *Examining Entitlement in California to Inform Policy and Process: Advancing Social Equity in Housing Development Patterns.* Available at SSRN: https://ssrn.com/abstract=3956250

Particularly where viable transportation alternatives are available, eliminating parking requirements and/or providing a "cap" on allowable parking can make infill development more financially feasible and is more conducive to lowering VMT. Measures to reduce parking in new developments can also be paired with funding or incentives for car share, electric vehicles, electric bikes and scooters, and other driving alternatives. AB 2097 (Friedman, Chapter 459, Statutes of 2022)[63] will help with this in certain areas, but there is still work to be done.

**Actions**:

- Develop financing and incentives programs that facilitate conversion of excess parking to housing and other strategic uses for communities.
- Enact parking maximums (caps).

5. **Preserve and protect existing affordable housing stock and protect existing residents and businesses from displacement and climate risk.** Identifying and preserving the existing affordable housing stock – both subsidized and "naturally occurring" affordable housing – is key to maintaining the economic accessibility and vitality of existing communities while investing in new development and ensuring that low-income residents are not displaced when new infill development occurs. Additionally, preserving all types of affordable housing requires climate mitigation and adaptation improvements to ensure the future safety and viability of those residences. One action the State could undertake could be to identify potential changes to federal and State policies to increase incentives to preserve existing affordable housing, implement climate adaptation improvements to existing affordable housing, and reduce and mitigate displacement of existing low-income residents.

**Actions**:

- Identify potential changes to federal and State policies to increase incentives to preserve existing affordable housing, implement climate adaptation improvements to existing affordable housing, and reduce and mitigate displacement of existing low-income residents.

[63] See https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220AB2097.

# APPENDIX D
# LOCAL ACTIONS

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# 1. Local Government Actions are Crucial for Supporting Attainment of the State's Climate Goals

Local government efforts to reduce greenhouse gas (GHG) emissions within their jurisdiction are critical to achieving the State's long-term climate goals, and can also provide important co-benefits, such as improved air quality, local economic benefits, healthier and more sustainable communities, and improved quality of life. Indeed, a substantial portion of California's GHG reduction potential comes from activities over which local governments have authority or influence.[1] Since the enactment of Assembly Bill (AB) 32 (Nuñez and Pavley, Chapter 488, Statutes of 2006), many local jurisdictions have sought to identify their role in implementing State-level decarbonization efforts. With increasing severity and occurrence of droughts, wildfires, extreme heat, and other conditions, the need for action is urgent.

Local governments have responsibility and authority over the built environment, transportation networks, and provision of local services. For example, local governments have primary authority to plan, zone, approve, and permit how and where land is developed to accommodate population and employment growth and the changing needs of their jurisdictions. They make decisions on how and when to deploy transportation infrastructure and can promote residential and commercial development that supports transit, bicycling, and walking. Local governments have the authority to adopt building ordinances that exceed statewide building code requirements and facilitate the implementation of zero-emission vehicle (ZEV) infrastructure.

Many jurisdictions have demonstrated bold climate leadership, yet meeting the challenge of climate change requires bolder actions from local governments across the state. For example, the City of Oakland requires all new construction to be all-electric and is currently working on electrifying existing buildings.[2] Starting in 2023, the City of Sacramento will require all new buildings under three stories to be all-electric. By 2026 the city will extend this requirement to all new construction, regardless of height, with some limited exemptions. The City of Sacramento also provides parking incentives for zero-emission carsharing and electric vehicle (EV) charging and will require higher than minimum State-required levels of EV charging infrastructure in new construction starting in 2023.[3] This type of leadership by local governments is critical to implementing State-level measures to address GHG emissions associated with transportation and the built environment.

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[1] Wheeler, S. M., Jones, C. M., & Kammen, D. M. 2018. Carbon Footprint Planning: Quantifying Local and State Mitigation Opportunities for 700 California Cities. *Urban Planning, 3(2), 35-51.* Available at: *https://www.cogitatiopress.com/urbanplanning/article/view/1218*.

[2] City of Oakland. *Building Electrification*. Available at: *https://www.oaklandca.gov/projects/building-electrification* .

[3] City of Sacramento. *Electrification of New Construction.* Available at: *http://www.cityofsacramento.org/SacElectrificationOrdinance*.

This appendix includes recommendations intended to build momentum for local government actions that align with the State's climate goals, with a focus on local GHG reduction strategies (commonly referred to as climate action planning) and approval of new land use development projects, including through environmental review under the California Environmental Quality Act (CEQA). This appendix is not regulatory but is instead intended to provide clarification on specific topics requested by planners, CEQA practitioners, and community groups in response to challenges local jurisdictions face when implementing GHG reduction strategies or approving much-needed housing projects. It is not exhaustive and does not include everything local governments can implement to support the State's climate goals. It focuses primarily on climate action plans (CAPs) and local authority over new residential development. It does not address other land use types (e.g., industrial) or air permitting.

Recommendations in this appendix are meant to be used in combination with other planning and CEQA guidance documents including Chapter 8 of the General Plan Guidelines published by the Governor's Office of Planning and Research (OPR),[4] the State CEQA Guidelines,[5] OPR's CEQA Technical Advisories,[6] as well as guidance from local air districts and the California Air Pollution Control Officers Association (CAPCOA).[7]

The following sections discuss the implications for sustainable development on equity and environmental justice as part of a strategy to combat climate change and provide recommendations to local governments for:

- Developing local CAPs and strategies consistent with the State's GHG emission reduction goals;
- Incorporating State-level GHG priorities into their processes for approving land use plans and individual projects;
- Implementing CEQA mitigation, as needed, to reduce GHG emissions associated with new land use development projects; and
- Leveraging opportunities for regional collaboration.

## 1.1 Centering Equity in Local Government Action is Key to Addressing the Climate Crisis

Local government action to reduce GHG emissions is not only essential for meeting the State's climate goals; it can build better places for everyone in ways that begin to address the

[4] OPR. *General Plan Guidelines - Chapter 8 Climate Change.* Available at: *https://opr.ca.gov/planning/general-plan/guidelines.html.*
[5] Cal. Code Regs., tit. 14, §§ 15000 et seq.
[6] OPR. *Technical Advisories.* Available at: *https://opr.ca.gov/ceqa/technical-advisories.html.*
[7] CAPCOA. 2021. Handbook for Analyzing Greenhouse Gas Emissions Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity: Designed for Local Governments, Communities, and Project Developers. Available at: *https://caleemod.com/handbook/index.html*.

entrenched inequities experienced by the most overburdened Californians (e.g., Black, Indigenous, People of Color [BIPOC] and low-income communities). Local policies that make it easier for people to afford homes in places with good access to jobs, services, open space, and education, as well as a variety of transportation options that reduce the need to drive, advance equity and reduce GHG emissions.

Ensuring that vulnerable communities benefit from efforts to reduce GHG emissions is crucial to the State's climate strategy. For example, Senate Bill (SB) 32 (Pavley, Chapter 249, Statutes of 2016) recognized that efforts to meet the State's climate goals must be done in an equitable manner by directing CARB to achieve more stringent GHG emission reductions in a way that benefits disadvantaged communities, who often bear the burden of climate impacts. AB 32 also directs that CARB "ensure that the greenhouse gas emission reduction rules, regulations, programs, mechanisms, and incentives under its jurisdiction, where applicable and to the extent feasible, direct public and private investment toward the most disadvantaged communities in California and provide an opportunity for small businesses, schools, affordable housing associations, and other community institutions to participate in and benefit from statewide efforts to reduce greenhouse gas emissions."[8] To address the State goals for housing affordability, social equity, and climate simultaneously, local government institutions are well-positioned to take on a portfolio of integrated strategies such that housing policies are designed to address climate goals and climate policies are designed to meet the State's housing needs. In many cases, land use strategies that support more compact development in infill areas, particularly those already displaying efficient resident travel patterns, have the greatest potential to reduce emissions while also reducing combined housing and transportation costs for Californians and infrastructure costs for local governments due to avoided new roads, public schools, and other sprawl supporting infrastructure. Infill housing development alleviates pressure to develop on the urban periphery, preserving natural and working lands and areas often at risk of wildfire.

The issues that shape where development goes are complex, but the location and type of new housing that is developed matters for climate, health, and equity. Accelerating housing production to meet the extraordinary need for more homes can help reduce vehicle miles traveled (VMT) and GHG emissions and advance health and equity objectives when new housing is developed in types and locations that align with these goals, and particularly when accompanied by complementary policies and investments to create sustainable communities and prevent displacement of existing residents. See Appendix E, Sustainable and Equitable Communities, for strategies to foster sustainable development.

Fostering transportation-efficient, resource-rich, accessible, and inclusive communities is a key strategy for climate, equity, health, and affordability. Climate-smart locations include neighborhoods, commercial corridors, town centers, downtowns, and other areas where

[8] Health & Saf. Code, § 38565.

residents have access to a broad range of mobility options in addition to private automobiles (such as transit, walking, and biking), as well as where residents have access to housing, jobs, and other key destinations. Such communities make it possible for residents to live, work, and recreate without dependence on a personal car. For trips where driving is required, car trips can be relatively short and public infrastructure should support the use of zero-emission vehicles. The predominant historical land use development paradigm that centers on mobility (how far you can go in a given amount of time) over accessibility (how many key destinations, including jobs, housing, and other services, you can reach in that time) has not resulted in equitable outcomes for BIPOC and low-income households, and, in fact, has exacerbated barriers to access and upward economic progress. Increasing housing opportunities in transportation-efficient locations is a necessary paradigm shift and is part of the State's GHG emission reduction strategy.

However, ensuring that the households that would benefit most from living in more accessible areas are not displaced by new investments requires that State, regional, and local governments proactively anticipate and avoid potential unintended equity and social consequences, including gentrification and displacement of historically underserved and disadvantaged communities. The most recent wave of displacement stems from a variety of factors and policies: exclusionary zoning, job growth and reinvestment, changing housing preferences among higher-income households, local policies and local opposition to new housing development proposals, lack of funding for new affordable housing, increased costs of building new housing, and a dearth of policies to preserve existing affordable housing and protect tenants.[9] These variables interact to drive up housing prices and rents for all households—particularly low-income and BIPOC households—increasing displacement pressures in established neighborhoods and forcing people to live in car-dependent neighborhoods away from community support systems and economic opportunities and increase households' combined housing and transportation costs.[10] Policies to facilitate both market rate and subsidized affordable housing production in infill neighborhoods should, over time, stabilize housing costs, minimize displacement, and create new housing opportunities in transportation-efficient locations.

Communities and local jurisdictions have a range of tools and strategies that they can utilize to proactively avoid displacement while facilitating much-needed new infill housing development. The State encourages local jurisdictions and communities to cooperatively develop strategic anti-displacement and neighborhood stabilization plans. Some California jurisdictions have developed these strategic plans (e.g., the City of Oakland's Roadmap to Promote Housing

[9] See resources posted at the Urban Displacement Project: *https://www.urbandisplacement.org/about/what-are-gentrification-and-displacement/*.
[10] Ewing, R., & Hamidi, S. 2017. *Costs of Sprawl.* Taylor & Francis.

Equity[11] and the City of San Jose's Citywide Anti-Displacement Strategy[12]). Jurisdictions and communities that have not implemented localized anti-displacement strategies can review lessons from other jurisdictions and refer to a 2021 literature review funded by CARB that examines the real-world effectiveness of various strategies to curb displacement.[13] In addition to documenting the efficacy of different strategies, the literature review also examines the potential of each strategy to prevent displacement, the type of regional housing market where the strategy is most effective, the most appropriate scale to implement different strategies, and the timeframe for preventing displacement.

The Department of Housing and Community Development's (HCD) recently established Prohousing Designation Program also recognizes local jurisdictions that take actions to accelerate housing production while promoting holistic land use planning that reflects the State's climate goals and helps to reduce VMT.[14] Local governments that earn the prohousing designation are effective at simultaneously promoting multiple objectives, including: increasing housing supply, affirmatively furthering fair housing, preserving existing affordable housing, and supporting VMT reduction. Communities that earn the prohousing designation can receive additional points or preference in the scoring of competitive State housing, community development, and infrastructure funding programs.

## 2. The Role of Local Climate Action Planning in Supporting the State's Climate Goals

Local governments across the state have developed different types of plans to tackle climate change, including CAPs, sustainability plans, or GHG reduction plans incorporated into a general plan.[15] While CAPs have become an important avenue for climate action at the local level, 47 percent of California cities and counties have no known CAP.[16] Many jurisdictions find that performing or hiring consultants to perform a GHG inventory and developing a CAP is

[11] City of Oakland. 2015. *A Roadmap Toward Equity: Housing Solutions for Oakland, California.* Available at: *https://www.policylink.org/sites/default/files/pl-report-oak-housing-070715.pdf.*
[12] City of San Jose. 2019. *Community Strategy to End Displacement.* Available at: *https://www.sanjoseca.gov/your-government/departments-offices/housing/resource-library/housing-policy-plans-and-reports/citywide-anti-displacement-strategy*.
[13] Karen Chapple & Anastasia Loukaitou-Sideris. 2021. White Paper on Anti-Displacement Strategy Effectiveness. CARB Research Contract Number 19RD018. Available at: *https://ww3.arb.ca.gov/research/single-project.php?row_id=68795*.
[14] Department of Housing and Community Development. 2022. *Prohousing Designation Program*. Available at: *https://www.hcd.ca.gov/planning-and-community-development/prohousing-designation-program*.
[15] CARB's Climate Action Portal Map compiles information about local GHG reduction plans and strategies throughout the state. Available at: *https://webmaps.arb.ca.gov/capmap/*.
[16] Boswell et al. 2019. 2019 Report on the State of Climate Action Plans in California. CARB Research Contract Number 17RD033. Available at: *https://ww2.arb.ca.gov/sites/default/files/2020-03/17RD033.pdf*.

costly and time-consuming, regardless of their desire to take action on climate.[17] This section seeks to identify the most effective GHG reduction actions at the local level and other barriers to local climate action to help ensure that local climate efforts align with the State's climate goals.

For purposes of this appendix, a CAP that has been adopted through the CEQA review process and meets the criteria specified in CEQA Guidelines section 15183.5(b) for a "plan for the reduction of greenhouse gas emissions" will be referred to as a "CEQA-qualified CAP." These CEQA-qualified CAPs allow eligible projects to streamline their determination of significance for GHG emissions. Pursuant to CEQA Guidelines section 15183.5(b), CEQA-qualified plans must:

(A) Quantify greenhouse gas emissions, both existing and projected over a specified period, resulting from activities within a defined geographic area;
(B) Establish a level, based on substantial evidence, below which the contribution to greenhouse gas emissions from activities covered by the plan would not be cumulatively considerable;
(C) Identify and analyze the greenhouse gas emissions resulting from specific actions or categories of actions anticipated within the geographic area;
(D) Specify measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level;
(E) Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendment if the plan is not achieving specified levels;
(F) Be adopted in a public process following environmental review.

Once adopted, CEQA-qualified CAPs provide local governments with a valuable tool for 1) coordinated climate planning in their community and 2) streamlining the CEQA GHG analysis for projects consistent with a CEQA-qualified CAP. When jurisdictions have a CEQA-qualified CAP, an individual project that complies with the strategies and actions within a CEQA-qualified CAP can tier and streamline its project-specific CEQA GHG analysis to make a determination "that a project's incremental contribution to a cumulative [GHG] effect is not cumulatively considerable" (CEQA Guidelines Sections 15064.4 (b)(3) and 15183.5).[18, 19] Guidance for preparing a CEQA-qualified CAP and using it to tier and streamline CEQA GHG

[17] Deborah Salon, Sinott Murphy & Gian-Claudia Sciara. 2014. Local climate action: motives, enabling factors and barriers. *Carbon Management, 5:1,67-79, DOI 10.4155/cmt.13.81.* Available at: *https://www.tandfonline.com/doi/full/10.4155/cmt.13.81*.

[18] The guidelines implementing CEQA (or "CEQA Guidelines") were amended in 2009 to include criteria for the analysis and mitigation of GHG emissions. The CEQA Guidelines acknowledge the use of plans to reduce GHG emissions in a cumulative impacts analysis. (CEQA Guidelines Section 15183.5(b)).

[19] Cal. Code Regs., tit. 14, § 15183.5.

analysis for future projects can be found in Section 15183.5(b)(2) of the CEQA Guidelines, as well as Chapter 8 of OPR's General Plan Guidelines.[20] Typically, this tiering and streamlining evaluates whether the proposed project would demonstrate consistency with 1) the adopted plans, as well as the growth and land use assumptions that underlie the CEQA-qualified CAP, and 2) all applicable GHG reduction measures identified in the CAP. This includes determining whether the growth associated with the proposed project was accounted for in the CAP's projects and whether the project's GHG reduction measures were identified to help meet the CAP target.

To assist with using a CEQA-qualified CAP for future CEQA streamlining, some jurisdictions have prepared CAP compliance checklists that future projects may use to identify and document the CAP measures that are applicable to the proposed project and how the project is consistent with the CAP measures.[21] The CAP compliance checklists are then included as part of the proposed project's CEQA analysis documenting the project's consistency with the CEQA-qualified CAP. The use of the CEQA-qualified CAP also provides greater clarity in the environmental analysis and more consistent expectations for how GHG reduction measures are applied across projects in the jurisdiction.

Because CEQA-qualified CAPs are voluntary and not subject to any legislative criteria nor requirements, the CEQA Guidelines provide that a plan should include the measures or a group of measures that would collectively achieve the plan's emissions reduction target (Section 15183.5(b)(1)(D)). As the CEQA Guidelines are silent on what measures or groups of measures a CEQA-qualified CAP should contain, this appendix identifies three priority areas that address the State's largest sources of emissions that local governments have authority or influence over. Local jurisdictions should focus on these three priority areas when preparing a CEQA-qualified CAP:

1. Transportation electrification
2. VMT reduction
3. Building decarbonization

By prioritizing climate action in these three priority areas, local governments can address the largest sources of GHGs within their jurisdiction. Local governments that prepare CEQA-

[20] OPR. *General Plan Guidelines - Chapter 8 Climate Change.* Available at: *https://opr.ca.gov/planning/general-plan/guidelines.html.*

[21] Examples of CEQA-qualified CAPs include San Francisco's GHG compliance checklists for private development and municipal projects. These checklists are available at: *https://sfplanning.org/permit/environmental-consultant-pools-guidelines-and-resources*.

qualified CAPs that include strategies in these areas are contributing to alignment between local climate action and the State's climate goals.

The State encourages local governments to follow this approach and adopt a CEQA-qualified CAP addressing the three priority areas. However, as not all jurisdictions have sufficient resources (e.g., political capital, staffing, funding) to do so, jurisdictions that wish to take meaningful climate action (such as preparing a non-CEQA-qualified CAP or as individual measures) aligned with the State's climate goals in the absence of a CEQA-qualified CAP should also look to the three priority areas when developing local climate plans, measures, policies, and actions.

To assist local jurisdictions with developing local climate plans, measures, policies, and actions aligned with the State's climate goals, Table 1 presents a non-exhaustive list of impactful GHG reduction strategies that can be implemented by local governments. The strategies in Table 1 are not applicable to all local jurisdictions, nor are they the only strategies that local governments can adopt, but they represent the core strategies that most jurisdictions in California can implement to reduce GHG emissions regardless of whether they have developed a CEQA-qualified CAP. Reaching the outcomes of these priority GHG reduction strategies requires a locally appropriate, comprehensive adoption of policies in support of these objectives. When developing local climate plans, measures, policies, and actions, local jurisdictions should incorporate the recommendations described in Table 1 to the extent appropriate to ensure alignment with State climate goals.

**Table 1 – Priority[22] GHG Reduction Strategies**

| Priority Areas | Priority GHG Reduction Strategies |
|---|---|
| **Transportation Electrification** | Convert local government fleets to ZEVs and provide EV charging at public sites |
| | Create a jurisdiction-specific ZEV ecosystem to support deployment of ZEVs statewide (such as building standards that exceed state building codes, permit streamlining, infrastructure siting, consumer education, preferential parking policies, and ZEV readiness plans) |
| **VMT Reduction** | Reduce or eliminate minimum parking standards[23] |
| | Implement Complete Streets policies and investments, consistent with general plan circulation element requirements[24,25] |
| | Increase access to public transit by increasing density of development near transit, improving transit service by increasing service frequency, creating bus priority lanes, reducing or eliminating fares, microtransit, etc. |
| | Increase public access to clean mobility options by planning for and investing in electric shuttles, bike share, car share, and walking |
| | Implement parking pricing or transportation demand management pricing strategies |

[22] These areas and strategies are designated as "priority" because they are the GHG reduction opportunities over which local governments have the most authority and that have the highest GHG reduction potential.
[23] AB 2097, adopted by the Legislature and signed by the Governor in September 2022 eliminates parking requirements for residential and commercial development within a half-mile of transit. Government Code, § 65863.2. "Residential, commercial, or other development types: parking requirements." Available at: *https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220AB2097*
[24] U.S. Department of Transportation. *Complete Streets.* Available at: *https://www.transportation.gov/mission/health/complete-streets.*
[25] OPR. *General Plan Guidelines - Chapter 4 Circulation Element.* Available at: *https://opr.ca.gov/planning/general-plan/guidelines.html.*

| Priority Areas | Priority GHG Reduction Strategies |
|---|---|
| | Amend zoning or development codes to enable mixed-use, walkable, transit-oriented, and compact infill development (such as increasing the allowable density of a neighborhood)[26] |
| | Preserve natural and working lands by implementing land use policies that guide development toward infill areas and do not convert "greenfield" land to urban uses (e.g., green belts, strategic conservation easements) |
| **Building Decarbonization** | Adopt all-electric new construction reach codes for residential and commercial uses[27] |
| | Adopt policies and incentive programs to implement energy efficiency retrofits for existing buildings, such as weatherization, lighting upgrades, and replacing energy-intensive appliances and equipment with more efficient systems (such as Energy Star-rated equipment and equipment controllers) |
| | Adopt policies and incentive programs to electrify all appliances and equipment in existing buildings such as appliance rebates, existing building reach codes, or time of sale electrification ordinances |
| | Facilitate deployment of renewable energy production and distribution and energy storage on privately owned land uses (e.g., permit streamlining, information sharing) |
| | Deploy renewable energy production and energy storage directly in new public projects and on existing public facilities (e.g., solar photovoltaic systems on rooftops of municipal buildings and on canopies in public parking lots, battery storage systems in municipal buildings) |

[26] AB 2011, adopted by the Legislature and signed by the Governor in September 2022 streamlines multifamily housing development that meet affordability, labor, and other objective standards in parcels zoned for office, retail, or parking uses. Government Code, § 65912.100. "Affordable Housing and High Road Jobs Act of 2022." Available at: *https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220AB2011*

[27] California Energy Commission. Local Ordinance Exceeding the 2019 Energy Code. Available at: *https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2019-building-energy-efficiency-3.*

## 2.1 Setting Local GHG Targets

Historically, local climate action planning by California cities and counties has primarily focused on adopting supportive measures, such as replacing incandescent traffic lights with LED traffic lights, for reaching the State GHG emission reduction targets mandated by law. Initially, targets were based on consistency with meeting AB 32's 2020 GHG reduction target. More recently, local jurisdictions have looked to consistency with the longer-term targets in following the adoption of SB 32 and issuance of various executive orders (e.g., EO B-30-15 and EO B-55-18) to look beyond 2020 (e.g., 2030, 2045, 2050, etc.), when setting longer-term targets. In September 2022, Governor Newsom signed AB 1279 (Muratsuchi and Garcia, Chapter 337, Statutes of 2022), which codifies a statewide target to achieve carbon neutrality by no later than 2045. The State's climate strategy and the role of local governments continue to evolve as climate goals become more refined and ambitious, and as we advance our understanding of GHG emission sources. To be consistent with science-based statewide targets, local GHG reduction targets should evolve as well. In addition to being required for a local CAP to comply with CEQA, local targets have long been recommended as part of the process of developing, monitoring, and updating a CAP regardless of whether it is CEQA-qualified.[28]

The agency preparing a local GHG reduction target is responsible for determining the precise method for doing so. This appendix is not intended to limit or to provide an exhaustive list of options for setting a local GHG reduction target. Any target should be supported by substantial evidence and meet the criteria in CEQA Guidelines Section 15183.5. Ultimately, a jurisdiction's GHG reduction efforts and target(s) should help to better inform decision-makers and the public about the sources of GHG emissions under a jurisdiction's control (also known as a GHG emissions "inventory") that would be affected by a proposed project and provide a basis for identifying ways to avoid or reduce potentially significant GHG emission impacts. It can be challenging to localize and sub-allocate an individual jurisdiction's share of the GHG reductions needed to curb a global crisis. Developing a localized GHG reduction target requires an adequate local GHG inventory from which to calculate a target, which most jurisdictions have not developed. The 2017 Scoping Plan Update suggested some non-binding options for setting GHG reduction targets.[29] In recognition of different sources of, and opportunities to reduce, GHG emissions, this appendix recognizes the complexities involved in local GHG target-setting and, as a result, does not recommend a specific GHG target or target-setting method for local governments. However, the appendix presents some considerations for various target-setting approaches below.

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[28] Climate Smart Communities. 2014. Climate Action Planning Guide. Available at: *https://cdrpc.org/wp-content/uploads/2015/05/CAP-Guide_MAR-2014_FINAL.pdf.*

[29] In the 2017 Scoping Plan, CARB recommended per capita, plan-level GHG targets of 6 MTCO2e per capita in 2030 and 2 MTCO2e per capita in 2050. Because the State is now pursuing carbon neutrality no later than 2045, CARB recommends that jurisdictions focus on developing locally appropriate, plan-level targets that align with the trajectory to carbon neutrality instead of focusing on a per capita 2050 target.

GHG reduction targets should typically be estimated for specific years aligned with the State's long-term climate targets established through existing laws or policy guidance. Various target years that are often, but not always, used in climate action planning include 2020 (for AB 32, SB 375, and EO S-3-05 consistency), 2030 (for SB 32 and EO B-30-15 consistency), 2035 (for SB 375 consistency), 2045 (for EO B-55-18 consistency, and there is now a statutory 2045 target in AB 1279), and 2050 (for EO S-3-05 and EO B-30-15 consistency),[30] as well as horizon years of local planning documents, such as general plans.

When establishing GHG reduction targets, jurisdictions should consider their respective share of the statewide reductions necessary to achieve the State's long-term climate target for each target year, and how they can best support those overall goals. Jurisdictions should also evaluate their specific inventory profile when establishing targets consistent with the State's long-term climate targets and should tailor their specific inventory profile to ensure the sectors included in the State's targets align with those included in the local jurisdiction's inventory and target, recognizing each region's distinctive sources and profile. For example, as the State's long-term climate targets address all emissions sectors within the state, a jurisdiction without an airport or port should "factor out" and remove these sectors from the State's long-term climate target when establishing local reduction targets. In essence, local governments should focus on sources and actions within their control, and set targets that support overall state goals.

Generally, a city or county that periodically examines their long-term GHG reduction trajectory is in a better position to determine whether GHG emission levels contemplated in their CAP are sustainable. This type of long-term approach benefits from interim reduction targets rather than a single target. Local governments that choose to adopt a single target year or opt to use a different method (e.g., project-by-project analysis, adopted significance thresholds, specific regional emissions targets, other State-related climate programs, etc.) should explain why their approach reflects sensible long-range planning horizons and should provide substantial evidence to support a conclusion that GHG emissions would decline along a trajectory consistent with the State's climate goals.

One approach to setting targets is to align local GHG-reducing strategies and actions with the respective State policies that will deliver GHG emission reductions, if successfully implemented and supported at the local level.[31] The CAP target-setting process should

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[30] AB 32 calls for California to reduce GHG emission to 1990 levels by 2020; SB 375 requires CARB to develop and set regional targets, indexed to years 2020 and 2035, for emission reductions from passenger vehicles; EO S-3-05 established a statewide interim target to reduce GHG emissions to 1990 levels by 2020 and 80 percent below 1990 levels by 2050; SB 32 requires the state to reduce statewide GHG emissions to 40% below 1990 levels by 2030; EO B-55-18 and AB 1279 call for carbon neutrality as soon as possible, but no later than 2045; and EO B-30-15 established a statewide interim GHG reduction target of 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.

[31] OPR. *General Plan Guidelines - Chapter 8 Climate Change.* Available at: *https://opr.ca.gov/planning/general-plan/guidelines.html.*

account for projected GHG emission reductions from State policies, programs, and strategies implemented over time. However, when using statewide data, local governments should avoid double-counting GHG emission reductions that are achieved through State-level efforts and should ensure that their target focuses on GHG emission reductions within the scope of the CAP. Local jurisdictions should refer to Table 2-2 in Chapter 2 of the 2022 Scoping Plan Update, which summarizes the key State actions (as well as supportive statutes, executive orders, and outcomes) under the Scoping Plan Scenario and identifies approaches to help guide setting targets that align with the State's GHG-reducing strategies. [32]

A number of these key State actions are directly relevant to the priority strategies described in this appendix and should be accounted for in local target-setting, including zero-emission light-duty vehicles (relevant to transportation electrification); smart growth/VMT reduction (relevant to vehicle miles traveled reduction); and new and existing residential and commercial buildings (relevant to building decarbonization). Table 2 summarizes these actions with milestones and benchmarks.[33] Local jurisdictions should consider these recommendations as a starting point when contextualizing the State's climate goals, GHG emissions inventory sectors, and actions for a CAP target-setting process to help align local targets with the State's climate goals.

[32] The Proposed Scenario is the Scoping Plan alternative that most closely aligns with existing statute and Executive Orders and assumes carbon neutrality by 2045 the deployment a broad portfolio of existing and emerging fossil fuel alternatives and clean technologies.

[33] The information in this table should be viewed as a general reference and may serve multiple uses, including providing resources that act as an aid to local governments when developing localized GHG targets for CAPs. The applicability of data, actions, and recommendations may vary across regions and should not be viewed or interpreted as official guidance, as thresholds of significance, or as dictating requirements for GHG target-setting processes. This is not considered an exhaustive list and does not represent the complete list of data resources and tools available. Not every recommendation provided will be relevant to, or appropriate for, a given area or plan.

**Table 2 –Summary of Priority Key Actions[34] and Recommendations for CAP Target-Setting Processes**

| Priority Areas | Related Actions in the Proposed Scenario | Recommendations for Local CAP Target-Setting |
|---|---|---|
| **Transportation Electrification** | 100 percent of light-duty vehicle sales are ZEVs by 2035 | Potential data sources and tools to localize this for target-setting include EMFAC *Fleet Database* (by county) and *Scenario Analysis Tool* and *Department of Motor Vehicles Database* (by fuel type and registration) |
| **VMT Reduction** | VMT per capita reduced 25 percent below 2019 levels by 2030 and 30 percent below 2019 levels by 2045 | Potential data sources to localize this for target-setting include VMT modeling outputs prepared for, or consistent with, the travel outcomes associated with the adopted SCS or other applicable regional plan |
| **Building Decarbonization** | All electric appliances in new construction beginning 2026 (residential) and 2029 (commercial) | Potential data sources to localize these for target-setting include:<br>*Commercial Building Energy Consumption Survey* |

[34] These areas and strategies are designated as “priority” because they are the GHG reduction opportunities over which local governments have the most authority and that have the highest GHG reduction potential.

| Priority Areas | Related Actions in the Proposed Scenario | Recommendations for Local CAP Target-Setting |
|---|---|---|
| | For existing residential buildings, 80 percent of appliance sales are electric by 2030 and 100 percent of appliance sales are electric by 2035 (appliances replaced at end of life)<br><br>For existing commercial buildings, 80 percent of appliance sales are electric by 2030 and 100 percent of appliance sales are electric by 2045 (appliances replaced at end of life) | *California Commercial End Use Survey*<br><br>*Residential Appliance Saturation Survey* |

California's overall state goal of achieving carbon neutrality no later than 2045 can also inform GHG reduction targets at individual community levels, and some communities or regions may be able to reach neutrality themselves. However, it is important to design targets in ways that support overall state goals, recognizing that each region has distinctive sources and systems. For instance, energy and transportation systems that serve Californians do not stop at jurisdictional boundaries, and some decisions can have ramifications for other communities (e.g., by inadvertently exporting emissions from a jurisdiction with a net-zero target to another jurisdiction with less stringent or no target). Jurisdictions considering a net-zero target should carefully consider the implications it may have on emissions in neighboring communities and beyond. Jurisdictions should also avoid creating targets that are impossible to meet as a basis to determine significance. For example, a net-zero target may imply that the GHG emissions of any project that are not reduced or offset to zero would be considered potentially significant. This may lead to undue burdens and frustrate project approval processes, which may be particularly problematic for residential development in climate-smart, infill areas. In addition, some jurisdictions have more land capacity to remove and store carbon, while others host GHG-emitting facilities that serve necessary functions and will take time to transition to new technology (e.g., municipal wastewater treatment plants, landfills, energy generation facilities). In those cases, jurisdictions that work together on a regional framework to rapidly decarbonize together may have better success in maximizing both emission reductions and other co-benefits. Ultimately, a net-zero target that makes it more difficult to achieve statewide goals by prohibiting or complicating projects that are needed to support the State's climate goals, like infill development or solar arrays, is not consistent with the State's goals. The scale of GHG reductions needed across all communities will be substantial. Local governments have the discretion to adopt targets that apply to their jurisdictions and may utilize the streamlining functions afforded in CEQA[35] so long as those targets are supported by substantial evidence.

# 3. The Role of Land Use Plans and Development Projects in Supporting the State's Climate Goals

## 3.1 Housing Demand and GHG Efficiency

Local governments are responsible for adopting and updating land use plans and related implementing ordinances, such as zoning and other development codes, as well as evaluating and making decisions regarding a development project's impact on the environment. The adoption of, or update to, local plans, as well as local discretionary approvals for new development, are subject to environmental review under CEQA, which requires public agencies, including local governments, to evaluate and disclose potential environmental effects from their discretionary decisions and actions and implement feasible mitigation. This environmental review process must address whether GHG emissions from a proposed project,

[35] Cal. Code Regs., tit. 14, § 15183.5.

as defined in Section 15378 of the CEQA Guidelines, would result in a cumulatively considerable contribution to climate change. As part of this review, lead agencies must consider whether a proposed project or plan would be consistent with, and supportive of, the State's climate goals.[36] Section 15064.4(b)(3) of the CEQA Guidelines states that lead agencies should evaluate whether a proposed project would "[c]onflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases." Moreover, CEQA Guidelines Section 15125(d) requires a discussion "of any inconsistencies between the proposed project and applicable general plans, specific plans, and regional plans…regional transportation plans …[and]…plans for the reduction of greenhouse gas emissions," among others.

However, the discretionary processes through which local jurisdictions permit land use development projects vary widely across California and are sometimes not uniformly applied within the same jurisdiction.[37] O'Neill et al. (2022) found that restrictive local zoning and development approval processes are the chief regulatory contributors to California's housing crisis. Local governments have a clear opportunity to eliminate these barriers by reforming their local laws to facilitate dense development in infill areas, particularly those in high-resource and/or low-VMT communities. Local jurisdictions can also choose to adopt ministerial entitlement processes[38] for housing instead of imposing discretionary review processes (some jurisdictions currently even impose multiple layers of discretionary review) that provide project opponents opportunities to slow or stop projects, sometimes without advancing legitimate environmental goals.

The literature review conducted by O'Neill et al. (2022) does not find a consensus among CEQA experts on the impact of litigation (or the threat thereof) on new housing construction. The report finds that litigation rates among entitled housing projects in the jurisdictions studied were low (less than three percent overall). Of the relatively small percentage of projects that were litigated, approximately two-thirds were challenged based on claimed deficiencies in their GHG or VMT analysis. (Note, however, that this statistic in itself is not particularly revealing, since attorneys frequently include in their lawsuits a range of claims regarding various CEQA resource areas to maximize chances of prevailing.) Thus, among other bases for CEQA challenges, CEQA GHG impact analyses and mitigation measures can to be sources of

[36] See, e.g., *Cleveland Nat'l Forest Found. v. San Diego Assn. of Governments* (2017) 3 Cal. 5th 497, 519 (holding that CEQA requires planning agencies to ensure their CEQA GHG analysis stays in step with evolving scientific knowledge and state regulatory schemes).

[37] O'Neill et al. 2022. "Final Report: Examining Entitlement in California to Inform Policy and Process: Advancing Social Equity in Housing Development Patterns." Available at: *https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3956250*.

[38] CEQA environmental review requirements only apply to discretionary project approvals; ministerial approvals are not subject to CEQA review. (Cal. Code Regs., tit. 14, § 15002(i).)

litigation and delay for projects, especially for housing projects in high-resource areas.[39] While the State has long been clear that urban infill projects, particularly in high-resource and low-VMT areas, would be generally supportive of the State's climate and regional air quality goals, such claims can persist. Although CEQA litigation can present additional complexity for housing development, restrictive local zoning and development approval processes are clearly the primary hurdles for housing development in California. Local jurisdictions have clear discretion to remove these barriers.

California continues to experience a severe housing shortage. The State must plan for more than 2.5 million residential units over the next eight years, and no less than one million of those residential units must be affordable to lower-income households.[40] This represents more than double the housing planned for during the last eight years.[41] The housing crisis and the climate crisis must be confronted simultaneously, and it is possible to address the housing crisis in a manner that supports the State's climate and regional air quality goals.[42] The following section includes recommendations to make doing so easier.

## 3.2 Evaluating Plan-Level and Project-Level Alignment with the State's Climate Goals in CEQA GHG Analyses

CEQA requires lead agencies to analyze the potential GHG-related impacts from their proposed projects.[43] As part of these analyses, agencies consider the extent to which their projects are consistent with the State's climate goals and requirements.[44] Land use plans (e.g., general plans, specific plans, area plans) and development projects have long operational lifespans, potentially locking in GHG emissions for decades. Some agencies have improperly attempted to use compliance with statewide regulatory programs to determine that their projects' GHG impacts are mitigated or are otherwise consistent with the Scoping Plan. While CARB has developed programs such as the State vehicle emissions standards (e.g., Advanced Clean Cars), the Low Carbon Fuel Standard, and the Cap-and-Trade program to reduce sector-wide GHG emissions, these programs were not designed to directly mitigate individual land use development project emissions from a CEQA perspective. Therefore, claimed consistency with these programs should not be used to conclude that motor vehicle

[39] O'Neill et al. 2022. Final Report: Examining Entitlement in California to Inform Policy and Process: Advancing Social Equity in Housing Development Patterns. CARB Research Contract 19STC005. Available at: *https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3956250*.
[40] California Department of Housing and Community Development. 2022. *Statewide Housing Plan.* Available at: *https://www.hcd.ca.gov/docs/statewide-housing-plan.pdf*.
[41] Ibid.
[42] Elkind, E. N., Galante, C., Decker, N., Chapple, K., Martin, A., & Hanson, M. 2017. Right Type, Right Place: Assessing the Environmental and Economic Impacts of Infill Residential Development through 2030. Available at: *https://ternercenter.berkeley.edu/research-and-policy/right-type-right-place/*.
[43] Cal. Code Regs., tit. 14, § 15064.4.
[44] Cal. Code Regs., tit. 14, § 15064.4(b)(3).

emissions from a land use development project are fully mitigated or that such projects are definitively consistent with the Scoping Plan—particularly where the project at issue is not itself directly regulated by these programs.[45]

This section outlines three distinct approaches that lead agencies may consider for evaluating alignment of proposed plans and residential and mixed-use[46] development projects with the State's climate goals and, therefore, may have a less-than-significant impact on GHG emissions. These approaches are recommendations only and are not requirements. They do not supplant lead agencies' discretion to develop their own evidence-based approaches for determining whether a project would have a potentially significant impact on GHG emissions.[47]

The recommendations outlined in this section apply only to residential and mixed-use development project types. California currently faces both a housing crisis and a climate crisis, which necessitates prioritizing recommendations for residential projects to address the housing crisis in a manner that simultaneously supports the State's GHG and regional air quality goals. CARB plans to continue to explore new approaches for other land use types in the future.

### 3.2.1 Project Attributes for Residential and Mixed-Use Projects to Qualitatively Determine Consistency with the Scoping Plan

Absent consistency with an adequate, geographically specific GHG reduction plan such as a CEQA-qualified CAP, as described in Section 2, the first approach the State recommends for determining whether a proposed residential or mixed-use residential development would align with the State's climate goals is to examine whether the project includes key project attributes that reduce operational GHG emissions while simultaneously advancing fair housing. Consistent with the Priority Strategies shown in Table 1, empirical research shows that the following project attributes result in reduced GHG emissions from residential and mixed-use development. Residential and mixed-use projects that have all of the key project attributes in Table 3 should accommodate growth in a manner consistent with State GHG reduction and equity prioritization goals.

[45] CEQA Guidelines section 15064.4(b)(3) allows compliance with "regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions" as an approach for the determination of significance for GHG emissions.
[46] Mixed use residential is defined as development including both residential and nonresidential uses with at least two-thirds of the square footage designated for residential use per Cal. Gov. Code., tit. 7, § 65589.5(h)(2)(B)).
[47] Cal. Code Regs., tit. 14, § 15064.4.

**Table 3 – Key Residential and Mixed-Use Project Attributes that Reduce GHGs**

| Priority Areas | Key Project Attribute |
|---|---|
| **Transportation Electrification** | Provides EV charging infrastructure that, at minimum, meets the most ambitious voluntary standard in the California Green Building Standards Code at the time of project approval[48] |
| **VMT Reduction** | Is located on infill sites that are surrounded by existing urban uses and reuses or redevelops previously undeveloped or underutilized land that is presently served by existing utilities and essential public services (e.g., transit, streets, water, sewer)[49] |
| | Does not result in the loss or conversion of natural and working lands |
| | Consists of transit-supportive densities (minimum of 20 residential dwelling units per acre),[50] or<br>Is in proximity to existing transit stops (within a half mile),[51] or<br>Satisfies more detailed and stringent criteria specified in the region's SCS[52] |
| | Reduces parking requirements[53] by:<br>Eliminating parking requirements or including maximum allowable parking ratios (i.e., the ratio of parking spaces to residential units or square feet); or<br>Providing residential parking supply at a ratio of less than one parking space per dwelling unit; or |

[48] Cal. Code Regs., tit. 24, Part 11.
[49] Government Code, § 65041.1. "Statewide Environmental Goals and Policy Report." Available at: *https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=GOV&sectionNum=65041.1*.
[50] Federal Transit Administration. 2014. *Planning for Transit-Supportive Development: A Practitioner's Guide.* Available at: *https://www.transit.dot.gov/funding/funding-finance-resources/transit-oriented-development/planning-transit-supportive*.
[51] Washington Department of Transportation. 2013. *Tools for Estimating VMT Reductions from Built Environment Changes.* Available at: *https://www.wsdot.wa.gov/research/reports/fullreports/806.3.pdf.*
[52] One example of an evaluation of consistency with the region's SCS is from the 2013 draft EIR for The Cannery in Davis, p. 3.7-26. Available at: *https://www.cityofdavis.org/home/showpublisheddocument/650/635607772224000000.*
[53] CAPCOA. 2021. Handbook for Analyzing Greenhouse Gas Emissions Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity: Designed for Local Governments, Communities, and Project Developers. Available at: *https://caleemod.com/handbook/index.html*.

| Priority Areas | Key Project Attribute |
|---|---|
| | For multifamily residential development, requiring parking costs to be unbundled from costs to rent or own a residential unit.[54] |
| | At least 20 percent of units included are affordable to lower-income residents[55, 56] |
| | Results in no net loss of existing affordable units |
| **Building Decarbonization** | Uses all-electric appliances without any natural gas connections and does not use propane or other fossil fuels for space heating, water heating, or indoor cooking[57, 58] |

These project attributes are intended as a guide to help local jurisdictions qualitatively identify those residential and mixed-use projects that are ***clearly*** consistent with the State's climate goals, since these attributes address the largest sources of operational emissions for residential projects. In general, residential and mixed-use development projects that incorporate ***all*** of these key project attributes are aligned with the State's priority GHG reduction strategies for local climate action as shown in Table 1 and with the State's climate and housing goals. As such, they are considered to be consistent with the Scoping Plan or other plans, policies, or regulations adopted for the purposes of reducing GHGs; therefore, the GHG emissions associated with such projects may result in a less-than-significant GHG impact under CEQA. Lead agencies may determine, with adequate additional supporting evidence,

[54] AB 2097, adopted by the Legislature and signed by the Governor in September 2022 eliminates parking requirements for residential and commercial development within a half-mile of transit. Government Code, § 65863.2. "Residential, commercial, or other development types: parking requirements." Available at: *https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220AB2097*

[55] Newmark, G. and Haas, P. 2015. Income, Location Efficiency, and VMT: Affordable Housing as a Climate Strategy. Available at: *https://chpc.net/wp-content/uploads/2016/05/CNT-Working-Paper-revised-2015-12-18.pdf*.

[56] California Housing Partnership Corporation and TransForm. 2014. Why Creating and Preserving Affordable Homes Near Transit is a Highly Effective Climate Protection Strategy. Available at: *https://1p08d91kd0c03rlxhmhtydpr-wpengine.netdna-ssl.com/wp-content/uploads/2015/11/4-AffordableTODResearchUpdate070114.pdf*.

[57] Energy and Environmental Economics. 2019. Residential Building Electrification in California: Consumer economics, greenhouse gases and grid impacts. Available at: *https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf*.

[58] Energy and Environmental Economics. 2021. Achieving Carbon Neutrality in California: PATHWAYS Scenarios Developed for CARB. Available at: *https://ww2.arb.ca.gov/sites/default/files/2020-10/e3_cn_final_report_oct2020_0.pdf.*

that projects that incorporate some, but not all, of the key project attributes are consistent with the State's climate goals.

This qualitative approach to determining the significance of GHG impacts is only intended for residential and mixed-use development projects. CARB will continue to explore this qualitative approach for evaluating the significance of GHG impacts for other types of land uses and encourages CEQA practitioners and lead agencies to do the same. The following two sections describe additional approaches lead agencies may employ in CEQA analyses.

### 3.2.2 Net-Zero Threshold of Significance

Absent consistency with an adequate, geographically specific GHG reduction plan, as described in Section 2 or consistency with the project attributes approach identified in Table 3 for residential and mixed-use development project types, lead agencies can make a significance determination, consistent with Section 4 below, based on whether the project would result in net-zero GHG emissions. (Note that lead agencies can also use other valid significance thresholds, as described in subsection 3.2.3 below.) Although achieving net-zero GHG emissions may be an appropriate overall objective, it should be noted this approach may not be feasible or appropriate for every project. Furthermore, in determining a project's net GHG impacts, agencies should carefully consider how to view the GHG emissions implications of changes to existing land uses at the project site, particularly where such uses may simply relocate to another location. Lead agencies should consider whether there is substantial evidence that the GHG emissions generated by existing uses of the project site will cease to exist as a direct result of the proposed project and will not merely occur at a different location after the proposed project is developed. If substantial evidence demonstrates that emissions from existing sources currently operating or generating emissions at the project site would continue elsewhere, lead agencies should account for those emissions when calculating the net change in emissions associated with the proposed project.

However, there are recent examples of land use development projects in California that have demonstrated that it is feasible to design projects of nearly any scale that achieve net-zero GHG emissions. Several projects have received certification from the Governor under AB 900, the Jobs and Economic Improvement through Environmental Leadership Act (Buchanan, Chapter 354, Statutes of 2011) and a similar program authorized under SB 7 (Atkins, Chapter 19, Statutes of 2021), demonstrating an ability to design economically viable projects that create jobs while contributing net-zero GHG emissions.[59] These projects have included mixed-use housing and commercial developments, large-scale residential projects, sports arenas, a medical center, and business campuses.

As discussed in Section 3.2.1, "Project Attributes for Residential Projects to Qualitatively Determine Consistency with the Scoping Plan," development in infill and transit-oriented areas

[59] OPR. 2021. *Judicial Streamlining*. Available at: *https://www.opr.ca.gov/ceqa/judicial-streamlining/*.

helps to reduce or avoid increasing GHG emissions. Although, while land use development patterns in California have become, in general, more compact than in the past, new low-density, auto-oriented development is still being planned for and built.[60] Despite this continuing challenge, several large and mixed-use projects within California have ultimately committed to achieving net-zero GHG emissions. For example, as part of the Downtown West Mixed Use Plan,[61] the applicant, Google LLC, ultimately committed to achieving net-zero GHG emissions for an approximately 80-acre mixed-use property, including almost 6,000 residential units, as well as retail, office, and other land uses, located in downtown San Jose, California. This commitment will be achieved through a combination of on-site measures and the purchase and retirement of carbon offset credits from CARB-approved registries in the voluntary market. Similarly, the Oakland Athletics, the applicant for the Oakland Waterfront Ballpark District Project located in Oakland, California, also committed its development to result in no net increase of GHG emissions through a combination of on-site and local mitigation measures and the purchase and retirement of carbon offset credits from CARB-approved registries in the voluntary market.[62] Design and local reduction measures[63] were employed by the developers to reduce 54 percent of total non-residential emissions, while 49 percent of operational emissions were reduced via carbon offset credits from the voluntary market.

Even California's largest, most sprawl-intensive housing developments have ultimately committed to achieving net-zero GHG emissions, even if only after intense legal battles. For example, under the Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan,[64] the applicant, Newhall Land and Farming Company, ultimately committed to achieving net-zero GHG emissions for an almost 12,000-acre plan area in the Santa Clarita Valley. This commitment will be achieved through a combination of on-site and local mitigation measures and the purchase and retirement of carbon offset credits from the voluntary market. Similarly, as a result of a recent settlement agreement, Tejon Ranch Company, the developer for the Centennial Specific Plan located in northern Los

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[60] CARB. 2022. Draft 2022 Progress Report California's Sustainable Communities and Climate Protection Act. P. 22-25. Available at: *https://ww2.arb.ca.gov/sites/default/files/2022-07/2022_SB_150_Main_Report_Draft_ADA.pdf*.

[61] OPR. 2022. *Judicial Streamlining: Archived Applications*. Available at: *https://opr.ca.gov/ceqa/judicial-streamlining/archive.html*.

[62] Ibid.

[63] Local reduction measures include measures to reduce VMT and trips (including reduced parking and transportation network surcharges), installing EV chargers at 10 percent of onsite parking spaces, electrification (i.e., prohibition of non-electric energy, such as natural gas) of 50 percent of residential units, and either converting an existing jet-fueled peaker plant to battery storage or installing 1,013 EV charging stations in the community.

[64] California Department of Fish and Wildlife. 2021. Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan: Final EIS/EIR Documents. Available at: (*https://nrm.dfg.ca.gov/documents/ContextDocs.aspx?cat=NewhallRanchFinal*).

Angeles County,[65] also committed its development to result in no net increase of GHG emissions.[66] Mitigation measures employed by these developers include the prohibition of natural gas in residential and commercial properties; the requirement of on-site solar photovoltaic energy systems on residential and commercial properties; the installation of almost 30,000 EV chargers within and outside the plan area; funding incentives for the purchase of 10,500 passenger EVs and electric school buses and trucks; and procuring and retiring carbon offset credits from the voluntary market.

Although the projects in San Jose and Oakland may not meet all of the key project attributes for qualitatively determining project consistency with statewide GHG goals, as shown in Table 3, and the Newhall and Tejon Ranch projects do not necessarily represent the type of development that California most needs to simultaneously tackle the housing and climate crises, they do demonstrate the feasibility of a net-zero approach for other large and complex residential development projects.

### 3.2.3 Recommended Thresholds of Significance

Lead agencies may also analyze the GHG impact of proposed projects by employing a threshold of significance recommended by the applicable air district[67] or other lead agencies.[68] As stated in CEQA Guidelines section 15064.7(b), "a lead agency may consider thresholds of significance previously adopted or recommended by other public agencies or recommended by experts, provided the decision of the lead agency to adopt such thresholds is supported by substantial evidence." However, thresholds for analyzing a project's GHG emissions can become outdated if they are not aligned with the State's most recent GHG reduction goals.[69] To be defensible, CEQA significance thresholds must be supported by substantial evidence.[70] Mitigating GHG emissions below an applicable GHG threshold of significance is one way lead agencies may demonstrate that a project's GHG emissions would have a less-than-significant impact on the environment. For lead agencies that pursue this approach, CAPCOA, which

[65] Los Angeles County Department of Regional Planning. 2019. *Specific Plan No. 02-232 / Centennial Specific Plan.* Available at: *https://planning.lacounty.gov/case/view/specific_plan_no_02_232_centennial_specific_plan*.
[66] Tejon Ranch. 2021. *Settlement Agreement Reached in Centennial lawsuit.* Available at: *https://tejonranch.com/settlement-agreement-reached-in-centennial-lawsuit/*.
[67] CARB research indicates that less than 20 percent of California's population is located in an area with CEQA GHG thresholds of significance addressing SB 32 reduction goals adopted by an air district (Bay Area Air Quality Management District and Sacramento Metropolitan Air Quality Management District).
[68] As with all CEQA significance thresholds, GHG significance thresholds must be supported by substantial evidence. Some lead agencies, such as the City of San Luis Obispo and County of Santa Barbara, have adopted CEQA GHG thresholds of significance due to the absence of a local air district-adopted threshold or because a local CEQA-qualified CAP used to tier and streamline its project-specific CEQA GHG analysis (per CEQA Guidelines Sections 15064.4 (b)(3) and 15183.5) may not be available or applicable.
[69] CEQA GHG analyses (including significance determinations) "must reasonably reflect evolving scientific knowledge and state regulatory schemes." (Cal. Code Regs., tit. 14, §§ 15064.4(b))
[70] Cal. Code Regs., tit. 14, § 15064.7(b).

provides a forum for the sharing of knowledge, experience, and information between air districts throughout the state, has developed tools and guidance for CEQA practitioners, such as the California Emissions Estimator Model[71] (CalEEMod) and guidance for developing and quantifying project-level GHG mitigation measures.[72]

## 4. Mitigating Greenhouse Gas Emissions Pursuant to CEQA

If a lead agency determines that a proposed project's GHG emissions would result in a significant impact and a cumulatively considerable contribution to climate change, the lead agency must impose feasible mitigation measures to reduce the project's GHG impact to a less-than-significant level.[73] According to the CEQA Guidelines, mitigation measures must be feasible, roughly proportional, not inappropriately deferred, capable of being monitored or reported, fully enforceable, and based on substantial evidence. They must also have a nexus to a legitimate governmental interest.[74] Any GHG offsets used as CEQA mitigation must not be otherwise required (e.g., by regulation or by existing permitted CEQA projects).[75] Lead agencies should present substantial evidence to document that a given mitigation measure would actually serve to mitigate the proposed project's GHG emissions.[76]

CAPCOA has developed tools and guidance for CEQA practitioners for developing and quantifying project-level GHG mitigation measures. These include CAPCOA's Handbook,[77] which it published in 2021 along with the mitigation module in CalEEMod.[78]

As the severe impacts of climate change become better understood and the State's climate goals become more stringent over time, local, off-site CEQA GHG mitigation measures will become increasingly necessary. However, several factors often hinder the adoption of local, off-site GHG mitigation under CEQA, including confusion about CEQA's requirements for GHG mitigation, a focus on carbon offset credits and lack of awareness of local GHG mitigation

[71] CAPCOA. 2022. *California Emissions Estimator Model.* Available at: *www.caleemod.com*.
[72] CAPCOA. 2021. Handbook for Analyzing Greenhouse Gas Emissions Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity: Designed for Local Governments, Communities, and Project Developers. Available at: *https://caleemod.com/handbook/index.html*.
[73] Cal. Code Regs., tit. 14, § 15126.4(c).
[74] Cal. Code Regs., tit. 14, § 15126.4(a)(4)(A).
[75] Cal. Code Regs., tit. 14, § 15126.4(c)(3)).
[76] Cal. Code Regs., tit. 14, § 15126.4(c)).
[77] CAPCOA. 2021. Handbook for Analyzing Greenhouse Gas Emissions Reductions. Assessing Climate Vulnerabilities and Advancing Health and Equity: Designed for Local Governments, Communities, and Project Developers. Available at: *https://caleemod.com/handbook/index.html*.
[78] CAPCOA. 2022. *California Emissions Estimator Model.* Available at: *www.caleemod.com*.

opportunities, and a perception of high costs (e.g., mitigation costs for project sponsors, administrative costs for lead and responsible agencies).

This section seeks to assist in overcoming barriers to GHG mitigation under CEQA and reduce the use of statements of overriding considerations by lead agencies by establishing a hierarchy of mitigation opportunities that reflect the State's priorities for mitigation. In doing so, this section encourages project applicants and local governments to use local and non-local off-site GHG mitigation approaches (including carbon offset credits) consistent with CEQA's requirements. This section also seeks to clarify how CEQA's mitigation requirements apply to GHG mitigation (including carbon offset credits).

While this section identifies ways to overcome some common barriers to local CEQA GHG mitigation, other barriers may take longer to remove and may even require legislative or other State-level action. Through appropriate application of local GHG mitigation under CEQA, lead agencies have an opportunity to benefit their communities while addressing the climate crisis. Local, off-site mitigation measures implemented in the communities in which project impacts occur have the added potential co-benefit of reducing emissions of toxic air contaminants and criteria air pollutants, which will improve health and social and economic resiliency to climate-related impacts. Verification of local mitigation can also be more straightforward than verification of mitigation that is outside of the jurisdictional boundaries of the lead agency.

## 4.1 GHG Mitigation Hierarchy

CEQA requires lead agencies to impose all feasible mitigation measures necessary to avoid or reduce GHG emissions to a less-than-significant level prior to certifying an Environmental Impact Report (EIR) or mitigated negative declaration. CEQA does not require mitigation measures that are infeasible for specific legal, economic, technological, or other reasons. If there are not sufficient mitigation measures that the lead agency determines are feasible for avoiding GHGs or reducing GHGs to a less-than-significant level, before approving a project, the lead agency must adopt all measures that are feasible and adopt a statement of overriding considerations (or significance "override") that explains why additional mitigation is infeasible.[79] The statement of overriding considerations must be supported by substantial evidence in the record.

A wide array of CEQA GHG mitigation that can help avoid the need to adopt statements of overriding considerations is discussed in Section 4.1.2 below. The hierarchy outlined below may provide a helpful reference for lead agencies and project sponsors on how to approach mitigation in a way that maximizes benefits to communities surrounding projects, with a particular emphasis on benefitting historically underserved and disadvantaged communities.

[79] Cal. Code Regs., tit. 14, § 15093(b).

The State recommends prioritizing CEQA GHG mitigation according to a geographic hierarchy as follows:

1. On-site design measures;
2. Off-site GHG mitigation:
    a. Funding or implementing local, off-site GHG reduction projects (within the communities or neighborhoods in the vicinity of the project);
    b. Funding or implementing non-local, off-site GHG reduction projects;
3. Purchasing and retiring carbon offset credits:
    a. That originate in the same air basin as the project;
    b. That originate elsewhere in California;
    c. That originate outside of California.

This geographical hierarchy is consistent with SB 7, in which the Legislature mandated a similar hierarchy for land use development projects seeking to be designated as "environmental leadership development projects" and granted certain streamlining provisions. Under this hierarchy, the community in which the project is located is prioritized to receive the environmental and economic co-benefits of the mitigation, especially the reductions in emissions of criteria air pollutants and toxic air contaminants that accompany many GHG reduction measures. Similar prioritization was included in the Oakland Waterfront Ballpark District Project, which required that a minimum of 50 percent of the GHG emission reductions from non-residential land uses result from local, direct measures, and stipulated that no more than 50 percent of reductions may result from offset credits.[80]

The following sections discuss each level of mitigation in the suggested hierarchy of mitigation.

### 4.1.1 On-site GHG Mitigation

Lead agencies should prioritize on-site design features within the project site that minimize GHG emissions. On-site GHG mitigation includes the implementation of project features, project design, or other measures, including but not limited to energy efficiency measures, installation of renewable energy electricity generation, all-electric building design, EV charging connections, and features that reduce VMT, such as a transportation demand management plan or the provision of shared mobility options (such as facilitating carpooling, providing active transportation and transit vouchers, and implementing telecommuting and alternate work schedules). Chapter 3 of CAPCOA's 2021 *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity*,[81] includes

[80] Bonta, Chapter 959, Statutes of 2018. California Environmental Quality Act: Oakland Sports and Mixed-Use Project. Available at: *https://leginfo.legislature.ca.gov/faces/billPdf.xhtml?bill_id=201720180AB734&version=20170AB73492CHP*.

[81] CAPCOA. 2021. Handbook for Analyzing Greenhouse Gas Emissions Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity: Designed for Local Governments, Communities, and Project Developers. Available at: *https://caleemod.com/handbook/index.html*.

many on-site GHG reduction measures for a variety of project and plan types for lead agencies to consider. Many on-site GHG mitigation measures also result in a reduction in emissions of criteria air pollutants and toxic air contaminants in the air basin in which the project is located, as well as emissions of toxic air contaminants on or near the project site, consistent with legislative direction from SB 32 to "achieve the state's more stringent greenhouse gas emission reductions in a manner that benefits the state's most disadvantaged communities."

### 4.1.2 Off-site GHG Mitigation

If implementation of all feasible on-site GHG reduction measures is insufficient to reduce a project's impact to a less-than-significant level, the State recommends that the lead agency next explore options to fund or implement ***local***, off-site direct GHG reduction strategies.

Funding or implementing GHG mitigation measures in the project's vicinity may allow the project proponent and the lead agency to work directly with the impacted community to identify and prioritize the mitigation measures that meet its needs while minimizing multiple environmental and societal impacts. Direct, local investments help build relationships for future mutually beneficial development and mitigation opportunities in that community and may also provide a multitude of other co-benefits to the neighborhood's residents. To help remove barriers to employing these types of mitigation, lead agencies may wish to consider developing a local mitigation bank[82] that enables project applicants to fund such projects in exchange for being credited with the resulting GHG reductions in their CEQA analyses. The lead agency should also provide substantial evidence to show that the mitigation would actually serve to mitigate the proposed project's GHG emissions (i.e., a project cannot take credit for unrelated off-site measures that would occur independently of the proposed project). Examples of local investments and their co-benefits include:

- **Local urban forestry** programs that increase the number of trees and other plants in urban areas can sequester carbon, reduce air pollution and ambient temperatures, help manage stormwater and improve water quality, provide shade to reduce energy demand for cooling buildings (and the associated cost and GHG emissions of that energy), improve aesthetics, foster mental health, and encourage physical activity of residents and employees, among many other benefits.
- **Local building retrofit programs** targeting existing residential and commercial buildings in the project's vicinity can fund installation of cool roofs, solar panels, solar or heat pump water heaters, smart meters, and energy efficient lighting and appliances; replacement of fossil fuel-powered appliances with electric models; installation of energy efficient windows, insulation, and other building envelope measures; and

[82] As discussed in Section 5, below, the Regional GHG Collaborative Group along the Central Coast are working to educate and provide avenues for offset projects to help meet current and future local GHG reduction targets and CEQA GHG reduction needs.

implementation of water conservation measures. These investments can improve comfort, reduce utility bills, and help manage the demand for electricity while reducing GHG emissions.

- **Off-site EV chargers** can increase access to EV charging throughout a community. Some examples could include EV chargers in multi-unit dwellings in disadvantaged or low-income areas, public locations (schools, libraries, city centers), workplaces, key destinations (e.g., parks, recreation areas, sports arenas).
- **Public transit subsidies** can increase access to transit and to daily activities served by transit and can encourage less reliance on driving and increased reliance on other modes of transportation (e.g., transit and active transportation), which provides air quality and cost savings co-benefits to residents.

Like many on-site GHG mitigation measures, implementation of most local, off-site GHG reduction strategies also results in reductions of toxic air contaminants and criteria air pollutants and their precursors in the same air basin in which the project is located. The State recommends that lead agencies prioritize GHG mitigation that also increases a community's social and economic resilience to adverse impacts exacerbated by climate change. Applying a local lens to GHG mitigation and allowing for community-led decision-making helps prioritize the mitigation measures that address community-identified needs and can also fill gaps in the existing local approach to climate action.

If a project needs further GHG reductions after adoption of all feasible local, off-site mitigation options, applicants should next consider non-local, off-site mitigation. There has been concern that GHG emission reductions from off-site GHG mitigation measures (including carbon offset credits) may double count GHG emission reductions from California's Cap-and-Trade program. However, off-site mitigation measures, such as EV charging or building efficiency retrofits, are viable options for mitigation under CEQA and would not be double counted, provided they are not otherwise required by law or regulation and would not have happened but for the mitigation requirements of the project. If the mitigation would have been implemented or required through another statute, regulation, existing local program, or requirement other than the project it is mitigating, then the project being mitigated may not also claim credit for the reductions.

### 4.1.3 Conditions Applicable to Carbon Offset Credits

If implementation of all feasible on-site GHG reduction measures and all feasible off-site GHG reduction measures are insufficient to reduce a project's impact to a less-than-significant level, then the lead agency or project applicant should consider purchasing and retiring carbon offset credits. The State recommends that carbon offset credits retired as CEQA mitigation be registered with a recognized and reputable carbon registry on the voluntary market. For example, while CARB does not review or authorize voluntary-market offset registries or protocols for use as CEQA mitigation, CARB notes that the registries

approved by CARB for the Cap-and-Trade Program also serve as voluntary market credit registries, with voluntary market offsets available for CEQA mitigation purposes.[83]

In addition, starting in 2023, the California Carbon Sequestration and Climate Resiliency Project Registry[84] will be maintained by the California Natural Resources Agency for the purposes of identifying and listing projects in the state that drive climate action on the state's natural and working lands. The Registry is seeking funding from State agencies and private entities and may provide additional carbon offset credits. Note that compliance offsets for the Cap-and-Trade Program (a state market-based carbon program unaffiliated with CEQA) cannot be used for any purpose other than Cap-and-Trade compliance by covered entities and therefore cannot be purchased for use as CEQA mitigation.[85] As with other types of off-site mitigation, the State recommends pursuing carbon offset credits that are as close to the project site as possible in the following order of priority: (1) carbon offset credits that originate in the same air basin as the project, (2) carbon offset credits that originate elsewhere in California, (3) carbon offset credits that originate outside of California.

## 4.2 Clarifying CEQA's Requirements for GHG Mitigation

Over the years, agencies and courts have provided direction and guidance regarding GHG mitigation. Given the variety of potential projects and mitigation scenarios, some uncertainty and misconceptions persist. For example, when lead agencies consider off-site GHG mitigation (including carbon offset credits), they may sometimes conflate the requirements for compliance-grade offsets in California's Cap-and-Trade regulation with the requirements for GHG mitigation measures under CEQA. The Cap-and-Trade regulation requires that compliance offsets used in the Cap-and-Trade Program meet certain regulatory criteria, including that they be real, additional, quantifiable, permanent, verifiable, and enforceable. In general, the State's Cap-and-Trade Program restricts compliance offsets from being used for any purpose other than Cap-and-Trade compliance, including being used as mitigation under CEQA.

When designing GHG mitigation measures (whether local, off-site mitigation or carbon offset credits), the State recommends that lead agencies focus on applying the requirements specified in the CEQA statute, Guidelines, and case law – e.g., not otherwise required (see CEQA Guidelines section 15126.4(c)(3)); enforceable (see CEQA Guidelines section 15126.4(a)(2)); supported by substantial evidence; etc. – rather than strictly importing all of the regulatory requirements used for compliance offsets within California's Cap-and-Trade

[83] CARB. 2022. *Offset Project Registries.* Available at: *https://ww2.arb.ca.gov/our- work/programs/compliance-offset-program/offset-project-registries*.
[84] Skinner, Chapter 237, Statutes of 2021. Carbon sequestration: state goals: natural and working lands: registry of projects. Available at: *https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB27*.
[85] Cal. Code Regs., tit. 14, Chapter 3, §§ 15000 et seq.

program. It may be appropriate for lead agencies to require CEQA mitigation that helps localities meet targets or commitments set in local planning documents, including CAPs, lacking sufficient funding and are not otherwise explicitly required by regulation. Lead agencies should use substantial evidence to document that a specific off-site mitigation measure is not otherwise required and would not have occurred at that time ***but for*** the requirement to mitigate a project's GHG impacts. Examples of off-site GHG mitigation that would not have occurred but for the requirement to mitigate a project's GHG impacts and could therefore be not otherwise required are included in Section 4.1.2, Off-site GHG Mitigation.

## 5. Importance of Regional Collaboration

While local jurisdictions have considerable authority to act individually, it is important to consider the many benefits of regional collaboration. Transportation, land use, housing, climate, and energy issues are often interconnected. Local governments can benefit from collaborating with neighboring jurisdictions and regional agencies as they seek to reduce GHG emissions from these sectors. For example, CAPs that consider regional travel patterns, job and housing availability, and regional opportunities to mitigate GHG emissions can be more effective. In collaboration with other regional entities, local jurisdictions can leverage investments, data, best practices, and opportunities for GHG emission reductions in an equitable manner.

Regional collaboration and partnership across levels of government can bring together community leaders, agencies, academia, industry, community-based organizations, and other stakeholders from multiple jurisdictions within a region to share expertise, information, lessons learned, and strategies to promote mutually defined goals. Regional collaboration may include leveraging existing collaboratives and partnerships or establishing new ones. There are many excellent examples of regional collaboration in California that support the intersection of transportation, housing, and land use in tackling climate change. Local jurisdictions can leverage the work of these collaboratives and build on existing efforts to support equitable implementation of priority strategies and GHG mitigation. Examples of existing regional collaboratives include Community Choice Aggregators (CCAs), Regional Energy Networks (RENs), Regional Climate Collaboratives, Regional Housing Collaboratives, and Plug-in Electric Vehicle Collaboratives. The Integrated Climate Adaptation and Resiliency Program (ICARP)[86] offers funding, case studies, and tools for forming regional climate coordination entities.

Regional collaboration has tremendous potential to address barriers and expand opportunities for successful local GHG mitigation. It can help increase local opportunities for feasible GHG mitigation under CEQA that also benefit the communities impacted by the development. It can

[86] Governor's Office of Planning and Research. 2022. *Integrated Climate Adaptation and Resiliency Program (ICARP)*. Available at: https://opr.ca.gov/climate/icarp/.

help overcome barriers, such as project and administrative costs. It can help increase awareness of local mitigation opportunities for project applicants and lead agencies, improve connections with existing programs that offer mitigation opportunities, and identify sites for off-site mitigation opportunities, all in an effort to support a local voluntary mitigation market. And it can help site owners aggregate smaller mitigation projects to potentially reduce costs, increase the efficiency of mitigation projects, and leverage expertise on mitigation strategies and quantification methodologies.

Regional collaboration can also lend support to lead agencies and air districts as they seek opportunities for local GHG mitigation. San Luis Obispo County Air Pollution Control District, County of Santa Barbara, County of Ventura, City of Santa Barbara, City of San Luis Obispo, and Community Environmental Council formed a tactical Regional GHG Collaborative Group to understand and identify opportunities for local carbon sequestration and GHG reduction projects.

Developing a local voluntary mitigation market will help a city or region capture mitigation dollars and provide local benefits that are not realized by the purchase of distant, out-of-state carbon offset credits, while providing greater transparency and enforceability. Keeping GHG mitigation dollars within communities or regions can also be a strategy to address community needs and inequities from historic and ongoing underinvestment in vulnerable and disadvantaged communities.

Creating, sustaining, and expanding regional collaboratives takes time, resources, and expertise that are not always available to local jurisdictions. There may be a role for the State to ensure that all regions have access to mitigation opportunities. One potential avenue to accomplish this would be through the creation of a statewide GHG mitigation bank designed for CEQA mitigation purposes.

## 6. Conclusion

Local governments are essential partners in California's efforts to reduce GHGs. Their unique expertise and respective authorities allow them to shape growth and development patterns within their jurisdiction, and as a result, local actions remain critical for reducing GHG emissions from the built environment and transportation. Indeed, the Scoping Plan proposes transformative reductions in GHG emissions from the building and transportation sectors. These critical emission reductions rely on significant electrification of the state's vehicle fleet and building stock, but also require a significant shift in the transportation choices for Californians favoring active mobility, shorter trips, and robust public transit rather than sprawl and automobile dependence. Local governments have a critical role to play in this transition through their land use policies, transportation investments, and partnerships with neighboring jurisdictions, community organizations, business and labor groups, and the State.

Local leadership and regional collaboration are paving the way for reducing emissions in these sectors, and this appendix seeks to inform jurisdictions about opportunities to promote transportation electrification, VMT reduction, and building decarbonization through:

- Developing local CAPs and strategies consistent with the framework described in Section 2: “The Role of Local Climate Action Planning in Supporting the State’s Climate Goals;”
- Localizing State-level GHG priorities when approving individual land use plans and projects as described in Section 3: “The Role of Land Use Development Projects in Supporting the State’s Climate Goals;”
- Implementing mitigation to reduce GHG emissions associated with CEQA projects, consistent with Section 4: “Mitigating Greenhouse Gas Emissions Pursuant to CEQA;” and
- Leveraging regional collaboration to enhance the effectiveness of local climate action and overcome barriers to CEQA GHG mitigation as highlighted in section 5: “Importance of Regional Collaboration.”

California must accommodate population and economic growth in a far more sustainable and equitable manner than in the past. California’s climate trajectory relies on local efforts that align with and help implement the State’s priorities. The recommendations provided in this appendix are non-binding and should not be interpreted as a directive to local governments, but rather as evidence-based analytical tools to assist local governments with their role as essential partners in achieving California’s climate goals.

# Deriving a Climate-Stabilizing Solution Set of *Fleet-Efficiency* and *Driving-Level* Requirements, for Light-Duty Vehicles in California

**Paper #796315**

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## ABSTRACT

An Introduction is provided, including the importance of light-duty vehicles (LDVs: cars and light duty trucks) and the top-level LDV requirements to limit their carbon dioxide ("CO2") emissions.

Climate crisis fundamentals are presented, including its cause, its potential for harm, California mandates, and a greenhouse gas (GHG) reduction road map to avoid disaster.

A 2030 climate-stabilizing GHG reduction target value is calculated, using statements by climate experts. The formula for GHG emissions, as a function of per-capita driving, population, fleet CO2 emissions per mile, and the applicable low-carbon fuel standard is given. The ratio of the 2015 value of car-emission-per-mile to the 2005 value of car-emission-per-mile is obtained.

Internal Combustion Engine (ICE) mileage values from 2000 to 2030 are identified, as either mandates or new requirements. A table is presented that estimates 2015 LDV fleet mileage.

Zero Emission Vehicle (ZEV) parameters are given. Methods are derived to compute equivalent 2030 mileage. Four cases are defined and overall equivalent mileage is computed for each. Those equivalent fleet mileage values are used to compute their corresponding required per-capita driving reductions, with respect to 2005. Measures to achieve the most reasonable per-capita driving reduction are described, with reductions allocated to each measure.

A conclusion is presented.

## INTRODUCTION

Humanity's top-level requirement is to stabilize our climate at a livable level. This top-level requirement must flow down to cars and light-duty trucks, also known as Light-Duty Vehicles (LDVs), due to the significant size of their emissions. As an example, LDVs emit 41% of the GHG in San Diego County[1].

From a systems engineering perspective, the needed top-level LDV requirements are an upper bound on greenhouse gas (GHG) emissions per mile driven, applicable to all of the vehicles on the road, in the year of interest, and an upper bound on per-capita driving, given population growth. These two upper bounds must achieve the climate-stabilizing GHG emission target level. This paper will do a calculation of required driving levels, based on calculations of how clean our cars and fuels could be, predicted population growth, and the latest, science-based, climate-

stabilizing target, or requirement. All three categories of LDV emission-reduction strategies will be used: cleaner cars, cleaner fuels, and less driving. Four cases will be considered.

# BACKGROUND: OUR CLIMATE PREDICAMENT

## Basic Cause

Our climate crisis exists primarily because of these two facts[2]: First, our combustion of fossil fuels puts "great quantities" of $CO_2$ into our atmosphere; second, atmospheric $CO_2$ traps heat.

## California's Primary CO2_e Emission-Reduction Mandates

California's Governor's Executive Order S-3-05[3] is based on the greenhouse gas (GHG) reduction limits that were recommended by climate scientists, for industrialized nations, in 2005. In 2005, climate scientists believed that if the industrialized nations of the world achieved the reduction-targets of S-3-05 (and other nations did something less), the Earth's climate could be stabilized at a livable level, with a reasonably high level of certainty. More specifically, this executive order aims for an average, over-the-year, atmospheric, temperature rise of "only" 2 degree Celsius, above the preindustrial temperature. It attempts to do this by limiting atmospheric $CO_2$_e to 450 PPM by 2050 and then reducing emissions further, so that atmospheric levels would come down to more tolerable levels in subsequent years. The S-3-05 emission targets are the 2000 emission level by 2010, the 1990 level by 2020, and 80% below the 1990 level by 2050.

It was thought that if the industrialized world achieved S-3-05 (and the non-industrialized world achieved an easier task), there would be a 50% chance that the maximum temperature rise will be less than 2 degrees Celsius, thus leaving a 50% chance that it would be larger than 2 degrees Celsius. A 2 degree increase would put over a billion people on the planet into a position described as "water stress" and it would mean a loss of 97% of our coral reefs.

There would also be a 30% chance that the temperature increase would be greater than 3 degrees Celsius. A temperature change of 3 degree Celsius is described in Reference 3 as being "exponentially worse" than a 2 degree Celsius increase.

