Rodeo Renewed Project

Final Environmental Impact Report

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Contra Costa County Department of Conservation and Development
30 Muir Road, Martinez, CA 94553, USA
Telephone: 925-655-2705
www.contracosta.ca.gov

Prepared by

Cardno, Inc.
2890 Gateway Oaks Drive, Suite 200, Sacramento, CA 95833, USA
Telephone: 916.923.1097
www.cardno.com

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Appendices

Acronyms

μg/m^3	microgram per cubic meter
AAS	Allision Avoidance Systems
AB	Assembly Bill
ABAG	Association of Bay Area Governments
APCD	Air Pollution Control District
API	American Petroleum Institute
AQMD	Air Quality Management District
ATB	articulated tug barges
ATS	automated information system
BCAQM	Butte County Air Quality Management District
BAAQMD	Bay Area Air Quality Management District
BACT	best available control technology
BART	Bay Area Rapid Transit
Basin Plan	Water Quality Control Plan for the San Francisco Bay Basin
BCDC	San Francisco Bay Conservation and Development Commission
BMPs	best management practices
BP	before present
bpd	barrels per day
BTC	Biodiesel Tax Credit
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CadnaA	Computer Aided Noise Abatement
CAFE	Corporate Average Fuel Economy
CAL FIRE	California Department of Forestry and Fire Protection
Cal/OSHA	California Division of Occupational Safety and Health
CalARP	California Accidental Release Prevention
CalEEMod	California Emissions Estimator Model
CalEnviroScreen	California Communities Environmental Health Screening Tool
CalEPA	California Environmental Protection Agency
CALVEG	Classification and Assessment with Landsat of Visible Ecological Groupings
CAP	Climate Action Plan
CARB	California Air Resources Board
CBC	California Building Code
CBE	California Board of Equalization
CCR	California Code of Regulations

CCTA	Contra Costa Transportation Authority
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGS	California Geological Survey (formerly California Division of Mines and Geology)
CH_4	methane
CI	carbon intensity
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CPUC	California Public Utilities Commission
CRPR	California Rare Plant Rank
CSLC	California State Lands Commission
CUPA	Certified Unified Program Agencies
CWA	Clean Water Act
CWHR	California Wildlife Habitat Relationships
CZLUO	Coastal Zone Land Use Ordinance
db	decibel
dBA	A-weighted decibels
DNL	day-night noise level
DPM	diesel particulate matter
DPS	distinct population segment
DTSC	Department of Toxic Substances Control
EIR	Environmental Impact Report
EMFAC2021	Emission Factor Model version 2021
EO	Executive Order
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FEMA	Federal Emergency Management Agency
FOG	fats, oils, and grease
GHG	greenhouse gas
GIS	geographic information system
GWP	Global Warming Potential
H_2	hydrogen gas

H_2S	hydrogen sulfide
HMBP	Hazardous Materials Business Plan
HRA	health risk assessment
I-80	Interstate 80
IPaC	Information for Planning and Consultation
IPCC	Intergovernmental Panel on Climate Change
ISO	Industrial Safety Ordinance
LCFS	Low-Carbon Fuel Standard
LCP	Local Coastal Program
LUP	Land Use Permit
MBPD	thousand barrels per day
MDAQMD	Mojave Desert Air Quality Management District
MEIR	maximally exposed individual residents
MEIW	maximum worker net cancer risk
mgd	million gallons per day
MHHW	mean higher water mark
MLD	Most Likely Descendent
MLLW	Mean lower low water
MMBtu	million British thermal units
MMT	million metric tons
MOC	Management of Change
MOTEMS	Marine Oil Terminal Engineering and Maintenance Standards Program
mph	mile per hour
MS4	Municipal Separate Storm Sewer System
MSRC	Marine Spill Response Corporation
MT	metric ton(s)
MTC	Metropolitan Transportation Commission
MW	megawatt
MWh	megawatt-hour
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
National Register	National Register of Historic Places
NEHRP	National Earthquake Hazards Reduction Program
NFPA	National Fire Protection Association
NH_3	ammonia
NHTSA	National Highway Traffic Safety Administration

NIS	nonindigenous species
NM Plan	NOx Mitigation Plan
NMFS	National Marine Fisheries Service
NO	nitric oxide
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOP	Notice of Preparation
NO_X	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRP	Nipomo-Regional Park
NSAQMD	Northern Sierra Air Quality Management District
NWI	National Wetlands Inventory
NWIC	Northwest Information Center
OCIMF	Oil Companies International Marine Forum
ODSVRA	Oceano Dunes State Vehicular Recreation Area
OEHHA	Office of Environmental Health Hazard Assessment
OMP	Odor Management Plan
OPA	Oil Pollution Act
OPC	Ocean Protection Council
OPR	Office of Planning and Research
OSHA	Occupational Safety and Health Administration
OSPR	Office of Spill Prevention and Response
OSRO	Oil Spill Response Organization
OSRP	oil spill response plan
PAWSA	Ports and Waterways Safety Assessment
PCAPCD	Placer County Air Pollution Control District
PG&E	Pacific Gas and Electric
PGA	Peak Ground Acceleration
PHMSA	Pipeline and Hazardous Materials Safety Administration
PIG	pipeline inspection gage
PM_{10}	particulate matter with a diameter of 10 microns or less
$PM_{2.5}$	particulate matter with a diameter of 2.5 microns or less
POC	precursor organic compounds
PORTS	Physical Oceanographic Real Time System
PPV	peak particle velocity
PRC	Public Resources Code
Project or proposed Project	Rodeo Renewed Project

PSD	Prevention of Significant Deterioration
PSM	Process Safety Management
PTU	Pre-treatment Unit
RCRA	Resource Conservation and Recovery Act of 1976
RFG	refinery fuel gas
RFS	Renewable Fuel Standard
RMP	Risk Management Plan
RMS	root mean square
RNA	Regulated Navigation Areas
ROG	reactive organic gases
RPS	Renewables Portfolio Standard
RWQCB	Regional Water Quality Control Board
SAFE	Safer Affordable Fuel Efficient
SB	Senate Bill
SCCAB	South Central Coast Air Basin
Section 106	Section 106 of the National Historic Preservation Act of 1966
SEL	sound exposure levels
SF_6	sulfur hexafluoride
SFBAAB	San Francisco Bay Area Air Basin
SFEI	San Francisco Estuary Institute
SHAQMD	Shasta County Air Quality Management District
SIGTTO	Society of International Gas Tanker and Terminal Operators
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SPCC	Spill Prevention, Control, and Countermeasure
STU	Sulfur Treatment Unit
SVP	Society of Vertebrate Paleontology
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminant
TCAPCD	Tehama County Air Pollution Control District
TCR	Tribal Cultural Resources
Trihydro	Trihydro Corporation
TSS	traffic separation scheme
UCO	used cooking oil
US	United States
USACE	US Army Corps of Engineers

USCG	US Coast Guard
USDOT	US Department of Transportation
USEIA	US Energy Information Administration
USEPA	US Environmental Protection Agency
USFS	US Forest Service
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
VdB	vibration decibels
VOC	volatile organic compounds
VSR	vessel speed reduction
VTS	vessel traffic service
WestCAT	Western Contra Costa County Transit Authority
ZEV	zero emission vehicle

3 Responses to Comments (continued)

Comment Letter 36. Natural Resources Defense Council—continued

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APPENDIX A

Karras, G., *Changing Hydrocarbons Midstream* (Karras, 2021a)

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Changing Hydrocarbons Midstream

Fuel chain carbon lock-in potential of crude-to-biofuel petroleum refinery repurposing

Prepared for the Natural Resources Defense Council (NRDC), by

Greg Karras, G Karras Consulting www.energy-re-source.com

August 2021

ABSTRACT

Moves to deoxygenate farmed lipids with hydrogen by repurposing troubled crude refining assets for "drop in" biofuels add a new carbon source to the liquid hydrocarbon fuel chain, with the largest biorefineries of this type that the world has ever seen now proposed in California. Characteristics of this particular biofuel technology were assessed across its shared fuel chain with petroleum for path-dependent feedstock acquisition, processing, fuel mix, and energy system effects on the environment at this newly proposed scale. The analysis was grounded by site-specific data in California.

This work found significant potential impacts are foreseeable. Overcommitment to purpose-grown biomass imports could shift emissions out of state instead of sequestering carbon. Fossil fuel assets repurposed for hydrogen-intensive deoxygenation could make this type of biorefining more carbon intensive than crude refining, and could worsen refinery fire, explosion, and flaring hazards. Locked into making distillate fuels, this technology would lock in diesel and compete with zero-emission freight and shipping for market share and hydrogen. That path-dependent impact could amplify, as electric cars replace gasoline and idled crude refining assets repurpose for more biomass carbon, to turn the path of energy transition away from climate stabilization. Crucially, this work also found that a structural disruption in the liquid hydrocarbon fuel chain opened a window for another path, to replace the freight and shipping energy function of crude refining without risking these impacts. The type and use of hydrogen production chosen will be pivotal in this choice among paths to different futures.

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ACRONYMS AND TERMS

Barrel (b):	A barrel of oil is a volume of 42 U.S. gallons.
BEV:	Battery-electric vehicle.
Biofuel:	Hydrocarbons derived from biomass and burned for energy.
Biomass:	Any organic material that is available on a recurring basis, excluding fossil fuels.
Carbon intensity:	The amount of climate emission caused by a given amount of activity at a particular emission source. Herein, CO_2 or CO_2e mass per barrel refined, or SCF hydrogen produced.
Carbon lock-in:	Resistance to change of carbon-emitting systems that is caused by mutually reinforcing technological, capital, institutional, and social commitments to the polluting system which have become entrenched as it was developed and used. A type of path dependance.
Catalyst:	A substance that facilitates a chemical reaction without being consumed in the reaction.
Ester:	A molecule or functional group derived by condensation of an alcohol and an acid with simultaneous loss of water. Oxygen, carbon, and other elements are bonded together in esters.
Electrolysis:	Chemical decomposition produced by passing an electric current through a liquid or solution containing ions. Electrolysis of water produces hydrogen and oxygen.
FCEV:	Fuel cell electric vehicle.
HDO:	Hydrodeoxygenation. Reactions that occur in HEFA processing.
HEFA:	Hydrotreating esters and fatty acids. A biofuel production technology.
Hydrocarbon:	A compound of hydrogen and carbon.
Lipids:	Organic compounds that are oily to the touch and insoluble in water, such as fatty acids, oils, waxes, sterols, and triacylglycerols (TAGS). Fatty acids derived from TAGs are the lipid-rich feedstock for HEFA biofuel production.
MPC:	Marathon Petroleum Corporation, headquartered in Findlay, OH.
P66:	Phillips 66 Company, headquartered in Houston, TX.
SCF:	Standard cubic foot. 1 ft^3 of gas that is not compressed or chilled.
TAG:	Triacylglycerol. Also commonly known as triglyceride.
Ton (t):	Metric ton.
ZEV:	Zero-emission vehicle.