The second California climate mandate is AB 32, the *Global Warming Solutions Act of 2006*. It includes provisions for a cap and trade program, to ensure meeting S-3-05's 2020 target, which is to be emitting at no more than the 1990 level of emissions. AB 32 was to continue after 2020. AB 32 required CARB to always implement measures that achieved the maximum *technologically feasible and cost-effective* (words taken from AB 32) greenhouse-gas-emission reductions.

In 2015 Governor Brown signed B-30-15. This Executive Order established a mandate for 40% below 2020 emissions by 2030, as can be seen by a Google search. If S-3-05 is interpreted as a straight line between its 2020 and its 2050 targets, then the B-30-15 target of 2030 is the same as the S-3-05 implied target of 2035, because 2035 is halfway between 2020 and 2050 and 40% is halfway to 80%. More recently, California adopted SB 32, which made achieving B-30-15 legally binding. Finally, in 2018, the Governors Executive Order B-55-18 established a mandate of zero net emissions by the year 2045.

California achieved the second GHG emission target of S-3-05 (to emit at the 1990 level by 2020) in 2018, which is two years early. However, the world emission levels have, for most years, been increasing, contrary to the S-3-05 trajectory. Because the world has been consistently failing to follow S-3-05's 2010-to-2020 trajectory, if California, still wants to lead the way to human survival, it must do far better than S-3-05, going forward, as will be shown.

## Failing to Achieve these Climate Mandates

What could happen if we fail to achieve S-3-05, AB 32, and B-30-15 or if we achieve them but they turn out to be too little too late and other states and countries follow our example or do less?

It has been written[4] that, "A recent string of reports from impeccable mainstream institutions - the International Energy Agency, the World Bank, the accounting firm of PricewaterhouseCoopers - have warned that the Earth is on a trajectory to warm by at least 4 Degrees Celsius and this would be incompatible with continued human survival."

It has also been written[5] that, "Lags in the replacement of fossil-fuel use by clean energy use have put the world on a pace for 6 degree Celsius by the end of this century. Such a large temperature rise occurred 250 million years ago and extinguished 90 percent of the life on Earth. The current rise is of the same magnitude but is occurring faster."

## Pictures That Are Worth a Thousand Words

Figure 1 shows (1) atmospheric $CO_2$ (in blue) and (2) averaged-over-a-year-then-averaged-over-the surface-of-the-earth, atmospheric temperature (in red). This temperature is with respect to a recent preindustrial revolution value. The data starts 800,000 years ago. It shows that the current value of atmospheric $CO_2$, which is over 410 PPM, far exceeds the values of the last 800,000 years. It also shows that we might expect the corresponding temperature to eventually be over 12 degrees above preindustrial temperatures. This would bring about a human disaster[3, 4, 5].

Figure 2 shows the average yearly temperature (in blue) with respect to the 1960-to-1990 baseline temperature. It also shows atmospheric levels of $CO_2$ (in red). The CO2 spike of Figure 1 is seen on Figure 2 to be an accelerating ramp up, starting at the time of our industrial revolution. The S-3-05 goal of 450 PPM is literally "off the chart", in Figure 2. Figure 2 shows that, as expected, temperatures are starting to rise along with the rising levels of $CO_2$. The large variations in temperature that are observed are primarily due to the random nature of the amount of solar energy being received by the earth.

## FURTHER BACKGROUND: CALIFORNIA'S SB 375 AND AN IMPORTANT DATA SET

As shown in the Introduction, LDVs emit significant amounts of $CO_2$. The question arises: will driving need to be reduced or can cleaner cars and cleaner fuels arrive in time to avoid such behavioral change? Steve Winkelman, of the Center for Clean Air Policy (CCAP), worked on this problem and his results probably inspired California's SB 375.

## SB 375, the *Sustainable Communities and Climate Protection Act of 2008*

Under SB 375, the California Air Resources Board (CARB) has given each Metropolitan Planning Organization (MPO) in California driving-reduction targets, for the years 2020 and 2035. "Driving" means yearly, per capita, vehicle miles travelled (VMT), by LDVs, with respect to 2005. The CARB-provided values are shown at this Wikipedia link, http://en.wikipedia.org/wiki/SB_375. It is important to note that although this link and many other sources show the targets to be "GHG" and not "VMT", SB 375 clearly states that the reductions are to be the result of the MPO's Regional Transportation Plan (RTP), or, more specifically, the Sustainable Communities Strategy (SCS) portion of the RTP. Nothing in the SCS will improve average mileage. That will be done by the state and federal governments by their Corporate Average Fleet Efficiency (CAFÉ) standards and any other laws or regulations that they might adopt. The SCS can only reduce GHG by reducing VMT.

**Figure 1 Atmospheric $CO_2$ and Mean Temperature from 800,000 Years Ago**

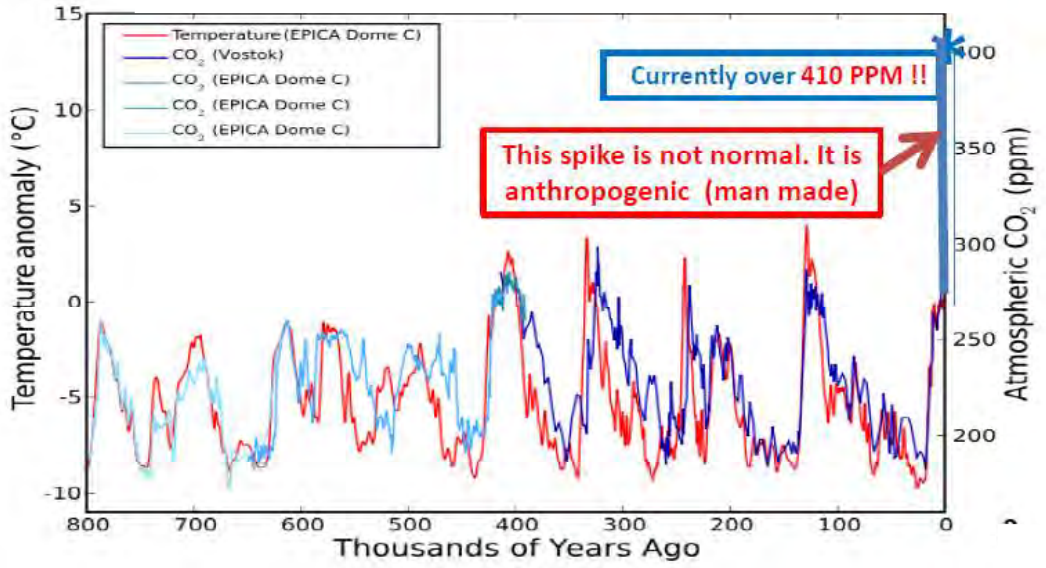
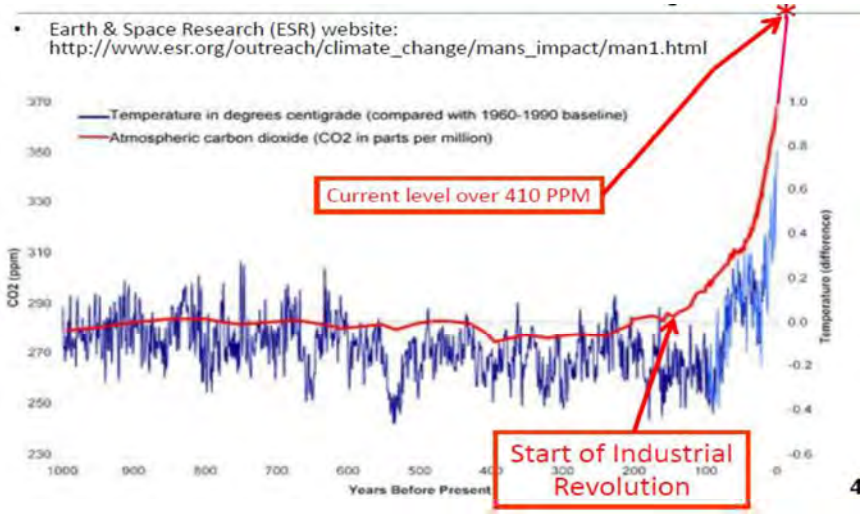



**Figure 2 Atmospheric $CO_2$ and Mean Temperature, Over the Last 1,000 Years**



Under SB 375, every Regional Transportation Plan (RTP) must include a section called a Sustainable Communities Strategy (SCS). The SCS must include driving reduction predictions corresponding to the CARB targets. Each SCS must include only *feasible* transportation, land use, and transportation-related policy data. If the SCS driving-reduction predictions fail to meet the CARB-provided targets, the MPO must prepare an Alternative Planning Strategy (APS). An APS uses *infeasible* transportation, land use, and transportation-related policy assumptions. The total reductions, resulting from both the SCS and the APS, must at least meet the CARB-provided targets.

## Useful Factors from Steve Winkelman's Data

Figure 3[6].shows 5 variables as a percent of their 2005 value and also the 1990 emission value (turquoise) related to the 2005 CO2 emission value (the blue line). All of the variables are for LDVs. The year 2005 is the baseline year of SB 375. The red line is the Caltrans prediction of VMT. The purple line is California's current mandate for a Low Carbon Fuel Standard (LCFS). The LCFS also can be used to get the equivalent mileage from the actual mileage by dividing the actual mileage by the LCFS. The LCFS can be used to get the equivalent CO2 per mile driven by multiplying the actual CO2 per mile driven by the LCFS. As shown, by 2020, fuel in California must emit 10% less per gallon than in 2005. As written above, the turquoise line is the 1990 GHG emission in California. As shown, it is 12% below the 2005 level. This is important because S-3-05 specifies that in 2020, state GHG emission levels must be at the 1990 level. The green line is the C02 emitted per mile, as specified by AB 1493, also known as "Pavley 1 and 2" named after Senator Fran Pavley. The values shown do not account for the LCFS. The yellow (or gold) line is the S-3-05 mandate, referenced to 2005 emission levels. The blue line is the product of the red (miles), the green (CO2 per mile), and the purple line (LCFS, which reduces emission per mile) and is the percentage of GHG emissions compared to 2005. Since VMT is not being adequately controlled, the blue line is not achieving the S-3-05 line. Figure 3 shows that driving must be reduced. For this reason, Steve Winkelman can be thought of as the true father of SB 375.

**Figure 3** **The S-3-05 Trajectory (the Gold Line) AND the $CO_2$ Emitted from Personal Driving (the Blue Line), where that $CO_2$ is a Function (the Product) of the California-Fleet-Average $CO_2$ per Mile (the Green Line), The Predicted Driving (VMT, the Red Line), and the Low-Carbon Fuel Standard (the Purple Line)**

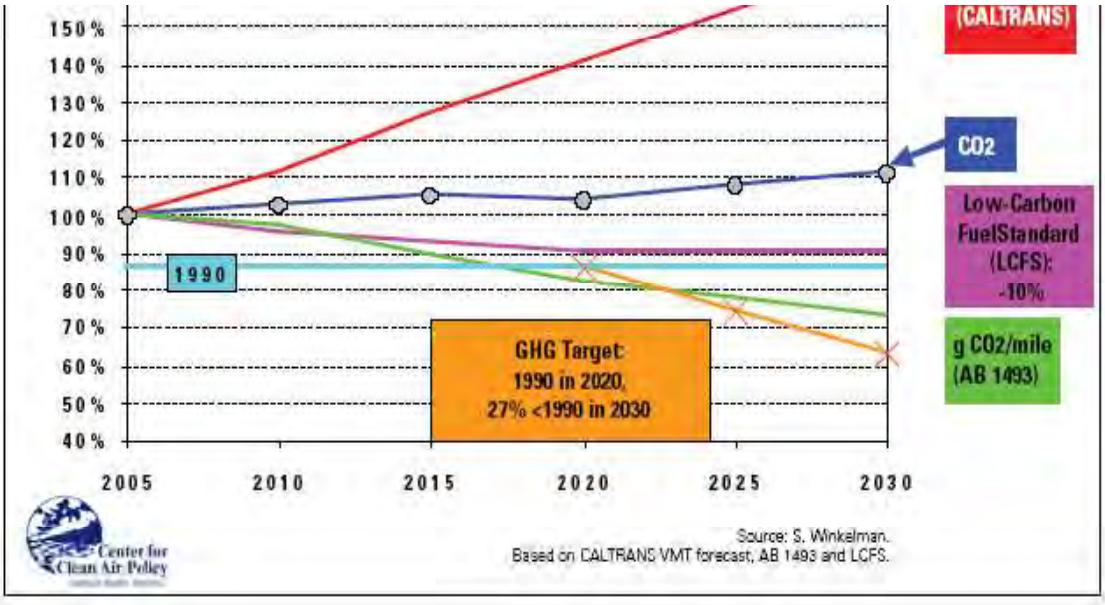


Figure 3 provides inspiration for a road map to climate success for LDVs. Climate-stabilization targets must be identified (from the climate scientists) and achieved by a set of requirements that will increase fleet efficiency and another set that will reduce per-capita driving.

## THE DERIVATION OF CALIFORNIA'S TOP-LEVEL LDV REQUIREMENTS TO SUPPORT CLIMATE STABILIZATION

It is clear that more efficient (less CO2 emitted per mile) LDVs will be needed and this can be achieved with appropriate requirements. Significant improvements in efficiency will be needed if driving reductions are going to remain within what many people would consider politically achievable. Mileage and equivalent mileage will need to be specified. A significant fleet-fraction of Zero-Emission Vehicles (ZEVs, either Battery-Electric LDVs or Hydrogen Fuel Cell LDVs) will be needed. Since mileage and equivalent mileage are more heuristic than CO2 emissions per mile, they will be used in the derivations. CO2 per mile driven will not appear in the final equations.

Since the SB-375 work used 2005 as the reference year, that convention will be used. It will be assumed that cars last 15 years.

### GHG Emission Target to Support Climate Stabilization

The primary problem with S-3-05 is that California's resolve and actions have been largely ignored by other states, our federal government, and many countries. Therefore, rather than achieving 2000 levels by 2010 (the first target of S-3-05) and 1990 levels by 2020 (the 2nd target of S-3-05), world emission has been increasing for nearly all of the years since 2010. (California, on the other hand achieved its 1990 emission level in 2018. This is two years sooner than the 2nd target of the S-3-05 requirement.) Reference 7 states on Page 14 that the required rate of reduction, if commenced in 2020, would be 15%. That rate means that the factor of 0.85 must be achieved, year after year. If this were done for 10 years, the factor would be $(0.85)^{10} = 0.2$, by 2030. This reduction of 80% down from the 2020 value matches the 2050 target requirement of S-3-5, which is 80% below the 1990 value. According to S-3-05, the 2020 emission value should be the same as the 1990 emission value. As noted above, the S-3-05 emission of 2050 was designed to support capping atmospheric CO2 at 450 PPM[3]. "Capping" means that the sum of all emissions (anthropogenic and natural) equals the sum of all sequestration (mostly photosynthesis.) Therefore, the author of the Reference 7 statement wanted the world to achieve the third target of S-3-05 to get the atmospheric CO2 to stop going up 20 years sooner than what S-3-05 was written to achieve. This shows the urgent nature of our climate crisis. Therefore, if California wants to do its part by setting an example for the world, the correct requirement for California is to achieve emissions that are reduced to 80% below California's 1990 value by 2030. The world's reduction rate is not anywhere near the needed 15% as we move towards the end of 2020. Therefore, the target, of 80% below 1990 levels by 2030 is considered to be correct for California. Reference 7 also calls into question the advisability of aiming for a 2 degree Celsius increase, given the possibilities of positive feedbacks that would increase warming. This concern for positive feedbacks is another reason that this paper will work towards identifying LDV requirement sets that will support LDVs achieving 80% below the 1990 value by 2030.

Thinking that LDVs can, for some reason, fail to achieve this target is dangerous thinking. As stated above, LDVs emit, by far, the most CO2 of all categories.

## Notes on Methods

The base year is 2005. An intermediate year of 2015 is used. The car efficiency factor of 2015 with respect to 2005 is taken directly from Figure 3. The car efficiency factor of 2030 with respect to 2015 is derived herein, resulting in a set of car-efficiency requirements.

It is assumed that cars last 15 years. This is equivalent to assuming that the effect of the cars that last more than 15 years, thus increasing emissions, will be offset by the effect of the older cars that don't last as long as 15 years, thus reducing old-car emissions. As will be seen, there will also have to be some sort of an additional action to remove many of the older Internal Combustion Engine cars that are 15, through just 8 years old. Natural attrition will take care of some of this since as cars get older the probability that they will be taken out of service increases. However, some sort of "cash for gas guzzlers" program will be needed. How this is done is not covered in this paper. This is not unique. As another example, the car manufacturers will have to figure out how to produce the needed cars and batteries.

## Primary Variables Used

Table 1 defines the primary variables that are used.

## Fundamental Equations

The emissions are equal to the CO2 per mile driven multiplied by the per-capita driving multiplied by the population, since per-capita driving multiplied by the population is total driving. This is true for any given year.

Future Year k: $$\boldsymbol{e_k = c_k * d_k * p_k}$$ **(Eq. 1)**

Base Year i: $$\boldsymbol{e_i = c_i * d_i * p_i}$$ **(Eq. 2)**

Dividing both sides of Equation 1 by equal values results in an equality. The terms on the right side of the equation can be associated as shown here:

$$\boldsymbol{\frac{e_k}{e_i} = \frac{c_k}{c_i} * \frac{d_k}{d_i} * \frac{p_k}{p_i}}$$ **(Eq. 3)**

**Table 1 Variable Definitions**

| **Variable Definitions** | |
|---|---|
| $\boldsymbol{e_k}$ | **LDV Emitted C02, in Year "$k$"** |
| $\boldsymbol{L_k}$ | **Low Carbon Fuel Standard (LCFS) Factor that reduces the Per-Gallon CO2 emissions, in Year "$k$"** |
| $\boldsymbol{C_k}$ | **LDV CO2 emitted per mile driven, average, in Year "$k$", not accounting for the Low Carbon Fuel Standard (LCFS) Factor** |
| $\boldsymbol{c_k}$ | **LDV CO2 emitted per mile driven, average, in Year "$k$", accounting for the Low Carbon Fuel Standard (LCFS) Factor** |

| | |
|---|---|
| $p_k$ | **Population, in Year "$k$"** |
| $d_k$ | **Per-capita LDV driving, in Year "$k$"** |
| $D_k$ | **LDV Driving, in Year "$k$"** |
| $M_k$ | **LDV Mileage, miles per gallon, in Year "$k$"** |
| $m_k$ | **LDV Equivalent Mileage, miles per gallon, in Year "$k$" accounting for Low Carbon Fuel Standard (LCFS) Factor, so this is $M_k/L_k$** |
| **N** | **Number of pounds of CO2 per gallon of fuel but not accounting for the Low Carbon Fuel Standard (LCFS) Factor** |

Since CO2 per mile ("c") is a constant (use "A", noting that it is equal to about 20 pounds per gallon) multiplied by the number of Gallons ("G") and since number of gallons is distance (use "D") divided by mileage (use "m"), then c = A*D/m. this shows that the ratio of the "c" values in different years is going to be equal to the reciprocal of the "m" values in those different years because the other variables will cancel out. Therefore:

To work with mileage: $$\frac{m_i}{m_k} = \frac{c_k}{c_i} \quad \textbf{(Eq. 4)}$$

Putting Equation 4 into Equation 5 results in the following equation:

$$\frac{e_k}{e_i} = \frac{m_i}{m_k} * \frac{d_k}{d_i} * \frac{p_k}{p_i} \quad \textbf{(Eq. 5)}$$

Showing the base year of 2005, the future year of 2030, introducing the intermediate year of 2015 and the year of 1990 (since emissions in 2030 are with respect to the 1990 value) results in Equation 6.

$$\frac{e_{2030}}{e_{1990}} * \frac{e_{1990}}{e_{2005}} = \frac{c_{2030}}{c_{2015}} * \frac{c_{2015}}{c_{2005}} * \frac{d_{2030}}{d_{2005}} * \frac{p_{2030}}{p_{2005}} \quad \textbf{(Eq. 6)}$$

The ratio on the far left is the climate-stabilizing target, which is the factor of the 2030 emission to the 1990 emission. It has been shown that this is 0.20 or 80% less. The next ratio is the emission of 1990 compared to 2005. It is the turquoise line of Figure 3, which is 0.87. The first ratio on the right side of the equation is the fleet emission per mile in 2030 compared to the value in 2015. This ratio will be derived in this report and it will result in a set of car-efficiency requirements. Moving to the right, the next ratio is the car efficiency in 2015 compared to 2005. It can obtained by multiplying the purple line 2015 value times the green line 2015 value, which is 0.90 * 0.93. The next term, still going from right to left, is the independent variable. It is the per-capita driving reduction required, with respect to the 2005 level of driving. The final term on the far right is the ratio of the population in 2030 to the population in 2005. Reference 8 shows that California's population in 2005 was 35,985,582. Reference 9 shows that California's population in 2030 is predicted to be 42,263,654. Therefore,

$$p_{2030}/p_{2005} = 42263654 \div 35985582 = 1.17446076 \quad \textbf{(Eq. 7)}$$

Putting in the known values results in Equation 8:

$$0.20 * 0.87 = \frac{c_{2030}}{c_{2015}} * 0.90 * 0.93 * \frac{d_{2030}}{d_{2005}} * 1.17446076 \quad \textbf{(Eq. 8)}$$

Combining the values, solving for the independent variable (the per-capita driving ratio), and changing from emission-per-mile to equivalent-miles-per-gallon results in the following:

$$\frac{d_{2030}}{d_{2005}} = 0.177004896 * \frac{m_{2030}}{m_{2015}} \quad \textbf{(Eq. 9)}$$

With the coefficient being so small, it is doubtful that we can get the equivalent mileage in 2030 to be high enough to keep the driving ratio from falling below one. The mileage of the 2015 fleet will be based on the best data we can get and by assuming cars last 15 years. The equivalent mileage in 2030 will need to be as high as possible to keep the driving-reduction factor from going too far below 1, because it is difficult to reduce driving too much. The equivalent mileage will be dependent on the fleet-efficiency requirements in the near future and going out to 2030. Those requirements are among the primary results of this report.

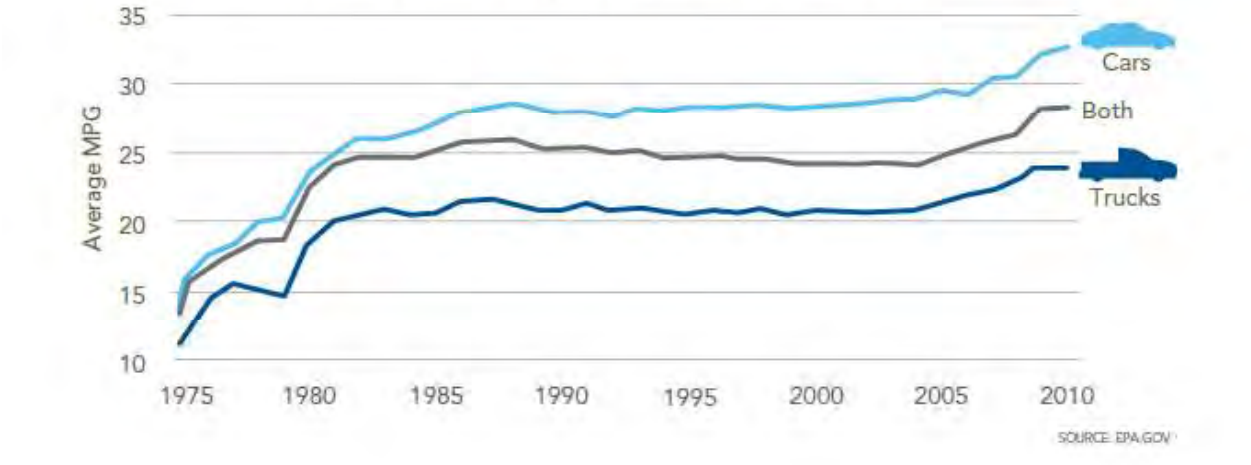
## Internal Combustion Engine (ICE) Mileage, from Year 2000 to Year 2030

The years from 2000 to 2011 are taken from a plot produced by the PEW Environment Group,

http://www.pewenvironment.org/uploadedFiles/PEG/Publications/Fact_Sheet/History%20of%20Fuel%20Economy%20Clean%20Energy%20Factsheet.pdf

The plot is shown here as Figure 6. The "Both" values are used.

**Figure 4** **Mileage Values From the PEW Environment Group**




The values from 2012 to 2025 are taken from the US Energy Information Agency (EIA) as shown on their website, http://www.c2es.org/federal/executive/vehicle-standards#ldv_2012_to_2025. They are the LDV Corporate Average Fleet Efficiency (CAFÉ) values enacted into law in the first term of President Obama. From 2025 to 2030, it is assumed that the yearly ICE improvement in CAFÉ will be 2.5 MPG.

## Overall Mileage of California's LDV Fleet in 2015

Table 2 uses these values of the Internal Combustion Engine (ICE) LDV mileage to compute the mileage of the LDV fleet in 2015. It assumes that the fraction of ZEVs being used over these years is small enough to be ignored. The 100 miles driven, nominally, by each set of cars, is an arbitrary value and inconsequential in the final calculation, because it will divide out. It is never-the-less used, so that it is possible to compare the gallons of fuel used for the different years. The "f" factor could be used to account for a set of cars being driven less. It was decided to not use this option by setting all of the values to 1. The Low Carbon Fuel Standard (LCFS) values are taken from Figure 3. The gallons of fuel are computed as shown in Equation 10, using the definition for $L_k$ that is shown in Table 2.

$$\boldsymbol{Gallons\ Used\ per\ f * 100\ miles} = \frac{\boldsymbol{fx100}}{\boldsymbol{(CAFE\ MPG)/L_k}} \qquad \textbf{(Eq. 10)}$$

As shown in Table 2, using the definitions in Eq. 9:

$$\boldsymbol{m_{2015} = 27.63}$$

If it is deemed acceptable to have per-capita driving in 2030 be reduced 32% with respect to 2005 driving, then the left side of Eq. 9 becomes 0.68 and it is possible to use Eq. 9 to solve for the 2030 mileage as:

$$\boldsymbol{m_{2030} = (27.63) * 0.68 * \left(\frac{1}{0.177004896}\right) = 106.1462} \qquad \textbf{(Eq. 11)}$$

Likewise if it is decided that the per-capita driving in 2030 should equal the per-capita driving in 2005 then:

$$\boldsymbol{m_{2030} = (27.63) * 1.00 * \left(\frac{1}{0.177004896}\right) = 156.0974} \qquad \textbf{(Eq. 12)}$$

These values will provide the targets for the tables that compute the mileage values for 2030.

## How ICE Mileage Values Will Be Used with ZEV Equivalent Mileage Values

To have LDVs achieve our climate-stabilizing target, after 2015, the net (computed using both ICE and ZEV vehicles) mileage values for each year will need to greatly improve by having a significant fraction of ZEVs. The ICE CAFÉ standards are used in this report as just the ICE contribution to fleet MPG. The ICE MPG values are inadequate by themselves and will therefore need to become less important; the ZEVs sales will need to overtake the ICE sales.

Federal requirements will need to change significantly. Currently, federally-mandated corporate average fuel efficiency (CAFÉ) standards have been implemented, from 2000 to 2025. These standards require that each corporation produce and sell their fleet of cars and light-duty trucks in the needed proportions, so that the combined mileage of all of the cars they sell (total miles driven in all cars sold in the year of interest divided by the total gallons used by all those cars, for any arbitrary distance) at least meets the specified mileage.

**Table 2 Calculation of the Fleet MPG for 2015**

| LDV Set | Years Old | Model Year | CAFE MPG | LCFS Factor $L_{Year}$ | Factor Driven f | Gallons Used Per f*100 Miles |
|---|---|---|---|---|---|---|
| 1 | 14-15 | 2001 | 24.0 | 1.0 | 1.0 | 4.17 |
| 2 | 13-14 | 2002 | 24.0 | 1.0 | 1.0 | 4.17 |
| 3 | 12-13 | 2003 | 24.0 | 1.0 | 1.0 | 4.17 |
| 4 | 11-12 | 2004 | 24.0 | 1.0 | 1.0 | 4.17 |
| 5 | 10-11 | 2005 | 25.0 | 1.0 | 1.0 | 4.00 |
| 6 | 9-10 | 2006 | 25.7 | .9933 | 1.0 | 3.87 |
| 7 | 8-9 | 2007 | 26.3 | .9867 | 1.0 | 3.75 |
| 8 | 7-8 | 2008 | 27.0 | .9800 | 1.0 | 3.63 |
| 9 | 6-7 | 2009 | 28.0 | .9733 | 1.0 | 3.48 |
| 10 | 5-6 | 2010 | 28.0 | .9667 | 1.0 | 3.45 |
| 11 | 4-5 | 2011 | 29.1 | .9600 | 1.0 | 3.30 |
| 12 | 3-4 | 2012 | 29.8 | .9533 | 1.0 | 3.20 |
| 13 | 2-3 | 2013 | 30.6 | .9467 | 1.0 | 3.09 |
| 14 | 1-2 | 2014 | 31.4 | .9400 | 1.0 | 2.99 |
| 15 | 0-1 | 2015 | 32.6 | .9333 | 1.0 | 2.86 |
| | | | | | Sum of Gallons: | 54.29 |
| | | | | | Miles = 100*Sum(f's): | 1500 |
| | | | | | MPG = Miles/(Sum of Gallons): | 27.63 |

The car companies want to maximize their profits while achieving the required CAFÉ standard. In California, the car companies are already be required to sell a specified number of electric vehicles, which have a particularly-high, equivalent-value of miles-per-gallon. If the laws are not changed, this situation will allow companies to take advantage of their ZEV vehicles to sell more low-mileage, high-profit cars and light-duty trucks, and still achieve the federal CAFÉ standard.

It will be better to apply the CAFÉ standards to only the ICEs and then require, in addition to the CAFÉ standards, that the fleet of LDVs sold achieve some mandated fraction of ZEVs. The ZEVs will get ever-improving equivalent mileage, as our electrical grid is powered by a larger percent of renewable energy. In other words, their equivalent mileage is not fixed, but will improve over the years. Requirements developed here are for 2030. Therefore a high percentage of all the electricity generated in the state, including both the "in front of the meter" (known as the "Renewable Portfolio Standard" or "RPS") portion and the "behind the meter" portion is assumed to come from sources that do not emit CO2. The values of 85% and 90% are assumed. The values become one of the important fleet-efficiency requirements for cases that are considered. Hopefully these assumptions are reasonable. San Diego's Climate Action Plan (CAP) was the first to specify 100% renewable energy by 2035. Many other cities have followed San Diego's lead in this regard.

## How to Compute the ZEV Equivalent Mileage Values

To calculate the equivalent mileage of the 2030 fleet of LDVs, it is necessary to derive a formula to compute the equivalent mileage of ZEVs, as a function of the percent of electricity that is generated without emitting CO2 (the mixed case), the equivalent ZEV mileage if the electricity is from 100% fossil fuel (the "West Virginia" case), and the equivalent ZEV mileage if the electricity is from 100% renewable sources (the ideal case), which is not infinity because it is assumed that the manufacturing of the car emits CO2. The variable definitions in Table 3 are used.

**Table 3 Variables Used in the Calculation of ZEV Equivalent Mileage**

| Variable | Definition |
|---|---|
| $m_z$ | ZEV Equivalent mileage |
| $m_{zr}$ | ZEV Equivalent mileage if the electricity is from renewables |
| $m_{zf}$ | ZEV Equivalent mileage if the electricity is from fossil fuels |
| $r$ | fraction of electricity generated from renewable sources |
| $G$ | Gallons of equivalent fuel used |
| $D$ | Arbitrary distance travelled |
| $Num$ | $m_{zr} * m_{zf}$ |
| $Den$ | $r * m_{zf} + (1 - r) * m_{zr}$ |

The derivation of the equation for equivalent ZEV mileage is based on the notion that the ZEV can be imagined to travel "r" fraction of the time on electricity generated from renewables and "(1-r)" fraction of the time on fossil fuel. If the vehicle travels "D" miles, then, using the definitions shown in Table 4, the following equation can be written.

$$G = \frac{r*D}{m_{zr}} + \frac{(1-r)*D}{m_{zf}} \quad \textbf{(Eq. 13)}$$

$$m_z = D/G = D/\left(\frac{r*D}{m_{zr}} + \frac{(1-r)*D}{m_{zf}}\right) \quad \textbf{(Eq. 14)}$$

Dividing the numerator and the denominator by D and multiplying the numerator and the denominator by the product of the two equivalent mileage values ($m_{zr}$ and $m_{zf}$) results in Equations 31.

$$m_z = m_{zr} * m_{zf}/\left(r * m_{zf} + (1 - r) * m_{zr}\right) \quad \textbf{(Eq. 15)}$$

Using the definitions in Table 3:

$$m_z = Num/(Den) \quad \textbf{(Eq. 16)}$$

Table 4 shows 3 assignments of assumed values in which the fraction of electricity generated from renewables is varied and the results, using Equations 15 and 16, results in the three values of ZEV equivalent mileage. This shows the urgent need to move towards cleaner electricity.

**Table 4 Variable Assignment and the Resulting ZEV Mileages**

| $m_{zr}$ | $m_{zf}$ | r | 1-r | Num | Den | $m_z$ |
|---|---|---|---|---|---|---|
| 5000 | 70 | 0.80 | 0.20 | 350000.00 | 1056.00 | 331.44 |
| 5000 | 70 | 0.85 | 0.15 | 350000.00 | 809.50 | 432.37 |
| 5000 | 70 | 0.90 | 0.10 | 350000.00 | 563.00 | 621.67 |

## Additional Variables Needed to Compute the Overall Equivalent Mileage in 2030, Taking Into Account Bothe ICEs and ZEVs

Table 5 shows the additional definitions that will be used in the calculation of 2030 overall mileage.

**Table 5 Additional Variables Used in the Calculation of 2030 LDV Mileage**

| Variable | Definition |
|---|---|
| $D_i$ | Distance travelled by ICE vehicles |
| $D_z$ | Distance travelled by ZEV vehicles |
| $G_i$ | Gallons of equivalent fuel used by ICE vehicles |
| $G_z$ | Gallons of equivalent fuel used by ZEVs |

## Computing an LDV Overall Equivalent Fleet Mileage, for the *Balanced_1* Case

Table 6 shows the calculation for the overall equivalent mileage for all the cars on the road, in the year of 2030, for the *Balanced_1* case.

The name, *Balanced_1*, comes from the attempt to *balance* the difficulty of achieving the fleet efficiency-related requirements with the difficulty of achieving the driving-reduction related requirements. The *Balanced*_1 case assumes that electricity is 85% renewable, which is also difficult.

There will also be a *Balanced*_2 case that assumes that electricity is 90% renewable. Both the *Balanced_1* and the *Balanced_ 2* cases assume that it is reasonable to have per-capita driving in 2030 reduced 32%, with respect to 2005 per-capita driving. That assumption, along with the 85% renewable electricity assumption, was used to select the $z$ values of Table 6 to result in the Equation 11 value of overall 2030 mileage, which is 106.1263 Miles Per Gallon (MPG). From Table 4, 85% renewable electricity results in a ZEV equivalent mileage of 432.37 MPG. That value of equivalent ZEV mileage in 2030, when electricity is 85% renewable, is used for all of the ZEV model years, for

this case. Note that this is overlooking the fact that not all BEVs are equally efficient. In order to simplify this analysis, the Table 4 values of $m_{zr}$ and $m_{zf}$ are considered to be applicable to all the ZEV models. Therefore, the 432.37 MPG value can be divided into each $D_z$ value to compute the corresponding $G_z$ value, in all of the model years being considered.

To reduce the miles driven in poor-mileage ICE's, the "f" factor is used. For example, if "f" is set to 0.30, as it is in 2016, then the miles driven is reduced by 70%. Achieving the required "f" values may require some type of "cash-for-gas-guzzlers" program. However, it could also be noted that when older cars are second or third cars in multi-car families in which family members have the luxury of choosing which car to drive, family members will usually choose the car that is cheaper to operate, thus making the "f" factors easier to achieve. Finally, the Low Carbon Fuel Standard (LCFS) is assumed to continue to improve from the currently mandated value of 0.9 by the end of 2019. This is another method of reducing the CO2 emissions of the ICE vehicles.

For the ICE vehicles, the $G_i$ values are computed as the $D_i$ value divided by the equivalent MPG value. The equivalent MPG is the CAFÉ MPG divided by the LCFS factor.

It is arbitrarily assumed that the cars, for each year being considered (the models for that year, both ZEVs and ICEs), go a total of 100 miles. Although this is an extremely small fraction of the actual miles that will be driven, it doesn't change the result because the number of gallons of equivalent gasoline is always proportional to miles. The fraction of cars that are ZEVs ($z$) is used to divide up this value of 100 Miles. However, the factor "f" reduces the miles driven by the ICE vehicles and this brings down the total miles driven for the years in which the "f" term is less than 1. For each year, the total miles per gallon (MPG) is computed as the total miles driven divided by the total gallons used. However, this value is not used in the calculation of the entire fleet equivalent mileage. The overall equivalent mileage is computed as the total miles driven divided by the total gallons used, where these quantities are summed over all of the 15 categories (years) of LDVs.

The following formulas are used to compute the overall equivalent mileage in 2030, of all of the LDVs on the road.

For the ICE calculations, for 2016, where

- "$L_k$" is defined in Table 1 (LCFS factor for year "k") and is the value in the "LCFS" column of Table 6 and
- "$z$" is from the "$z$" column and is the fraction of cars sold in the year that are ZEVs and
- "$m_i$" is the value from the CAFÉ MPG column:

$$D_i = 100 * f * (1 - z) \quad \textbf{(Eq. 17)}$$

$$G_i = D_i/(m_i / L_{2016}) \quad \textbf{(Eq. 18)}$$

For the ZEV calculations:

$$D_z = 100 * z \quad \textbf{(Eq. 17)}$$

$$G_z = D_z/(432.37) \quad \textbf{(Eq. 18)}$$

In updating this report from its 2015 version, the fleet fraction of ZEVs ("$z$"), from 2015 to 2019, had to be reduced to approximate the low values that actually occurred from 2015 to 2019. However,

in 2020, it is assumed that the fraction will be at least as large as 8%, which is not such a trivial value. If it is actually larger than 8%, then there will be some margin built into the requirements derived in this report.

**Table 6 Calculation of 2030 LDV Mileage Assuming the *Balanced_1* Case**

| Year | ICE Parameters and Calculations | | | | | | ZEVs | | | Yearly Totals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CAFÉ MPG | LCFS | Eq. MPG | f | $D_i$ | $G_i$ | $z$ | $D_z$ | $G_z$ | Total Miles | Total Gallons | 2030 MPG |
| 2016 | 34.3 | .9267 | 37.01 | .3 | 29.4 | 0.7943 | .02 | 2 | .005 | 31.40 | 0.7989 | 39.30 |
| 2017 | 35.1 | .9200 | 38.15 | .4 | 39.2 | 1.0275 | .02 | 2 | .005 | 41.20 | 1.0321 | 39.92 |
| 2018 | 36.1 | .9133 | 39.53 | .5 | 48.5 | 1.2271 | .03 | 3 | .007 | 51.50 | 1.2340 | 41.73 |
| 2019 | 37.1 | .9067 | 40.92 | .6 | 57.6 | 1.4077 | .04 | 4 | .009 | 61.60 | 1.4169 | 43.47 |
| 2020 | 38.3 | .9000 | 42.56 | .7 | 64.4 | 1.5133 | .08 | 8 | .019 | 72.40 | 1.5318 | 47.26 |
| 2021 | 40.3 | .8500 | 47.41 | .8 | 64.0 | 1.3499 | .20 | 20 | .046 | 84.00 | 1.3961 | 60.17 |
| 2022 | 42.3 | .8000 | 52.88 | .9 | 58.5 | 1.1064 | .35 | 35 | .081 | 93.50 | 1.1873 | 78.75 |
| 2023 | 44.3 | .8000 | 55.38 | 1.0 | 45.0 | 0.8126 | .55 | 55 | .127 | 100.00 | 0.9398 | 106.40 |
| 2024 | 46.5 | .8000 | 58.13 | 1.0 | 20.0 | 0.3441 | .80 | 80 | .185 | 100.00 | 0.5291 | 188.99 |
| 2025 | 48.7 | .8000 | 60.88 | 1.0 | 6.0 | 0.0986 | .94 | 94 | .217 | 100.00 | 0.3160 | 316.48 |
| 2026 | 51.2 | .8000 | 64.00 | 1.0 | 3.0 | 0.0469 | .97 | 97 | .224 | 100.00 | 0.2712 | 368.70 |
| 2027 | 53.7 | .8000 | 67.13 | 1.0 | 2.0 | 0.0298 | .98 | 98 | .227 | 100.00 | 0.2565 | 389.93 |
| 2028 | 56.2 | .8000 | 70.25 | 1.0 | 1.0 | 0.0142 | .99 | 99 | .229 | 100.00 | 0.2432 | 411.17 |
| 2029 | 58.7 | .8000 | 73.38 | 1.0 | 1.0 | 0.0136 | .99 | 99 | .229 | 100.00 | 0.2426 | 412.20 |
| 2030 | 61.2 | .8000 | 76.50 | 1.0 | 1.0 | 0.0131 | .99 | 99 | .229 | 100.00 | 0.2420 | 413.15 |
| **Sum of Miles and then Gallons of Equivalent Fuel:** | | | | | | | | | | **1235.60** | **11.64** | |
| **Equivalent MPG of LDV Fleet in 2030:** | | | | | | | | | | ***106.17*** | | |
| Sum of ZEV Miles = **795**. Fraction of Miles Driven by ZEVs = **64.3%** | | | | | | | | | | | | |

There is probably some margin from the 2016 to 2019 values as well. The difficult values are for 2022, 2023, and 2024, with 2024 requiring that ZEV sales are 80% of all the cars purchased in California. The purple color of the $\boldsymbol{z}$ values denotes difficulty. This shows that the government will need to require that the car companies achieve the **z** values or buy credits from a company such as Tesla, which sells 100% ZEVs.

The Table 6 $\boldsymbol{z}$ values were put into an EXCEL spread sheet that looks like Table 6. It produced the values shown in Table 6. The values were selected to try to get to the 106.1462 value that was computed in Eq. 11.

Using the result of 106.17 MPG into Equation 9, gives the following result:

$$\frac{\boldsymbol{d_{2030}}}{\boldsymbol{d_{2005}}} = \mathbf{0.17700} * \frac{\boldsymbol{m_{2030}}}{\boldsymbol{m_{2015}}} = \mathbf{0.17700} * \frac{\mathbf{106.17}}{\mathbf{27.63}} = \mathbf{0.68016} \qquad \textbf{(Eq. 19)}$$

This is the 32% reduction desired. It will be difficult to achieve. However, the required schedule of ZEV adoption is also difficult. The values of *z* from the years 2021 to 2025 will be at least as difficult as achieving the 32% reduction. This situation motivates the next case. If electricity could be made cleaner sooner, the years from 2021 to 2025 could be less difficult.

## Computing an LDV Overall Equivalent Fleet Mileage, for the *Balanced_2* Case

The *Balanced_2* case is shown in Table 7.

The *Balanced_2* case is the same as the *Balanced_1* case except it includes an assumption that electricity is 90% renewable in 2030 instead of 85%. Table 7 shows the results using that assumption, which becomes a requirement for this case. For the *Balanced_2* case, the values of *z* are once again assigned to achieve the desired driving-reduction value of 32%.

From the second line of Table 4, this means that the equivalent mileage of the ZEV vehicles is 621.67 MPG.

Eq. 18 becomes:

$$\boldsymbol{G_z = D_z/(621.67)} \qquad \textbf{(Eq. 20)}$$

This is used to compute the gallons of equivalent fuel from the distance, for the ZEV vehicles in Table 7.

The Table 7 $\boldsymbol{z}$ values were put into an EXCEL spread sheet that looks like Table 7. It produced the values shown in Table 7. The *z* values were selected to try to get to the 106.1462 value that was computed in Eq. 11.

Using the Table 7 result of 106.22 MPG into Equation 9, gives the following result:

$$\frac{d_{2030}}{d_{2005}} = 0.17700 * \frac{m_{2030}}{m_{2015}} = 0.17700 * \frac{106.22}{27.63} = 0.68045 \qquad \text{(Eq. 21)}$$

**Table 7 Calculation of 2030 LDV Mileage Assuming the *Balanced_2* Case**

| Year | ICE Parameters and Calculations | | | | | | ZEVs | | | Yearly Totals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CAFÉ MPG | LCFS | Eq. MPG | f | $D_i$ | $G_i$ | $z$ | $D_z$ | $G_z$ | Total Miles | Total Gallons | 2030 MPG |
| 2016 | 34.3 | .927 | 37.01 | .3 | 29.4 | 0.7943 | .02 | 2 | .003 | 31.40 | .7975 | 39.37 |
| 2017 | 35.1 | .920 | 38.15 | .4 | 39.2 | 1.0275 | .02 | 2 | .003 | 41.20 | 1.0307 | 39.97 |
| 2018 | 36.1 | .913 | 39.53 | .5 | 48.5 | 1.2271 | .03 | 3 | .005 | 51.50 | 1.2319 | 41.81 |
| 2019 | 37.1 | .907 | 40.92 | .6 | 57.6 | 1.4077 | .04 | 4 | .006 | 61.60 | 1.4141 | 43.56 |
| 2020 | 38.3 | .900 | 42.56 | .7 | 64.4 | 1.5133 | .08 | 8 | .013 | 72.40 | 1.5262 | 47.44 |
| 2021 | 40.3 | .850 | 47.41 | .8 | 68.0 | 1.4342 | .15 | 15 | .024 | 83.00 | 1.4584 | 56.91 |
| 2022 | 42.3 | .800 | 52.88 | .9 | 67.5 | 1.2766 | .25 | 25 | .040 | 92.50 | 1.3168 | 70.25 |
| 2023 | 44.3 | .800 | 55.38 | 1.0 | 55.0 | 0.9932 | .45 | 45 | .072 | 100.00 | 1.0656 | 93.84 |
| 2024 | 46.5 | .800 | 58.13 | 1.0 | 30.0 | 0.5161 | .70 | 70 | .113 | 100.00 | .6287 | 159.05 |
| 2025 | 48.7 | .800 | 60.88 | 1.0 | 5.0 | 0.0821 | .95 | 95 | .153 | 100.00 | .2349 | 425.62 |
| 2026 | 51.2 | .800 | 64.00 | 1.0 | 3.0 | 0.0469 | .97 | 97 | .156 | 100.00 | .2029 | 492.84 |
| 2027 | 53.7 | .800 | 67.13 | 1.0 | 2.0 | 0.0298 | .98 | 98 | .158 | 100.00 | .1874 | 533.52 |
| 2028 | 56.2 | .800 | 70.25 | 1.0 | 1.0 | 0.0142 | .99 | 99 | .159 | 100.00 | .1735 | 576.42 |
| 2029 | 58.7 | .800 | 73.38 | 1.0 | 1.0 | 0.0136 | .99 | 99 | .159 | 100.00 | .1729 | 578.45 |
| 2030 | 61.2 | .800 | 76.50 | 1.0 | 1.0 | 0.0131 | .99 | 99 | .159 | 100.00 | .1723 | 580.31 |
| **Sum of Miles and then Gallons of Equivalent Fuel:** | | | | | | | | | | **1233.60** | **11.61** | |
| **Equivalent MPG of LDV Fleet in 2030:** | | | | | | | | | | | ***106.22*** | |
| Sum of ZEV Miles = **761**. Fraction of Miles Driven by ZEVs = **61.7%** | | | | | | | | | | | | |

This is the 32% reduction desired. It will be difficult to achieve. However, the required schedule of ZEV adoption is also difficult. The values of $z$ from the years 2021 to 2025 will be at least as difficult as achieving the 32% reduction. However, they are easier to achieve than the values needed in the *Balanced_1* Case. This quantifies the benefit of increasing the renewable fraction of electricity from 85% to 90%.

## Computing an LDV Overall Equivalent Fleet Mileage, for the *2005_Driving* Case

When climate change and transportation policies are discussed, the opinion that we should simply electrify our fleet as soon as possible is often expressed. The idea is that the per-capita driving level does not have to be reduced, if we electrify our fleet fast enough. The relationships developed in this paper enable an analysis to see how this would work. This gives rise to the *2005_Driving* Case. For this case, it is assumed that electricity is 90% renewable.

From the third line of Table 4, this means that the equivalent mileage of the ZEV vehicles is 621.67 MPG. Therefore, the relationship shown in Eq. 20 is used.

The *2005_Driving* case is shown in Table 8.

For the *2005_Driving* case, the values of *z* are assigned to achieve the overall equivalent mileage (MPG) value computed in Eq. 12, which is 156.0974, because that value was computed for there being no change in the per-capita driving from the 2005 value.

Using the result of 155.99 MPG into Equation 9, gives the following result:

$$\frac{d_{2030}}{d_{2005}} = 0.17700 * \frac{m_{2030}}{m_{2015}} = 0.17700 * \frac{155.99}{27.63} = 0.99930 \qquad \textbf{(Eq. 22)}$$

This is the 0% reduction desired. However, the required schedule of ZEV adoption is not possible. Jumping from 8% in 2020 to 82% in 2021 defies reason. It appears that our best bet, to do our part to avoid human extinction, is to proceed with the assumption (and thus requirement) that we are going to have to reduce per-capita driving, as shown in either the *Balanced_1* or the *Balance_2* case.

## Computing an LDV Overall Equivalent Fleet Mileage, for the *Mary_Nichols* Case

Mary Nichols was first appointed to the California Air Resource Board (CARB) in 1975 and became Chair in 1979. After leaving CARB, she founded the Los Angeles Chapter of the Natural Resources Defense Council (NRDC) in 1989. She was reappointed to the position of Chair of

CARB in 2007 by Governor Arnold Schwarzenegger and she is still serving in that position today.

**Table 8 Calculation of 2030 LDV Mileage Assuming the *2005_Driving* Case**

| Year | ICE Parameters and Calculations | | | | | | ZEVs | | | Yearly Totals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CAFÉ MPG | LCFS | Eq. MPG | f | $D_i$ | $G_i$ | $z$ | $D_z$ | $G_z$ | Total Miles | Total Gallons | 2030 MPG |
| 2016 | 34.3 | .9267 | 37.01 | .3 | 29.4 | .7943 | .02 | 2.0 | .003 | 31.40 | 0.7975 | 39.37 |
| 2017 | 35.1 | .9200 | 38.15 | .4 | 39.2 | 1.0275 | .02 | 2.0 | .003 | 41.20 | 1.0307 | 39.97 |
| 2018 | 36.1 | .9133 | 39.53 | .5 | 48.5 | 1.2271 | .03 | 3.0 | .005 | 51.50 | 1.2319 | 41.81 |
| 2019 | 37.1 | .9067 | 40.92 | .6 | 57.6 | 1.4077 | .04 | 4.0 | .006 | 61.60 | 1.4141 | 43.56 |
| 2020 | 38.3 | .9000 | 42.56 | .7 | 64.4 | 1.5133 | .08 | 8.0 | .013 | 72.40 | 1.5262 | 47.44 |
| 2021 | 40.3 | .8500 | 47.41 | .8 | 14.4 | .3037 | .82 | 82.0 | .132 | 96.40 | 0.4356 | 221.29 |
| 2022 | 42.3 | .8000 | 52.88 | .9 | 2.7 | .0511 | .97 | 97.0 | .156 | 99.70 | 0.2071 | 481.42 |
| 2023 | 44.3 | .8000 | 55.38 | 1.0 | 1.0 | .0181 | .99 | 99.0 | .159 | 100.00 | 0.1773 | 563.99 |
| 2024 | 46.5 | .8000 | 58.13 | 1.0 | 1.0 | .0172 | .99 | 99.0 | .159 | 100.00 | 0.1765 | 566.72 |
| 2025 | 48.7 | .8000 | 60.88 | 1.0 | 1.0 | .0164 | .99 | 99.0 | .159 | 100.00 | 0.1757 | 569.23 |
| 2026 | 51.2 | .8000 | 64.00 | 1.0 | 1.0 | .0156 | .99 | 99.0 | .159 | 100.00 | 0.1749 | 571.84 |
| 2027 | 53.7 | .8000 | 67.13 | 1.0 | 1.0 | .0149 | .99 | 99.0 | .159 | 100.00 | 0.1741 | 574.23 |
| 2028 | 56.2 | .8000 | 70.25 | 1.0 | 1.0 | .0142 | .99 | 99.0 | .159 | 100.00 | 0.1735 | 576.42 |
| 2029 | 58.7 | .8000 | 73.38 | 1.0 | 1.0 | .0136 | .99 | 99.0 | .159 | 100.00 | 0.1729 | 578.45 |
| 2030 | 61.2 | .8000 | 76.50 | 1.0 | 1.0 | .0131 | .99 | 99.0 | .159 | 100.00 | 0.1723 | 580.31 |
| **Sum of Miles and then Gallons of Equivalent Fuel:** | | | | | | | | | | **1254.20** | **8.04** | |
| **Equivalent MPG of LDV Fleet in 2030:** | | | | | | | | | | ***155.99*** | | |
| Sum of ZEV Miles = **990.0** Fraction of Miles Driven by ZEVs = **78.9%** | | | | | | | | | | | | |

The following quote[13] inspires the *Mary_Nichols* Case:

*Regulations on the books in California, set in 2012, require that 2.7 percent of new cars sold in the state this year be, in the regulatory jargon, ZEVs. These are defined as battery-only or fuel-cell cars, and plug-in hybrids. The quota rises every year starting in 2018 and reaches 22 percent in 2025. Nichols wants 100 percent of the new vehicles sold to be zero- or almost-zero-emissions by 2030*

The mathematical relationships developed in this paper make it possible to determine the driving reduction that would be required if it is desired to stabilize the climate at a livable level, assuming the schedule of fleet electrification implied by the above quote. Electricity is required to be 90% renewable. The results of the *Mary_Nichols* Case are shown in Table 9.

The corresponding driving reduction is computed using Eq. 9.

$$\frac{d_{2030}}{d_{2005}} = 0.177005 * \frac{m_{2030}}{m_{2015}} = 0.177055 * \frac{77.24}{27.63} = 0.495 \quad \textbf{(Eq. 14)}$$

This means that the per-capita driving will need to be about 50% less in 2030 than in year 2005. It is not known if CARB understands this.

The official policy of the California Democratic Party (CDP) is expressed in its Platform. A statement that applies to this report and to CARB can be viewed by looking at the California Democratic Party (CDP) website, then select "About Us", "Standing Committees", "Platform Committee", "2020 Platform", and finally "Energy and Environment Plank". In that Plank, the following statement is found

- *Demand a state plan specifying how cars and light-duty trucks can meet climate-stabilizing targets by defining enforceable measures to achieve necessary fleet efficiency and per-capita driving limits;*

However, your author's efforts to get CARB to do such a "state plan", or to convince a state legislator to write legislation to direct CARB to do such a plan, have not been successful.

If CARB would do such a plan or would consider the results of this report, they would perhaps decide to push for a more ambitious fleet electrification schedule and would also push for state legislation and regulation to enact measures to reduce VMT.

## Preliminary Conclusions Drawn from the Results of the Four Cases Run

Table 10 is a summary showing the most important results of the four cases considered. The purple-colored entries denote difficult requirements; red denotes nearly impossible.

Considering the *Balance_1* and the *Balanced_2* cases and the fleet electrification schedules for each, it is first concluded that California needs to work to get its electricity to be at least 85% renewable by 2030 and furthermore that getting it to be 90% from renewables by 2030 would make the electrification schedule much easier.

**Table 9 Calculation of 2030 LDV Mileage Assuming the *Mary_Nichols* Case**

| Year | ICE Parameters and Calculations | | | | | | ZEVs | | | Yearly Totals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CAFÉ MPG | LCFS | Eq. MPG | f | $D_i$ | $G_i$ | $z$ | $D_z$ | $G_z$ | Total Miles | Total Gallons | 2030 MPG |
| 2016 | 34.3 | .9267 | 37.01 | .3 | 29.2 | .7886 | .027 | 2.7 | .004 | 31.89 | 0.7930 | 40.22 |
| 2017 | 35.1 | .9200 | 38.15 | .4 | 38.9 | 1.0201 | .027 | 2.7 | .004 | 41.62 | 1.0245 | 40.63 |
| 2018 | 36.1 | .9133 | 39.53 | .5 | 47.4 | 1.2003 | .051 | 5.1 | .008 | 52.56 | 1.2086 | 43.49 |
| 2019 | 37.1 | .9067 | 40.92 | .6 | 55.5 | 1.3560 | .075 | 7.5 | .012 | 63.01 | 1.3681 | 46.06 |
| 2020 | 38.3 | .9000 | 42.56 | .7 | 63.0 | 1.4814 | .099 | 9.9 | .016 | 72.98 | 1.4974 | 48.74 |
| 2021 | 40.3 | .8500 | 47.41 | .8 | 70.1 | 1.4790 | .124 | 12.4 | .020 | 82.47 | 1.4988 | 55.02 |
| 2022 | 42.3 | .8000 | 52.88 | .9 | 76.7 | 1.4509 | .148 | 14.8 | .024 | 91.48 | 1.4746 | 62.03 |
| 2023 | 44.3 | .8000 | 55.38 | 1.0 | 82.8 | 1.4957 | .172 | 17.2 | .028 | 100.00 | 1.5233 | 65.65 |
| 2024 | 46.5 | .8000 | 58.13 | 1.0 | 80.4 | 1.3834 | .196 | 19.6 | .032 | 100.00 | 1.4149 | 70.67 |
| 2025 | 48.7 | .8000 | 60.88 | 1.0 | 78.0 | 1.2813 | .220 | 22.0 | .035 | 100.00 | 1.3167 | 75.95 |
| 2026 | 51.2 | .8000 | 64.00 | 1.0 | 62.4 | 0.9750 | .376 | 37.6 | .060 | 100.00 | 1.0355 | 96.57 |
| 2027 | 53.7 | .8000 | 67.13 | 1.0 | 46.8 | 0.6972 | .532 | 53.2 | .086 | 100.00 | 0.7828 | 127.75 |
| 2028 | 56.2 | .8000 | 70.25 | 1.0 | 31.2 | 0.4441 | .688 | 68.8 | .111 | 100.00 | 0.5548 | 180.25 |
| 2029 | 58.7 | .8000 | 73.38 | 1.0 | 15.6 | 0.2126 | .844 | 84.4 | .136 | 100.00 | 0.3484 | 287.05 |
| 2030 | 61.2 | .8000 | 76.50 | 1.0 | 0.0 | 0.0000 | 1.000 | 100.0 | .161 | 100.00 | 0.1609 | 621.67 |
| **Sum of Miles and then Gallons of Equivalent Fuel:** | | | | | | | | | | **1236.00** | **16.00** | |
| **Equivalent MPG of LDV Fleet in 2030:** | | | | | | | | | | | ***77.24*** | |
| Sum of ZEV Miles = **457.9**. Fraction of Miles Driven by ZEVs = **37.0%** | | | | | | | | | | | | |

Certainly, achieving a 32% reduction in driving in 2030 compared to the 2005 level will be difficult. However, increasing the rate of fleet electrification, from what is shown in the *Balanced_1* and *Balanced_2* cases ($z$, in Tables 6 and 7) would be even more difficult.

**Table 10** **Four-Case Summary of Requirements**

| | Case Designations | | | |
|---|---|---|---|---|
| | Balanced_1 | Balanced_2 | 2005 Driving | Mary Nichols |
| % Renewable Electricity | 85.0% | 90.0% | 90.0% | 90.00% |
| *% ZEVs, Year 2016* | 2.0% | 2.0% | 2.0% | 2.70% |
| *% ZEVs, Year 2017* | 2.0% | 2.0% | 2.0% | 2.70% |
| *% ZEVs, Year 2018* | 3.0% | 3.0% | 3.0% | 5.11% |
| *% ZEVs, Year 2019* | 4.0% | 4.0% | 4.0% | 7.53% |
| *% ZEVs, Year 2020* | 8.0% | 8.0% | 8.0% | 9.94% |
| *% ZEVs, Year 2021* | 20.0% | 15.0% | 82.0% | 12.35% |
| *% ZEVs, Year 2022* | 35.0% | 25.0% | 97.0% | 14.76% |
| *% ZEVs, Year 2023* | 55.0% | 45.0% | 99.0% | 17.18% |
| *% ZEVs, Year 2024* | 80.0% | 70.0% | 99.0% | 19.59% |
| *% ZEVs, Year 2025* | 94.0% | 95.0% | 99.0% | 22.00% |
| *% ZEVs, Year 2026* | 97.0% | 97.0% | 99.0% | 37.60% |
| *% ZEVs, Year 2027* | 98.0% | 98.0% | 99.0% | 53.20% |
| *% ZEVs, Year 2028* | 99.0% | 99.0% | 99.0% | 68.80% |
| *% ZEVs, Year 2029* | 99.0% | 99.0% | 99.0% | 84.40% |
| *% ZEVs, Year 2030* | 99.0% | 99.0% | 99.0% | 100.00% |
| *% Reduction in Per-Capita Driving With Respect to Year 2005* | 32.0% | 32.0% | 0% | 50.5% |

Besides that, it should be recognized that California alone cannot stabilize our earth's climate. California's best hope is to set an example for other states and other countries. Taking too many of the world's production of electric vehicles will not work. For a more specific example, lithium batteries may be in short supply and so it may be counterproductive for California to have more than its fair share, thus preventing other states and countries from electrifying their fleet at the required rate. The rates of electrification shown for the *Balanced_1* and the *Balanced_2* cases are aggressive enough, as shown by the purple-colored entries.

California needs to adopt a set of requirements to achieve the 32% reduction. If CARB wants to work to have California legislate requirements to achieve the *Mary Nichol*'s case of a 50% reduction in driving, that would also work and allow more electric cars to go to other states and countries. However the 50% reduction in per-capita driving might be politically impossible at this time.

Since the 32% reduction seems prudent, it begs the question as to what this means in terms of roadway congestion.

The net (as opposed to the per-capita) driving change, going from 2005 to 2030 can be computed by multiplying the per-capita driving factor corresponding to the 32% reduction, which is 0.68, by the population factor of 1.1744, computed in Equation 7. The product of these two values is 0.7986. This means that, even with the 17% increase in California's population, the net driving will have to drop by the factor of about 0.80, or by 20%. If this LDV-driving-reduction requirement (of 0.68) is selected, all of California's transportation money can be used to improve transit, improve active transportation (mainly walking and biking), and maintain, but not expand, roads. There can be little or no congestion because California highway capacity now is larger than it was in 2005 while the state's net driving must drop by 20%.

## ACHIEVING THE REQUIRED DRIVING REDUCTION OF THE *BALANCED_1* AND THE *BALANCED_2* CASES

As shown in Equation 19, for the *Balanced_1* case, and in Equation 21 for the *Balanced_2* Case, in 2030, the per-capita driving will need to be 32% below the 2005 value. As shown in this link, https://en.wikipedia.org/wiki/Sustainable_Communities_and_Climate_Protection_Act_of_2008 , California's Metropolitan Planning Organizations (MPOs) are adopting Region Transportation Plans (RTPs) that will achieve reductions in year 2020 and 2035. The convention adopted in this report for these reductions, specifically the per-capita driving reduction with respect to the per-capita driving in 2005, matches the SB 375 convention. As shown in the link, the targets, for year 2035, range from 0% for the Shasta MPO to 16% for Sacramento Area Council of Governments. However, it may be true that some of the 2035 requirements have been revised upwards, to be as large as 19% for some MPOs. Since the climate stabilization target year here is 2030 instead of 2035, and to be reasonably conservative, it is assumed here that the state (this is for all MPOs) will achieve a 12% reduction in per-capita driving, in 2030, compared to 2005. This leaves approximately 20% to be achieved by new requirements.

The title of each of the following subsections contains the estimated per-capita driving reduction each strategy will achieve, by 2030.

## Reallocate Funds Earmarked for Highway Expansion to Transit and Consider Transit-Design Upgrades (2%)

San Diego County has a sales tax measure called "TransNet", which allocates approximately one-third for highway expansion, one-third for transit, and one-third for road maintenance. It has a provision that allows for a reallocation of funds, if supported by at least two-thirds of SANDAG Board members, including a so-called weighted vote, where governments are given a portion of 100 votes, proportional to their population. This requirement would be to reallocate the TransNet amount, earmarked for highway expansion, to transit and to do similar reallocations throughout California.

This money could be used to fund additional transit systems; improve transit operations; and/or fund the redesign and implementation of the redesign of existing transit systems. The redesign could include electrification and automation (including automation of fare collection and such features as screening passengers to prevent them from boarding if they have a fever or are in a "test positive" database) or even upgrading to a different transit technology.

## A Comprehensive Road-Use Charge (RUC) Pricing and Payout System to Unbundle the Cost of Operating Roads (10%)

*Comprehensive* means that pricing would be set to cover all costs (including road maintenance and externalities such as harm to the environment and health); that privacy and the interests of low-income drivers doing necessary driving would be protected; that the incentive to drive fuel-efficient cars would be at least as large as it is under the current fuels excise tax; and finally, as good technology becomes available, congestion pricing is used to protect critical driving from congestion.

The words *payout* and *unbundle* mean that some of the money collected would go to people that are losing money under the current system.

User fees (gas taxes and tolls) are not enough to cover road costs[10] and California is not properly maintaining its roads. Reference 10 shows that in California user fees amount to only 24.1% of what is spent on roads. Besides this, the improved mileage of the ICEs and the large number of ZEVs mean that gas tax revenues will drop precipitously.

This RUC system could be used to help reduce the ICE LDV miles driven in 2016 to 2022, as shown in the "f" column of Tables 6 through 9. This system could probably be implemented in less than 2 years if the urgency of our climate crisis is recognized..

## Unbundling the Cost of Car Parking (8%)

Unbundling the cost of car parking[11] throughout California is conservatively estimated to decrease driving by 8%, based on Table 1 of Reference 11. That table shows driving reductions that occur in response to introducing a price, for 10 cases. Its average reduction in driving is 25% and its smallest reduction is 15%. However, these numbers are for individual cases whereas the 8% is the decrease in driving in California, due to introducing value pricing where there is a zero price today, or where the price is below its value price. These concepts are explained in Reference 11.

The first such systems should be installed by a (RFP is Request for Proposal) RFP-process-identified, third-party vendor, such as Google, Qualcomm, Uber, or Lime Bicycle, for municipal government employees, as part of the government's Climate Action Plan. The system would be operated for the financial gain of the employees, with a hard requirement in the RFP that even

employees that continue to drive every day would at least break even. The winning third-party vendor would be skilled at monetizing parking whenever it is not being used by the employees and skilled at monetizing data. The parking system would be fully automated, like Uber, except with a more useful phone app that would find the best parking at the user-specified price and walk-distance. The parking would be available to all drivers driving a car registered in the system. Briefly stated, the system is value priced, shared, automated, and provides earnings to all the people that are effectively losing wages or paying higher costs because the parking is being provided. The vendor would also be good at expanding the system both geographically and over all types of uses, in an economically disruptive way; as Uber and Lyft did to the taxi cab industry. The system would be as easy to use as "free" parking, once the car is registered. It would utilize congestion pricing to protect the desired maximum-occupancy rate.

## Good Bicycle Projects

The best criterion for spending money for bicycle transportation is the estimated reduction in driving per the amount spent. The following strategies may come close to maximizing this parameter.

***Projects to Improve Bicycle Access (1%)***

All of the smart-growth neighborhoods, central business districts, and other high-trip destinations or origins, both existing and planned, should be checked to see if bicycle access could be substantially improved with either a traffic calming project, a "complete streets" project, more shoulder width, or a project to overcome some natural or made-made obstacle. For example, in some cases, long stretches of freeways cut off bicycle passage on surface streets that are perpendicular to the freeway. In some of these cases, a bicycle bridge over the freeway would be cost effective.

***League-of-American-Bicyclist-Certified (LCI) Instruction of "Traffic Skills 101" (1%)***

Most serious injuries to bike riders occur in accidents that do not involve a motor vehicle[12]. Most car-bike accidents are caused by wrong-way riding and errors in intersections; the clear-cut-hit-from-behind accident is rare[12].

After attending *Traffic Skills 101,* students that pass a rigorous written test and demonstrate proficiency in riding in traffic and other challenging conditions, in passing an on-road-riding test, would be paid for their time and effort.

As an example of what could be done in San Diego County, if the average class size was 3 riders per instructor and each rider passes both tests and earns $100 and if the instructor, with overhead, costs $500 dollars, for a total of $800 for each 3 students, that would mean that $160M could teach $160M/$800 = 200,000 classes of 3 students, for a total of 600,000 students. The population of San Diego County is around 3 million.

## Eliminate or Greatly Increase the Maximum Height and Density Limits Close to Transit Stops that Meet Appropriate Service Standards (2%)

As sprawl is reduced, more compact, transit-oriented development (TOD) will need to be built. This strategy will incentivize a consideration of what level of transit service will be needed, how it can be achieved, and what levels of maximum height and density are appropriate. Having no limits at all is reasonable if models show that the development can function without harming the existing adjacent

neighborhoods, given the level of transit service and other supporting transportation policies (such as car parking that unbundles the cost and supports the full sharing of parking[12]) that can be assumed.

## Complete Streets (Streets designed for all users), "Road Diets", and "Traffic Calming", Such as Replacing Signalized Intersections with Roundabouts (1%)

These projects will encourage active transportation, such as bicycling and walking. These projects also fit well with the addition of TOD and increasing density. They will reduce speeds and therefore reduce noise. The noise reduction and increased safety will encourage people to want to live on and around the redesigned arterials where they would not want to have lived before. People will also be more inclined to shop and to work in such surroundings.

## Net Driving Reduction from All Identified Strategies

By 2030, the sum of these strategies should be realized as shown in Table 11.

# CONCLUSION

The urgency of our climate crisis dictates that California should develop plans such as the cases considered in this paper for a climate-stabilizing target year of 2030. The state needs to select a case and move forward with legislation and implementation. The cases considered in this paper indicate that California should achieve electricity that is at least 85% from renewable sources and a per-capita driving reduction of at least 32% with respect to 2005 driving levels. The eight driving-reducing requirements described in this paper are an example of how this could be done.

**Table 11 Requirements to Achieve a 32% Reduction in 2030 Per-Capita Driving, with Respect to 2005**

| Driving Reduction Requirements | Percent Reduction | Factor |
|---|---|---|
| Legislated (SB 375) Plans to Reduce Driving | 12% | 0.88 |
| Value-Priced Road Use Charge (RUC) | 10% | 0.90 |
| Value-Priced Parking (Unbundling the Cost) | 8% | 0.92 |
| Transfer Highway Expansion Funds to Transit | 2% | 0.98 |
| Increase Height & Density by Transit Stations | 2% | 0.98 |
| "Complete Streets", "Road Diet" (walk/bike) | 1% | 0.99 |
| *Pay-to-Graduate* Bicycle Traffic-Skills Class | 1% | 0.99 |
| Bicycle Projects to Improve Access | 1% | 0.99 |
| **Product of Factors** | | 0.68 |
| **% Reduction** | | **32%** |

## ABREVIATIONS AND ACRONYMS

| | |
|---|---|
| **AB 1493** | California's Assembly Bill 1493 |
| **AB 32** | California's Assembly Bill 32 |
| **APS** | Alternative Planning Strategy |
| **CAFE** | Corporate Average Fleet Efficiency |
| **CARB** | California Air Resources Board |
| **CBD** | Center for Biological Diversity |
| **CEQA** | California Environmental Quality Act |
| **CCAP** | Center for Clean Air Policy |
| **CNFF** | Cleveland National Forest Foundation |
| **SB 375** | California's Senate Bill 375 |
| **$CO_2$** | Carbon Dioxide |
| **$CO_2$_e** | Carbon Dioxide Equivalent GHG |
| **EHM** | "Extra Heroic Measures" LDV Case |
| **GEO** | Governor's Executive Order |
| **ICE** | Internal Combustion Engine LDV |
| **kW-h** | Kilo Watt-hour |
| **LCFS** | Low Carbon Fuel Standard |
| **LDV** | Light-Duty Vehicle |
| **MPO** | Metropolitan Planning Organization |
| **Pavley** | Senator Pavley's AB 1493 |
| **PPM** | Parts per Million |
| **RPS** | Renewable Portfolio Standard |
| **RTP** | Regional Transportation Plan |
| **S-3-05** | Governor's Executive Order S-3-05 |
| **SANDAG** | San Diego Association of Governments |
| **SCS** | Sustainable Community Strategy |
| **TransNet** | San Diego County sales tax |

| | | | |
|---|---|---|---|
| **GHG** | Greenhouse gas | **URL** | Universal Resource Locator |
| **GW-h** | Giga Watt-Hours | **VMT** | Vehicle Miles Travelled |
| **HM** | "Heroic Measures" LDV Case | **ZEV** | Zero Emission Vehicle LDV |

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## KEYWORDS

Driving, climate, mandates, S-3-05, SB 375, RTP, CEQA, Unbundled, GHG, CAFÉ, ZEVs

# Dividend-Account Parking: Feasible & Enforceable Mitigation

**Updated from Air and Waste Management Association Paper 2010-A-554-AWMA**

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## ABSTRACT

*Bundled-cost* and *bundled-benefit* car-parking systems (generally called "free parking") are defined, showing that they are not free and that they increase the drive-alone mode, since non-drivers lose just as much money as those that use the parking.

*Dividend-Account Parking* (DAP) is defined as a parking system in which all of the parking spaces are *shared* by all drivers that are driving a car that is registered in the system. "Registered" means that the car can be associated with a person having an *account* in the system. The parking is *value-priced*, with an option for a *congestion pricing overlay*. The critical final feature is that the earnings (*dividends*) are given to the people, for whom the parking is built, such as employees, shoppers, residents of apartments or condominiums, students, or train riders. It is stated that this system is defined in the California Democratic Party (CDP) Platform, making it the official policy of the largest political, environmental, and public-policy-advocacy organization in California. It is also at the center of the Sierra Club's lawsuit against the San Diego County's Climate Action Plan (CAP). The court has found in multiple rulings that DAP is feasible mitigation.

Motivations for change are provided, mostly based on an Air and Waste Management Association paper, *Climate-Stabilizing California Light-Duty-Vehicle (LDV) Requirements*. The following is shown:

1. Parking reform is needed, since fleet electrification, while critically needed (ASAP), cannot, under even the most wildly-optimistic assumptions, achieve the needed GHG emission reduction, for light-duty vehicles (LDVs), soon enough to achieve climate-stabilizing targets.
2. Per-capita driving must be reduced.

It is asserted that parking reform has a large role to play.

DAP is presented as a feasible, enforceable, mitigation measure for any Climate Action Plan or for any application where sustainability is a goal.

## 100 word summary:

*Bundled-cost* and *bundled-benefit* car-parking systems (erroneously called "free") are defined, showing that they are not free and that they increase the drive-alone mode, since non-drivers lose just as much money as drivers, due to the parking.

Dividend Account Parking (DAP) is presented as a mitigation measure for any Climate Action Plan (CAP) or for any application where sustainability is a goal. The parking is shared, convenient, fully automated, and value priced with a congestion-pricing algorithm. Earnings go to those losing money because the parking is provided.

Motivations are provided, based on an Air and Waste Management Association (AWMA) paper.

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It is asserted that parking reform has a large role to play.

DAP is presented as a feasible, enforceable, mitigation measure for any Climate Action Plan or for any application where sustainability is a goal.

It shows documented driving reductions due to the pricing of parking. It notes that although the benefits of priced and shared parking are known, such parking has not been widely implemented, due to understandable concerns. It states that a system solution, called *Dividend-Account Parking*, can overcome these concerns, because it would be is easy to use, share, understand, and support. The system operates the parking to maximize the financial gain of those losing money because of the parking. Eight background informational items are provided, including how value-priced parking would help California achieve greenhouse gas (GHG) reduction targets. Arguments for less parking, shared parking, and priced parking are made. Barriers to progress are identified. The fair pricing of parking is described. Seven goals of *Dividend-Account Parking* are listed. Eleven definitions and concepts that define *Dividend-Account Parking* are given. This includes a method to compute a baseline price of parking and how to adjust that price instantaneously to keep the vacancy above 15%. That price adjustment implements "Congestion Pricing." This information is sufficient to support a "Request for Proposal" (RFP) process to get a *Dividend-Account Parking* design. An implementation strategy is provided.

## INTRODUCTION:

It has been well established that appropriately priced parking will significantly reduce driving[1]. Most case studies presented in Table 1 are evaluations of the most general type of "car-parking cash-out": *a program that pays employees extra money each time they get to work without*

*driving*. They show that a price differential between using parking and not using parking will significantly reduce driving, even when transit is described as poor. Since driving *must* be reduced[2], the pricing of parking is desirable.

Shared parking is also recognized as desirable because it can sometimes result in less parking being needed.

Although the advantages of pricing and sharing parking have been recognized for many years, these practices are still rare. This paper identifies some of the reasons for this lack of progress. The pricing and sharing method of this paper has a natural transparency and ease of use that would reduce many of the concerns. This paper also suggests that those governments that have the necessary resources can take the lead role in developing and implementing the described systems. These governments will recover their investments, over time.