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FINDINGS AND TAKEAWAYS

Finding 1. Oil companies are moving to repurpose stranded and troubled petroleum assets using technology called "Hydrotreated Esters and Fatty Acids" (HEFA), which converts vegetable oil and animal fat lipids into biofuels that refiners would sell for combustion in diesel engines and jet turbines. The largest HEFA refineries to be proposed or built worldwide to date are now proposed in California. A-1

Takeaways

F1.1 Prioritizing industry asset protection interests ahead of public interests could lock in HEFA biofuels instead of cleaner alternatives to petroleum diesel and jet fuel.

F1.2 HEFA refining could continue to expand as refiners repurpose additional crude refining assets that more efficient electric cars will idle by replacing gasoline. A-2

F1.3 Assessment of potential impacts across the HEFA fuel chain is warranted before locking this new source of carbon into a combustion-based transportation system. A-3

Finding 2. Repurposing refining assets for HEFA biofuels could increase refinery explosion and fire hazards. Switching from near-zero oxygen crude to 11 percent oxygen biomass feeds would create new damage mechanisms and intensify hydrogen-driven exothermic reaction hazards that lead to runaway reactions in biorefinery hydro-conversion reactors. These hydrogen-related hazards cause frequent safety incidents and even when safeguards are applied, recurrent catastrophic explosions and fires, during petroleum refining. At least 100 significant flaring incidents traced to these hazards occurred since 2010 among the two refineries where the largest crude-to-biofuel conversions are now proposed. Catastrophic consequences of the new biorefining hazards are foreseeable. A-4

Takeaways

F2.1 Before considering public approvals of HEFA projects, adequate reviews will need to report site-specific process hazard data, including pre-project and post-project equipment design and operating data specifications and parameters, process hazard analysis, hazards, potential safeguards, and inherent safety measures for each hazard identified.

F2.2 County and state officials responsible for industrial process safety management and hazard prevention will need to ensure that safety and hazard prevention requirements applied to petroleum refineries apply to converted HEFA refineries. A-5

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Finding 3. Flaring by the repurposed biorefineries would result in acute exposures to episodic air pollution in nearby communities. The frequency of these recurrent acute exposures could increase due to the new and intensified process safety hazards inherent in deoxygenating the new biomass feeds. Site-specific data suggest bimonthly acute exposure recurrence rates for flare incidents that exceed established environmental significance thresholds. This flaring would result in prolonged and worsened environmental justice impacts in disparately exposed local communities that are disproportionately Black, Brown, or low-income compared with the average statewide demographics. A-6

Takeaways

F3.1 Before considering public approvals of HEFA projects, adequate reviews will require complete analyses of potential community-level episodic air pollution exposures and prevention measures. Complete analyses must include worst-case exposure frequency and magnitude with impact demographics, apply results of process hazard, safeguard, and inherent safety measures analysis (F2.1), and identify measures to prevent and eliminate flare incident exposures.

F3.2 The Bay Area, San Joaquin Valley, and South Coast air quality management districts will need to ensure that flare emission monitoring and flaring prevention requirements applied to petroleum refineries apply to converted HEFA refineries. A-7

Finding 4. Rather than contributing to a reduction in emissions globally, HEFA biofuels expansion in California could actually shift emissions to other states and nations by reducing the availability of limited HEFA biofuels feedstock elsewhere. Proposed HEFA refining for biofuels in California would exceed the per capita state share of total U.S. farm yield for all uses of lipids now tapped for biofuels by 260 percent in 2025. Foreseeable further HEFA growth here could exceed that share by as much as 660 percent in 2050. These impacts are uniquely likely and pronounced for the type of biomass HEFA technology demands. A-8

Takeaways

F4.1 A cap on in-state use of lipids-derived biofuel feedstocks will be necessary to safeguard against these volume-driven impacts. *See also Takeaway F6.1.*

F4.2 Before considering public approvals of HEFA projects, adequate reviews will need to fully assess biomass feedstock extraction risks to food security, low-income families, future global farm yields, forests and other natural carbon sinks, biodiversity, human health, and human rights using a holistic and precautionary approach to serious and irreversible risks. A-9

F4.3 This volume-driven effect does not implicate the Low Carbon Fuel Standard and can only be addressed effectively via separate policy or investment actions. A-10

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Finding 5. Converting crude refineries to HEFA refineries would increase the carbon intensity of hydrocarbon fuels processing to 180–240 percent of the average crude refinery carbon intensity nationwide. Refiners would cause this impact by repurposing otherwise stranded assets that demand more hydrogen to deoxygenate the type of biomass the existing equipment can process, and supply that hydrogen by emitting some ten tons of carbon dioxide per ton of hydrogen produced. In a plausible HEFA growth scenario, cumulative CO_2 emissions from continued use of existing California refinery hydrogen plants alone could reach 300–400 million metric tons through 2050. A-11

Takeaways

F5.1 Before considering public approvals of HEFA projects, adequate reviews will need to complete comprehensive biorefinery potential to emit estimates based on site-specific data, including project design specifications, engineering for renewable-powered electrolysis hydrogen capacity at the site, and potential to emit estimates with and without that alternative. *See also Takeaways F7.1–4.*

Finding 6. HEFA biofuels expansion that could be driven by refiner incentives to repurpose otherwise stranded assets is likely to interfere with state climate protection efforts, in the absence of new policy intervention. Proposed HEFA plans would exceed the lipids biofuel caps assumed in state climate pathways through 2045 by 2025. Foreseeable further HEFA biofuels expansion could exceed the maximum liquid hydrocarbon fuels volume that can be burned in state climate pathways, and exceed the state climate target for emissions in 2050. A-12

Takeaways

F6.1 A cap on lipids-derived biofuels will be necessary to safeguard against these HEFA fuel volume-driven impacts. *See also Takeaway F4.1.*

F6.2 Oil company incentives to protect refining and liquid fuel distribution assets suggest HEFA biofuels may become locked-in, rather than transitional, fuels. A-13

F6.3 A cap on HEFA biofuels would be consistent with the analysis and assumptions in state climate pathways. A-14

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Finding 7. A clean hydrogen alternative could prevent emissions, spur the growth of zero-emission fuel cell vehicle alternatives to biofuels, and ease transition impacts.

Early deployment of renewable-powered electrolysis hydrogen production at California crude refineries during planned maintenance or HEFA repurposing could prevent 300–400 million metric tons of CO_2 emissions through 2050 and support critically needed early deployment of energy integration measures for achieving zero emission electricity and heavy-duty vehicle fleets.

Moreover, since zero-emission hydrogen production would continue on site for these zero-emission energy needs, this measure would lessen local transition impacts on workers and communities when refineries decommission.

Takeaways

F7.1 This feasible measure would convert 99 percent of current statewide hydrogen production from carbon-intensive steam reforming to zero-emission electrolysis. This clean hydrogen, when used for renewable grid balancing and fuel cell electric vehicles, would reap efficiency savings across the energy system. A-15

F7.2 Early deployment of the alternatives this measure could support is crucial during the window of opportunity to break free from carbon lock-in which opened with the beginning of petroleum asset stranding in California last year and could close if refiner plans to repurpose those assets re-entrench liquid combustion fuels. A-16

F7.3 During the crucial early deployment period, when fuel cell trucks and renewable energy storage could be locked out from use of this zero-emission hydrogen by excessive HEFA growth, coupling this electrolysis measure with a HEFA biofuel cap (*F4.1; F6.1*) would greatly increase its effectiveness. A-17

F7.4 Coupling the electrolysis and HEFA cap measures also reduces HEFA refinery hazard, localized episodic air pollution and environmental justice impacts. A-18

F7.5 The hydrogen roadmap in state climate pathways includes converting refineries to renewable hydrogen, and this measure would accelerate the deployment timeline for converting refinery steam reforming to electrolysis hydrogen production. A-19

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INTRODUCTION

i.1 Biofuels in energy systems

Fossil fuels redefined the human energy system. Before electric lights, before gaslights, whale oil fueled our lanterns. Long before whaling, burning wood for light and heat had been standard practice for millennia. Early humans would learn which woods burned longer, which burned smokier, which were best for light, and which for heat. Since the first fires, we have collectively decided on which biofuel carbon to burn, and how much of it to use, for energy.

We are, once again, at such a collective decision point. Biofuels—hydrocarbons derived from biomass and burned for energy—seem, on the surface, an attractive alternative to crude oil. However, there are different types of biofuels and ways to derive them, each carrying with it different environmental impacts and implications. Burning the right type of biofuel for the right use *instead* of fossil fuels, such as cellulose residue-derived instead of petroleum-derived diesel for old trucks until new zero emission hydrogen-fueled trucks replace them, might help to avoid severe climate and energy transition impacts. However, using more biofuel burns more carbon. Burning the wrong biofuel *along with* fossil fuels can increase emissions—and further entrench combustion fuel infrastructure that otherwise would be replaced with cleaner alternatives. A-20

i.1.1 <u>Some different types of biofuel technologies</u>

Corn ethanol

Starch milled from corn is fermented to produce an alcohol that is blended into gasoline. Ethanol is about 10% of the reformulated gasoline sold and burned in California. A-21

Fischer-Tropsch synthesis

This technology condenses a gasified mixture of carbon monoxide and hydrogen to form hydrocarbons and water, and can produce synthetic biogas, gasoline, jet fuel, or diesel biofuels. A wide range of materials can be gasified for this technology. Fischer-Tropsch synthesis can make any or all of these biofuels from cellulosic biomass such as cornstalk or sawmill residues.

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Biofuel in the Climate System 101

People and other animals exhale carbon dioxide into the air while plants take carbon dioxide out of the air. Biofuel piggybacks on—and alters—this natural carbon cycle. It is fuel made to be burned but made from plants or animals that ate plants. Biofuels promise to let us keep burning fuels for energy by putting the carbon that emits back into the plants we will make into the fuels we will burn next year. All we have to do is grow a lot of extra plants, and keep growing them.

But can the biofuel industry keep that promise?

This much is clear: burning biofuels emits carbon and other harmful pollutants from the refinery stack and the tailpipe. Less clear is how many extra plants we can grow; how much land for food, natural ecosystems and the carbon sinks they provide it could take; and ultimately, how much fuel combustion emissions the Earth can take back out of the air.

Some types of biofuels emit more carbon than the petroleum fuels they replace, raise food prices, displace indigenous peoples, and worsen deforestation. Other types of biofuels might help, along with more efficient and cleaner renewable energy and energy conservation, to solve our climate crisis.

How much of which types of biofuels we choose matters.

"Biodiesel"

Oxygen-laden hydrocarbons made from lipids that can only be burned along with petroleum diesel is called "biodiesel" to denote that limitation, which does not apply to all diesel biofuels.

Hydrotreating esters and fatty acids (HEFA)

HEFA technology produces hydrocarbon fuels from lipids. This is the technology crude refiners propose to use for biofuels. The diesel hydrocarbons it produces are different from "biodiesel" and are made differently, as summarized directly below.

A-21 cont'd

i.2 What is HEFA technology?

i.2.1 How HEFA works

HEFA removes oxygen from lipidic (oily) biomass and reformulates the hydrocarbons this produces so that they will burn like certain petroleum fuels. Some of the steps in HEFA refining are similar to those in traditional petroleum refining, but the "deoxygenation" step is very different, and that is because lipids biomass is different from crude and its derivatives.

i.2.2 HEFA feedstocks

Feedstocks are detailed in Chapter 2. Generally, all types of biomass feedstocks that HEFA technology can use contain lipids, which contain oxygen, and nearly all of them used for HEFA biofuel today come directly or indirectly from one (or two) types of farming.

A-22

Purpose-grown crops

Vegetable oils from oil crops, such as soybeans, canola, corn, oil palm, and others, are used directly and indirectly as HEFA feedstock. Direct use of crop oils, especially soy, is the major

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portion of total HEFA feeds. Indirect uses are explained below. Importantly, these crops were cultivated for food and other purposes which HEFA biofuels now compete with—and a new oil crop that has no existing use can still compete for farmland to grow it. Some other biofuels, such as those which can use cellulosic residues as feedstock for example, do not raise the same issue. Thus, in biofuels jargon, the term "purpose-grown crops" denotes this difference among biofuels.

Animal fats

Rendered livestock fats such as beef tallow, pork lard, and chicken fat are the second largest portion of the lipids in HEFA feedstock, although that might change in the future if refiners tap fish oils in much larger amounts. These existing lipid sources also have existing uses for food and other needs, many of which are interchangeable among the vegetable and animal lipids. Also, particularly in the U.S. and similar agricultural economies, the use of soy, corn and other crops as livestock feeds make purpose-grown crops the original source of these HEFA feeds. A-22 cont'd

Used cooking oils

Used cooking oil (UCO), also called yellow grease or "waste" oil, is a variable mixture of used plant oils and animal fats, typically collected from restaurants and industrial kitchens. It notably could include palm oil imported and cooked by those industries. HEFA feeds include UCO, though its supply is much smaller than those of crop oils or livestock fats. UCO, however, originates from the same purpose grown oil crops and livestock, and UCO has other uses, many of which are interchangeable with the other lipids, so it is not truly a "waste" oil.

i.2.3 <u>HEFA processing chemistry</u>

The HEFA process reacts lipids biomass feedstock with hydrogen over a catalyst at high temperatures and pressures to form hydrocarbons and water. The intended reactions of this "hydro-conversion" accomplish the deoxygenation and reformulation steps noted above.

The role of hydrogen in HEFA production

Hydrogen is consumed in several HEFA process reactions, especially deoxygenation, which removes oxygen from the HEFA process hydrocarbons by bonding with hydrogen to form water. Hydrogen also is essential for HEFA process reaction control. As a result, HEFA processing requires vast amounts of hydrogen, which HEFA refineries must produce in vast amounts. HEFA hydro-conversion and hydrogen reaction chemistry are detailed in Chapter 1. A-23

i.2.4 <u>What HEFA produces</u>

"Drop in" diesel

One major end product of HEFA processing is a "drop-in" diesel that can be directly substituted for petroleum diesel as some, or all, of the diesel blend fueled and burned. Drop-in diesel is distinct from biodiesel, which must be blended with petroleum diesel to function in combustion engines and generally needs to be stored and transported separately. Drop-in diesel

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is also referred to as "renewable" diesel, however, those labels also apply to diesel made by other biofuel technologies, so diesel produced by the HEFA process is called "HEFA diesel" herein.

"Sustainable Aviation Fuel"

The other major end product of HEFA processing is a partial substitute for petroleum-based jet fuel, sometimes referred to as "Sustainable Aviation Fuel" or "SAF," which also is produced by other biofuel technologies. HEFA jet fuel is allowed by aviation standards to be up to a maximum of 50% of the jet fuel burned, so it must be blended with petroleum jet fuel. A-23 cont'd

i.3 Conversions of Crude oil refineries to HEFA

i.3.1 Current and proposed conversions of oil refineries

Phillips 66 Co. (P66) proposes to convert its petroleum refinery in Rodeo, CA into a 80,000 barrel per day (b/d) biorefinery.[2] In nearby Martinez, Marathon Petroleum Corporation (MPC) proposes a 48,000 b/d biorefinery[3] at the site where it closed a crude refinery in April 2020.[4] Other crude-to-biofuel refinery conversions are proposed or being built in Paramount, CA (21,500 b/d new capacity),[5] Bakersfield, CA (15,000 b/d),[6] Port Arthur, TX (30,700 b/d),[7] Norco, LA (17,900 b/d new capacity),[8] and elsewhere. All of these projects are super-sized compared with the 2,000–6,000 b/d projects studied as of just a few years ago.[9] The P66 Rodeo and MPC Martinez projects are the largest of their kind to be proposed or built to date. P66 boasts that its Rodeo biorefinery would be the largest in the world.[10]

i.3.2 Repurposing of existing equipment

Remarkably, all of the crude-to-biofuel conversion projects listed above seek to use HEFA technology—none of the refiners chose Fischer-Tropsch synthesis despite its greater flexibility than HEFA technology and ability to avoid purpose-grown biomass feedstock. However, this is consistent with repurposing the plants already built. The California refiners propose to repurpose existing hydro-conversion reactors—hydrocrackers or hydrotreaters—for HEFA processing, and existing hydrogen plants to supply HEFA process hydrogen needs.[2–6] Moreover, it is consistent with protecting otherwise stranded assets; repurposed P66 and MPC assets have recently been shut down, are being shut down, or will potentially be unusable soon, as described in Chapter 1. A-24

While understandable, this reaction to present and impending petroleum asset stranding appears to be driving our energy system toward HEFA technology instead of potentially cleaner alternatives at an enormous scale, totaling 164,500 b/d by 2024 as proposed now in California. This assets protection reaction also presents a clear potential for further HEFA expansion. Refiners could continue to repurpose petroleum refining assets which will be idled as by the replacement of gasoline with more efficient electric passenger vehicles.

Before allowing this new source of carbon to become locked into a future combustion-based transportation system, assessment of potential impacts across the HEFA fuel chain is warranted.

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i.4 Key questions and concerns about crude-to-biofuel conversions

i.4.1 Potential impacts of biomass feedstock acquisition

Proposed and potential HEFA expansions in California would rapidly and substantially increase total demand for globally traded agricultural lipids production. This could worsen food insecurity, risk deforestation, biodiversity and natural carbon sink impacts from expansions of farm and pasture lands, and drive populations elsewhere to prioritize use of their remaining lipids shares for food. Biofuel, biodiversity, and climate analysts often refer to the food security impact and agriculture expansion risks in terms of food price and "indirect land use" impacts. The latter effect, on *where* a globally limited biofuel resource could be used, is often referred to by climate policy analysts as an emission-shifting or "leakage" impact. Chapter 2 reviews these potential feedstock acquisition impacts and risks. A-25

i.4.2 Potential impacts of HEFA refinery processing

Processing a different oil feedstock is known to affect refinery hazards and emissions, and converted HEFA refineries would process a very different type of oil feedstock. The carbon intensity—emissions per barrel processed—of refining could increase because processing high-oxygen plant oils and animal fats would consume more hydrogen, and the steam reformers that refiners plan to repurpose emit some ten tons of CO_2 per ton of hydrogen produced. Explosion and fire risks could increase because byproducts of refining the new feeds pose new equipment damage hazards, and the extra hydrogen reacted with HEFA feeds would increase the frequency and magnitude of dangerous runaway reactions in high-pressure HEFA reactors. Episodic air pollution incidents could recur more frequently because refiners would partially mitigate the impacts of those hazards by rapid depressurization of HEFA reactor contents to refinery flares, resulting in acute air pollutant exposures locally. Chapter 3 assesses these potential impacts. A-26

i.4.3 Potential impacts on climate protection pathways

A climate pathway is a road map for an array of decarbonization technologies and measures to be deployed over time. California has developed a range of potential pathways to achieve its climate goals—all of which rely on replacing most uses of petroleum with zero-emission battery-electric vehicles and fuel cell-electric vehicles (FCEVs) energized by renewable electricity. Proposed and potential HEFA biofuels growth could exceed this range of state pathways or interfere with them in several ways that raise serious questions for our future climate. A-27

HEFA biofuels could further expand as refiners repurpose assets idled by the replacement of gasoline with electric vehicles. This could exceed HEFA caps *and* total liquid fuels volumes in the state climate pathways. Hydrogen committed to HEFA growth would not be available for FCEVs and grid-balancing energy storage, potentially slowing zero-emission fuels growth. High-carbon hydrogen repurposed for HEFA refining, which could not pivot to zero-emission FCEV fueling or energy storage, could lock in HEFA biofuels instead of supporting transitions to cleaner fuels. These critical-path climate factors are assessed in Chapter 4.

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i.4.4 Alternatives, opportunities and choices

Zero emission hydrogen alternative

Renewable-powered electrolysis of water produces zero-emission hydrogen that could replace existing high-carbon hydrogen production during refinery maintenance shutdowns and HEFA conversions. Indeed, a "Hydrogen Roadmap" in state climate pathways envisions converting all refineries to renewable hydrogen. This measure could cut emissions, support the growth of FCEVs and grid-balancing energy needed to further expand renewable electricity and zero-emission fuels, and reduce local transition impacts when refineries decommission.