This paper describes how parking facilities could be tied together and operated in an optimum system, named *Dividend Account Parking (DAP)*. The description of *Dividend Account Parking (DAP)* is sufficient to support a "Request for Proposal" process, leading to full implementation.

There are two distinct parts to *Dividend Account Parking (DAP)*. The first is how to set the price. The second is how to distribute the earnings. Briefly, the earnings go to the individuals in the group for whom the parking is built.

**Table 1 Eleven Cases of Pricing Impact on Parking Demand**

| Location | Number of Workers @ Number of Firms | 1995 $'s Per Mo. | Parking Use Decrease |
|---|---|---|---|
| ***Group A: Areas with poor public transportation*** | | | |
| West Los Angeles | 3500 @ 100+ | $81 | 15% |
| Cornell University, Ithaca, NY | 9000 Faculty & Staff | $34 | 26% |
| San Fernando Valley, Los Angeles | 850 @ 1 | $37 | 30% |
| Costa Mesa, CA | Not Shown | $37 | 22% |
| **Average for Group** | | **$47** | **23%** |
| ***Group B: Areas with fair public transportation*** | | | |
| Los Angeles Civic Center | 10,000+ @ "Several" | $125 | 36% |
| Mid-Wilshire Blvd, Los Angeles | 1 "Mid-Size" Firm | $89 | 38% |
| Washington DC Suburbs | 5,500 @ 3 | $68 | 26% |
| Downtown Los Angeles | 5,000 @ 118 | $126 | 25% |
| **Average for Group** | | **$102** | **31%** |
| ***Group C: Areas with good public transportation*** | | | |
| U. of Washington, Seattle, WA | 50,000 employees, students | $18 | 24% |
| Downtown Ottawa, Canada | 3,500 government staff | $72 | 18% |
| Bellevue, WA | 430 @ 1 | $54 | 39%* |
| **Average for Group, except Bellevue, WA Case*** | | **$45** | **21%** |
| **Overall Average, Excluding Bellevue, WA Case*** | | | **25%** |

* Bellevue, WA case was not used in the averages because its walk/bike facilities also improved and those improvements could have caused part of the decrease in driving.

## PERTINENT BACKGROUND INFORMATION

- Vehicle miles traveled (VMT) are a major cause of global warming and pollution[2, 3].
- California's Metropolitan Planning Organizations (MPOs) will need to adopt strategies that reduce vehicle miles traveled (VMT), in order to meet SB375 GHG reduction targets, to be issued by the California Air Resources Board in late 2010, for years 2020 and 2035[2].
- The appropriate pricing of parking is one of the least costly documented tools to reduce VMT.
- New technologies, such as sensors feeding computer-generated billing, offer the potential to efficiently bill drivers for parking and alert law enforcement of trespassers.
- Reformed parking policies can increase fairness, so that, for example, people who use transit or walk do not have to pay higher prices or suffer reduced wages, due to parking.
- Methods to unbundle parking cost are inefficient unless they support the spontaneous sharing of parking spaces. Shared parking with unbundled cost would ultimately allow cities to require significantly less parking.
- Typical systems of timed parking and metered parking are far from ideal. Parking has no automated record keeping, so it is difficult to know where there is too much or too little.
- Good policies will eventually let cities turn parking minimums into parking maximums.

## A GLIMPSE INTO A POSSIBLE FUTURE

Jason is driving to work for the first time in several years. He has decided to save money by carrying home a new 3-D, big-screen computer, which he plans to purchase at a store near his office after work. He wanted to avoid paying delivery charges.

Things have been changing around his office development since they unbundled the cost of parking at the near-by train station. Many people who caught the early trains and lived close to the station stopped driving and parking in the best parking spaces; demand for housing close to the station went up; and wealthy riders, who insisted on driving, did so, confidant that they could always find parking as close to the platform as their schedules required, due to congestion pricing. Who would have guessed how much those people were willing to pay? It was shocking. Parking-lot earnings, paid to round-trip train riders, meant that the net cost to ride the train went significantly down. Ridership and neighborhood vitality both went significantly up. All Jason knew was that the price to park at his office had been going up yearly because of increased land values. His parking-lot earnings from his office had been increasing almost every month, due to the ripple effect of train riders parking off-site at cheaper parking. Some of them were using his office parking.

As he pulls out of his driveway, he tells his GPS navigation unit his work hours (it already knew his office location), the location of the store where he plans to buy the computer, and his estimated arrival and departure times at the store. He tells the GPS unit he wants to park once, park no more than 1 block from the store, walk no more than 1 mile total, and pay no more than an average of $2 per hour to park. He is not surprised to hear the GPS tell him that his request is

impossible. He tells the GPS he will pay an average of $3 per hour and learns that the GPS has located parking.

It guides him into a church parking lot. He hopes the church will use his money wisely. The GPS tells him the location of a bus stop he could use to get to work and the bus's next arrival time at the stop. With automatic passenger identification and billing, the bus has become easy to use, except that it is often crowded. Jason gets out of the car and walks to work, with no action required regarding the parking.

Three weeks later, when Jason gets his monthly statement for his charges and income for automotive road use, transit use, parking charges, and parking earnings, he finds that the day's parking did indeed cost about $30 for the 10 total hours that he parked. He notes that the parking-lot earnings for his office parking averaged about $10 per day that month. He then notices the parking lot earnings from the store, where he spent about $1000 dollars. He sees that the parking-lot earnings percent for the store that month was 1.7%, giving him about $17. So for the day, Jason only spent a net of about $3 on parking. Then he realized that he should have had the computer delivered after all. If he would have bicycled that day, as he usually did, he would have still gotten the $27 earnings from the two parking facilities and he would have paid nothing for parking. So the choice to drive cost him $30. He remembers that the delivery would have only been $25 dollars. Oh well. He enjoyed his before-work and after-work walks.

## THE CASE FOR LESS PARKING

Less parking will support more compact development.[1] This makes walking and biking more enjoyable and less time consuming. There would certainly be less "dead space", which is how parking lots feel to people, whether they arrive by car or not, after they become pedestrians.

Since parking can be expensive, less parking can reduce overhead costs significantly, such as leasing expense and parking-lot maintenance cost. Less overhead means more profit and less expense for everyone. A need for less parking can create redevelopment opportunities at existing developments and reduce project cost at new developments.

At new developments, car-parking costs could prevent a project from getting built.[2]

## THE CASE FOR SHARED PARKING

Shared parking for mixed uses means that less parking is needed. For example, shared parking could be used mostly by employees during the day and mostly by residents at night.

Fully shared parking means that very little parking would be off limits to anyone. In a central business district with shared parking, drivers would be more likely to park one time per visit, even when going to several locations. Pedestrian activity adds vitality to any area.

## THE CASE FOR APPROPRIATELY-PRICED PARKING

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[1] This is especially true of surface parking, which only accommodates 120 cars per acre.

[2] On September 23, 2008, a panel of developers reviewed the Oceanside, Ca. "Coast Highway Vision" http://www.ci.oceanside.ca.us/pdf/chv_finalvisionstrategicplan.pdf. Parts of this plan were described as smart growth.

At the review, developer Tom Wiegel said, "Parking is the number 1 reason to do nothing," where "do nothing" meant "build no project." The other developers at the meeting agreed.

## To Reduce Driving Relative to Zero Pricing

### *Traditional Charging or Paying Cash-out Payments*

As shown in the Introduction, this relationship (pricing parking reduces driving) is not new.[3]

Using results like Table 1, at least one study[4] has used an assumption of widespread pricing to show how driving reductions could help meet greenhouse gas (GHG) target reductions. Dr. Silva Send of EPIC http://www.sandiego.edu/epic/ghgpolicy/ assumes that all work locations with 100 employees or more in San Diego County will implement cash-out, to result in 12% less driving to work. Currently, almost all employees in San Diego County "park for free", unless they happen to work in a downtown core area.

### *Current, Best-Practice "Unbundling"*

The "best-practice" use of the phrase, "unbundled parking cost", is to describe the case where either the cost of parking, for the case of a condominium, or the rent for parking, for the case of an apartment, is separated from either the purchase price and common fees or the rent of the dwelling unit.

This gives the resident families the choice of selecting the number of parking spaces they would like to rent or buy, including the choice of zero. This would tend to reduce the average number of cars owned per dwelling unit and, in this way, would also tend to reduce driving. Its major drawback is that this method does not encourage sharing.

## To Increase Fairness and Protect the US Economy

It is stated above that almost all employees in San Diego County "park for free". Of course there is really no such thing as "parking for free". So-called "free parking" always reduces wages or increases costs. At a work site, it reduces everyone's wage, even those employees that never drive. At an apartment complex, so-called "free parking" increases the rent. Therefore, "free parking" at work or at apartments violates the fundamental rule of the free market, which is that people should pay for what they use and not be forced to pay for what they do not use. Parking should at least be priced to achieve fairness to non-drivers.

The US economy would also benefit. Reductions in driving would lead to reductions in oil imports, which would reduce the US trade deficit.[4]

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[3] For many years the Victoria Transport Policy Institute (VTPI) has been recognized as a source of reliable information on "Transportation Demand Management", or TDM.

From http://www.vtpi.org/tdm/tdm72.htm#_Price_Parking:

> Even a relatively small parking fee can cause significant travel impacts and provide significant TDM benefits.

"TDM Benefits" refers to the many public and private benefits of having fewer people choosing to drive.

[4] From http://en.wikipedia.org/wiki/Balance_of_trade#Warren_Buffett_on_trade_deficits, Warren Buffet wrote in 2006,

> "The U.S. trade deficit is a bigger threat to the domestic economy than either the federal budget deficit or consumer debt and could lead to political turmoil. Right now, the rest of the world owns $3 trillion more of us than we own of them."

## BARRIERS TO PROGRESS

Given all this, it might seem that the widespread pricing of parking should have happened by now. However there are barriers. In 2007, a majority of the City Council of Cupertino, Ca. indicated that they wanted their City Manger to negotiate reduced parking requirements with any company that would agree to pay sufficient cash-out payments. To this date, no company, including Apple Inc., has expressed an interest. Most companies probably perceive cash-out as expensive. Even if they realize they could get a reduced parking requirement in exchange for paying sufficient cash-out amounts and even if the economics worked in support of this action (quite possible where land is expensive), they want to stay focused on their core business, instead of getting involved in new approaches to parking, real estate, and redevelopment.

On the other hand, simply charging for parking and then giving all the employees a pay raise is probably going to run into opposition from the employees, who will feel that they would be losing a useful benefit.

In addition, neighbors fear the intrusion of parked cars on their streets. Permit parking, which could offer protection, is not always embraced. City Council members know that a sizable fraction of voting citizens believe that there can actually never be too much "free parking", Professor Shoup's famous book[5] notwithstanding. Some Council members probably feel that way themselves.

It doesn't help that current methods of charging for downtown parking are often very inefficient.[5] For example, downtown Oceanside, California has parking meters that will only accept coins. Besides this, all their on-street, downtown parking is timed, with maximums from 10 minutes to 4 hours. These time limits are enforced by a city employee, who applies chalk from a tire to the street and then records the time. However, by watching the time and moving their car soon enough, drivers can avoid getting a ticket. Of course, they could instead drive to the mall and not have to worry about having coins or elapsed time since parking. It is not surprising that downtown merchants often object to charging for parking.

In summary, those that resist charging for parking, *based on their perceptions*, include

- Companies, *who fear the complexity and expense of paying cash-out payments*;
- Employees, *who fear losing a current benefit*;
- City leaders, *who fear the political repercussions*;
- Downtown patrons, *who dislike the inconvenience and worry*;
- Downtown business owners, *who fear that it will drive away customers*.

## THE COST, VALUE, AND FAIR PRICE OF PARKING

### Estimated and Actual Capital Cost

#### *Surface Parking*

One acre of surface parking will accommodate 120 cars. Land zoned for mixed use is sometimes expensive. At $1.2 million per acre, the land for a single parking space costs $10,000. Construction cost should be added to this to get the actual, as-built cost of each parking space.

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[5] According to Bern Grush, Chief Scientist of Skymeter Corporation http://www.skymetercorp.com/cms/index.php, often two-thirds of the money collected from parking meters is used for collection and enforcement costs.

Estimated cost can be determined by using appraised land value and construction estimates. For new developments, after the parking is constructed, it is important to note the actual, as-built cost.

### *Parking-Garage Parking*

One acre of parking-garage will accommodate considerably more than 120 cars. The construction cost of the garage and the value of its land can be added together to get the total cost. Dividing that total cost by the number of parking spaces yields the total, as-built cost of each parking space. Adding levels to a parking garage may seem like a way to cut the cost of each parking space, for the case of expensive land. However, there is a limit to the usefulness of this strategy because the taller the parking garage, the more massive the supporting structural members must be on the lower levels, which increases total cost. Parking-garage parking spaces are often said to cost between $20,000 and $40,000. The actual costs should be noted.

### *Underground Parking*

In order to compute an estimate for the cost of a parking space that is under a building, it is necessary to get an estimate of the building cost with and without the underground parking. The difference, divided by the number of parking spaces, yields the cost of each parking space. The cost or value of land plays no role in the cost of this parking. However, it does not follow that this parking is cheap. Underground parking spaces are often said to cost between $60,000 and $90,000 dollars each. Although there will be an "as built" cost of the building with the parking, there will never be an "as built" cost of the building without the parking. However, after the construction is done, the estimate for the cost of the underground parking should be reconsidered and re-estimated if that is needed. The final, best-estimate cost should be noted.

## Value

Initially, value and cost are the same. For surface parking and parking-garage parking, the value would initially be the same as the as-built cost. For underground parking, the value would initially be the same as the best-estimate cost. However, over time, the value must be updated. Both construction costs and land-value costs will change. The value assigned to a parking place should always be based on the current conditions.

## Fair Pricing

Parking space "values", as described above, must first be converted to a yearly price by using a reasonable conversion factor. This conversion factor could be based on either the "cost of money" or the "earnings potential of money". It is expected that this conversion factor would be 2% to 5% during times of low interest rates and slow growth; but could be over 10% during times of high-interest and high growth. For example, if the surface parking value is $12,000 and it is agreed upon to use 5% as the conversion factor, then each parking spot should generate $600 per year, just to cover capital costs. The amount needed for operations, collection, maintenance, depreciation, and any special applicable tax is then added to the amount that covers capital cost. This sum is the amount that needs to be generated in a year, by the parking space.

The yearly amount of money to cover capital cost needs to be re-calculated every year or so, since both the value and the conversion factor will, in general, change each year. The cost of operations, collection, maintenance, depreciation, and any special applicable tax will also need to be reconsidered.

Once the amount generated per year is known, the base price, per unit year, can be computed by dividing it (the amount generated per year) by the estimated fraction of time that the space will

be occupied, over a year. For example, if a parking space needs to generate $900 per year but it will only be occupied 50% of the time, the time rate charge is $1800 per year. This charge rate per year can then be converted to an hourly or even a per-minute rate. The estimated fraction of time that the parking is occupied over a year will need to be reconsidered at least yearly.

## NEW DEFINITIONS TO PROMOTE AN OBJECTIVE VIEW OF PRICING

- The "fair price" means the price that accounts for all costs.
- The "baseline amount of driving" means the driving that results from the application of the fair price.
- "Zero transportation demand management" ("zero TDM") is the amount of demand management that results when the fair price is used. It will result in the baseline amount of driving.
- "Negative TDM" refers to the case where the price is set below the fair price. This will cause driving to exceed the baseline amount. Since TDM is commonly thought to be an action that reduces driving, it follows that negative TDM would have the opposite effect.
- "Positive TDM" refers to the case where the price is set above the fair price. This would cause the amount of driving to fall below the baseline amount.

Clearly, so-called "free parking" is an extreme case of negative TDM. The only way to further encourage driving would be to have a system that pays a driver for the time their car is parked.

## GOALS OF THE "DIVIDEND ACCOUNT PARKING" CAR-PARKING SYSTEM (FORMERLY "*INTELLIGENT PARKING")*

- There is only one third-party vendor (or several, collaborating so closely that users are unaffected compared to a single operator) operating all parking. ("All parking" does not include driveways and garages in single-family homes.) *Dividend Account Parking* is designed and installed by regional or state government, using low-bid contractors, with design and start-up costs covered by the overhead portion of collection fees.
- Nearly all parking is shared. Almost always, anyone can park anywhere. Those who want exclusive rights to parking will pay "24/7" (all day, every day).
- Parking is operated so that the potential users of parking will escape the expense of parking by choosing to not use the parking. This characteristic is named "unbundled" because the cost of parking is effectively unbundled from other costs.
- Parking is priced and marketed to eliminate the need to drive around looking for parking.
- Parking at any desired price is made as easy as possible to find and use.
- Records of the use of each parking space are kept, to facilitate decisions to either add or subtract parking spaces.
- The special needs of disabled drivers, the privacy of all drivers, and, if desired, the economic interests of low-income drivers are protected.

## DEFINITIONS & CONCEPTS OF *DIVIDEND ACCOUNT PARKING (DAP)*

### Parking Beneficiary Groups

There are at least 7 types of beneficiary groups. Note that in all cases, members of beneficiary groups must be old enough to drive.

1.) People who have already paid for the capital cost of parking. An example of this type of beneficiary group would be the owners of condominiums, where parking has been built and the cost is included in the price of the condominium. Note that although they have technically already paid for the parking, if they borrowed money to pay for some portion of the price, the cost is built into their monthly payment. This illustrates why the value of parking and the cost of borrowing money (rate of return on money) are key input variables to use to compute the appropriate base, hourly charge for parking.

2.) People who are incurring on-going costs of parking. An example of this type of beneficiary group is a set of office workers, where the cost of 'their" parking is contained in either the building lease or the cost of the building. Either way, the parking costs are reducing the wages that can be paid to these employees.[6]

3.) People who are purchasing or renting something where the cost of the parking is included in the price. Examples of this beneficiary group are people that rent hotel rooms, rent an apartment, buy items, or dine in establishments that have parking.

4.) People who own off-street parking as a business. They could be the individual investors or could be a government or government-formed entity.

5.) People who are said to benefit from parking, even though the money for the parking has been supplied by a source that may have very little relationship to those that are said to benefit. An example of this group would be train riders that make round trips from a station which has parking that is said to be "for riders". Students at a school with parking would be another example.

6.) People who are considered by many to be the logical beneficiaries of on-street parking. Owners of single-family homes are the beneficiaries of the parking that is along the boundaries of their property. The same status is given to residents of multi-family housing.

7.) Governments. Since they build and maintain the streets, they should get a significant benefit from on-street parking.

## Unbundled Cost and Spontaneous Sharing

"Unbundled cost" means those who use the parking can see exactly what it costs and those who don't use the parking will either avoid its cost entirely or will get earnings to make up for the hidden parking cost they had to pay. This conforms to the usual rule of the free market where a person only pays for what they choose to use. Unbundled cost is fair.

"Spontaneous sharing" means that anyone can park anywhere at any time and for any length of time. Proper pricing makes this feasible.

### *How to Unbundle*

The method of unbundling can be simply stated, using the concept of "beneficiary group" as discussed above. First, the fair price for the parking is charged. The resulting earnings[7] amount is

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[6] Such parking is often said to be "for the benefit of the employees". Defining this beneficiary group will tend to make this statement true, as opposed to the common situation where the employees benefit only in proportion to their use of the parking.

[7] The earnings amount is the revenue collected minus the collection cost and any other costs that will have to be paid due to the implementation of *Dividend Account Parking (DAP)*. The costs associated with the parking, paid *before*

given to the members of the beneficiary group in a manner that is fair to each member. Methods are described below.

### *Why this Supports Sharing*

Members of a beneficiary group benefit financially when "their" parking is used. They will appreciate users increasing their earnings. They are also not obligated to park in "their" parking. If there is less-expensive parking within a reasonable distance, they might park there, to save money. This is fine, because all parking is included in the *Dividend Account Parking (DAP)* system.

### *Computing the Earnings for Individuals*

*Dividend Account Parking (DAP)* must be rigorous in paying out earnings[7]. For a mixed use, the total number of parking spaces must first be allocated to the various beneficiary groups. For example in an office/housing complex, 63.5% of the parking might have been sold with the office. If so, the housing portion must be paying for the other 36.5%. For this case, it would follow that the first step is to allocate 63.5% of the earnings to the workers and 36.5% to the residents.

How the monthly earnings are divided up among the members of the beneficiary group depends on the beneficiary group type. For each member, the group's total monthly earnings amount is always multiplied by a quantity and divided by the sum (the sum is the denominator) of that quantity, for all members.

For example, for each employee, the multiplier is the number of hours that the employee worked over the month while the denominator is the total number of hours worked by all employees over the month. At a school, for each student, the numerator is the total time spent at the school, over the month, while the denominator is the sum of the same quantity, for all the students.

For a train station with parking being supplied for passengers that ride on round trips of one day or less, the numerator is the passenger's monthly hours spent on such round trips, over the month; while the denominator is the total number of hours spent by all passengers on such round trips, over the month. Radio Frequency Identification (RFID) units on passengers could support an automated calculation of monthly charges for fares, as well as monthly hours on round trips.

At a shopping center, the numerator is the sum of the money spent by the shopper, over the month, while the denominator is the total amount of money spent by all shoppers over the month.

At a condominium, the numerator is the number of parking places that were paid for (directly or indirectly) by the resident family and the denominator is the total number of parking places at the condominium project; similarly, for apartment complexes.

### *Where Earnings Are Low*

The goal is that if someone doesn't park, they don't pay, either directly or indirectly, because the earnings that they get will balance out their losses (like reduced wages, for example). However, charging for parking that few want to use will not sufficiently compensate the people that have been forced, or are being forced, to pay for such parking. The only remedy in this case is to redevelop the parking or lease the parking in some other way, for storage, for example. The

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the implementation of *Dividend Account Parking (DAP)*, should *not* be subtracted from the revenue because they will continue to be paid as they were before the implementation of *Dividend Account Parking (DAP)*. Therefore, these costs will continue to reduce wages and increase the prices of goods and services.

earnings from the new use should go to those that are in the beneficiary group that was associated with the low-performing parking.

### *Why This Method of Unbundling Will Feel Familiar to Leaders*

Developers will still be required to provide parking and will still pass this cost on, as has been discussed. There will be no need to force an owner of an exiting office with parking to break his single business into two separate businesses (office and parking).

Parking beneficiaries are identified that conform to traditional ideas about who should benefit from parking.[8]

### *Unbundling the Cost of On-Street Parking*

The revenue from on-street parking in front of businesses will be split evenly between the city and the business's parking beneficiaries. All of the earnings from on-street parking in front of apartments or single-family homes will be given to the resident families.[9]

### *Special Considerations for Condominiums*

Unbundling for a condominium owner means that, although their allocated amount of parking has added to their initial cost, their allocated amount of parking also earns money for them. Unbundling for a condominium could also mean that an owner can choose to have control over a single or several parking places. Such parking spaces could be equipped with a red light and a green light. If the red light is lit, this will mean that the space is not available for parking, except for the person who is controlling the spot. If the green light is lit, it will mean that the space is available to anyone. A space that is being reserved with a red light is charged at the full price to the condominium owner that has control over the space. The owner that controls these spaces can change the state of the parking space (available or not available) by either a phone call, on line, or at any pay station system that might be in use for the system. After condominium owners experience the cost of reserving a space for themselves, they might give up on the idea of having their own, personal, unshared parking space; especially since *Dividend Account Parking (DAP)* will give most owners and their guests all the flexibility they need in terms of parking their cars.

Some people think that condominium parking should be gated, for security reasons. However, parking within parking garages needs to be patrolled at the same frequency level as on-street parking, which is enough to ensure that crime around either type of parking is very rare. Cameras can help make parking garages that are open to the public safe from criminal activity.

### *Special Considerations for Renters*

Unbundling for renters means that, although their allocated amount of parking increases their rent, their allocated amount of parking also earns money for them. Therefore, their traditional rent (includes parking) is effectively reduced by the money earned by those parking spaces allocated to them. Renters will be motivated to either not own a car or to park in a cheaper

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[8] Showing exactly where parking earnings go will reduce the political difficulties of adopting pay parking in a democracy where the high cost of parking is often hidden and rarely discussed.

[9] Although governments own the streets, often, back in history, developers paid for them and this cost became embedded in property values. Admittedly, how to allocate on-street parking earnings is somewhat arbitrary. With congestion pricing and efficient methods, governments may earn significantly more than they are under current practices.

location. Parking in a cheaper location is not a problem because all parking is part of the *Dividend Account Parking (DAP)* system. Renters will welcome anyone to park in "their" parking, because it will increase their earnings.

### *Special Considerations for Employers*

At first, companies may want the option of offering "free parking" to their employees so as to be able to compete with traditional job sites. This means giving employees that drive every single day an "add-in" amount of pay so that the sum of the add-in and their parking-lot earnings equals their charge, for any given monthly statement. The operator of the parking, which sends out statements, can pay out the "add in" amount, in accordance with the company's instruction. The company will then be billed for these amounts. There could be no requirement for the company to provide any such "add-in" amount to the employees that don't drive every day. This would allow the company to treat its every-day drivers better than other employees and so this would be a negative TDM. However, this economic discrimination would be substantially less than the current, status-quo, economic discrimination, where drivers get "free" parking and non-drivers get nothing.

## Clusters of Parking

Clusters are a contiguous set of parking spaces that are nearly equal in desirability and thus can be assigned the same price. They should probably consist of from 20 to 40 spaces. For off-street parking, they could be on either side of the access lane to the parking spaces, so that an observer could see the 20 to 40 cars, and get a feel for the vacancy rate. At a train station, clusters will normally be organized so that their parking spaces are approximately an equal distance from the boarding area. On-street clusters would normally conform to our current understanding of what a block is, which is to say from one cross street to the next cross street. The width of the street and the length of the block should be taken into account in defining on-street clusters of parking and in deciding if the parking on either side of the street should or should not be in the same cluster of parking spaces.

## Examples of Good and Bad Technology

### *Parking Meters or Pay Stations*

Parking meters are a relic of an earlier period, before computers. Pay stations do not add enough usefulness to merit their inclusion in *Dividend Account Parking (DAP)*, except as a bridge technology. Once good systems are set up, pay stations should cost additional money to use because of their expense. It would be best to devise an implementation strategy that will minimize their use when the system is first put into effect and will take them out of service as soon as possible.

### *Radio Frequency Identification Backed Up by Video-Based "Car Present" and License Recognition*

Government will eventually enter into an RFID (Radio Frequency Identification) age. Organizers of large athletic events already have. Organizers that put on large open-water swims, foot races, and bike rides have routinely used RFID for many years.[10] An RFID vendor in San Diego[11]

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[10] For example, over 20,000 people ran the 2008 Bay-to-Breakers foot race in San Francisco. Each runner had a "chip" in their shoe lace. Each runner's start time and finish time were recorded and all results were available as soon as the last runner crossed the finish line.

states that passive RFID units cost less than $5, are reliable, are durable, and they could be used to identify cars as well as people. He also sees no problem in implementing most of the features of *Dividend Account Parking (DAP)*.[12]

### *Automatic Data Collection and Sending Out Statements*

Note that the "back end database" of Dr. Carta's written statement[12] refers to the ability to send statements of earnings and billing to students.[13]

### *Putting it Together*

Certainly, government, and in particular transit agencies and parking agencies, could use RFID-based technology. For example, when a person with an RFID unit which is tied to a billable address or a credit card with an open account gets on a bus or a train, they should not have to pay at that time, visit a pay station, or "swipe a card" that has a positive balance. Utility customers that pay their bills are not required to pre-pay. The same courtesy should be extended to transit riders, people that drive on roads, people that get parking-lot earnings, and people that park cars. There should be one monthly bill or statement, for all four activities.

### *Global Positioning Systems GPS*

An alternative model is to have GPS systems in cars that would detect the car's parking location, that location's current charge rate, and would perform all of the charging functions in the car. The only information the parking-lot-enforcement system would need is whether or not a car being parked is owned by a bill-paying owner. The car owner's responsibility would be to pay the bills indicated by the box in the car. The box would need to process a signal that a bill had been paid. It would also need to process pricing signals.

### *Not Picking Winners*

The purpose of this report is to describe what an ideal system would do, *not* how it is done. How a proposed system works is left to the systems, software, and hardware engineers that work together to submit a proposal based on this description of what an ideal system does.

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[11]David R. Carta, PhD, CEO Telaeris Inc., 858-449-3454

[12] Concerning a Final Environmental Impact Report-approved and funded new high school in Carlsbad, California, where the School Board has signed a *Settlement Agreement* to consider "*unbundled parking*", "*cash-out*", and "*pricing*", Dr. Carta wrote, in a January 13th, 2010 written statement to the Board,

> I wanted to send a quick note discussing the technical feasibility of tracking cars into a lot without impacting students or requiring the need for gates. Mike Bullock and I have discussed this project; it can be accomplished straightforwardly by utilizing Radio Frequency Identification and/or Video Cameras integrated with automated license recognition systems. The cars would need to register with the system at the start, but it would be fairly painless for the users after the initial installation. The back end database system can also be implemented both straightforwardly and at a reasonable price.
>
> This is not necessarily a recommendation of the proposal for unbundled parking. Rather it is strictly an unbiased view of the technical feasibility of the proposal to easily and unobtrusively track cars, both registered and unregistered, into a fixed lot.

[13] In an earlier email on this subject, Dr. Carta wrote,

> This is not too tough - we probably would integrate with a service that already sends physical mail from an electronic submission instead of re-inventing this wheel.

## Privacy

Privacy means that no one can see where someone has parked, without a search warrant. Also, the level of the detail of information that appears on a bill is selected by the customer.[14]

## Ease of Use for Drivers

For credit-worthy drivers that have followed the rules of the system, pay parking will not require any actions other than parking. Paying for all parking fees over a month is then done in response to a monthly billing statement. Parking will feel to the consumer like a service provided by a municipality, such as water, energy, or garbage. One important difference is that users belonging to a "beneficiary group" will get an earnings amount in their monthly statement. Those that earn more than what they are charged will receive a check for the difference. This ease of use will make all parking less stressful.

## Base Price

### *Off-Street*

Off-street parking is priced so that even if demand does not threaten to fill the parking beyond 85%, the money generated will at least equate to an agreed-upon return on the parking value and pay all yearly costs. Equation 1 shows the calculation of the hourly rate.

$$r_{BaselineHourly} = \frac{(r_{Investment} \times v_{Parking}) + c_{YOPD}}{(n_{HoursPerYear} \times f_{TO})} \quad \textbf{(Eq. 1)}$$

where:

| | | |
|---|---|---|
| $r_{BaselineHourly}$ | = | the computed baseline hourly rate to park |
| $r_{Investment}$ | = | yearly return on investment, such as .06 |
| $v_{Parking}$ | = | value of a parking space, such as (parking garage) $40,000 |
| $c_{YOPD}$ | = | yearly operations[15] plus depreciation, per space, such as $100 |
| $n_{HoursPerYear}$ | = | number of hours per year, 24 x 365 = 8760 Hours per Year |
| $f_{TO}$ | = | fraction of time occupied, such as 0.55. |

For the example values given, the base hourly rate of parking, to cover the cost of the investment, operations[15], and depreciation is $0.519 per hour. This could be rounded up to $0.52 per hour. This price could also be increased to result in positive TDM, to reduce driving more than the fair-price, zero-TDM amount.

### *On-Street*

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[14] License plates that have no RFID tags fail to use the best technology to accomplish the primary purpose of license plates, which is to identify and help intercept cars used in a crime. Identifying cars is a legitimate government goal. Protecting privacy is also a legitimate goal. Both goals can be realized with good laws, good enforcement, and good systems engineering.

[15] This includes money for policing, cleaning, maintenance, any applicable parking tax, and all collection costs. Collection costs will need to include an amount to recover the development and installation costs of *Dividend Account Parking (DAP)*.

If on-street parking is located within walking distance (one-quarter mile) of off-street parking, its base price is set equal to the closest off-street parking's base price. Otherwise, it is set to some agreed-upon value, like fifty cents per hour. However, on-street parking has a special meaning for downtown merchants and for neighborhoods, two powerful political forces in any city. Merchants that have few cars parking on their street, even though it is permitted, are probably failing in their businesses. They would like free parking to help draw visitors to their store front. Neighborhoods that are not impacted by parking would probably prefer no pricing. For these reasons, for any on-street parking cluster, no price is charged until the cluster occupancy reaches 50%. (Time of day is irrelevant.)

## Congestion Pricing

The time-rate price of parking is dynamically set on each cluster of parking, to prevent the occupancy rate from exceeding 85% (to reduce the need to drive around looking for parking). An 85% occupancy rate (15% vacancy) results in just over one vacant parking space per city block[5]. If the vacancy rate is above 30%, the price is left at the baseline hourly rate. If vacancies fall below 30%, the price can be calculated in a stair-step method, such as shown in Table 2.

Equation 2 is an alternative method.

In either case, the total charge is time parked, multiplied by the time-averaged, time-rate price. The base multiplier would be adjusted to be just large enough to keep the vacancy rate from falling below a desired level, such as 15%, so it is always easy to find parking.

**Table 2 Hourly Rates for 2 Base Multipliers and a Baseline Hourly Rate of $0.52**

| Vacancy Rate | Base Multiplier = 2 | | | Base Multiplier = 2.5 | | |
|---|---|---|---|---|---|---|
| | Multiplication | | Hourly Rate | Multiplication | | Hourly Rate |
| | Formula | Value | | Formula | Value | |
| Above 30% | $2^0$ | 1 | $0.52 | $2.5^0$ | 1 | $0.52 |
| 25% to 30% | $2^1$ | 2 | $1.04 | $2.5^1$ | 2.5 | $1.30 |
| 20% to 25% | $2^2$ | 4 | $2.08 | $2.5^2$ | 6.25 | $3.25 |
| 15% to 20% | $2^3$ | 8 | $4.16 | $2.5^3$ | 15.625 | $8.13 |
| 10% to 15% | $2^4$ | 16 | $8.32 | $2.5^4$ | 39.0625 | $20.31 |
| 5% to 10% | $2^5$ | 32 | $16.64 | $2.5^5$ | 97.6563 | $50.78 |
| Below 5% | $2^6$ | 64 | $33.28 | $2.5^6$ | 244.1406 | $126.95 |

$$r_{HourlyRate} = r_{BaselineHourly} \times \left(B^{(30-V)/5}\right), for\ V < 30;\ r_{BaslineHourly}, otherwise \quad \textbf{(Eq. 2)}$$

where:

$r_{HourlyRate}$ = the congestion-priced hourly rate to park

$r_{BaselineHourly}$ = the baseline hourly rate to park, such as $0.52 per hour (taken from from Eq. 1.

$B$ = the base of the multiplier being computed, such as 2.50

$V$ = the vacancy rate percent, such as 17.5, for 7 vacancies in a cluster of 40 spaces, 100*(7/40) = 17.5

For the example values given, the hourly rate of parking would be $9.88 per hour.

## Pricing Predictions and Notifications

Drivers will develop strategies for their routine trips. The computer system that keeps records of parking use will also provide help for users. The *Dividend Account Parking (DAP)* website will direct a user to an appropriate cluster of parking if the user provides the destination location or locations, the time and date, and the hourly rate they wish to pay. If the walk is going to be long, the website could suggest using transit to get from the cheaply-priced parking to the destination. In such cases, the website may also suggest using transit for the entire trip.

Another user option is to specify the time, location, and the distance the user is willing to walk. In this case, the computer would give the cheapest cluster of parking available at the specified walk distance. The price prediction would be provided.

All price predictions would also have a probability of correctness associated with them. If a user can show that a computer has predicted a much lower price than what actually occurred, with a sufficiently high probability, it would be reasonable to charge the user the predicted price rather than the actual price.

Websites could routinely inform viewers when occupancy rates are expected to be unusually high, due to a special event (for example, a sporting event). The parking system website will always give current and predicted hourly rates for all locations. The hourly rates of parking will also be available at a phone number and possibly at pay stations. The base-price hourly rate, for any parking cluster, would be stable and could therefore be shown on signs. Parking garage entrances could have large video screens showing both predicted and existing price. Users will also learn to look at parking and judge whether congestion pricing applies, or could apply, while their car is parked. It would not be long before these capabilities are added into GPS navigation systems.

## Prepaid RFID

To be inclusive, pay stations or convenience stores will offer a pre-paid RFID that can be set on the dashboard of a car. This will support drivers with poor credit or drivers who have not obtained the necessary equipment to support the normal, trouble-free methods. This will also work for drivers that do not trust the system to protect their privacy for a certain trip (by removing or disabling the permanent RFID) or for all trips. No billing would occur.

## Enforcement

The system would notify the appropriate law enforcement agency if an unauthorized car was parked. Authorized cars would need either a pre-paid RFID or equipment indicating that their owners had *Dividend Account Parking (DAP)* accounts and were sufficiently paid up on their bills.

# IMPLEMENTATION

This description of *Dividend Account Parking (DAP)* will help to implement efficient parking systems. Parking at train stations, schools, and government buildings could introduce many of these concepts. This description of *Dividend Account Parking (DAP)* is sufficient to support a "Request for Proposal" process, which could lead to full implementation. Widespread

installation should be done by a government agency, to minimize actions required on the part of the private sector. Laws would simply require the cooperation of all private-sector and government entities.

## SUMMARY

A parking plan, *Dividend Account Parking (DAP)* has been described.

1. Technology will make it easy to use for most drivers.
2. Its parking is almost always shared, to support mixed uses.
3. It unbundles cost by charging and having earnings go to the parking beneficiaries.
4. Traditional groups, such as single-family home owners, employees, tenants, train riders, and students benefit from parking. The benefit is equal for drivers and non-drivers.
5. Baseline prices are computed primarily from the value of the parking and an agreed-upon rate of return. On-street parking is free until it is half full, at which time its base price often matches that of the closest off-street parking.
6. For all parking, price is dynamically increased to guarantee availability. Earnings are therefore only limited by what people are willing to pay.
7. Technology helps drivers find parking and decide if they want to drive or use transit.
8. Prepaid RFIDs provide service to those who have poor credit or don't want to be billed.
9. Disabled and perhaps low-income drivers will have accounts that allow them to park at reduced prices and perhaps avoid congestion pricing. Specially designated spots might also be required for disabled drivers.
10. The system will provide reports showing where additional parking would be a good investment and where it would be wise to convert existing parking to some other use.
11. Privacy will be protected. Law enforcement officials would need a search warrant to see where someone's car has been parked. The level of detail on billing would be selected by the car's owner.
12. Implementations could begin in carefully selected locations and expand.

Global warming, air pollution, trade deficits, and fairness are some of the significant reasons that governments have a responsibility to implement *Dividend Account Parking (DAP)*.

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## KEYWORDS

A&WMA, Parking, Unbundled, Shared, TDM, cash-out, pricing, beneficiary, greenhouse gas, GHG, GPS, RFID

# *Eliminating the Harm* of Bundled-Cost or Bundled-Benefit Parking

- Definitions of Parking Systems
- New System: *Dividend-Account Parking*
  - Motivations for change
  - Definition and features
  - A demonstration project

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# A *Bundled-Cost* Parking System

**The most common of all parking systems. Erroneously called "free"**

**The cost of the parking is hidden within some other payment, such as:**

- **Rent**
- **Train fare (at least 1 train station with so-called "free" parking)**
- **Price of consumer items, including food**

# A Bundled-Benefit Parking System

**The 2nd most common of all parking systems. Erroneously called "free"**

**The parking is part of a benefit package being provided, such as:**

- **Compensation for work**
- **Public or private education**

***Bundled-Cost*** **and** ***Bundled-Benefit*** **systems take** ***money*** **from people without their knowledge or consent.**

**They increase the choice to drive alone.**

**Sierra Club California:** **Appropriate pricing of parking is the least costly way to reduce vehicle miles travelled.**

# *Bundled-Cost* or *Bundled-Benefit* systems should be replaced with the *DAP* Car-Parking system!

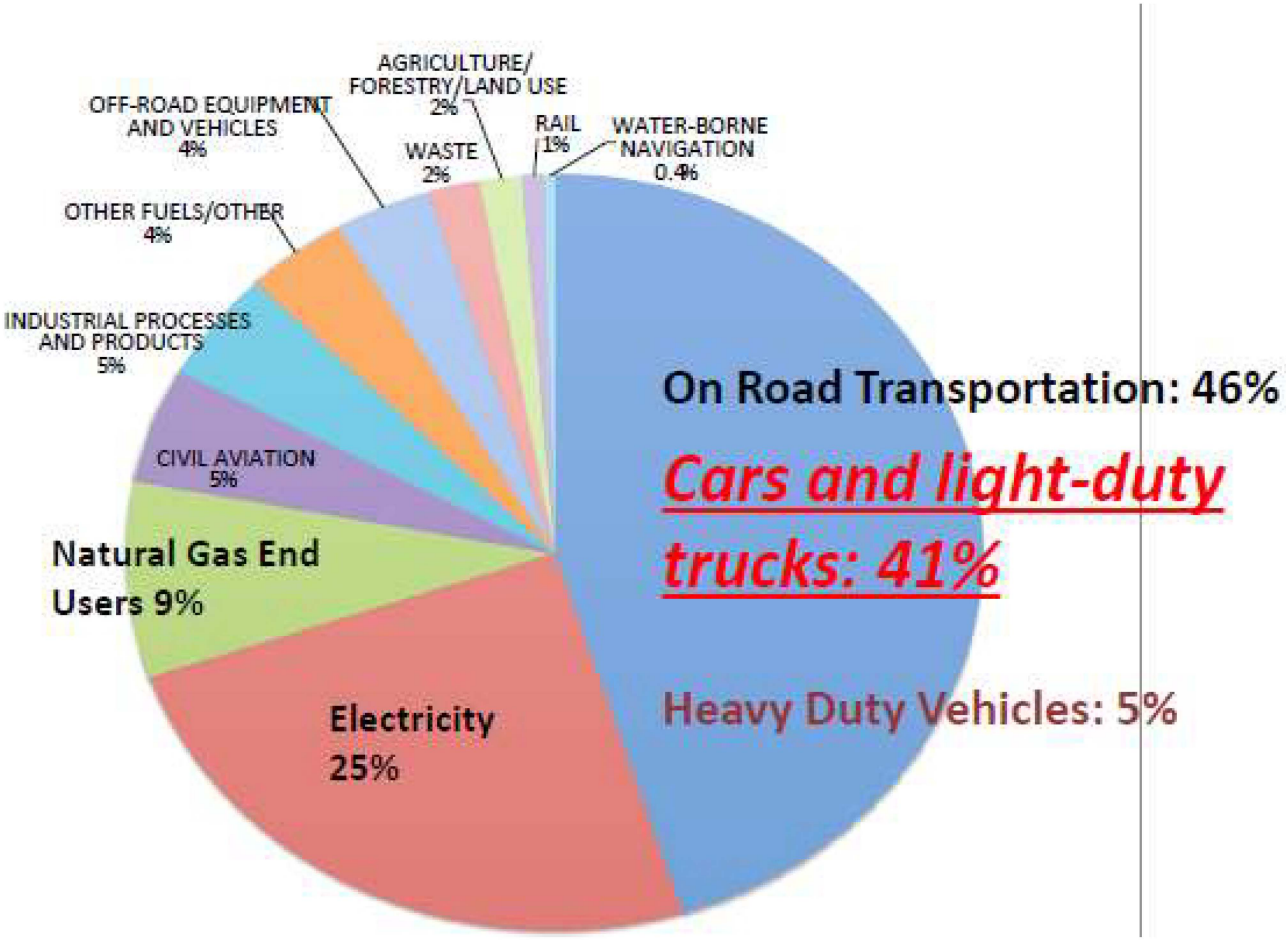
## Dividend Account Parking (DAP)

### *Brief System Definition*

1. Automated (nothing to do; just park)
2. Value-priced, with a congestion-pricing option
3. It generates earnings for those who are losing money because of the parking
4. Cars parked are associated with an Account
5. Parking is available to those having an Account (shared parking)

# Motivation for Change, 1 of 4

## *Cars and Light-duty vehicles (LDVs) emit the most GHG of any category*



# Motivation for Change, 2 of 4

- ***Fleet Efficiency Will Not Come Soon Enough, as shown in this peer-reviewed report:***

**2020 Air & Waste Management Association (AWMA) Report**

***Deriving Climate-Stabilizing Solution Sets of Fleet-Efficiency and Driving-Level Requirements, for California Light-Duty Vehicles****

***Available upon request from mike_bullock@earthlink.net**

# Motivation for Change, 3 of 4

## *Climate-Stabilizing Requirements, for Four Cases*

**Difficult but possible**

| | Case Designations | | | |
|---|---|---|---|---|
| | Balanced_1 | Balanced_2 | 2005 Driving | Mary Nichols |
| % Renewable Elecricity | 85.0% | 90.0% | 90.0% | 90.00% |
| % ZEVs, Year 2016 | 2.0% | 2.0% | 2.0% | 2.70% |
| % ZEVs, Year 2017 | 2.0% | 2.0% | 2.0% | 2.70% |
| % ZEVs, Year 2018 | 3.0% | 3.0% | 3.0% | 5.11% |
| % ZEVs, Year 2019 | 4.0% | 4.0% | 4.0% | 7.53% |
| % ZEVs, Year 2020 | 8.0% | 8.0% | 8.0% | 9.94% |
| % ZEVs, Year 2021 | 20.0% | 15.0% | 82.0% | 12.35% |
| % ZEVs, Year 2022 | 35.0% | 25.0% | 97.0% | 14.76% |
| % ZEVs, Year 2023 | 55.0% | 45.0% | 99.0% | 17.18% |
| % ZEVs, Year 2024 | 80.0% | 70.0% | 99.0% | 19.59% |
| % ZEVs, Year 2025 | 94.0% | 95.0% | 99.0% | 22.00% |
| % ZEVs, Year 2026 | 97.0% | 97.0% | 99.0% | 37.60% |
| % ZEVs, Year 2027 | 98.0% | 98.0% | 99.0% | 53.20% |
| % ZEVs, Year 2028 | 99.0% | 99.0% | 99.0% | 68.80% |
| % ZEVs, Year 2029 | 99.0% | 99.0% | 99.0% | 84.40% |
| % ZEVs, Year 2030 | 99.0% | 99.0% | 99.0% | 100.00% |
| % Reduction in Per-Capita Driving With Respect to Year 2005 | 32.0% | 32.0% | 0.0% | 50.5% |

**Driving as much as we did in 2005 might seem nice, but these % ZEV jumps are not possible**

**Air Resources Board Mary Nichols has a nice electrification schedule but it would require a very difficult reduction in driving.**

# Motivation for Change, 4 of 4

**Requirements to Achieve the Needed 32% Reduction in Per-Capita Driving, With Respect to 2005**

| Driving-Reduction Requirments | Per-Cent Reduction | Factor |
|---|---|---|
| Legislated (SB 375) Plans to Reduce Driving | 12% | 0.88 |
| Value-Priced Road Use Charge (RUC) | 10% | 0.90 |
| **Dividend Account Parking** | **8%** | **0.92** |
| Transfer Highway Expansion Funds to Transit | 2% | 0.98 |
| Increase Height & Density by Transit Stations | 2% | 0.98 |
| "Complete Streets", "Road Diet" (walk/bike) | 1% | 0.99 |
| *Pay-to-Graduat*e Bicycle Traffic-Skills Class | 1% | 0.99 |
| Bicycle Projects to Improve Access | 1% | 0.99 |
| **Product of Factors** | | **0.68** |
| **% Reduction** | | **32%** |

# A *Dividend-Account Parking System* for Oceanside's Civic Center Garage

## A System to Eliminate the Harm of Bundled-Benefit Car Parking for City Employees

### 300 North Coast Highway

- Top-Level Outcome & Overview
- Some Top-Level Calculations
- Who gets to use the system
- Overcoming problems & perceptions
- Outcomes of a new incentive
- Cash flow ("Hey, where does the $$ come from?")

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# Top-Level Outcomes

- Employees that drive every day, break even **(Lose no money!)**
- Employees get *paid to not drive* **(Make more money!)**
- Fewer employees drive, reducing Greenhouse Gas (GHG) emissions **(Less GHG!)**

# Overview

- Fully-automated parking system, implemented by a 3rd-party vendor (RFP selection process)
- operated for the financial gain of employees
  - Earnings = Money Generated Minus Vendor Earnings
  - Earnings go to employees
- Price is cost per minute
  - Such as 1.85 cents per minute (= $1.11 per hour= $10 per 9 hours at the workplace)
- An employee's **Earnings** ("**Dividend**") is proportional to their time at the work site

# Calculations of an Employee's Earnings

- An employee's earning is proportional to time spent at work (automatic collection of enter/exit times, using employee RFID)

| Definitions to Compute an Employee's Monthly Earnings | |
|---|---|
| $T_{Employee}$ | The Employee's Monthly Time at the Work Site |
| $T_{AllEmployees}$ | Total Monthly Time at the Work Site, All Employees |
| $E_{AllEmployees}$ | Total Monthly Earnings from the Employee Parking |

$$\text{Employee Earnings} = E_{AllEmployees} \times ( T_{Employee} / T_{AllEmployees})$$

# "Add In" Payment so Those that Drive Every Day Will Lose No Money

## Note: This is for an individual employee

**The employee's Parking Payment =**

**The employee's Earnings – The employee's parking charge + The employee's "Add In"**

**"Add In" is zero, unless it must take on a positive value so that the employee loses nothing**

**"Add In" payments will be easily covered by Dividend Account Parking parkers that are not employees.**

# Charge, Earnings, & Add-In, Payment *For Each Employee*

- **Charge**
  - Total Minutes Parked x Cost per Minute
- **Earnings**
  - As shown on earlier slide (proportional to employee's time spent at work)
- **Add-In**
  - If **Charge** > **Earnings**, **Add-In** = **Charge** – **Earnings**
  - **Otherwise, Add-In = zero**
- **Payment** = **Earnings** – **Charge** + **Add-In**

# Who Gets To Use Dividend-Account Parking

- ***Anyone*** (not necessarily an employee) driving a car registered in the system
  - There is a person with an account associated with the car
  - The car will be identified
    - License plate reader and/or
    - RFID tag not needed
  - Account can be established on the spot, in less than 5 minutes: credit card info and license number

# Employee Behavior 1 of 2

***Employees Must Park in Their Parking Lot if they Drive to Work***

**Measures to Reduce "Cheating" = Parking in the Neighborhood**

Not Stated in Presentation to Stay within 15 minutes

Russ was worried!

- Soft, pre-emptive measure: messaging
  - **Perceived integrity** is every employee's responsibility
  - **Insufficient perceived integrity** can cost employees
    - Reduced chance of promotion
    - Smaller pay raises
    - More chance of terminated employment
  - Parking free in the neighborhood will not be tolerated
  - The City wants to be a good neighbor: this is the reason for off-street parking ordinances

# Employee Behavior 2 of 2

***Employees Must Park in Their Parking Lot if they Drive to Work***

**Measures to Reduce "Cheating" = Parking in the Neighborhood**

Not stated in presentation to stay within 15 minutes

- Soft, pre-operational measure: data collection
  - Operate the system for a time, perhaps even a year, before actually collecting or distributing money
  - Self-identified non-drivers are recognized, thanked, and asked to provide details as to how they are getting to work without driving
- Soft, In-Operation Mode: New non-drivers are thanked and interrogated as to how they do it
- **Hard: cameras or RFID sensors can identify employees walking into the work perimeter from the neighborhoods**

Russ was worried!

# Difficult-to-Not-Drive Example

## Fictional, Simplified Case with Pricing and Payout Considered per Day, *Page 1*

- Employment Center (factory and office)
- Outside Hemet, California
- 100 employees; parking lot has 100 spaces
- No Transit, 110-degree temperature with poor roads for biking, culture of not car-pooling
- Before installing
  - 99 drive
  - 1 bikes

# Difficult-to-Not-Drive Example

## Fictional, Simplified Case with Pricing and Payout Considered per Day, *Page 2*

- Dividend-Account Parking charges $10/day
- After installing
  - 99 drive
  - 1 bikes
- Total collected each day: $990
- Each employee gets $9.90 earnings per day ($990/100)
- Each driver loses 10 cents per day
- The "crazy" bike rider gets $9.90 per day extra

**Hey, isn't this an improvement? I would say the "crazy" bike rider is earning his money!**

If another employee bikes, the drivers would lose 20 cents per day and the bike riders would get $9.80 per day. If the company president rented out the 2 extra spaces for $10 per day, the drivers would lose nothing and the bike riders would get $10 per day. Biking would increase by 100%! **What's wrong with that?**

# Results of 3 Actions, Including Cash-out

**Case (#1), Reference Patrick Siegman's article in Bicycle Pedestrian Federation**

- Company: CH2M Hill
  - Location: Bellevue, WA (Seattle suburb)
  - Engineering Firm with 430 employees
- Actions
  - $54/month (1995 $'s), *to not drive*
  - Improved Transit
  - Improved Bike/Ped facilities

| CH2M Hill Work Trips | | |
|---|---|---|
| ***Mode*** | ***Before*** | ***After*** |
| **Drive Alone** | **89%** | **54%** |
| **Carpool** | **9%** | **12%** |
| **Bus** | **1%** | **17%** |
| **Bike, Walk** | **1%** | **17%** |
| | ***100%*** | ***100%*** |

**Since these changes are brought about by more than just cashout, this case is not used in the tabulation of cashout results (next chart)**

# Cash-Out Results

## (11 Locations, 3 Groups, 1995 Dollars)

**Money Matters !!!!**

- Reference: *How to Get Paid to Bike to Work: A Guide to Low-traffic, High- Profit Development* by Patrick Siegman*. Published in *Bicycle Pedestrian Federation of America*, 1995.
- 3 Largest Responses
  - 38%, 36%, 31%
- 3 Smallest Responses
  - **15%** , 18%, 24%
- Responses are the *change;* car vacancy rates would be larger

*Patrick Siegman, of Nelson Nygaard

**Impact of Financial Incentives on Parking Demand**

| Location | Scope | 1995 dollars per mo. | Parking Use Decrease[1] |
|---|---|---|---|
| ***Group A: Areas with little or no public transportation*** | | | |
| CenturyCityDistrict, West Los Angeles | 3500 employees at 100+ firms | $81 | 15% |
| Cornell University, Ithaca, NY | 9000 faculty & staff | $34 | 26% |
| San Fernando Valley, Los Angeles | 1 employer, 850 employees | $37 | 30% |
| Costa Mesa, CA | | $37 | 22% |
| **Average for Group** | | **$47** | **23%** |
| ***Group B: Areas with fair public transportation*** | | | |
| Los Angeles Civic Center | 10000+ employees, several firms | $125 | 36% |
| Mid-Wilshire Blvd., Los Angleles | 1 mid-size firm | $89 | 38% |
| Washington DC Suburbs | 5500 employees at 3 worksites | $68 | 26% |
| Downtown Los Angeles | 5000 employees, 118 firms | $126 | 25% |
| **Average for Group** | | **$102** | **31%** |
| ***Group C: Areas with good public transportation*** | | | |
| University of Washington, Seattle Wa. | 50,000 faculty, staff & students | $18 | 24% |
| Downtown Ottowa, Canada | 3500+ government staff | $72 | 18% |
| Bellevue, WA | 1 firm with 430 employees | $54 | 39%[2] |
| **Average for Group, but not Bellevue Washington** | | **$45** | **21%** |
| **Over All Average, Excluding Bellevue Washington** | | | **25%** |

[1] **Parking vacancy would be higher!** [2] **Not used, since transit & walk/bike facilities also improved.**

# *Dividend-Account Parking, Oceanside*

# *Civic Center Parking Garage*

# Money Flow Calculations

## Simplifying Assumptions:

1. **Workers work 8 hours, with a one-hour lunch, for 9 total hours at the work location, each day they work**
2. **They only work from 8 AM to 5 PM**
3. **Evening hours, when parking can earn money from the public, are (only) from 5 PM to 9 PM**
4. **Week-end workers also work on weekdays, for a total of 7*9 = 63 hours, at the work location, per week**

# ***Dividend-Account Parking***

## Money Flow Calculations

| Notation Conventions | |
|---|---|
| **Letters** | **Meaning** |
| N | Number |
| DAP | Dividend Account Parking |
| VP | Value Priced |
| WE | Week End |
| WD | Week Day |
| WH | Work Hours, Meaning 8 AM to 5 PM |
| AH | After Hours, Meaning 5 PM to 9 PM |

# ***Dividend-Account Parking***

## Money Flow Calculations

**Assume This is the "Value-Price" of the Parking**

***Use $10 per 9 Hours at the Work Site***

| Value | Units |
|---|---|
| 1.8519 | Cents per Minute |
| 1.11 | Dollars per Hour |

# Dividend-Account Parking

## Money Flow Calculations

| Assumed Values Used in the Following Performance Assesment | | |
|---|---|---|
| **Description** | **Name** | **Value** |
| Number of parking places | N_DAP | 250 |
| Number or employees | N_Emp | 250 |
| % employees that drive on week day & week end | %Drive | 80 |
| Value-price to park, per 9 hours day (8 hours work + lunch) | VP_9Hrs | $ 10.00 |
| % employees that work on Sat. and on Sun. | %WE | 20 |
| Yearly bonus paid to all workers | Y_Bonus | $100.00 |
| | | |
| **Non-Workers Use This Per-Cent of the Parking That Is Not Used by Workers** | | |
| Week Day, Work Hours | %NonWrkWDWH | 50 |
| Week Day, After Hours (5 to 9) | %NonWrkWDAH | 30 |
| Week End, Work Hours | %NonWrkWEWH | 50 |
| Week End, After Hours (5 to 9) | %NonWrkWEAH | 30 |

# Dividend-Account Parking

## Money Flow Calculations

| Calculations to get the Weekly Earnings From Employees & the Weekly "AddIns" Required, per Employee | | | |
|---|---|---|---|
| **Description** | **Formula** | **Name** | **Value** |
| Number of Employees That Drive on a Week Day | N_Emp * %Drive / 100 | **N_DrWD** | 200 |
| Money From Employees on a Week Day | VP_9Hrs * N_DrWD | **$_AllE_WD** | $ 2,000 |
| Number of Employees That Work on a Week End | N_Emp * %WE / 100 | **N_WrkWE** | 50 |
| Number of Employees Driving on a Week-End Day | N_WrkWE * %Drive / 100 | **N_DrWE** | 40 |
| Money From All Employees Each Week-End Day | VP_9Hrs * N_DrWE | **$_AllWE** | $ 400 |
| Weekly Money From Employees From Both the Week End & the Week Days | 5 * $AllE_WD + 2 * $_AllWE | **$_AllE** | $ 10,800 |
| Total Hours at This Location Per Week | N_Emp * 9 * 5 + N_Emp * %WE / 100 * 9 * 2 | **HrsPerWeek** | 12150 |
| Weekly Earnings for an Employee at the Location for 45 Hours | $_AllE * 45 / HrsPerWeek | **PerWeek45** | $ 40.00 |
| AddIn for an Employee at the Location for 45 Hours per Week | 5 * VP_9Hrs - PerWeek45 | **AddIn45** | $ 10.00 |
| Weekly earnings for an employee at the location for 63 hours | $_AllE * 63 / HrsPerWeek | **PerWeek63** | $ 56.00 |
| Per Week AddIn for an Employee at the location for 63 Hours per week | 7 * VP_9Hrs - PerWeek63 | **AddIn63** | $ 14.00 |

# ***Dividend-Account Parking***

## Money Flow Calculations

| Calculation of the Weekly Amount Generated by Spaces Not Used by Workers, Week Day Work Hours (8 to 5) | | | |
|---|---|---|---|
| **Description** | **Formula** | **Name** | **Value** |
| Spaces Available for Non-Workers, Work Day, Work Hours | N_DAP - N_DrWD | **S_4NW_WDWH** | 50 |
| Spaces Used by Non-Workers, Work Day Work Hours | S_4NW_WDWH * %NonWrkWDWH / 100 | **SNW_WDWH** | 25 |
| Money from Spaces Used by Non-Workers Per Day | SNW_WDWH * VP_9Hrs | **$NW_WDWH** | $ 250 |
| Money from Spaces Used by Non-Workers Per Week | 5 * $NW_WDWH | **W$NW_WDWH** | $ 1,250 |

# ***Dividend-Account Parking***

## Money Flow Calculations

| Calculation of the Weekly Amount Generated by Spaces Not Used by Workers, Week Day After Hours (5 to 9) | | | |
|---|---|---|---|
| Spaces Available for Non-Workers, Work Day, 5 to 9, AKA After Hours | N_DAP | **S_4NW_WDAH** | 250 |
| Spaces Used by Non-Workers, Week Day After Hours | S_4NW_WDAH * %NonWrkWDAH / 100 | **SNW_WDAH** | 75 |
| Money From Spaces Not Used by Workers, Week Day After Hours | (4/9) * VP_9Hrs * SNW_WDAH | **$NW_WDAH** | $ 333 |
| Money per Week from Spaces Not Used by Workers, Week Day After Hours | 5 * $NW_WDAH | **W$NW_WDAH** | $ 1,667 |

# ***Dividend-Account Parking***

## Money Flow Calculations

| Calculation of the Weekly Amount Generated by Spaces Not Used by Workers, Week End Work Hours (8 to 5) | | | |
|---|---|---|---|
| Spaces Available for Non-Workers, Week End Work Hours | N_DAP - N_DrWE | **S_4NW_WEWH** | 210 |
| Spaces Used by Non-Workers, Week End Work Hours | S_4NW_WEWH * %NonWrkWEWH / 100 | **SNW_WEWH** | 105 |
| Money From Spaces Used by Non-workers Per Week-End Day, Work Hours | SNW_WEWH * VP_9Hrs | **$NW_WEWH** | $ 1,050 |
| Money From Spaces Used by Non-workers On the Week End After Hours, Per Week | 2* $NW_WEWH | **W$NW_WEWH** | $ 2,100 |

# ***Dividend-Account Parking***

## Money Flow Calculations

| Calculation of the Weekly Amount Generated by Spaces Not Used by Workers, Week End After Hours (5 to 9) | | | |
|---|---|---|---|
| Spaces Available for Non-Workers, Week End After Hours | N_DAP | **S_4NW_WDAH** | 250 |
| Spaces Used by Non-Workers, Week End After Hours | S_4NW_WDAH*%NonWrk WDAH/100 | **SNW_WDAH** | 75 |
| Money From Spaces Used by Non-workers Per Week-End Day After Hours | 4/9 * SNW_WDAH * VP_9Hrs | **$NW_WDAH** | $ 333 |
| Money From Spaces Used by Non-workers on Week-End Days After Hours, Per Week | 2 * $NW_WDAH | **W$NW_WDAH** | $ 667 |

# Dividend-Account Parking

## Money Flow Calculations

| The Weekly Earnings From Non-Employees, the Weekly "AddIns" Required, the Weekly Surplus Generated, the Yearly Surplus, and the Yearly Surplus After Giving Employees a $100 Per Year Bonus | | | |
|---|---|---|---|
| **Description** | **Formula** | **Name** | **Value** |
| Weekly Money Earned by the spaces not taken by workers | W$NW_WDWH + W$NW_WDAH + W$NW_WEWH + W$NW_WEAH | **W$NW** | $ 5,683 |
| Weekly Money Required to Pay All of the AddIn Amounts | N_DrWD * AddIn45 + N_DrWE * AddIn63 | **AddInPerWeek** | $ 2,560 |
| Weekly Money Left Over After Paying Add Ins | W$NW - AddInPerWeek | **$PerWeek** | $ 3,123 |
| Yearly Money After Paying Add Ins From the Money From Non-Workers | 52 * $PerWeek | **$PerYear** | **$ 162,413** |
| Yearly Money After Paying Add Ins and Also a $100 Bonus Per Year for Each Employee | $PerYear - $100 * N_Emp | **$PerYear** | **$ 137,413** |

# ***Dividend-Account Parking***

## Money Flow Calculations

| 3 Cases of Dividend-Account Parking Performance<br>Oceanside Civic Center Garage | | | |
|---|---|---|---|
| | **Baseline** | **Worse** | **Better** |
| % employees that drive on week day & week end | 80% | 85% | 75% |
| % employees that work on Sat. and on Sun. | 20% | 25% | 15% |
| **% Parking Not Used by Workers, That is Used by Non-Workers** | | | |
| Week Day, Work Hours | 50% | 45% | 55% |
| Week Day, After Hours (5 to 9) | 30% | 25% | 35% |
| Week End, Work Hours | 50% | 45% | 55% |
| Week End, After Hours (5 to 9) | 30% | 25% | 35% |
| Yearly Amount Left Over After Paying Add-Ins | **$162,413** | **$125,242** | **$210,374** |
| Amount Left After Paying Add-Ins & $100 Bonus | **$137,413** | **$100,242** | **$185,374** |

# *Conclusion 1*

***Given our climate emergency, we need this parking system to spread to all parking, to include offices, on-street, apartments, "big box", shopping centers, and mixed use.***

# *Conclusion 2*

## *Society needs a corporation to specialize in managing and optimizing parking*

### *Skills Needed Include:*

1. Data collection, computing, marketing, archiving, transferring money, protecting privacy, and generating financial statements
2. Monetizing unused parking and data
3. **Financing and building solar canopies, roof top solar, and charging stations**
4. **Selling electricity**

# *Conclusion 3*

***This could be an enforceable mitigation measure in a city's Climate Action Plan, to reduce driving, perhaps in its Transportation Demand Management (TDM) Section.***

# Back up Slides

# Conclusion & Path Forward

- A big part of the needed 32% reduction needs to come from car-parking reform.
- The first step could be a demonstration project of a car-parking system, at a work location.

# From the California Democratic Party (CDP) 2018 Platform

From: https://www.cadem.org/our-party/standing-committees/body/CDP-Platform-2018.pdf

## Transportation Sub-Plank Statement

- Work for **shared**, convenient, and **value-priced** parking, operated with a system that **provides financial support** to those paying higher costs or getting a reduced wage, due to the cost of providing the parking ***Note: this is DAP!***

## 1500-Character Extended Abstract

The presentation starts with the definition of two commonly-used, car-parking systems: the bundled-price system and the bundled-cost system. The flaws of these systems are exposed. The Dividend Account Parking (DAP) parking system is introduced; with the motivation for its implementation: the importance of cars in reducing GHG and how DAP fits into a plan to ensure that cars support climate-stabilization.

The rest of the slides present a specific DAP proposal, in downtown Oceanside, CA, for city employees. Outcomes, an overview, and a definition of DAP are given. Charge & payout formulations are specified. Methods to prevent cheating are described. A brief, simplified example of a DAP implementation is shown, where it would be difficult to not drive to work, showing DAP to still be a good choice. Results from cases of car parking cash-out (where employees are paid to get to work without driving) are given, showing that if a price differential (between driving and not driving to work) is introduced (DAP does this), driving alone to work is significantly reduced.

Money cash flow calculations are presented, using reasonable simplifying assumptions and then reasonably-conservative assumptions of how much money could be earned from employee parking, whenever it is not being used by an employee. The results from three cases (“Baseline”, “Worse”, and “Better”) are shown.

Twenty six back up slides appear, but they are NOT part of the presentation.

# Measures to Get 32%

Estimated Reduction

- Predictions, Regional Transportation Plans 10%
- Stop expanding most roads and all freeways 2%
  - No need, Eliminate congestion with less driving
- Reallocate freeway-expansion $$$ to **transit** 2%
- **Payment methods**, **to increase fairness & choice**
  - Demonstration projects: Dividend-Account Parking
  - **Legislation**
    - Replace Bundled-Cost or Bundled-Benefit Parking 8%
    - Equitable and environmentally-sound road-use fees 8%
- **Smarter growth**, complete streets, bike classes 2%

**32%**

# Climate Literacy

**THEREFORE BE IT RESOLVED,** that the California Democratic Party reinforces the need for all high school students to know, before they graduate, and elected officials to know, acknowledge, and address, as soon as possible, (1) both the existence of and the reason for anthropogenic climate change; (2) its potential for harm; (3) the difference between stabilizing the climate at a livable level and destabilization; (4) science-based, climate-stabilizing, GHG reduction targets; (5) the primary variables and considerations in identifying those targets and (6) the approximate amount of life style and technology change required to achieve those climate-stabilizing targets.

# XXX Implementation Example

The City could have the vendor operate the system, for the first 10 years. Over those years, the vendor would be motived to debug the system and continue to look for operational efficiencies. The vendor could receive 10% of the revenue, for the first 5 years; 5% of the revenue, for the next 3 years; and 2%, for the final 2 years. If 600 cars are parked for 8 hours, 200 days per year, at 50 cents per hour, then the yearly revenue would be $480,000. The vendor would collect $240,000 over the first 5 years, $72,000 over the next 3 years, and $28,800 over the last two years.