Window of opportunity

A crucial window of opportunity to break out of carbon lock-in has opened with the beginning of California petroleum asset stranding in 2020 and could close if refiner plans to repurpose those assets re-entrench liquid combustion fuels. The opening of this time-sensitive window underscores the urgency of early deployment for FCEV, energy storage, and zero-emission fuels which renewable-powered electrolysis could support. A-28

Potential synergies with HEFA biofuels cap

Coupling this measure with a HEFA biofuels cap has the potential to enhance its benefits for FCEV and cleaner fuels deployment by limiting the potential for electrolysis hydrogen to instead be committed to HEFA refining during the crucial early deployment period, and has the potential to reduce HEFA refining hazard, episodic air pollution and environmental justice impacts.

i.4.5 A refinery project disclosure question

Readers should note that P66[2] and MPC[11] excluded flares and hydrogen production which would be included in their proposed HEFA projects from emission reviews they assert in support of their air permit applications. To date neither refiner has disclosed whether or not its publicly asserted project emission estimate excludes any flare or hydrogen production plant emissions. A-29 However, as shown in Chapter 3, excluding flare emissions, hydrogen production emissions, or both could underestimate project emission impacts significantly.

i.5 The scope and focus of this report

This report addresses the questions and concerns introduced above. Its scope is limited to potential fuel chain and energy system impacts of HEFA technology crude-to-biofuel conversion projects. It focuses on the California setting and, within this setting, the Phillips 66 Co. (P66) Rodeo and Marathon Petroleum Corp. (MPC) Martinez projects. Details of the data and methods supporting original estimates herein are given in a Supporting Material Appendix.[1]

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1. OVERVIEW OF HEFA BIOFUEL TECHNOLOGY

All of the full-scale conversions from petroleum refining to biofuel refining proposed or being built in California now seek to use the same type of technology for converting biomass feedstock into fuels: hydrotreating esters and fatty acids (HEFA).[2 3 4 6] "Hydrotreating" signifies a hydro-conversion process: the HEFA process reacts biomass with hydrogen over a catalyst at high temperatures and pressures to form hydrocarbons and water. "Esters and fatty acids" are the type of biomass this hydro-conversion can process: triacylglycerols (TAGs) and the fatty acids derived from TAGs. HEFA feedstock is biomass from the TAGs and fatty acids in plant oils, animal fats, fish oils, used cooking oils, or combinations of these biomass lipids.

This chapter addresses how HEFA biofuel technology functions, which is helpful to assessing its potential impacts in the succeeding chapters, and explores why former and current crude oil refiners choose this technology instead of another available fuels production option.

1.1 HEFA process chemistry

A-30

Hydrocarbons formed in this process reflect the length of carbon chains in its feed. Carbon chain lengths of the fatty acids in the TAGs vary by feed source, but in oil crop and livestock fat feeds are predominantly in the range of 14–18 carbons (C14–C18) with the vast majority in the C16–C18 range.[1] Diesel is predominantly a C15–C18 fuel; Jet fuel C8–C16. The fuels HEFA can produce in relevant quantity are thus diesel and jet fuels, with more diesel produced unless more intensive hydrocracking is chosen intentionally to target jet fuel production.

HEFA process reaction chemistry is complex, and in practice involves hard-to-control process conditions and unwanted side-reactions, but its intended reactions proceed roughly in sequence to convert TAGs into distillate and jet fuel hydrocarbons.[12 13 14 15 16 17 18 19 20 21 22] Molecular sites of these reactions in the first step of HEFA processing, hydrodeoxygenation (HDO), are illustrated in Diagram 1 below.

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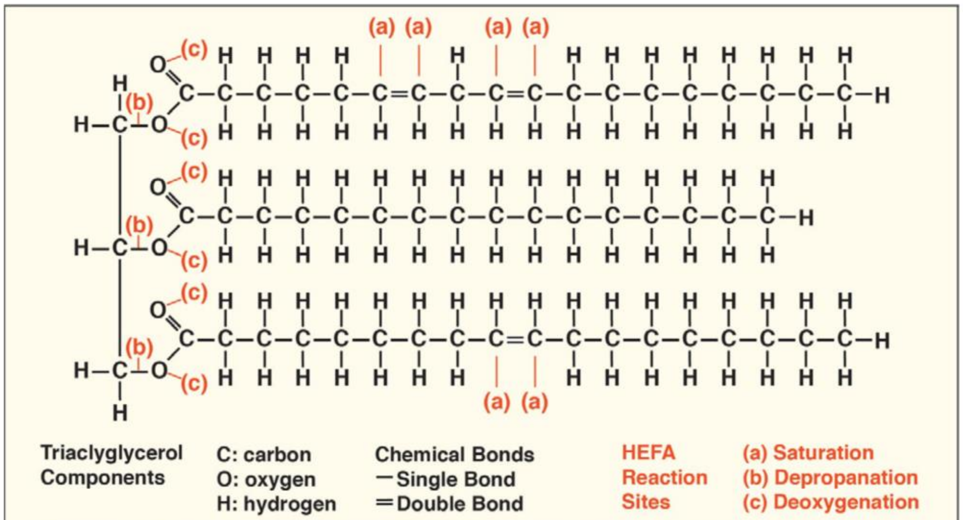

Diagram 1. Hydrodeoxygenation (HDO) of a triacylglycerol (TAG).

Fatty acids are "saturated" by bonding hydrogen to their carbon atoms. *See* (a) in Diagram. This tends to start first. Then, the fatty acids are broken free from the three-carbon "propane knuckle" of the TAG (Diagram 1, left) by breaking its bonds to them via hydrogen insertion. (Depropanation; *see* (b) in Diagram 1.) Still more hydrogen bonds with the oxygen atoms (c), to form water (H_2O), which is removed from the hydrocarbon process stream. These reactions yield water, propane, some unwanted but unavoidable byproducts (not shown in the diagram for simplicity), and the desired HDO reaction products—hydrocarbons which can be made into diesel and jet fuel.

But those hydrocarbons are not yet diesel or jet fuel. Their long, straight chains of saturated carbon make them too waxy. Fueling trucks or jets with wax is risky, and prohibited by fuel specifications. To de-wax them, those straight-chain hydrocarbons are turned into their branched-chain isomers.

Imagine that the second-to-last carbon on the right of the top carbon chain in Diagram 1 takes both hydrogens bonded to it, and moves to in between the carbon immediately to its left and one of the hydrogens that carbon already is bonded to. Now imagine the carbon at the end of the chain moves over to where the second-to-last carbon used to be, and thus stays attached to the carbon chain. That makes the straight chain into its branched isomer. It is isomerization.

Isomerization of long-chain hydrocarbons in the jet–diesel range is the last major HEFA process reaction step. Again, the reaction chemistry is complex, involves hard-to-control process conditions and unwanted side reactions at elevated temperatures and pressures, and uses a lot of

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hydrogen. But these isomerization reactions, process conditions, and catalysts are markedly different from those of HDO.[9 14–17 19 20] And these reactions, process conditions, catalysts and hydrogen requirements also depend upon whether isomerization is coupled with intentional hydrocracking to target jet instead of diesel fuel production.[1] Thus this last major set of HEFA process reactions has, so far, required a separate second step in HEFA refinery configurations. For example, MPC proposes to isomerize the hydrocarbons from its HDO reactors in a separate second-stage hydrocracking unit to be repurposed from its shuttered Martinez crude refinery.[3]

HEFA isomerization requires very substantial hydrogen inputs, and can recycle most of that hydrogen when targeting diesel production, but consumes much more hydrogen for intentional hydrocracking to boost jet fuel production, adding significantly to the already-huge hydrogen requirements for its HDO reaction step.[1]

A-30 cont'd

The role and impact of heat and pressure in the HEFA process

Hydro-conversion reactions proceed at high temperatures and extremely high pressures. Reactors feeding gas oils and distillates of similar densities to HEFA reactor feeds run at 575–700 ºF and 600–2,000 pounds per square inch (psi) for hydrotreating and at 575–780 ºF and 600–2,800 psi for hydrocracking.[16] That is during normal operation. The reactions are exothermic: they generate heat in the reactor on top of the heat its furnaces send into it. Extraordinary steps to handle the severe process conditions become routine in hydro-conversion. Hydrogen injection and recycle capacities are oversized to quench and attempt to control reactor heat-and-pressure rise.[16 22] When that fails, which happens frequently as shown in a following chapter, the reactors depressurize, dumping their contents to emergency flares. That is during petroleum refining.

Hydro-conversion reaction temperatures increase in proportion to hydrogen consumption,[21] and HDO reactions can consume more hydrogen, so parts of HEFA hydro-conversion trains can run hotter than those of petroleum refineries, form more extreme "hot spots," or both. Indeed, HEFA reactors must be designed to depressurize rapidly.[22] Yet as of this writing, no details of design potential HEFA project temperature and pressure ranges have been reported publicly.

1.2 Available option of repurposing hydrogen equipment drives choice of HEFA

Refiners could choose better new biofuel technology

A-31

Other proven technologies promise more flexibility at lower feedstock costs. For example, Fischer-Tropsch synthesis condenses a gasified mixture of carbon monoxide and hydrogen to form hydrocarbons and water, and can produce biogas, gasoline, jet fuel, or diesel biofuels.[23] Cellulosic biomass residues can be gasified for Fischer-Tropsch synthesis.[24] This alternative promises lower cost feedstock than HEFA technology and the flexibility of a wider range of future biofuel sales, along with the same ability to tap "renewable" fuel subsidies as HEFA technology. Refiners choose HEFA technology for a different reason.

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Refiners can repurpose existing crude refining equipment for HEFA processing

Hydro-conversion reactors and hydrogen plants which were originally designed, built, and used for petroleum hydrocracking and hydrotreating could be repurposed and used for the new and different HEFA feedstocks and process reactions. This is in fact what the crude-to-biofuel refinery conversion projects propose to do in California.[2 3 5 6]

In the largest HEFA project to be proposed or built, P66 proposes to repurpose its 69,000 barrel/day hydrocracking capacity at units 240 and 246 combined, its 16,740 b/d Unit 248 hydrotreater, and its 35,000 b/d Unit 250 hydrotreater for 100% HEFA processing at Rodeo.[2 25] In the second largest project, MPC proposes to repurpose its 40,000 b/d No.2 HDS hydrotreater, 70,000 b/d No. 3 HDS hydrotreater, 37,000 b/d 1st Stage hydrocracker, and its 37,000 b/d 2nd Stage hydrocracker for 100% HEFA processing at Martinez.[3 26]

For hydrogen production to feed the hydro-conversion processing P66 proposes to repurpose 28.5 million standard cubic feet (SCF) per day of existing hydrogen capacity from its Unit 110 and 120 million SCF/d of hydrogen capacity from the Air Liquide Unit 210 at the same P66 Rodeo refinery.[2 25 27] MPC proposes to repurpose its 89 million SCF/d No. 1 Hydrogen Plant along with the 35 million SCF/d Air Products Hydrogen Plant No. 2 at the now-shuttered MPC Martinez refinery.[3 4 11 26]

A-31 cont'd

By converting crude refineries to HEFA biofuel refiners protect otherwise stranded assets

Motivations to protect otherwise stranded refining assets are especially urgent in the two largest crude-to-biofuel refining conversions proposed to date. Uniquely designed and permitted to rely on a landlocked and fast-dwindling crude source already below its capacity, the P66 San Francisco Refinery has begun to shutter its front end in San Luis Obispo County, which makes its unheated pipeline unable to dilute and send viscous San Joaquin Valley crude to Rodeo.[28] This threatens the viability of its Rodeo refining assets—as the company itself has warned.[29] The MPC Martinez refinery was shut down permanently in a refining assets consolidation, possibly accelerated by COVID-19, though the pandemic closed no other California refinery.[30]

The logistics of investment in new and repurposed HEFA refineries as a refining asset protection mechanism leads refiners to repurpose a refining technology that demands hydrogen, then repurpose refinery hydrogen plants that supply hydrogen, then involve other companies in a related sector—such as Air Liquide and Air products—that own otherwise stranded hydrogen assets the refiners propose to repurpose as well.

Refiners also seek substantial public investments in their switch to HEFA biofuels. Tepperman (2020)[31] reports that these subsidies include federal "Blenders Tax" credits, federal "Renewable Identification Number" credits, and state "Low Carbon Fuel Standard" credits that one investment advisor estimated can total $3.32 per gallon of HEFA diesel sold in California. Krauss (2020)[32] put that total even higher at $4.00 per gallon. Still more public money could be directed to HEFA jet fuel, depending on the fate of currently proposed federal legislation.[33]

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2. UPSTREAM — IMPACT OF FEEDSTOCK CHOICES

The types, amounts, and characteristics of energy feedstocks have repercussions across the energy system and environment. Choosing HEFA technology would lock into place a particular subset of the biomass carbon on our planet for use in energy production. It would further create a need for continued and potentially additional hydrogen use. This chapter evaluates the environmental impacts of feedstock acquisition and feedstock choices in HEFA production.

2.1 Proposed feedstock use by the Phillips 66, Marathon, and other California projects

2.1.1 Biomass volume

The proposed conversions at P66 and MPC, and attendant use of HEFA feedstocks, are very large in scale. P66 boasts that its Rodeo biorefinery would be the largest in the world.[10] The feedstock capacity of its HEFA biorefinery proposed in Rodeo, CA reported by P66 is 80,000 barrels per day (b/d).[2] With a feedstock capacity of 48,000 b/d, the MPC Martinez, CA project could then be the second largest HEFA refinery to be proposed or built worldwide.[3] The World Energy subsidiary, AltAir, expansion in Paramount, CA, which also plans to fully convert a petroleum refinery, would add 21,500 b/d of new HEFA feedstock capacity.[5] And Global Clean Energy Holdings, Inc. plans to convert its petroleum refinery in Bakersfield, CA into a HEFA refinery[6] with at least 15,000 b/d of new capacity. Altogether that totals 164,500 b/d of new HEFA feedstock capacity statewide. A-32

The aggregate proposed new California feedstock demand is some 61–132 *times* the annual feedstock demand for HEFA refining in California from 2016–2019.[34] But at the same time, the proposed new California biofuel feed demand is only ten percent of California refinery demand for crude oil in 2019,[35] the year before COVID-19 forced temporary refining rate cuts.[36] This raises a potential for the new HEFA feed demand from crude-to-biofuel refinery conversions proposed here today to be only the beginning of an exponentially increasing trend.

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2.1.2 Biomass type

HEFA technology, proposed at all of the California refineries currently proposing conversion to biofuel production, uses as feedstock triacylglycerols (TAGs) and fatty acids derived from TAGs (Chapter 1). Primary sources of these biomass lipids in concentrations and amounts necessary for HEFA processing are limited to oil crop plants, livestock fats, and fish oils. Existing U.S. biofuels production has tapped soybean oil, distillers corn oil, canola oil, cottonseed oil, beef tallow, pork lard and grease, poultry fats, fish oils from an unreported and likely wide range of species, and used cooking oil—lipids that could be recovered from uses of these primary sources, also known as "yellow grease."[37 38 39]

A-32 cont'd

2.1.3 Other uses for this type of biomass

Importantly, people already use these oils and fats for many other needs, and they are traded globally. Beside our primary use of this type of biomass to feed ourselves directly, we use it to feed livestock in our food system, to feed our pets, and to make soap, wax, lubricants, plastics, cosmetic products, and pharmaceutical products.[40]

2.2 Indirect impacts of feedstock choices

2.2.1 Land use and food system impacts

Growing HEFA biofuel feedstock demand is likely to increase food system prices. Market data show that investors in soybean and tallow futures have bet on this assumption.[41 42 43] This pattern of radically increasing feedstock consumption and the inevitable attendant commodity price increases threatens significant environmental and human consequences, some of which are already emerging even with more modestly increased feedstock consumption at present.

As early as 2008, Searchinger et al.[44] showed that instead of cutting carbon emissions, increased use of biofuel feedstocks and the attendant crop price increases could expand crop land into grasslands and forests, reverse those natural carbon sinks, and cause food-sourced biofuels to emit more carbon than the petroleum fuels they replace. The mechanism for this would be global land use change linked to prices of commodities tapped for both food and fuel.[44]

A-33

Refiners say they will not use palm oil, however, that alone does not solve the problem. Sanders et al. (2012)[45] showed that multi-nation demand and price dynamics had linked soy oil, palm oil, food, and biofuel feedstock together as factors in the deforestation of Southeast Asia for palm oil. Santeramo (2017)[46] showed that such demand-driven changes in prices act across the oil crop and animal fat feedstocks for HEFA biofuels in Europe and the U.S. Searle (2017)[47] showed rapeseed (canola) and soy biofuels demand was driving palm oil expansion; palm oil imports increase for other uses of those oils displaced by biofuels demand.

Additionally, The Union of Concerned Scientists (2015),[48] Lenfert et al. (2017),[49] and Nepstad and Shimada (2018)[50] linked soybean oil prices to deforestation for soybean plantations in the Brazilian Amazon and Pantanal. By 2017, some soy and palm oil biofuels were found to

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emit more carbon than the petroleum fuels they are meant to replace.[47 51] By 2019 the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) warned large industrial biofuel feedstock plantations threaten global biodiversity.[52] By 2021 the Intergovernmental Panel on Climate Change joined the IPBES in this warning.[53] At high yields and prices, up to 79 million acres could shift to energy crops by 2030 in the U.S. alone.[40] And once a biofuel feedstock also used for food is locked in place, the human impacts of limiting land conversion could potentially involve stark social injustices, notably food insecurity and hunger.[44]

Work by many others who are not cited here contributed to better understanding the problem of our growing fuel chain-food chain interaction. Potential biodiversity loss, such as pollinator population declines, further risks our ability to grow food efficiently. Climate heating threatens more frequent crop losses. The exact tipping point, when pushing these limits too hard might turn the natural carbon sinks that biofuels depend upon for climate benefit into global carbon sources, remains unknown.

2.1.2 Impact on climate solutions

Technological, economic, and environmental constraints across the arrays of proven technologies and measures to be deployed for climate stabilization limit biofuels to a targeted role in sectors for which zero-emission fuels are not yet available.[53 54 55 56 57 58 59 60 61] And these technologies and measures require place-based deployment actions understood in a larger global context—actions that must be planned, implemented, and enforced by the political jurisdictions in each geography, but whose effect must be measured on a worldwide scale. California policy makers acted on this fact by expressly defining an in-state emission reduction which results in an emission increase elsewhere as inconsistent with climate protection.[62] A-33 cont'd

Tapping a biomass resource for biofuel feedstock can only be part of our state or national climate solution if it does not lead to countervailing climate costs elsewhere that wipe out or overtake any purported benefits. Thus, if California takes biomass from another state or nation which that other state or nation needs to cut emissions there, it will violate its own climate policy, and more crucially, burning that biofuel will not cut carbon emissions. Moreover, our climate policy should not come at the cost of severe human and environmental harms that defeat the protective purpose of climate policy.

Use of biofuels as part of climate policy is thus limited by countervailing climate and other impacts. Experts that the state has commissioned for analysis of the technology and economics of paths to climate stabilization suggest that state biofuel use should be limited to the per capita share of sustainable U.S. production of biofuel feedstock.[54 55] Per capita share is a valid benchmark, and is used herein, but it is not necessarily a basis for just, equitable, or effective policy. Per capita, California has riches, agriculture capacity, solar energy potential, and mild winters that populations in poorer, more arid, or more polar and colder places may lack. Accordingly, the per capita benchmark applied in Table 1 below should be interpreted as a conservative (high) estimate of sustainable feedstock for California HEFA refineries.

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Table 1. U.S. and California lipid supplies *v.* potential new lipid feedstock demand from crude-to-biofuel refinery conversions now planned in California.

MM t/y: *million metric tons/year*

Lipids supply	U.S. (MM t/y)	U.S. (%)	CA per capita [d] (MM t/y)	CA produced [e] (MM t/y)
Biofuels [a]	4.00	100 %	0.48	0.30
All uses	20.64	100 %	2.48	1.55
Soybean oil [b]	10.69	52 %		
Livestock fats [a]	4.95	24 %		
Corn oil [b]	2.61	13 %		
Waste oil [a]	1.40	7 %		
Canola oil [b]	0.76	4 %		
Cottonseed [b]	0.23	1 %		

Lipids Demand for four proposed CA refineries (MM t/y) [c]	Percentage of U.S. and California supplies for all uses: U.S. total	CA per capita	CA produced
8.91	43 %	359 %	575 %

a. US-produced supply of feedstocks for hydro-processing esters and fatty acids (HEFA) in 2030, estimated in the U.S. Department of Energy *Billion-Ton Update* (2011).[40] Includes total roadside/farm gate yields estimates in the contiguous U.S. for biofuel feedstock consumption, and for all uses of animal fats and waste oil (used cooking oil).
b. U.S. farm yield for all uses of lipids used in part for biofuels during Oct 2016–Sep 2020 from U.S. Department of Agriculture *Oil Crops Data: Yearbook Tables;* tables 5, 20, 26 and 33.[38] See also Karras (2021a).[63]
c. From proposed Rodeo,[2] Martinez,[3] Paramount[5] and Bakersfield[6] capacity at a feed specific gravity of 0.914.
d. California per capita share of U.S. totals based on 12 percent of the U.S. population.
e. Calif. produced lipids, after *Billion-Ton Update* by Mahone et al.,[55] with lipids for all uses scaled proportionately.