# How Bad Could It Get?

## Governor Brown to the Pope:

## *Humanity must*

***Reverse Course**** **or** ***Face Extinction***

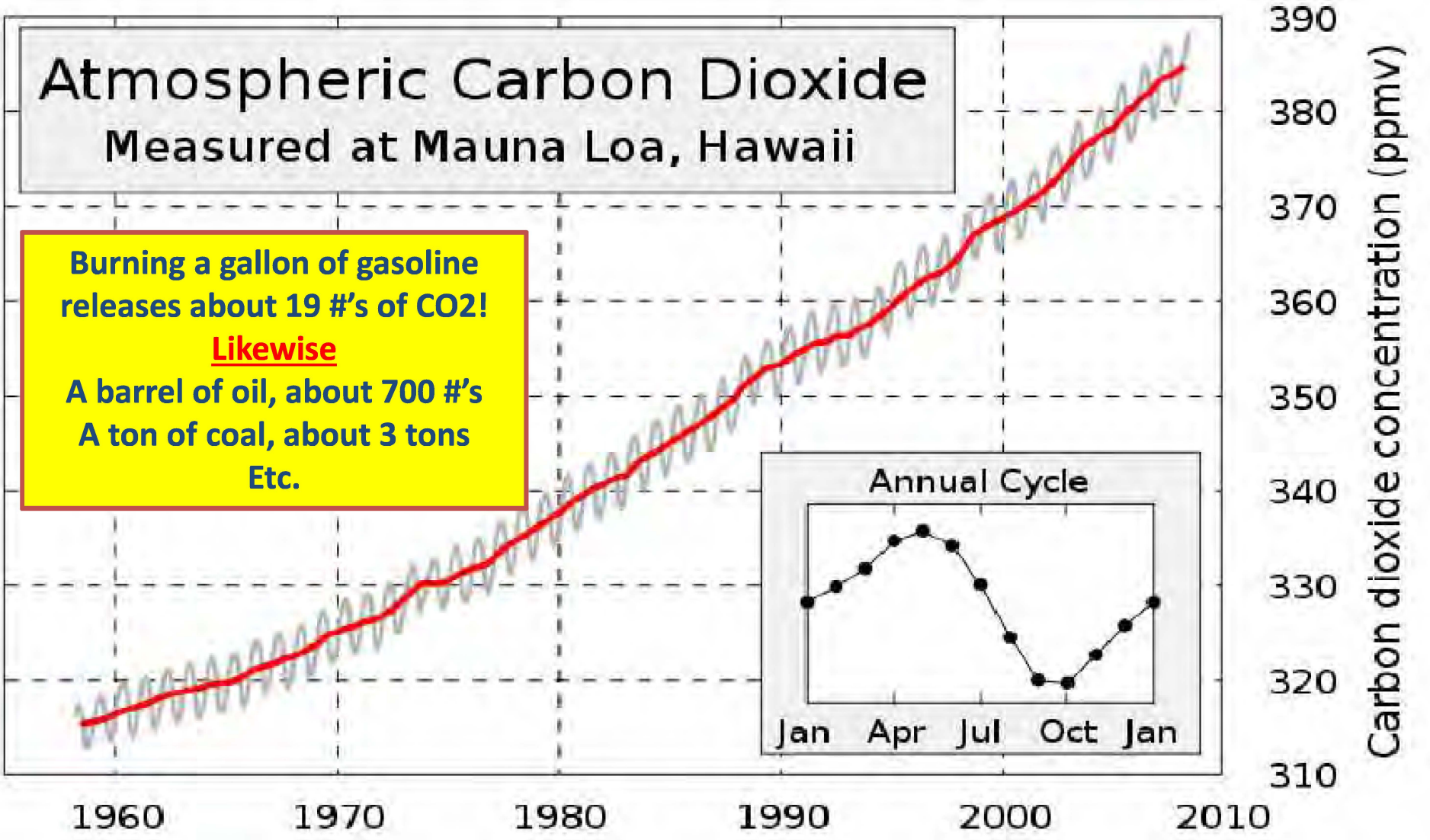
* ***Must be quantified***

# Climate Data

**Currently 400 PPM!** *

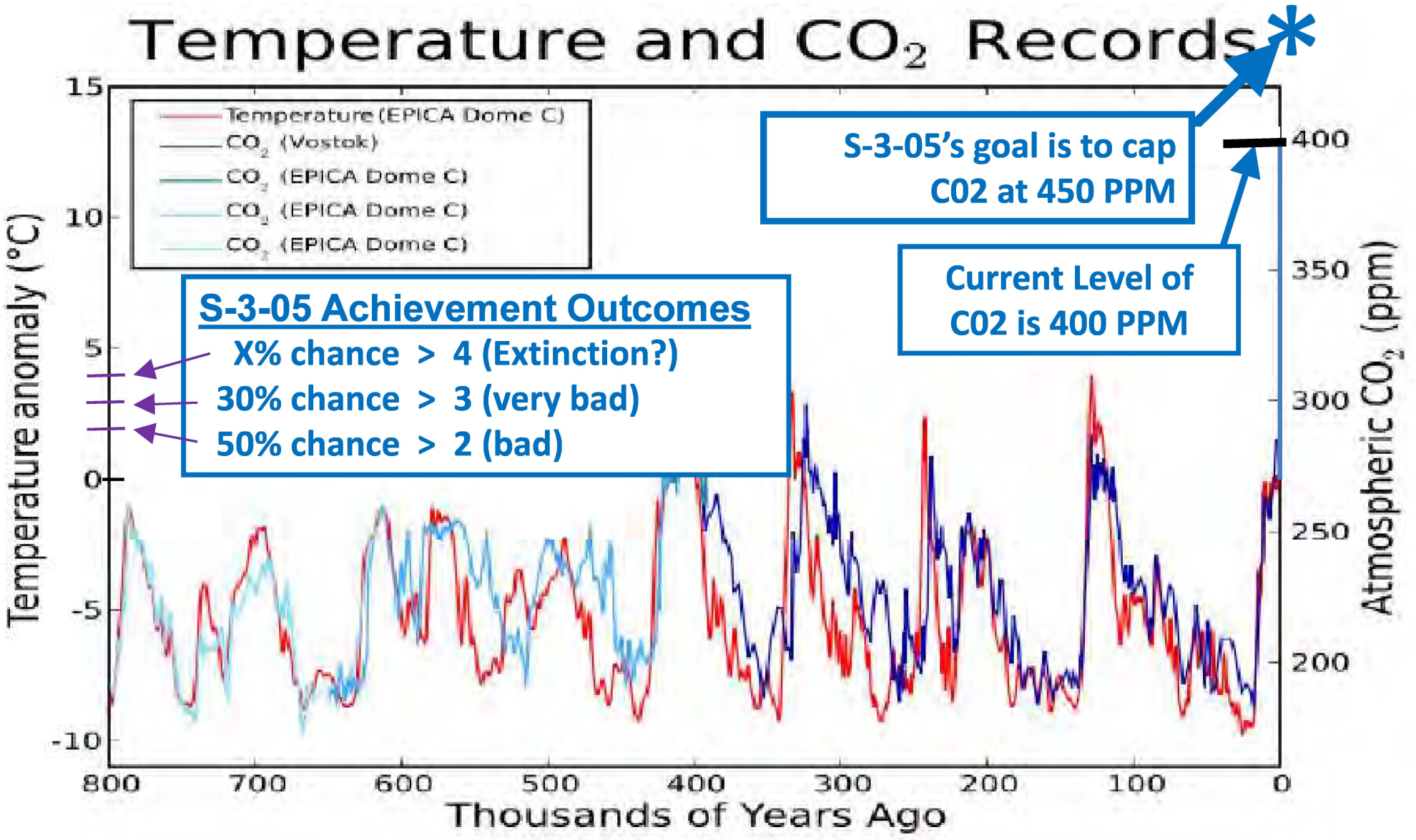
- Keeling Curve:

  http://en.wikipedia.org/wiki/An_Inconvenient_Truth#Scientific_basis



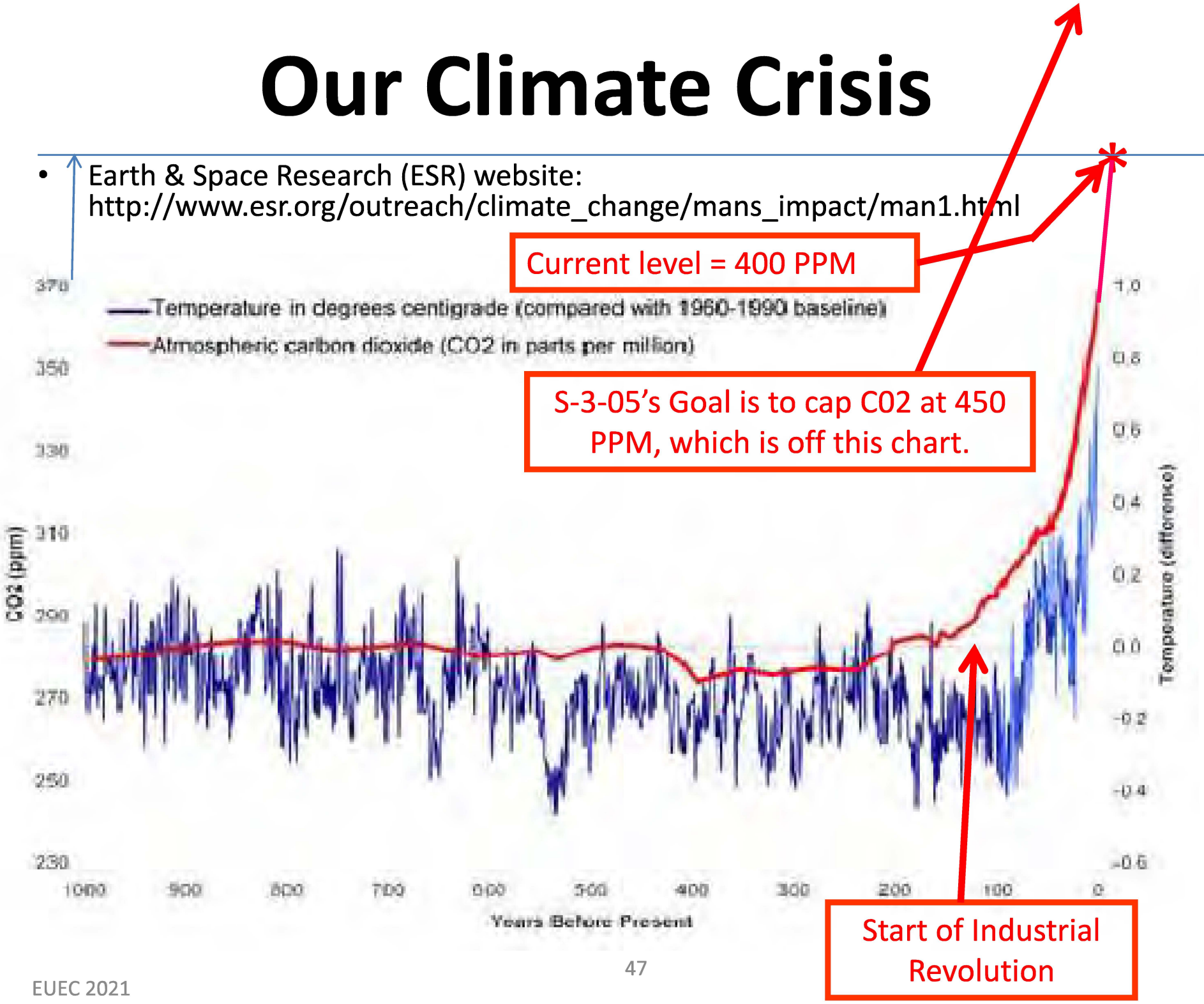
# Our Climate Crisis

- From: http://en.wikipedia.org/wiki/An_Inconvenient_Truth#Scientific_basis



# Our Climate Crisis

- Earth & Space Research (ESR) website: http://www.esr.org/outreach/climate_change/mans_impact/man1.html



# Fixing the Problem

***We must stabilize the value of the earth's atmospheric CO2_e***

## CO2_e Emissions

## Sequestration (Photosynthesis)

$E_N + E_A + E_{WFB}$ **>** → Positive Slope

$E_N + E_A + E_{WFB}$ **=** → Zero Slope

$E_N + E_A + E_{WFB}$ **<** → Negative Slope

$S$

**N**atural: rotting, fire, digestion. respiration

**A**nthropogenic: combustion of fossil fuel, methane, other

**W**arming **F**eed **B**ack: such as methane from melting permafrost

**Growth of plants on Earth**

**The Warming Feed Back term is the wild card. It must not become dominant.**

**If Anthropogenic emissions were to be sufficiently low (80% below 1990 levels has been allocated to developed countries), the slope would be zero, thus capping the value of the Earth's atmospheric CO2_e**

# Motivation for Change

- Fairness to individuals
  - Costs no longer hidden
  - Costs avoided or recovered, by not using parking
- Less driving, to reduce environmental harm
  - Motivates choosing alternative modes
  - Less driving to find parking
- Cost Effective Development
  - Less parking needed reduces land and building costs

# Goals, 1 of 2

- One agency operates all parking
- Nearly all parking is shared
- Parking costs are effectively unbundled
  - From wages and rents
  - From costs of goods and services
- No change to how parking gets built
  - Generally, municipalities require & developers build

# Goals, 2 of 2

- Priced right
  - Value Priced: Base price derived from costs
  - Driver demand determines a congestion price
- No need to search for parking
  - Directions to parking  that meets user's needs
  - Accurate price predictions
- Each parking space's use is archived
  - Supports informed decisions
- Privacy and the needs of the disabled are supported

# Definitions and Methods, 1 of 6

- Definition & Examples of ***Parking Beneficiary Group***
  - Owners
    - Private investors or governments operating public parking
  - Those losing money due to provided parking
    - Employees
    - Apartment renters or condominium owners
    - Hotel or restaurant patrons
    - Shoppers
  - Those offered specific parking
    - Driving-age students at a school with parking
    - Driving-age train riders using a station with parking

# Definitions and Methods 2 of 6

- How to Effectively Unbundle the Cost or the Benefit
  - Price charged per minute
    - Base price rate established to cover all costs
    - Congestion price rate
      - Dynamically set as a function of occupancy rate
      - Charge is time average, if rate changes, while car is parked
  - Parking generally available to all drivers
  - Earnings distributed to members of *Beneficiary Group*
    - Calculation of individual's earnings depends on situation

# Definitions and Methods, 3 of 6

- Calculation of monthly earnings
  - If parking is provided for several groups, each group's portion of the earnings is proportional to its original contribution to cost (Mixed use case)
  - Each beneficiary group's total is divided up among its members
    - Condominium owners: proportional to spaces effectively purchased
    - Renters: proportional to spaces effectively renting
    - Shoppers: proportional to money spent
    - Employees or students of driving age: proportional to time spent at work or school
    - Train riders of driving age: proportional to time spent on round trips

# Definitions and Methods, 4 of 6

- For congestion pricing, *define* ***Cluster of Parking***
  - 20 to 40 contiguous spaces nearly equal in desirability
  - Assigned the same price
- Pricing
  - Base price
    - Covers all costs $r_{BaselineHourly} = \frac{(r_{Invesment} \times v_{Parking}) + c_{YOPD}}{(n_{HoursPerYear} \times f_{TO})}$
    - Report's Page 13 & 14 provides details
  - Congestion price, for each cluster

$$r_{HourlyRate} = r_{BaselineHourly} \times \left(B^{(30-V)/5}\right), for\ V < 30;\ r_{BaslineHourly}, otherwise$$

  - *B* is nominally 2; adjusted to keep vacancy above 15%
  - *V* is the vacancy % rate (Report's Eq. 2, Table 2, Pages 14 & 15)

# Definitions and Methods, 5 of 6

- Pricing predictions
  - For any set of dates, start times, durations, and destinations
  - Availability of predictions
    - Broadcast into navigational units
    - Website or phone
- Help to find desired parking
  - Driver gives times and locations and stipulates . . .
    - Max price, to get space at minimum walk distance
    - Max walk distance, to get space at minimum price
  - Voice-activated navigational system for ease and safety

# Definitions and Methods, 6 of 6

- Monthly statements
  - All parking charges and earnings
    - First, within state
    - Then, within nation
    - Finally, within North and South America
  - Customer selects presentation detail
    - Less detail for ease and more privacy
    - More detail to know and adjust parking decisions
  - Packaged with other statements
    - All utilities, transit use, road use

# Implementation Plan, 1 of 3

- Prototype design
  - Most likely a Climate Action Plan Mitigation Measure
- Requirements document to support request for proposal (RFP)
- Winning proposal leads to design
  - Hardware selection and design
  - Software generation
- Prototype installation
  - Most likely a Climate Action Plan Mitigation Measure
  - Debug
  - Adjustments to satisfy stakeholders

# Implementation Plan, 2 of 3

- Government agency develops and executes full installation strategy
  - To minimize impact on institutions
  - To maximize early success and driving reductions
    - Large employment centers with “free” parking
    - Train stations with large, “free” parking lots
  - Supported by new law that requires cooperation but very little effort, from . . .
    - Private and public institutions
    - Individuals

# Implementation Plan, 3 of 3

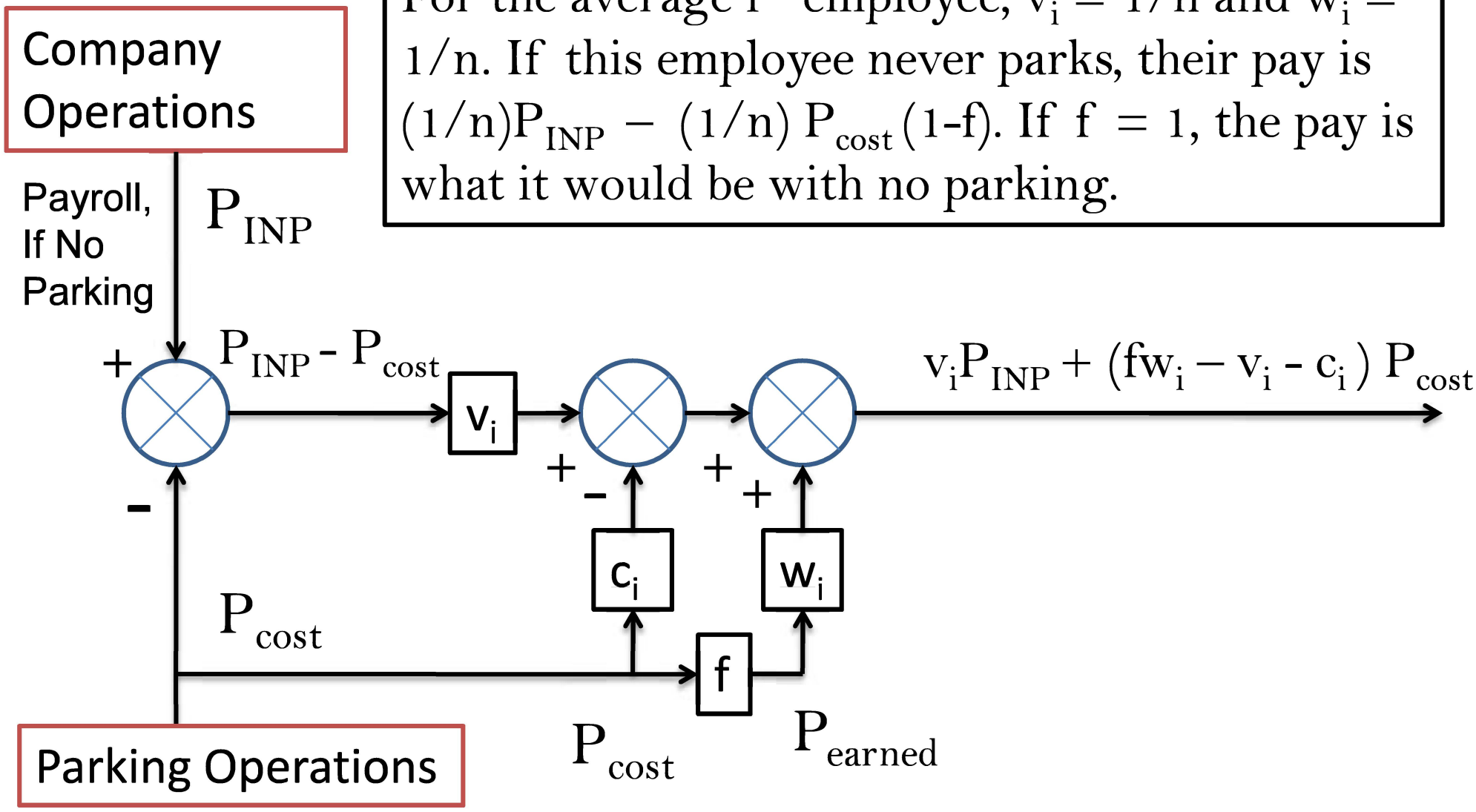
- Basis for a new law supporting installations
  - To provide equal protection of the law
    - Government has required parking for 50 years
    - Those driving less than average often lose money
  - Prototype will have demonstrated feasibility
  - Global warming considerations show subsidized parking to be a public nuisance
    - Global warming will likely cause a human catastrophe
    - Short term strategies  are critical
    - Electric cars and getting most electricity from renewables will take decades
    - Properly pricing parking is relatively cheap and quick (5 years)

# Unbundle Flow Diagram Definitions

| Variable | Definition |
|---|---|
| $P_{INP}$ | Company payroll if there were no parking costs |
| $P_{cost}$ | Total parking cost. Price will be sized to recover this. |
| $P_{earned}$ | Parking earnings equals parking cost minus collection cost |
| $v_i$ | Employee value. Fraction of available pay. For the average employee, 1/n |
| $c_i$ | Fraction of parking cost paid. Zero, if the employee never parks. |
| $f$ | Parking earnings divided by parking cost. Close to 1 for efficient collection |
| $w_i$ | time worked divided by total time worked of all employees. If average, this is 1/n. |

# Unbundle Flow Diagram

For the average $i^{th}$ employee, $v_i = 1/n$ and $w_i = 1/n$. If this employee never parks, their pay is $(1/n)P_{INP} - (1/n)\,P_{cost}\,(1\text{-}f)$. If $f = 1$, the pay is what it would be with no parking.



# Mike Bullock, 1 of 2

- Personal
  - Married, two daughters, 3 grand daughters, 1 grandson
    - Daughter Laura Bullock  White (Berkeley)
    - Heidi  Bullock (Oceanside)
  - Moved from Cupertino to Oceanside in April 2007
  - Oceanside home (1800 Bayberry Dr) and 4-plex (506 N. Ditmar)
  - Swims with and competes for Oceanside Swim Masters
- Education
  - BSEE, Lamar University
  - MSE, University of Texas at El Paso
- Professional
  - Lockheed Martin Systems Engineer, 1971 to 2007
    - Last 2 years, Space Based Infrared System (SBIRS, satellite to detect and track missiles)
    - 10 Years previous: Milstar (communication satellite)
      - Verification of antenna pointing accuracy
      - Antenna pointing calibration

# Mike Bullock, 2 of 2

- Most Recent Activities
  - California Democratic Party
    - Delegate, 76$^{TH}$ AD
    - Elected member of the San Diego County Central Committee
    - CDP Resolutions and Platform

# *San Diego County's Climate Action Plan Misadventures*

- The Sierra Club proposed Dividend-Account parking, as a demonstration project for County employees
- The County argued it was infeasible
- Superior Court Judge Taylor ruled that the County failed to show it was infeasible
- The County appealed on a 3-2 vote
- This is the 2nd failed CAP for the County. The first was ordered rescinded on the same issue and resulted in a published Appellant Court Ruling

| | |
|---|---|
| **From:** | Keith B. Jones |
| **To:** | mike_bullock@earthlink.net |
| **Subject:** | Re: Oceanside Transit Center: Housing Retail Office = need for an intelligent car-parking system |
| **Date:** | Friday, March 11, 2022 2:51:00 PM |
| **Attachments:** | image001.jpg |

Mike,

Happy Friday afternoon to you.  Thank you for your thoughtful and well crafted response.

Yes, please feel free to share ACE's interest in participating in an opportunity to provide these parking solutions.

Have a great weekend,
Keith

**Keith B. Jones**
Owner | ACE Parking
ACE Parking
645 Ash Street
San Diego, CA  92101
T: 619.233.6624

On Sat, Mar 5, 2022 at 5:41 PM <mike_bullock@earthlink.net> wrote:

> Keith,
>
> Thank you so much for getting back to me.
>
> No, there is no RFP.
>
> However, the North County Transit District (NCTD), the agency doing the Transit Center project, has a representative on the Oceanside Bike-Ped Committee who seems interested. The Bike-Ped Committee supports the Dividend Account Parking (DAP) system. The Chair of the NCTD, Tony Krantz, who is an Encinitas Councilman, should be supportive, but I have not presented to him. I have presented to the Mayor of Encinitas.
>
> I have put more work into this for the City of Oceanside, for their Civic Center

Parking Garage, which is supposed to be City Employee parking, but is also free to the public. On Thursdays, when Oceanside has its Farmers Market, late-arriving employees sometimes find no vacant parking and then park in the neighborhood. Oceanside is not planning to issue an RFP. However, I may be able to coax one out of them if they know you are interested. I need 3 votes and I estimate that I have only 1 right now. However, several on the Council have expressed interest in the Dividend Account Parking (DAP) system. At the Oceanside Climate Action Plan (CAP) meeting, where I was hoping to get three votes, only one Council Member expressed interest. If DAP were installed at the Civic Center Parking Garage, the Transit Center should follow. They are about 4 blocks away.

Most realize that our climate emergency is getting more acute. However, no city has ever done this, and it is tough to ask an elected official to do something new. Most Climate Action Plans have a Transportation Demand Management (TDM) ordinance, where DAP would fit.

Oceanside has parking meters and pay-station parking close to the Civic Center Parking Garage and close to the Transit Center. Both the parking meter parking and the pay-station parking could be automated with DAP, so the user could take their pick. I predict that younger people would tend to choose DAP; older drivers would tend to use the meters and the pay station. Over time, DAP would win out.

Regarding climate, humanity needs the private sector to do the design and operation of the needed systems (parking and roads.) (Where would we be without Elon Musk?)

**Would it be OK for me to disclose your interest in submitting a proposal for a DAP system RFP?** Your interest would be important, it seems to me. I have also raised this issue in Encinitas and Carlsbad. Barbara and I were strategizing on how to introduce this to San Diego, when the pandemic hit. San Diego is known to have a poor Climate Action Plan when it comes to driving. Driving is the category that emits the most GHG. A reduction of 10% at a location would be very significant and be a good verification of the system. And employees would have to be pleased with the new system.

The County might be interested, especially if they knew you were interested. DAP was ruled to be a feasible mitigation measure in the lawsuit against their first CAP. There are 3 members on the BOS who claim to be very concerned about climate. You have probably read about their “framework for decarbonization by 2035.” After

nearly 10 years of trying, the County still has no legal CAP.

Ukraine (Putin) has presented another argument for having meaningful TDM measures to reduce gasoline use. In any case, any measure adopted would need to increase choice and equity. DAP would do that.

**Regards,**

Mike Bullock
1800 Bayberry Drive
Oceanside, CA 92054
760-421-9482

Former California Democratic Party Delegate, 76th Assembly District

Former Elected (now Associate) Member of the San Diego County Democratic Party Central Committee

Satellite Systems Engineer, 36 years (Now Retired)

Air and Waste Management Association published and presented papers:

Author, ***The Development of California Light-Duty Vehicle (LDV) Requirements to Support Climate Stabilization: Fleet-Emission Rates & Per-Capita Driving***

Author, ***A Climate-Killing Regional Transportation Plan Winds Up in Court: Background and Remedies***

Co-author, ***A Plan to Efficiently and Conveniently Unbundle Car Parking Cost***

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**From:** Keith B. Jones <kjones@aceparking.com>
**Sent:** Thursday, March 3, 2022 2:06 PM
**To:** mike_bullock@earthlink.net
**Subject:** Fwd: FW: Oceanside Transit Center: Housing Retail Office = need for an intelligent car-parking system

Mike,

Good afternoon.  Barbara Bry sent me your email regarding Oceanside Transit Center.  Is there an RFP for the car parking you suggest I respond to?

Thanks,

Keith

**Keith B. Jones**
Owner | ACE Parking
ACE Parking
645 Ash Street
San Diego, CA  92101
T: 619.233.6624

---------- Forwarded message ---------
From: **Barbara Bry** <bbry@blackbirdv.com>
Date: Sun, Feb 27, 2022 at 6:36 PM
Subject: FW: Oceanside Transit Center: Housing Retail Office = need for an intelligent car-parking system
To: Keith Jones <kjones@aceparking.com>

Fyi, from Mike Bullock, hope you're having a great time visiting islands!

Barbara Bry

Chief Operating Officer

Chief Financial Officer

Blackbird Ventures

(858) 248-9465

https://www.linkedin.com/in/barbarabry/

---

**From:** Mike Bullock <mike_bullock@earthlink.net>
**Date:** Sunday, February 27, 2022 at 4:24 PM
**To:** Barbara Bry <bbry@blackbirdv.com>
**Subject:** Oceanside Transit Center: Housing Retail Office = need for an intelligent car-parking system

http://enewspaper.sandiegouniontribune.com/infinity/article_share.aspx?guid=0dbb7ab6-0514-4bc1-b06b-4d7d1894f882

Please forward this to Keith. Would he submit a response to an RFP if the NCTD issued one for a good car-parking system? This is a bit of a chicken and egg situation.

Putin gives us one more reason to stop using a car-parking system that incentivizes driving. Our climate emergency is all the reason we need.

We need a car parking vendor to take over the world of bad car-parking systems.

Mike

NORTH COUNTY TRANSIT DISTRICT

810 Mission Avenue
Oceanside, CA 92054
(760) 966-6500
(760) 967-2001 (fax)
GoNCTD.com

January 26, 2023

Mr. Tom Frankum
Sent via Email: tomfrankum@aol.com

Subject: Public Records Act Request
NCTD File No.: 2023-2161 PRR

Dear Mr. Frankum:

This will serve as the North County Transit District's (NCTD) response to your Public Records Request pursuant to California Government Code § 7922.530, et seq. which was received on January 19, 2023, requesting:

*"Toll Brothers Agreement for the Oceanside Transit Center Redevelopment Project."*

After conducting a search for records responsive to your request, NCTD has determined that responsive documents do exist, and the documents have been included in this response.

Sincerely,

Imelda Kubota
Senior Administrative Assistant

DocuSign Envelope ID: 2A780FB9-3553-4831-8FFF-FE34F6A7B337

# EXCLUSIVE NEGOTIATION AGREEMENT

**THIS EXCLUSIVE NEGOTIATION AGREEMENT** ("ENA" or "Agreement") is entered into this 2nd day of October, 2020 ("Effective Date") by and between North County Transit District, a public agency existing under the laws of the State of California, pursuant to California Public Utility Code sections 125000, et seq., and hereinafter referred to as "NCTD" or "District", and Toll Brothers, Inc. ("Developer"), individually referred to herein as the "Party" and collectively referred to herein as the "Parties", on the terms and provisions set forth below.

WHEREAS, NCTD issued a Request for Proposal (RFP) on January 6, 2020 for redevelopment of the Oceanside Transit Center property (the "Transit Center" or "Property") as a mixed-use mobility hub to accommodate the needs of NCTD, the development, future transit riders and public visitors to the area; and

WHEREAS, on September 17, 2020, the NCTD Board of Directors (the "NCTD Board of Directors" or the "Board") approved the Source Selection Committee recommendation to select Developer as the highest ranked proposer for the Oceanside Transit Center Redevelopment project (the "Proposed Project") pursuant to the RFP and authorized the Executive Director to enter into an Exclusive Negotiation Agreement ("ENA") with Developer; and

WHEREAS, NCTD Board Policy No. 33 regulates the Joint Development process for the District including the base requirements for this ENA; and

WHEREAS, the Parties desire to negotiate the terms and conditions of the required documents as contemplated under the RFP including but not limited to a Disposition and Development Agreement ("DDA") and a Ground Lease (the "Ground Lease") for the Property under consideration for the Proposed Project; and

WHERAS, the Developer has proposed that certain design for the Proposed Project as provided in its proposal to the RFP which it believes can meet the needs of the District as provided in the RFP; and

WHEREAS the Parties now desire to enter into exclusive negotiations as contemplated in the RFP;

NOW THEREFORE, IT IS HEREBY MUTUALLY AGREED AS FOLLOWS:

## I. Negotiation

### A. Good Faith Negotiations

NCTD and the Developer agree for the period set forth below to negotiate in good faith to prepare the business terms and agree upon the final form of a DDA, a Ground Lease and any other related documents required to effectuate the terms thereof, to be entered into between NCTD, as authorized or approved by the NCTD Board of Directors and in accordance with the requirements of NCTD Board Policy No. 33, and the Developer with respect to that area known as the Transit Center and 810 S. Mission Avenue, as designated on the Site Map attached hereto and incorporated herein as **Exhibit A.** However, by entering into this ENA, the Parties are not required to enter into a DDA and Ground Lease and this ENA does not obligate the Parties to do so.

B. Period of Negotiations, Due Diligence and Approvals

(i) Initial Period. The Parties agree, beginning on the Effective Date, to an initial negotiation period (the "Initial Period") of sixty (60) days (the "Initial Termination Date", as extended, if applicable}, for the purpose of agreeing on a form of the ODA and Ground Lease to be submitted to the NCTD Board of Directors. Either the Developer or NCTD may at their election request up to two extensions of thirty (30) days each of the Initial Period. Such extensions (the "Subsequent Periods") shall be requested in writing by either Party at least fourteen (14) days prior to the expiration of the Initial Termination Date or expiration of a Subsequent Period, as applicable. If the Parties have been unable to agree on a form of the DOA and Ground Lease to be submitted to the NCTD Board of Directors within said period, then this ENA shall automatically terminate unless extended by mutual agreement of the Parties, in their sole discretion, at least fourteen (14) days prior to the expiration of the then applicable period. Upon agreement of the terms of the ODA within said period, the Parties shall cause the ODA to be executed and delivered.

(ii) Due Diligence Period. Provided (1) the ENA has not expired during the Initial Period and (2) NCTD has approved the form of the ODA and Ground Lease, as described below, Developer shall, from and after receipt of notice of NCTD's approval of the form agreements of the ODA and Ground Lease, have sixty (60) days (the "Due Diligence Period") to evaluate all due diligence materials, the Property, make analyses thereof or request due diligence materials from NCTD to determine the feasibility of the Proposed Project. During the Due Diligence Period, NCTD shall reasonably cooperate with Developer and ensure that Developer, its agents and representatives have reasonable access to the Property and due diligence materials related to the Property to facilitate Developer's due diligence review of the Proposed Project. On or prior to the expiration of the Due Diligence Period, Developer may provide NCTD with notice of its intent not to proceed with the Proposed Project.

(iii) Approval Period. Provided Developer has not tendered a notice of termination on or prior to the expiration of the Due Diligence Period, Developer shall work diligently, with NCTD's reasonable cooperation, to obtain all required governmental approvals necessary for development of the Proposed Project, including but not limited to those certain entitlements and approvals to be obtained from the City of Oceanside and/or the California Coastal Commission (collectively, the "Approvals"). Developer shall have a period of two (2) years commencing from the expiration of the Due Diligence Period to obtain Approvals from the City of Oceanside and a period of one (1) year commencing from the expiration of the 2-year City of Oceanside Approval process to obtain Approvals from the California Coastal Commission (together, the "Approvals Period"; subject to a one (1) year extension option, upon mutual agreement of the Parties), subject to a tolling period, not to exceed two (2) years, for any periods of time litigating such Approvals (the "Tolling Period"; subject to successive one (1) year extension options, upon mutual agreement of the Parties and to be granted by NCTD in its sole discretion). The Tolling Period shall only apply to the time of active litigation directly related to the Approvals and shall be cumulative in nature if applied to more than one action. Throughout the Approvals Period (including during any Tolling Period}, Developer will work diligently to develop all necessary plans and documentation for the Proposed Project, obtain the necessary Approvals and entitlements and make arrangements for all necessary and appropriate financing. NCTD, in its sole discretion, will determine whether reasonable and sufficient effort and

progress has been made with respect to the foregoing in its consideration of the extension of the Tolling Period, the one year extension and any subsequent extension of the Approvals Period.

(iv) Execution of the Ground Lease. The Approvals Period shall terminate prior to its expiration under Section I.B.(iii) above when all required Approvals are obtained (but for the building permit) for the Project (as hereinafter defined) and there shall be no appeals of any of the foregoing pending and any associated appeals period with respect thereto shall have lapsed and the Project has not been determined to be out of compliance with CEQA. At such time, the Parties shall mutually execute and deliver the Ground Lease and Developer shall diligently pursue the development of the Proposed Project pursuant to the agreed upon terms of the DDA and Ground Lease.

C. Document Negotiation Phases

The Parties anticipate the following stages for developing a DDA and Ground Lease for presentation to the NCTD Board of Directors:

Stage I (first 30 days of the Initial Period) - Negotiation of High-Level Concepts and Terms and a Mutually Agreeable Term Sheet

Stage II (second 30 days of the Initial Period, as extended as provided above, as applicable) - Preparation of Mutually Agreeable form of the DDA and Ground Lease for Presentation to Board

As soon as the Parties agree on all pertinent details for a mutually agreeable term sheet, Developer will prepare the template DDA and Ground Lease form documents and submit them to NCTD for review and comment. Upon mutual agreement on the forms of the DDA and Ground Lease for submission to the NCTD Board of Directors, the Initial Period (or Subsequent Period, if applicable) under this ENA will be automatically extended for sixty (60) days from the date of such submittal to enable NCTD to (1) determine whether it desires to propose any revisions to the DDA and Ground Lease form documents or (2) take the actions necessary to authorize execution of the DDA at the end of the Initial Period (or Subsequent Period, if applicable) and approve the form of Ground Lease to be executed upon the obtainment of all Approvals upon terms and conditions acceptable to Developer in its reasonable discretion during the Approvals Period, which will include consideration and approval by the NCTD Board of Directors. This period may be extended by mutual agreement of the Parties, in their respective sole discretion.

If, upon the expiration of the Initial Period (or subsequent Period, as applicable), NCTD has not considered and approved the forms of DDA and Ground Lease (unless in the automatic 60-day extension period described in the preceding paragraph), then this ENA shall automatically terminate along with any and all rights or obligations under this Agreement, except to the extent such matters expressly survive the expiration of this Agreement, and all deposits paid, including the deposit paid by the Developer to NCTD at the time of developer selection by the NCTD Board of Directors shall be non-refundable, except as described below; provided, however, NCTD and the Developer may mutually agree to extend the Initial Period (or Subsequent Period, if applicable) as described above.

D. Deposit

Within ten (10) days of the full execution of this ENA, the Developer shall submit to a mutually agreeable escrow agent a good faith deposit in the amount of fifty thousand dollars ($50,000) (the

"Initial Deposit"), to ensure that Developer will proceed diligently and in good faith to negotiate and perform all of the Developer's obligations under this ENA. If the Parties are unable to agree upon mutually acceptable forms of the DDA and Ground Lease during the Initial Period (or Subsequent Period, if applicable}, NCTD shall be entitled to retain the Initial Deposit as consideration for the opportunities provided to Developer hereunder.

At the time of the commencement of the Approvals Period, an additional deposit in the amount of one hundred fifty thousand dollars ($150,000) (the "Additional Deposit"; together, the Initial Deposit and Additional Deposit are sometimes hereinafter referred to as the "Deposits" or the "Deposit"), shall be submitted. These Deposits, totaling two hundred thousand dollars ($200,000}, shall, as of such date, (1) be non-refundable, (2) not be a credit against any Ground Lease or other payment, and (3) should the proposed transaction fail to close, NCTD shall be entitled to retain the Deposit as consideration for the opportunities provided to Developer hereunder.

II. Proposed Development

A. Development Concept and Essential Terms and Conditions

The proposed phased development to be negotiated hereunder shall include, at minimum, the development of approximately 10.2 acres of the existing Oceanside Transit Center located at 235 S. Tremont Street and approximately 1.3 acres located at 810 S. Mission Avenue, Oceanside, California, as depicted in Exhibit A. When completed, the proposed mixed-use project will include the new NCTD administrative headquarters building and associated parking, new ticketing transit center, relocated bus transfer station, 560 replacement transit parking spaces, ground floor retail, multi-family residential buildings, including affordable (located at 810 S. Mission Avenue) and market rate units, hospitality, open public spaces, a new community center, associated site and infrastructure improvements and additional parking spaces required per code for the new proposed uses, all in substantial conformance with Developer's submittal to NCTD prior to this ENA and the Approvals {the "Project").

The essential terms and conditions of the DDA and Ground Lease entered into with the Developer shall be in conformance with the following requirements:

(i) The Developer shall ground lease the Property from NCTD. The conveyance of a leasehold interest in the Property will occur after the Developer has zoning approval, entitlements and permits for the Proposed Project, as specified in the DDA.

(ii) The Developer shall design, subject to NCTD's reasonable approval, and construct the Proposed Project, including required infrastructure and all NCTD office, transit uses and parking facilities, at its own cost and expense, in accordance with a Schedule of Performance to be negotiated as part of the DDA and in accordance with plans and specifications prepared by the Developer and approved by NCTD.

(iii) The Developer shall be responsible for financing all elements of the Project. NCTD shall reasonably cooperate with Developer in negotiating terms and conditions required in connection with financing the Project including, but not limited to, a recognition agreement from the ground lessor for lender's benefit.

(iv) The Developer, working through the City of Oceanside, shall secure all necessary planning, zoning and other entitlements or approvals, including without limitation those required by the California Coastal Commission, for the Project at its own cost and expense.

(v) The Developer, working through the City of Oceanside, shall prepare, or pay the costs to have prepared, all required environmental analysis documents in accordance with the California Environmental Quality Act (CEQA) of 1970, as amended, at its own cost and expense.

(vi) The Developer shall be responsible for marketing and leasing the Project and generating ground lease payments and any agreed to revenues that it will share with NCTD through each operational phase of the Project in accordance with the Ground Lease.

B. Developer's Responsibilities

In addition to the responsibilities previously set forth, the Developer shall also during the Due Diligence Period agree with NCTD on a "Concept Plan" for the Project which will contain minimum acceptable parameters for the relevant components of the Proposed Project. To facilitate the foregoing, Developer shall provide NCTD with the following information, satisfactory to NCTD (provided that NCTD may not object to any of such items following the expiration of the Due Diligence Period):

(i) A preliminary site plan showing building layout and dimensions, parking, landscaping, and access.

(ii) Cost estimates and project data for the proposal in sufficient detail to permit adequate financial analysis by NCTD.

(iii) A detailed financial plan once scope, strategy and limitations are agreed to by NCTD and the Developer, including:

a. The approach for securing construction financing.

b. The approach for securing long-term financing.

c. The approach for public payment on the public facilities and/or transit parking facilities.

d. Financial proforma and project budget and schedule.

(iv) Location and design of project marketing and information signs placed on the Property prior to development with wording to be approved by NCTD.

(v) The City of Oceanside, in collaboration with Developer, shall be the lead entity in all environmental matters as required by the California Environmental Quality Act (CEQA) of 1970, as amended. NCTD will provide all necessary data relative to the Property, as existing and available to NCTD.

C. Developer's Finding Determinations, Studies, and Reports

On or before the tenth (10th) day of each calendar month, starting with the first full month of the Due Diligence Period, the Developer agrees to make written progress reports related to Developer's responsibilities as outlined in Section 11.B, and to submit to NCTD final reports and analyses, advising NCTD on all matters related to the Project, including financial feasibility

analyses, construction cost estimates, marketing studies, and similar due diligence matters. Should negotiations not result in a DDA and Ground Lease between NCTD and the Developer, NCTD may use the information provided by the Developer in any way deemed by NCTD to be of benefit to NCTD, and NCTD shall be the owner of such information. However, Developer does not warrant the accuracy or completeness of such documents and information and therefore NCTD will rely on them at its own risk. All costs incurred by Developer in the preparation and presentation of such findings, determinations, studies, reports or other requests by NCTD under this ENA shall be at the sole expense of the Developer.

Access to government records is governed by the laws of the State of California under the California Public Records Act (Gov. Code 6250, et seq.). Documents submitted to NCTD in connection with this ENA are public records and may, therefore, be disclosed in accordance with the California Public Records Act. Any such proprietary information, trade secrets or confidential commercial and financial information which Developer believes should be exempted from disclosure shall be specifically identified and marked as such. Blanket-type identification by designating whole pages or sections as containing proprietary information, trade secrets or confidential commercial and financial information will not ensure confidentiality. Developer shall submit proprietary information, trade secrets or confidential commercial and financial information, which Developer believes should be exempted from disclosure, in a separate volume specifically identified and marked as such.

D. NCTD's Responsibilities

(i) NCTD's Role in the Entitlement Process. The land use authority rests with City of Oceanside and the sole entitlement decision-making bodies are the City Council of the City of Oceanside (City) and the California Coastal Commission. NCTD will assist the Developer in working with the City to obtain entitlements and land use approvals for the Project as reasonably required. NCTD's role will be limited to that of the land owner and other than certain authorization and related cooperation, NCTD will not be a party to or have any other obligation in the entitlement process.

(ii) NCTD shall cooperate fully in providing the Developer with appropriate Property information it has in its actual possession or is reasonably available to NCTD.

(iii) NCTD will cooperate fully in providing the Developer with all information relevant to NCTD's bonding capacity and capabilities and credit rating, as well as all information necessary to assess the feasibility of accessing grants and other forms of public or private financing to the extent necessary to support any financing efforts by the Developer. NCTD shall not be obligated in any way to secure funding or any other financing mechanism unless expressly agreed to in NCTD's sole and absolute discretion.

(iv) NCTD will reasonably support the Developer with any approvals required from the Federal Transit Administration (FTA).

III. Ground Lease Payment and/or Other Considerations

The Ground Lease Payment payable by the Developer will be established in the DDA and Ground Lease.

IV. The Developer

- Nature of the Developer

Developer will be: Toll Brothers, Inc.

It is proposed that, through completion of the Project, the Leasehold Interest in the real property to be developed will be held by the following entity or entities or type of entity or entities: Developer or a wholly-owned affiliate thereof but may be ultimately assigned to a single purpose entity controlled by Developer and in which Developer holds no less than a 20% direct or indirect interest and which is created to manage and hold the Leasehold Interest, with the full financial backing of Developer.

## V. Offices of the Developer

The principal offices of the Developer are located at:

- Corporate Office - 1140 Virginia Drive, Fort Washington, PA 19034
- Southern California Office - 23422 Mill Creek Drive, Suite 105, Laguna Hills, CA 92653

### A. Principals and Employees of the Developer

The principals of the Developer are as follows:

- Charles Elliott - President
- John McCullough - Senior VP/ Managing Director (Operations)
- Russ Rochestie - Senior VP/ Managing Director (CFO)
- John DePaul - President of Hospitality & Property Management

The Developer's employees or representatives who will be directly involved in this Project are as follows:

- Michael Mccann - Regional Director of Acquisitions & Development
- Sumesh Behl - Director of Development
- Chris Bernot - Senior Development Manager, Hospitality
- Michael Skena - National Director, Mixed-Use

The Developer has designated the following person(s) to negotiate the DDA and Ground Lease with NCTD, and to engage in the activities necessary to determine the feasibility of the Proposed Project:

- Michael Mccann - Regional Director of Acquisitions & Development
- Yolanda Rodriguez - Chief Transactional Counsel
- Domingo Cruz - Vice President, Legal

### B. The Developer's Consultants and Professionals

The Developer's attorneys will be:

- Yolanda Rodriguez - Chief Transactional Counsel
- Domingo Cruz - Vice President, Legal
- Jeffrey Chine - Allen Matkins, Land Use
- Bonnie Neely- Nossman, Coastal Commission Advisor

The Developer's architect will be: Stantec. The Developer will notify NCTD in writing if any team members are added or changed and provide their information.

The Developer's building contractors will be: Clark Building Group, Snyder Langston, Suffolk Construction.

The Developer's consultants will be:

- Scott Moffatt- SVP, Lincoln Properties West
- Jodi Rothery - Director of Development, Chelsea Investment Corporation
- H. Michael Schwartzman - Development Management, DevelUP
- Leslie Rogers - Funding Grant Specialist, LTR Consulting

The Developer is a publicly-traded company with information regarding its principals and financial statements publicly available as so required.

The principals, partners, joint ventures, development manager, consultants, and other directly involved employees of the Developer are subject to the approval of NCTD, which will not be unreasonably withheld.

## VI. The Developer's Financial Capacity

### A. Financial Statement

Financial statements of the Developer are publicly available. Toll Brothers, Inc., a FORTUNE 500 Company, is the nation's leading builder of luxury homes. The Developer began business over 50 years ago in 1967 and became a public company in 1986. As of July 31, 2020 (third fiscal quarter end), the Developer had approximately $11 billion in assets, $5 billion in equity and $2.3 billion in available liquidity. The Developer has raised over $8 billion in corporate and joint venture capital over the last 5 years.

### B. Equity

The Developer proposes to obtain its equity capital in the following manner:

The Developer has the financial capacity to develop the Project with its own capital. Should it seek an equity partner, the Developer has relationships with a diverse group of institutional investors.

### C. Construction Financing

The Developer proposes to obtain its construction financing for the Project in the following manner:

The Developer has a wide variety of debt available to finance the Project, including its $1.9 billion credit facility. The Developer has also secured project-level financing for many of its projects.

### D. Long-Term Development Financing

The Developer proposes to obtain its long-term development financing in the following manner:

See above.

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E. Bank and Other Financial References

The Developer's bank and other financial references are as follows:

Edward Kang
Senior Vice President
Commercial Real Estate
Wells Fargo Corporate & Investment Banking
57 Headquarters Plaza, West Tower, 5th floor | Morristown, NJ 07960
MAC J2373-050 jOffice: 973-828-6826 j Cell: 917-921-92861 Fax: 973-828-6830

Rushabh M. Shah
Executive Director, Transactions
PGIM Real Estate
Office: +1 973.683.1742 | Mobile: +1 973.342.6109

F. Full Disclosure

The Developer will be required to make and maintain full disclosure to NCTD of the methods of financing and the financing documents to be used in the Project.

VII. Approvals

The ODA and Ground Lease and other documents, as provided for in Section I of this ENA, will only become effective if and after these agreements have been considered and approved by the NCTD Board of Directors and fully executed and delivered by NCTD and Developer. Additionally, NCTD may be required to obtain the appropriate approvals from the FTA for any associated federal grant funding.

VIII. Real Estate Commissions

NCTD shall not be liable for any real estate commission or brokerage fees which may arise herefrom. NCTD represents it has engaged only CBRE, Inc. in connection with this transaction, and the Developer agrees to pay CBRE, Inc. the success fee as outlined within the RFP pursuant to a separate agreement to be entered into between CBRE, Inc. and Developer, to be entered into prior to the effectiveness of this ENA.

IX. Limitations on Remedies for Breach or Default and Release of Claims

A. Rights and Remedies. If either Party defaults with regard to any of the provisions of this Agreement, then the non-defaulting Party shall serve written notice of such default upon the defaulting Party. If the default is not cured within a reasonable time (but not more than fifteen (15) calendar days), then the defaulting Party shall be liable to the non-defaulting Party for any damages caused by such default, and the non-defaulting Party may thereafter (but not before) commence an action for damages against the defaulting Party with respect to such default; provided however, that neither Party shall have any obligation to the other for payment of punitive, exemplary or consequential damages and provided further, that each Party waives its right to bring an action for specific performance against the other Party, except that the Developer may bring an action for specific performance to enforce the NCTD's obligation to negotiate exclusively with the Developer during the term of this Agreement and NCTD may bring an action for specific performance to enforce the Developer's obligation to pay NCTD costs expressly required by this Agreement to be paid by the Developer (which shall in no event exceed the amount of the then-submitted

Deposits pursuant to Section I.D). In the event of a breach or default of this Agreement, the non-breaching Party shall be entitled to all remedies available pursuant to the terms of this Agreement, at law and in equity, and all such remedies are cumulative in nature and may be asserted by such Party in the alternative and the assertion of a remedy by a Party shall not be deemed an exclusive election of remedies or waiver of any other rights conferred on that Party by the terms of this Agreement. Notwithstanding the foregoing, in no event shall NCTD be liable to Developer for any claim of damages or other amount in excess of the total Deposit amount(s) paid pursuant to Section I.D.

X. Termination by NCTD

A. NCTD shall have the right to terminate this ENA in the event of any of the following:

(i) The Developer fails timely to perform any of its material obligations hereunder or is otherwise in material default under this ENA; or
(ii) The Developer proposes provisions or conditions which materially vary from the parameters for the Proposed Project to be agreed upon in the "Concept Plan" to be agreed upon pursuant to Section 11.B, and fails to rescind such proposals within fifteen (15) calendar days after NCTD notifies the Developer of its intent to terminate this ENA as a result of such proposals; or
(iii) During the Initial Period (or Subsequent Period, if applicable), the proposed terms of the DOA and/or Ground Lease are deemed not in the best interests of NCTD as determined by NCTD in its sole and absolute discretion.

B. NCTD's right of termination shall be subject to the fifteen (15) calendar day notice and cure provisions set forth in Section IX of this ENA.

XI. Termination by Developer

A. The Developer shall have the right to terminate this ENA in the event of either of the following:

(i) It is reasonably likely that the Project will not obtain all necessary entitlements and environmental clearances necessary for the development and operation of the Project upon terms and conditions acceptable to Developer in its sole discretion; or
(ii) NCTD fails timely to perform any of its material obligations hereunder or is otherwise in material default under this ENA.

B. The Developer's right of termination shall be subject to the fifteen (15) calendar day notice and cure provisions set forth in Section IX of this ENA.

XII. INDEMNITY

Other than arising from a dispute between the Developer and NCTD regarding any such Party's performance hereunder, Developer shall protect, indemnify, defend, and hold NCTD, its Board of Directors, officers, employees, agents, and successors and assigns (collectively, the "NCTD Indemnitees" in this Section) harmless against all suits and causes of action, claims, costs, and liability, including, but not limited to, reasonable attorney's fees and costs of any litigation, or arbitration or mediation, if any, arising out of Developer's breach of this ENA or any negligent or tortious conduct of Developer related to this ENA. Nothing in this Section shall be construed to mean that Developer shall hold the NCTD Indemnitees harmless and/or defend them to the extent of any claims arising from, or alleged to arise from the negligence, willful misconduct or illegal acts

of any of the NCTD Indemnitees, the failure of NCTD to follow any rule, procedure or law applicable to NCTD, and/or any claims that this ENA violates any current agreement to which NCTD is subject. NCTD agrees that it shall reasonably cooperate with Developer in the defense of any matter in which Developer is defending and/or holding the NCTD Indemnitees harmless. NCTD may make all reasonable decisions with respect to their representation in any legal proceeding, including, but not limited to, the selection of attorney(s). This indemnity obligation shall survive the termination of this ENA.

Developer shall protect, indemnify, defend, and hold harmless NCTD in the event that, at Developer's request, NCTD withholds production of any records submitted in connection with this ENA that are marked "Confidential"" Trade Secret" "Proprietary", or similar designations, in response to a Public Records Act request pursuant to California Government Code section 6250 or a Freedom of Information Act request. This indemnity obligation shall survive the termination of this ENA.

Other than arising from a dispute between the Developer and NCTD regarding any such Party's performance hereunder, subject to the limitation on damages set forth in Section IX hereof, NCTD shall protect, indemnify, defend, and hold Developer, its members, officers, employees, agents, consultants and successors and assigns (collectively, the "Developer Indemnitees" in this Section) harmless against all suits and causes of action, claims, costs, and liability, including, but not limited to, reasonable attorney's fees and costs of any litigation, or arbitration or mediation, if any, arising out of NCTD's breach of this ENA or any grossly negligent or tortious conduct of NCTD related to this ENA. Nothing in this Section shall be construed to mean that NCTD shall hold the Developer Indemnitees harmless and/or defend them to the extent of any claims arising from, or alleged to arise from the negligence, willful misconduct or illegal acts of any of the Developer Indemnitees, the failure of Developer to follow any rule, procedure or law applicable to Developer, and/or any claims that this ENA violates any current agreement to which Developer is subject. Developer agrees that it shall fully cooperate with NCTD in the defense of any matter in which NCTD is defending and/or holding the Developer Indemnitees harmless. Developer may make all reasonable decisions with respect to their representation in any legal proceeding, including, but not limited to, the selection of attorney(s). This indemnity obligation shall survive the termination of this ENA.

## XIII. Notices

Any notice, request, approval or other communication to be given hereunder shall be in writing and may be given by personal delivery, by certified or registered mail or nationally recognized overnight delivery service, and shall be deemed sufficiently given when delivered.

If to NCTD:
Real Estate Department
North County Transit District
810 Mission Avenue
Oceanside, CA 92054

If to Developer:
Toll Bros, Inc.
Southern California Office
23422 Mill Creek Drive, Suite 105
Laguna Hills, CA 92653

## XIV. Need for the DOA and Ground Lease

NCTD shall, from the date of written confirmation that Developer has submitted all necessary and pertinent information, as determined by NCTD in its sole discretion, negotiate a form ODA and Ground Lease during the Initial Period (and Subsequent Periods, as applicable), and make a recommendation to the NCTD Board of Directors to either terminate the ENA or enter into a DOA and Ground Lease with the Developer at the applicable time periods.

The Parties acknowledge and agree that this ENA is for the sole purpose of stating the intention of the parties to negotiate a DOA and Ground Lease. The Parties have not reached agreement on the matters described herein, and do not intend to be bound until such time as a final written DOA and Ground Lease are executed by both Parties. All costs incurred by the Parties during the term of this ENA, and any extensions thereto, shall be borne by the Party incurring the cost, except to the extent that NCTD may utilize the deposits described in Section I.D. In the event the final, written DOA and Ground Lease are not executed by both Parties within the time provided in Section I.B, this ENA shall automatically terminate, and be of no further force or effect, unless extended by mutual agreement and action of NCTD and Developer.

NCTD's acknowledgment of this ENA is merely an agreement to enter into a period of negotiations according to the concepts presented herein, reserving final discretion and approval by the NCTD Board of Directors, or any other agencies as to any actions required of them, if any.

Subject to the terms and conditions to be set forth in the ODA, NCTD and any other applicable agencies retain full discretion to consider any environmental review pursuant to CEQA on the Project and the Board of Directors may approve the resultant project, disapprove it, or require additional mitigation measures or alternatives in their absolute discretion. The obligations of the Parties shall be implemented and interpreted to be in compliance with CEQA, Save Tara v. City of West Hollywood, 45 Cal.4th 116 (2008), and River Watch v. Olivenhain Municipal Water Dist., 170 Cal.App.4th 1186 (2009)

## XV. General Provisions

A. It shall be a condition hereof that this ENA shall be fully executed no later than three (3) business days from the NCTD Board of Directors' approval of the Developer as the highest ranked proposer for the Proposed Project and the Board authorizing the Executive Director of NCTD to enter into this ENA with Developer.
B. The Agreement shall be interpreted and enforced under the laws of the State of California.
C. If any provision of the ENA is found invalid or unenforceable, the balance of the ENA shall remain in full force and effect.
D. The ENA is not intended for the benefit of any person or entity that is not a Party to this ENA, and shall not be enforceable by any person or entity who is not a Party to this ENA.
E. The terms and conditions of this ENA shall be governed by the laws of the State of California. Any action or proceeding brought by any party against any other party arising out of or related to this ENA shall be brought exclusively in San Diego County.
F. No alterations to this ENA or variance from the provisions hereof shall be valid unless made in writing and executed by both of the Parties hereto.
G. Each of the Parties signing this ENA warrants to the other that it has the full authority of the entity on behalf of which its signature is made.
H. The ENA may be executed in counterparts with the same force and effect as if executed in one complete document by all Parties.

**[Signatures on following page]**

IN WITNESS WHEREOF, the Parties hereto have executed this ENA of the date set opposite their signatures.

NORTH COUNTY TRANSIT DISTRICT

Dated: 10/2/2020

By: _____
Matthew O. Tucker, Executive Director

APPROVED AS TO FORM AND LEGALITY

Dated: 10/2/2020

By: _____
Lori A. Winfree, General Counsel

DEVELOPER:

**TOLL BROTHERS, INC.,**
A D lIilfinGGfPOration

Dated: October 2, 2020

By: ssJL d.u.sfo.,

Name: usse l .-Rochestie
Title: Vice President

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# Exhibit A - Page I

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# Exhibit A - Page 2

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Option Agreement by and between North County Transit District and Toll Bros., Inc. dated March 18, 2021 (as subsequently amended, the "Agreement")

Acceptance of Revised Exhibit Memorandum (Exhibit "G" to the Agreement)

Optionor and Optionee accept the revised Exhibits "C" and "D" to the Agreement, attached hereto with the agreed-to forms of DDA and Ground Lease and incorporated by reference.

**OPTIONOR**:

**NORTH COUNTY TRANSIT DISTRICT**,
a public agency

By: _____
Name: Matthew O. Tucker
Title: Executive Director
Dated: November 18, 2021

**OPTIONEE**:

**TOLL BROS., INC.**,
a Pennsylvania corporation

DocuSigned by:
By: Russell Rochestie
Name: Russell R. Rochestie
Title: Senior Vice President
Dated: November 11, 2021

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**Exhibit C – Form DDA (with 810 S. Mission Ave. Side Letter)**

[to be attached]

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# DISPOSITION AND DEVELOPMENT AGREEMENT

**by and between**

**NORTH COUNTY TRANSIT DISTRICT**

**and**

**TOLL BROS., INC.**

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# DISPOSITION AND DEVELOPMENT AGREEMENT

This Disposition and Development Agreement ("**Agreement**") is entered into by and between NORTH DISTRICT COUNTY TRANSIT DISTRICT, a public agency existing under the laws of the State of California pursuant to California Public Utilities Code Sections 125000, *et seq*. (the "**District**" or "**NCTD**"), and TOLL BROS., INC., a Pennsylvania corporation ("**Developer**"). The District and Developer are sometimes hereinafter referred to individually as a "**Party**" and collectively as the "**Parties.**" This Agreement is dated for reference purposes only as of _____, 202_.

The Parties agree as follows:

## SECTION 1. Purpose of the Agreement

1.1 The purpose of this Agreement is to provide for the development of the NCTD Improvements (as defined in Section 1.3 below) by Developer at its sole cost and expense in accordance with this Agreement, including the scope of development that is attached hereto as Attachment No. 1 and is incorporated by reference herein (the "**Scope of Development**"), and the schedule of performance that is attached hereto as Attachment No. 2 and is incorporated by reference herein (the "**Schedule of Performance**").

1.2 The District is the owner of approximately 10.2 acres of land located at 235 S. Tremont Street, in the City of Oceanside ("City"), County of San Diego ("**County**"), State of California ("**State**") (the "**Oceanside Transit Center**").

1.3 The Parties contemplate the redevelopment of the Oceanside Transit Center by Developer with a mixed-use project, including a new administrative headquarters building for the District with ground floor retail and associated parking (the "**NCTD Headquarters Building**") a new ticketing transit center, a relocated bus transfer station, approximately 560 replacement transit parking spaces, as more specifically set forth in the Scope of Development (collectively, the "**NCTD Improvements**" or "**Project**")), as well as a multi-family residential project comprising of approximately 547 market rate units; an approximately 141-key hotel, open public spaces, associated site and infrastructure improvements and additional required parking (collectively, the "**Oceanside Transit Center Improvements**"). The NCTD Improvements will be located entirely on the "**NCTD Improvements Property**" (or "**Property**") which is described and depicted in Attachments 3 and 4 respectively, which are attached hereto and are incorporated by reference herein.

1.4 The Parties acknowledge that in order to obtain the entitlements to construct the Oceanside Transit Center Improvements in compliance with the City's inclusionary housing ordinance codified in Chapter 14C of the Oceanside Municipal Code, the City will require, as a condition of approval / development obligation, that 101 low- and/or moderate-income residential units will be required to be constructed. The Parties further acknowledge that the required affordable units will be constructed on a separate property located at 810 Mission Avenue, Oceanside, CA 92054 (the "**Mission Avenue Property**").

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1.5 The Project is intended to be constructed and operated in a manner consistent with this Agreement, together with (a) that certain Option Agreement between District and Developer, dated March 18, 2021, as amended (the "Option Agreement"), and (b) those certain ground leases between the District and Developer of even date herewith concerning certain portions of the Oceanside Transit Center Project as more specifically identified as follows: **[INSERT GROUND LEASE INFO]** (collectively, the "Leases"). The development and use of the Project pursuant to this Agreement, the Option Agreement, and the Leases, and the fulfillment generally of this Agreement, are in the vital and best interests of the District, and in accord with the public purposes and provisions of applicable federal, state, and local laws and requirements.

**SECTION 2. Term**

This Agreement shall commence and become effective upon the last day that all of the following events have occurred: (1) execution of this Agreement by both Parties; and (2) recordation of this Agreement by the Escrow Holder (as that term is defined in Section 5.1 of the Option Agreement) in accordance with Section 5.2(d)(ii) of the Option Agreement (the "**Effective Date**"). The term of this Agreement shall commence upon the Effective Date and shall remain in effect until completion of construction, and acceptance by NCTD, of the NCTD Improvements. Upon completion of construction by Developer and acceptance of the NCTD Improvements by the District, this Agreement shall automatically terminate and be of no further force and effect, and the Parties shall have no further obligations under this Agreement with the exception of Sections 11.1, 11.2, and 11.3 herein, which shall survive termination or expiration of this Agreement.

**SECTION 3. The Property**

The NCTD Improvements will be located entirely on the NCTD Improvements Property. The NCTD Improvements Property is owned by the District and will be located in the Oceanside Transit Center Project. The NCTD Improvements Property is located at 235 S. Tremont Street, in the City, County and State, as more particularly described in the legal description attached hereto as Attachment No. 3 and the depiction attached hereto as Attachment 4. A site map depicting the Oceanside Transit Center Project is attached hereto as Attachment No. 5.

**SECTION 4. Relationship of the Parties**

It is hereby acknowledged that the relationship of the District to Developer is neither that of a partnership nor that of a joint venture and that neither the District nor Developer shall be deemed or construed for any purpose to be the agent of the other Party, and neither Party shall have the power or the authority to speak on behalf of the other Party or to bind the other Party to any contractual or other obligations. Developer shall not at any time hold itself out to the District or to any other third party as an agent of the District, and shall not, by any act or omission, mislead any third party into believing, or allow any third party to continue in the mistaken belief, that Developer is an agent of the District or has the power or authority to bind the District to any contractual or other obligation.

**SECTION 5. Not a Development Agreement**

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This Agreement is not a development agreement as provided in Government Code Section 65864, and is not a grant of any entitlement, permit, land use approval, or vested right in favor of the District, the Project or the Property, or any portion thereof. The District and Developer shall use good faith efforts to take such actions as may be necessary or appropriate to effectuate and carry out this Agreement in a timely and commercially reasonable manner.

**SECTION 6. Recording of this Agreement**

Upon receipt of executed and notarized original counterparts of this Agreement and Memorandum of DDA (as that term is defined in Section 5.2(a)(iv) of the Option Agreement) from Developer and District in accordance with Sections 5.2(a) and 5.2(b) of the Option Agreement, the Escrow Holder (as that term is defined in Section 5.1 of the Option Agreement) shall record a Memorandum of this Agreement in the Official Records of San Diego County, California (the "**Official Records**"), in accordance with Section 5.2(d) of the Option Agreement. The form of the Memorandum of DDA is attached hereto as Attachment 6 and is hereby incorporated by reference herein. Upon the expiration or Termination of this Agreement the parties shall cooperate to remove the Memorandum of this Agreement from the Official Records of San Diego County.

**SECTION 7. Project Approvals**

7.1 Permitting and Agency Approvals Period

Prior to the Effective Date, Developer obtained pursuant to the Option Agreement all required governmental approvals necessary for the development and construction of the NCTD Improvements and the issuance of building permits with respect thereto (upon payment of the ordinary building permit fee), including but not limited to the necessary and required land use and development entitlement approvals issued by the City, the other Approving Parties (as defined in Section 7.2 below), and the California Coastal Commission, as listed in Attachment 7 attached hereto (individually, an "**Entitlement**," and collectively, the "**Entitlements**").

7.2 Cooperation

The Parties acknowledge and agree that although the Entitlements to develop the NCTD Improvements were obtained prior to the Effective Date, the District hereby agrees to reasonably cooperate with Developer in connection with the processing and obtaining any additional approvals, permits, entitlements, certifications, consents, letters, applications, documents, agreements, or other authorizations (collectively, the "**Additional Approvals**") that may become necessary to obtain during the Term of this Agreement in order to design, engineer and construct the NCTD Improvements. The Additional Approvals, if any, will be obtained at no out-of-pocket cost to the District. Without limiting the generality of the foregoing, the District agrees, subject to applicable NCTD procedural requirements which NCTD agrees to diligently pursue and complete, within ten (10) business days after request by Developer, to execute any Additional Approvals that may be necessary to construct the NCTD Improvements which are reasonably required by Developer or requested by any Approving Parties to allow Developer to construct the NCTD Improvements. For purposes of this Agreement, "**Approving Parties**" means any other applicable

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governmental or quasi-governmental agency, body or authority having jurisdiction over the Oceanside Transit Center.

**SECTION 8. Additional Documentation**

8.1 In addition to this Agreement, the Option Agreement and the Leases, the Parties acknowledge and agree that design, engineering, development and construction of the NCTD Improvements requires reciprocal easement agreements, cost sharing agreements, management and operations agreements for the ground floor retail space in the NCTD Headquarters Building, and/or other additional agreements that will burden and benefit certain portions of the Oceanside Transit Center, and potentially the Mission Avenue Property, and provide for the subdivision, maintenance, improvement, development, ownership, management, administration and/or use of such portions of the Oceanside Transit Center, including without limitation a property management agreement for the ground floor retail space to be located in the NCTD Headquarters Building and Additional Project Documents contemplated in Section 13 below (collectively, the "**Additional Project Documents**").

8.2 Prior to the Effective Date, the Parties have agreed upon the forms of the Additional Project Documents (as defined in the Option Agreement), which are listed in Attachment 8 attached hereto. Nevertheless, the Parties acknowledge the possibility that Additional Project Documents may need to be negotiated, prepared and entered into by the Parties during the Term of this Agreement. If that is the case, such Additional Project Documents shall be prepared by Developer's counsel and shall be subject to the District's approval in its reasonable discretion. In the event that the District fails to deliver written notice of its approval or disapproval (and in the case of disapproval, stating in detail the reasons for such disapproval) within twenty (20) days after receipt of Developer's proposed forms of the Additional Project Documents, then Developer shall have the right to provide the District with a second written request for approval in which any items raised are either addressed or the parties shall meet and confer within five (5) business days of District's receipt of Developer's written request to obtain a mutually agreeable solution (hereinafter "Developer's Second Request"). Developer's Second Request for approval must specifically state in boldface capitalized text that the District's failure to respond to such second notice within a period of five (5) business days of receipt of Developer's Second Request shall be deemed to be approval by the District. If the District's failure to respond continues for five (5) business days after the District's receipt of Developer's second written request for approval, then the District shall be deemed to have approved such forms. In the event that the District timely delivers written notice to Developer of its disapproval of the proposed forms of the Additional Project Documents pursuant to the preceding sentences, then the terms of Section 27 below regarding dispute resolution shall apply. To the extent Additional Project Documents are required to be agreed upon and prepared during the Term of this Agreement, the Parties agree to cooperate in good faith in the negotiation and preparation of such Additional Project Documents, and such Additional Project Documents will be executed by the Parties and recorded (as applicable).

**SECTION 9. Assignments and Transfers**

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9.1 Developer represents, warrants, and agrees that its undertakings pursuant to this Agreement are for the purpose of redeveloping the Property and constructing the Project. Developer further recognizes that the qualifications and identity of Developer are of particular importance to the District. Developer further recognizes that it is because of such qualifications and identity that the District is entering into this Agreement with Developer. Therefore, no voluntary or involuntary successor-in-interest of Developer shall acquire any rights or powers under this Agreement except as expressly permitted under this Agreement.

9.2 Developer shall not assign, in whole or in part, or transfer any rights under this Agreement without the express written consent of the District, which may be withheld in its sole discretion. Notwithstanding the foregoing, Developer is hereby authorized and permitted to assign this Agreement to an entity that owns, is owned or controlled by, or is under common control with Developer (as shown in advance by reasonable written evidence delivered to the District), without the consent of the District.

**SECTION 10. Key Employees**

Developer represents and warrants that Developer's key employees or representatives (the "**Key Employees**") who will be directly involved in the development of the Project, so long as each is employed by Developer, are as follows:

[INSERT NAMES AND CONTACT INFO
FOR THE TOLL EMPLOYEES THAT WILL BE
INVOLVED IN INTERFACING WITH DISTRICT]

In the event that one or more of the Key Employees listed above needs to be changed at any time during the Term of this Agreement, Developer will provide written notice of such change(s) to the District in accordance with the procedures set forth in Section 31 below.

**SECTION 11. Representations and Warranties**

11.1 Developer's Representations and Warranties. As an inducement to the District to enter into this Agreement and to perform its obligations hereunder, Developer represents and warrants to the District as follows:

(a) Developer, in conjunction with its retained consultants, has the necessary expertise, experience, qualifications and legal status necessary to perform as Developer pursuant to this Agreement and to construct and complete the Project and, without limiting the foregoing, Developer, with its retained consultants, is experienced in the construction, development, management, and completion of projects of the size and type described in this Agreement and understands the process and requirements associated with projects such as the NCTD Improvements described herein.

(b) Developer is a corporation duly organized, validly existing, and in good standing under the laws of the State of Pennsylvania, and is duly qualified to conduct business in the State of California. This Agreement and all the documents executed by Developer which are

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to be delivered to the District pursuant to the terms of this Agreement are or will be duly authorized, executed, and delivered by Developer, and will not violate any provisions of any agreement to which Developer is a party. This Agreement is binding and enforceable against Developer in accordance with its terms.

(c) Developer has all requisite power and authority required to enter into this Agreement and the other instruments and documents referenced in this Agreement, and to consummate the transactions contemplated hereby and thereby, to take any steps contemplated thereby or hereby, and to perform its obligations hereunder and thereunder.

(d) All currently required action has been taken by Developer and, subject to all conditions set forth in this Agreement for the benefit of Developer, Developer has obtained all required consents in connection with entering into this Agreement and the instruments and documents referenced in this Agreement to which Developer is or shall be a party and the consummation of the transactions contemplated hereby.

(e) The individuals executing this Agreement and the other instruments and documents referenced in this Agreement on behalf of Developer have the legal power, right and actual authority to bind Developer to the terms and conditions hereof and thereof.

(f) Neither the execution or delivery of this Agreement or the documents referenced in this Agreement, nor the incurring of the obligations set forth in this Agreement, nor the consummation of the transactions contemplated in this Agreement, nor compliance with the terms of this Agreement and the documents referenced in this Agreement, will violate any provision of law, any order of any court or other government entity or conflict with or result in the breach of any terms, conditions, or provisions of, or constitute a default under any bond, note, or other evidence of indebtedness or any contract, indenture, mortgage, deed of trust, loan partnership agreement, lease or other agreements or instruments to which Developer is a party or which affect any portion of the Project.

(g) No attachments, execution proceedings, assignments of benefit to creditors, bankruptcy, reorganization or other proceedings are pending or, to the best of Developer's knowledge, threatened against Developer.

(h) There is no pending or, to the best of Developer's knowledge, threatened litigation that could prevent or materially impair Developer's ability to develop the NCTD Improvements as contemplated by the terms of this Agreement.

(i) As of the Effective Date, Developer has the equity capital and bonding capacity required for completion of the Project as further described in the Scope of Development, and to perform and satisfy all of Developer's covenants contained in this Agreement.

11.2 District's Representations and Warranties. As an inducement for Developer to enter into this Agreement and perform its obligations hereunder, the District represents and warrants to Developer as follows:

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(a) The District is a public agency existing under the laws of the State of California pursuant to California Public Utilities Code Sections 125000, *et seq*. This Agreement and all the documents executed by the District which are to be delivered to Developer pursuant to the terms of this Agreement are or will be duly authorized, executed, and delivered by the District, and will not violate any provisions of any agreement to which the District is a party or to which it or the NCTD Improvements Property is subject. This Agreement is binding and enforceable against the District in accordance with its terms. The individual(s) executing this Agreement and the instruments referenced in this Agreement on behalf of the District have the legal power, right, and actual authority to bind the District to the terms and conditions of this Agreement.

(b) The District has all requisite power and authority required to enter into this Agreement, and subject to all conditions set forth in this Agreement and the instruments referenced in this Agreement, to consummate the transactions contemplated and to take appropriate steps contemplated in this Agreement, and to perform its obligations under this Agreement. Other than the District's Board, no consent of any additional individual, official, board, division, judicial or administrative body, authority, or other party is required in connection with any of the foregoing.

(c) All required action has been taken by the District and the District has obtained all required consents in connection with entering into this Agreement and the consummation of the transactions contemplated hereby.

(d) As of the Effective Date, there are no pending or, to the District's actual knowledge, threatened legal proceedings or actions of any kind or character affecting the Property or any portion thereof or the District's interest therein or affecting this Agreement, including without limitation, general or special assessment proceedings of any kind, or condemnation or eminent domain actions or proceedings of any kind. There is no insolvency or bankruptcy proceeding pending or, to the knowledge of the District, contemplated involving the District or involving the Property.

(e) Neither the execution and delivery of this Agreement and the documents and instruments referenced herein (including, without limitation, the Leases), nor the incurrence of the obligations set forth herein, nor the consummation of the transaction contemplated herein, nor compliance with the terms of this Agreement and the documents and instruments referenced herein (including, without limitation, the Leases) conflict with or result in the material breach of any terms, conditions or provisions of, or constitute a default under, any mortgage, deed of trust, loan, lease or other agreement or instrument to which the District is a party or affecting the NCTD Improvements Property.

(f) The District owns fee title to the NCTD Improvements Property which, to the best of District's actual knowledge, is free and clear of all liens, encumbrances, covenants, restrictions, easements, leases or other matters affecting title, other than recorded title exceptions. Except as set forth in the Due Diligence Materials (as that term is defined in the Option Agreement), the District has not granted any leases, licenses, options or rights of first refusal to any other party. Except for matters shown on the Title Report (as that term is defined in the Option Agreement), there are no commitments or agreements which would require Developer to pay any money or perform any obligation with respect to the Property following Closing or which would

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otherwise affect the District's ownership of the Property or development of the Property by Developer following Closing.

(g) To the District's actual knowledge, there are no physical conditions or impediments affecting the Property that would have the effect of impairing or prohibiting, in any material respect, the development and use of the Property as contemplated by this Agreement.

(h) Except as set forth in the Due Diligence Materials, the District has not to the District's actual knowledge, nor has any other person or entity, used any portion of the Property, nor permitted any other person or entity to use the Property for the purpose of storage, generation, manufacture, disposal, transportation or treatment of any petroleum or any substance which may be classified as a hazardous, toxic, chemical or radioactive substance, or a contaminant or pollutant (collectively, "**Hazardous Substances**") under applicable federal, state or local law, ordinance, rule or regulation ("**Applicable Laws**") or which may require any cleanup, remediation or other corrective action pursuant to such Applicable Laws. Further, to the District's actual knowledge, no underground storage tanks are located at the Property. In addition, to the District's actual knowledge, the District has provided to Developer true and complete copies of all environmental reports in District's possession or control.

(a) (i) To the District's actual knowledge, there are no violations of any Applicable Laws pertaining to the Property. No notice by any governmental or other public authority has been served upon District, or anyone on District's behalf, relating to violations of any applicable housing, building, safety, fire or other ordinances or any of the Applicable Laws.

(b) (j) For the purposes of this Section 11.2, the District's actual knowledge shall mean the current actual knowledge of Matthew Tucker and Tracey Foster (collectively, the "District Knowledge Parties"), without investigation or the attribution of the knowledge of others as of the Effective Date. The District represents and warrants to Developer that the District Knowledge Parties are the persons most knowledgeable concerning the NCTD Improvements Property and the matters that are the subject of the foregoing representations and warranties qualified by reference to the District's actual knowledge.

11.3 Indemnity for Breach of Representations and Warranties

(a) Developer Indemnity. Developer shall indemnify, defend (with counsel reasonably acceptable to the District), protect and hold the District harmless from and against all claims, losses, liabilities, damages, costs and expenses (including, but not limited to, reasonable attorneys' fees, expert witness fees and court costs) to the extent arising from the inaccuracy or breach of any representation or warranty by Developer in this Agreement. Such indemnification shall be binding upon the successors and assigns of Developer and inure to the benefit of the District and its successors and assigns for a period ending one (1) year following the completion, and the District's acceptance of, the NCTD Improvements, or earlier termination of this Agreement. Any claim, action, suit or proceeding by the District under this Section shall be commenced and served, if at all, on or before the expiration of such one (1) year period.

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(b) District Indemnity. District shall indemnify, defend (with counsel reasonably acceptable to Developer), protect and hold Developer harmless from and against all claims, losses, liabilities, damages, costs and expenses (including, but not limited to, reasonable attorneys' fees, expert witness fees and court costs) to the extent arising from the inaccuracy or breach of any representation or warranty by the District in this Agreement. Such indemnification shall be binding upon the successors and assigns of the District and inure to the benefit of Developer and its successors and assigns for a period ending one (1) year following the completion, and the District's acceptance of, the NCTD Improvements, or earlier termination of this Agreement. Any claim, action, suit or proceeding by Developer under this Section shall be commenced and served, if at all, on or before the expiration of such one (1) year period.

**SECTION 12. Warranties; Indemnification**

12.1 Warranties. Upon Completion of NCTD Improvements and acceptance of the NCTD Improvements by the District (as provided in Section 19.1.2 below), all warranties in which Developer may have an interest relating to work, labor, skill or materials furnished in connection with the construction of the NCTD Improvements, together with all of Developer's rights to the plans and specifications which have been prepared by or for Developer in connection with the NCTD Improvements, shall be deemed assigned to the District on a non-exclusive basis without consideration or expense to the District and without representation or warranty.

12.2 Indemnification. Except to the extent caused by the intentional misconduct or grossly negligent acts, errors or omissions of the District or one or more of the District's officials, employees, agents, attorneys, and contractors (collectively, the "District's Affiliated Parties"), Developer shall indemnify, defend, and hold harmless the District and the District's Affiliated Parties from and against all suits, claims, liabilities, losses, damages, penalties, obligations, and expenses (including but not limited to reasonable attorneys' fees and costs) (collectively, a "**Claim**") that may arise, directly or indirectly, from the acts, omissions, or operations of Developer or Developer's agents, contractors, subcontractors, agents, or employees in the course of Development of the NCTD Improvements pursuant to this Agreement. Such indemnification and defense shall be provided by counsel selected by Developer after good faith consultation with the District to ensure the proposed legal counsel has the professional expertise and experience to demonstrate they are well-qualified to defend the District against the Claim(s).

**SECTION 13. Access to Oceanside Transit Center; Construction Easements and Licenses Necessary for Design, Engineering and Construction of NCTD Improvements**

From and after the Effective Date, Developer and Developer's contractors, consultants, representatives, employees and agents shall have the right, upon obtaining the required permits from NCTD ("**Access Permits**"), to enter the Oceanside Transit Center for purposes of constructing the NCTD Improvements.

Concurrently with the execution of this Agreement, the District and Developer will enter into various license agreements, and the District will issue the necessary access and encroachment permits, and record all necessary easements, in order to provide Developer the rights for ingress

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and egress onto the Oceanside Transit Center for purposes of designing, engineering, developing and constructing the NCTD Improvements. Further, the District will enter into the necessary license agreements, issue the necessary permits, and record the necessary easements to allow for Developer to construct the NCTD Improvements on the Oceanside Transit Center. A list of the licenses, access and encroachment permits, and easements to be issued to Developer for purposes of constructing the NCTD Improvements are set forth in Attachment 9, which is incorporated by reference herein.

In the event additional licenses, permits, or easements become necessary to design, engineer, develop and construct the NCTD Improvements during the Term of this Agreement that were not otherwise contemplated by the Parties at the time this Agreement was executed, the District hereby agrees to cooperate with Developer in connection with the processing, obtaining, issuing, entering into, executing and recording any such additional licenses, permits, and easements that become necessary for Developer to construct the NCTD Improvements. Without limiting the generality of the foregoing, the District agrees, within ten (10) business days after request by Developer, to take the necessary actions to process, enter into, issue, and record, as applicable, such additional licenses, permits and easements.

**SECTION 14. Administrative Changes**

The District's Executive Director shall have the authority to approve changes to this Agreement and its attachments, including the Scope of Development, the Schedule of Performance and the Phasing Schedule, as reasonably requested by Developer in order to design, engineer, implement, develop, construct and operate the NCTD Improvements, including but not limited to helping to obtain a construction loan or other financing for the NCTD Improvements, provided that the requested changes do not have, in the determination of the District's Executive Director, an adverse impact to the District's interests under this Agreement, the Final Approved Plans, and any Additional Project Documents. The District's Executive Director may approve any such proposed changes administratively, or in his or her discretion, refer any such proposed changes for consideration by the District Board.

**SECTION 15. Intentionally Blank**

**SECTION 16. Intentionally Blank**

**SECTION 17. Proof of Insurance**

Prior to or concurrently with the Effective Date of this Agreement, Developer shall have obtained and delivered to the District a binder or certificate evidencing the insurance required under Section 18 of this Agreement.

**SECTION 18. Insurance Coverage**

18.1 Developer shall maintain, at its sole cost and expense, or cause to be maintained, until Completion (as defined in Section 19.1.2 below) and acceptance of the NCTD Improvements, the following insurances:

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(a) Statutory Workers' Compensation insurance and Employer's Liability insurance with limits not less than One Million Dollars ($1,000,000.00) per claim.