A-33 cont'd

2.3 Effect of supply limitations on feedstock acquisition impacts

Feeding the proposed new California HEFA refining capacity could take more than 350% of its per capita share from total U.S. farm yield for *all uses* of oil crop and livestock fat lipids that have been tapped for biofuels in much smaller amounts until now. See Table 1. The 80,000 b/d (~4.24 MM t/y) P66 Rodeo project[2] alone could exceed this share by ~71%. At 128,000 b/d (~6.79 MM t/y) combined, the P66[2] and Marathon[3] projects together could exceed it by ~174%.

A-34

2.3.1 Supply effect on climate solutions

Emission shifting would be the first and most likely impact from this excess taking of a limited resource. The excess used here could not be used elsewhere, and use of the remaining farmed lipids elsewhere almost certainly would prioritize food. Reduced capacity to develop and use this biofuel for replacing petroleum diesel outside the state would shift future emissions.

2.3.2 Supply effect on land use and food systems

Displacement of lipid food resources at this scale would also risk cascading impacts. These food price, food security, and land conversion impacts fuel deforestation and natural carbon sink destruction in the Global South, and appear to have made some HEFA biofuels more carbon-

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intensive than petroleum due to indirect land use impacts that diminish the carbon storage capacity of lands converted to biofuel plantations, as described above.[41–53]

The severity of these risks to food security, biodiversity, and climate sinks appears uncertain for some of the same reasons that make it dangerous. Both the human factors that drove land use impacts observed in the past[41–53] and the ecological resilience that constrained their severity in the past may not always scale in a linear or predictable fashion, and there is no precedent for the volume of lipid resource displacement for energy now contemplated.

In contrast, the causal trigger for any or all of these potential impacts would be a known, measurable volume of potential lipid biomass feedstock demand. Importantly, this volume-driven effect does not implicate the Low Carbon Fuel Standard and can only be addressed effectively by separate policy or investment actions. A-34 cont'd

2.3.3 Supply effect on HEFA feedstock choices

Both Marathon and P66 have indicated informally that their preferred feedstocks are used cooking oil "waste" and domestic livestock fats rather than soy and other food crop oils. It is clear, however, that supplies of these feedstocks are entirely insufficient to meet anticipated demand if the two conversions (and the others planned in California) move forward. Table 1 reveals the fallacy of assuming that used "waste" cooking oil or domestic livestock fats could feed the repurposed HEFA refineries, showing that supplies would be inadequate even in an extreme hypothetical scenario wherein biofuel displaces all other uses of these lipids.

As discussed below, these HEFA feedstock availability limitations have fuel chain repercussions for the other critical HEFA process input—hydrogen.

2.4 Impact of biomass feedstock choices on hydrogen inputs

2.4.1 All HEFA feedstocks require substantial hydrogen inputs to convert the triacylglycerols and fatty acids in the lipid feedstock into HEFA biofuels

Hydrogen (H_2) is the most abundant element in diesel and jet fuel hydrocarbons, and all of the lipid feedstocks that HEFA refiners could process need substantial refinery hydrogen inputs. In HEFA refining hydrogen bonds with carbon in lipid feeds to saturate them, to break the fatty acids and propane "knuckle" of those triacylglycerols apart, and—in unavoidable side-reactions or intentionally to make more jet fuel—to break longer carbon chains into shorter carbon chains. (Chapter 1.) Hydrogen added for those purposes stays in the hydrocarbons made into fuels; it is a true HEFA biofuel feedstock. A-35

Hydrogen also bonds with oxygen in the lipids to remove that oxygen from the hydrocarbon fuels as water. *Id.* Forming the water (H_2O) takes two hydrogens per oxygen, and the lipids in HEFA feedstocks have consistently high oxygen content, ranging from 10.8–11.5 weight percent,[1] so this deoxygenation consumes vast amounts of hydrogen. Further, hydrogen is injected in large amounts to support isomerization reactions that turn straight-chain hydrocarbons

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into branched-chain hydrocarbons. (Chapter 1.) And more hydrogen is injected to quench and control severe processing conditions under which all of these hydro-conversion reactions proceed. *Id.* A-35 cont'd

2.4.2 <u>Some HEFA feedstocks need more hydrogen for HEFA processing than others</u>

All types of HEFA feeds consume hydrogen in all the ways described above. However, how much is consumed in the first reaction—saturation—depends on the number of carbon double bonds in the fatty acids of the specific lipid feed source. *<u>See</u>* Diagram 1, Chapter 1. That matters because fatty acids in one specific HEFA lipids feed can have more carbon double bonds than fatty acids in another. Charts 1-A through 1–F below illustrate these differences in the fatty acid profiles of different HEFA feeds. The heights of the columns in these charts show the percentages of fatty acids in each feed that have various numbers of carbon double bonds.

In soybean oil, which accounts for the majority of U.S. oil crops yield shown in Table 1, most of the fatty acids have 2–3 carbon double bonds (Chart 1-A). In contrast, most of the fatty acids in livestock fats have 0–1 carbon double bonds (Chart 1-B). And in contrast to the plant oil *and* livestock fat profiles, which are essentially empty on the right side of charts 1-A and 1-B, a significant portion of the fatty acids in fish oils have 4–6 carbon double bonds (Chart 1-C). A-36

Thus, HEFA processing requires more hydrogen to saturate the carbon double bonds in soy oil than those in livestock fats, and even more hydrogen to saturate those in fish oils. Such single-feed contracts are plausible, but feedstock acquisition logistics for the HEFA biofuels expansion—especially in light of the supply problem shown in Table 1—suggest refiners will process blends, and likely will process yield-weighted blends. Charts 1-D and 1-F show that such blends would dampen but still reflect these differences between specific plant oils, livestock fats, and fish oils. Finally, Chart 1-E illustrates the notoriously variable quality of used cooking oil (UCO), and Chart 1-F illustrates how the impact of UCO variability could be small compared with the differences among other feeds, since UCO could be only a small portion of the blend, as shown in Table 1.

2.4.3 <u>Refining HEFA feedstocks demands more hydrogen than refining crude oil</u>

Table 2, on the next page following the charts below, shows total hydrogen demand per barrel of feedstock, for processing different HEFA feeds, and for targeting different HEFA fuels.

Hydrogen demand for saturation of carbon double bonds ranges across the biomass feeds shown in Table 2 from 186–624 standard cubic feet of H_2 per barrel of biomass feed (SCF/b), and is the largest feedstock-driven cause of HEFA H_2 demand variability. For comparison, total on-purpose hydrogen production for U.S. refining of petroleum crude from 2006–2008, before lighter shale oil flooded refineries, averaged 273 SCF/b.[1 64] This 438 (624-186) SCF/b saturation range alone exceeds 273 SCF/b. The extra H_2 demand for HEFA feeds with more carbon double bonds is one repercussion of the livestock fat and waste oil supply limits revealed in Table 1. A-37

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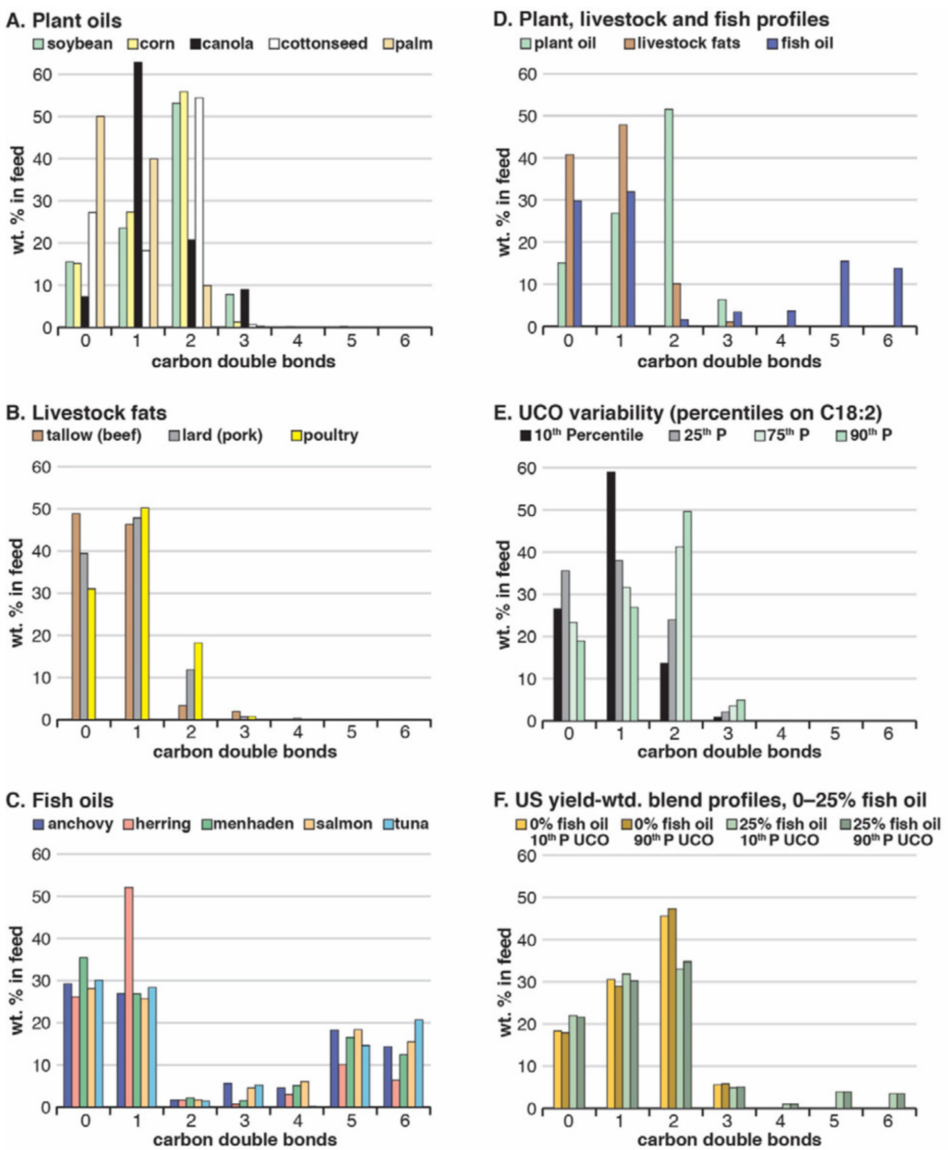

A-37 cont'd

1. HEFA feed fatty acid profiles by number of carbon double bonds.
Carbon double bonds require more hydrogen in HEFA processing. **A–C.** Plant oil, animal fat and fish oil profiles. **D.** Comparison of weighted averages for plant oils (US farm yield-wtd. 70/20/7/3 soy/corn/canola/cottonseed blend), livestock fats (40/30/30 tallow/lard/poultry blend) and fish oils (equal shares for species in Chart 1C). **E.** UCO: used cooking oil, a highly variable feed. **F.** US yield-weighted blends are 0/85/10/5 and 25/60/10/5 fish/plant/livestock/UCO oils. Profiles are median values based on wt.% of linoleic acid. *See* Table A1 for data and sources.[1]

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Table 2. Hydrogen demand for processing different HEFA biomass carbon feeds.