(b) Commercial Automobile Liability insurance in an amount not less than a One Million Dollar ($1,000,000.00) combined single limit of liability. Commercial Auto coverage shall include the District as an additional insured.

(c) Commercial General Liability insurance in an amount not less than One Million Dollars ($1,000,000.00) per occurrence, and Two Million Dollars ($2,000,000.00) in the aggregate, and which shall provide coverage for both ongoing and completed operations through the applicable statute of repose. General Liability coverage shall include the District as an additional insured on a primary and non-contributory basis through the applicable statute of repose.

(d) Excess or Umbrella Liability, in excess of the coverages required in sections 18.1 (a), (b), and (c) (excluding Workers Compensation coverage), in an amount not less than Twenty-Five Million Dollars ($25,000,000.00) per occurrence, and Twenty-Five Million Dollars ($25,000,000.00) in the aggregate.

(e) Contractors Pollution Liability ("**CPL**") coverage in an amount not less than Three Million Dollars ($3,000,000.00) per occurrence, and Three Million Dollars ($3,000,000.00) in the general aggregate, and which shall provide coverage for both ongoing and completed operations through the applicable statute of repose. CPL coverage shall include the District as an additional insured on a primary and non-contributory basis through the applicable statute of repose.

18.2 Developer shall cause the project architect and engineers to maintain Professional Liability insurance in an amount not less than $3,000,000.00 per claim, and $6,000,000.00 in the aggregate, and for all other professional service vendors and/or consultants, in an amount not less than $1,000,000.00 per claim, and $2,000,000.00 in the aggregate.

18.3 Developer shall maintain, or cause to be maintained, at its sole cost and expense, until Completion of the NCTD Improvements, Builder's Risk insurance coverage for the NCTD Improvements based on one hundred percent (100%) of hard costs, and which shall also include so called soft cost coverage, in the event of damage or destruction, on a completed value basis. Coverage shall include foundations, excavations, underground machinery or equipment, retaining walls, and all paved surfaces. This insurance shall include as additional covered parties the construction manager or general contractor, and their sub-contractors, as their respective interests may appear, and shall insure against loss from fire and lightning, extended coverage perils, and shall include "all risk" insurance for physical loss or damage including, without duplication of coverage, at least theft, vandalism, malicious mischief, flood, terrorism, testing and earthquake (in an amount that may be reasonably required by the parties).

18.4 The coverages as noted in this Section 18 may include deductibles as may be reasonably approved by the District, and any other insurance reasonably required by the District to be maintained during the construction of the NCTD Improvements.

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18.5 The policies of insurance required to be maintained under this Section 18 shall meet the following criteria:

(a) The policies of insurance shall be from companies rated in the A.M. Best Key Rating Guide with a financial strength rating of at least "A-" and a financial size category of at least VII, and such companies shall be licensed to do business in the State of California.

(b) The policies shall contain a provision that before any non-renewal or cancellation of a policy, at least thirty (30) days' advance written notice shall be given to the District.

(c) All coverages shall include a waiver of subrogation in favor of the District.

(d) Certificate(s) of Insurance evidencing the existence of all policies required to be maintained under this Section 18 shall be delivered to the District prior to the start of work on the NCTD Improvements. Prior to the expiration or termination date of any policy, Developer shall deliver a renewal or replacement policy, or certificate(s) evidencing the existence thereof, to the District.

(e) In the event that Developer fails to provide evidence of insurance as required to by the District hereunder, and does not cure such default within five (5) business days after request therefor, then the District shall be authorized (but not required) to procure such coverage in the amounts stated herein with all costs thereof to be reimbursed by Developer.

**SECTION 19. Scope of Development**

19.1 Requirement to Develop the NCTD Improvements

The Scope of Development attached to this Agreement as Attachment 1 sets forth the overall plan for the construction and development of the NCTD Improvements, including design, engineering, development, and construction of the NCTD Improvements on the Oceanside Transit Center in accordance with the Entitlements (as that term is defined in Section 4.1 of the Option Agreement). Developer shall develop the NCTD Improvements in the manner described in and materially consistent with this Agreement (including but not limited to the Scope of Development and Schedule of Performance), the Final Approved Plans (as defined in Section 21.1 below), and the Additional Project Documents (if any).

19.1.1 Project Development Costs

Within the time period set forth in the Schedule of Performance, Developer agrees that it shall design and construct the NCTD Improvements at Developer's sole cost and expense (with the exception of any Reimbursable Items as contemplated in Section 21.2 below) as a completely private development project that will be financed in its entirety through private resources and that no part of any construction, demolition, or other work to be carried out as part of the NCTD

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Improvements shall cause the NCTD Improvements to be paid for, either in whole or in part, or in any way subsidized, by any governmental authority in any manner that would cause the NCTD Improvements to constitute "public work" as defined in California Labor Code Section 1720, *et seq*. Without limiting the generality of the foregoing, Developer hereby agrees that all costs associated with planning, designing, and financing the NCTD Improvements, preparing the NCTD Improvements Property, and constructing the NCTD Improvements, including all hard costs, soft costs, interest and lender fees, the cost of services, fees, exactions, dedications, cost overruns, profit, overhead, consultants' fees, liens, taxes, legal fees, and wages required to be paid to any person employed by Developer, or its contractors or subcontractors, shall be the responsibility of Developer, all City processing fees and all other costs and fees described in this Agreement as to be paid by Developer (collectively, "**Development Costs**"), without any cost to the District.

19.1.2 Completion of Improvements; Acceptance by District

Developer shall, as a condition precedent to NCTD formally accepting the NCTD Improvements, Complete or cause the Completion of all of the NCTD Improvements, which are the responsibility of Developer pursuant to this Agreement. For purposes of this Agreement, the terms "**Complete**" or "**Completion**" of the NCTD Improvements shall mean the point in time when all of the following shall have occurred: (a) the NCTD Improvements have been fully constructed in accordance with this Agreement, the Entitlements, the Final Approved Plans, and any Additional Project Documents; (b) the issuance of a final Certificate of Occupancy by the City for the NCTD Improvements, or, to the extent a Certificate of Occupancy is not required by the City for a particular NCTD Improvement, the equivalent final inspection, signoff or other permit activity with respect to such NCTD Improvement; and (c) any mechanics' liens that have been recorded or stop notices that have been delivered in connection with the NCTD Improvements have been paid, settled or otherwise extinguished, discharged, released, waived, bonded around or insured against to the reasonable satisfaction of NCTD. The District shall accept the NCTD Improvements Phase (as defined in Section 19.2 below) within 30 calendar days of Completion of all of the NCTD Improvements within such Phase.

19.2 Phasing Schedule

The Parties acknowledge and agree that the Project will be constructed in phases (each a "Phase"). The phasing schedule for the construction of the Project, which includes the NCTD Improvements, is attached hereto as Attachment 10. (the "Phasing Schedule").

20. **INTENTIONALLY BLANK**

**SECTION 21 Change Orders for NCTD Improvements**

21.1 The Parties acknowledge that pursuant to the Option Agreement, the Entitlements for the NCTD Improvements are to be "building permit ready," and that this Agreement does not become effective until after the Entitlements have been obtained (i.e., at "Closing" pursuant to Article V of the Option Agreement). Therefore, the District will have already approved all final design, engineering, site plans, construction plans and specifications for the NCTD Improvements (the "**Final Approved Plans**") prior to this Agreement becoming effective. However, the Parties

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acknowledge that change orders may become necessary after Closing has occurred due to a variety of reasons, including changed or new City (or other governmental agency) rules, regulations or requirements that become applicable to the NCTD Improvements after Closing, or due to unforeseen circumstances that arise during construction of the NCTD Improvements. To the extent that one or more change orders become necessary for the development and construction of the NCTD Improvements, the following procedures shall apply: The Party requesting the change order (the "**Requesting Party**") shall submit a written request to the other Party (the "**Reviewing Party**") for such change order(s) (a "**Change Order Request**"), which shall include, at a minimum, a description of the change(s) requested, the basis for the Change Order Request, and in the case of Change Order Requests from the District, proof that such change has been authorized and approved by the appropriate District staff member or District Board, as applicable. All Change Order Requests must be consistent with the Scope of Development attached hereto as Attachment 1, the Entitlements, and any Additional Project Documents. Upon receipt of a written change order request from the Requesting Party, the Reviewing Party shall review and, within ten (10) business days of receipt of the Change Order Request, approve or deny, in its reasonable discretion, the Change Order Request and will promptly provide written notice to the Requesting Party of such approval or denial (unless such change order is mandated by applicable local, state or federal law(s), rules, or regulations, or is necessary as the result of unforeseen events or discovery of unknown circumstances during construction of the NCTD Improvements, in which case the Reviewing Party shall promptly approve the Change Order Request). Nothing herein shall be interpreted as altering, modifying, waiving, amending, or reducing any requirements of any governmental permit required by any local, state or federal permitting authority for the NCTD Improvements.

21.2 To the extent Developer requests reimbursement (individually a "**Reimbursable Item**," and collectively "**Reimbursable Items**") for certain materials or work in connection with the NCTD Improvements (for example, as the result of a District Change Order Request, as that term is defined in Section 21.1 above), Developer shall provide the District with a proforma setting forth Developer's estimate of costs for the Reimbursable Item. The proforma will only be intended to serve as a guide, and the Parties acknowledge that the actual costs of the Reimbursable Item shall be based on more refined cost estimates. Following receipt of bids (if applicable) for the cost of the Reimbursable Item, Developer shall submit to the District an updated cost estimate for the Reimbursable Item. Developer shall identify with specificity any submitted documents in connection with the Reimbursable Item which Developer wants the District to maintain as confidential documents (to the extent allowed under applicable laws). The District shall not disseminate such information and shall take all reasonable steps to maintain such confidentiality, unless otherwise required by applicable laws. The District's staff, agents, negotiators and consultants may review the statements as necessary as long as such parties agree to maintain the confidentiality of such statements.

With respect to Change Order Requests submitted by the District and approved by Developer, Developer shall provide to the District a written estimated price quote and extension of construction time, if applicable, that Developer expects as the result of the District's Change Order Request. Any increase in costs to design, engineer, develop or construct the NCTD Improvements as the result of a Change Order Request from the District, or a change order

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mandated by applicable local, state or federal law(s), rules or regulations, or is necessary as the result of unforeseen events or discovery of unknown circumstances during construction of the NCTD Improvements, shall be a Reimbursable Item pursuant to this Section 21.2. Upon receipt of Developer's estimated price quote and extension of construction time, the District shall have ten (10) business days to provide written authorization to Developer whether to proceed with such Change Order Request. District's failure to timely provide Developer with written authorization to proceed with the change order shall be deemed to be District's decision to not proceed with the change order.

**SECTION 22. Schedule of Performance**

22.1 The Parties acknowledge and agree that time is of the essence with respect to the dates set forth in the attached Schedule of Performance. Following the Effective Date of this Agreement, Developer shall promptly begin and thereafter diligently prosecute to completion all steps required by the Schedule of Performance for construction of the NCTD Improvements within the time specified in the Schedule of Performance, subject to extension due to occurrence of a Force Majeure Event (as defined in Section 26 below). The District may, upon written request from Developer, extend the time for any item, deadline, milestone, or date specified in the Schedule of Performance. Any such agreed upon changes shall be within the limitations of the Entitlements, Additional Approvals, Additional Project Documents, and all other governmental requirements. Any extension requests shall be in writing and provided to NCTD in accordance with Section 31 below.

22.2 During periods of construction of the NCTD Improvements, Developer shall submit to the District a written report of the progress of construction when, and as reasonably requested by the District, but not more frequently than once every quarter. The report shall be in such form and detail as may be reasonably required by the District and shall include a reasonable number of construction photographs taken since the last report by Developer.

**SECTION 23. Construction Covenants**

With respect to construction of the NCTD Improvements, Developer hereby covenants and agrees as follows:

(a) Developer shall maintain throughout the term of this Agreement, sufficient equity capital necessary to (i) pay through completion, all costs of development and construction of all the NCTD Improvements; and (ii) enable Developer to perform and satisfy all the covenants of Developer contained in this Agreement.

(b) The development of the NCTD Improvements shall be done in a professional and competent manner. Developer shall perform all work required to complete the NCTD Improvements and related work at the level of quality set forth in the Scope of Development attached hereto.

(c) Developer shall be responsible for the timeliness and quality of all work performed and materials and equipment furnished in connection with the NCTD Improvements,

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whether the work, materials and equipment are performed and furnished by Developer or through subcontractors, sub-subcontractors (of all tiers) and suppliers; provided however, that following the Completion and acceptance of the NCTD Improvements and the assignment to District of the warranties with respect to the NCTD Improvements as set forth in Section 12 above, Developer shall have no further responsibility to District pursuant to this subsection.

(d) Developer shall, within sixty (60) calendar days of obtaining actual knowledge of the same, promptly cause to be removed or bonded against (such bonding to be by the provision of bonds satisfying California statutory requirements) any and all mechanic's liens, stop notices and/or bonded stop notices that are recorded in the Official Records and/or served by subcontractors, sub-subcontractors (of all tiers) and suppliers in connection with the NCTD Improvements.

(e) Developer shall commence the development of the NCTD Improvements promptly and shall diligently pursue to completion and shall complete development of the NCTD Improvements in accordance with the time periods set forth in the Schedule of Performance and in all events, on or before the dates set forth for completion of the NCTD Improvements set forth in the Schedule of Performance, subject to any Force Majeure Events in accordance with Section 26 below.

**SECTION 24. Obligation to Refrain from Discrimination**

Developer covenants and agrees that there shall be no discrimination against or segregation of any person, or group of persons, on account of sex, race, color, religion, ancestry, national origin, disability, medical condition, marital status, or sexual orientation in connection with the work contemplated in this Agreement, including the design, engineering, development and construction of the NCTD Improvements.

**SECTION 25. Material Defaults**

25.1 Monetary Defaults

Notwithstanding any other provision of this Agreement, if a Party fails to pay the other Party any sum required to be paid pursuant to this Agreement, and the non-defaulting party gives the defaulting party written notice of such nonpayment, such nonpayment shall be a "**Potential Default**." The defaulting party shall have a period of fifteen (15) calendar days after such notice is received, or deemed to have been received, within which to cure the Potential Default by making the required payment. In the event a Potential Default for nonpayment is not cured within said fifteen (15) calendar day period, the Potential Default shall become a "Material Default" that shall be deemed to have occurred upon the expiration of the cure period.

25.2 Non-Monetary Defaults

Subject to a Force Majeure Event (as defined in Section 26 below), with respect to non-monetary defaults under this Agreement, a Potential Default shall become a "**Material Default**" in the event the Potential Default is not cured, at the Defaulting Party's expense, (a) within thirty

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(30) business days after written notice of such default from the non-defaulting party, (b) if such cure cannot be reasonably accomplished within such thirty (30) business day period, within ninety (90) calendar days after receiving notice of the Potential Default, but only if the defaulting party has commenced such cure within such thirty (30) business day period and diligently pursues such cure to completion, or (c) within such longer period of time as may be expressly provided in this Agreement or as mutually agreed to in writing between the Parties with respect to the Potential Default. Following written notice and failure to cure within the time periods set forth above, each Potential Default shall become a Material Default that shall be deemed to have occurred upon the expiration of the applicable cure period.

25.3 No Waiver

Failure or delay in giving notice of a Potential Default shall not constitute a waiver of any default, nor shall it change the time of default. Except as otherwise expressly provided in this Agreement, any failures or delays by either Party in asserting any of its rights and remedies as to any default shall not operate as a waiver of any default or of any such rights or remedies. Delays by either Party in asserting any of its rights and remedies shall not deprive either Party of its right to institute and maintain any actions or proceedings which it may deem necessary to protect, assert or enforce any such rights or remedies.

25.4 Cumulative Remedies

Except with respect to rights and remedies expressly declared to be exclusive in this Agreement, the rights and remedies of the Parties are cumulative, and the exercise by either Party of one or more such rights or remedies shall not preclude the exercise by it, at the same or different times, of any other rights or remedies for the same Material Default or any other Material Default by the other Party. Except as otherwise specifically set forth in this Agreement, wherever a Party has a right to damages for the Material Default of another Party and/or a right of indemnification under this Agreement: (a) such damages shall be limited to direct (actual) damages for the Material Default of the other Party, and such indemnification shall be limited to direct actual losses of such Party, and (b) each of the Parties, on behalf of itself and its successors and assigns, hereby expressly waives, releases and relinquishes any and all right to any expectation, anticipation, indirect, consequential, exemplary or punitive damages or losses.

## SECTION 26. FORCE MAJEURE

Except as otherwise expressly provided in this Agreement, should the performance of any act required or permitted by this Agreement to be performed be prevented or delayed by reason of a Force Majeure Event (as defined below), the time for performance of the act and the Term of this Agreement will be extended for a period equivalent to the period of delay and performance of the act during the period of delay will be excused; provided, however, that nothing contained in this section shall excuse the prompt payment of any amounts when due and payable under the terms of this Agreement, or the performance of any act rendered difficult or impossible solely because of the financial condition of the Party required to perform the act. For the purposes of this Agreement, a "**Force Majeure Event**" shall mean any of the following: act of God, strike, lockout, unavailability of materials, moratorium on building, construction or planning approvals,

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restrictions due to pandemic or other public health crises, or governmental orders related thereto, or other restrictive governmental laws or regulations which prohibit or effectively prohibit performance, or any other cause except financial inability not the fault of the Party required to perform the act.

## SECTION 27. MEDIATION; JUDICIAL REFERENCE

27.1 Mediation

Before commencing any action or proceeding with respect to any disagreement, controversy or dispute arising under this Agreement (a "Dispute"), the Parties shall first attempt to settle the Dispute through consultation and negotiation in good faith and in a spirit of mutual cooperation. If the Dispute is not resolved within ten (10) business days, either Party may elect to escalate the resolution of such Dispute by submitting the Dispute in writing to senior executives from each Party who will promptly meet and confer telephonically or by video conference in an effort to resolve the Dispute. Each Party will identify such senior executive by notice to the other Party, and each Party may change its senior executive at any time thereafter by notice. Any mutually agreed decisions reduced to writing of the senior executives will be final and binding on both Parties. In the event the senior executives are unable to resolve any Dispute within ten (10) business days after submission to them, either Party may then refer such Dispute to mediation by a mutually acceptable mediator to be chosen by both Parties within ten (10) business days after written notice by either Party demanding mediation. Neither Party may unreasonably withhold, delay or condition consent to the selection of a mediator. If the Parties are unable to agree on a mediator, the mediation will be referred to JAMS and the selection of a mediator will be made by JAMS in accordance with its rules for selecting mediators. All communications and discussions in furtherance of this paragraph shall be treated as confidential settlement negotiations that are not subject to disclosure to any third party. The costs of the mediator shall be shared equally, but each Party shall pay its own attorneys' fees. The mediation shall be concluded within ninety (90) days after the mediation begins unless the Parties mutually agree to extend the mediation period. The cumulative time periods set forth in this Section 27.1 utilized by the Parties to attempt to resolve a Dispute are referred to herein as the "Dispute Resolution Period." To the extent that any Dispute is not resolved during the Dispute Resolution Period despite the good faith efforts of the Parties, then the Parties may pursue any and all available rights and remedies (subject to the terms of this Agreement, including without limitation Section 27.2 below). Notwithstanding anything contained in this Agreement to the contrary, the Term of this Agreement shall be automatically extended for a period equivalent to the Dispute Resolution Period for each Dispute.

27.2 Judicial Reference

The Parties agree that any Disputes between them arising out of, related to or in connection with this Agreement or any other document relating to the subject matter of this Agreement that are not resolved pursuant to Section 27.1 above shall be heard and resolved by a referee under the provisions of the California Code of Civil Procedure, Sections 638 – 645.1, inclusive (as the same may be amended, or any successor statute(s) thereto) (the "Referee Sections"). Any fee to initiate

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the judicial reference proceedings shall be paid by the Party initiating such procedure; provided however, that the costs and fees, including any initiation fee, of such proceeding shall ultimately be borne in accordance with Section 27.2.2 below. The venue of the proceedings shall be in the county in which the Oceanside Transit Center is located.

27.2.1 Appointment of Referee(s)

Within ten (10) business days after receipt by any Party of a written request to resolve any Dispute or controversy, the Parties shall agree upon a single referee who shall try all issues, whether of fact or law, and report a finding and judgment on such issues as required by the Referee Sections. If the Parties are unable to agree upon a referee within such 10-day period, then any Party may thereafter file a lawsuit in the county in which the Oceanside Transit Center is located for the purpose of appointment of a referee under California Code of Civil Procedure Sections 639 and 640, as the same may be amended or any successor statute(s) thereto. If the referee is appointed by the court, the referee shall be a neutral and impartial retired judge with substantial experience in the relevant matters to be determined, from Jams/Endispute, Inc., the American Arbitration Association or similar mediation/arbitration entity. The proposed referee may be challenged by any Party for any of the grounds listed in Section 641 of the California Code of Civil Procedure, as the same may be amended or any successor statute(s) thereto.

27.2.2 Powers of Referee

The referee shall have the power to decide all issues of fact and law and report his or her decision on such issues, and to issue all recognized remedies available at law or in equity for any cause of action that is before the referee, including an award of attorneys' fees and costs in accordance with California law. The referee shall not, however, have the power to award punitive damages, nor any other damages which are not permitted by the express provisions of this Agreement, and the Parties hereby waive any right to recover any such damages. The referee shall oversee discovery and may enforce all discovery orders in the same manner as any trial court judge, with rights to regulate discovery and to issue and enforce subpoenas, protective orders and other limitations on discovery available under California law; provided, however, that the referee shall limit discovery to that which is essential to the effective prosecution or defense of the action, and in no event shall discovery by either Party include more than one non-expert witness deposition unless both Parties otherwise agree.

27.2.3 Conduct of Proceeding

The reference proceeding shall be conducted in accordance with California law (including the rules of evidence), and in all regards, the referee shall follow California law applicable at the time of the reference proceeding. In accordance with Section 644 of the California Code of Civil Procedure, the decision of the referee upon the whole issue must stand as the decision of the court, and upon the filing of the statement of decision with the clerk of the

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court, or with the judge if there is no clerk, judgment may be entered thereon in the same manner as if the action had been tried by the court.

**SECTION 28. Legal Fees and Costs**

Subject to the terms of Section 27 above, if either Party hereto brings an action against the other by reason of the breach of any covenant, provision or condition hereof, or otherwise arising out of or in connection with this Agreement, the prevailing Party shall be entitled to recover from the other all reasonable attorneys' fees, expert witness fees, court costs and litigation expenses actually incurred in connection with the action. The prevailing Party in any such action shall be entitled, in addition to and separately from the amounts recoverable hereunder, to the payment by the losing Party of the prevailing Party's reasonable attorneys' fees, expert witness fees, court costs and litigation expenses incurred in connection with (a) any appellate review of the judgment rendered in such action or of any other ruling in such action, and (b) any proceeding to enforce a judgment in such action. It is the intent of the Parties that the provisions of this Section 28 be distinct and severable from the other rights of the Parties under this Agreement, shall survive the entry of judgment in any action and shall not be merged into such judgment.

**SECTION 29. Modifications or Amendments**

Unless otherwise provided for in this Agreement, no amendment, change, modification or supplement to this Agreement shall be valid and binding on any of the Parties unless it is represented in writing and signed by each of the Parties hereto.

**SECTION 30. Further Assurances**

Each of the Parties hereto shall execute and deliver, at their own cost and expense, any and all additional papers, documents, or instruments, and shall do any and all acts and things reasonably necessary or appropriate in connection with the performance of its obligations hereunder in order to carry out the intent and purposes of this Agreement.

**SECTION 31. Notices**

All notices or other communications between the District and the Developer required or permitted hereunder shall be in writing and personally delivered or sent by certified mail, return receipt requested and postage prepaid, sent by reputable overnight courier (such as FedEx, UPS or DHL), or transmitted by electronic mail to the following addresses:

To District: North County Transit District
810 Mission Avenue
Oceanside, CA 92054
Attn: Clerk of the Board
Email: _____

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With copy to: NCTD Development Services Director, Tracey Foster

_____
Attn: _____
Email: _____

To Developer: Toll Bros., Inc.
1140 Virginia Drive
Fort Washington, PA 19034
Attn: Yolanda Rodriguez, Chief Transactional Counsel
Email: yrodriguez2@tollbrothers.com

Toll Bros., Inc.
1140 Virginia Drive
Fort Washington, PA 19034
Attn: Charles Elliott, Managing Director
Email: celliott@tollbrothers.com

With copy to: Jackson Tidus
2030 Main Street, Suite 1200
Irvine, CA 92614
Attn: Andrew P. Bernstein, Esq.
Gregory P. Powers, Esq.
Email: abernstein@jacksontidus.law
gpowers@jacksontidus.law

A notice shall be effective on the date of personal delivery if personally delivered before 5:00 p.m. Pacific time or otherwise on the day following personal delivery; or when received, if transmitted by electronic mail (e-mail) prior to 5:00 p.m. Pacific time or otherwise on the next business day, provided receipt of such transmission shall be confirmed by follow-up notice within forty-eight (48) hours by another method authorized herein; or two (2) business days following the date the notice is postmarked, if mailed; or on the day following delivery to the applicable overnight courier, if sent by overnight courier. Any refusal to accept a notice transmitted as provided in this Section 31 shall be deemed delivery thereof.

**SECTION 32. Construction**

The language in all parts of this Agreement shall in all cases be construed simply, as a whole and in accordance with its fair meaning and not strictly for or against any Party. The Parties hereto acknowledge and agree that this Agreement has been prepared jointly by the Parties and has been the subject of arm's length and careful negotiation over a considerable period of time, that each Party has been given the opportunity to independently review this Agreement with legal counsel, and that each Party has the requisite experience and sophistication to understand, interpret, and agree to the particular language of the provisions hereof. Accordingly, in the event of an ambiguity in or dispute regarding the interpretation of this Agreement, this Agreement shall

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not be interpreted or construed against the Party preparing it; instead other rules of interpretation and construction shall be utilized.

**SECTION 33. Effect of Invalidity or Unenforceability**

If any term or provision of this Agreement, the deletion of which would not adversely affect the receipt of any material benefit by any Party hereunder, shall be held by a court of competent jurisdiction to be invalid or unenforceable, the remainder of this Agreement shall not be affected thereby and each other term and provision of this Agreement shall be valid and enforceable to the fullest extent permitted by law. It is the intention of the Parties hereto that in lieu of each clause or provision of this Agreement that is illegal, invalid, or unenforceable, there be added as a part of this Agreement an enforceable clause or provision as similar in terms to such illegal, invalid, or unenforceable clause or provision as may be possible.

**SECTION 34. Captions**

The captions of the sections and clauses in this Agreement are inserted solely for convenience and under no circumstances are they or any of them to be treated or construed as part of this instrument.

**SECTION 35. References**

References in this instrument and in the attachments hereto to "**this Agreement**" mean, refer to and include this instrument as well as any riders, schedules, exhibits, addenda and attachments hereto (which are hereby incorporated in this Agreement by this reference) and all other documents expressly incorporated by reference in this instrument. Any references to any covenant, conditions, obligation and/or undertaking "herein," "hereunder," or "pursuant hereto") (or language of like import) shall mean, refer to and include the covenants, obligations and undertakings existing pursuant to this Agreement and any riders, schedules, exhibits, addenda, attachments or other documents affixed to or expressly incorporated by reference in this instrument.

**SECTION 36. Time of Essence; Performance of Acts on Business Days**

Time is of the essence with respect to all provisions of this Agreement in which a definite time for performance is specified; provided, however, that the foregoing shall not be construed to limit or deprive a Party of the benefits of any cure period or Force Majeure delay expressly provided for in this Agreement. In the event that the final date for payment of any amount, or performance of any act under this Agreement falls on a day other than a business day, such payment may be made or act performed on the next succeeding business day. For purposes of this Agreement, the term "business day" shall mean any day Monday through Friday, other than a holiday, and the term "holiday" shall mean any other day in which banking institutions in the State of California are authorized or obligated by law or executive order to close.

**SECTION 37. Fees and Other Expenses**

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Except as otherwise provided in this Agreement, each of the Parties hereto shall pay its own fees and expenses, including attorneys' fees, experts' fees and consultants' fees and costs, in connection with negotiation and preparation of this Agreement.

**SECTION 38. No Third-Party Beneficiaries**

This Agreement has been made and entered into solely for the benefit of the Parties to this Agreement and their respective successors and permitted assigns. Nothing in this Agreement confers any rights or remedies on any other person or entity.

**SECTION 39. Counterparts**

This Agreement may be executed in one or more counterparts, including the transmission of counterparts via facsimile or electronic mail, each of which shall be deemed an original and all of which together shall constitute one and the same instrument. Electronically-transmitted signatures (including signatures generated using electronic signature technology (e.g., DocuSign or similar technology)) shall be deemed effective as originals, and such signatures shall, for purposes of validity, enforceability and admissibility, be deemed to be valid, binding and effective signatures of the Parties so signing to the same effect as if such signing party signed and delivered a handwritten original signature.

**SECTION 40. Authority of Signatories to Agreement**

Each person executing this Agreement represents and warrants that he or she is duly authorized and has legal capacity to execute and deliver this Agreement on behalf of the Party for which such execution is made, and has the requisite authority to bind his or her respective Party.

**SECTION 41. Entire Agreement**

This Agreement, including all of the Attachments appended hereto, constitutes the entire understanding and agreement of the parties. This Agreement integrates all of the terms and conditions mentioned herein or incidental hereto, and supersedes all negotiations or previous agreements between the parties with respect to all or any part of the subject matter hereof. All waivers of the provisions of this Agreement must be in writing and signed by the appropriate authorities of District or Developer, and all amendments hereto must be in writing and signed by the appropriate authorities of District and Developer.

*[SIGNATURES ON FOLLOWING PAGE]*

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IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date set forth below.

| "THE DISTRICT" | "DEVELOPER" |
|---|---|
| **NORTH COUNTY TRANSIT DISTRICT**, a public agency | **TOLL BROS., INC.**, a Pennsylvania corporation |
| By: _____ | By: _____ |
| Print Name: _____ | Print Name: _____ |
| Title: _____ | Title: _____ |
| Dated: _____, 20__ | Dated: _____, 20__ |

Approved as to form:

_____

_____

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# ATTACHMENT 1

## Scope of Development

[Insert behind this page]

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# ATTACHMENT 2

## Schedule of Performance

[Insert behind this page]

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# ATTACHMENT 3

## Legal Description of NCTD Improvements Property

[Insert behind this page]

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# ATTACHMENT 4

## Depiction of NCTD Property

[Insert behind this page]

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# ATTACHMENT 5

## Oceanside Transit Center Site Map

[Insert behind this page]

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**ATTACHMENT 6**

**Form of Memorandum of DDA**

[Insert behind this page]

SPACE ABOVE THIS LINE FOR RECORDER'S USE

**MEMORANDUM OF**
**DISPOSITION AND DEVELOPMENT AGREEMENT**
**BY AND BETWEEN NORTH COUNTY TRANSIT DISTRICT**
**AND TOLL BROS., INC.**

***[PRIOR TO EXECUTION, CONFORM ALL QUOTED SECTIONS OF DDA TO THEN CURRENT VERSION OF DDA]***

This MEMORANDUM OF DISPOSITION AND DEVELOPMENT AGREEMENT BY AND BETWEEN NORTH COUNTY TRANSIT DISTRICT AND TOLL BROS., INC. ("**Memorandum**") is made as of _____, 20__("**Memorandum Effective Date**") by and between the North County Transit District, a public agency existing under the laws of the State of California pursuant to California Public Utilities Code Sections 125000, *et seq*. (the "**District**"), and Toll Bros., Inc., a Pennsylvania corporation ("**Developer**"), to memorialize the execution and delivery by the District and Developer of that certain Disposition and Development

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Agreement by and between North County Transit District and Toll Bros., Inc., dated as of _____, 20__ (the "**DDA**"). The District and Developer are sometimes referred to herein individually as a "**Party**" and collectively as the "**Parties**." Capitalized terms used herein and not otherwise defined shall have the meanings ascribed to such terms in the DDA.

NOW THEREFORE, the Parties hereby agree as follows:

1. Real Property Affected by the DDA. The property affected by the DDA is (a) the NCTD Improvements Property, as that term is defined in Section 1.3 of the DDA, and is comprised of the land legally described and depicted on Exhibit A attached hereto and incorporated by reference herein which is owned by the District, (b) all improvements, if any, located on the NCTD Improvements Property, (c) all appurtenances pertaining to the NCTD Improvements Property, and (d) all permits, licenses, approvals and authorizations issued by any governmental authority relating to the NCTD Improvements, including the Entitlement (as that term is defined in Section 7.1 of the DDA and listed in Attachment 7 of the DDA).

2. Declaration. This Memorandum has been executed as of the Memorandum Effective Date and shall be recorded in the Office of the San Diego County Recorder's Office (the "**Official Records**") to memorialize the execution and delivery of the DDA by the Developer and The District.

3. Effect of the DDA. The DDA imposes certain obligations, agreements, covenants, conditions and restrictions with respect to the NCTD Improvements Property and the design, engineering, development and construction of the NCTD Improvements on the NCTD Improvements Property that run with the NCTD Improvements Property, unless and until terminated in accordance with their respective terms, as further set forth in the DDA.

4. DDA and Memorandum Run With the Land. The DDA and this Memorandum, and all other obligations, agreements, covenants, representations, warranties, and indemnities set forth in the DDA and this Memorandum, are hereby agreed by the District and by Developer to be covenants running with the land and enforceable as equitable servitudes against the NCTD Improvements Property, and are hereby declared to be and shall be binding upon the NCTD Improvements Property, the District and Developer, and their respective successors and assigns in accordance with the DDA.

5. Priority of DDA and Special Restrictions. The DDA and this Memorandum shall be superior in priority to all mortgages, deeds of trust or other security instruments recorded against the NCTD Improvements Property.

6. Interpretation; Notice. This Memorandum is prepared for recordation and notice purposes only and in no way modifies the terms, conditions, provisions and covenants of the DDA. In the event of any inconsistency between terms, conditions, provisions and covenants of this Memorandum and the DDA, the terms, conditions, provisions and covenants of the DDA shall prevail.

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7. Attachments. The Attachments attached to this Memorandum of DDA are hereby incorporated by this reference into this Memorandum of DDA as though fully set forth in this Section.

8. Counterparts. This Memorandum of DDA may be executed in counterparts, each of which shall constitute an original, but all of which shall constitute one and the same instrument.

*{signatures on next page}*

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IN WITNESS WHEREOF, the Parties have executed this Memorandum of DDA as of the last date set forth below, to be effective as of the Memorandum Effective Date.

**DISTRICT**:

**NORTH COUNTY TRANSIT DISTRICT**,
a public agency

By: _____
Print Name: _____
Title: _____
Dated: _____, 202_

**DEVELOPER**:

**TOLL BROS., INC.**,
a Pennsylvania corporation

By: _____
Print Name: _____
Title: _____
Dated: _____, 202_

Approved as to form:

_____

_____

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State of _____)
County of _____)

On _____, before me, _____, Notary Public,
(here insert name and title of the officer)
personally appeared _____,
who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument, and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature_____

(Seal)

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A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of _____)
County of _____)

On _____, before me, _____, Notary Public,
(here insert name and title of the officer)
personally appeared _____,
who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument, and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature_____

(Seal)

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EXHIBIT "A"

DESCRIPTION OF NCTD IMPROVEMENTS PROPERTY

The land referred to herein is situated in the City of Oceanside, County of San Diego, State of California, and described as follows:

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**ATTACHMENT 5**

**List of Entitlements**

[Insert behind this page]

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# ATTACHMENT 6

## List of Forms of Additional Project Documents

[Insert behind this page]

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# ATTACHMENT 7

## List of Licenses, Permits and Easements for Construction of NCTD Improvements

[Insert behind this page]

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# ATTACHMENT 8

## Phasing Schedule

[Insert behind this page]

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[FORM SIDE LETTER AGREEMENT FOR 810 MISSION]

**YOLANDA RODRIGUEZ, ESQUIRE** **DIRECT DIAL: 215-938-8216**

**CHIEF TRANSACTIONAL COUNSEL** **FACSIMILE: 215-938-8255**

yrodriguez2@tollbrothers.com

November ___, 20___

**VIA ELECTRONIC MAIL AND UPS**

Real Estate Department
North County Transit District
810 Mission Avenue
Oceanside, CA 92054

Re: Letter Agreement Regarding Construction of Affordable Housing Project at 810 S. Mission Avenue ("**Letter Agreement**") in conjunction with the Oceanside Transit Center Redevelopment Project (the "**Oceanside Transit Center Project**")

Dear Sir/Madam:

Reference is made to (i) that certain Exclusive Negotiation Agreement (as subsequently amended, the "**ENA**") dated October 2, 2020 by and between North County Transit District ("**NCTD**") and Toll Brothers, Inc. ("**Toll**") (collectively, the "**Parties**"), and (ii) that certain Option Agreement dated March 18, 2021 by and between NCTD and Toll Bros., Inc. (an affiliate of Toll) (as subsequently amended, the "Option Agreement"). Any undefined capitalized terms used herein shall have the respective meaning given under the ENA or the Option Agreement.

Pursuant to Recital C and Exhibit "B" of the Option Agreement, and also Section II(A) of the ENA (entitled "Development Concept and Essential Terms and Conditions"), the Parties under the above-referenced agreements agreed that, in conjunction with the Oceanside Transit Center Project, Toll would be responsible for obtaining all necessary land use entitlements, approvals and permits, and redeveloping the property owned by NCTD and located at 810 S. Mission Avenue, Oceanside, CA (the "**Mission Avenue Property**") with an affordable housing project comprising approximately 101 rental units, together with associated site and infrastructure improvements and required parking (collectively, the "**Mission Avenue Project**"). More specifically, pursuant to Section II(A) of the ENA, the Parties agreed that Toll would, among other things, do the following: (i) Enter into a ground lease with NCTD for the Mission Avenue Property, (ii) finance all elements of the Mission Avenue Project, (iii) secure all necessary planning, zoning and other entitlements or approvals (including any required California Coastal Commission approvals) at Toll's sole cost and expense in order to implement and construct the Mission Avenue Project, (iv) prepare, or pay for the preparation of, all required analyses under the California Environmental Quality Act for the Mission Avenue Project at Toll's sole cost and expense, and (v) market and lease the Mission Avenue Project and generate ground lease payments.

Without limiting any of the rights of the Parties under the above-referenced agreements, the Parties hereto agree to perform the above-referenced obligations as described in the Option Agreement and the ENA regarding the Mission Avenue Property and Mission Avenue Project. The Parties further

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acknowledge and agree that under Chapter 14C of the Oceanside Municipal Code, entitled "Inclusionary Housing," low and moderate income housing is required to be constructed as part of the Oceanside Transit Center Project, and under Oceanside Municipal Code Section 14C.5, a minimum of ten percent (10%) of the residential units to be constructed in the Oceanside Transit Center Project are required to be reserved for low and moderate income households. Pursuant to this Letter Agreement, the Parties acknowledge and agree that the affordable housing requirements contained in Chapter 14C of the Oceanside Municipal Code are intended to be fully satisfied by the construction of the Mission Avenue Project on the Mission Avenue Property.

Please countersign this letter in the space provided below acknowledging NCTD's consent and agreement to the foregoing. The above-referenced agreements shall remain in full force and effect with no rights of the Parties thereunder being affected or waived hereby.

Sincerely,
Toll Brothers, Inc.

By: _____
Yolanda Rodriguez
Chief Transactional Counsel

Acknowledged and agreed:

NORTH COUNTY TRANSIT DISTRICT:

By:_____
Name:_____
Its:_____

cc: Charles Elliott
Michael McCann
Elizabeth Self

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## Exhibit D – Form Ground Lease

[to be attached]

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# GROUND LEASE

NORTH COUNTY TRANSIT DISTRICT, a public agency
existing under the laws of the State of California, LANDLORD

and

_____,
a _____, TENANT

_____, 202_

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EXHIBIT "E" – Legal Description of Landlord Parcel
EXHIBIT "F" – Memorandum of Lease
EXHIBIT "G" – Tenant's Right of First Offer
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# GROUND LEASE

THIS GROUND LEASE (the "**Lease**"), dated for reference purposes as of _ _____, 202_ and effective upon the date of the last party to execute the Lease (the "**Effective Date**"), is entered into by and between NORTH COUNTY TRANSIT DISTRICT, a public agency existing under the laws of the State of California, pursuant to California Public Utility Code Sections 125000, *et seq*. (hereinafter referred to as "**Landlord**"), and _____, a _____ (hereinafter referred to as "**Tenant**").

## RECITALS

A. Landlord owns that certain tract of land containing approximately _____ (____) acres lying and being in the City of Oceanside (the "**City**"), County of San Diego (the "**County**"), State of California, being more particularly described on Exhibit "A" attached hereto and by reference incorporated herein (the "**Site**").

B. Tenant desires to lease the Site from Landlord, together with all rights, easements, and appurtenances that belong and appertain to the Site (the "**Appurtenances**"; together with the Site, the "**Premises**"), for the purpose of redeveloping the Premises with a [**multi-family apartment project / hotel**] together with associated facilities and/or other improvements that may be constructed by Tenant from time to time, for the rent and on the terms and conditions set forth in this Lease.

C. Landlord and Tenant or Tenant's affiliate are signatories to (i) that certain Option Agreement dated as of March 18, 2021, as amended by that certain First Amendment to Option Agreement dated as of August 4, 2021 (as the same may be further amended from time to time, the "**Option Agreement**"), and (ii) that certain Development and Disposition Agreement dated as of _____, 202_ (as the same may be amended from time to time, the "**DDA**").

## AGREEMENT

NOW, THEREFORE, in consideration of the foregoing and the mutual agreements herein set forth, and other valuable consideration, receipt of which is hereby acknowledged, Landlord and Tenant agree as follows:

### ARTICLE I. DEMISE OF PREMISES

Section 1.01 Demise. For and in consideration of Ten and No/100 Dollars ($10.00), the rents, terms, covenants and agreements hereinafter set forth on the part of Tenant to be paid, kept, observed and performed, Landlord does hereby demise and lease to Tenant, and Tenant does hereby lease, take and hire from Landlord, upon and subject to the terms and conditions contained herein, the Premises. A plat of the Site is attached hereto as Exhibit "C" and by reference incorporated herein. The term "**Improvements**" as used in this Lease shall mean any and all structures and appurtenances thereto of every type and kind on, at or under the Site, including, but not limited to, buildings, outbuildings, garages, sheds, patios, patio covers, awnings, additions, walkways, bicycle trails, sprinkler systems or pipes, utility connections and meters, garages, roads, curbing, paving, driveways, parking areas, fences, screening walls, retaining walls, stairs, decks,

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fixtures, landscaping hedges, windbreaks, poles, signs, exterior tanks, solar panels and equipment, exterior evaporative coolers, air conditioning and water softener fixtures, exterior antennae, aerials and other equipment for the reception or transmission of radio, television, microwave, electromagnetic, or other similar or dissimilar communication systems, and anything or any device that alters the natural flow of water from any property adjoining the Premises.

Section 1.02 Appurtenant Easements. The Site is leased by Landlord to Tenant together with all Appurtenances, including without limitation, the non-exclusive easements appurtenant to the Site.

## ARTICLE II. TERM OF LEASE

Section 2.01 Term of Lease. The term of this Lease (hereinafter referred to as the "**Term**") shall commence on the Effective Date and shall expire with respect to the Premises, unless sooner terminated under the terms and conditions contained herein, at 11:59 p.m. (local time at the City) on the last day of the month immediately preceding the ninety-ninth (99th) anniversary of the Effective Date (the "**Termination Date**").

## ARTICLE III. TOTAL FIXED RENT

Section 3.01 Total Fixed Rent. In consideration for Landlord entering into this Lease, Tenant shall pay Landlord as annual fixed rent under this Lease ("**Fixed Rent**") for the first five (5) years of the Term the sum of _____and 00/100 Dollars ($_____.00) per annum, commencing on the Effective Date. Commencing on the first day of year six (6) of the Term, the Fixed Rent shall increase in accordance with the schedule attached hereto as Schedule "1" (the ("**Fixed Rent Schedule**"). Fixed Rent payments shall be made in equal monthly installments of one twelfth (1/12) of the annual Fixed Rent amount on or before the first day of each month by wire transfer of funds or by check (at Tenant's election). Fixed Rent shall be prorated for the first and last month of the Term, as applicable based upon the number of days in the actual month. All Fixed Rent that becomes due and payable under this Lease shall be paid to Landlord at the address of Landlord listed in Section 18.10 below, or such other place as Landlord may from time to time designate by written notice given to Tenant. In the event Tenant fails to make any payment of Fixed Rent as required pursuant to this Section 3.01, such sums shall accrue Interest (as defined in Section 4.03 below) from the due date until paid in full. The Fixed Rent is calculated on an absolute triple net basis, and Tenant will be solely responsible during the Term for the payment of all Taxes (as defined in Section 4.01 below), Charges (as defined in Section 4.02 below), insurance, and all other costs arising out of the operation and maintenance of the Premises by Tenant.

## ARTICLE IV. TAXES, ASSESSMENTS AND CHARGES

Section 4.01 Taxes and Assessments. Subject to the provisions of Section 14.01 hereof (concerning Permitted Contests), Tenant covenants and agrees to discharge and pay before the same become delinquent and before any fine, penalty, or interest may be added for nonpayment, any and all taxes (including possessory interest taxes, assessments, and other charges levied or assessed during the Term by any governmental agency or entity) on or against the Premises, any interest in the Premises (other than the interest of Landlord), or any improvements on the Premises

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owned by Tenant (all or any one of which are hereinafter referred to as "**Taxes**"), Tenant is on notice that a possessory interest subject to property taxation may be created by this Lease and that Tenant may be subject to the payment of property taxes levied on such interest. Pursuant to Section 107.6 of the California Revenue and Taxation Code (the "**Code**"), Landlord hereby notifies Tenant that a possessory interest with respect to the Premises is created pursuant to this Lease and is subject to property taxation under the Code, and Tenant shall be subject to, and shall bear the payment of, all property taxes and related charges and expenses attributable to all periods during the Term with respect to the possessory interest. Tenant acknowledges that the foregoing complies with Section 107.6 of the Code.

Section 4.02 Charges. Subject to the provisions of Section 14.01 hereof (concerning Permitted Contests), Tenant covenants and agrees that it shall pay when due all charges, deposits, access fees, tap-in and hook-up fees, and the similar fees regarding the initial installment of utilities or related to the construction or alteration of the Improvements for all public or private utility services including, but not limited to, water, sewer, gas, light, heat and air conditioning, telephone, electricity, cable television, trash removal, power and other utility and communications services (all or any one of which are hereinafter referred to as "**Charges**") that are rendered or become due and payable with respect to the Premises at any time during the Term.

Section 4.03 General. Tenant shall prepare and file all reports and returns required by law and governmental regulations with respect to any Taxes and, upon Landlord's request, shall furnish copies thereof to Landlord (provided Tenant shall not be required to provide Landlord with copies of any income tax returns). Upon written request from Landlord, Tenant shall forward to Landlord copies of any bill or assessment respecting any Taxes upon Tenant's receipt thereof from the taxing authority. Likewise, Landlord shall promptly furnish to Tenant copies of any bill or assessment respecting any Taxes upon Landlord's receipt thereof from the taxing authority. Upon written request from Landlord, Tenant shall furnish and deliver to Landlord receipts evidencing the payment of any Taxes and/or Charges payable by Tenant as provided in Section 4.01 and Section 4.02 hereof. If Taxes shall include any special assessments for improvements which may be paid in installments, Tenant shall be obligated to pay only such installments as they become due and shall be obligated to pay only such installments which are to become due and payable prior to the expiration of the Term. Any Taxes for the year in which Tenant's obligation to pay Taxes commences and terminates or expires shall be prorated on a daily basis between Landlord and Tenant. If Tenant fails to pay any Taxes and/or Charges (or any installment thereof) when due, Landlord, without declaring a default hereunder and without relieving Tenant of any liability hereunder, may, but shall not be obligated to, pay any such Taxes and/or Charges (or any installment thereof) and any amount so paid by Landlord, together with all costs and expenses incurred by Landlord in connection therewith, shall be paid by Tenant to Landlord within thirty (30) days after written notice from Landlord demanding payment (including reasonably detailed supporting information regarding the amounts owed) with Interest thereon in the manner provided in the following paragraph. Tenant's obligation to pay Taxes and Charges which accrue during the Term shall survive any termination of this Lease.

In those circumstances where Tenant shall fail or refuse to pay any amounts owed under this Lease and Landlord elects to pay such amounts as herein provided, such amounts incurred by Landlord shall accrue interest at the rate of five percent (5%) plus the "prime rate" (as used herein, "**prime rate**" shall mean the rate of interest per annum announced from time to time by Bank of

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America, N.A., or its successor organization, as its prime commercial lending rate) (herein referred to as "**Interest**") from the due date through the date paid or, if demand is required therefor by the terms of this Lease, from the date which is thirty (30) days after the date of written notice from Landlord demanding payment (including reasonably detailed supporting information regarding the amounts owed) through the date paid.

Section 4.04 Impact Fees. Tenant shall be solely responsible for and shall pay any charges in the nature of building permit fees, impact fees and other similar fees and charges attributable to the construction of Improvements on the Site.

## ARTICLE V. INTENTIONALLY DELETED

## ARTICLE VI. CONSTRUCTION OF IMPROVEMENTS; USE OF THE PREMISES

Section 6.01 Construction of the Improvements. Tenant covenants and agrees that construction of the "**Initial Improvements**" (as defined in Exhibit "H" attached hereto and by reference made a part hereof) shall commence when Tenant has obtained the approval by Landlord (such approval not to be unreasonably withheld, conditioned or delayed and limited to the matters described on Exhibit "H") of the Plans (as defined in Exhibit "H") relating to construction of the Initial Improvements prior to Tenant's submission of the plans and specifications for review and approval by the City and all other applicable governmental and regulatory authorities. The Initial Improvements constructed by Tenant shall be installed in a good and workmanlike manner, in compliance with all federal, state, county, municipal and other governmental codes, laws, statutes, orders, decrees, restrictions, ordinances and regulations, now or hereafter enacted prior to the commencement of construction of the Initial Improvements, which are applicable to or affect the Premises, including, without limitation, obtaining all applicable permits, inspections and approvals of all governmental authorities, fire underwriters or other entities having jurisdiction (collectively, the "**Laws**"). The Initial Improvements shall be constructed in a good and workmanlike manner in accordance with sound design and building practices for the commercial real estate industry in the City for similar projects.

Section 6.02 Use of the Premises. Subject to the terms and conditions hereof, Tenant, its successors or assigns (as permitted hereunder), may use and occupy the Premises for all uses which are permitted under the Laws (including, without limitation, zoning ordinances) applicable to the Site and which are not prohibited under this Lease (such uses permitted hereunder being hereinafter referred to as the "**Permitted Business**"). Tenant agrees that it will not use the Premises for, and the Permitted Business shall not include, any of the uses set forth on Exhibit "D" attached hereto and by reference made a part hereof ("**Prohibited Uses**"). In consideration for Tenant's agreement that the Premises not be used for the Prohibited Uses, Landlord agrees that in the event that Landlord sells, transfers, leases or otherwise intends to redevelop (or permit other third parties to redevelop) the Landlord Parcel (as defined below) for use as a multifamily residential, residential condominium development or hotel, then Landlord shall include in the documentation of such transfer a restriction prohibiting uses substantially similar to the Prohibited Uses are placed upon the Landlord Parcel prior to redevelopment. The "**Landlord Parcel**" is the property owned by Landlord and located adjacent to the Premises, as more particularly described in Exhibit "E".

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Section 6.03 Condition of the Premises. EXCEPT AS OTHERWISE EXPRESSLY PROVIDED IN SECTION 7.06 AND SECTION 18.05 OF THIS LEASE, OR AS PROVIDED IN THE OPTION AGREEMENT OR THE DDA, TENANT IS LEASING THE PREMISES IN AN "AS IS" CONDITION, "WITH ALL FAULTS," AND TENANT IS NOT RELYING ON ANY REPRESENTATIONS OR WARRANTIES OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, FROM LANDLORD, ANY LANDLORD RELATED PARTIES, OR THEIR AGENTS, OR ANY OTHER PERSON ACTING OR PURPORTING TO ACT ON BEHALF OF LANDLORD, AS TO ANY MATTERS CONCERNING THE PREMISES, INCLUDING WITHOUT LIMITATION: (I) THE QUALITY, NATURE, ADEQUACY AND PHYSICAL CONDITION AND ASPECTS OF THE PREMISES, (II) THE QUALITY, NATURE, ADEQUACY, AND PHYSICAL CONDITION OF SOILS, GEOLOGY AND ANY GROUNDWATER ON THE PREMISES, (III) THE EXISTENCE, QUALITY, NATURE, ADEQUACY AND PHYSICAL CONDITION OF UTILITIES SERVING THE PREMISES, (IV) THE DEVELOPMENT POTENTIAL OF THE PREMISES, AND THE PREMISES' USE, HABITABILITY, MERCHANTABILITY, OR FITNESS, SUITABILITY, VALUE OR ADEQUACY OF THE PREMISES FOR ANY PARTICULAR PURPOSE, (V) THE ZONING OR OTHER LEGAL STATUS OF THE PREMISES OR ANY OTHER PUBLIC OR PRIVATE RESTRICTIONS ON USE OF THE PREMISES, (VI) THE PRESENCE OF HAZARDOUS MATERIALS ON, UNDER OR ABOUT THE PREMISES OR THE ADJOINING OR NEIGHBORING PROPERTY, (VII) THE QUALITY OF ANY LABOR AND MATERIALS USED IN ANY IMPROVEMENTS ON THE PREMISES, (VIII) THE CONDITION OF TITLE TO THE PREMISES, (IX) THE VALUE, ECONOMICS OF THE OPERATION OR INCOME POTENTIAL OF THE PREMISES, OR (X) THE PHYSICAL CONDITION, VALUE, ECONOMICS OF OPERATION OR INCOME POTENTIAL OF THE PREMISES. THE PROVISIONS OF THIS SECTION 6.03 SHALL SURVIVE THE EXPIRATION OR EARLIER TERMINATION OF THIS LEASE.

## ARTICLE VII. COMPLIANCE WITH LAW; LIENS AND ENCUMBRANCES

Section 7.01 Compliance with Laws. Subject to the provisions of Section 7.06 hereof (concerning Hazardous Substances) and Section 14.01 hereof (concerning Permitted Contests), Tenant, at its sole cost and expense, shall comply with and cause the Premises and any and all Improvements located thereon, to comply with (a) all Laws affecting the Premises or any part thereof, or the use thereof, (b) all rules, orders and regulations of the National Board of Fire Underwriters or other bodies exercising similar functions and responsibilities in connection with the prevention of fire or the correction of hazardous conditions which apply to the Premises, and (c) the requirements of all policies of public liability, fire and other insurance which at any time may be in force with respect to the Premises (all or any one of the items enumerated in this Section 7.01 hereinafter referred to as "**Regulation**").

Section 7.02 Tenant's Agreement Relating to Hazardous Substances. Tenant hereby covenants that Tenant and its agents, employees and contractors will not (and Tenant shall not permit any third party to) generate, store, use, treat or dispose of any "Hazardous Substances" (as hereinafter defined) in, on or at the Premises or any part of the Improvements, except for Hazardous Substances as are commonly legally used or stored (and in such amounts as are commonly legally used or stored) as a consequence of using the Premises for the Permitted

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Business, but only so long as the quantities thereof do not pose a threat to public health or to the environment and do not necessitate a "response action", as that term is defined in CERCLA (as hereinafter defined), and so long as Tenant strictly complies or causes compliance with all Laws concerning the use or storage by Tenant of such Hazardous Substances. Tenant further covenants that neither the Premises nor any part of the Improvements shall ever be used by Tenant or its agents, contractors, employees, or subtenants as a dump site or storage site (whether permanent or temporary) for any Hazardous Substances during the Term.

Subject to Section 7.06, Tenant hereby agrees to protect, indemnify Landlord, its Board of Directors, agents, officers, employees, volunteers and authorized representatives (collectively, "**Landlord Indemnitees**"), defend (with legal counsel reasonably selected by Landlord), and hold Landlord Indemnitees harmless from and against any and all losses, liabilities, including strict liability, damages, injuries, expenses, including reasonable attorneys' fees, costs of any settlement or judgment and claims of any and every kind whatsoever paid, incurred or suffered by, or asserted against, Landlord by any person or entity or governmental agency for, with respect to, or as a direct or indirect result of, the presence or alleged presence on or under, or the escape, seepage, leakage, spillage, discharge, emission, discharging or release on or from, the Premises or the Improvements of any Hazardous Substance (including, without limitation, any losses, liabilities, including without limitation strict liability, damages, injuries, expenses, including without limitation reasonable attorneys' fees, costs of any settlement or judgment or claims asserted or arising under the Comprehensive Environmental Response, Compensation and Liability Act ("**CERCLA**"), any so called federal, state or local "Superfund" or "Superlien" laws, or any other Laws regulating, relating to or imposing liability, including strict liability, or standards of conduct concerning any Hazardous Substance); provided, however, that the foregoing indemnity is (a) limited to matters arising or attributable to the period during the Term of this Lease and the period of Tenant's use or occupation of the Premises, (b) excludes matters caused by the Landlord Indemnitees, and (c) does not extend to Hazardous Substances that Tenant demonstrates were on the Site as of the date Tenant first goes onto the Site to exercise rights pursuant to this Lease. This indemnification includes, without limitation, any and all costs incurred because of any investigation of the Site, any clean-up, removal or restoration mandated by a federal, state, or local agency or political subdivision.

For purposes of this Lease, "**Hazardous Substances**" shall mean and include those elements or compounds which are contained in the lists of hazardous substances or wastes now or hereafter adopted by the United States Environmental Protection Agency (the "**EPA**") or the lists of toxic pollutants designated now or hereafter by Congress or the EPA or which are defined as hazardous, toxic, pollutant, infectious or radioactive by CERCLA or any Superfund law or any Superlien law or any other Federal, state or local statute, law, ordinance, code, rule, regulation, order or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic or dangerous waste, substance or material, as now or at any time hereafter in effect.

Landlord shall have the right but not the obligation, and without limitation of Landlord's rights under this Lease, to enter onto the Premises or to take such other actions as it deems reasonably necessary or advisable to clean up, remove, resolve or minimize the impact of, or otherwise deal with, any Hazardous Substance following receipt of any notice from any person or entity (including without limitation the EPA) asserting the existence of any Hazardous Substance

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in, on or at the Premises or any part thereof which, if true, could result in an order, suit or other action against Tenant and/or Landlord; provided, however, Landlord agrees that, except in the case of an emergency, Landlord will take such action only after written notice to Tenant of the alleged existence of Hazardous Substances and the failure by Tenant within a reasonable period of time following receipt of such notice to commence (but in no event more than thirty [30] days without Landlord's written consent), or the failure by Tenant to thereafter diligently pursue to completion, the appropriate action to cleanup, remove, resolve or minimize the impact of such Hazardous Substances. All reasonable costs and expenses (including, without limitation, penalties, fees, interest, reasonable and actual attorneys' fees and court costs) incurred by Landlord in the exercise of any such rights, which costs and expenses result from the violation of the covenants and agreements of Tenant contained in the first paragraph of this Section 7.02, shall be payable by Tenant within ten (10) days after the date of written notice from Landlord demanding payment (including reasonably detailed supporting information regarding the amounts owed).

This Section 7.02 shall survive cancellation, termination or expiration of this Lease.

Section 7.03 Storm Water Pollution Prevention: Compliance with Construction General Permit for the Property. If coverage under the Construction General Permit and/or NCTD MS4 Permit requirements (as defined in this Section 7.03) pursuant to applicable NCTD, local, state, and federal ordinances, laws, rules and regulations is required, Tenant shall prepare, implement and monitor a Storm Water Pollution Prevention Plan ("**SWPPP**") that is consistent with the current NCTD SWPPP template at Appendix A of the NCTD Storm Water Management Plan dated July 2019 and is in compliance with the current Construction General Permit for the purpose of preventing, among other things, the discharge of pollutants into receiving waters. This includes elimination of non-storm water pollution discharges such as improper dumping, spills or leakage from storage tanks or transfer areas. If coverage under the Construction General Permit is required, in addition to the requirements set forth herein, Tenant shall not perform or cause to be performed any covered construction or demolition activities on the Property until Tenant obtains a Waste Dischargers Identification number, as that term is defined in the Construction General Permit. For purposes of this Section 7.03, "**Construction General Permit**" shall mean the State Water Resources Control Board ("**SWRCB**") National Pollutant Discharge Elimination System ("**NPDES**") General Permit for Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities, as it may be amended or superseded, (currently Order No. 2012-0006-DWQ, as amended by 2010-0014-DWQ and 2012-0006-DWQ); and MS4 Program shall mean the SWRCB issued Phase II Small Municipal Separate Storm Sewer System ("**MS4**") Program (currently Order No. 2013-0001-DWQ) as it may be amended or superseded.

(a) Tenant shall prepare, implement and monitor an Erosion and Sediment Control Plan ("**ESCP**") consistent with the current NCTD ESCP template at Appendix B of the NCTD Storm Water Management Plan dated July 2019 for the purpose of preventing the discharge of pollutants into receiving waters for all construction or demolition activities performed or caused to be performed by Tenant on the Property for activities not requiring coverage under the Construction General Permit, industrial general permit or an individual National Pollutant Discharge Elimination System permit, including activities that result in a total land disturbance of less than one acre that are not part of a larger common plan of development or sale. This includes

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elimination of non-storm water pollution discharges such as improper dumping, spills or leakage from storage tanks or transfer areas.

(b) Without limiting the provisions set forth herein, Tenant shall comply with the NCTD Storm Water Management Plan dated July 2019 and all NCTD, local, state and federal ordinances, laws, rules and regulations governing storm water discharges, including but not limited to those associated with construction and demolition activities such as clearing, excavating, grading, demolition and other land disturbances.

(c) Tenant shall pay and be responsible for all fees, as applicable and as required by SWRCB, during the term of this Lease.

(d) Tenant shall submit all SWRCB required documentation, as applicable and including but not limited to Permit Registration Documents, as that term is defined in the Construction General Permit, to the SWRCB through the SWRCB SMARTS online system and shall provide a copy of such documentation and proof of submittal to NCTD.

(e) Landlord may approve or disapprove any provision in the Permit Registration Documents or ESCP or proposed work in Landlord's reasonable discretion, as set forth further in Section 7.04, and Landlord may require such changes or impose such conditions as Landlord, in its reasonable discretion, deems necessary or appropriate for the Permit Registration Documents or ESCP to comply with the NCTD rules and regulations governing storm water discharges. Without limiting the provisions set forth further in this Lease, including but not limited to Section 6.03 and Article 8, Landlord and Landlord's employees, consultants, and agents assume no responsibility for and make no representations or warranties, express or implied, as to the Permit Registration Documents or ESCP or Tenant's compliance with the same, including but not limited to the design, condition, workmanship, or adequacy of the drawings, specifications, construction documents, Permit Registration Documents, ESCP or work. No review, comments, requirements, or inspection shall relieve Tenant or Tenant's engineers, contractors, subcontractors, or consultants from its responsibility under the Construction General Permit, including but not limited to errors or omissions in the drawings, specifications, application, construction documents, Permit Registration Documents or ESCP, or for the quality or adequacy of the work.

(f) As required by NCTD's Phase II MS4 Permit (Order No. 2013-0001-DWQ, NPDES Permit No. CAS000004) ("**MS4 Permit**"), NCTD may conduct periodic water sampling associated with any drainage facility installed by Tenant within the Premises. Tenant shall be required to reimburse NCTD for its reasonable, out-of-pocket costs associated with collection, sampling and reporting. NCTD may require Tenant to perform corrective actions, at Tenant's sole cost and expense, in order to meet the requirements of the MS4 Permit.

Section 7.04 Storm Water Pollution Prevention: Compliance with Individual or Industrial National Pollutant Discharge Elimination System Permit for the Property. If coverage under an industrial general permit or individual National Pollutant Discharge Elimination System ("**NPDES**") permit is required pursuant to applicable NCTD, local, state, and federal ordinances, laws, rules and regulations, Tenant shall obtain such coverage in order to lawfully discharge storm water associated with its activity on the Property, prior to conducting any activity on the Property triggering such permit, and shall comply with the approved permit. Tenant shall submit to

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Landlord, for review and approval, a draft permit application. Landlord may approve or disapprove any provision or proposed work in Landlord's reasonable discretion, and Landlord may require such changes or impose such conditions as Landlord, in its reasonable discretion, deems necessary or appropriate for the permit application to comply with NCTD rules and regulations governing storm water discharges. Without limiting the provisions set forth herein, including but not limited to Section 7.06, Landlord and Landlord's employees, consultants, and agents assume no responsibility for and make no representations or warranties, express or implied, as to the application or Tenant's compliance with the permit, including but not limited to the design, condition, workmanship, or adequacy of the drawings, specifications, construction documents, application or work. No review, comments, requirements, or inspection shall relieve Tenant or Tenant's engineers, contractors, subcontractors, or consultants from its responsibility under the NPDES permit, including but not limited to errors or omissions in the drawings, specifications, application, or construction documents, or for the quality or adequacy of the work.

Section 7.05 Liens and Encumbrances. Subject to the provisions of Section 14.01 hereof (concerning Permitted Contests), Tenant shall not create or permit to be created or to remain, and, shall promptly discharge or bond over, at its sole cost and expense, any lien, encumbrance or charge (all or any one of which are hereinafter referred to as "**Lien**") upon the Premises, or any part thereof or upon Tenant's leasehold estate created hereby that arises from the use or occupancy of the Premises by Tenant or by reason of any labor, service (including, without limitation, real estate brokerage, leasing or management services) or material furnished or claimed to have been furnished to or for the benefit of Tenant or by reason of any construction, repairs or demolition by or at the direction of Tenant of all or any part of the Improvements, or by reason of any Permitted Contest under Section 14.01 hereof. The term "Lien" does not include any lien of or for Taxes that are not yet due and payable, or any lien relating to any Leasehold Mortgagee or any contractor, laborer, materialmen, or supplier to the Improvements (where the lien right of such party exists merely by virtue of their work or supplies and such party has not filed or recorded any document against the Premises or Tenant).

Notice is hereby given that Landlord shall not be liable for the cost and expense of any labor, services (including, without limitation, real estate brokerage, leasing or management services) or materials furnished or to be furnished with respect to the Premises at or by the direction of Tenant or anyone holding the Premises or any part thereof by, through or under Tenant and that no laborer's, mechanic's or materialman's or other lien (including, without limitation, any real estate broker or service provider lien) for any such labor, service or materials shall attach to or affect the interest of Landlord in and to the Premises. Nothing contained in this Lease shall be deemed or construed in any way as constituting the consent or request of Landlord, express or implied, by inference or otherwise, to any contractor, subcontractor, laborer or materialman for the performance of any labor or the furnishing of any materials for any improvements or repairs to or of the Premises or any part thereof, nor as giving Tenant any right, power or authority on behalf of Landlord to contract for or permit the rendering of any services or the furnishing of any materials that would give rise to the filing of any Lien against the Premises or any part thereof.

If Tenant fails to discharge or bond over any Lien created or established in violation of Tenant's covenant herein and such failure continues for a period of thirty (30) days after receipt by Tenant of written notice from Landlord of the existence of the Lien, or if Tenant fails to comply with any Regulation as required in Section 7.01 hereinabove provided, and such failure continues

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for a period of thirty (30) days after receipt by Tenant of written notice from Landlord of noncompliance with any Regulation (provided that if Tenant in good faith commences to cure such failure to perform such Regulation within said thirty (30) day period, said thirty (30) day period will be extended for such time as Tenant is continuously and diligently pursuing the cure of such failure), and provided such Lien or Regulation is not being contested by Tenant pursuant to Section 14.01 hereof, Landlord, without declaring a default hereunder and without relieving Tenant of any liability hereunder, may, but shall not be obligated to, discharge or pay such Lien (either by paying the amount claimed to be due or by procuring the discharge of such Lien by deposit or by bonding proceedings) or cause compliance with such Regulation, and any amount so paid by Landlord and all costs and expenses incurred by Landlord in connection therewith shall be paid immediately by Tenant to Landlord within thirty (30) days after written notice from Landlord demanding payment (including reasonably detailed supporting information regarding the amounts owed), with Interest thereon from the date of such written demand by Landlord.

Section 7.06 Landlord's Agreement Relating to Hazardous Substances. Landlord hereby represents to Tenant that Landlord has received no written warning notice, notice of violation, administrative complaint, judicial complaint or formal or informal written notice alleging that conditions on the Site are in violation of any environmental laws, regulations, ordinances or rules. Landlord shall indemnify, defend (with legal counsel selected by Tenant in its reasonable discretion) and hold Tenant harmless from any and all claims, damages, fines, judgments, penalties, costs, liabilities, or losses (including, without limitation, attorneys' fees, and consultant and expert fees) arising during or after the Term as a result of the breach by Landlord of the representation made in the preceding sentence; provided, however, the foregoing indemnity, representation and warranty excludes matters caused by Tenant, or its agents, employees or contractors, and does not extend to Hazardous Substances first introduced in, on or to the Site after the Effective Date. The obligations of Landlord under this Section 7.06 shall not be affected by the expiration or termination of the Term. Landlord hereby covenants that Landlord shall operate and maintain the property adjacent to the Site owned by Landlord in compliance with all Laws concerning the use or storage by Landlord of Hazardous Substances.

## ARTICLE VIII. REPAIRS AND ALTERATIONS

Section 8.01 Maintenance and Repairs. Prior to completion of the Initial Improvements on the Premises, Tenant shall keep and maintain the Premises either in substantially its current condition or otherwise landscaped and/or paved in a manner consistent with the Landlord Parcel. Once the Initial Improvements are completed, during the term of the Lease, Tenant shall repair and maintain the Premises in good condition and repair; and clean, sanitary, free of debris and graffiti and in accordance with all applicable Laws. At the expiration or termination of the Term, Tenant shall surrender the Premises to Landlord in good working condition, clean and free of debris, ordinary wear and tear excepted, subject to Landlord's acceptance of the property, in Landlord's reasonable discretion. Any damage or deterioration of the Premises shall not be deemed ordinary wear and tear if the same could have been prevented by good maintenance practices by Tenant. Tenant shall remove all personal property from the Premises and shall repair any damage to the Premises caused by such removal. Tenant shall be obligated to repair or restore the Premises or Improvements to a level that is comparable with other first-class [**multi-family apartment / hotel**] developments in Oceanside, California, of comparable age, quality and construction, and in accordance with all Laws. Tenant shall be liable for failure to repair or restore

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the Premises or Improvements to the extent required herein. Notwithstanding anything to the contrary contained herein, any and all costs and expenses ("**Capital Costs**") incurred by Tenant with respect to capital improvements or repairs ("**Capital Improvements**") made to the Premises or Improvements within the last ten (10) years of the Term shall be amortized on a straight-line basis over the useful life of such Capital Improvements as reasonably determined by Tenant, and Landlord shall, within thirty (30) days after written demand from Tenant, reimburse Tenant for all unamortized Capital Costs from and after the expiration of the Term. Landlord is not required to make any repairs or replacements to the Premises whatsoever (including, without limitation, the roofs, foundations, all interior and exterior walls, and all structural and non-structural portions of the buildings and other improvements), structural or otherwise, ordinary or extraordinary, foreseen or unforeseen, including but not limited to the exterior and interior windows, doors and entrances, signs, floor coverings, columns and partitions, and lighting, heating, plumbing and sewerage facilities, and air conditioning equipment, and during the Term of this Lease, Landlord shall have no liability whatsoever with respect to any faulty repair or failure to repair the Premises.

Section 8.02 Alterations. Subject to Landlord's reasonable approval pursuant to the terms of Exhibit "H" (to the extent applicable), Tenant may, at its sole cost and expense, make additions or improvements to or alterations of the Improvements provided that (i) any such action shall be diligently pursued and completed in a good and workmanlike manner in compliance with the terms and condition of this Lease and all applicable Laws, insurance policies and agreements then in effect to which Tenant is a party or by which it is bound, and (ii) Tenant shall have procured and paid for all governmental permits and licenses (if any) required in connection therewith. Landlord agrees to reasonably cooperate with Tenant for the purposes of securing necessary permits for any such additions, improvements or alterations, provided that Landlord shall not be required to incur any material liability or expense with respect to the same. Notwithstanding the foregoing, in no event shall Landlord have the right to review and/or approve (a) any signage installed within the Premises or the content (i.e. tenant identification signage) of any such signs and Tenant shall have the right to add, remove and modify any such signage from time to time, in its sole discretion, or (b) Non-Material Alterations (as defined below). For the purposes hereof, "**Non-Material Alterations**" means any additions or alterations to any of the Improvements that cost less than $100,000 and do not relate to the Design Factors (as such term is defined in Exhibit "H").

## ARTICLE IX. DAMAGE AND DESTRUCTION

Section 9.01 Notice. In the event of any material damage to or destruction of all or any part of the Improvements, Tenant will promptly give written notice thereof to Landlord, which notice shall generally describe the nature and extent of such damage or destruction. There shall be no abatement of or adjustment to any other payments or obligations of Tenant under this Lease as a result of any damage or destruction.

Section 9.02 Restoration. In the event of any damage to or destruction of all or any part of the Improvements and whether or not the insurance proceeds on account of such damage or destruction shall be sufficient for the purpose, except with respect to the last fifteen (15) years of the Term as set forth below, this Lease will not be terminated and, Tenant, at its sole cost and expense, shall elect at its option either to (a) to raze any improvements and clear the Site, or (b) promptly commence and thereafter diligently and continuously prosecute to completion, the

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restoration, replacement or rebuilding of the Improvements (such restoration, replacement or rebuilding, together with any temporary repairs and property protection, are herein collectively referred to as "**Restoration**"). Tenant may commence and complete the Restoration without obtaining any consent or approval of or from Landlord so long as the Improvements following the completion of the Restoration are substantially similar to the Improvements prior to the damage or destruction, and in compliance with (i) all Laws, (ii) insurance policies with respect to the Premises, and (iii) agreements to which Tenant is a party or by which it is bound, then in effect, with such changes as are necessary to comply with then applicable Regulations.

In the event damage to or destruction of a substantial portion of the Improvements occurs within the last fifteen (15) years of the Term, Tenant shall have the right, at its election and in lieu of fulfilling its obligations under this Section 9.02, to terminate this Lease upon thirty (30) days' written notice to Landlord, which notice shall be delivered to Landlord on or before the date ninety (90) days after such event of damage or destruction, by paying to Landlord, simultaneously with such notice, a sum equal to any outstanding charges or amounts due from Tenant to Landlord as of such termination date, and by surrendering the Premises to Landlord, on or before the effective date of such termination, in a clean, sightly and safe condition, free of all debris and damaged Improvements, subject to Landlord's acceptance of the property in its reasonable discretion. For the avoidance of doubt, Landlord's acceptance of the property pursuant to the preceding sentence shall be limited to a determination in its reasonable discretion that the requirements of this Section 9.02 have been satisfied. Tenant shall retain for Tenant's account (or the account of its Leasehold Mortgagee) all insurance proceeds due on account of such damage or destruction.

Section 9.03 Application of Proceeds. Insurance proceeds received on account of any damage to or destruction of the Improvements or any part thereof shall be paid directly to Tenant, or at Tenant's direction, to its Leasehold Mortgagee. Any such payment to Leasehold Mortgagee shall be disbursed as required under this Lease to pay for the cost of Restoration pursuant to such usual safeguards as are customarily used by Institutional Lenders (as hereinafter defined) to assure the completion of and payment for the reconstruction of improvements. To the extent any such proceeds exceed the costs of Restoration, Tenant shall retain such excess for Tenant's account (or the account of its Leasehold Mortgagee).

## ARTICLE X. INSURANCE

Section 10.01 Classes of Insurance. Commencing on the date of this Lease (with regard to the insurance required by subsection (b) below) and on the date Tenant shall commence construction of any alterations or other Improvements on the Site (with regard to the insurance required by subsection (a) below), and at all times thereafter through and during the Term, Tenant shall keep the Premises insured, or shall cause the Premises to be kept insured against the risks and hazards and with coverage in amounts not less than those specified as follows:

(a) Insurance against the risks customarily included under "all-risks" policies with respect to improved properties similar to the Premises in an amount equal to the "full insurable value" (which as used herein shall mean the full replacement value, including the costs of debris removal, which amount shall be determined not less often than every five (5) years) of the Improvements. Tenant shall be entitled to carry a deductible of up to $150,000.00 in Constant Dollars (except for earthquake coverage, for which Tenant shall be entitled to carry a deductible

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of up to five percent (5%) of the insurable value of the Premises in Constant Dollars) in connection with said coverage provided Tenant self-insures for the amount of the deductible. Tenant hereby further agrees that to the extent available, Tenant will obtain an "agreed amount" endorsement with respect to such insurance so as to prevent either Landlord or Tenant from becoming a co-insurer of any loss.

(b) Commercial general liability and property damage insurance (including, but not limited to, coverage for any construction, reconstruction or alteration by or at the instance of Tenant on or about the Premises) covering the legal liability of Landlord and Tenant against all claims for any bodily injury or death of persons and for damage to or destruction of property occurring on, in or about the Premises and the adjoining streets, sidewalks, passageways, and parking areas utilized by Tenant or any users or occupants of the Premises in combined single limits for both property damage and bodily injury and in the minimum amount of Ten Million and No/100 Dollars ($10,000,000.00) in Constant Dollars in connection with any single occurrence. Tenant shall be entitled to carry a deductible of up to $100,000.00 in Constant Dollars in connection with said coverage provided Tenant self-insures for the amount of the deductible.

"**Constant Dollars**" means and refers to the present value of the dollars to which such phrase refers. An adjustment shall occur on January 1 of the sixth ($6^{th}$) calendar year following the date of this Lease, and thereafter at five (5) year intervals. Constant Dollars will be determined by multiplying the dollar amount to be adjusted by a fraction, the numerator of which is the Current Index Number and the denominator of which is the Base Index Number. The "**Base Index Number**" will be the level of the Index for the month during which this Lease is dated; the "**Current Index Number**" will be the level of the Index for the month of September of the year preceding the adjustment year.

"**Index**" means and refers to the Consumer Price Index for All Urban Consumers (U.S. City Average), published by the Bureau of Labor Statistics of the United States Department of Labor (base year 1982-84 = 100), or any successor index thereto as hereinafter provided. If publication of the Index is discontinued, or if the basis of calculating the Index is materially changed, then Tenant shall substitute for the Index comparable statistics as compiled by an agency of the United States Government or, if none is available, by a substantial and responsible periodical or publication of nationally recognized authority most closely approximating the result which would have been achieved by the Index.

Section 10.02 Requirements. All insurance required under Section 10.01 hereof shall be written by companies of recognized financial standing (with a rating from Best's Insurance Reports of not less than A-/VIII) which are authorized to do insurance business in the State of California, and shall expressly provide (a) with respect to the insurance required by subsection (a) of Section 10.01 above, an effective waiver by the insurer of all rights of subrogation against any additional insured and against such additional insured's interest in the Premises and against any income derived therefrom, (b) that no cancellation or reduction in the amount of coverage shall be effective until the insurer has given at least thirty (30) days written notice thereof to Landlord, (c) that no material change in coverage shall be effective until Tenant has given at least thirty (30) days written notice thereof to Landlord, and (d) that during construction, reconstruction, alteration or material remodeling of any Improvements on the Premises such policies shall be in "builder's risk" form if there would be an exclusion of coverage under Tenant's all-risks policy as a result of such

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construction, reconstruction, alteration or material remodeling. Landlord shall also be designated as an additional insured under Tenant's commercial general liability policy. A certificate of insurance in force, in form reasonably acceptable to Landlord, issued by the insurer as provided in Section 10.01 hereof, shall be delivered to Landlord on or before the date Tenant is required to obtain the applicable insurance, and prior to expiration of the policy being renewed or replaced. Tenant may obtain the insurance required hereunder by endorsement on its blanket insurance policies, provided that said policies fulfill the requirements of this Section 10.02, that said policies reference the Premises, and that Landlord receives the certificate of insurance in force with respect thereto as provided above. Nothing contained in this Lease shall be construed to require Landlord to prosecute any claim against any insurer or to contest any settlement proposed by any insurer. Landlord and Tenant shall each have included in all policies of fire, extended coverage, workers compensation, business interruption and loss of rents insurance respectively obtained by them covering the Premises or the Improvements or the contents thereof, a waiver by the insurer of all rights of subrogation against the other in connection with any loss or damage thereby insured against. Any additional premium for such waiver shall be paid by the primary insured.

Section 10.03 Certificates. At least once per year without request, and within fifteen (15) days after receipt of written request from Landlord (but in no event more often than twice annually), Tenant shall deliver to Landlord a certificate addressed to Landlord issued by Tenant's insurance provider, and dated within thirty (30) days prior to the delivery thereof, which lists the insurers and policy numbers evidencing all the other insurance then required to be maintained by Tenant hereunder, and which such insurance shall be in full force and effect as required by this Lease. In the event that Tenant fails to obtain, maintain or renew any insurance provided for in this Article X or to pay the premiums therefor, or to deliver to Landlord any of such certificates, Landlord may, but shall not be obligated to, procure such insurance, pay the premiums therefor or obtain such certificates and any costs or expenses incurred by Landlord for such purposes shall be immediately paid by Tenant to Landlord upon demand by Landlord, with Interest thereon from the date of demand by Landlord.

Section 10.04 Waiver of Subrogation. Landlord and Tenant each hereby release and relieve the other, and waive their entire right to recover damages against the other, for loss of or damage to its property arising out of or incident to the perils insured against herein by valid and collectible insurance policies (but only to the extent of the insurance proceeds collected under such policies), regardless of cause or origin, **INCLUDING NEGLIGENCE OF EITHER PARTY HERETO, ITS AGENTS, OFFICERS OR EMPLOYEES**. Landlord and Tenant each agree to give written notice of the terms of this mutual waiver to their respective property damage insurance carriers. To the extent available under applicable laws and/or insurance regulations, Landlord and Tenant agree to have their respective property damage insurance carriers waive, by proper endorsement, any right to subrogation that such companies may have against Landlord or Tenant, as the case may be, so long as the insurance is not invalidated thereby.

## ARTICLE XI. INDEMNIFICATION

Section 11.01 Tenant Indemnification. Tenant covenants and agrees to pay, defend (with attorneys reasonably acceptable to Landlord), indemnify and save harmless Landlord Indemnitees from and against any and all liability, loss, damage, cost, expense (including without limitation reasonable and actual attorneys' fees and expenses of Landlord), causes of action, suits, claims,

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demands or judgments of any nature whatsoever (including, without limitation, those relating to or arising from any construction, building or other work on the Premises and those relating to any construction or workmanship defects regarding any of the Improvements) (collectively, "**Claims**") to the extent arising out of Tenant's or Tenant's agents' or subtenants' use or occupancy of the Premises, whether or not resulting from the negligence or willful misconduct or omission of Tenant, its agents, contractors or employees during the Term of this Lease. If any action or proceeding should be brought against Landlord based upon any such claim and if Tenant, upon notice from Landlord, shall cause such action or proceeding to be defended at Tenant's expense by counsel reasonably satisfactory to Landlord, without any disclaimer of liability by Tenant in connection with such claim, Tenant shall not be required to indemnify Landlord for additional attorneys' fees in connection with such action or proceeding. This Section 11.01 shall survive the expiration or termination of this Lease.

Section 11.02 Landlord Indemnification. Landlord covenants and agrees to pay, defend, indemnify and save harmless Tenant from and against any and all liability, loss, damage, cost, expense (including without limitation reasonable and actual attorneys' fees and expenses of Tenant), causes of action, suits, claims, demands or judgments of any nature whatsoever to the extent resulting from the breach of this Lease by Landlord or to the extent resulting solely from the gross negligence or willful misconduct of Landlord during the Term of this Lease with respect to the Premises. If any action or proceeding should be brought against Tenant based upon any such claim and if Landlord, upon notice from Tenant, shall cause such action or proceeding to be defended at Landlord's expense by counsel reasonably satisfactory to Tenant, without any disclaimer of liability by Landlord in connection with such claim, Landlord shall not be required to indemnify Tenant for additional attorneys' fees in connection with such action or proceeding. This Section 11.02 shall survive the expiration or termination of this Lease.

## ARTICLE XII. OWNERSHIP OF IMPROVEMENTS

Section 12.01 Title to Improvements. Title to the Improvements constructed by Tenant shall, during the Term, be in Tenant, but notwithstanding such title, the terms and conditions of this Lease shall govern the construction, use, and operation of the Improvements and the exercise of Tenant's rights with respect thereto; and Tenant's right, title, interest, and estate in and to the Improvements shall not be separable from the leasehold estate granted Tenant hereunder. Upon the termination or expiration of this Lease, title to all Improvements (other than trade fixtures), if any, then located on the Premises shall vest in and become the full and absolute property of Landlord without need of any further action being taken by Tenant or Landlord, and Tenant shall immediately surrender possession of the Improvements, if any, then located on the Premises upon such termination or expiration as provided in Section 12.02 hereof. The value or cost of the Improvements constructed by Tenant shall not in any way constitute a substitute for or a credit against any obligation of Tenant under this Lease to pay other payments or obligations of Tenant under this Lease.

Section 12.02 Surrender. Upon the expiration or termination of this Lease, Tenant shall peaceably quit and surrender the Premises and all Improvements to Landlord, subject to Tenant's maintenance and repair obligations under Section 8.01. Tenant shall have the right upon a termination, on or before the date one (1) business day after the termination or expiration of this Lease to remove from the Premises all furniture, inventory, trade fixtures, signs, sign panels (but

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not any pylon or monument) or other personal property of Tenant (collectively, "**Tenant's Property**"), provided, however, that in the event that Tenant shall fail to remove all or any portion of Tenant's Property from the Premises on or before the date one (1) business day after the termination or expiration of this Lease, Tenant's Property shall automatically become the sole and exclusive property of Landlord (subject to any rights or security interests of any Leasehold Mortgagee), and Landlord may sell, dispose of, use, or keep such Tenant's Property as Landlord shall choose. In no event shall any built-in or attached machinery and equipment (other than trade fixtures) used in and necessary to the operation of the Improvements be removed by Tenant at the expiration of the Term. Notwithstanding the foregoing to the contrary, in connection with any new lease entered into between Landlord and Leasehold Mortgagee pursuant to Section 13.03(f) of this Lease, Landlord will, by quitclaim deed, convey to Leasehold Mortgagee or its nominee that enters into such new lease title to any of Tenant's Property that becomes vested in Landlord as a result of the termination of this Lease; provided, that such conveyance shall be subject to the terms of such new lease, including, without limitation, a provision that provides that the improvements become the property of Landlord upon expiration of the new lease.

Section 12.03 Waiver of Landlord's Lien. Tenant shall have the right, without Landlord's consent, to finance the furniture, inventory, trade fixtures and personal property of Tenant at the Premises and grant liens and security interest in such items. Subject to Landlord's rights under Section 12.02 of this Lease, Landlord waives and releases any and all statutory landlord's liens with respect to Tenant's furniture, inventory, trade fixtures or other personal property of Tenant. Landlord agrees to execute and deliver to Tenant within fifteen (15) days after written request therefor, a written confirmation in favor of Tenant's lender of the waiver set forth in this Section 12.03, in form reasonably acceptable to Tenant's lender and Landlord.

## ARTICLE XIII. ASSIGNMENT AND SUBLETTING; NONSUBORDINATION TO LEASEHOLD MORTGAGING

Section 13.01 Assignment and Subletting; Prior Consent.

(a) Except as expressly provided in this Lease, neither this Lease nor the interest of Tenant in this Lease or in the Premises, or any part thereof, shall be sold, assigned, conveyed, sublet or otherwise transferred (each a "**Transfer**"), in whole or in part, directly or indirectly, whether by operation of law or otherwise, without the express prior written consent of Landlord. Subject to the terms of this Article XIII, Landlord agrees not to unreasonably withhold, condition or delay such consent. In the event that Landlord withholds, refuses, or fails to give consent or approval to any Transfer, Landlord shall notify Tenant in writing setting forth in reasonable detail the reasons for such withholding or refusal. If Tenant is a corporation, partnership, limited liability company, or other entity, the transfer (whether by a single transfer or by a series of related or unrelated transfers) of fifty percent (50%) or more of the stock, partnership interests, membership interests, or other interests of Tenant, or of any Parent Entity (hereinafter defined) (except as provided below), however accomplished and whether effected voluntarily or by operation of law, in a single or by multiple transactions, shall be deemed a Transfer of this Lease, whether such Transfer(s) shall involve a Transfer or Transfers of outstanding interests of Tenant and/or the issuance of interests in Tenant (whether stock, partnership, membership interests or other interests); provided, however this restriction shall not apply to the following transfers of ownership interests in a Parent Entity (and the same shall not require the consent or approval of

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Landlord but Tenant shall provide written notice to Landlord of such Transfer, together with reasonably acceptable documentation demonstrating compliance with the requirements hereof (a "**Compliance Notice**"), within thirty (30) days after the date thereof): (1) if a Parent Entity owns multiple properties and assets (including the Premises) and the Premises comprise less than 20% of the value of such assets, then the sale, issuance, or transfer, cumulatively or in one transaction, of all the ownership interests in such Parent Entity, in connection with the merger, consolidation, or other entity restructuring of such Parent Entity; (2) if a Parent Entity directly or indirectly owns multiple properties and assets (including the Premises) and the Premises comprise less than 20% of the value of such assets, then the sale, issuance, or transfer, cumulatively or in one transaction, of all the ownership interests in such Parent Entity in connection with the sale of all or substantially all of the business and assets of such Parent Entity; (3) if a Parent Entity directly or indirectly owns multiple properties and assets (including the Premises) and the Premises comprise less than 20% of the value of such assets, then the sale, issuance, or transfer, cumulatively or in one transaction, in connection with raising additional equity for such Parent Entity; (4) the sale, assignment or transfer of any interest in any Parent Entity to an affiliate of such Parent Entity so long as **Toll Brothers, Inc.** retains Control (as defined in Section 13.02(e) hereof) of such Parent Entity, (5) if the Parent Entity is a real estate investment trust or other investment fund that owns multiple properties and assets (including the Premises) and the Premises comprise less than 20% of the value of such assets, any sale, issuance or transfer in the ordinary course of such Parent's Entity's administration of its business provided that substantially the same principals continue to manage the operation of such Parent Entity or (6) transfers of stock in a Parent Entity where such stock is publicly traded on a nationally recognized stock exchange. A "**Parent Entity**" is any entity that directly or indirectly owns fifty percent (50%) or more or a controlling interest of the stock, partnership interests, general partnership interests, membership interests, or other interests of Tenant. Consent to one Transfer shall not destroy or waive this provision, and all later Transfers shall likewise be made only upon the prior written consent of Landlord. **Notwithstanding anything contained herein but subject to Article 13.02(a), (b), (c), (d), (e), and (f), Tenant shall have no right to sell, assign, convey or otherwise transfer its interest in this Lease or in the Premises until Substantial Completion (as defined in Section 13.02(c) below) of the Initial Improvements.** Any Transfer which does not comply with the terms and conditions of this Article XIII shall be null, void, and of no force or effect.

(b) Should Tenant desire to initiate a Transfer and such Transfer could require Landlord's prior written consent under this Lease, Tenant shall give Landlord written notice of such desire, which notice shall contain (i) the name and address of the proposed subtenant, assignee or transferee and its form of organization, (ii) the material terms and conditions of the proposed Transfer (including, without limitation, the financial terms of such proposed subletting or assignment and the proposed commencement date of the proposed Transfer and the term of any proposed sublease), (iii) a description of any proposed remodeling or renovation to the exterior of the Improvements to be conducted by the proposed assignee, subtenant, or transferee, (iv) evidence of the financial status of the proposed transferee (other than a subtenant), and (v) such other information as Landlord shall reasonably request, together with the request that Landlord approve such Transfer. Landlord shall have a period of thirty (30) days following receipt of such written notice within which to notify Tenant in writing that Landlord elects either (a) to deny Tenant the right to consummate such Transfer including Landlord's reasons for such denial, or (b) permit Tenant to consummate the Transfer. If Landlord fails to notify Tenant in writing of such election within the thirty (30) day period described above, Tenant may give Landlord an additional written

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notice requesting such approval (which additional written notice shall contain a statement in boldface capital letters that in the event the proposed Transfer is not approved or disapproved by Landlord in writing to Tenant within ten (10) business days following receipt of such additional written notice, the proposed Transfer shall be deemed approved), and the failure of Landlord to notify Tenant in writing of such election (and in the case of disapproval, stating in detail the reasons for such disapproval) within ten (10) business days after receipt of such additional written notice shall be deemed approval of such proposed Transfer.

(c) In the event a dispute arises as to whether Landlord has unreasonably conditioned, withheld or denied its consent to any proposed Transfer, such dispute shall be resolved by arbitration as provided in Section 18.23 of this Lease.

(d) Any consent given by Landlord to any Transfer shall apply only to the specific transaction thereby authorized and shall not relieve Tenant or any approved successor of Tenant from obtaining the prior written consent of Landlord to any further Transfer where such consent is required by this Lease.

Section 13.02 Permitted Assignment and Subletting Without Prior Consent.

(a) Notwithstanding any provision of this Lease to the contrary, Tenant has the right, at any time, without the consent of Landlord (but Tenant shall provide a Compliance Notice to Landlord of such Transfer at least ten (10) days prior to the date thereof, except as otherwise set forth in Section 13.01(a) above) (i) to assign all or a part of Tenant's interest in this Lease to any entity controlled by or under common control with Tenant (as "Control" is defined in subsection 13.02(e) of this Lease), and (ii) to mortgage, pledge or hypothecate this Lease, the interest of Tenant in this Lease or in the Premises, or any part thereof, as security for any bona fide indebtedness (the primary purpose of which is not to consummate a Transfer which otherwise would require Landlord's consent) Tenant may incur, whether by deed to secure debt, mortgage, deed of trust or other security instrument, provided, however that such mortgage, pledge or hypothecation is subject and subordinate to Landlord's rights to collect any sums due hereunder and otherwise made in accordance with Section 13.03 below and the other terms and conditions of this Lease.

(b) Notwithstanding any provision of this Lease to the contrary, at any time (including prior to Substantial Completion of construction of the Initial Improvements, provided that Tenant delivers a Completion Guarantee (as such term is defined below) to Landlord concurrently with the Transfer described in this subsection), Tenant has the right, without the consent of Landlord (but Tenant shall provide a Compliance Notice to Landlord of such Transfer at least ten (10) days prior to the date thereof), to Transfer up to eighty percent (80%) of the outstanding interests of Tenant (directly and/or indirectly) and/or the issuance of new interests (directly and/or indirectly) comprising eighty percent (80%) of the interests of Tenant (whether stock, partnership, membership interests or other interests) to an Institutional Investor (as hereinafter defined) or to any entity controlled by an Institutional Investor (as "Control" is defined in subsection 13.02(e) of this Lease) provided that Tenant or an affiliate of the then-existing Tenant retains at least twenty percent (20%) of the outstanding interests of Tenant (directly and/or indirectly). For purposes hereof, (i) a Transfer contemplated pursuant to the immediately preceding sentence shall be referred to as a "**Transfer Offering**," and (ii) a "**Completion**

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**Guarantee**" shall refer to a completion guarantee in commercially reasonable form and substantially similar to the completion guarantee provided or to be provided to the construction lender for the Initial Improvements, in which completion will be based on plans and specifications for the Initial Improvements agreed to by Tenant and such construction lender; provided, however, that in no event shall such Completion Guarantee include any representation, warranty or other assurance that the construction lender will fund the Initial Improvements or will otherwise perform its obligations under the construction loan. Notwithstanding any provision of this Lease to the contrary, following any such Transfer Offering, upon (a) a default by the sponsor of the Transfer Offering that results in removal of the sponsor of such Transfer Offering from its interest in Tenant, (b) the failure of the sponsor of the Transfer Offering to fund a required portion of the equity capital for development of the Premises (which results in the dilution of its interest in Tenant) and/or (c) the exercise by the initial (but not subsequent) Institutional Investor in Tenant of any put/call rights under the applicable sponsorship or joint venture agreement with the Institutional Investor, then: (1) any then existing Institutional Investor that is then an existing owner of an interest in Tenant may, without the consent of Landlord, acquire all or additional portions of ownership interests in Tenant, and (2) interests in Tenant may be transferred to such Institutional Investor or affiliates or subsidiaries thereof.

(c) Notwithstanding any provision of this Lease to the contrary, following Substantial Completion (as defined below) of construction of the Initial Improvements, Tenant has the right, without the consent of Landlord (but Tenant shall provide a Compliance Notice to Landlord of such Transfer at least ten (10) days prior to the date thereof), to assign all or a part of Tenant's interest in this Lease to any Institutional Investor or to any entity controlled by an Institutional Investor (as "Control" is defined in subsection 13.02(e) of this Lease). For purposes of this Lease, "**Substantial Completion**" shall mean the issuance of all certificates of occupancy for the Initial Improvements, which may be temporary certificates of occupancy so long as the Initial Improvements may be occupied and operated thereunder, except for any retail component of the Initial Improvements for which a tenant has not been identified (provided that the same has been finished to a cold, dark shell condition) or for components which Tenant will not control post-completion. Notwithstanding any provision of this Lease to the contrary, following any such Transfer, at any time thereafter: (1) any then existing Institutional Investor that is then an existing owner of an interest in Tenant may, without the consent of Landlord, acquire all or additional portions of ownership interests in Tenant, and (2) interests in Tenant may be transferred to such Institutional Investor or affiliates or subsidiaries thereof.

(d) Notwithstanding any provision of this Lease to the contrary, Tenant shall have the right from time to time, without any requirement of obtaining Landlord's prior written consent, to sublet portions of the Premises (but not all or substantially all of the Premises in a single sublease) to subtenants ("**Subtenants**") through the execution of subleases having terms that are less than the balance of the Term ("**Subleases**"). All Subleases shall be subject to and subordinate to this Lease. Notwithstanding Tenant's ability to enter into any Subleases, Tenant shall not be released from any of Tenant's obligations contained herein.

(e) Notwithstanding any provision of this Lease to the contrary, at any time (including prior to Substantial Completion of construction of the Initial Improvements, provided Tenant delivers a Completion Guarantee to Landlord concurrently with the assignment described in this subsection), Tenant shall have the right, without Landlord's consent (but Tenant shall

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provide a Compliance Notice to Landlord of such Transfer within thirty (30) days after the date thereof), to assign this Lease to (i) any successor to Tenant in connection with a bona fide material reorganization, recapitalization, consolidation, share exchange, acquisition or merger of Tenant, (ii) any entity that acquires or purchases all or substantially all of the assets of Tenant, and (iii) any parent corporation of which Tenant is a direct or indirect wholly-owned subsidiary, to any direct or indirect wholly-owned subsidiary of Tenant, to any wholly-owned subsidiary of any parent corporation of which Tenant is a direct or indirect wholly-owned subsidiary, or to any entity which directly or indirectly, through one (1) or more intermediaries, controls or is controlled by or is under common control with Tenant. "**Control**" as used in this paragraph means, with respect to a corporation, the right to exercise more than twenty percent (20%) of the voting rights attributable to the shares of the controlled corporation and, with respect to an entity that is not a corporation, the ownership, directly or indirectly, of more than twenty percent (20%) of the controlled entity or the possession of the power to direct or cause the direction of the management and policies of the controlled entity.

(f) Notwithstanding any provision of this Lease to the contrary, any sale, assignment or transfer of Tenant's interest in this Lease in any proceeding for the foreclosure of any Leasehold Mortgage (as defined in Section 13.03 below), or the assignment or transfer of Tenant's interest in this Lease under any instrument of assignment or transfer in lieu of the foreclosure of, or exercise of power of private sale under, any Leasehold Mortgage (collectively, "**Foreclosure**") shall be deemed to be a permitted Transfer of Tenant's interest in this Lease (without the need for any consent of Landlord). In the event that any Institutional Lender (as hereinafter defined) or its nominee acquires Tenant's interest in this Lease or in a new lease through Foreclosure, such Institutional Lender or its nominee, as applicable, shall have the right to sell, transfer, convey or assign its interest in the Lease one time without Landlord's consent. "**Institutional Lender**" shall mean one (1) or more of the following: (i) a bank, savings and loan association, investment bank, insurance company, trust company, real estate investment trust, nationally recognized financial services company, a nationally recognized conduit lender, the Federal National Mortgage Association (Fannie Mae), the Federal Home Loan Mortgage Corporation (Freddie Mac), or the Federal Housing Administration (FHA), (ii) a trustee or similar Person in connection with a securitization of a mortgage loan or a nationally recognized conduit lender, so long as the trustee or similar Person is an entity that otherwise would be an Institutional Lender under clause (i) of this definition and which, in each case of clauses (i) or (ii) of this definition, is regularly engaged in the business of making or owning commercial real estate loans, (iii) any Institutional Investor, or (iv) any other person or entity in the business of making or owning commercial real estate loans, with a net worth in excess of Forty Million Dollars ($40,000,000) in Constant Dollars. For purposes of this Lease, "**Person**" means an individual, a corporation, a partnership, a joint venture, a limited liability company, a trust, an unincorporated association, any governmental authority or any other entity.

(g) For purposes above, "**Institutional Investor**" means any of the following persons or entities:

(1) Any savings bank, savings and loan association, commercial bank, or trust company having shareholder equity (as determined in accordance with GAAP accounting) of at least Forty Million Dollars ($40,000,000) in Constant Dollars;

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(2) Any fund, credit union, trust or insurance company having a net worth of at least Forty Million Dollars ($40,000,000) in Constant Dollars;

(3) Any employment benefit plan subject to ERISA having a net worth of Forty Million Dollars ($40,000,000) in Constant Dollars or more;

(4) Any pension plan established for the benefit of the employees of any state or local government, or any governmental authority, having a net worth of at least Forty Million Dollars ($40,000,000) in Constant Dollars; or

(5) Any other person or entity in the business of owning interests in commercial real estate, with a net worth (either itself, or including its parent, subsidiaries and affiliates) in excess of Forty Million Dollars ($40,000,000) in Constant Dollars.

Section 13.03 Leasehold Mortgaging.

(a) Landlord's right, title and interest herein and in the Premises shall not be subordinated to the lien, priority and security title of any encumbrance of this Lease or the interest of Tenant hereunder as security for any indebtedness Tenant may incur, whether by deed to secure debt, mortgage, deed of trust or other security instrument (all or any one of which hereinafter referred to as "**Leasehold Mortgage**," and the owner or owners or holder or holders of all or any of which hereinafter referred to as "**Leasehold Mortgagee**"), and without limiting the foregoing, Landlord's right to receive any other charges due from Tenant to Landlord hereunder shall have priority over any rights of any Leasehold Mortgagee.

(b) Landlord agrees and acknowledges that Tenant shall have the right and power to do all of the following without the need of obtaining Landlord's consent thereto (but Tenant shall provide written notice to Landlord of such Financing, as defined below, at least ten (10) days prior to the date Tenant first obtains such Financing): (a) finance construction, alteration or removal of the Improvements ("**Construction Financing**"), and (b) obtain (i) interim, take-out or permanent or other financing for the purposes of repaying such Construction Financing, and (ii) any other financing for holding, owning or operating the Improvements or for any other purposes related to the Premises (including in connection with a Transfer of Tenant's leasehold interests hereunder) (herein collectively called the "**Permanent Financing**"). Such Construction Financing and Permanent Financing are sometimes hereinafter collectively referred to as "**Financing**." Pursuant to Section 13.01(a), Tenant shall have the right, subject to the requirements set forth in this Section 13.03, without the consent of Landlord, to convey a security interest in all or a part of Tenant's interest under this Lease as security for any bona fide indebtedness that Tenant may incur (provided the same is not used primarily for the purpose of consummating a Transfer which otherwise would require Landlord's consent under this Lease). No Leasehold Mortgage shall be binding upon Landlord with respect to the enforcement of the rights and remedies contained therein and provided by law for the benefit of any Leasehold Mortgagee unless and until a written notice of such Leasehold Mortgage shall have first been delivered to Landlord, notwithstanding any other form of notice to Landlord, actual or constructive. Subject to the requirements set forth in this Section 13.03, Tenant may without the need of consent or approval from Landlord encumber the leasehold estate hereby created and Tenant's interest, if any, in the Improvements by a Leasehold Mortgage to secure the Financing, but each such Leasehold Mortgage (and all other

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related loan documents entered into as part of such Leasehold Mortgage) shall be subject to each and all of the covenants, conditions, obligations and restrictions set forth in this Lease, none of which covenants, conditions, obligations and restrictions is or shall be waived by Landlord by reason of the rights given to Tenant under this Section 13.03(b). Landlord agrees, within fifteen (15) days of request from the Leasehold Mortgagee or Tenant, to execute a recognition/non-disturbance and attornment agreement (but not a subordination agreement) with the Leasehold Mortgagee and Tenant in a commercially reasonable form acceptable to all such parties.

(c) If Landlord shall have received from Tenant or from a Leasehold Mortgagee written notice in the manner provided in Section 18.10 hereof, specifying the name and address of such Leasehold Mortgagee and requesting that Landlord give to such Leasehold Mortgagee a copy of each notice of default by Tenant at the same time as and whenever any such notice of default shall thereafter be given by Landlord to Tenant, then (i) Landlord shall comply with such request by giving such notice, addressed to such Leasehold Mortgagee at the address last furnished to Landlord, with respect to each default by Tenant occurring on or after the date of Landlord's receipt of such notice, and (ii) (A) if such default is a default in the payment of any sum due hereunder, such Leasehold Mortgagee will have the right to cure such default for the longer of the time period afforded to Tenant under this Lease or thirty (30) days after receipt by such Leasehold Mortgagee of such notice; (B) if such default is a default in observing or performing any other covenant or condition to be observed or performed by Tenant hereunder, and such default can be cured by such Leasehold Mortgagee without obtaining possession of the Premises, such Leasehold Mortgagee will have the right to cure such default for the longer of the time period afforded to Tenant under this Lease or sixty (60) days after receipt of such notice (provided, however, in the case of a default that cannot with diligence be cured, or the curing of which cannot be commenced, within such sixty (60) days, such Leasehold Mortgagee shall have such additional period as may be necessary to cure such default with diligence and continuity); or (C) if such default is a default that can only be cured by such Leasehold Mortgagee upon obtaining possession of the Premises, the time period afforded to such Leasehold Mortgagee to cure such default will include the time necessary to obtain such possession with diligence and continuity, through a receiver or otherwise, and an additional sixty (60) days after obtaining such possession (provided, however, in the case of a default that cannot with diligence be cured, or the curing of which cannot be commenced, within such period of sixty (60) days, such Leasehold Mortgagee shall have such additional period as may be necessary to cure such default with diligence and continuity). So long as Leasehold Mortgagee is prevented by any process, stay or injunction issued by any court of competent jurisdiction, from commencing or prosecuting foreclosure or other appropriate proceedings of that nature, the foregoing cure period afforded to Leasehold Mortgagee will be extended for an additional period of time necessary to enable such Leasehold Mortgagee to obtain possession or control of the Premises, provided that Leasehold Mortgagee uses reasonable efforts to contest and appeal the issuance or continuance of any such process, stay or injunction. Landlord shall accept performance by any Leasehold Mortgagee of any covenant, condition or agreement on Tenant's part to be performed hereunder with the same force and effect as though performed by Tenant, if, at the time of such performance (or prior thereto), Landlord shall be (or shall have been) furnished with evidence reasonably satisfactory to Landlord of the interest in this Lease claimed by the Leasehold Mortgagee tendering such performance. Timeframes for Leasehold Mortgagee to respond to any notice or demand under this Lease will run from the date such written notice or demand is actually received by Leasehold Mortgagee. Leasehold Mortgagee shall not be required to cure any previously occurred non-monetary defaults of Tenant which are not reasonably susceptible of

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being cured by Leasehold Mortgagee. Examples of such previously occurred non-monetary defaults would include, without limitation, Tenant's failure to provide reports and returns with respect to Taxes under Section 4.03 of this Lease or a prior non-recurring violation of the permitted use clause under Section 6.02 of this Lease.

(d) If any Leasehold Mortgagee or its nominee shall acquire title to all or a part of Tenant's interest in this Lease, by foreclosure, assignment in lieu of foreclosure or otherwise, or enters into a new lease with Landlord as provided in Section 13.03(f) hereof, such Leasehold Mortgagee or its nominee may assign its interest in this Lease (or such new lease), subject to and in accordance with the provisions and conditions of this Article XIII and such Leasehold Mortgagee or its nominee, as applicable, shall thereupon be released from any further liability for the performance or observance of the covenants and conditions under this Lease (or such new lease) contained on the Tenant's part to be performed and observed after the date of such assignment, but not with respect to the period of time in which Leasehold Mortgagee or its nominee held title to such interest, for which Leasehold Mortgagee or its nominee shall remain liable.

(e) In the event of a Foreclosure, the purchaser at any sale of Tenant's interest in this Lease in any Foreclosure shall be deemed to be a permitted assignee or transferee of this Lease. No Leasehold Mortgagee or other acquirer of Tenant's interest in this Lease pursuant to Foreclosure, or who becomes the tenant under a new lease, and each subsequent acquirer of Tenant's interest in this Lease or of the tenant's interest in the new lease (collectively, the "**Successor**") shall become personally liable for the performance or observation of any covenants or conditions to be performed or observed by Tenant unless and until such Successor becomes the owner of all or a portion of Tenant's interest hereunder upon a Foreclosure or enters into a new lease with Landlord pursuant to Section 13.03(f) hereof. Any Successor shall be liable for (i) the performance and observance of such covenants and conditions only so long as such Successor owns such interest of Tenant under this Lease or the interest of the tenant under such new lease, and (ii) any defaults by such Successor occurring during the period it owned such interest of Tenant under this Lease or the interest of the tenant under such new lease (collectively, the "**Successor Liabilities**"). Each Successor, upon acquiring Tenant's interest in this Lease or tenant's interest in the new lease, may only sell, transfer, mortgage, encumber, convey or assign Tenant's interest in this Lease or tenant's interest in the new lease in accordance with the terms and conditions of Article XIII of this Lease, and thereafter be relieved of all obligations under this Lease or the new lease to be performed from and after the date of such assignment, but not relieved of the Successor Liabilities.

(f) (i) In the event this Lease is terminated for any reason prior to the end of the Term, including, without limitation, by reason of any bankruptcy proceedings in respect of Tenant, any Leasehold Mortgagee or a person designated by such Leasehold Mortgagee shall have the right, exercisable by written notice to Landlord within thirty (30) days after the effective date of such termination, rejection or disaffirmance, to enter into a new lease of the Premises with Landlord; (ii) the term of said new lease shall begin on the date of the termination, rejection or disaffirmance of this Lease and shall continue for the remainder of the Term; (iii) such new lease shall otherwise contain the same terms and conditions as those set forth herein, except for requirements that are no longer applicable or have already been performed, provided that such Leasehold Mortgagee has cured all defaults on the part of Tenant hereunder that are susceptible of being cured by the payment of money, and that such new lease will require the tenant thereunder

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promptly to commence, and expeditiously to continue, to cure all other defaults on the part of Tenant hereunder to the extent susceptible of being cured; and (iv) this provision shall survive the termination of this Lease and shall continue in full force and effect thereafter to the same extent as if this provision were a separate and independent contract among Landlord, Tenant and each Leasehold Mortgagee.

(g) Landlord agrees that, so long as any Leasehold Mortgagee holds a Leasehold Mortgage, no voluntary termination of the Lease by Tenant and no cancellation, surrender or modification of this Lease will be effective without the prior written consent of each then outstanding Leasehold Mortgagee. Notwithstanding the foregoing to the contrary, Leasehold Mortgagee's consent shall not be required with respect to minor or ministerial modifications of this Lease that do not adversely affect the rights of Tenant or the Leasehold Mortgagee. Tenant will provide any Leasehold Mortgagee with a copy of any modification executed pursuant to either of the two (2) preceding sentences promptly following execution by Landlord and Tenant.

(h) Within fifteen (15) days after receipt of written request from any Leasehold Mortgagee, Landlord shall execute, acknowledge and deliver to such Leasehold Mortgagee a written certificate certifying (i) that attached to the certificate is a true and correct copy of the Ground Lease, (ii) to the actual knowledge of Landlord, the Lease is in full force and effect (or, if not, so specifying), (iii) whether or not, to the actual knowledge of Landlord, a default or Event of Default by Tenant has occurred under this Lease which has not been cured (and if so, specifying the same) or whether or not to Landlord's actual knowledge conditions exist which but for the passage of time or the giving of notice, or both, would constitute an Event of Default by Tenant, (iv) the date through which Fixed Rent has been paid, and (v) any other matters or state of facts regarding this Lease which are reasonably requested by such Leasehold Mortgagee.

(i) For so long as any Leasehold Mortgagee or its nominee is the owner of the leasehold estate created hereby, Landlord shall look solely to the interest of such Leasehold Mortgagee or its nominee in the Premises, including, without limitation, any rents, revenue, profits, property insurance or rent loss insurance proceeds or other proceeds derived from the Premises after such Leasehold Mortgagee shall have been notified in writing by Landlord that a default or an Event of Default has occurred under this Lease, in the event of the breach or default by such Leasehold Mortgagee or its nominee under the terms of this Lease, and Landlord agrees that any judgment or decree to enforce the obligations of such Leasehold Mortgagee or its nominee shall be enforceable only to the extent of the interest of such Leasehold Mortgagee or its nominee in the Premises, and any such judgment shall not be subject to execution on nor be a lien on any assets of the Leasehold Mortgagee or nominee other than the Premises. The benefits of this Section 13.03(i) shall inure only to the benefit of any first in priority Leasehold Mortgagee or its nominee. The term "Premises", as used in this Section, shall be deemed to include, without limitation, any rents, revenue, profits, property insurance or rent loss insurance proceeds or other proceeds derived from the Premises during any period the leasehold estate created hereby is owned by such Leasehold Mortgagee or its nominee and such Leasehold Mortgagee or its nominee has been notified in writing by Landlord that a default or Event of Default has occurred under this Lease.

Section 13.04 Lender Requirements. If required by a Leasehold Mortgagee as a condition to making a loan secured by the Premises, Landlord agrees that Landlord will enter into

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commercially reasonable non-disturbance and attornment agreements with any retail subtenants of the Premises.

## ARTICLE XIV. RIGHT TO CONTEST

Section 14.01 Permitted Contests. Tenant, at its sole cost and expense, may contest by appropriate legal proceedings conducted in good faith and with due diligence (individually, a "**Permitted Contest**", any two or more, collectively, "**Permitted Contests**") the amount, validity or application, in whole or in part, of any Taxes or Charges referred to in Section 4.01 and Section 4.02 hereof, any Regulation referred to in Section 7.01 hereof or any Lien referred to in Section 7.05 hereof; provided, however, that (a) Tenant shall give Landlord prior written notice of each such contest, (b) Tenant shall first make all contested payments (under protest if it desires) unless such proceeding shall suspend the collection thereof from Landlord or from the Premises, (c) no part of the Premises or any interest therein under this Lease shall be subjected thereby to sale, forfeiture, foreclosure or interference, (d) Landlord shall not be exposed thereby to any civil or criminal liability for failure to comply with any Regulation and the Premises shall not be subject to the imposition of any Lien as a result of such failure, and (e) Tenant shall have furnished any security required in such proceeding to ensure payment of any Taxes, Charges, Lien or compliance with any Regulation. Tenant agrees that it shall pay, and save Landlord harmless from and against, any and all losses, judgments, decrees and costs (including all reasonable attorneys' fees and expenses) in connection with any Permitted Contest and that, promptly after the final determination of every Permitted Contest, Tenant shall fully pay and discharge the amounts which shall be levied, assessed, charged or imposed or be determined to be payable therein, together with all penalties, fines, interest, costs and expenses resulting therefrom and shall promptly comply with any Regulation under which compliance is required therein.

## ARTICLE XV. DEFAULT

Section 15.01 Events of Default. The occurrence of any of the following acts, events or conditions, notwithstanding the pendency of any proceeding which has or might have the effect of preventing Tenant from complying with the terms, conditions or covenants of this Lease, shall constitute an "**Event of Default**" under this Lease:

(a) Any sum of money payable under this Lease is not paid when due and such failure shall continue for ten (10) days after written notice of such failure of payment; or

(b) Any sale, assignment or other transfer of this Lease or any interest of Tenant hereunder or in the Premises or any sublet of the Premises without full compliance with any and all requirements therefor set forth in Article XIII of this Lease; or

(c) Any conveyance, mortgage or encumbrance of the Premises, or any portion thereof, as security for any debt if such conveyance, mortgage or encumbrance is in violation of this Lease, and the failure of Tenant to discharge such conveyance, mortgage or encumbrance as a lien or security interest against the Premises, within thirty (30) days after written notice of such default from Landlord; or

(d) The filing by Tenant of a voluntary petition in bankruptcy or the filing by Tenant of any petition or answer seeking or acquiescing in any reorganization, arrangement,

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composition, readjustment, liquidation, dissolution or similar relief for itself under any present or future federal, state or other law or regulation relating to bankruptcy, insolvency or other relief for debtors, or Tenant seeking or consenting to or acquiescing in the appointment of any trustee, receiver or liquidator of Tenant, or of all or substantially all of the assets of Tenant, or of all or substantially all of the income, rents, issues, profits or revenues thereof, in connection with the insolvency of Tenant, or the making by Tenant of any general assignment for the benefit of creditors, or the admission in writing by Tenant of its inability to pay its debts generally as they become due; or

(e) The filing of a petition against Tenant seeking any reorganization, arrangement, composition, readjustment, liquidation, dissolution or similar relief under any present or future federal, state or other law or regulation relating to bankruptcy, insolvency or other relief for debtors, or the appointment of any trustee, receiver or liquidator of Tenant, unless the petition shall be dismissed within ninety (90) days after the filing, but in any event prior to the entry of a final order, judgment or decree approving such petition; or

(f) The failure or refusal of Tenant, at any time during the Term, to fulfill or perform any other covenant, agreement or obligation of Tenant hereunder if such failure or refusal shall continue without correction for a period of thirty (30) consecutive calendar days from and after notice thereof to Tenant, provided that if such covenant, agreement or obligation shall be of such nature that it can be fulfilled or performed and if Tenant in good faith commences to fulfill or perform same within said thirty (30) day period, but due to the nature of same it could not be reasonably fulfilled or performed within said thirty (30) day period exercising due diligence, an Event of Default shall not be deemed to have occurred if Tenant is then diligently pursuing the fulfillment or performance of the covenant, agreement or obligation and shall thereafter continuously and diligently proceed therewith until completion.

Section 15.02 Remedies.

(a) If an Event of Default occurs under this Lease, as hereinabove provided, then, Landlord shall have the right to elect any of the following remedies to the extent permitted by applicable law, immediately and without further written notice (except as required to be delivered to a Leasehold Mortgagee pursuant to the terms of this Lease): (i) to seek an award for the unpaid Rent for which Tenant is in default, with or without entering into possession or terminating this Lease, (ii) to terminate this Lease and to enter into and upon the Premises and take possession of the Premises by any lawful means, and pursue the remedies set forth below in this Section and/or (iii) to pursue any other remedies which may be available under this Lease, at law, or in equity; provided, however, that notwithstanding the foregoing, Landlord shall not have the right to terminate this Lease or enter upon and take possession of the Premises from Tenant following the occurrence of an Event of Default unless such Event of Default shall continue for an additional period of thirty (30) calendar days after delivery to Tenant of an additional written notice of default prominently marked on both the notice itself and on the outside of the envelope containing the notice with the legend "SECOND DEFAULT NOTICE - FAILURE TO CURE WITHIN THIRTY (30) CALENDAR DAYS MAY RESULT IN TERMINATION OF LEASE."

In the event that an Event of Default occurs and Landlord elects to terminate this Lease in accordance with the terms of this Section 15.02(a), then Landlord may recover from Tenant: (A) the worth at the

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time of award of any unpaid rent which had been earned at the time of the termination, plus (B) the worth at the time of award of the amount by which the unpaid rent which would have been earned after termination until the time of award exceeds the amount of such rental loss that Tenant proves could have been reasonably avoided, plus (C) the worth at the time of award of the amount by which the unpaid rent for the balance of the Term after the time of award exceeds the amount of such rental loss that Tenant proves could be reasonably avoided, plus (D) any other amounts necessary to compensate Landlord for all the detriment proximately caused by Tenant's failure to perform its obligations under this Lease or which, in the ordinary course of things, would be likely to result therefrom.

As used in subparagraphs (A) and (B) above, the "worth at the time of award" is computed by allowing interest at a rate equal to the lesser of five (5%) per annum or the maximum legal rate. As used in subparagraph (C) above, the "worth at the time of award" is computed by discounting such amount at the discount rate of the Federal Reserve Bank of San Francisco at the time of award plus one percent (1%).

(b) In the event that an Event of Default occurs and Landlord does not elect to terminate this Lease, Landlord may pursue one or more of the following remedies: (i) exercise self-help to cure the Event of Default, whereupon notwithstanding anything in this Lease to the contrary, Landlord, and its agents, employees, representatives, and contractors, may enter the Premises upon at least ten (10) days prior written notice (except in the case of emergency in which case only reasonable notice under the circumstances shall be required) and pursue such cure, and Tenant shall reimburse Landlord the reasonable and actual costs to cure such Event of Default within thirty (30) days after receipt of invoice and reasonable supporting documentation, (ii) seek any available equitable remedies, including without limitation, injunctive relief and specific performance, and (iii) sue Tenant for collection of past due sums and any Interest owed by Tenant to Landlord hereunder. Landlord hereby waives its right to seek any other remedy.

Section 15.03 General. No course of dealing between Landlord and Tenant or any failure or delay on the part of Landlord in exercising any rights of Landlord under Section 15.02 hereof or under any other provisions of this Lease shall operate as a waiver of any rights of Landlord under this Lease, nor shall any waiver of an Event of Default on one occasion operate as a waiver of any subsequent Event of Default or of any other Event of Default. No express waiver shall affect any condition, covenant, rule, or regulation other than the one specified in such waiver and that one only for the time and in the manner specifically stated. The exercise by Landlord of any one or more of the rights and remedies provided in this Lease shall not prevent the subsequent exercise by Landlord of any one or more of the other rights and remedies herein provided.

## ARTICLE XVI. CONDEMNATION

Section 16.01 Total Condemnation. If, during the Term, all or such portion of the Premises as renders the remaining portion thereof to be of substantially no commercial value for the conduct of the Permitted Business (as reasonably determined by Tenant), is condemned or taken by the United States or any other legal entity having the power of eminent domain with respect thereto, or is transferred to the United States or such entity in lieu thereof, this Lease shall terminate as of the date that title to the Premises or portion thereof vests in such condemning authority; provided, however, that such termination shall be without prejudice to the rights of either Landlord or Tenant to recover just and adequate compensation from the condemning authority.

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Section 16.02 Partial Condemnation. If, during the Term, any portion of the Premises is condemned or taken by the United States or any other legal entity having the power of eminent domain with respect thereto, or is transferred to the United States or such entity in lieu thereof, and the remaining portion of the Premises can be adapted and economically operated for the conduct of the Permitted Business in substantially the same manner as it was operated prior thereto (as reasonably determined by Tenant), then (i) this Lease shall terminate only as to the portion of the Premises so condemned or taken as of the date that title to such portion of the Premises vests in such condemning authority (provided, however, that such termination shall be without prejudice to the rights of either Landlord or Tenant to recover just and adequate compensation from the condemning authority) and Fixed Rent shall be equitably abated, and (ii) except with respect to the last fifteen (15) years of the Term as set forth below, this Lease will not terminate as to the portion of the Premises not condemned, and Tenant shall forthwith cause the Improvements to be restored, at Tenant's sole cost and expense, to as nearly the same architectural condition and character as that which existed prior to such taking. Tenant shall commence such restoration promptly following the taking and shall thereafter diligently and continuously prosecute same to completion. Tenant shall not be entitled to an abatement of any other payments or amounts due to Landlord under this Lease during any such period of restoration. In the event such partial condemnation does not satisfy the foregoing conditions or occurs within the last fifteen (15) years of the Term, Tenant shall have the right, at its election and in lieu of fulfilling its obligations under this Section 16.02, to terminate this Lease by providing thirty (30) days prior written notice of such termination to Landlord, on or before the date ninety (90) days after such partial condemnation is finalized, and satisfaction of the following conditions: (a) by paying to Landlord, on the effective date of such termination, a sum equal to all amounts and payments under this Lease due from Tenant to Landlord through such date (if any), (b) by releasing to Landlord all of the right and interest of Tenant in and to any condemnation award made in connection with such condemnation proceeding, and (c) by surrendering the Premises to Landlord on the effective date of such termination.

Section 16.03 Awards.

(a) If this Lease is terminated in its entirety pursuant to Section 16.01 or Section 16.02 on account of any condemnation: (i) Landlord and Tenant hereby agree to petition the court in such condemnation proceeding to make separate awards to Landlord and Tenant, if said separate awards are not prohibited by law, in accordance with the principles of division set forth in Section 16.03(b) hereof, and (ii) if the court in such condemnation proceeding is prohibited by law from making separate awards to Landlord and Tenant or declines to do so, the award shall be divided between Landlord and Tenant in accordance with the principles of division set forth in Section 16.03(b) hereof.

(b) (i) Landlord shall receive an amount equal to the then present value of Landlord's reversionary interest in the Premises calculated as if the Premises had not been condemned and this Lease had not been terminated on account of such condemnation, (ii) Tenant shall receive an amount equal to the value of Tenant's leasehold estate hereunder, including the right to use and occupy the Premises for the remainder of the Term, calculated as if the Premises had not been condemned and this Lease had not been terminated on account of such condemnation, including the value of the Improvements, and (iii) to the extent any portion of the award remains

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after the application of (i) and (ii) above, the remainder of the award shall be divided between Landlord and Tenant in proportion to the awards given in (i) and (ii) above.

(c) If this Lease is not terminated in its entirety pursuant to Section 16.01 or Section 16.02 on account of any condemnation: (i) Landlord and Tenant hereby agree to petition the court in such condemnation proceeding to make separate awards to Landlord and Tenant, if said separate awards are not prohibited by law, in accordance with the principles of division set forth in Section 16.03(d) hereof, and (ii) if the court in such condemnation proceeding is prohibited by law from making separate awards to Landlord and Tenant or declines to do, the award shall be divided between Landlord and Tenant in accordance with the principles of division set forth in Section 16.03(d) hereof.

(d) (i) Landlord shall receive an amount equal to the then present value of Landlord's reversionary interest of such portion of the Premises condemned, calculated as if the Premises had not been condemned and this Lease had not been terminated with respect to such portion of the Premises on account of such condemnation, (ii) Tenant shall receive an amount equal to the value of Tenant's leasehold estate with respect to such portion of the Premises condemned, including the right to use and occupy such portion of the Premises for the remainder of the Term, calculated as if such portion of the Premises had not been condemned and this Lease had not been terminated on account of such condemnation, including the then current value of any Improvements condemned, and (iii) to the extent any portion of the award remains after the application of (i) and (ii) above, the remainder of the award shall be divided between Landlord and Tenant in proportion to the awards given in (i) and (ii) above.

(e) If a court is prohibited by law from making separate awards to Landlord and Tenant or declines to do so, and if Landlord and Tenant cannot agree on the allocation of the award, and if such inability to agree continues for thirty (30) days after the amount of the award is determined, Landlord and Tenant agree that the determination of such allocation will be made in accordance with the following procedure. Landlord and Tenant will each promptly appoint one (1) appraiser. Those two (2) appraisers will promptly appoint a third (3rd) appraiser. Each appraiser appointed will be a member of the American Institute of Real Estate Appraisers (or successor organization) with an MAI designation and having at least ten (10) years' experience in appraisal of real estate for commercial use in the County. If such appraisers fail to appoint such third (3rd) appraiser within thirty (30) days after notice of their appointment, then either Landlord or Tenant, upon notice to the other, may request the appointment of a third (3rd) appraiser pursuant to California Code of Civil Procedure Section 1281.6 (or a successor statute). The three (3) appraisers so appointed will jointly make the required allocation of the award, based on their determinations of the loss and/or damage incurred by Landlord and Tenant, and if they cannot agree, the determination of the third (3rd) appraiser will be accepted by Landlord and Tenant. If, after notice by either Landlord or Tenant of the appointment of an appraiser by the party giving such notice, the other party to whom such notice is given shall fail, within a period of ten (10) days after such notice, to appoint an appraiser, then the appraiser so appointed by the party giving the notice will have the power to proceed as sole appraiser to make the determination and allocation hereunder. Landlord will pay the fees and expenses of the person appointed by Landlord as an appraiser hereunder, Tenant will pay the fees and expenses of the person appointed by Tenant as an appraiser hereunder, and Landlord and Tenant will each pay one-half (1/2) of the fees and expenses of the third (3rd) appraiser appointed pursuant to the provisions of this Section 16.03(e).

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Section 16.04 General.

(a) Notwithstanding anything contained in this Lease to the contrary, neither Landlord nor Tenant shall be prohibited from introducing into any condemnation proceeding or proceedings with respect to the Premises such appraisals or other estimates of value, loss and/or damage as each may in its discretion determine. Tenant shall be entitled to claim in any condemnation proceedings such award as may be allowed for relocation costs or other consequential damages. At Tenant's direction, any condemnation award to which Tenant is entitled will be paid directly to Leasehold Mortgagee. Any such payment to Leasehold Mortgagee shall be disbursed as required by this Lease to restore the Improvements pursuant to such usual and customary safeguards customarily used by Institutional Lenders to assure the completion of and payment for the reconstruction of improvements.

(b) In the event of any condemnation during the Term, the rights and obligations of Landlord and Tenant with respect to such condemnation and any award in connection therewith shall be as provided in this Article XVI. Landlord and Tenant hereby waive the provisions of California Code of Civil Procedure Section 1265.110 *et seq.* (or any successor statute) concerning the right to terminate this Lease or the right to any suspension, diminution, abatement or reduction of rent upon such condemnation.

Section 16.05 Taking for Temporary Use. If there is a temporary taking of a non-material portion of the Premises (as reasonably determined by Tenant), each party shall give prompt notice thereof to the other, and the Term shall not be reduced or affected in any way (it being agreed that a temporary taking shall be a taking for a period of less than six (6) months occurring during the last two (2) years of the Term and otherwise for a period of less than eighteen (18) months). In such case, Tenant shall continue to pay any sums and charges provided to be paid by Tenant hereunder. Tenant shall be entitled to the entire award for such taking (whether paid by way of damages, rent or otherwise) unless the period of occupation and use by the condemning authority shall extend beyond the date of expiration of the Term, in which case the award made for such taking shall be apportioned between Landlord and Tenant as of the date of such expiration. In any proceeding for such temporary taking, Landlord shall have the right to intervene and participate, but no award or settlement shall be made without Tenant's written approval; provided that if such intervention shall not be permitted, Tenant shall, at Tenant's expense, consult with Landlord, its attorneys and experts, and shall cooperate with Landlord in the prosecution or defense of such proceeding. At the termination of any such use or occupation of the Premises, Tenant will, at its sole cost, repair and restore the Improvements then upon the Premises to the condition, as nearly as may be reasonably possible, in which such Improvements were at the time of such taking. Tenant shall not be required to make such repairs and restoration if the Term shall expire prior to the date of termination of the temporary taking, and in any such event, Landlord shall be entitled to recover all damages and awards arising out of the failure of the condemning authority to repair and restore the Improvements at the expiration of such temporary taking. Any recovery or sum received by Tenant as an award or compensation for physical damage to the Premises caused by and during the temporary taking shall be used to the extent necessary for the purpose of repairing or restoring such damage as required hereinabove.

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## ARTICLE XVII. BROKERAGE PROVISIONS

Section 17.01 Brokers. Landlord and Tenant each represent and warrant that it has not engaged any broker, commission agent, real estate agent or salesman other than CBRE, Inc. ("**Broker**") to assist in the negotiation of this Lease, its procurement or in the procurement of Landlord or Tenant. Other than Broker, who will be compensated by Tenant pursuant to the terms of a separate agreement, no person, firm, corporation or other entity is or shall be entitled to the payment of any fee, commission, compensation or other form of remuneration in connection herewith in any manner. Landlord shall and does hereby indemnify and agree to hold Tenant harmless from and against any claims, demands, actions and judgments of any and all brokers, agents and other intermediaries alleging a commission, fee or other payment to be owing by reason of Landlord's dealings, negotiations or communications in connection with this Lease or the demise of the Premises. Likewise, Tenant shall and does hereby indemnify and agree to hold Landlord harmless from and against any claims, demands, actions and judgments of any and all brokers, agents and other intermediaries (other than Broker) alleging a commission, fee or other payment to be owing by reason of Tenant's dealings, negotiations or communications in connection with this Lease or the demise of the Premises or the management, subleasing, or development of the Premises during the Term of this Lease (including, without limitation, any brokers, agents, or intermediaries alleging a commission, fee or other payment arising from representation of prospective or actual subtenants, assignees, licensees, users, or occupants of the Premises). The terms of this Section 17.01 shall survive any termination of this Lease.

## ARTICLE XVIII. MISCELLANEOUS

Section 18.01 Right of Tenant to Grant Easements; Joinder by Landlord. Tenant shall not be entitled to grant easements with respect to the Premises without Landlord's prior written consent, which consent shall not be unreasonably withheld, delayed or conditioned. Landlord hereby acknowledges and agrees that as part of the development and continued operation of the Premises, certain easements will be necessary and Landlord agrees to cooperate in good faith with Tenant with respect to any such easements and execute any such easements which are necessary for the development and continued operation of the Premises (and to provide any reasonably requested subordinations thereof). Tenant shall submit its request for additional easements in writing to Landlord. Landlord shall have a period of fifteen (15) business days following receipt of such written notice within which to notify Tenant in writing that Landlord elects either (a) to deny Tenant's request for such additional easements, including Landlord's reasons for such denial, or (b) to allow such easements. If Landlord fails to notify Tenant in writing of such election within the fifteen (15) business day period described above, Tenant may give Landlord an additional written notice requesting such easements (which additional written notice shall contain a statement that in the event the proposed easements are not approved or disapproved by Landlord in writing to Tenant within five (5) business days following receipt of such additional written notice, the proposed easements shall be deemed approved), and the failure of Landlord to notify Tenant in writing of such election (and in the case of disapproval, stating in detail the reasons for such disapproval) within five (5) business days after receipt of such additional written notice shall be deemed approval of such easements by Landlord. In the event that Tenant is required by the applicable governmental authority to dedicate any portion of the Premises for use as public right-of-way in connection with the development of the Premises, Landlord agrees to cooperate with Tenant in good faith with respect to such dedication provided, however, that Landlord shall have

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the right to participate in the negotiations with such governmental authority regarding such dedication and the timing thereof. Landlord shall have the right to disapprove such dedication should same present a conflict with Landlord's public purposes, in Landlord's reasonable discretion.

Section 18.02 No Waiver. Failure of Landlord or Tenant to insist upon the strict performance by the other party of any term, condition or covenant on such other party's part to be performed pursuant to the terms of this Lease or to exercise any option, right, power, or remedy contained in this Lease shall not be or be deemed to be a waiver of such performance or relinquishment of such right now or at any time subsequent hereto. The receipt by Landlord of any sums required to be paid by Tenant hereunder with knowledge of any Event of Default by Tenant shall not be or be deemed to be a waiver of such Event of Default. No waiver by Landlord or Tenant of any provision of this Lease shall be or be deemed to have been made unless expressed in writing and signed by Landlord or Tenant, as the case may be.

Section 18.03 Estoppel Certificates. On or before the date thirty (30) days after receipt of written request of Landlord from time to time, Tenant shall execute, acknowledge and deliver to Landlord and to any mortgagee of or prospective purchaser from Landlord, a written certificate certifying (i) that this Lease is unmodified and in full force and effect (or if there have been modifications, that this Lease is in full force and effect as modified, and stating the modifications), (ii) that no notice has been received by Tenant of and Tenant has no knowledge of any default or Event of Default by Tenant hereunder or any default by Landlord hereunder which has not been cured, except as to any default or Event of Default specified in said certificate (or stating any defaults or Events of Default), and (iii) any other matters or state of facts regarding the Lease which are reasonably requested by Landlord.

On or before the date thirty (30) days after receipt of written request of Tenant from time to time, Landlord shall execute, acknowledge and deliver to Tenant and any party designated by Tenant a written certificate certifying (i) that this Lease is unmodified and in full force and effect (or if there have been modifications, that this Lease is in full force and effect as modified, and stating the modifications), (ii) whether or not, to the knowledge of Landlord, a default or Event of Default by Tenant has occurred under this Lease which has not been cured (and if so, specifying the same), and (iii) any other matters or state of facts regarding the Lease which are reasonably requested by Tenant.

Section 18.04 No Merger of Title. No merger of the leasehold estate created by this Lease with the fee estate of Landlord shall occur notwithstanding the fact that the same person may own or hold both the leasehold estate created by this Lease or any interest therein and the fee estate in the Premises or any interest therein. No such merger shall occur unless and until all persons or entities (including any mortgagee with respect to the fee estate of Landlord and any Leasehold Mortgagee) having any interest in the leasehold estate created by this Lease or the fee estate in the Premises shall join in a written instrument effecting such merger and shall duly record the same or the same person or entity owns and holds all interests in the fee estate of the Premises and the leasehold estates created by this Lease.

Section 18.05 Quiet Enjoyment; No Change in Entitlements. If and so long as Tenant shall pay, when due, all sums reserved or payable under this Lease and shall comply with all terms,

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conditions and covenants and other obligations required to be observed by Tenant under this Lease, Landlord covenants that Tenant will have the peaceful and quiet occupation and enjoyment of the Premises; provided, however, that this Section 18.05 shall not abrogate or diminish, in any way, the approval and inspection rights or other rights or benefits granted Landlord under this Lease. Without the prior written consent of Tenant, which consent may be withheld in Tenant's sole discretion, Landlord shall not initiate, join in or consent to any change in the Entitlements (as defined in the Option Agreement) which affect the Premises.

Section 18.06 Transfer by Tenant. Except for a Foreclosure, in the event Tenant shall transfer or assign or otherwise dispose of all or any portion of its interest in the Premises or in this Lease, in accordance with the terms and conditions of this Lease, Tenant shall thereupon be released and discharged from any and all liabilities and obligations under this Lease (except those accruing prior to such transfer, assignment or other disposition) with respect to the portion or interest transferred, assigned or otherwise disposed of, and such liabilities and obligations thereafter accruing shall be binding upon the assignee of Tenant's interest under this Lease with respect to the portion or interest transferred, assigned or otherwise disposed of.

Section 18.07 Transfer by Landlord. In the event that Landlord shall sell, assign or transfer this Lease, or otherwise dispose of its interest in the Premises, Landlord shall thereupon be released and discharged from any and all liabilities and obligations under this Lease (except those accruing prior to such transfer, assignment or other disposition) and such liabilities and obligations thereafter accruing shall be binding upon the assignee of Landlord's interest under this Lease.

Section 18.08 No Fee Mortgages. Any provision, term or condition of this Lease which is or which may appear to be to the contrary notwithstanding, Landlord shall not pledge, collaterally assign or mortgage Landlord's fee simple title in and to the Premises or this Lease or Landlord's reversionary right to the Improvements.

Section 18.09 Separability. Each and every covenant and agreement contained in this Lease shall be for any and all purposes hereof construed as separate and independent, and the breach of any covenant by Landlord shall not discharge or relieve Tenant from its obligation to perform each and every covenant and agreement to be performed by Tenant under this Lease. All rights, powers and remedies provided herein may be exercised only to the extent that the exercise thereof does not violate applicable law and shall be limited to the extent necessary to render this Lease valid and enforceable. If any term, provision or covenant of this Lease or the application thereof to any person or circumstance shall be held to be invalid, illegal or unenforceable, by a court of last resort having jurisdiction in the Premises, the validity of the remainder of this Lease shall not be affected, this Lease shall not terminate, and there shall be substituted for such illegal, invalid or unenforceable provision a like provision which is legal, valid and enforceable within the limits established by such court's final opinion and which most nearly accomplishes and reflects the original intention of the parties.

Section 18.10 Notices, Demands and Other Instruments; Notices to Leasehold Mortgagees. All notices, demands, requests, consents, and approvals desired, necessary, required or permitted to be given pursuant to the terms of this Lease shall be in writing and shall be deemed to have been properly given if personally delivered (including delivery by courier or by Federal

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Express or similar overnight delivery service) or sent, postage prepaid, by first class registered or certified United States mail, return receipt requested, or transmitted by electronic mail and addressed to each party hereto at the following address:

Landlord:

North County Transit District
810 Mission Avenue
Oceanside, CA 92054
Attention: Real Estate Department, Tracey Foster
Email: tfoster@nctd.org

with a copy to:

North County Transit District
810 Mission Avenue
Oceanside, CA 92054
Attention: Legal Department, Lori Winfree
Email: lwinfree@nctd.org

Tenant:

c/o Toll Bros., Inc.
1140 Virginia Drive
Fort Washington, PA 19034
Attention: Yolanda Rodriguez, Esq., Chief Transactional Counsel
Email: yrodriguez2@tollbrothers.com

c/o Toll Bros., Inc.
1140 Virginia Drive
Fort Washington, PA 19034
Attention: Charles Elliott, Managing Director
Email: celliott@tollbrothers.com

with a copy to:

Jackson Tidus
2030 Main Street, 12th Floor
Irvine, CA 92614
Attention: Andrew P. Bernstein, Esq.
Email: abernstein@jacksontidus.law

or at such other address in the United States as Landlord or Tenant may from time to time designate by like notice. A notice shall be effective on the date of personal delivery if personally delivered before 5:00 p.m. Pacific time or otherwise on the day following personal delivery; or when received, if transmitted by electronic mail (e-mail) prior to 5:00 p.m. Pacific time or otherwise on the next business day, provided receipt of such transmission shall be confirmed by follow-up notice within forty-eight (48) hours by another method authorized herein; or two (2) business days following the date the notice is postmarked, if mailed; or on the day following delivery to the

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applicable overnight courier, if sent by overnight courier. Rejection or other refusal to accept or inability to deliver because of changed address of which no notice was given will not affect the date upon which a notice, demand, request or other communication is deemed given, delivered and received. Either party may change its notice address herein provided by delivering to the other party written notice of such changed address.

If Landlord shall have received from Tenant or from a Leasehold Mortgagee written notice in the manner provided in this Section 18.10, specifying the name and address of such Leasehold Mortgagee and requesting that Landlord give to such Leasehold Mortgagee a copy of each notice of default or Event of Default at the same time as and whenever any such notice of default or Event of Default shall thereafter be given by Landlord to Tenant, then no notice or demand under this Lease will be effective as to any Leasehold Mortgagee until such written notice or demand is received by such Leasehold Mortgagee.

Section 18.11 Successors and Assigns. Each and every covenant, term, condition and obligation contained in this Lease shall apply to and be binding upon and inure to the benefit or detriment of the respective legal representatives, heirs, successors and permitted assigns of Landlord and Tenant. Whenever reference to the parties hereto is made in this Lease, such reference shall be deemed to include the legal representatives, successors, heirs and permitted assigns of said party the same as if in each case expressed.

Section 18.12 Headings. The headings to the various Articles and Sections of this Lease have been inserted for purposes of reference only and shall not limit or define or otherwise affect the express terms and provisions of this Lease.

Section 18.13 Counterparts. This Lease may be executed in any number of counterparts, each of which shall be an original, but all of which shall constitute one instrument. Electronically-transmitted signatures (including signatures delivered by electronic mail or generated using electronic signature technology (e.g., DocuSign or similar technology)) shall be deemed effective as originals, and such signatures shall, for purposes of validity, enforceability and admissibility, be deemed to be valid, binding and effective signatures of the parties so signing to the same effect as if such signing party signed and delivered a handwritten original signature.

Section 18.14 Applicable Law. This Lease shall be construed under and enforced in accordance with the laws of the State of California.

Section 18.15 Entire Agreement; Amendments. This Lease sets forth the entire understanding and agreement of Landlord and Tenant with respect to the subject matter of this Lease; all courses of dealing, usage of trade and all prior representations, promises, understandings and agreements, whether oral or written, are superseded by and merged into this Lease. No modification or amendment of this Lease shall be binding upon Landlord and Tenant, or either, unless in writing and fully executed by Landlord and Tenant.

Section 18.16 All Genders and Numbers Included. Whenever the singular or plural number, or masculine, feminine, or neuter gender is used in this Lease, it shall equally apply to, extend to, and include the other.

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Section 18.17 Relationship of the Parties. Nothing contained herein shall be deemed or construed by the parties hereto, or any third party, as creating the relationship of principal and agent or a partnership or joint venture between the parties hereto, it being understood and agreed that neither the method of computation of rent nor any other provision contained herein, nor any acts of the parties hereto, shall be deemed to create any relationship between the parties hereto other than the relationship of landlord and tenant.

Section 18.18 Force Majeure; Time Is of Essence. Whenever a period of time is prescribed in this Lease for action (other than the payment of money) to be taken by Landlord or Tenant, then Landlord or Tenant, as the case may be, shall not be liable or responsible for, and there shall be excluded from the computation of any such period of time, any delays caused by a Force Majeure Event (as defined below). For the purposes of this Lease, a "**Force Majeure Event**" shall mean any of the following: act of God, strike, lockout, moratorium on building, construction or planning approvals, restrictions due to pandemic or other public health crises, or governmental orders related thereto, or other restrictive governmental laws or regulations which prohibit or effectively prohibit performance, or any other cause except financial inability not the fault of the party required to perform the act. Except as provided in this Section 18.18, time is declared to be of the essence of this Lease.

Section 18.19 Recording of Memorandum of Lease. Landlord and Tenant hereby agree that this Lease shall not be recorded; provided, however, a memorandum incorporating the terms of this Lease (the "**Memorandum of Lease**") shall be executed and acknowledged by Landlord and Tenant in the form of Exhibit "F" attached hereto concurrently with their execution of this Lease. The Memorandum shall be recorded in the Official Records of the County.

Section 18.20 Inspection Rights. Tenant expressly acknowledges and agrees that Landlord has the right, but not the duty, at all times and from time to time, to enter upon the Premises and any portion thereof to determine to Landlord's reasonable satisfaction whether the terms, covenants and conditions of this Lease, including Tenant's performance obligations, are being kept and observed. Landlord agrees (i) to give written notice to Tenant at least three (3) business days prior to each entry, specifying the portions of the Premises Landlord desires to enter and the reasons for such entry, except in the event of an emergency in which event no notice is required, (ii) to conduct such visits in a manner which does not unreasonably interfere with the occupants of the Premises or violate any subleases in effect with respect to any such occupants, and (iii) to permit a representative of Tenant to accompany Landlord on such visits. Landlord will indemnify, defend and hold Tenant harmless from all costs, expenses and liabilities created as a result of such inspection and entry as provided in Section 11.02 of this Lease.

Section 18.21 Holding Over, No Extension, Tenancy at Sufferance and Double Rent. In the event Tenant shall hold the Premises after the expiration of the Term, without the express written consent of Landlord, such holding over shall be deemed to have created a tenancy at sufferance with respect to the portion of the Premises affected which shall be immediately terminable by Landlord, and in the event that Landlord shall elect to accept any rental or other payment from Tenant, Tenant shall pay to Landlord, in addition to any amounts otherwise due and owing from Tenant under this Agreement, and without waiving any of Landlord's rights or remedies under this Lease, or in equity or at law, a monthly rent payment equal to one hundred fifty percent (150%) of the monthly Fixed Rent amount applicable to the last month of the Term.

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Section 18.22 Schedules and Exhibits. Schedule "1" and Exhibits "A", "B", "C", "D", "E", "F", and "G" attached hereto are hereby incorporated by reference and made a part of this Lease.

Section 18.23 Mediation; Judicial Reference.

(a) Mediation. Before commencing any action or proceeding with respect to any disagreement, controversy or dispute arising under this Lease (a "**Dispute**"), the parties shall first attempt to settle the Dispute through consultation and negotiation in good faith and in a spirit of mutual cooperation. If the Dispute is not resolved within ten (10) business days, either party may elect to escalate the resolution of such Dispute by submitting the Dispute in writing to senior executives from each party who will promptly meet and confer telephonically or by video conference in an effort to resolve the Dispute. Each party will identify such senior executive by notice to the other party, and each party may change its senior executive at any time thereafter by notice. Any mutually agreed decisions reduced to writing of the senior executives and fully executed and delivered will be final and binding on both parties. In the event the senior executives are unable to resolve any Dispute within ten (10) business days after submission to them, either party may then refer such Dispute to mediation by a mutually acceptable mediator to be chosen by both parties within ten (10) business days after written notice by either party demanding mediation. Neither party may unreasonably withhold, delay or condition consent to the selection of a mediator. If the parties are unable to agree on a mediator, the mediation will be referred to JAMS and the selection of a mediator will be made by JAMS in accordance with its rules for selecting mediators, or if JAMS no longer exists, then the selection of a mediator will be made by the American Arbitration Association or other similar mediation/arbitration entity reasonably acceptable to the parties. All communications and discussions in furtherance of this paragraph shall be treated as confidential settlement negotiations that are not subject to disclosure to any third party. The costs of the mediator shall be shared equally, but each party shall pay its own attorney's fees. The mediation shall be concluded within ninety (90) days after the mediation begins unless the parties mutually agree to extend the mediation period. The cumulative time periods set forth in this Section 18.23(a) utilized by the parties to attempt to resolve a Dispute are referred to herein as the "**Dispute Resolution Period**." To the extent that any Dispute is not resolved during the Dispute Resolution Period despite the good faith efforts of the parties, then the parties may pursue any and all available rights and remedies (subject to the terms of this Lease, including without limitation Section 18.23(b) below).

(b) Judicial Reference. The parties agree that any Disputes between them arising out of, related to or in connection with this Lease or any other document relating to the subject matter of this Lease that are not resolved pursuant to Section 18.23(a) above shall be heard and resolved by a referee under the provisions of the California Code of Civil Procedure, Sections 638 – 645.1, inclusive (as the same may be amended, or any successor statute(s) thereto) (the "**Referee Sections**"). Any fee to initiate the judicial reference proceedings shall be paid by the party initiating such procedure; provided however, that the costs and fees, including any initiation fee, of such proceeding shall ultimately be borne in accordance with Section 18.23(b)(ii) below. The venue of the proceedings shall be in the County.

(i) Appointment of Referee(s). Within ten (10) days after receipt by any party of a written request to resolve any Dispute or controversy pursuant to this Section 18.23(b), the parties shall agree upon a single referee who shall try all issues, whether of fact or

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law, and report a finding and judgment on such issues as required by the Referee Sections. If the parties are unable to agree upon a referee within such 10-day period, then any party may thereafter file a lawsuit in the County for the purpose of appointment of a referee under California Code of Civil Procedure Sections 639 and 640, as the same may be amended or any successor statute(s) thereto. If the referee is appointed by the court, the referee shall be a neutral and impartial retired judge with substantial experience in the relevant matters to be determined, from Jams/Endispute, Inc., the American Arbitration Association or similar mediation/arbitration entity. The proposed referee may be challenged by any party for any of the grounds listed in Section 641 of the California Code of Civil Procedure, as the same may be amended or any successor statute(s) thereto.

(ii) Powers of Referee. The referee shall have the power to decide all issues of fact and law and report his or her decision on such issues, and to issue all recognized remedies available at law or in equity for any cause of action that is before the referee, including an award of attorneys' fees and costs in accordance with California law. The referee shall not, however, have the power to award punitive damages, nor any other damages which are not permitted by the express provisions of this Lease, and the parties hereby waive any right to recover any such damages. The referee shall oversee discovery and may enforce all discovery orders in the same manner as any trial court judge, with rights to regulate discovery and to issue and enforce subpoenas, protective orders and other limitations on discovery available under California law; provided, however, that the referee shall limit discovery to that which is essential to the effective prosecution or defense of the action, and in no event shall discovery by either party include more than one non-expert witness deposition unless both parties otherwise agree.

(iii) Conduct of Proceeding. The reference proceeding shall be conducted in accordance with California law (including the rules of evidence), and in all regards, the referee shall follow California law applicable at the time of the reference proceeding. In accordance with Section 644 of the California Code of Civil Procedure, the decision of the referee upon the whole issue must stand as the decision of the court, and upon the filing of the statement of decision with the clerk of the court, or with the judge if there is no clerk, judgment may be entered thereon in the same manner as if the action had been tried by the court.

(iv) Cooperation. The parties shall promptly and diligently cooperate with one another and the referee, and shall perform such acts as may be necessary to obtain a prompt and expeditious resolution of the Dispute in accordance with the terms of this Section 18.23(b). To the extent that no pending lawsuit has been filed to obtain the appointment of a referee, any party, after the issuance of the decision of the referee, may apply to the court of the County for confirmation by the court of the decision of the referee in the same manner as a petition for confirmation of an arbitration award pursuant to Code of Civil Procedure Section 1285 et seq. (as the same may be amended or any successor statute(s) thereto).

Section 18.24 Cooperation. Landlord and Tenant agree to cooperate in good faith with respect to the Premises and this Lease. Landlord and Tenant agree to execute such instruments and documents (including without limitation, any permit, application, subdivision plat, subdivision improvement or dedication agreement or other document) and to diligently undertake such actions as may be reasonably necessary or desirable to complete the development, maintenance, repair and

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operation of the Premises as contemplated by this Lease (but subject to the provisions of this Lease expressly pertaining thereto).

Section 18.25 Modification. If any Institutional Lender or Institutional Investor requires, as a condition of their investment, loan or other participation in the Site, that changes be made to this Lease, Landlord agrees to work with Tenant in good faith to consider such requests.

Section 18.26 Civil Code Section 1938. Pursuant to California Civil Code Section 1938, Landlord hereby advises Tenant that, as of the Effective Date, the Premises have not been inspected by a Certified Access Specialist, as that term is defined in California Civil Code Section 55.52(a)(3). The following statement is required by California Civil Code Section 1938: "A Certified Access Specialist (CASp) can inspect the subject premises and determine whether the subject premises comply with all of the applicable construction-related accessibility standards under state law. Although state law does not require a CASp inspection of the subject premises, the commercial property owner or lessor may not prohibit the lessee or tenant from obtaining a CASp inspection of the subject premises for the occupancy or potential occupancy of the lessee or tenant, if requested by the lessee or tenant. The parties shall mutually agree on the arrangements for the time and manner of the CASp inspection, the payment of the fee for the CASp inspection, and the cost of making any repairs necessary to correct violations of construction-related accessibility standards within the premises."