Standard cubic feet of hydrogen per barrel of biomass feed (SCF/b)

	Hydrodeoxygenation reactions		Total with isomerization / cracking	
Biomass carbon feed	Saturation [a]	Others [b,c]	Diesel target	Jet fuel target [d]
Plant oils				
Soybean oil	479	1,790	2,270	3,070
Plant oils blend [e]	466	1,790	2,260	3,060
Livestock fats				
Tallow	186	1,720	1,910	2,690
Livestock fats blend [e]	229	1,720	1,950	2,740
Fish oils				
Menhaden	602	1,880	2,480	3,290
Fish oils blend [e]	624	1,840	2,460	3,270
US yield-weighted blends [e]				
Blend without fish oil	438	1,780	2,220	3,020
Blend with 25% fish oil	478	1,790	2,270	3,070

a. Carbon double bond saturation as illustrated in Diagram 1 (a). **b, c.** Depropanation and deoxygenation as illustrated in Diagram 1 (b), (c), and losses to unwanted (diesel target) cracking, off-gassing and solubilization in liquids. **d.** Jet fuel total also includes H_2 consumed by intentional cracking along with isomerization. **e.** Blends as shown in charts 1-D and 1-F. Data from Tables A1and Appendix at A2.[1] Figures may not add due to rounding.

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Moreover, although saturation reaction hydrogen alone can exceed crude refining hydrogen, total hydrogen consumption in HEFA feedstock processing is larger still, as shown in Table 2.

Other hydrodeoxygenation reactions—depropanation and deoxygenation—account for most of the total hydrogen demand in HEFA processing. The variability in "other" hydrogen demand mainly reflects unavoidable hydrogen losses noted in Table 2, which rise with hydro-conversion intensity. Targeting maximum jet fuel rather than diesel production boosts total HEFA hydrogen demand by approximately 800 SCF/b.[1 9 65] This is primarily a product slate rather than feed-driven effect: maximizing jet fuel yield from the HDO reaction hydrocarbons output consumes much more hydrogen for intentional hydrocracking, which is avoided in the isomerization of a HEFA product slate targeting diesel.

Total hydrogen demand to process the likely range of yield-weighted biomass blends at the scale of planned HEFA expansion could thus range from 2,220–3,070 SCF/b, fully 8–11 *times* that of the average U.S. petroleum refinery (273 SCF/b).[1 64] This has significant implications for climate and community impacts of HEFA refining given the carbon-intensive and hazardous ways that refiners already make and use hydrogen now.

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3. MIDSTREAM — HEFA PROCESS ENVIRONMENTAL IMPACTS

This chapter assesses refinery carbon emissions, refinery explosion and fire hazards, and air pollution impacts from refinery flares in HEFA processing. As shown in Chapter 2, turning a petroleum refinery into a HEFA refinery increases its hydrogen input intensity. This increased hydrogen intensity is particularly problematic given that the proposed conversions are all based on plans to re-purpose existing fossil fuel hydrogen production and hydro-conversion processes (Chapter 1). Current refinery hydrogen production that refiners propose to re-purpose uses the extraordinarily carbon intense "steam reforming" technology. Additionally, refinery explosion, fire, and flare emission hazards associated with processing in hydro-conversion units which refiners propose to re-purpose intensify at the increased hydrogen feed rates HEFA processing requires. P66 proposes to repurpose 148.5 million standard cubic feet per day (MMSCFD) of existing steam reforming hydrogen production capacity and 120,740 barrels per day (b/d) of existing hydro-conversion capacity for its proposed HEFA refinery in Rodeo. *Id.* MPC proposes to repurpose 124 MMSCFD of steam reforming capacity and 147,000 b/d of hydro-conversion capacity for its proposed HEFA refinery in Martinez. *Id.*

3.1 Carbon impact of steam reforming in the HEFA process

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The hydrogen intensity of HEFA processing makes emissions from supplying the hydrogen all the more important, and as noted, refiners propose to repurpose carbon-intensive steam reforming. This could boost HEFA refinery carbon emissions dramatically.

Steam reforming makes hydrogen by stripping it from hydrocarbons, and the carbon left over from that forms carbon dioxide (CO_2) that emits as a co-product. *See* Diagram 2. It is often called methane reforming, but refiners feed it other refining byproduct hydrocarbons along with purchased natural gas, and even more CO_2 forms from the other feeds. The difference illustrated in Diagram 2 comes out to 16.7 grams of CO_2 per SCF of H_2 produced from propane *versus* 13.9 grams CO_2/SCF H_2 produced from methane. Fossil fuel combustion adds more CO_2.

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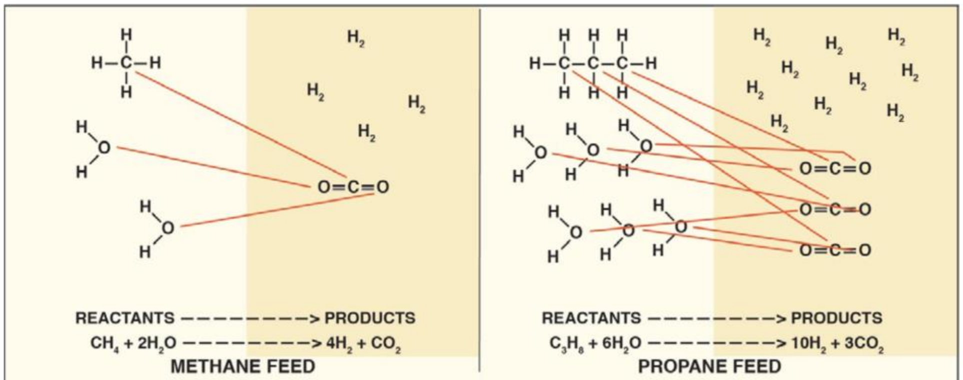

Diagram 2. Hydrogen steam reforming: reforming and shift reactions.

As the reforming and shift reactions produce hydrogen (H_2) from the hydrogen atoms (H) in hydrocarbons and steam, they bond the left-over carbon (C) and oxygen (O) atoms in those reactants together to form carbon dioxide (CO_2). This emits more CO_2 per H_2 produced from hydrocarbons with more carbon atoms.

Heating the water and feed to make the mixture of superheated steam and hydrocarbons that react at 1,300–1,900 ºF, and making the additional steam and power that drive its pumps and pressure, make steam reforming energy intensive. Natural gas and refinery process off gas burn for that energy. Combustion energy intensity, based on design capacities verified and permitted by local air officials, ranges across 11 hydrogen plants that serve or served Bay Area refineries, from 0.142–0.277 million joules (MJ) per SCF H_2 produced, with a median of 0.202 MJ/SCF across the 11 plants.[1] At the median, ~10 gCO_2/SCF H_2 produced emits from burning methane. That, plus the 13.9 g/SCF H_2 from methane feed, could emit 23.9 g/SCF. This median energy intensity (EI) for methane feed is one of the potential plant factors shown in Table 3 below. A-38 cont'd

Hydrogen plant factors are shown in Table 3 for two feeds—methane, and a 77%/23% methane/propane mix—and for two combustion energy intensities, a Site EI and the median EI from Bay Area data discussed above. The mixed feed reflects propane by-production in HEFA process reactions and the likelihood that this and other byproduct gases would be used as feed, fuel, or both. Site EI should be more representative of actual P66 and MPC plant factors, but details of how they will repurpose those plants have not yet been disclosed. Median EI provides a reference point for P66 and MPC plant factors, and is applied to the other projects in the statewide total at the bottom of the table.

Table 3 shows how high-carbon hydrogen technology and high hydrogen demand for hydro-conversion of HEFA feeds (Chapter 2) combine to drive the carbon intensity of HEFA refining. At the likely hydrogen feed mix and biomass feed blend lower bound targeting diesel production, HEFA hydrogen plants could emit 55.3–57.9 kilograms of CO_2 per barrel of biomass feed. And in those conditions at the upper bound, targeting jet fuel, they could emit 76.4–80.1 kg/b.

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Table 3. CO_2 emissions from hydrogen production proposed for HEFA processing by full scale crude-to-biofuel refinery conversions planned in California.

g: gram (CO_2) **SCF:** standard cubic foot (H_2) **b:** barrel (biomass feed) **Mt:** million metric tons

	Plant factor[a]	Conversion demand (SCF/b)[b]		Carbon intensity	Mass emission[c]
	(g/SCF)	Lower bound	Upper bound	(kg/b)	(Mt/y)
P66 Rodeo					
Mixed feed [d]					
Site EI [a]	26.1	2,220	3,070	57.9 – 80.1	1.69 – 2.34
Median EI [a]	24.9	2,220	3,070	55.3 – 76.4	1.61 – 2.23
Methane [d]					
Site EI [a]	25.0	2,220	3,070	55.5 – 76.7	1.62 – 2.24
Median EI [a]	23.9	2,220	3,070	53.1 – 73.4	1.55 – 2.14
MPC Martinez					
Mixed feed [d]					
Site EI [a]	25.8	2,220	3,070	57.3 – 79.2	1.00 – 1.39
Median EI [a]	24.9	2,220	3,070	55.3 – 76.4	0.97 – 1.34
Methane [d]					
Site EI [a]	24.7	2,220	3,070	54.8 – 75.8	0.96 – 1.33
Median EI [a]	23.9	2,220	3,070	53.1 – 73.4	0.93 – 1.29
Total CA Plans: P66, MPC, AltAir and GCE					
Mixed feed [a, d]	25.8	2,220	3,070	57.3 – 79.2	3.51 – 4.86
Methane [a, d]	24.6	2,220	3,070	54.6 – 75.5	3.35 – 4.63

a. Plant factor energy intensity (EI) expressed as emission rate assuming 100% methane combustion fuel. Site EI is from plant-specific, capacity-weighted data; median EI is from 11 SF Bay Area hydrogen plants that serve or served oil refineries. CA total assumes site EIs for P66 and MPC and median EI for AltAir and GCE. **b.** H_2 demand/b biomass feed: lower bound for yield-weighted blend with 0% fish oil targeting maximum diesel production; upper bound for yield-weighted blend with 25% fish oil targeting maximum jet fuel production. **c.** Mass emission at kg/b value in table and capacity of proposed projects, P66: 80,000 b/d; MPC: 48,000 b/d; Altair: 21,500 b/d; GCE: 18,500 b/d. **d.** Mixed feed is 77% methane and 23% propane, the approximate proportion of propane by-production from HEFA processing, and the likely disposition of propane, other process byproduct gases, or both; methane: 100% methane feed to the reforming and shift reactions. *See* Appendix for details.[1]