***(Signatures Appear On The Following Page)***

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IN WITNESS WHEREOF, Landlord and Tenant have executed this Lease as of the Effective Date.

**LANDLORD**:

**NORTH COUNTY TRANSIT DISTRICT**,
a public agency

By: _____
Printed Name: _____
Title: _____

Approved as to form:

_____
_____

**TENANT**:

_____,
a _____

By: _____
Printed Name: _____
Title: _____

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**SCHEDULE "1"**

Fixed Rent Schedule

[To be attached.]

**[*Note: The Fixed Rent schedule will provide for Fixed Rent increases commencing on the first day of year six (6) of the Term and on every fifth (5th) anniversary thereafter (i.e., years 11, 16, 21, 26, 31, etc.), based on compounded 2.5% annual increases, as applied to the then-current Fixed Rent*.]**

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# EXHIBIT "A"

Legal Description of the Site

[To be attached.]

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# EXHIBIT "B"

RESERVED

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**EXHIBIT "C"**

Plat of the Site

[To be attached.]

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# EXHIBIT "D"

Prohibited Uses

**1.** Any use which is a public or private nuisance;

**2.** Funeral parlor, mortuary or funeral home;

**3.** Industrial, manufacturing, assembling, distilling, refining, smelting, agricultural or mining use;

**4.** Adult bookstore, adult video tape store or other similar store or establishment selling or exhibiting obscene material;

**5.** Massage parlor, "strip club", "nude dance club", "semi-nude dance club" or other similar club or establishment;

**6.** Flea market, pawn shop, amusement gallery, video game arcade, so-called "virtual reality" game or amusement establishments or game room (except for a game room/recreational facility as part of the Premises to serve only the residents, guests or occupants of the Premises);

**7.** Gambling facility or operation, including off-track or sports betting parlor, table games such as black-jack or poker, slot machines, video poker/black-jack machines or similar devices or a bingo hall, slot machines or video games;

**8.** Junk yard, dumping, disposal, incineration or reduction of garbage, sewage, dead animals or refuse;

**9.** Stockyard, slaughter of animals, livestock sales pavilion, or open farmers market (but this shall not prohibit a bona fide grocery store);

**10.** Sale of fire arms;

**11.** Car dealership or gasoline station;

**12.** Any use which produces or is accompanied by any unusual fire or explosive hazards (including the storage, display, sale or use of explosives or fireworks but excluding heating implements, HVAC systems, water heaters, grills, gas or wood burning or other flame grills used in accordance with applicable laws and otherwise in compliance with the terms of this Lease);

**13.** Any operation primarily used as a storage warehouse operation or any assembling, manufacturing, refining, smelting, industrial, drilling or mining operation or any distilling operation;

**14.** Church, synagogue, mosque or other house of worship (but this shall not prohibit a bona fide religious or spiritual bookstore); or

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**15.** Dry cleaner; provided that a chemical-free dry cleaning operation shall be permitted and any operation whose use of chemicals is performed off-site (*e.g.*, a "pick-up/drop-off only" location) shall be permitted.

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# EXHIBIT "E"

Legal Description of Landlord Parcel

[To be attached.]

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**EXHIBIT "F"**

Memorandum of Lease

RECORDING REQUESTED BY
AND WHEN RECORDED MAIL TO:

North County Transit District
810 Mission Avenue
Oceanside, CA 92054
Attention: Real Estate Department

With a copy to:

Toll Bros., Inc.
140 Virginia Drive
Fort Washington, PA 19034
Attention: Domingo G. Cruz, Esq.,
Vice President and Counsel

(Space above this line for Recorder's use)

**MEMORANDUM OF GROUND LEASE**

This Memorandum of Ground Lease (this "**Memorandum**") is entered into as of _____, 202_, by and between NORTH COUNTY TRANSIT DISTRICT, a public agency existing under the laws of the State of California, pursuant to California Public Utility Code Sections 125000, *et seq.* ("**Landlord**"), and _____, a _____("**Tenant**"), with reference to the following facts:

**RECITALS**

A. Landlord and Tenant have entered into that certain unrecorded Ground Lease dated as of _____, 202_ (the "**Lease**"). All capitalized terms used herein without definition shall have the same meanings as assigned in the Lease.

B. Landlord and Tenant desire to provide notice that Tenant is leasing as of the Effective Date all that certain real property in the City of Oceanside, County of San Diego, State of California more particularly described in Exhibit A attached hereto (the "**Premises**").

**NOW, THEREFORE**, in consideration of the mutual covenants set forth herein, Landlord and Tenant hereby agree as follows:

1. Demise of Premises. Landlord hereby leases to Tenant, and Tenant hereby leases from Landlord, the Premises, subject to the terms and conditions of the Lease. The Effective Date of

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the Lease occurred on _____, 202_, and the Term will end ninety-nine years after the Effective Date (the "**Lease Expiration Date**"), unless sooner terminated pursuant to the terms of the Lease.

2. Title to Improvements; Depreciation. Until the Lease expiration date or earlier termination of the Lease, title to any and all Improvements that Tenant may construct on the Premises, any and all fixtures that Tenant may install therein, and any and all alterations that Tenant may make thereto shall be solely Tenant's property, Tenant's interest therein shall be as owner and not as tenant and Tenant alone shall be entitled to depreciate the same for tax purposes. On the Lease expiration date, title to any Improvements located on the Premises, any and all fixtures that Tenant may install therein (other than trade fixtures) and any alterations thereto shall vest in and become the full and absolute property of Landlord.

3. Right of First Offer. The Lease contains a right of first offer in favor of Tenant regarding the sale or transfer of the Premises.

4. Incorporation by Reference; No Modification of Lease. The terms and conditions of the Lease are incorporated herein by this reference. This Memorandum is prepared and recorded for the purpose of putting the public on notice of the Lease, and this Memorandum in no way modifies the terms and conditions of the Lease. In the event of any inconsistency between the terms and conditions of this Memorandum and the terms and conditions of the Lease, the terms and conditions of the Lease shall control.

5. Miscellaneous. This Memorandum shall be governed by and construed in accordance with the laws of the State of California. No addition to or modification of any term hereof shall be effective unless set forth in writing and signed by Landlord and Tenant. All of the provisions of this Memorandum shall inure to the benefit of and shall be binding upon the successors and assigns of Landlord and Tenant. This Memorandum may be executed in two or more counterparts and by different parties in different counterparts, all of which together shall constitute one and the same original.

[***Signatures on following page***.]

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**IN WITNESS WHEREOF**, Landlord and Tenant have duly executed this Memorandum as of the date first written above.

**LANDLORD:**

**NORTH COUNTY TRANSIT DISTRICT**,
a public agency

By:_____
Print Name: _____
Title: _____

APPROVED AS TO FORM:

_____
_____

**TENANT:**

_____,
a _____

By:_____
Print Name: _____
Title: _____

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A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF .

On ___, _____, before me, _____
(here insert name and title of the officer)

personally appeared _____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

_____ (Seal)
Signature

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF .

On ___, _____, before me, _____
(here insert name and title of the officer)

personally appeared _____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

_____ (Seal)
Signature

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## EXHIBIT A TO MEMORANDUM OF GROUND LEASE

### Legal Description of Premises

The land referred to herein is situated in the City of Oceanside, County of San Diego, State of California, and described as follows:

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# EXHIBIT "G"

Tenant's Right of First Offer

1. If at any time, or from time to time, during the Term, Landlord shall desire to sell, lease, convey or otherwise transfer to a third party unrelated to Landlord all or a portion of its interest in the Premises or the Landlord Parcel (a "**Landlord ROFO Transfer**"), Landlord shall notify Tenant of its intention (the "**Landlord Right of First Offer Notice**"). The Landlord Right of First Offer Notice shall specify the property desired to be offered for sale, lease or transfer (the "**Landlord Sale Property**") and the economic terms and conditions under which Landlord is prepared to offer the Landlord Sale Property. Tenant shall have the right (the "**Tenant Right of First Offer**") to purchase or lease the Landlord Sale Property on the terms set forth in the Landlord Right of First Offer Notice by giving Landlord written notice of such exercise (the "**Tenant Right of First Offer Acceptance**") within ten (10) business days after receipt of the Landlord Right of First Offer Notice that Tenant has elected to purchase or lease the Landlord Sale Property, which shall include at a minimum an earnest money deposit of at least five percent (5%) of the purchase price to be deposited with a mutually acceptable escrow agent within ten days of delivery of the Tenant Right of First Offer Acceptance (the "**Tenant Deposit**"). If Tenant does not so notify Landlord within such time period, Landlord may give Tenant an additional written notice including a copy of the Landlord Right of First Offer Notice, and if Tenant does not notify Landlord in writing within five (5) days after receipt of such additional written notice that Tenant has elected to purchase or lease the Landlord Sale Property on the economic terms that are not substantially more favorable to purchaser than those set forth in the Landlord Right of First Offer Notice, such failure to notify shall be deemed to constitute Tenant's election not to purchase or lease, and Landlord may sell or convey or lease the Landlord Sale Property at any time within twelve (12) months of the Landlord Right of First Offer Notice at a price that equals or exceeds ninety five percent (95%) of the price contained in the Landlord Right of First Offer Notice, and substantially in accordance with the other economic terms and conditions set forth in the Landlord Right of First Offer Notice. If Tenant does not so notify Landlord within such time period that Tenant has elected to purchase or lease the Landlord Sale Property, and Landlord desires to sell, lease or convey the Landlord Sale Property at any time within twelve (12) months of the Landlord Right of First Offer Notice at a price that is less than ninety five percent (95%) of the price contained in the Landlord Right of First Offer Notice and on other economic terms and conditions that are not substantially more favorable to purchaser than those set forth in the Landlord Right of First Offer Notice, Landlord shall notify Tenant of the reduced price or such other material changes (the "**Landlord Reduced Price Notice**"), and Tenant shall have the right to purchase or lease the Landlord Sale Property at the reduced price and/or such other economic terms or conditions that are not substantially more favorable to purchaser than those set forth in the Landlord Right of First Offer Notice, by giving Landlord written notice of such exercise (which shall be deemed a "**Tenant Right of First Offer Acceptance**") within five (5) days after receipt of the Landlord Reduced Price Notice that Tenant has elected to purchase or lease the Landlord Sale Property.

2. If Tenant timely provides the Tenant Right of First Offer Acceptance as set forth in Section 1 of this Exhibit "G", and makes the Tenant Deposit, Landlord shall be bound to sell or lease and Tenant shall be bound to purchase or lease the Landlord Sale Property (except as provided in the following sentence) in accordance with the terms of the Landlord Right of First Offer Notice, and the consummation of the purchase and sale or lease (the "**Landlord ROFO**

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**Closing**") shall take place on the day thirty (30) days after Landlord's receipt of the Tenant Right of First Offer Acceptance. At the Landlord ROFO Closing, title to the Landlord Sale Property shall be conveyed or leased by grant deed, ground lease or other conveyance consistent with the terms of the Landlord Right of First Offer Notice in recordable form (if applicable) executed by Landlord, subject to the following matters: all title matters directly created or caused by or resulting from the acts or omissions of Tenant, anyone claiming under Tenant, or their respective agents or employees, all then existing service contracts, leases and subleases, and all matters of record as of the Landlord Right of First Offer Notice (collectively, the "**Landlord Title Matters**"); provided, however, Landlord shall deliver to Tenant a complete list of the service contracts, leases and subleases affecting the Landlord Sale Property, as applicable, together with the Landlord Right of First Offer Notice, and Landlord shall satisfy or cure all "Monetary Title Matters" (as hereinafter defined) at or prior to the Landlord ROFO Closing or, at the Landlord ROFO Closing, Tenant may pay such Monetary Title Matters and take a credit against the purchase price of the Landlord Sale Property equal to the amount thereof. "**Monetary Title Matters**" means mortgages, deeds of trust, mechanic's or materialmen's liens and all other monetary liens (other than the lien of Taxes not yet due and payable) and judgments and claims (except to the extent created by, caused by or resulting from the acts or omissions of Tenant, anyone claiming under Tenant, or their respective agents or employees). In the event any Monetary Title Matters are not cured prior to or at the Landlord ROFO Closing, Tenant will proceed with the Landlord ROFO Closing and pay the Monetary Title Matters and take a credit against the purchase price in the amount thereof (provided that the Monetary Title Matters amount to less than or equal to such purchase price). The other terms of the Landlord ROFO Closing and the payment of costs in connection therewith shall be in accordance with the customs and practices of real estate closings in the City, provided Tenant shall be responsible for any title policy costs for any title policy it obtains. If Tenant elects the Landlord Right of First Offer but then fails to timely close and perform its obligations as provided above, then (i) the Tenant Deposit shall be immediately delivered to Landlord as liquidated damages for Tenant's failure to so perform (the parties hereto agreeing that the Tenant Deposit is a reasonable amount as liquidated damages, that such amount constitutes liquidated damages and not a penalty and that the specific amount of damages in the event of Tenant's failure to close or breach would be difficult to ascertain), and (ii) for the next 12 month period, Tenant shall have no Landlord Right of First Offer hereunder and Landlord may undertake a Landlord ROFO Transfer at any price to any party without compliance with the terms of this Exhibit "G".

3. Except as expressly set forth in this Exhibit "G" to the contrary, Tenant's Right of First Offer shall apply to each and every Landlord ROFO Transfer. In the event that Tenant elects or is deemed to have elected not to purchase or lease the Landlord Sale Property pursuant to Paragraph 1 of this Exhibit "G", and Landlord fails to convey, sell, lease or otherwise transfer the Landlord Sale Property within twelve (12) months of such Landlord Right of First Offer Notice, at a price that equals or exceeds ninety five percent (95%) of the price contained in such Landlord Right of First Offer Notice and on other economic terms and conditions that are not substantially more favorable to purchaser than those set forth in the Landlord Right of First Offer Notice, Tenant's right of first offer under this Exhibit "G" shall be deemed to have been re-established with respect to such Landlord Sale Property.

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4. Notwithstanding anything set forth in this Exhibit "G" to the contrary, Tenant's Right of First Offer (i) shall be subject to applicable Laws, and (ii) shall not apply to any merger or change in control of Landlord or change in control of the functions of Landlord to another public entity.

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# EXHIBIT "H"

Approval Rights

1. Notwithstanding anything to the contrary herein, Tenant shall have the right to make any interior improvements, alterations, additions and modifications without Landlord's approval, and Tenant shall have no obligation to seek Landlord's approval for same. Landlord may request copies of Tenant's interior plans for the Initial Improvements, but such interior plans do not and will not constitute any portion of the Preliminary Plans or of the Proposed Plans or of the Plans (each as hereinafter defined), and Landlord has no right of approval with respect to such interior plans, including, without limitation, interior mechanical, electrical or other interior building systems plans.

2. In connection with the initial construction of improvements on any portion of the Premises (the "**Initial Improvements**"), Tenant shall submit to Landlord for approval a set of preliminary plans (the "**Proposed Preliminary Plans**") for the Initial Improvements indicating generally (i) the nature of the proposed construction, (ii) the location, shape and size of all buildings, and (iii) the locations of all exits, entrances, exterior way finding signs, exterior monument signs (but not other signs), drive-ways, walk-ways, and parking areas, as well as such other information as the Landlord may from time to time reasonably require. Landlord will not unreasonably withhold, condition or delay approval of the Proposed Preliminary Plans, and to the extent the same are consistent with the preliminary site plan and other details described on Exhibit H-1 (which Landlord has approved) [***Note: To be attached***], the same shall not be a cause for objection by Landlord. Landlord will approve or disapprove the Proposed Preliminary Plans in writing, stating the reasons in detail for any disapproval, on or before the date which is thirty (30) days after receipt by Landlord of the Proposed Preliminary Plans. Tenant will resubmit the Proposed Preliminary Plans to Landlord, as revised to reflect Landlord's comments (to the extent reasonable and consistent with the requirements herein), within ten (10) business days after receipt by Tenant of such comments, and Landlord will approve or disapprove such revised Proposed Preliminary Plans (Landlord's review on such resubmittal will be limited to those matters which Landlord most recently disapproved) within ten (10) days after receipt by Landlord of any revisions to the Proposed Preliminary Plans. If Landlord fails to notify Tenant in writing of the approval or disapproval of the Proposed Preliminary Plans or the revised Proposed Preliminary Plans, or fails in such written disapproval to state in detail the reasons for any disapproval, within the applicable period set forth above, Tenant may give Landlord an additional written notice requesting such approval (which additional written notice shall contain a statement in boldface capital letters that in the event the Proposed Preliminary Plans or revised Preliminary Plans are not approved or disapproved (including a statement in detail of the reasons for any disapproval) by Landlord in writing to Tenant within ten (10) days following receipt of such additional written notice, the Proposed Preliminary Plans shall be deemed approved), and the failure of Landlord to notify Tenant in writing of such election (and in the case of disapproval, stating in detail the reasons for such disapproval) within ten (10) days after such additional written notice shall be deemed

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approval of the Proposed Preliminary Plans. Notwithstanding anything to the contrary contained in this Lease, Landlord shall not object to any matters which do not relate to layout of the Site and the exterior design thereof, including, without limitation, the building height and the appearance and quality of material portions of building exteriors (collectively, the "**Design Factors**"). Landlord shall not object to matters if in order to satisfy the objection changes would be required which are inconsistent with the requirements of governmental statutes, laws, rules, orders, regulations, or ordinances affecting the Premises or any part thereof, or the use thereof. The Proposed Preliminary Plans which have been approved by Landlord are called the "**Preliminary Plans**" and will serve as the basis for the "Plans" (as hereinafter defined).

Following the approval of the Preliminary Plans, Tenant will submit to Landlord detailed design plans and outline specifications for the Initial Improvements ("**Proposed Plans**"). The Proposed Plans will be subject to the prior written approval of Landlord, which approval shall not be unreasonably withheld, conditioned or delayed so long as the same are consistent with the requirements of this Lease and the Preliminary Plans previously approved by Landlord (and shall be limited to approval of the Design Factors). Landlord shall not object to elements contained within the Proposed Plans if such elements were contained in the Preliminary Plans. Landlord shall not object to matters if in order to satisfy the objection changes would be required which are inconsistent with the requirements of governmental statutes, laws, rules, orders, regulations, or ordinances affecting the Premises or any part thereof, or the use thereof. The Proposed Plans must include, without limitation, site plans showing the location of the Initial Improvements, descriptions and plans showing the size, configuration, design, and proposed use of the Initial Improvements, including the location and design of all parking areas, driveways, exterior way finding signs, exterior monument signs (but not other signs), and all landscaped and other exterior areas, and such other information regarding the exterior design of the Initial Improvements as Landlord may reasonably request. The Proposed Plans also must include a general description of the kinds and types of materials to be used in connection with the construction of the Initial Improvements. Landlord will approve or disapprove the Proposed Plans in writing, stating the reasons in detail for any disapproval, on or before the date which is thirty (30) days after receipt by Landlord of the Proposed Plans. Tenant will resubmit the Proposed Plans to Landlord, as revised to reflect Landlord's comments (to the extent reasonable and consistent with the requirements herein), within ten (10) business days after receipt by Tenant of such comments, and Landlord will approve or disapprove such revised Proposed Plans (Landlord's review on such resubmittal will be limited to those matters which Landlord most recently disapproved) within ten (10) days after receipt by Landlord of any revisions to the Proposed Plans. If Landlord fails to notify Tenant in writing of the approval or disapproval of the Proposed Plans or the revised Proposed Plans, or fails in such written disapproval to state in detail the reasons for any disapproval, within the applicable period set forth above, Tenant may give Landlord an additional written notice requesting such approval (which additional written notice shall contain a statement in boldface capital letters that in the event the Proposed Plans or revised Proposed Plans are not approved or disapproved (including a statement in detail of the reasons for any disapproval) by Landlord in writing to Tenant within ten (10) days following receipt of such additional written notice, the Proposed Plans shall be deemed approved), and the failure of Landlord

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to notify Tenant in writing of such election (and in the case of disapproval, stating in detail the reasons for such disapproval) within ten (10) days after such additional written notice shall be deemed approval of the Proposed Plans. The Proposed Plans which have been approved by Landlord are called the "**Plans**". Following Landlord's approval of the Plans, Tenant shall develop and construct the Initial Improvements on the Premises so that the Initial Improvements are in conformance, in all material respects, with the Plans, provided, however, Tenant may modify or amend the same in its discretion so long as the same does not relate to the Design Factors.

From time to time after Landlord's approval of the Plans, Tenant may submit to Landlord proposed modifications to the Plans (if the same relates to the Design Factors). Landlord will not unreasonably withhold, condition or delay approval of such proposed modifications to the Plans. Landlord will approve or disapprove such proposed modifications in writing, stating the reasons in detail for any disapproval, on or before the date which is ten (10) business days after receipt by Landlord of such proposed modifications. Tenant will resubmit such proposed modifications to Landlord, as revised to reflect Landlord's comments (to the extent reasonable and consistent with the requirements herein), within ten (10) business days after receipt by Tenant of such comments, and Landlord will approve or disapprove such revised proposed modifications (Landlord's review on such resubmittal will be limited to those matters which Landlord most recently disapproved) within ten (10) business days after receipt by Landlord of such revised proposed modifications. If Landlord fails to notify Tenant in writing of the approval or disapproval of the Plans or the revised Plans, or fails in such written disapproval to state in detail the reasons for any disapproval, within the applicable period set forth above, Tenant may give Landlord an additional written notice requesting such approval (which additional written notice shall contain a statement in boldface capital letters that in the event the Plans or revised Plans are not approved or disapproved (including a statement in detail of the reasons for any disapproval) by Landlord in writing to Tenant within ten (10) days following receipt of such additional written notice, the Plans shall be deemed approved), and the failure of Landlord to notify Tenant in writing of such election (and in the case of disapproval, stating in detail the reasons for such disapproval) within ten (10) days after such additional written notice shall be deemed approval of the Plans. Landlord shall not object to matters if in order to satisfy the objection changes would be required which are inconsistent with the requirements of governmental statutes, laws, rules, orders, regulations, or ordinances affecting the Premises or any part thereof, or the use thereof.

If Landlord notifies Tenant of its disapproval, stating in reasonable detail the reason for such disapproval, of the Proposed Preliminary Plans or Proposed Plans, as the case may be, within the applicable period set forth above, for the limited scope as provided above, and the parties are unable to mutually resolve any differences within ten (10) business days, then, upon the written request of either party, each party shall submit its version of the Proposed Preliminary Plans or Proposed Plans to _____ [***Note: Parties to agree on and insert Independent Architect***] or such other independent third-party architect reasonably agreed to by Landlord and Tenant (i) who has not previously been employed by Tenant or Landlord or any affiliate of Tenant or Landlord, (ii) who is duly licensed (if

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applicable) by the State of California, and (iii) who has at least ten (10) years' experience in the design of additions, improvements or alterations similar to the additions, improvements or alterations set forth in the Proposed Preliminary Plans or Proposed Plans (the "**Independent Architect**") within three (3) business days after such written request. Within three (3) business days thereafter, as to the Proposed Preliminary Plans, the Independent Architect shall select either the Proposed Preliminary Plans submitted by Tenant or the Proposed Preliminary Plans submitted by Landlord, and as to the Proposed Plans, the Independent Architect shall select the Proposed Plans that most closely conform with the Preliminary Plans (with respect only to the limited scope of items subject to Landlord's approval provided above), and shall notify Landlord and Tenant in writing of such selection. The Independent Architect may not modify any Proposed Preliminary Plans or Proposed Plans submitted to it but shall be limited to selecting one of such submissions. The party whose Proposed Preliminary Plans or Proposed Plans were not selected by the Independent Architect shall pay the costs of the Independent Architect in making the selection required hereunder. The Proposed Preliminary Plans selected by the Independent Architect shall be binding upon both parties and shall constitute the "Proposed Plans", unless subsequently modified as provided above in this Exhibit "H". The Proposed Plans selected by the Independent Architect shall be binding upon both parties and shall constitute the "Plans", unless subsequently modified as provided above in this Exhibit "H".

3. In connection with any additions or improvements to or alterations of the Improvements requiring Landlord's approval of the plans therefor pursuant to Section 8.02 of this Lease (relating to the Design Factors), Tenant shall submit to Landlord for approval a set of preliminary plans (the "**Proposed Alteration Plans**") for such additions, improvements or alterations showing the size, configuration, design, and proposed use of such additions, improvements or alterations which relate to the Design Factors, if applicable, including a general description of the kinds and types of materials to be used in connection with the construction of such additions, improvements or alterations, and such other information regarding the design of such additions, improvements or alterations, as Landlord may reasonably request. Landlord will not unreasonably withhold, condition or delay approval of the Proposed Alteration Plans (and if the same do not relate to the Design Factors, do not require any Landlord consent or approval). Landlord will approve or disapprove the Proposed Alteration Plans in writing, stating the reasons in detail for any disapproval, on or before the date which is thirty (30) days after receipt by Landlord of the Proposed Alteration Plans. Tenant will resubmit the Proposed Alteration Plans to Landlord, as revised to reflect Landlord's comments, within ten (10) business days after receipt by Tenant of such comments, and Landlord will approve or disapprove such revised Proposed Alteration Plans (Landlord's review on such resubmittal will be limited to those matters which Landlord most recently disapproved) within ten (10) business days after receipt by Landlord of any revisions to the Proposed Alteration Plans. If Landlord fails to notify Tenant in writing of the approval or disapproval of the Proposed Alteration Plans or the revised Proposed Alteration Plans, or fails in such written disapproval to state in detail the reasons for any disapproval, within the applicable period set forth above, Tenant may give Landlord an additional written notice requesting such approval (which additional written notice shall contain a statement in boldface capital letters that in the event the Proposed Alteration Plans or revised Proposed Alteration Plans are not approved or disapproved

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(including a statement in detail of the reasons for any disapproval) by Landlord in writing to Tenant within ten (10) days following receipt of such additional written notice, the Proposed Alteration Plans shall be deemed approved), and the failure of Landlord to notify Tenant in writing of such election (and in the case of disapproval, stating in detail the reasons for such disapproval) within ten (10) days after such additional written notice shall be deemed approval of the Proposed Alteration Plans. The Proposed Alteration Plans which have been approved by Landlord are called the "**Alteration Plans**". Following Landlord's approval of the Alteration Plans, Tenant shall construct such additions, improvements or alterations in conformance, in all material respects, with the Alteration Plans. Landlord shall not object to matters if in order to satisfy the objection changes would be required which are inconsistent with the requirements of governmental statutes, laws, rules, orders, regulations, or ordinances affecting the Premises or any part thereof, or the use thereof.

From time to time after Landlord's approval of the Alteration Plans, Tenant may submit to Landlord proposed modifications to the Alteration Plans. Landlord will not unreasonably withhold, condition or delay approval of such proposed modifications to the Alteration Plans (and any such approval shall be limited to the Design Factors). Landlord will approve or disapprove such proposed modifications in writing, stating the reasons in detail for any disapproval, on or before the date which is ten (10) business days after receipt by Landlord of such proposed modifications. Tenant will resubmit such proposed modifications to Landlord, as revised to reflect Landlord's comments, within ten (10) business days after receipt by Tenant of such comments, and Landlord will approve or disapprove such revised proposed modifications (Landlord's review on such resubmittal will be limited to those matters which Landlord most recently disapproved) within ten (10) business days after receipt by Landlord of such revised proposed modifications. If Landlord fails to notify Tenant in writing of the approval or disapproval of the revised Alteration Plans, or fails in such written disapproval to state in detail the reasons for any disapproval, within the applicable period set forth above, Tenant may give Landlord an additional written notice requesting such approval (which additional written notice shall contain a statement in boldface capital letters that in the event the revised Alteration Plans are not approved or disapproved (including a statement in detail of the reasons for any disapproval) by Landlord in writing to Tenant within ten (10) days following receipt of such additional written notice, the revised Alteration Plans shall be deemed approved), and the failure of Landlord to notify Tenant in writing of such election (and in the case of disapproval, stating in detail the reasons for such disapproval) within ten (10) days after such additional written notice shall be deemed approval of the revised Alteration Plans. Landlord shall not object to matters if in order to satisfy the objection changes would be required which are inconsistent with the requirements of governmental statutes, laws, rules, orders, regulations, or ordinances affecting the Premises or any part thereof, or the use thereof.

If Landlord does not notify Tenant of its disapproval, stating in reasonable detail the reason for such disapproval, of the Proposed Alteration Plans within the applicable period set forth above for the limited scope as provided above, and the parties are unable to mutually resolve any differences within ten (10) business days, then, upon the written request of either party ("**Notice of Selection**"), Landlord and Tenant will attempt to mutually agree

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upon an architect (i) who has not previously been employed by Tenant or Landlord or any affiliate of Tenant or Landlord, (ii) who is duly licensed (if applicable) by the State of California, and (iii) who has at least ten (10) years' experience in the design of additions, improvements or alterations similar to the additions, improvements or alterations set forth in the Proposed Alteration Plans ( "**Third Party Architect**"). If Landlord and Tenant fail to agree upon a Third Party Architect within three (3) business days of the sending of the Notice of Selection, then at the written request of either party, Landlord and Tenant shall each select one Third Party Architect within three (3) business days of receipt of such request, and, within three (3) business days after the selection of the second Third Party Architect, the two Third Party Architects so selected shall appoint the independent architect to make the determination under this grammatical paragraph and if they fail to agree upon said appointment within said time period, upon request of either Landlord or Tenant the sole Third Party Architect shall be appointed by the presiding judge of the San Diego County Superior Court, or his or her designee. In the event a party fails to appoint its Third Party Architect in accordance with the preceding sentence, the Third Party Architect appointed by the other party shall be the arbitrator for purposes of choosing the Proposed Alteration Plans. The Third Party Architect selected by the foregoing process is the "**Independent Alteration Architect**". Within three (3) business days after the selection of the Independent Alteration Architect, the Independent Alteration Architect shall select either the Proposed Alteration Plans submitted by Tenant or the Proposed Alteration Plans submitted by Landlord, according to which set of Proposed Alteration Plans contains exterior architectural elements most consistent with the rest of the Premises with respect only to the limited scope of items subject to Landlord's approval provided above. The Independent Alteration Architect may not modify any Proposed Alteration Plans submitted to it but shall be limited to selecting one of such submissions. The party whose Proposed Alteration Plans were not selected by the Independent Alteration Architect shall pay the costs of the Independent Alteration Architect in making the selection required hereunder. The Proposed Alteration Plans selected by the Independent Alteration Architect shall be binding upon both parties and shall be used to construct such additions, improvements or alterations, unless subsequently modified as provided above in this Exhibit "H".

4. Upon request of Landlord, in connection with all matters requiring the approval of Landlord under this Lease, Tenant will reasonably meet with internal Landlord groups, but Landlord shall be responsible for obtaining all internal approvals required in connection with all such matters.

5. No decision, approval or disapproval by Landlord of any plans or specifications (i) will imply any warranty, representation or approval by Landlord, its representatives, officers, directors, employees, or agents of the compliance of such plans or specifications with any applicable laws, permits, consents or approvals, including, without limitation, any applicable building or zoning laws, ordinances, rules or regulations, (ii) will constitute a representation or warranty by Landlord, its representatives, officers, directors, employees, or agents that the matters shown on such plans or specifications can or will be approved by applicable governmental authorities having jurisdiction thereof, (iii) constitute an assumption by Landlord, its representatives, officers, directors, employees, or agents of any responsibility for any violation of laws or any defect in the design or construction of

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the matters shown on such plans or specifications, or (iv) will in any way waive the obligations of Tenant under this Lease (but it will satisfy the obligation to obtain the applicable consent, approval or disapproval of Landlord).

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# OPTION AGREEMENT

THIS OPTION AGREEMENT (the "**Agreement**") is dated for reference purposes as of March 18, 2021, and effective upon the date of the last party to execute the Agreement as set forth below (the "**Effective Date**"), and is entered into by and between NORTH COUNTY TRANSIT DISTRICT, a public agency existing under the laws of the State of California, pursuant to California Public Utilities Code Sections 125000, *et seq.* (""**NCTD**" and/or **Optionor**"), and TOLL BROS., INC., a Pennsylvania corporation ("**Optionee**"). Optionor and Optionee are sometimes hereinafter referred to individually as a "**Party**" and collectively as the "**Parties**."

RECITALS:

A. Optionor owns (i) approximately 10.2 acres of land located at 235 S. Tremont Street, in the City of Oceanside (the "**City**"), County of San Diego (the "**County**"), State of California (the "**State**") (the "**Oceanside Transit Center**") and (ii) approximately 1.3 acres of land located at 810 S. Mission Avenue in the City, County and State (the "**810 Mission Property**"). The Oceanside Transit Center and the 810 Mission Property are collectively referred to in this Agreement as the "**Property**." The Property is more particularly described on **Exhibit "A"** attached hereto.

B. The Parties contemplate the redevelopment of the Oceanside Transit Center by Optionee with a phased mixed-use project, including a new administrative headquarters building for Optionor with ground floor retail and associated parking (the "**NCTD Headquarters Building**"), a new ticketing transit center, a relocated bus transfer station, approximately 560 replacement transit parking spaces, and a new community center (collectively, the "**NCTD Improvements**"), as well as a multi-family apartment project comprising approximately 547 market rate units, an approximately 141-key hotel, open public spaces, associated site and infrastructure improvements and additional required parking (collectively, the "**Oceanside Transit Center Project**").

C. The Parties contemplate the redevelopment of the 810 Mission Property by Optionee with an affordable housing project comprising approximately 101 rental units, together with associated site and infrastructure improvements and required parking (collectively, the "**810 Mission Project**"; the Oceanside Transit Center Project and the Proposed 810 Mission Project shall be collectively referred to herein as the "**Proposed Project.**"

D. Prior to the Effective Date, the Parties entered that certain Exclusive Negotiation Agreement dated October 2, 2020 regarding the Proposed Project (the "**ENA**"), which was authorized by Optionor's Board of Directors at its March 18, 2021 meeting (Agenda Item No. 11). The Parties agree that in the event of any inconsistency between the terms of this Agreement and the terms of the ENA, the terms of this Agreement shall control.

E. Optionor and Optionee now desire to enter into this Agreement pursuant to which Optionor grants Optionee an option to enter into (i) the Disposition and Development Agreement (DDA) (as defined in Section 3.3 below) regarding the Proposed Project, and (ii) one (1) or more Leases (as defined in Section 3.3 below) for each Phase (as defined in Section 3.1 below) for

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portions of the Property, subject to the terms and conditions of this Agreement.

## AGREEMENT:

NOW, THEREFORE, in consideration of the foregoing and the mutual agreements herein set forth, and other valuable consideration, receipt of which is hereby acknowledged, Optionor and Optionee agree as follows.

### I
### GRANT OF OPTION

1.1 Grant. Optionor hereby grants to Optionee an exclusive option (herein referred to as the **"Option")** to lease the applicable portions of the Property pursuant to the Leases and to enter into the DDA with Optionor, subject to the terms and conditions set forth in this Agreement. The term of the Option **("Option Term")** shall commence on the Effective Date and shall terminate five (5) business days after the expiration of the Agency Approvals Period (as defined in Section 4.1 below), as such period may be extended pursuant to the terms of Sections 4.1 and 4.2 below.

1.2 Option Consideration. The Option is granted in consideration of Optionee's payment to Optionor of the sum of ONE HUNDRED DOLLARS ($100). Optionee shall pay such amount to Optionor upon the execution of this Agreement.

1.3 Deposit. Prior to the Effective Date, Optionee delivered the "Initial Deposit" (as defined in the ENA) in the amount of FIFTY THOUSAND DOLLARS ($50,000) to Optionor pursuant to the terms of the ENA. Provided Optionee has not elected to terminate this Agreement pursuant to Section 2.1 below, Optionee shall deliver an additional deposit of ONE HUNDRED FIFTY THOUSAND DOLLARS ($150,000) (the **"Additional Deposit")** to Optionor within three (3) business days after the expiration of the Due Diligence Period (as defined in Section 2.1 below). The Initial Deposit and the Additional Deposit shall collectively be referred to herein as the **"Deposit."** Except as otherwise expressly set forth in this Agreement, the Deposit shall be non-refundable to Optionee and shall not be applicable to any amounts to be paid by Optionee to Optionor pursuant to the terms of the Leases or the DDA. Notwithstanding anything contained in this Agreement to the contrary, the entire Deposit shall be promptly refunded to Optionee in the event of Optionor's Default (as defined in Section 8.2 below).

### II
### INVESTIGATIONS

2.1 Due Diligence Period. During the period of the Option Term that commences on the Effective Date and ends on the sixtieth ($60^{th}$) day after the Effective Date (the **"Due Diligence Period"),** Optionee shall, at its sole cost and expense, investigate all matters concerning Optionee's proposed development of the Proposed Project as it may determine, including without limitation the following (collectively the **"Due Diligence Matters"):** (i) the physical condition of the Property (including the environmental condition thereof); (ii) Optionee's ability to obtain the necessary approvals and entitlements required in order to develop the Proposed Project; (iii) the economic feasibility of developing the Proposed Project; (iv) the Due Diligence Materials (as

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defined in Section 2.2 below); (v) the condition of title to the Property; and (vi) all other matters related to the development and construction of the Proposed Project. Optionee shall, on or before the end of the Due Diligence Period, notify Optionor in writing whether Optionee has approved of the Due Diligence Matters (the **"Due Diligence Period Approval Notice").** In the event that prior to the end of the Due Diligence Period Optionee disapproves the Due Diligence Matters, or fails to timely deliver the Due Diligence Period Approval Notice, then Optionee will be deemed to have elected to terminate this Agreement, whereupon this Agreement and the Option shall terminate, Optionor shall retain the Initial Deposit, and neither Party shall have any further rights or obligations to the other hereunder, except as specifically set forth herein. The Due Diligence Period may only be extended by mutual agreement of the Parties in their respective sole discretion.

2.2 Due Diligence Materials. Within two (2) business days following the Effective Date, Optionor shall provide Optionee with access for review and copy all non-proprietary documents associated with the Property in Optionor's possession or, to Optionor's actual knowledge (as defined in Section 6.1 below) control (collectively, the **"Due Diligence Materials")** including, without limitation, any existing soils, environmental and building reports and engineering data pertaining to the Property, any architectural studies, structural/seismic reports, surveys, grading plans, topographical maps and similar data regarding the Property, and copies of all agreements or contracts affecting the Property, including any leases and occupancy agreements. Notwithstanding anything contained herein to the contrary, to Optionor's actual knowledge all reports, studies and other materials concerning the physical or environmental condition of the Property in Optionor's possession or control shall be included in the Due Diligence Materials and provided by Optionor to Optionee for review. Except as set forth in Section 6.1(i) below, Optionor makes no representation or warranty as to the accuracy or comprehensiveness of the Due Diligence Materials.

2.3 Access to the Property. From and after the Effective Date, Optionee and Optionee's contractors, consultants, representatives, employees and agents shall have the right, upon obtaining the required permits from NCTD **("Access Permits"),** to enter the Property for purposes of conducting various studies and tests, including without limitation, engineering, surveying, soils, geological and environmental, as Optionee, in Optionee's sole discretion, deems appropriate. All acts done on the Property by Optionee, or on behalf of Optionee, shall be performed at no expense to Optionor and in accordance with all applicable laws, rules and regulations. Optionee shall not allow any liens to be recorded against or to attach to the Property in connection with Optionee's inspection and investigation of the Property. Prior to entering the Property, Optionee shall: (a) deliver to Optionor written evidence that Optionee has procured the insurance required under Section 2.4 below; and (b) provide Optionor with at least one (1) business day prior written or telephonic notice of any intended entry and in any event, give Optionor forty-eight (48) hours prior telephonic or written notice of any intended access which involves invasive testing or boring on the Property or which may result in any impairment of the use of any portion of the Property. In connection with Optionee's entry upon the Property pursuant to this Agreement, Optionee shall restore the Property to substantially the same condition prior to any entry by Optionee, to the extent that the need for such restoration is caused by the acts of Optionee. Optionee may not conduct any invasive testing or boring without the prior written consent of Optionor, as to the nature and scope thereof, in Optionor's sole discretion, as set forth in the applicable Access Permit.

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2.4 Insurance. Prior to entering the Property, Optionee shall deliver to Optionor a certificate of insurance naming Optionor as an additional insured (on a primary, non-contributing basis) evidencing commercial general liability insurance with limits of not less than Five Million Dollars ($5,000,000.00).

2.5 Indemnification of Optionor. Optionee hereby agrees to protect, indemnify, defend (with counsel reasonably acceptable to Optionor) and hold Optionor and its officials, directors and employees free and harmless from and against any and all claims, costs, expenses, losses, damages, liabilities, fees, fines and penalties (collectively, **"Claims")** to the extent resulting from Optionee's exercise of its right of entry onto the Property pursuant to Section 2.3, including any inspections, surveys, tests or studies performed by Optionee or its employees, consultants or contractors, except to the extent such claims result from the negligence or willful misconduct of Optionor or its agents, employees or representatives and provided that Optionee shall not be responsible for and the foregoing indemnity shall not cover any defects or negative information discovered as a result of Optionee's mere exercise of its rights in this Article 2. Optionee's obligations under this Section 2.5 shall survive the termination of this Agreement for a period of one (1) year.

2.6 Title Review. Within five (5) business days following the Effective Date, Optionee shall cause First American Title Insurance Company (the **"Title Company")** to provide Optionee, at Optionee's expense, with a current preliminary title report, copies of all documents referenced in such report and a map plotting all locatable easements (collectively, **"Title Report").** Optionee shall have until the date that is forty-five (45) days after receipt of the Title Report (the **"Title Review Period")** to review and approve the Title Report. Unless Optionee gives Optionor written notice (a **"Title Objection Notice")** of Optionee's disapproval of any exceptions set forth in the Title Report prior to the expiration of the Title Review Period, Optionee shall be deemed to have approved of all such exceptions (other than Disapproved Exceptions, as defined below) and of the Title Report. If Optionee timely delivers a Title Objection Notice to Optionor, then Optionor may elect in its sole discretion, by giving written notice (the **"Optionor Notice")** of such election to Optionee on or before the date that is ten (10) business days after Optionee's delivery of the Title Objection Notice but in no event later than the expiration of the Due Diligence Period (the **"Optionor Response Period"),** to cause such exception to be removed from title or endorsed over (subject to Optionee's approval of the form of endorsement in Optionee's reasonable discretion) on or prior to the Closing (as defined in Section 5.3(a) below). Unless Optionor delivers the Optionor Notice to Optionee on or before the expiration of the Optionor Response Period that Optionor will cause such exception to be removed (or endorsed over, subject to the preceding sentence) from title on or prior to the Closing, Optionee shall have until the later of (i) three (3) business days after receipt of the Optionor Notice or (ii) the expiration of the Due Diligence Period (the **"Optionee Response Period")** to either elect to accept title subject to such previously disapproved matter or to terminate this Agreement, whereupon this Agreement and the Option shall terminate, Optionor shall retain the Initial Deposit, and neither Party shall have any further rights or obligations to the other hereunder, except as specifically set forth herein. If Optionee fails to notify Optionor in writing of its election prior to the expiration of the Optionee Response Period, then Optionee shall be deemed to have elected to accept title subject to such previously disapproved matter. In the event that Optionor gives written notice to Optionee that Optionor will cause such disapproved matter to be removed (or endorsed over, subject to the terms hereof) from title on or prior to the Closing, then if Optionor fails to remove or endorse over such item, Optionee

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shall have the option of declaring Optionor in default hereunder or waiving Optionee's objection in writing and proceeding to the Closing.

2.7 Disapproved Exceptions. Notwithstanding anything contained in this Agreement to the contrary, Optionor agrees, at its sole cost and expense, to cause all of the following to be removed from title prior to the Closing: any mortgage, deed of trust, or other instrument securing any financial obligation of any party (other than Optionee), any then-currently due and payable tax liens, abstracts of judgments, mechanics' liens or similar liens or encumbrances which require any monetary payment to remove or release, and any title exceptions reflected in a supplement to or update of the Title Report delivered after the expiration of the Due Diligence Period (other than new title exceptions resulting from Optionee's actions) (collectively, the **"Disapproved Exceptions").**

2.8 Title Policies. Optionee shall have the right to obtain from the Title Company one or both of the following: (a) upon expiration of the Due Diligence Period, a policy of title insurance, at Optionee's expense, together with any endorsements required by Optionee, insuring the Option and Optionee's rights under this Agreement, and showing the Option vested in Optionee **("Option Policy"),** subject only to (i) title exceptions approved or deemed approved by Optionee pursuant to Section 2.6 above, (ii) non-delinquent real property taxes and special assessments, (iii) the Memorandum of Option (as defined in Section 9.14 below), (iv) the Additional Project Documents (as defined in Section 3.4 below), and (v) any exceptions arising from Optionee's actions (collectively, the **"Permitted Exceptions");** and (b) upon Optionee exercising its right to lease the applicable portion of the Property, a leasehold policy of title insurance together with any endorsements required by Optionee, insuring each Lease and Optionee's leasehold estate in such portion of the Property, and showing such leasehold estate vested in Optionee **("Leasehold Policy"),** subject only to the Permitted Exceptions (other than the Memorandum of Option), the Memorandum of Lease (as defined in Section 5.2(a)(iii) below) as to the applicable Lease and the Memorandum ofDDA (as defined in Section 5.2(a)(iv) below) (as applicable). Optionee shall pay the premium charged by the Title Company to issue each Leasehold Policy and any title endorsements requested by Optionee, if applicable. Optionor agrees to reasonably cooperate in causing the Title Company to issue the Option Policy and each Leasehold Policy, and to record (A) the Memorandum of Option pursuant to the terms of Section 9.14 below, (B) the Memorandum of DDA at the Closing, and (C) each Memorandum of Lease at the Closing. Without limiting the generality of the foregoing, Optionor shall provide the Title Company with an owner's affidavit **("Owner's Affidavit"),** the form and content of which shall be reasonably acceptable to Optionor, and such other information about Optionor and/or the Property as may be reasonably required by the Title Company and to enable the Title Company to remove the parties in possession exception from each Leasehold Policy.

## III
## APPROVAL OF CERTAIN MATTERS DURING DUE DILIGENCE PERIOD

3.1 Phasing Schedule. The Parties acknowledge and agree that the Proposed Project will be constructed in three (3) (or more) phases (each, a **"Phase").** The preliminary phasing schedule for the construction of the Proposed Project is attached hereto as **Exhibit "B"** (the **"Phasing Schedule").** During the Due Diligence Period, at Optionee's request, the Parties shall negotiate in good faith any modifications to the Phasing Schedule. Notwithstanding the foregoing,

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the Phasing Schedule will be subject to further modifications by Optionee during the Agency Approvals Period as progress is made regarding the Entitlements (as such term is defined in Section 4.1 below); provided, however, that any such further modifications that concern or affect the NCTD Improvements shall be subject to the approval of Optionor in its reasonable discretion. In the event that Optionor fails to deliver written notice of its approval or disapproval (and in the case of disapproval, stating in detail the reasons for such disapproval) within ten (10) business days after receipt of Optionee's proposed modifications to the Phasing Schedule, then Optionee shall have the right to provide Optionor with a second written request for approval. Optionee's second request for approval must specifically state in boldface capitalized text that Optionor's failure to respond to such second notice within a period of five (5) business days shall be deemed to be approval by Optionor. If Optionor's failure to respond continues for five (5) business days after Optionor's receipt of Optionee's second written request for approval, then Optionor shall be deemed to have approved such modifications. In the event that Optionor timely delivers written notice to Optionee of its disapproval of the proposed modifications to the Phasing Schedule pursuant to the preceding sentences, then the terms of Section 9.19(a) below regarding the resolution of a Dispute (as defined in Section 9.19(a) below) shall apply. Those portions of each Phase that are to be controlled and operated by Optionee shall be subject to one (1) or more separate Leases.

3.2 Overall Base Rent. The Parties acknowledge and agree that the cumulative base rent to be paid by Optionee to Optionor pursuant to all of the Leases shall be a total of Three Hundred Fifty Thousand Dollars ($350,000) per annum for the first five (5) years commencing upon the term of the Leases to be executed by the Parties concurrently upon the Closing **("Overall Base Rent").** The Overall Base Rent shall be allocated among the Leases for each Phase pursuant to a formula to be agreed upon by the Parties during the Due Diligence Period. Additionally, the Parties acknowledge and agree that the Overall Base Rent for the first five (5) years of the terms of the Leases is based on the current Proposed Project. If at the end of the Agency Approvals Period the approved project differs from the parameters for the Proposed Project, the Overall Base Rent shall be equitably adjusted based on a formula to be established and agreed upon by the Parties during the Due Diligence Period.

3.3 DDA and Leases. The draft terms and prov1s10ns of the Disposition and Development Agreement (the **"DDA")** to be entered into by the Parties at the Closing concerning the Proposed Project are set forth in **Exhibit "C"** attached hereto (the **"DDA Terms").** The draft terms and provisions of the separate ground leases to be entered into by the Parties at the Closing for those elements of the Proposed Project to be developed and owned by Optionee (collectively, the **"Leases")** are set forth in **Exhibit "D"** attached hereto (the **"Lease Terms").** During the Due Diligence Period, the Parties shall negotiate in good faith the form of the DDA based upon the DDA Terms and the form of the Leases based on the Lease Terms. The Parties shall negotiate such documents in good faith, but may elect to agree or not agree to the terms thereof in their sole respective discretion. The forms of the DDA and Leases, as approved by the Parties during the Due Diligence Period, shall be accepted by the Parties as revised **Exhibit "C"** and **Exhibit "D",** and confirmed by the execution of the Acceptance of the Revised Exhibit Memorandum, attached as **Exhibit "G".** The DDA and Leases are subject to modification by Optionee to the extent required by the Final Approval (as defined in Section 4.3 below); provided, however, that any such modifications that concern or affect the NCTD Improvements shall be subject to the approval of

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Optionor in its reasonable discretion. In the event that Optionor fails to deliver written notice of its approval or disapproval (and in the case of disapproval, stating in detail the reasons for such disapproval) within ten (10) business days after receipt of Optionee's proposed modifications to the DDA and/or the Leases, then Optionor shall be deemed to have approved such modifications. In the event that Optionor timely delivers written notice to Optionee of its disapproval of the proposed modifications pursuant to the preceding sentence, then the terms of Section 9.19(a) below regarding the resolution of a Dispute shall apply.

3.4 Outline of Additional Project Documents. In addition to the DDA and the Leases, the Parties acknowledge and agree that the Proposed Project will require reciprocal easement agreements, cost sharing agreements, and/or other additional agreements that will burden and benefit certain portions of the Property and provide for the subdivision, maintenance, improvement, development, ownership, management, administration and/or use of such portions of the Property, including without limitation a property management agreement for the ground floor retail space to be located in the NCTD Headquarters Building (collectively, the **"Additional Project Documents").** During the Due Diligence Period, the Parties shall negotiate in good faith an outline setting forth the material terms of the Additional Project Documents (the **"Additional Project Documents Outline").** During the Agency Approvals Period, the forms of the Additional Project Documents shall be prepared by Optionee's counsel based on the Additional Project Documents Outline and shall be subject to Optionor's approval in its reasonable discretion. In the event that Optionor fails to deliver written notice of its approval or disapproval (and in the case of disapproval, stating in detail the reasons for such disapproval) within ten (10) business days after receipt of Optionee's proposed forms of the Additional Project Documents, then Optionee shall have the right to provide Optionor with a second written request for approval. Optionee's second request for approval must specifically state in boldface capitalized text that Optionor's failure to respond to such second notice within a period of five (5) business days shall be deemed to be approval by Optionor. If Optionor's failure to respond continues for five (5) business days after Optionor's receipt of Optionee's second written request for approval, then Optionor shall be deemed to have approved such forms. In the event that Optionor timely delivers written notice to Optionee of its disapproval of the proposed forms of the Additional Project Documents pursuant to the preceding sentences, then the terms of Section 9.19(a) below regarding the resolution of a Dispute shall apply. The Additional Project Documents will be executed by the Parties and recorded (as applicable) upon the Closing, as contemplated by the Additional Project Documents Outline.

## IV
## PROJECT APPROVALS

4.1 Entitlements; Agency Approvals Period. Provided that Optionee has not terminated this Agreement on or prior to the expiration of the Due Diligence Period pursuant to Section 2.1 above, Optionee shall use commercially reasonable efforts to obtain, at Optionee's expense, all required governmental approvals necessary for the development and construction of the Proposed Project and the issuance of building permits with respect thereto (upon payment of the ordinary building permit fee), including but not limited to those certain entitlements and approvals to be obtained from the City and the other Approving Parties (as defined in Section 4.3 below), including without limitation the California Coastal Commission (the **"CCC")** (individually, an **"Entitlement,"** and collectively, the **"Entitlements").** Optionee shall have a period of two (2)

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years commencing upon the expiration of the Due Diligence Period to obtain the applicable Entitlements from the City, and the other Approving Parties, with the exception of the CCC (the **"City Approvals Period"),** and a period of one (1) additional year commencing upon the expiration of the City Approvals Period to obtain the applicable Entitlements from the CCC (collectively, the **"Agency Approvals Period"),** each period being subject to extension (a) due to a Force Majeure Event (as defined in Section 9.13 below) and (b) pursuant to the terms of Section 9.19(a) below regarding the resolution of a Dispute. In addition, the City Approvals Period and the Agency Approvals Period shall be subject to extension as follows: (i) provided that Optionee is using commercially reasonable efforts to pursue the Entitlements, Optionee shall have the option to extend the City Approvals Period or the Agency Approvals Period for up to a period not to exceed one (1) year in the aggregate upon written notice to Optionor; and (ii) the City Approvals Period and the Agency Approvals Period shall each be automatically extended by a tolling period, not to exceed two (2) years, for any periods of time required to resolve any active litigation regardless of the case of multiple actions) concerning an Entitlement or the Entitlements (the **"Tolling Period"),** subject to successive one (1) year extensions upon the mutual agreement of the parties, in their respective sole discretion. It is contemplated that review under the California Environmental Quality Act **("CEQA")** will occur during the City Approvals Period and that certification of the final Environmental Impact Report will occur during the City Approvals Period. Optionor shall have the right to review and approve the plans and specifications for the NCTD Improvements in its reasonable discretion in accordance with the applicable terms of the DDA as approved by the Parties on or before the end of the Due Diligence Period, and such terms of the DDA shall automatically be deemed incorporated herein by this reference effective as of the date upon which the Parties approve the form of the DDA pursuant to the terms of this Agreement.

4.2 Cooperation. Optionor hereby agrees to cooperate with Optionee in connection with the processing and obtaining of the Entitlements by Optionee, at no out-of-pocket cost to Optionor. Without limiting the generality of the foregoing, Optionor agrees, within ten (10) business days after request by Optionee, to execute any applications, consents, letters, authorizations, documents, agreements and/or maps (collectively, **"Project Entitlement Documents")** which are reasonably required by Optionee or requested by any Approving Party (as defined in Section 4.3 below) to allow Optionee to process and obtain the Entitlements. In the event Optionor fails to execute any Project Entitlement Document within such ten (10) business day period, then the Agency Approvals Period shall be automatically extended on a day-for-day basis for each day of delay.

4.3 Final Approval. As used in this Agreement, the term **"Final Approval"** means that all of the Entitlements have been: (a) formally approved by the City, the County, the CCC and any other applicable governmental or quasi-governmental agency, body or authority having jurisdiction over the Property (each an **"Approving Party"** and collectively, the **"Approving Parties")** in a form and content and subject to conditions of approval reasonably acceptable to Optionee (and conditions of approval reasonably acceptable to Optionor solely with respect to the NCTD Improvements to be owned and operated by Optionor); and (b) any statutorily provided appeal and challenge periods (whether judicial, administrative or electoral) to protest the Entitlements have expired without an appeal being taken or challenge made, or if any appeal is taken or any challenge to one or more of the Entitlements is made (each a **"Challenge"),** the body ruling on such Challenge (or the voters in an election) shall have made a formal, final finding upholding such Entitlements in a form and content and subject to conditions of approval

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reasonably acceptable to Optionee (and Optionor, solely with respect to the NCTD Improvements to be owned and operated by Optionor), and all further appeal and challenge periods have expired without a further Challenge being made.

4.4 Grant of Dedications and Easements Within Property. Optionor acknowledges that the Approving Parties may require various dedications, covenants, easements and restrictions and other impositions on the Property affecting not only the leasehold interests to be acquired by Optionee pursuant to the terms of this Agreement, but also Optionor's fee title to the Property, as conditions to granting the Entitlements. Provided that Optionee exercises the Option, Optionor agrees to cooperate and join with Optionee in granting such interests in the Property required by the Approving Parties and consistent with the use of the Property for the Proposed Project without further consideration payable by Optionee to Optionor for doing so, provided that Optionor has approved in its reasonable discretion any such interests to be granted by Optionor. In the event that Optionor does not approve any such interests required by the Approving Parties to be granted by Optionor, then Optionee may terminate this Agreement by providing written notice to Optionor and Escrow Holder, in which event the Deposit shall be retained by Optionor (unless this Agreement is terminated as a result of a default by Optionor, in which event the Deposit shall be promptly returned to Optionee in addition to any other rights or remedies Optionee may have under this Agreement), and neither Party shall have any further obligation to the other except as otherwise provided in this Agreement.

## V
## EXERCISE OF OPTION; CLOSING

5.1 Option Exercise Notice. If Optionee desires to exercise the Option, Optionee may do so at any time during the Option Term (provided that the conditions set forth in Sections 5.4(a)(iv) and 5.5(a)(iii) below have been satisfied) by delivering a written notice (the **"Exercise Notice")** to Optionor with a copy to First American Title Company, 18500 Von Karman Avenue, Suite 600, Irvine, CA 92612, attention: Jeanne Gould, Senior Escrow Officer (phone: 949.885.2405; email: jagould@firstam.com) **("Escrow Holder")** no later than 5:00 p.m. Pacific Time on the last day of the Option Term. The date upon which Optionee delivers the Exercise Notice to Optionor and Escrow Holder is referred to in this Agreement as the **"Exercise Date".**

5.2 Closing.

(a) Optionee Deliveries. If Optionee delivers the Exercise Notice to Optionor and Escrow Holder pursuant to Section 5.1 above, then no later than thirty (30) days following the Exercise Date, Optionee shall deliver to Escrow Holder, with copies to Optionee, all of the following documents:

(i) Two (2) counterpart originals of the DDA, executed by Optionee and notarized;

(ii) Two (2) counterpart originals of each of the Leases for the applicable portions of the Property, executed by Optionee;

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(iii) One (1) counterpart original of each Memorandum of Lease in the form attached to the applicable Lease as an exhibit (each, a "Memorandum of Lease"), executed by Optionee and notarized; and

(iv) One (1) counterpart original of the Memorandum of DDA in the form attached to the DDA as an exhibit (the "Memorandum of DDA"), executed by Optionee and notarized.

(b) Optionor Deliveries. No later than thirty (30) days following the Exercise Date, Optionor shall deliver to Escrow Holder, with copies to Optionee, all of the following documents:

(i) Two (2) counterpart originals of the DDA, executed by Optionor and notarized;

(ii) Two (2) counterpart originals of each of the Leases for the applicable portions of the Property, executed by Optionor;

(iii) One (1) counterpart original of each Memorandum of Lease, executed by Optionor and notarized;

(iv) One (1) counterpart original of the Memorandum of DDA, executed by Optionor and notarized; and

(v) One (1) original Owner's Affidavit, executed by Optionor.

(c) Preparation for Closing. No later than ten (10) days following the Exercise Date, Escrow Holder shall:

(i) Prepare and submit to Optionor and Optionee an estimated closing statement identifying all of the following: (A) escrow and recording fees and costs for the Closing; (B) title charges for the Leasehold Policy for each of the Leases; (C) documentary transfer tax payable upon recordation of each Memorandum of Lease; and (D) proration, as of the date estimated for the Closing by the Parties, of any current general and special real property taxes and assessments for the portions of the Property to be encumbered by each Memorandum of Lease previously paid or payable for the current fiscal tax period; and

(ii) Update the Title Report and identify to Optionor and Optionee any further documents, funds or instruments required to issue the Leasehold Policy for each Lease.

(d) Closing Instructions for Escrow Holder. Upon receipt of the deliveries described in Sections 5.2(a) and 5.2(b) above, Escrow Holder shall:

(i) Assemble two (2) fully-executed originals of each Lease, two (2) fully-executed originals of the DDA, one (1) fully-executed original of the Memorandum of DDA, and one (1) fully-executed original of each Memorandum of Lease and date each of the executed originals as of the date each Memorandum of Lease and the Memorandum of DDA is submitted for recording in the Official Records of San Diego County, California (the "Official Records");

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(ii) Record the Memorandum ofDDA and each Memorandum of Lease in the Official Records when Escrow Holder is committed to issue to Optionee the Leasehold Policy for each Lease in the form described in Section 2.8 above; and

(iii) Deliver one (1) fully-executed original of the DDA and each Lease and conformed copies of the recorded Memorandum of DDA and each Memorandum of Lease to both Parties.

5.3 Closing and Closing Costs.

(a) As used in this Agreement, the term **"Closing"** shall mean the recordation of each Memorandum of Lease, the recordation of the Memorandum of DDA and the completion of the deliveries as described in Section 5.2 above.

(b) At the Closing, Optionee shall pay (i) one-half of all escrow fees, recording charges and documentary transfer taxes, and (ii) the premium charged by the Title Company to issue each Leasehold Policy.

(c) At the Closing, Optionor shall pay (i) one-half of all escrow fees and recording charges, in an amount not to exceed $10,000 (and any amount in excess of $10,000 shall be paid by Optionee), and (ii) and one-half of all documentary transfer taxes.

5.4 Optionee Closing Conditions.

(a) Optionee's obligation to proceed to Closing is subject to the satisfaction of the following conditions, each of which is for the sole benefit of Optionee and may only be waived by Optionee in writing:

(i) Leasehold Policy. Title Company shall be irrevocably committed to issue each Leasehold Policy in favor of Optionee, subject only to those Permitted Exceptions that affect the applicable portions of the Property.

(ii) Due Performance. Optionor shall not be in default under this Agreement, and shall have duly performed each and every covenant, undertaking and agreement to be performed by it prior to the Closing hereunder.

(iii) Optionor's Representations and Warranties. Each representation and warranty made in this Agreement by Optionor shall be true and correct as of the Closing.

(iv) Final Approval. Optionee shall have obtained Final Approval of the Entitlements.

(v) No Moratorium. There shall be no moratorium, statute, law, ordinance, regulation or administrative or judicial decision in effect or proposed to be imposed by any applicable governmental authority or public utility as of the Closing that would adversely affect Optionee's ability to grade, construct, or permit occupancy of the Property, or to obtain water, sewer or other utility services for the Property.

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(b) Optionee may at any time or times on or before the Closing, at its sole election, waive any of the conditions precedent to Optionee's obligations hereunder and consummate the transaction, but any such waiver shall be effective only if contained in a writing signed by Optionee and delivered to Optionor and Escrow Holder. Notwithstanding anything contained in this Agreement to the contrary, in the event any of the conditions precedent for the benefit of Optionee are not completely fulfilled and satisfied, then in addition to any other rights or remedies Optionee may have hereunder, Optionee may terminate this Agreement, in which event the Deposit shall be retained by Optionor (unless this Agreement is terminated as a result of a failure of the conditions set forth in Sections 5.4(a)(ii) or **(iii)** above, in which event the Deposit shall be promptly returned to Optionee), and neither Party shall have any further obligation to the other except as otherwise provided in this Agreement.

5.5 Optionor Closing Conditions.

(a) Optionor's obligation to proceed to Closing is subject to the satisfaction of the following conditions, each of which is for the sole benefit of Optionor and may only be waived by Optionor in writing:

(i) Due Performance. Optionee shall not be in default under this Agreement, and shall have duly performed each and every covenant, undertaking and agreement to be performed by it prior to the Closing hereunder.

(ii) Optionee's Representations and Warranties. Each representation and warranty made in this Agreement by Optionee shall be true and correct as of the Closing.

(iii) Final Approval. Optionee shall have obtained Final Approval of the Entitlements.

(b) Optionor may at any time or times on or before the Closing, at its sole election, waive any of the conditions precedent to Optionor's obligations hereunder and consummate the transaction, but any such waiver shall be effective only if contained in a writing signed by Optionor and delivered to Optionee and Escrow Holder. Notwithstanding anything contained in this Agreement to the contrary, in the event any of the conditions precedent for the benefit of Optionor are not completely fulfilled and satisfied, then in addition to any other rights or remedies Optionor may have hereunder, Optionor may terminate this Agreement, in which event the Deposit shall be retained by Optionor, and neither Party shall have any further obligation to the other except as otherwise provided in this Agreement.

## VI
## REPRESENTATIONS AND WARRANTIES

6.1 Optionor Representations and Warranties. Optionor represents and warrants to Optionee that the following matters are true and correct as of the execution of this Agreement and as of the Closing:

(a) Organization; Authority. Optionor is a public agency duly formed under the laws of the State of California. This Agreement and all the documents executed by Optionor which

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are to be delivered to Optionee pursuant to the terms of this Agreement are or will be duly authorized, executed, and delivered by Optionor, and will not violate any provisions of any agreement to which Optionor is a party or to which it or the Property is subject. This Agreement is binding and enforceable against Optionor in accordance with its terms. The person who has executed this Agreement on behalf of Optionor has the authority to do so.

(b) Legal Proceedings. There are no pending or, to Optionor's actual knowledge, threatened legal proceedings or actions of any kind or character affecting the Property or any portion thereof or Optionor's interest therein or affecting this Agreement, including without limitation, general or special assessment proceedings of any kind, or condemnation or eminent domain actions or proceedings of any kind. There is no insolvency or bankruptcy proceeding pending or, to the knowledge of Optionor, contemplated involving Optionor or involving the Property.

(c) Required Actions. All requisite action has been or will be taken by Optionor in connection with the entering into this Agreement and the instruments referenced herein (including, without limitation, the DDA and the Leases), and the consummation of the transaction contemplated thereby. No consent of any other party is required hereunder.

(d) No Conflicts. Neither the execution and delivery of this Agreement and the documents and instruments referenced herein (including, without limitation, the DDA and the Leases), nor the incurrence of the obligations set forth herein, nor the consummation of the transaction contemplated herein, nor compliance with the terms of this Agreement and the documents and instruments referenced herein (including, without limitation, the DDA and the Leases) conflict with or result in the material breach of any terms, conditions or provisions of, or constitute a default under, any mortgage, deed of trust, loan, lease or other agreement or instrument to which Optionor is a party or affecting the Property.

(e) Title. Except as set forth in the Due Diligence Materials, Optionor has not granted any leases, licenses, options or rights of first refusal to any other party. Except for matters shown on the Title Report, there are no commitments or agreements which would require Optionee to pay any money or perform any obligation with respect to the Property following Closing or which would otherwise affect the ownership or development of the Property by Optionee following Closing.

(f) Intentionally Deleted.

(g) Hazardous Substances. Except as set forth in the Due Diligence Materials, Optionor has not to Optionor's actual knowledge, nor has any other person or entity, used any portion of the Property, nor permitted any other person or entity to use the Property for the purpose of storage, generation, manufacture, disposal, transportation or treatment of any petroleum or any substance which may be classified as a hazardous, toxic, chemical or radioactive substance, or a contaminant or pollutant (collectively, "Hazardous Substances") under applicable federal, state or local law, ordinance, rule or regulation ("Applicable Laws") or which may require any cleanup, remediation or other corrective action pursuant to such Applicable Laws. Further, to Optionor's actual knowledge, no underground storage tanks are located at the Property. In addition, to

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Optionor's actual knowledge, Optionor has provided to Optionee true and complete copies of all environmental reports in Optionor's possession or control.

(h) No Violation of Laws. To Optionor's actual knowledge, there are no violations of any Applicable Laws pertaining to the Property. No notice by any governmental or other public authority has been served upon Optionor, or anyone on Optionor's behalf: relating to violations of any applicable housing, building, safety, fire or other ordinances or any of the Applicable Laws.

(i) Due Diligence Materials. To Optionor's actual knowledge, Optionor has made available to Optionee true, correct and complete copies of all Due Diligence Materials in its possession or control concerning the Property (including, without limitation, all reports, studies and other materials concerning the physical or environmental condition of the Property), and Optionor has no actual knowledge of any material inaccuracies in the Due Diligence Materials.

(i) Intentionally Deleted.

(k) Endangered Species; Critical Habitat. Optionor has no actual knowledge of any archaeological, anthropological, or historical finds, objects or any endangered or threatened species in, on, or about the Property. To the best of Optionor's actual knowledge, no portion of the Property constitutes a "critical habitat" as such term is defined in the Endangered Species Act of 1973, as amended.

For the purposes of this Agreement, Optionor's actual knowledge shall mean the current actual knowledge of Matthew Tucker, Tracey Foster and Jeff Ryan (collectively, the **"Optionor Knowledge Parties"),** without investigation or the attribution of the knowledge of others. Optionor represents and warrants to Optionee that the Optionor Knowledge Parties are the persons most knowledgeable concerning the Property and the matters that are the subject of the foregoing representations and warranties qualified by reference to Optionor's actual knowledge.

6.2 Optionee Representations and Warranties. Optionee represents and warrants to Optionor that the following matters are true and correct as of the execution of this Agreement and as of the Closing:

(a) Organization; Authority. Optionee is a corporation duly organized, validly existing, and in good standing under the laws of the State of Pennsylvania, and is duly qualified to conduct business in the State of California. This Agreement and all the documents executed by Optionee which are to be delivered to Optionor pursuant to the terms of this Agreement are or will be duly authorized, executed, and delivered by Optionee, and will not violate any provisions of any agreement to which Optionee. This Agreement is binding and enforceable against Optionee in accordance with its terms. The person who has executed this Agreement on behalf of Optionee has the authority to do so.

6.3 Indemnity.

(a) Optionee Indemnity. Optionee shall indemnify, defend (with counsel reasonably acceptable to Optionor), protect and hold Optionor harmless from and against all

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claims, losses, liabilities, damages, costs and expenses (including, but not limited to, reasonable attorneys' fees and court costs) to the extent arising from the inaccuracy or breach of any representation or warranty by Optionee in this Agreement. Such indemnification shall be binding upon the successors and assigns of Optionee and inure to the benefit of Optionor and its successors and assigns for a period ending one (1) year following the Closing or earlier termination of this Agreement. Any claim, action, suit or proceeding by Optionor under this Section shall be commenced and served, if at all, on or before the expiration of such one (1) year period.

(b) Optionor Indemnity. Optionor shall indemnify, defend (with counsel reasonably acceptable to Optionee), protect and hold Optionee harmless from and against all claims, losses, liabilities, damages, costs and expenses (including, but not limited to, reasonable attorneys' fees and court costs) to the extent arising from the inaccuracy or breach of any representation or warranty by Optionor in this Agreement. Such indemnification shall be binding upon the successors and assigns of Optionor and inure to the benefit of Optionee and its successors and assigns for a period ending one (1) year following the Closing or earlier termination of this Agreement. Any claim, action, suit or proceeding by Optionee under this Section shall be commenced and served, if at all, on or before the expiration of such one (1) year period. Notwithstanding the foregoing, in no event shall Optionor have liability for (i) any claims hereunder with an aggregate value of $25,000 or less (the **"Floor Amount"),** or (ii) for any amount in excess of $2,000,000 (the **"Liability Cap").** If a final judgment on such claim is greater than the Floor Amount, Optionor shall be liable for the entire judgement amount, including the Floor Amount, but subject to the Liability Cap.

6.4 AS-lS. SUBJECT TO OPTIONOR'S REPRESENTATIONS, WARRANTIES AND COVENANTS SET FORTH IN THIS AGREEMENT AND THE DOCUMENTS TO BE DELIVERED TO OPTIONEE AT CLOSING, OPTIONEE IS ACCEPTING THE PROPERTY IN ITS "AS-lS" CONDITION, "WITH ALL FAULTS," AND OPTIONEE IS NOT RELYING ON ANY REPRESENTATIONS OR WARRANTIES OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, FROM OPTIONOR OR ITS AGENTS, OR ANY OTHER PERSON ACTING OR PURPORTING TO ACT ON BEHALF OF OPTIONOR, AS TO ANY MATTERS CONCERNING THE PROPERTY, INCLUDING WITHOUT LIMITATION: (I) THE QUALITY, NATURE, ADEQUACY AND PHYSICAL CONDITION AND ASPECTS OF THE PROPERTY, (II) THE QUALITY, NATURE, ADEQUACY, AND PHYSICAL CONDITION OF SOILS, GEOLOGY AND ANY GROUNDWATER ON THE PROPERTY, (III) THE EXISTENCE, QUALITY, NATURE, ADEQUACY AND PHYSICAL CONDITION OF UTILITIES SERVING THE PROPERTY, (IV) THE DEVELOPMENT POTENTIAL OF THE PROPERTY, AND THE PROPERTY'S USE, HABITABILITY, MERCHANTABILITY, OR FITNESS, SUITABILITY, VALUE OR ADEQUACY OF THE PROPERTY FOR ANY PARTICULAR PURPOSE, (V) THE ZONING OR OTHER LEGAL STATUS OF THE PROPERTY OR ANY OTHER PUBLIC OR PRIVATE RESTRICTIONS ON USE OF THE PROPERTY, (VI) THE PRESENCE OF HAZARDOUS SUBSTANCES ON, UNDER OR ABOUT THE PROPERTY OR THE ADJOINING OR NEIGHBORING PROPERTY, (VII) THE QUALITY OF ANY LABOR AND MATERIALS USED IN ANY IMPROVEMENTS ON THE PROPERTY, (VIII) THE CONDITION OF TITLE TO THE PROPERTY, (IX) THE VALUE, ECONOMICS OF THE OPERATION OR INCOME POTENTIAL OF THE PROPERTY, OR (X) THE PHYSICAL CONDITION, VALUE, ECONOMICS OF OPERATION OR INCOME POTENTIAL OF THE

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PROPERTY. THE PROVISIONS OF THIS SECTION 6.4 SHALL SURVIVE THE CLOSING. OPTIONEE ACKNOWLEDGES THAT THE OCEANSIDE TRANSIT CENTER HAS BEEN USED AND CONTINUES TO BE USED AS A TRANSPORTATION HUB, INCLUDING WITHOUT LIMITATIONS AS A BUS ISLAND AND STATION, A RAIL STATION AND PARKING LOT.

## vu
## COVENANTS OF OPTIONOR

Optionor hereby covenants with Optionee as follows:

7.1 Transfers. With the exception of a change in control of Optionor as a result of a merger or the change in control of the functions of Optionor to another public agency, no part of the Property, or any interest therein, shall be leased, subleased, licensed, assigned, liened, encumbered in any manner or otherwise transferred by Optionor without the prior written approval of Optionee, which approval shall not be unreasonably withheld, it being agreed that Optionee shall be reasonable in withholding its approval of such transfer if such transfer: (a) increases the risk of a material adverse change to the physical condition of all or any part the Property; (b) adversely impacts the economic feasibility of the Proposed Project and/or inhibits the likelihood of obtaining the Entitlements; (c) does not automatically terminate or expire prior to expiration of the Option Term; or (d) results in the need for Optionor to obtain the approval of any other party to Optionor's issuance of any consent or approval contemplated hereunder, or to Optionor entering into an amendment to this Agreement or to Optionee processing and obtaining the Entitlements.

7.2 No New Contracts. Optionor shall not, without the prior written consent of Optionee (which consent Optionee may only withhold in its reasonable discretion), enter into any contract, easement or agreement affecting or relating to the Property or any portion thereof.

7.3 Notice of Changes. Optionor shall promptly notify Optionee in writing of (a) any notice or communication from any party concerning any threatened, pending or actual litigation relating to Optionor and the Property or the Proposed Project, and (b) any other event or circumstance which makes any representation or warranty of Optionor to Optionee under this Agreement materially untrue or misleading.

7.4 Condition of Property; Compliance with Laws. Optionor shall not undertake or permit any actions that would result in a material or adverse change in the physical condition of the Property or the condition of title to the Property. Optionor shall comply with all applicable laws, ordinances, rules and regulations affecting the Property and shall pay all assessments levied against the Property prior to such amounts being delinquent.

## VIII
## DEFAULT AND REMEDIES

8.1 Optionor's Remedies; Liquidated Damages. IF OPTIONEE FAILS TO PERFORM ANY MATERIAL OBLIGATION UNDER THIS AGREEMENT AND DOES NOT CURE SUCH FAILURE OR COMMENCE AND DILIGENTLY PURSUE SUCH CURE AFTER OPTIONOR HAS GIVEN OPTIONEE THIRTY (30) DAYS PRIOR WRITTEN NOTICE **("OPTIONEE'S**

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**DEFAULT**"), THEN UPON WRITTEN NOTICE FROM OPTIONOR, OPTIONOR SHALL BE ENTITLED TO TERMINATE THIS AGREEMENT AND TO RETAIN THE AMOUNT OF THE DEPOSIT PAID TO OPTIONOR AT SUCH TIME AS LIQUIDATED DAMAGES FOR OPTIONEE'S DEFAULT AS OPTIONOR'S SOLE AND EXCLUSIVE REMEDY. THE PARTIES AGREE THAT, BASED UPON CIRCUMSTANCES NOW EXISTING, KNOWN AND UNKNOWN, IT WOULD BE IMPRACTICAL OR EXTREMELY DIFFICULT TO FIX OPTIONOR'S ACTUAL DAMAGES BY REASON OF OPTIONEE'S DEFAULT, THAT THE FOREGOING AMOUNT IS A REASONABLE ESTIMATE OF THESE DAMAGES, AND THAT OPTIONOR SHALL RETAIN THE DEPOSIT RECEIVED BY OPTIONOR AT SUCH TIME AS OPTIONOR'S SOLE AND EXCLUSIVE REMEDY, AT LAW OR IN EQUITY, FOR OPTIONEE'S DEFAULT. OPTIONOR HEREBY WAIVES ANY RIGHT THAT OPTIONOR MAY HAVE TO RECOVER ANY OTHER DAMAGES OR TO EXERCISE ALL OTHER REMEDIES AVAILABLE AT LAW OR IN EQUITY INCLUDING WITHOUT LIMITATION ANY AND ALL RIGHTS OPTIONOR WOULD OTHERWISE HAVE UNDER CALIFORNIA CIVIL CODE SECTION 3389 TO SPECIFICALLY ENFORCE THIS AGREEMENT. THE PARTIES ACKNOWLEDGE THAT THEY HAVE READ AND UNDERSTAND THE PROVISIONS OF THIS SECTION 8.1 AND BY THEIR INITIALS IMMEDIATELY BELOW AGREE TO BE BOUND BY ITS TERMS.

MOT

Optionor's Initials

Optionee's Initials

8.2 Optionee's Remedies. IF OPTIONOR FAILS TO PERFORM ANY MATERIAL OBLIGATION UNDER THIS AGREEMENT AND DOES NOT CURE SUCH FAILURE OR COMMENCE AND DILIGENTLY PURSUE SUCH CURE TO COMPLETION AFTER OPTIONEE HAS GIVEN OPTIONOR THIRTY (30) DAYS PRIOR WRITTEN NOTICE ("**OPTIONOR'S DEFAULT**"), THEN OPTIONEE MAY, AT ITS OPTION AND AS ITS EXCLUSIVE REMEDY, EITHER (A) TERMINATE THIS AGREEMENT BY DELIVERING WRITTEN NOTICE OF TERMINATION TO OPTIONOR, WHEREUPON OPTIONOR SHALL RETURN TO OPTIONEE THE DEPOSIT, OPTIONOR SHALL PAY OPTIONEE ITS REASONABLY DOCUMENTED OUT-OF-POCKET EXPENSES FOR NEGOTIATING THIS AGREEMENT, THE DDA AND THE LEASES, INSPECTING THE CONDITION OF THE PROPERTY AND PROCESSING THE ENTITLEMENTS, NOT TO EXCEED 750,000, AND BOTH OPTIONEE AND OPTIONOR WILL BE RELIEVED OF ANY FURTHER OBLIGATIONS OR LIABILITIES HEREUNDER, EXCEPT FOR THOSE OBLIGATIONS WHICH EXPRESSLY SURVIVE ANY TERMINATION OF THIS AGREEMENT, OR (B) SEEK SPECIFIC PERFORMANCE OF THIS AGREEMENT. NOTWITHSTANDING THE FOREGOING, IF SPECIFIC PERFORMANCE IS NOT AVAILABLE DUE TO THE INTENTIONAL ACTIONS OR WILLFUL MISCONDUCT OF OPTIONOR, OPTIONEE SHALL HAVE THE RIGHT TO TERMINATE THIS AGREEMENT, IN WHICH EVENT THE DEPOSIT SHALL BE IMMEDIATELY RETURNED TO OPTIONEE, AND OPTIONEE SHALL HAVE THE RIGHT TO OBTAIN FROM OPTIONOR OPTIONEE'S ACTUAL DAMAGES AS A RESULT OF OPTIONOR'S DEFAULT. NOTHING CONTAINED SECTION SHALL LIMIT OPTIONEE'S RIGHT TO RECEIVE REIMBURSEMENT FOR COSTS AND EXPENSES PURSUANT TO SECTION 9.12 BELOW INCURRED WITH RESPECT TO THE ENFORCEMENT OF OPTIONEE'S REMEDIES.

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## IX
## MISCELLANEOUS

9.1 Notices. All notices or other communications between Optionor and Optionee required or permitted hereunder shall be in writing and personally delivered or sent by certified mail, return receipt requested and postage prepaid, sent by reputable overnight courier (such as Federal Express, UPS or DHL), or transmitted by electronic mail to the following addresses:

To Optionor:
North County Transit District
810 Mission Avenue
Oceanside, CA 92054
Attn: Real Estate Department, Tracey Foster
Email: tfoster@nctd.org

With copy to:
North County Transit District
810 Mission Avenue
Oceanside, CA 92054
Attn: Legal Department, Lori A. Winfree
Email: lwinfree@nctd.org

To Optionee:
Toll Bros., Inc.
1140 Virginia Drive
Fort Washington, PA 19034
Attn: Domingo G. Cruz, Esq., Vice President and Counsel
Email: dcruz3@tollbrothers.com

Toll Bros., Inc.
1140 Virginia Drive
Fort Washington, PA 19034
Attn: Charles Elliott, Managing Director
Email: celliott@tollbrothers.com

With copy to:
Jackson Tidus
2030 Main Street, 12th Floor
Irvine, CA 92614
Attn: Andrew P. Bernstein, Esq.
Email: abernstein@jacksontidus.law

A notice shall be effective on the date of personal delivery if personally delivered before 5:00 p.m. Pacific time or otherwise on the day following personal delivery; or when received, if transmitted by electronic mail (e-mail) prior to 5:00 p.m. Pacific time or otherwise on the next business day, provided receipt of such transmission shall be confirmed by follow-up notice within forty-eight (48) hours by another method authorized herein; or two (2) business days following the date the notice is postmarked, if mailed; or on the day following delivery to the applicable overnight courier, if sent by overnight courier. Any refusal to accept a notice transmitted as provided in this Section 9.1 shall be deemed delivery thereof.

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9.2 Brokers and Finders. Optionor and Optionee agree that there are no brokers involved in this Agreement or the Proposed Project other than CBRE, Inc., who shall be compensated by Optionee pursuant to the terms of a separate agreement. If any other claims for brokers' or finders' fees arise for the consummation of this transaction, then Optionee hereby agrees to indemnify, defend and hold harmless Optionor from and against such claims if they are based upon any statement, representation or agreement made by Optionee, and Optionor hereby agrees to indemnify, defend and hold harmless Optionee if such claims are based upon any statement, representation or agreement made by Optionor. The provisions of this Section shall survive the termination of this Agreement.

9.3 No Assignment. Optionee shall have no right to assign or transfer its rights or obligations under this Agreement to any other person or entity, without the express written consent of Optionor, which consent may be withheld by Optionor in its sole and absolute discretion. Notwithstanding the foregoing, Optionee shall have the right to assign, transfer or convey its rights or obligations under this Agreement to an entity that owns, is owned or controlled by, or is under common control with Optionee **("Assignee")** (as shown in advance by reasonable written evidence delivered to Optionor) without the consent of Optionor. In the event of any such assignment by Optionee to an Assignee after the Memorandum of Option (as defined in Section 9.14 below) has been recorded in the Official Records, Optionor and Assignee (as successor in interest to Optionee) shall each execute (and have acknowledged) and deliver to Escrow Holder an amended and restated Memorandum of Option which Escrow Holder shall promptly record in the Official Records, and Assignee shall execute (and have acknowledged) and deliver to Escrow Holder a replacement Quitclaim Deed (as defined in Section 9.14 below), which Escrow Holder shall hold pursuant to the terms of Section 9.14 below.

9.4 Amendments. This Agreement may be amended or modified only by a written instrument executed by the Parties.

9.5 Interpretation. Words used in the singular shall include the plural, and vice-versa, and any gender shall be deemed to include each other gender. The captions and headings of the articles and sections of this Agreement are for convenience of reference only, and shall not be deemed to define or limit the provisions hereof.

9.6 Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the State of California.

9.7 Entire Agreement. Except for the ENA, this Agreement constitutes the entire agreement between the Parties with respect to the Option, the DDA and the Leases and supersedes all prior agreements and understandings between the Parties relating to the subject matter hereof.

9.8 Severability. If any provision or provisions, or if any portion of any provision or provisions, in this Agreement is found by a court of law to be in violation of any applicable local, state or federal ordinance, statute, law, administrative or judicial decision, or public policy, and if such court should declare such portion, provision or provisions of this Agreement to be illegal, invalid, unlawful, void or unenforceable as written, then it is the intent both of Optionor and Optionee that such portion, provision or provisions shall be given force to the fullest possible extent that they are legal, valid and enforceable, that the remainder of this Agreement shall be

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construed as if such illegal, invalid, unlawful, void or unenforceable portion, prov1s10n or provisions were not contained therein, and that the rights, obligations and interest of Optionor and Optionee under the remainder of this Agreement shall continue in full force and effect.

9.9 Counterparts. This Agreement may be executed in one or more counterparts, including the transmission of counterparts via facsimile or electronic mail, each of which shall be deemed an original and all of which together shall constitute one and the same instrument. Electronically-transmitted signatures (including signatures generated using electronic signature technology (e.g., DocuSign or similar technology)) shall be deemed effective as originals, and such signatures shall, for purposes of validity, enforceability and admissibility, be deemed to be valid, binding and effective signatures of the Parties so signing to the same effect as if such signing party signed and delivered a handwritten original signature.

9.10 No Third Party Liability of Optionee. Optionee shall have no liability to any third parties with respect to any matters arising out of, or pertaining to, this Agreement or the Property.

9.11 Eminent Domain. Optionor shall promptly notify Optionee in writing of any condemnation proceeding commenced against the Property, or any portion thereof. If any such proceeding relates to or may result in the loss of any portion of the Property, Optionee may elect either to: (a) terminate this Agreement, in which event the Deposit shall be returned to Optionee and neither Party shall have any further rights or obligations under this Agreement, or (b) continue this Agreement in effect, in which event Optionee shall be entitled to make a claim for such portion of any compensation, awards, or other payments or relief attributable to its interest in the Property and resulting from such condemnation proceedings (and Optionor agrees to support Optionee in making such claim).

9.12 Legal Fees. Subject to the terms of Section 9.19 below, if either Party hereto brings an action against the other by reason of the breach of any covenant, provision or condition hereof, or otherwise arising out of or in connection with this Agreement, the prevailing Party shall be entitled to recover from the other all reasonable attorney's fees and costs actually incurred in connection with the action. The prevailing Party in any such action shall be entitled, in addition to and separately from the amounts recoverable hereunder, to the payment by the losing Party of the prevailing Party's reasonable attorneys' fees, expert witness fees, court costs and litigation expenses incurred in connection with (a) any appellate review of the judgment rendered in such action or of any other ruling in such action, and (b) any proceeding to enforce a judgment in such action. It is the intent of the Parties that the provisions of this Section 9.12 be distinct and severable from the other rights of the Parties under this Agreement, shall survive the entry of judgment in any action and shall not be merged into such judgment.

9.13 Force Majeure. Except as otherwise expressly provided in this Agreement, should the performance of any act required or permitted by this Agreement to be performed be prevented or delayed by reason of a Force Majeure Event (as defined below), the time for performance of the act and the Option Term will be extended for a period equivalent to the period of delay and performance of the act during the period of delay will be excused; provided, however, that nothing contained in this section shall excuse the prompt payment by Optionee of any amounts when due and payable under the terms of this Agreement, the performance of any act rendered difficult or impossible solely because of the financial condition of the Party required to perform the act, or the

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delivery of possession of the Property by Optionor to Optionee as required by this Agreement and the Leases. For the purposes of this Agreement, a **"Force Majeure Event"** shall mean any of the following: act of God, strike, lockout, moratorium on building, construction or planning approvals, restrictions due to pandemic or other public health crises, or governmental orders related thereto, or other restrictive governmental laws or regulations which prohibit or effectively prohibit performance, or any other cause except financial inability not the fault of the Party required to perform the act.

9.14 Recordation of Memorandum of Option. Within five (5) business days after Optionee's payment of the Additional Deposit to Optionor, (a) Optionor and Optionee shall each execute (and have acknowledged) and deliver to Escrow Holder a memorandum of this Agreement in the form attached hereto as **Exhibit "E" ("Memorandum of Option"),** and (b) Optionee shall execute (and have acknowledged) and deliver to Escrow Holder a quitclaim deed in the form attached hereto as **Exhibit "F" ("Quitclaim Deed").** Escrow Holder shall record the Memorandum of Option against the entire Property in the Official Records upon receipt of the Memorandum of Option without further instruction from the Parties. In the event that this Agreement terminates for any reason (other than Optionor's default) prior to the Parties' entering into the DDA and the Leases, Escrow Holder shall record the Quitclaim Deed in the Official Records to cause the Memorandum of Option to be removed from title to the Property.

9.15 Successors and Assigns. Subject to Section 9.3 above, the rights and obligations of the Parties under this Agreement shall be binding upon the Parties' respective successors and assigns.

9.16 Performance on Non-Business Day. Unless otherwise stated, the term "day" shall mean "calendar day". If the time period for the performance of any act called for under this Agreement occurs or expires on a Saturday, Sunday, or any other day in which banking institutions in the State of California are authorized or obligated by law or executive order to close **("Holiday"),** the act in question may be performed on the next succeeding day that is not a Saturday, Sunday, or Holiday.

9.17 Business Day. The term "business day" shall mean any day Monday through Friday, other than a Holiday.

9.18 Joint Effort. Preparation of this Agreement has been a joint effort of the Parties, and the resulting document shall not be construed more severely against one of the Parties than against the other.

9.19 Mediation; Judicial Reference.

(a) Mediation. Before commencing any action or proceeding with respect to any disagreement, controversy or dispute arising under this Agreement (a **"Dispute"),** the Parties shall first attempt to settle the Dispute through consultation and negotiation in good faith and in a spirit of mutual cooperation. If the Dispute is not resolved within ten (10) business days, either Party may elect to escalate the resolution of such Dispute by submitting the Dispute in writing to senior executives from each Party who will promptly meet and confer telephonically or by video conference in an effort to resolve the Dispute. Each Party will identify such senior executive by

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notice to the other Party, and each Party may change its senior executive at any time thereafter by notice. Any mutually agreed decisions reduced to writing of the senior executives will be final and binding on both Parties. In the event the senior executives are unable to resolve any Dispute within ten (10) business days after submission to them, either Party may then refer such Dispute to mediation by a mutually acceptable mediator to be chosen by both Parties within ten (10) business days after written notice by either Party demanding mediation. Neither Party may unreasonably withhold, delay or condition consent to the selection of a mediator. If the Parties are unable to agree on a mediator, the mediation will be referred to JAMS and the selection of a mediator will be made by JAMS in accordance with its rules for selecting mediators. All communications and discussions in furtherance of this paragraph shall be treated as confidential settlement negotiations that are not subject to disclosure to any third party. The costs of the mediator shall be shared equally, but each Party shall pay its own attorney's fees. The mediation shall be concluded within ninety (90) days after the mediation begins unless the Parties mutually agree to extend the mediation period. The cumulative time periods set forth in this Section 9.19(a) utilized by the Parties to attempt to resolve a Dispute are referred to herein as the "Dispute Resolution Period." To the extent that any Dispute is not resolved during the Dispute Resolution Period despite the good faith efforts of the Parties, then the Parties may pursue any and all available rights and remedies (subject to the terms of this Agreement, including without limitation Section 9.19.(b) below). Notwithstanding anything contained in this Agreement to the contrary, the City Approvals Period and the Agency Approvals Period shall be automatically extended for a period equivalent to the Dispute Resolution Period for each Dispute.

(b) Judicial Reference. The Parties agree that any Disputes between them arising out of, related to or in connection with this Agreement or any other document relating to the subject matter of this Agreement that are not resolved pursuant to Section 9.19(a) above shall be heard and resolved by a referee under the provisions of the California Code of Civil Procedure, Sections 638 – 645.1, inclusive (as the same may be amended, or any successor statute(s) thereto) (the "Referee Sections"). Any fee to initiate the judicial reference proceedings shall be paid by the Party initiating such procedure; provided however, that the costs and fees, including any initiation fee, of such proceeding shall ultimately be borne in accordance with Section 9.19(b)(ii) below. The venue of the proceedings shall be in the county in which the Property is located.

(i) Appointment of Referee(s). Within ten (10) days after receipt by any Party of a written request to resolve any Dispute or controversy pursuant to this Section 9.19(b), the Parties shall agree upon a single referee who shall try all issues, whether of fact or law, and report a finding and judgment on such issues as required by the Referee Sections. If the Parties are unable to agree upon a referee within such 10 day period, then any Party may thereafter file a lawsuit in the county in which the Property is located for the purpose of appointment of a referee under California Code of Civil Procedure Sections 639 and 640, as the same may be amended or any successor statute(s) thereto. If the referee is appointed by the court, the referee shall be a neutral and impartial retired judge with substantial experience in the relevant matters to be determined, from Jams/Endispute, Inc., the American Arbitration Association or similar mediation/arbitration entity. The proposed referee may be challenged by any Party for any of the grounds listed in Section 641 of the California Code of Civil Procedure, as the same may be amended or any successor statute(s) thereto.

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(ii) Powers of Referee. The referee shall have the power to decide all issues of fact and law and report his or her decision on such issues, and to issue all recognized remedies available at law or in equity for any cause of action that is before the referee, including an award of attorneys' fees and costs in accordance with California law. The referee shall not, however, have the power to award punitive damages, nor any other damages which are not permitted by the express provisions of this Agreement, and the Parties hereby waive any right to recover any such damages. The referee shall oversee discovery and may enforce all discovery orders in the same manner as any trial court judge, with rights to regulate discovery and to issue and enforce subpoenas, protective orders and other limitations on discovery available under California law; provided, however, that the referee shall limit discovery to that which is essential to the effective prosecution or defense of the action, and in no event shall discovery by either Party include more than one non-expert witness deposition unless both Parties otherwise agree.

(iii) Conduct of Proceeding. The reference proceeding shall be conducted in accordance with California law (including the rules of evidence), and in all regards, the referee shall follow California law applicable at the time of the reference proceeding. In accordance with Section 644 of the California Code of Civil Procedure, the decision of the referee upon the whole issue must stand as the decision of the court, and upon the filing of the statement of decision with the clerk of the court, or with the judge if there is no clerk, judgment may be entered thereon in the same manner as if the action had been tried by the court.

(iv) Cooperation. The Parties shall promptly and diligently cooperate with one another and the referee, and shall perform such acts as may be necessary to obtain a prompt and expeditious resolution of the Dispute in accordance with the terms of this Section 9.19(b). To the extent that no pending lawsuit has been filed to obtain the appointment of a referee, any Party, after the issuance of the decision of the referee, may apply to the court of the county in which the Property is located for confirmation by the court of the decision of the referee in the same manner as a petition for confirmation of an arbitration award pursuant to Code of Civil Procedure Section 1285 *et seq.* (as the same may be amended or any successor statute(s) thereto).

9.20 Further Assurances. Each of the Parties agrees to cooperate in good faith with each other, and to execute and deliver such further documents and perform such other acts as may be reasonably necessary or appropriate to consummate and carry into effect the transactions contemplated under this Agreement. This Section shall survive the Closing.

**[SIGNATURES ON FOLLOWING PAGE]**

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IN WITNESS WHEREOF, the Parties have executed this Agreement as of the last date set forth below, to be effective as of the Effective Date.

**OPTIONOR**:

**NORTH COUNTY TRANSIT DISTRICT**,
a public agency

By: _____
Print Name: Matthew O. Tucker
Title: Executive Director
Dated: March 18, 2021

**OPTIONEE**:

**TOLL BROS., INC.**,
a Pennsylvania corporation

By: _____
Print Name: charles Elliott
Title: Vice President
Dated: 03-18-2021, 2021

Approved as to form:

_____ 3/18/2021
Lori A. Winfree, General Counsel

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# EXHIBIT "A"

## DESCRIPTION OF PROPERTY

[**To be attached**]

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PARCEL A: APN: 147-350-24

PARCEL 1:

LOTS 9 THROUGH 16, BLOCK 7, OCEANSIDE, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 344, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, JULY 1, 1885. LOT 9, BLOCK 7, BRYAN'S ADDITION, ACCORDING TO MAP THEREOF NO. 219, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, MARCH 10, 1887.

PARCEL 2:

ALL OF BLOCK 8 OF BRYAN'S ADDITION, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 219, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, MARCH 10, 1887.

TOGETHER WITH THOSE PORTIONS OF CLEVELAND STREET AND MICHIGAN AVENUE VACATED BY DOCUMENT RECORDED MARCH 14, 1994 AS INSTRUMENT NO. 94-0164097 WHICH WOULD REVERT TO SAID LAND BY OPERATION OF LAW.

PARCEL 3:

FRACTIONAL LOT 8 IN BLOCK 9 OF BRYAN'S ADDITION TO OCEANSIDE, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 219, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, MARCH 10, 1887.

TOGETHER WITH THE NORTHERLY 20 FEET OF TOPEKA STREET AS VACATED AND CLOSED TO PUBLIC USE, LYING SOUTHEASTERLY OF AND ADJACENT TO SAID LOT.

PARCEL 4:

LOTS 1, 2, 3, 4 AND 5 IN BLOCK 10 OF BRYAN'S ADDITION, IN THE CITY OF OCEANSIDE, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 219, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, MARCH 10, 1887.

ALSO THAT PORTION OF TOPEKA STREET LYING WESTERLY FROM CLEVELAND STREET AND NORTH OF AND ADJACENT TO SAID LOT 1, BLOCK 10, WHICH SAID PORTION OF TOPEKA STREETS WAS CLOSED TO PUBLIC USE BY RESOLUTION NO. 915, IN THE CITY COUNCIL OF THE CITY OF OCEANSIDE, CALIFORNIA.

ALSO TOGETHER WITH THOSE PORTIONS OF CLEVELAND STREET AND TYSON STREET VACATED BY DOCUMENT RECORDED MARCH 14, 1994 AS INSTRUMENT NO. 94-0164097 OF OFFICIAL RECORDS WHICH WOULD REVERT TO SAID LAND BY OPERATION OF LAW.

PARCEL 5:

THAT PORTION OF A TRACT OF LAND COMMONLY KNOWN AS THE DEPOT GROUNDS IN OCEANSIDE, TOGETHER WITH THAT CERTAIN 200.00 FOOT RIGHT-OF-WAY OF THE ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY LYING SOUTHEASTERLY OF SAID DEPOT GROUNDS, ALL IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 313, BY H.P VINCENT, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, JULY 19, 1886, DESCRIBED AS FOLLOWS:

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BEGINNING AT THE MOST WESTERLY CORNER OF LOT 16, BLOCK 7 OF OCEANSIDE, ACCORDING TO MAP THEREOF NO. 344, FILED IN SAID COUNTY RECORDER'S OFFICE ON JULY 1, 1885; THENCE SOUTHEASTERLY ALONG THE SOUTHWESTERLY LINE OF SAID BLOCK 7 AND ITS SOUTHEASTERLY PROLONGATION 443.70 FEET, MORE OR LESS TO THE MOST EASTERLY CORNER OF SAID DEPOT GROUNDS; THENCE SOUTHWESTERLY ALONG THE SOUTHEASTERLY LINE OF SAID DEPOT GROUNDS, 150.00 FEET TO THE NORTHEASTERLY RIGHT-OF-WAY LINE OF THE ATCHISON, TOPEKA AND SANTA FE RAILROAD BEING ALSO THE NORTHWESTERLY PROLONGATION OF THE SOUTHWESTERLY LINE OF BLOCK 10 OF BRYAN'S ADDITION TO OCEANSIDE AS SHOWN ON MAP THEREOF NO. 219, FILED IN SAID COUNTY RECORDER'S OFFICE ON MARCH 10, 1887; THENCE SOUTHEASTERLY ALONG SAID PROLONGATION AND SAID SOUTHWESTERLY LINE TO THE MOST SOUTHERLY CORNER OF LOT 5 IN SAID BLOCK 10; THENCE SOUTHWESTERLY ALONG THE SOUTHWESTERLY PROLONGATION OF THE SOUTHEASTERLY LINE OF SAID LOT 5, A DISTANCE OF 75.00 FEET; THENCE NORTHWESTERLY ALONG A LINE THAT IS PARALLEL WITH AND 75.00 FEET SOUTHWESTERLY OF SAID SOUTHWESTERLY LINE OF BLOCK 10 OF BRYAN'S ADDITION, MAP NO. 219, A DISTANCE OF 371.70 FEET; THENCE AT RIGHT ANGLES, NORTHEASTERLY 47.00 FEET; THENCE ALONG A LINE THAT BEARS LEFT 45°00'00" FROM THE NORTHEASTERLY PROLONGATION OF THE LAST MENTIONED LINE, 181.02 FEET TO A POINT ON A LINE THAT IS PARALLEL WITH AND 50.00 FEET SOUTHWESTERLY OF THE SOUTHWESTERLY LINE OF SAID BLOCK 7 OF OCEANSIDE, MAP NO. 344; THENCE ALONG SAID PARALLEL LINE, NORTHWESTERLY TO A POINT ON THE SOUTHWESTERLY PROLONGATION OF THE NORTHWESTERLY LINE OF SAID LOT 16, BLOCK 7 OF MAP NO. 344; THENCE NORTHEASTERLY ALONG SAID PROLONGATION, 50.00 FEET TO THE POINT OF BEGINNING.

PARCEL B:

PARCEL 1: APN 150-043-01, 02, 03 AND 04

ALL OF LOTS 7 AND 8 IN BLOCK 10 AND LOTS 1, 2, 3 AND 4 IN BLOCK 11, ALL BEING BRYAN'S ADDITION TO OCEANSIDE, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 219, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, MARCH 10, 1887, TOGETHER WITH THAT PORTION OF MICHIGAN AVENUE (80.00 FEET WIDE) LYING ADJACENT TO AND BETWEEN SAID BLOCKS AS VACATED AND CLOSED TO PUBLIC USE ON DECEMBER 23, 1931 BY RESOLUTION NO. 633 OF THE CITY COUNCIL OF THE CITY OF OCEANSIDE.

EXCEPTING FORM SAID LOT 7 IN BLOCK 10, THE NORTHWESTERLY 30.00 FEET THEREOF AS DESCRIBED IN DEED RECORDED TO THE CITY OF OCEANSIDE, RECORDED JANUARY 6, 1932 IN BOOK 88, PAGE 3 OF OFFICIAL RECORDS.

TOGETHER WITH THAT PORTION OF CLEVELAND STREET VACATED BY DOCUMENT RECORDED MARCH 14, 1994 AS INSTRUMENT NO. 164097 WHICH WOULD REVERT TO SAID LAND BY OPERATION OF LAW.

PARCEL 2: APN 150-043-05 & 06

LOTS 5, 6, 7 AND 8 IN BLOCK 11 OF BRYAN'S ADDITION TO OCEANSIDE, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 219, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, MARCH 10, 1887.

TOGETHER WITH THAT PORTION OF CLEVELAND VACATED BY DOCUMENT RECORDED MARCH 14, 1994 AS INSTRUMENT NO. 94-0164097 OF OFFICIAL RECORDS WHICH WOULD REVERT TO SAID LAND BY OPERATION OF LAW.

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EXCEPTING AND RESERVING, UNTO GRANTOR HEREIN, ALL OIL, GAS AND OTHER HYDROCARBON SUBSTANCES IN AND UNDER ALL OF THE ABOVE DESCRIBED REAL PROPERTY, BUT WITHOUT ANY RIGHT TO PENETRATE, USE OR DISTURB THE SURFACE OF SAID PROPERTY OR ANY PORTION OF SAID PROPERTY WITHIN FIVE HUNDRED FEET (500') OF THE SURFACE THEREOF, AS EXCEPTED IN THE DEED RECORDED MAY 15, 1991 AS INSTRUMENT NO. 91-0227598 OF OFFICIAL RECORDS.

PARCEL C:

PARCEL 1: APN 150-046-17

LOTS 1, 2, 3, 4 AND 5 IN BLOCK 12 OF BRYAN'S ADDITION, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 219, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, MARCH 10, 1887.

PARCEL 2: APN 150-046-01, 02, 03, 04, 05, 06, 07 & 08

LOTS 9 – 16 INCLUSIVE, IN BLOCK 12 OF BRYANS ADDITION, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 219, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY MARCH 10, 1887.

EXCEPTING AND RESERVING, UNTO GRANTOR HEREIN, ALL OIL, GAS AND OTHER HYDROCARBON SUBSTANCES IN AND UNDER ALL OF THE ABOVE DESCRIBED REAL PROPERTY, BUT WITHOUT ANY RIGHT TO PENETRATE, USE OR DISTURB THE SURFACE OF SAID PROPERTY OR ANY PORTION OF SAID PROPERTY WITHIN FIVE HUNDRED FEET (500') OF THE SURFACE THEREOF.

TOGETHER WITH PORTIONS OF CLEVELAND STREET AND MICHIGAN AVENUE VACATED BY DOCUMENT RECORDED MARCH 14, 1994 AS INSTRUMENT NO. 94-0164097 OF OFFICIAL RECORDS WHICH WOULD REVERT TO SAID LAND BY OPERATION OF LAW.

PARCEL D: APN 147-191-11

LOTS 1 THROUGH 9 INCLUSIVE AND 11 THROUGH 18 INCLUSIVE OF BLOCK 74 OF HORNE'S ADDITION, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 323, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY APRIL 3, 1886.

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# EXHIBIT "B"

## PHASING SCHEDULE

- Phase I
    - 44,000 NSF NCTD headquarters build-to-suit office building in addition to 6,800 NSF of ground-floor retail
    - Stand-alone parking structure with 365 parking spaces
    - 228-unit residential apartment building with 9,325 SF of ground-floor retail and 739 parking spaces
    - Bus transfer center with 4 bus berths
    - 4,000 SF transit center
    - 10,000 SF community center
    - 18,000 SF public plaza with 8 NCTD bus berths
- Phase II
    - 141-key limited service hotel with 14,500 SF of ground floor retail and 165 parking spaces
    - 319-unit residential apartment building with 510 parking spaces and a public pocket park
- Phase III
    - 101-unit affordable residential apartment building with 50 parking spaces at 810 S. Mission Ave.

**[*Note: The information above is subject to change based upon the terms of Section 3.1 of the Agreement and the Final Approval of the Entitlements.*]**

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# EXHIBIT "C"

## DDA TERMS

The DDA to be entered into by Optionor and Optionee at the Closing shall include the following terms and provisions:

- **Development Entitlements and Approvals:** The DDA will provide that Optionee shall work diligently, with Optionor's cooperation, to obtain all required local, state and federal (as applicable) governmental approvals necessary to obtain building permits for the Proposed Project.

- **Term of DDA:** The Term of the DDA will commence when the following has occurred: (1) Execution of the DDA by Optionor and Optionee; and (2) the authorizing resolution or ordinance by Optionor approving the DDA becomes effective. The DDA shall be in effect until completion of construction of the NCTD Improvements pursuant to the terms and conditions of the DDA.

- **Timing to Obtain Entitlements and Approvals:** The DDA will incorporate the time periods and Optionee's extension rights for obtaining the Entitlements set forth in the Option Agreement.

- **Development:** The DDA will address development of the Proposed Project in three or more Phases, subject to modification as set forth in the Option Agreement. It will also grant Optionee the necessary licenses, easements and/or encroachment permits that are required in order to construct the improvements in each Phase that will ultimately be owned by Optionor.

- **Construction:** The DDA will set forth the schedule and terms and conditions of the construction of the NCTD Improvements.

- **Continuous Operational Functionality:** The Parties acknowledge that throughout the process of constructing the Proposed Project, NCTD will require maintaining a high degree of operational functionality. The DDA will include various provisions to assure such uninterrupted functionality, including without limitation:

    - Workspace for a total of 8 employees providing operational support and customer service
    - Parking spaces for 10 employees
    - Bathroom access and break area for customer service, bus, and rail operators
    - At least 50% of current parking capacity
        - Construction crew parking cannot compete with patron parking
    - Bus operations should be preserved through maintaining the existing bus island at its current location until new bus terminal is complete
    - Any changes to parking need to have clearly marked paths from parking to rail bus platforms

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- **Cooperation and Approval Rights:** The DDA will provide that Optionor shall have reasonable approval rights for all plans and specifications for the improvements to be dedicated to and owned by Optionor, and will further provide that Optionor will commit to cooperating in processing all approvals and entitlements for, and implementing and complying with any mitigation measures imposed on the Proposed Project (including the improvements to be owned by Optionor).

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# EXHIBIT "D"

## LEASE TERMS

The Leases to be entered into by Optionor and Optionee at the Closing shall include the following terms and provisions:

- **Ground Leased Property**: The Oceanside Transit Center and the 810 Mission Property (as applicable), excluding the NCTD Improvements to be owned and operated by Optionor.
- **Ground Tenant**: Optionee or its affiliate, subject to the transfer provisions below.
- **Ground Landlord**: Optionor.
- **Term of Leases**: Ninety-nine (99) years, commencing upon execution of each Lease.
- **Rent**:
    - Base Rent Years 1-5: A total of Three Hundred Fifty Thousand Dollars ($350,000) per annum for all of the Leases, subject to the terms of Section 3.2 of the Option Agreement regarding (1) allocation of the Overall Base Rent among the Leases, and (2) adjustment of the Overall Base Rent in the event the approved project differs from the parameters for the Proposed Project.
    - Base Rent Adjustments: Commencing on the first day of year six (6) of the Term and on every fifth ($5^{th}$) anniversary thereafter (i.e., years 11, 16, 21, 26, 31, etc.), Base Rent shall be adjusted to a fixed increase based on compounded 2.5% annual increases, as applied to the then-current Base Rent.
    - Triple Net: The Base Rent assumes an absolute triple net lease structure. Ground Tenant will assume, at the time possession is tendered to Ground Tenant under each Lease, the payment of all real estate taxes and assessments, insurance, and costs of public utilities and services arising out of the operation and maintenance of the applicable portion of the Property.
- **Assignment and Subleases**:
    - Single Purpose Entity Each Lease will be assignable by Ground Tenant to a single purpose entity with Optionor's consent, not to be unreasonably withheld, conditioned or delayed, and subject to the following parameters in the Leases which, if satisfied, will automatically satisfy Optionor's consent requirement:
        - A managing member of such single purpose entity will be Optionee or an affiliate of Optionee, and in which entity Optionee or an affiliate of Optionee will hold no less than a 20% direct or indirect interest; and
        - Upon commencement of each phase of the Proposed Project, Optionee will provide to Optionor a completion guarantee in commercially reasonable form and substantially similar to the completion guarantee to be provided

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to the construction lender for such phase in which completion will be based on plans and specifications for the Proposed Project agreed to by Ground Tenant and the construction lender.

- Institutional Investor: Each Lease will also be assignable by Ground Tenant to an "Institutional Investor" (to be defined in the Leases) with Optionor's consent, not to be unreasonably withheld, conditioned or delayed, and subject to parameters in the Leases which, if satisfied, will automatically satisfy Optionor's consent requirement, but only upon substantial completion of the relevant phase of the Proposed Project. Substantial completion shall be deemed achieved if a temporary (if available) or permanent certificate of occupancy can be obtained for the relevant phase of the Proposed Project but for a component such as retail space finished to a cold, dark shell for which a tenant has not been identified or for components which Ground Tenant will not control post-completion.

- Subleases: Ground Tenant will be permitted to enter subleases with space tenants (as applicable) without Optionor's consent or approval, provided that Ground Tenant will not be released from any of its obligations under the Lease.

- **Leasehold Financing**: Ground Tenant will be free to enter into a leasehold mortgage of all or any portion of the Property subject to the Leases. Ground Tenant's interest under each Lease is intended to be financeable including, but not limited to, customary leasehold mortgagee protective provisions, including notice and cure rights for Ground Tenant's mortgagee and Optionor's acknowledgement of the subordination of any interest in condemnation and insurance loss proceeds. Optionor shall reasonably cooperate with Ground Tenant in satisfying any terms and conditions required in connection with the leasehold mortgage financing.

- **Right of First Offer**: Ground Tenant will have a right of first offer with respect to any transfer by Optionor of Optionor's fee interest in the Property; provided, however, such right of first offer will not apply to any merger or change in control of Optionor or change in control of the functions of Optionor to another public entity.

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# EXHIBIT "E"

## MEMORANDUM OF OPTION

(See Attached)

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RECORDING REQUESTED BY
AND WHEN RECORDED MAIL TO:

North County Transit District
810 Mission Avenue
Oceanside, CA 92054
Attention: Real Estate Department

With a copy to:

Toll Bros., Inc.
140 Virginia Drive
Fort Washington, PA 19034
Attention: Domingo G. Cruz, Esq.,
Vice President and Counsel

(Space Above For Recorder's Use)

**MEMORANDUM OF OPTION AGREEMENT**

THIS MEMORANDUM OF OPTION AGREEMENT (the "**Memorandum**") dated as of _____, 2021 (the "**Grant Date**") is entered into by and between NORTH COUNTY TRANSIT DISTRICT, a public agency existing under the laws of the State of California, pursuant to California Public Utility Code Sections 125000, *et seq.* ("**Optionor**"), and TOLL BROS., INC., a Pennsylvania corporation ("**Optionee**").

WHEREAS, Optionor and Optionee are the parties to an Option Agreement dated as of the Grant Date ("**Option Agreement**") whereby Optionor grants to Optionee an option to ground lease portions of the real property legally described in Exhibit "A" attached hereto (the "**Property**") and to enter into a Disposition and Development Agreement (the "**DDA**") regarding the development of the Property.

NOW THEREFORE, the parties hereby agree as follows:

1. Grant of Option. Optionor hereby grants to Optionee an option to ground lease portions of the Property and to enter into the DDA (the "**Option**") on all of the terms and conditions described in the Option Agreement for a term commencing on the Grant Date and ending on: _____ ***[Note: Insert date that is 3 years following the expiration of the Due Diligence Period]*** (the "**Option Period**"), subject to extension pursuant to the terms of the Option Agreement.

2. Purpose of Memorandum; Conflict. This Memorandum is prepared and recorded for the purpose of putting the public on notice of the Option Agreement, and this Memorandum in no way modifies the terms and conditions of the Option Agreement. In the event of any inconsistency between the terms and conditions of this Memorandum and the terms and conditions of the Option Agreement, the terms and conditions of the Option Agreement shall control.

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3. Counterparts. This Memorandum may be executed in counterparts, each of which shall constitute an original, but all of which shall constitute one and the same instrument.

IN WITNESS WHEREOF, this Memorandum has been executed as of the Grant Date.

**OPTIONOR**:

NORTH COUNTY TRANSIT DISTRICT

By: _____
Name: _____
Title: _____

**OPTIONEE**:

TOLL BROS., INC.,
a Pennsylvania corporation

By: _____
Name: _____
Title: _____

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A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of _____)
County of _____)

On _____, before me, _____, Notary Public,
(here insert name and title of the officer)
personally appeared _____,
who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument, and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature_____

(Seal)

DocuSign Envelope ID: 8F351548-0629-416E-8FDD-BFD156C49E2D

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of _____)
County of _____)

On _____, before me, _____, Notary Public,
(here insert name and title of the officer)
personally appeared _____,
who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument, and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature_____

(Seal)

DocuSign Envelope ID: 8F351548-0629-416E-8FDD-BFD156C49E2D

EXHIBIT "A"

DESCRIPTION OF PROPERTY

The land referred to herein is situated in the City of Oceanside, County of San Diego, State of California, and described as follows:

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# EXHIBIT "F"
# QUITCLAIM DEED

(See Attached)

DocuSign Envelope ID: 8F351548-0629-416E-8FDD-BFD156C49E2D

RECORDING REQUESTED BY
AND WHEN RECORDED MAIL TO:

North County Transit District
810 Mission Avenue
Oceanside, CA 92054
Attention: Real Estate Department

With a copy to:

Toll Bros., Inc.
140 Virginia Drive
Fort Washington, PA 19034
Attention: Domingo G. Cruz, Esq.,
Vice President and Counsel

(Space Above For Recorder's Use)

**QUITCLAIM DEED**

The undersigned declares:
Documentary Transfer Tax is -0-
(Consideration less than $100)

FOR VALUABLE CONSIDERATION, receipt of which is hereby acknowledged, TOLL BROS., INC., a Pennsylvania corporation, hereby remises, releases and quitclaims to NORTH COUNTY TRANSIT DISTRICT, a public agency existing under the laws of the State of California, all of its right, title and interest in and to the real property in the City of Oceanside, County of San Diego, State of California, described on Exhibit 1 attached hereto and incorporated herein by this reference and releases the encumbrance of that certain Memorandum of Option Agreement recorded _____ as Instrument No. _____ in the Official Records of San Diego County.

TOLL BROS., INC.,
a Pennsylvania corporation

By: _____
Name: _____
Title: _____

DocuSign Envelope ID: 8F351548-0629-416E-8FDD-BFD156C49E2D

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of _____)
County of _____)

On _____, before me, _____, Notary Public,
(here insert name and title of the officer)
personally appeared _____,
who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument, and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature_____ (Seal)

DocuSign Envelope ID: 8F351548-0629-416E-8FDD-BFD156C49E2D

# EXHIBIT "1"

## DESCRIPTION OF PROPERTY

The land referred to herein is situated in the City of Oceanside, County of San Diego, State of California, and described as follows:

DocuSign Envelope ID: 8F351548-0629-416E-8FDD-BFD156C49E2D

PARCEL A: APN: 147-350-24

PARCEL 1:

LOTS 9 THROUGH 16, BLOCK 7, OCEANSIDE, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 344, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, JULY 1, 1885; LOT 9, BLOCK 7, BRYAN'S ADDITION, ACCORDING TO MAP THEREOF NO. 219, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, MARCH 10, 1887.

PARCEL 2:

ALL OF BLOCK 8 OF BRYAN'S ADDITION, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 219, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, MARCH 10, 1887.

TOGETHER WITH THOSE PORTIONS OF CLEVELAND STREET AND MICHIGAN AVENUE VACATED BY DOCUMENT RECORDED MARCH 14, 1994 AS INSTRUMENT NO. 94-0164097 WHICH WOULD REVERT TO SAID LAND BY OPERATION OF LAW.

PARCEL 3:

FRACTIONAL LOT 8 IN BLOCK 9 OF BRYAN'S ADDITION TO OCEANSIDE, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 219, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, MARCH 10, 1887.

TOGETHER WITH THE NORTHERLY 20 FEET OF TOPEKA STREET AS VACATED AND CLOSED TO PUBLIC USE, LYING SOUTHEASTERLY OF AND ADJACENT TO SAID LOT.

PARCEL 4:

LOTS 1, 2, 3, 4 AND 5 IN BLOCK 10 OF BRYAN'S ADDITION, IN THE CITY OF OCEANSIDE, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 219, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, MARCH 10, 1887.

ALSO THAT PORTION OF TOPEKA STREET LYING WESTERLY FROM CLEVELAND STREET AND NORTH OF AND ADJACENT TO SAID LOT 1, BLOCK 10, WHICH SAID PORTION OF TOPEKA STREETS WAS CLOSED TO PUBLIC USE BY RESOLUTION NO. 915, IN THE CITY COUNCIL OF THE CITY OF OCEANSIDE, CALIFORNIA.

ALSO TOGETHER WITH THOSE PORTIONS OF CLEVELAND STREET AND TYSON STREET VACATED BY DOCUMENT RECORDED MARCH 14, 1994 AS INSTRUMENT NO. 94-0164097 OF OFFICIAL RECORDS WHICH WOULD REVERT TO SAID LAND BY OPERATION OF LAW.

PARCEL 5:

THAT PORTION OF A TRACT OF LAND COMMONLY KNOWN AS THE DEPOT GROUNDS IN OCEANSIDE, TOGETHER WITH THAT CERTAIN 200.00 FOOT RIGHT-OF-WAY OF THE ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY LYING SOUTHEASTERLY OF SAID DEPOT GROUNDS, ALL IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 313, BY H.P VINCENT, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, JULY 19, 1886, DESCRIBED AS FOLLOWS:

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BEGINNING AT THE MOST WESTERLY CORNER OF LOT 16, BLOCK 7 OF OCEANSIDE, ACCORDING TO MAP THEREOF NO. 344, FILED IN SAID COUNTY RECORDER'S OFFICE ON JULY 1, 1885; THENCE SOUTHEASTERLY ALONG THE SOUTHWESTERLY LINE OF SAID BLOCK 7 AND ITS SOUTHEASTERLY PROLONGATION 443.70 FEET, MORE OR LESS TO THE MOST EASTERLY CORNER OF SAID DEPOT GROUNDS; THENCE SOUTHWESTERLY ALONG THE SOUTHEASTERLY LINE OF SAID DEPOT GROUNDS, 150.00 FEET TO THE NORTHEASTERLY RIGHT-OF-WAY LINE OF THE ATCHISON, TOPEKA AND SANTA FE RAILROAD BEING ALSO THE NORTHWESTERLY PROLONGATION OF THE SOUTHWESTERLY LINE OF BLOCK 10 OF BRYAN'S ADDITION TO OCEANSIDE AS SHOWN ON MAP THEREOF NO. 219, FILED IN SAID COUNTY RECORDER'S OFFICE ON MARCH 10, 1887; THENCE SOUTHEASTERLY ALONG SAID PROLONGATION AND SAID SOUTHWESTERLY LINE TO THE MOST SOUTHERLY CORNER OF LOT 5 IN SAID BLOCK 10; THENCE SOUTHWESTERLY ALONG THE SOUTHWESTERLY PROLONGATION OF THE SOUTHEASTERLY LINE OF SAID LOT 5, A DISTANCE OF 75.00 FEET; THENCE NORTHWESTERLY ALONG A LINE THAT IS PARALLEL WITH AND 75.00 FEET SOUTHWESTERLY OF SAID SOUTHWESTERLY LINE OF BLOCK 10 OF BRYAN'S ADDITION, MAP NO. 219, A DISTANCE OF 371.70 FEET; THENCE AT RIGHT ANGLES, NORTHEASTERLY 47.00 FEET; THENCE ALONG A LINE THAT BEARS LEFT 45°00'00" FROM THE NORTHEASTERLY PROLONGATION OF THE LAST MENTIONED LINE, 181.02 FEET TO A POINT ON A LINE THAT IS PARALLEL WITH AND 50.00 FEET SOUTHWESTERLY OF THE SOUTHWESTERLY LINE OF SAID BLOCK 7 OF OCEANSIDE, MAP NO. 344; THENCE ALONG SAID PARALLEL LINE, NORTHWESTERLY TO A POINT ON THE SOUTHWESTERLY PROLONGATION OF THE NORTHWESTERLY LINE OF SAID LOT 16, BLOCK 7 OF MAP NO. 344; THENCE NORTHEASTERLY ALONG SAID PROLONGATION, 50.00 FEET TO THE POINT OF BEGINNING.

PARCEL B:

PARCEL 1: APN 150-043-01, 02, 03 AND 04

ALL OF LOTS 7 AND 8 IN BLOCK 10 AND LOTS 1, 2, 3 AND 4 IN BLOCK 11, ALL BEING BRYAN'S ADDITION TO OCEANSIDE, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 219, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, MARCH 10, 1887, TOGETHER WITH THAT PORTION OF MICHIGAN AVENUE (80.00 FEET WIDE) LYING ADJACENT TO AND BETWEEN SAID BLOCKS AS VACATED AND CLOSED TO PUBLIC USE ON DECEMBER 23, 1931 BY RESOLUTION NO. 633 OF THE CITY COUNCIL OF THE CITY OF OCEANSIDE.

EXCEPTING FORM SAID LOT 7 IN BLOCK 10, THE NORTHWESTERLY 30.00 FEET THEREOF AS DESCRIBED IN DEED RECORDED TO THE CITY OF OCEANSIDE, RECORDED JANUARY 6, 1932 IN BOOK 88, PAGE 3 OF OFFICIAL RECORDS.

TOGETHER WITH THAT PORTION OF CLEVELAND STREET VACATED BY DOCUMENT RECORDED MARCH 14, 1994 AS INSTRUMENT NO. 164097 WHICH WOULD REVERT TO SAID LAND BY OPERATION OF LAW.

PARCEL 2: APN 150-043-05 & 06

LOTS 5, 6, 7 AND 8 IN BLOCK 11 OF BRYAN'S ADDITION TO OCEANSIDE, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 219, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, MARCH 10, 1887.

TOGETHER WITH THAT PORTION OF CLEVELAND VACATED BY DOCUMENT RECORDED MARCH 14, 1994 AS INSTRUMENT NO. 94-0164097 OF OFFICIAL RECORDS WHICH WOULD REVERT TO SAID LAND BY OPERATION OF LAW.

DocuSign Envelope ID: 8F351548-0629-416E-8FDD-BFD156C49E2D

EXCEPTING AND RESERVING, UNTO GRANTOR HEREIN, ALL OIL, GAS AND OTHER HYDROCARBON SUBSTANCES IN AND UNDER ALL OF THE ABOVE DESCRIBED REAL PROPERTY, BUT WITHOUT ANY RIGHT TO PENETRATE, USE OR DISTURB THE SURFACE OF SAID PROPERTY OR ANY PORTION OF SAID PROPERTY WITHIN FIVE HUNDRED FEET (500') OF THE SURFACE THEREOF, AS EXCEPTED IN THE DEED RECORDED MAY 15, 1991 AS INSTRUMENT NO. 91-0227598 OF OFFICIAL RECORDS.

PARCEL C:

PARCEL 1: APN 150-046-17

LOTS 1, 2, 3, 4 AND 5 IN BLOCK 12 OF BRYAN'S ADDITION, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 219, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, MARCH 10, 1887.

PARCEL 2: APN 150-046-01, 02, 03, 04, 05, 06, 07 & 08

LOTS 9 – 16 INCLUSIVE, IN BLOCK 12 OF BRYANS ADDITION, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 219, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY MARCH 10, 1887.

EXCEPTING AND RESERVING, UNTO GRANTOR HEREIN, ALL OIL, GAS AND OTHER HYDROCARBON SUBSTANCES IN AND UNDER ALL OF THE ABOVE DESCRIBED REAL PROPERTY, BUT WITHOUT ANY RIGHT TO PENETRATE, USE OR DISTURB THE SURFACE OF SAID PROPERTY OR ANY PORTION OF SAID PROPERTY WITHIN FIVE HUNDRED FEET (500') OF THE SURFACE THEREOF.

TOGETHER WITH PORTIONS OF CLEVELAND STREET AND MICHIGAN AVENUE VACATED BY DOCUMENT RECORDED MARCH 14, 1994 AS INSTRUMENT NO. 94-0164097 OF OFFICIAL RECORDS WHICH WOULD REVERT TO SAID LAND BY OPERATION OF LAW.

PARCEL D: APN 147-191-11

LOTS 1 THROUGH 9 INCLUSIVE AND 11 THROUGH 18 INCLUSIVE OF BLOCK 74 OF HORNE'S ADDITION, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 323, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY APRIL 3, 1886.

DocuSign Envelope ID: 8F351548-0629-416E-8FDD-BFD156C49E2D

# Exhibit "G"

Acceptance of of Revised Exhibit Memorandum

Optionor and Optionee accept the revised Exhibits "C" and "D", attached hereto and incorporated by reference.

**OPTIONOR**:

**NORTH COUNTY TRANSIT DISTRICT**,
a public agency

By: _____
Print Name: _____
Title: _____
Dated: _____, 2021

**OPTIONEE**:

**TOLL BROS., INC.**,
a Pennsylvania corporation

By: _____
Print Name: _____
Title: _____
Dated: _____, 2021

Date. 7 Feb '23

Project: Toll Brothers Apartment Living.

Comment: The project should have camera surveillance in the general & public areas of the project and on the exit and entrance to parking on site. The cameras need to be of high clarity so that license plates can be read. The camera system should be able to magnify an individual's face for proper identification. There should be signs posted for everyone to read that the area is under camera surveillance. There should be no expectation of privacy in the general areas of the property and in the public areas.

Patrick Marier
410 S. Pacific St.
Oceanside, CA 92054

## Oceanside Transit Center Redevelopment EIR

## PUBLIC SCOPING MEETING
## COMMENT FORM

**NAME AND ADDRESS OF COMMENTOR:** (include group or public agency affiliation, as applicable)

Michele Cyr
3689 Seaflower Ln
Oceanside, Ca 92056

michele.cyr@sbcglobal.net
(951) 970-0372

**COMMENTS:**

Please provide your comments on potential environmental issues/impacts that you feel should be addressed as part of the EIR. Attach additional pieces of paper, as needed.

This form and/or additional comments can be submitted to City staff at the Scoping Meeting or mailed to the City of Oceanside, 300 N. Coast Hwy, Oceanside, California 92054, Attention: Mr. Rob Dmohowski. Comments may also be e-mailed to: rdmohowski@oceansideca.org. Please note that comments are due on February 13, 2023.

Hello Rob! I attended the public meeting on Feb 1st, 23 and would like to express my concerns about this transit project's EIR. Primarily, as an avid bicyclist in our community I'd like to support the ideas expressed to help this project be bike friendly - safe, secure areas to lock our bikes, bike lockers, lanes for enhanced safety. I'm also concerned about the effects of the pollution, ultimately hoping we will get away from diesel fuel as soon as possible! I'm concerned for the renters of the new apartments that may be in the way of the exhaust which may stream →

into that U shape of the building.

My hope is that we install a paid type of parking lot to deter as much use of cars as possible & encourage our city to be extra bike-friendly!

Thank you so much!

Mackie Dyer

(951) 970-0372

**California Department of Transportation**

DISTRICT 11
4050 TAYLOR STREET, MS-240
SAN DIEGO, CA 92110
(619) 709-5152 | FAX (619) 688-4299 TTY 711
www.dot.ca.gov

February 10, 2023

11-SD-5
PM 52.097
Oceanside Transit Center Redevelopment
NOP/SCH#2023010231

Mr. Rob Dmohowski, AICP
Principal Planner
City of Oceanside
300 N. Coast Highway
Oceanside, CA 92054

Dear Mr. Dmohowski:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the Notice of Preparation (NOP) for the Oceanside Transit Center Redevelopment project located near Interstate 5 (I-5). The mission of Caltrans is to provide a safe and reliable transportation network that serves all people and respects the environment. The Local Development Review (LDR) Program reviews land use projects and plans to ensure consistency with our mission and state planning priorities.

Safety is one of Caltrans' strategic goals. Caltrans strives to make the year 2050 the first year without a single death or serious injury on California's roads. We are striving for more equitable outcomes for the transportation network's diverse users. To achieve these ambitious goals, we will pursue meaningful collaboration with our partners. We encourage the implementation of new technologies, innovations, and best practices that will enhance the safety on the transportation network. These pursuits are both ambitious and urgent, and their accomplishment involves a focused departure from the status quo as we continue to institutionalize safety in all our work.

Caltrans is committed to prioritizing projects that are equitable and provide meaningful benefits to historically underserved communities, to ultimately improve transportation accessibility and quality of life for people in the communities we serve.

We look forward to working with the City of Oceanside in areas where the City and Caltrans have joint jurisdiction to improve the transportation network and connections

between various modes of travel, with the goal of improving the experience of those who use the transportation system.

Caltrans has the following comments:

**Traffic Impact Study**

- A Vehicle Miles of Travel (VMT) based Traffic Impact Study (TIS) should be provided for this project. Please use the Governor's Office of Planning and Research Guidance to identify VMT related impacts.[1]

- The TIS may also need to identify the proposed project's near-term and long-term safety or operational issues, on or adjacent to any existing or proposed State facilities.

**Complete Streets and Mobility Network**

Caltrans views all transportation improvements as opportunities to improve safety, access and mobility for all travelers in California and recognizes bicycle, pedestrian and transit modes as integral elements of the transportation network. Caltrans supports improved transit accommodation through the provision of Park and Ride facilities, improved bicycle and pedestrian access and safety improvements, signal prioritization for transit, bus on shoulders, ramp improvements, or other enhancements that promotes a complete and integrated transportation network. Early coordination with Caltrans, in locations that may affect both Caltrans and the City of Oceanside is encouraged.

To reduce greenhouse gas emissions and achieve California's Climate Change target, Caltrans is implementing Complete Streets and Climate Change policies into State Highway Operations and Protection Program (SHOPP) projects to meet multi-modal mobility needs. Caltrans looks forward to working with the City to evaluate potential Complete Streets projects.

Maintaining bicycle, pedestrian, and public transit access during construction is important. Mitigation to maintain bicycle, pedestrian, and public transit access during construction is in accordance with Caltrans' goals and policies.

[1] California Governor's Office of Planning and Research (OPR) 2018. "Technical Advisory on Evaluating Transportation Impacts in CEQA." https://opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf

**Land Use and Smart Growth**

Caltrans recognizes there is a strong link between transportation and land use. Development can have a significant impact on traffic and congestion on State transportation facilities. In particular, the pattern of land use can affect both local vehicle miles traveled and the number of trips. Caltrans supports collaboration with local agencies to work towards a safe, functional, interconnected, multi-modal transportation network integrated through applicable "smart growth" type land use planning and policies.

The City should continue to coordinate with Caltrans to implement necessary improvements at intersections and interchanges where the agencies have joint jurisdiction.

**Environmental**

Caltrans welcomes the opportunity to be a Responsible Agency under the California Environmental Quality Act (CEQA), as we have some discretionary authority of a portion of the project that is in Caltrans' R/W through the form of an encroachment permit process. We look forward to the coordination of our efforts to ensure that Caltrans can adopt the alternative and/or mitigation measure for our R/W. We would appreciate meeting with you to discuss the elements of the EIR that Caltrans will use for our subsequent environmental compliance.

An encroachment permit will be required for any work within the Caltrans' R/W prior to construction. As part of the encroachment permit process, the applicant must provide approved final environmental documents for this project, corresponding technical studies, and necessary regulatory and resource agency permits. Specifically, CEQA determination or exemption. The supporting documents must address all environmental impacts within the Caltrans' R/W and address any impacts from avoidance and/or mitigation measures.

We recommend that this project specifically identifies and assesses potential impacts caused by the project or impacts from mitigation efforts that occur within Caltrans' R/W that includes impacts to the natural environment, infrastructure including but not limited to highways, roadways, structures, intelligent transportation systems elements, on-ramps and off-ramps, and appurtenant features including but not limited to lighting, signage, drainage, guardrail, slopes and landscaping. Caltrans is interested in any additional mitigation measures identified for the project's draft Environmental Document.

**Broadband**

Caltrans recognizes that teleworking and remote learning lessen the impacts of traffic on our roadways and surrounding communities. This reduces the amount of VMT and decreases the amount of greenhouse gas (GHG) emissions and other pollutants. The availability of affordable and reliable, high-speed broadband is a key component in supporting travel demand management and reaching the state's transportation and climate action goals.

**Right-of-Way**

- Per Business and Profession Code 8771, perpetuation of survey monuments by a licensed land surveyor is required, if they are being destroyed by any construction.
- Any work performed within Caltrans' R/W will require discretionary review and approval by Caltrans and an encroachment permit will be required for any work within the Caltrans' R/W prior to construction.

Additional information regarding encroachment permits may be obtained by contacting the Caltrans Permits Office at (619) 688-6158 or emailing D11.Permits@dot.ca.gov or by visiting the website at https://dot.ca.gov/programs/traffic-operations/ep. Early coordination with Caltrans is strongly advised for all encroachment permits.

If you have any questions or concerns, please contact Kimberly Dodson, LDR Coordinator, at (619) 985-1587 or by e-mail sent to Kimberly.Dodson@dot.ca.gov .

Sincerely,

*Maurice A. Eaton*

MAURICE EATON
Branch Chief
Local Development Review

SIERRA CLUB

COASTERS
NORTH COUNTY COASTAL GROUP

Explore, Enjoy & Protect the Planet

February 13, 2023

Rob Dmohowski,
Principal Planner
City of Oceanside
300 N. Coast Highway
Oceanside, CA 92054

RE: Oceanside Transit Center Redevelopment Project – CEQA Scoping Meeting Comments

Dear Mr. Dmohowski:

On behalf of the Sierra Club, I am submitting comments for the proposed redevelopment at the Oceanside Transit Center, and its potential environmental impacts.

This redevelopment project demonstrates several aspects of the type of development that the Sierra Club supports. The Sierra Club's mission, in combination with growing threats to our environment, requires a renewed emphasis on places where people can live, work, and thrive while protecting and restoring our natural environment and fighting the causes and impacts of climate change.

Therefore, the Sierra Club supports transformative strategies that build communities that feature:

- Affordable housing accessible to all
- Transit, bike, and pedestrian first approaches to transportation
- Expanded opportunities for all residents to participate in the local economy and civic decisions
- Living wage jobs
- A balance between employment opportunities and housing
- Access to education, services, amenities, and recreation that improve overall quality of life
- Measures and policies that increase climate resilience.

Support for such communities is a natural corollary to the Sierra Club's opposition to sprawl, which promotes automobile dependence, destroys natural ecosystems, separates people from each other, increases social inequity, reduces economic security and increases carbon emissions.

This project embodies several smart growth principles, including: location near the city center, access to public transit, and mixed use development (inclusive housing, commercial, retail, amenities). These aspects of smart growth help communities thrive.

Some items we believe should be incorporated into the redevelopment plans include:

**Better design of the streets and traffic flow to enhance the approach to the transit hub and promote intermodal transportation including comfortable pedestrian and bike travel into the transit hub.**

**A better plan for convenient and safe bicycle access and secure bicycle storage.**

**Enhanced accessibility to the beach west of the hub.**

Some items that we believe need to be analyzed and addressed in the DEIR include:

**VMTs and Transportation Demand Management (TDM)**

We would like to see comprehensive plans to capitalize on the proximity to the transit hub to reduce VMTs for the different land uses that will be developed and provided.

**TDM**

Robust TDM plans should be required for all planned uses: area and regional transit, hotel, housing, office space, retail, amenities, etc. TDM plans should require a significant reduction in car trips, plus reporting and monitoring.

**Parking Demand Management (PDM)**

As other groups have pointed out in their comments on the project, the proposal touts the addition of a several new parking areas, in addition to the existing parking structure at Seagaze. We understand the need to accommodate the new housing units, a hotel, office buildings, stores, etc. However, we know that PDM strategies designed to reduce parking demand, and promote a shift from single occupant vehicle (SOV) trips to transit, pedestrian, and bicycling trips would reduce VMT and environmental harm. A combination of parking pricing and supply-side strategies should be reviewed for implementation. Parking pricing involves charging a fee for parking, whereas parking supply strategies involve restricting the supply of available parking.

**Impact from Nearby Developments**

A comprehensive review of the impacts from other nearby potential projects should be included. This project includes a new hotel and about 550 housing units which will be developed in an area where other large developments are planned or already approved. A Superior Court ruling recently nullified an analysis of how a similar-sized housing project in Rancho Penasquitos would affect nearby traffic, noise and wildfire threats, saying it had failed to account for two large nearby housing projects.

**Mitigation Measures**

Consider use of mitigation measures that will lower the overall GHGs generated by the project, these include: build high-efficiency buildings that minimize energy use, all-electric buildings which would also eliminate the need for additional gas infrastructure; install renewable power that exceeds the minimum code requirements.

Thank you for your consideration of our comments.

Sincerely,

Barbara Collins, Executive Committee Member

Sierra Club North County Coastal Group

## Robert Dmohowski

**From:** John MacDowell <johnmacdowell344@gmail.com>
**Sent:** Sunday, February 12, 2023 5:25 PM
**To:** Robert Dmohowski
**Subject:** Transit Center Development

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

**Warning: External Source**

Dear Mr. Dmohowski,

I appreciated the opportunity to attend the scoping meeting for the proposed Transit Center development on February 1. While I recognize the work put into the project planning by the City, developer, and consultants, I was disappointed in the proposal.

Oceanside has a tremendous opportunity to build a project that takes advantage of the transit opportunities at the Transit Center and its downtown location. Sadly, the proposal falls short of the mark.

I would encourage the developer to include a parking management plan, to facilitate the use of transit. I would hope to see improved pedestrian and bicycle access. The project could serve as a gateway to the downtown. Instead, it walls off the transit center from the rest of downtown.

Oceanside is served by NCTD bus transit, the Sprinter, Coaster, Metrolink, and Amtrak, through its transit center. Yet the proposed project seems to disregard these opportunities.

It is my hope that the developer addresses these concerns, and that the City works toward a project that is a true asset to Oceanside.

Thank you for considering my comments.

John MacDowell
3101 Buena Hills Dr.
Oceanside 92056
949-375-4966

## Robert Dmohowski

**From:** Marge Hitchen <marge.hitchen@live.com>
**Sent:** Monday, February 13, 2023 8:54 AM
**To:** Robert Dmohowski
**Subject:** New Transit center concerns

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

Warning: External Source

---

We own a home 1 block south on Cleveland from the proposed transit center & new housing.
We are very concerned about the increased traffic the new hotel & rental apartments will cause. At the recent meeting we didn't see this excessive traffic addressed.
Also very unhappy with your plans to move the bus traffic/lanes to the south. What is wrong with leaving the public transportation where it is at. It is closer to the current public parking (which is staying), close to the downtown businesses, riders are familiar with the bus system/location and it provides some privacy to the residential area south of the transit center. Moving the location from the present north location will again increase traffic to the south (vehicle & foot), increase air pollution from the buses and increase the noise.
You also didn't address how you will handle the homeless population as well as the young adults that tend to congregate around this transit area. This includes the underpass, benches & other public areas.
We understand that the transit area needs to be improved but much more research and thought needs to be done so it meets the needs of the community and doesn't adversely effect the surrounding residents.
Thank you,
Margaret Hitchen
510 S. Cleveland

Sent from my iPhone

## Robert Dmohowski

**From:** Angela L Keshavan <angiekesh@yahoo.com>
**Sent:** Saturday, February 11, 2023 11:41 AM
**To:** Robert Dmohowski
**Subject:** Transit center hotel

**Warning: External Source**

My Greendale Andra wrote to you about all the environmental issues building more in downtown oceanside along with noise and fust factors. I'd like to 2nd everything she said since we'll. I also don't think anyone is thinking about what effect all the building that's being planned will have on the already bad traffic. The road infrastructure wasn't meant for so many new buildings. Taking down the few trees in the area at transit center environmentally effects the air quality. Parking will become a nightmare.
I think oceanside is only thinking of tax revenue and ruining the nice city that downtown oceanside is.

Very concerned and sad
Angie Keshavan
301 Mission ave
Unit 510
Oceanside 92054
281 389 9243

Sent from Yahoo Mail on Android

## Robert Dmohowski

**From:** joan bockman <joanbockman@sbcglobal.net>
**Sent:** Monday, February 13, 2023 4:52 PM
**To:** Robert Dmohowski
**Subject:** Transit Ctr EIR comments

**Warning: External Source**

Please enter these comments into the record for response.
Regards,
Joan Bockman

Aesthetics - The design must be something unique to Oceanside. Don't build unless you are really contributing to our culture, affordable housing and sense of place. We are not faux Hawaii, Solana Beach or anywhere else.
What is the gift to the street? It is usually not ornamentation - it is usually good design.

Biological Resources - The landscape needs to be native habitat. Palms are not native and only arrived a few years ago (look at Oside photos of the 1940's/50's). All trees must be canopy trees. Landscapes must be able to absorb the leaf litter without mow and blow maint techniques. Rainwater harvesting should be total and passively feed the landscape. Plants adapted to fog (ie Torrey Pines) are needed. We are now part of the habitat and must provide for the flora and fauna among us. Where will birds nest? Are there seasonal native berries?
Require all cats to be indoor to protect birds. Require birdfriendly glass.

Cultural Resources - incorporate as much history as possible via design and exhibits.

Energy - Use passive heating (air/water) and cooling as much as possible, design the building to be self sufficient in all aspects of energy use.

Geology and Soils - The buildings should have exhibits with information on our geologic history using samples from the site. Is this a marine terrace? What does that say about sea level rise?

Greenhouse Gas Emissions - Include passive heating and cooling as much as possible, Gaudi did this in 1912 with light and air on two sides of every room in a 4 story apartment building Casa Mila. You can do it too!

Hazards and Hazardous Materials - Design in the food waste system so that methane is minimized.

Hydrology and Water Quality - Water must be contained on site and used for landscape irrigation, can some wastewater (ie laundry) be used for toilet flushing?

Land Use and Planning - There must be a skyline such that the "downtown" of Oceanside (which only spans Civic Center to Seagaze) is taller than this project. there must be a significant skyline within this project that breaks up any wall effect from north to south. Palm trees may not be used in lines that will block views at any height. Does this building add to the strip mall issue with retail or does it create a place distinct from other areas? There must be housing to the ground level in certain parts to provide a respite from storefronts and a pleasant walking experience on sidewalks that are spaced

away from curbs by honoring the Parkways that exist in our area now. It is ok to have a "dead" side of the builiding provided the parkway landscaping next to the curb extends the linear park that we have now on our streets.

Noise - Roof top decks may not be used since the noise travels all the way up the hill on the prevailing breezes. Heating and cooling equipment must not add to the ambient noise.

Population and Housing - Must have as many truly affordable (VLI) units as possible. That is who uses transit and they must be accommodated.

Recreation - Parkways (landscape between the sidewalk and curb) provide an important linear park within our historic city structure. These must be maintained. Sidewalks must not be adjacent to curbs. Canopy trees must be planted every 25ft. No palms may be planted. Oside has too many palms - no new palms. They are dangerous to prune, block views 60ft in the air (!) and are NOT any part of habitat.

Wildfire - Palms are torches whereas saltbush (Atriplex lentiformus) won't easily catch fire and can be pruned into a hedge and provide a refuge for birds. Incorporate Saltbush to provide protection from cats.

02/13/2023

**VIA EMAIL ONLY**

Mr. Rob Dmohowski, AICP, Principal Planner
Development Services Department
City of Oceanside
300 N. Coast Hwy
Oceanside, CA 92054
rdmohowski@oceansideca.org

**RE: NOP Comments for Oceanside Transit Center Redevelopment Project**

Dear Mr. Dmohowski,

San Diegans for Sustainable Economic and Equitable Development ("SD SEED") appreciates the opportunity to comment on the Notice of Preparation ("NOP") for environmental review of the Oceanside Transit Center Redevelopment Project (the "Project"). The Project applicant is Toll Brothers Apartment Living.

The proposed Project would include two up to six-story buildings with 547 residential apartment units, 6-story boutique hotel with 165 rooms, 61,260-square foot NCTD Headquarters building, 3,741-square foot modern transportation center, 23,794 square feet of retail and food and beverage service, and 1,798 parking stalls for public and private use.

SD SEED respectfully requests, under CEQA complete analysis of all identified potential environmental impacts, imposition of all feasible mitigation and study of a reasonable range of alternatives including at least two environmentally superior alternatives to the Project.

## I. General Comments

After reviewing the information provided, the following comments are being submitted for consideration as part of the EIR process.

a) **Project Description & Baseline:** An erroneous project description and baseline can lead to masking potentially significant impacts. Therefore, in order to reflect a good faith effort at full disclosure, the DEIR must provide a detailed description of the "real conditions on the ground" and use these physical conditions as the baseline to assess the significance of the Project's impacts. The California Supreme Court, in *Communities for a Better Environment v. South Coast Air Quality Management District*, recognized that "the baseline 'normally' consists of 'the

physical environmental conditions in the vicinity of the project, as they exist at the time ... environmental analysis is commenced.... *CBE v. SCAQMD,* supra, 48 Ca.4th 310, 327–328, citing Guidelines, § 15125, subd. (a).

In addition, the Project objectives should not be crafted in a manner that limits the range of alternatives considered. Such a narrow approach for describing project objectives ensures that the alternatives analysis is essentially useless and foregone conclusion. In *We Advocate Through Envtl. Review v. City of Mount Shasta*, the court found that the project objectives were unreasonably narrow and impacted analysis of the no-project alternative.

b) **Air Quality**: Estimates of the significance of air quality impacts on public health must be consistent with current epidemiological studies regarding the effects of pollution and various kinds of environmental stress on public health. The DEIR must therefore include a Health Risk Assessment (HRA). The HRA should account for operational phase emission sources such as backup generators, and on-site diesel-powered equipment.

c) **Mitigation measures:** Mitigation measures must be effective and enforceable and go beyond what is required by law to minimize impacts to the fully extent possible. Every effort must be made to incorporate modern technology in the mitigation measures and MMRP. For example, to mitigate air quality impacts during construction phase, the City should require that all off-road equipment and trucks using the site during construction and operations be zero emissions (ZE), near-zero emissions (NZE) or alternative-fueled vehicle would both reduce and/or eliminate air pollution impacts and CO2 emissions. The City can also limit the daily number of fuel-fueled trucks allowed at the Project during construction.

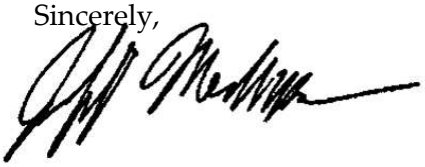
d) **Full Disclosure:** Provide all sources and referenced materials when the DEIR is made available.

## II. Conclusion

Thank you for the opportunity to submit NOP comments. Again, SD SEED respectfully requests under CEQA full analysis of the environmental impacts, feasible mitigation, and reasonable alternatives to the Project.

We look forward to reviewing and commenting on the DEIR.

Sincerely,



Jeff Modrzejewski
*Interim Director of Outreach*

2-12-23

Mr Dmohowski,

I am writing in response to the letter we received regarding the proposed Oceanside Transit Center Redevelopment project.

My spouse & I have resided a block away from the Oceanside Transit Center for almost 11 years. During this time I can think of only 1 year that major construction was not being performed around us. Condos on either side of our 4 row home community, major repairs to the condos across the street, hotels, parking garages etc.

Enough is enough. We do not have the infra-structure to support ANYMORE construction in this area. Trying to navigate Coast Hwy, especially during the summer months, is incredibly difficult and time consuming. We are constantly being told to conserve water due to drought conditions. We are also encouraged to utilize mass transit (which is why we moved a block away from the train station). But where will people who do not live within walking distance park their cars to board the train?

Your letter states the "project could potentially affect 17 of the 20 environmental topic areas identified." This is completely unacceptable even if only 1 were to be affected.

Finally, there have been innumerable businesses that have opened in downtown Oceanside since we moved here in 2012. Close to half of them have not survived. Some due to Covid, but many shut down even before Covid. Some have been taken over by some other organization. But many are empty store fronts, graffiti ridden, dilapidated eye sores. We do not need any more bars, boutiques, restaurants or gift shops.

We do not support this proposed project & appreciate your time and consideration of our valid concerns.

Thank you

Maryanne Bienkowski

Dr. & Mrs. Ed Bienkowski
424 S Cleveland St
Oceanside, CA 92054

# Oceanside Transit Center Redevelopment EIR

## PUBLIC SCOPING MEETING
## COMMENT FORM

**NAME AND ADDRESS OF COMMENTOR:** (include group or public agency affiliation, as applicable)

Bogart Bacon Alberta Ave.

**COMMENTS:**

Please provide your comments on potential environmental issues/impacts that you feel should be addressed as part of the EIR. Attach additional pieces of paper, as needed.

This form and/or additional comments can be submitted to City staff at the Scoping Meeting or mailed to the City of Oceanside, 300 N. Coast Hwy, Oceanside, California 92054, Attention: Mr. Rob Dmohowski. Comments may also be e-mailed to: rdmohowski@oceansideca.org. Please note that comments are due on February 13, 2023.

- EFFECTIVELY support and set standards for top tier Active transportation without A Car.
- Sets standards for Climate, Environmental Building, Leed, Green power,
- Price Parking
- Fees for not planting trees AS plan Pe4rms, palms are not trees.
- See "TOD Lifestyle ..." sheet
- Real grocery store ex: trader Joes, with Loading Dock. 7 Eleven or convince store is not Acceptable.
- Restrict short term "Less than 30 days" percentage of Available units

See Back

TOD lifestyle Infrastructure priorities

Lifestyle design

- Grade level protected cyclist "locker" room( secure, gear and lite repair)
    -> cctv monitered, break-in theft of registered devices from locker insured as part of rent. Insured to replacement value.
    -> reduces facility cleaning/wear+tear.
    -> provides more seamless TOD experince.
    -> brownie points
    -> ebikes require less $pace to park. Sucessful implimentation may lead to change in CEQA parking req's allowing for ebike parking equivalence.

Behavior change

- Grade level Staffed Alternitive Commuter education room ( L.A.B. **smart cycling program** home base, planning trips with transit time tables class, connecting people to initiatives and resources)
    -> like a storefront with a classroom, rent free.
    -> sufficent space to park 25 ebikes, class seating for 30, projector.
    -> hurt people cant work therefore dont pay rent.
    -> helps really sell the TOD.
    -> win brownie points
    -> spread best practices

Access

- Below grade bike under the track crossing. Like the one over by pier view. but with two identical ramps to seporate ped and bike. This is a transit department land transit project so the lossan permit should not be difficult given the increasing number of trains and delay times.

- (extra reach) outdoor spaces for deployable infrastructure testing. Curbside ideally midblock, level, 15'x 40' space.