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Total CO_2 emissions from hydrogen plants feeding the currently proposed HEFA refining expansion proposed statewide could exceed 3.5 million tons per year—if the refiners only target diesel production. *See* Table 3. If they all target jet fuel, and increase hydrogen production to do so, those emissions could exceed 4.8 million tons annually. *Id.*

It bears note that this upper bound estimate for targeting jet fuel appears to require increases in permitted hydrogen production at P66 and MPC. Targeting jet fuel at full feed capacity may also require new hydrogen capacity a step beyond further expanding the 1998 vintage[66] P66 Unit 110 or the 1963 vintage[67] MPC No. 1 Hydrogen Plant. And if so, the newer plants could be less energy intensive. The less aged methane reforming merchant plants in California, for example, have a reported median CO_2 emission rate of 76.2 g/MJ H_2.[68] That is 23.3 g/SCF, close to, but

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less than, the methane reforming median of 23.9 g/SCF in Table 3. Conversely, the belief, based on available evidence until quite recently, that methane emissions from steam reformers do not add significantly to the climate-forcing impact of their huge CO_2 emissions, might turn out to be wrong. Recently reported aerial measurements of California refineries[69] indicate that methane emissions from refinery hydrogen production have been underestimated dramatically. Thus, the upper bound carbon intensity estimates in Table 3 might end up being too high or too low. But questions raised by this uncertainty do not affect its lower bound estimates, and those reveal extreme-high carbon intensity.

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Total CO_2 emissions from U.S. petroleum refineries averaged 41.8 kg per barrel crude feed from 2015–2017, the most recent period in which we found U.S. government-reported data for oil refinery CO_2 emitted nationwide.[1] At 55–80 kg per barrel biomass feed, the proposed HEFA hydrogen production *alone* exceeds that petroleum refining carbon intensity by 32–91 percent.

Additional CO_2 would emit from fuel combustion for energy to heat and pressure up HEFA hydro-conversion reactors, precondition and pump their feeds, and distill, then blend their hydrocarbon products. Unverified potential to emit calculations provided by one refiner[1] suggest that these factors could add ~21 kg/b to the 55–80 kg/b from HEFA steam reforming. This ~76–101 kg/b HEFA processing total would exceed the 41.8 kg/b carbon intensity of the average U.S. petroleum refinery by ~82–142 percent. Repurposing refineries for HEFA biofuels production using steam reforming would thus increase the carbon intensity of hydrocarbon fuels processing.

3.2 Local risks associated with HEFA processing

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HEFA processing entails air pollution, health, and safety risks to workers and the surrounding community. One of these risks—the intensified catastrophic failure hazard engendered by the more intensive use of hydrogen for HEFA processing—renders HEFA refining in this respect more dangerous than crude processing.

3.2.1 <u>HEFA processing increases refinery explosion and fire risk</u>

After a catastrophic pipe failure ignited in the Richmond refinery sending 15,000 people to hospital emergency rooms, a feed change was found to be a causal factor in that disaster—and failures by Chevron and public safety officials to take hazards of that feed change seriously were found to be its root causes.[70] The oil industry knew that introducing a new and different crude into an existing refinery can introduce new hazards.[71] More than this, as it has long known, side effects of feed processing can cause hazardous conditions in the same types of hydro-conversion units it now proposes to repurpose for HEFA biomass feeds,[71] and feedstock changes are among the most frequent causes of dangerous upsets in these hydro-conversion reactors.[16]

But differences between the new biomass feedstock refiners now propose and crude oil are bigger than those among crudes which Chevron ignored the hazards of before the August 2012 disaster in Richmond—and involve oxygen in the feed, rather than sulfur as in that disaster.[70]

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Chevron Richmond Refinery, 6 Aug 2012. Image: CSB

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This categorical difference between oxygen and sulfur, rather than a degree of difference in feed sulfur content, risks further "minimizing the accuracy, or even feasibility, of predictions based on historical data."[71] At 10.8–11.5 wt. %, HEFA feeds have very high oxygen content,[1] while the petroleum crude fed to refinery processing has virtually none. Carbonic acid forms from that oxygen in HEFA processing. Carbonic acid corrosion is a known hazard in HEFA processing.[22] But this corrosion mechanism, and the specific locations it attacks in the refinery, differ from those of the sulfidic corrosion involved in the 2012 Richmond incident. Six decades of industry experience with sulfidic corrosion[71] cannot reliably guide—and could misguide—refiners that attempt to find, then fix, damage from this new hazard before it causes equipment failures.

Worse, high-oxygen HEFA feedstock boosts hydrogen consumption in hydro-conversion reactors dramatically, as shown in Chapter 2. That creates more heat in reactors already prone to overheating in petroleum refining. Switching repurposed hydrocrackers and hydrotreaters to HEFA feeds would introduce this second new oxygen-related hazard.

A specific feedback mechanism underlies this hazard. The hydro-conversion reactions are exothermic: they generate heat.[16 21 22] When they consume more hydrogen, they generate more

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heat.[21] Then they get hotter, and crack more of their feed, consuming even more hydrogen,[16 21] so "the hotter they get, the faster they get hot."[16] And the reactions proceed at extreme pressures of 600–2,800 pound-force per square inch,[16] so the exponential temperature rise can happen fast.

Refiners call these runaway reactions, temperature runaways, or "runaways" for short. Hydro-conversion runaways are remarkably dangerous. They have melted holes in eight-inch-thick, stainless steel walls of hydrocracker reactors[16]—and worse. Consuming more hydrogen per barrel in the reactors, and thereby increasing reaction temperatures, HEFA feedstock processing can be expected to increase the frequency and magnitude of runaways.

High temperature hydrogen attack or embrittlement of metals in refining equipment with the addition of so much more hydrogen to HEFA processing is a third known hazard.[22] And given the short track record of HEFA processing, the potential for other, yet-to-manifest, hazards cannot be discounted.

On top of all this, interdependence across the process system—such as the critical need for real-time balance between hydro-conversion units that feed hydrogen and hydrogen production units that make it—magnifies these hazards. Upsets in one part of the system can escalate across the refinery. Hydrogen-related hazards that manifest at first as isolated incidents can escalate with catastrophic consequences. A-39 cont'd

Significant and sometimes catastrophic incidents involving the types of hydrogen processing systems proposed for California HEFA projects are unfortunately common in crude oil refining, as reflected in the following incident briefs posted by *Process Safety Integrity*[72] report:

- Eight workers are injured and a nearby town is evacuated in a 2018 hydrotreater reactor rupture, explosion and fire.
- A worker is seriously injured in a 2017 hydrotreater fire that burns for two days and causes an estimated $220 million in property damage.
- A reactor hydrogen leak ignites in a 2017 hydrocracker fire that causes extensive damage to the main reactor.
- A 2015 hydrogen conduit explosion throws workers against a steel refinery structure.
- Fifteen workers die, and 180 others are injured, in a series of explosions when hydrocarbons flood a distillation tower during a 2005 isomerization unit restart.
- A vapor release from a valve bonnet failure in a high-pressure hydrocracker section ignites in a major 1999 explosion and fire at the Chevron Richmond refinery.
- A worker dies, 46 others are injured, and the community must shelter in place when a release of hydrogen and hydrocarbons under high temperature and pressure ignites in a 1997 hydrocracker explosion and fire at the Tosco (now MPC) Martinez refinery.
- A Los Angeles refinery hydrogen processing unit pipe rupture releases hydrogen and hydrocarbons that ignite in a 1992 explosion and fires that burn for three days.

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- A high-pressure hydrogen line fails in a 1989 fire which buckles the seven-inch-thick steel of a hydrocracker reactor that falls on other nearby Richmond refinery equipment.
- An undetected vessel overpressure causes a 1987 hydrocracker explosion and fire.[72]

These incidents all occurred in the context of crude oil refining. For the reasons described in this section, there is cause for concern that the frequency and severity of these types of hydrogen-related incidents could increase with HEFA processing.

Refiners have the ability to use extra hydrogen to quench, control, and guard against runaway reactions as described in Chapter 1, a measure which has proved partially effective and appears necessary for hydro-conversion processing to remain profitable. As a safety measure, however, it has proved ineffective so often that hydro-conversion reactors are equipped to depressurize rapidly to flares.[16 22] And that last-ditch safeguard, too, has repeatedly failed to prevent catastrophic incidents. The Richmond and Martinez refineries were equipped to depressurize to flares, for example, during the 1989, 1997, 1999 and 2012 incidents described above. In fact, precisely because it is a last-ditch safeguard, to be used only when all else fails, flaring reveals how frequently these hazards manifest as potentially catastrophic incidents. *See* Table 4 for specific examples.

Indeed, despite current safeguards, hydro-conversion and hydrogen-related process safety hazards which their HEFA conversion projects could worsen contribute to significant flaring incidents at the P66 Rodeo and MPC Martinez refineries frequently. Causal analysis reports for significant flaring show that hydrogen-related hazard incidents occurred at those refineries a combined total of 100 times from January 2010 through December 2020.[1] This is a conservative estimate, since incidents can cause significant impacts without causing environmentally significant flaring, but still represents, on average, and accounting for the Marathon plant closure since April 2020, another hydrogen-related incident at one of those refineries every 39 days.[1] A-39 cont'd

Sudden unplanned or emergency shutdowns of major hydro-conversion or hydrogen production plants occurred in 84 of these 100 reported process safety hazard incidents.[1] Such sudden forced shutdowns of *both* hydro-conversion and hydrogen production plants occurred in 22 of these incidents.[1] In other words, incidents escalated to refinery-level systems involving multiple plants frequently—a foreseeable consequence, given that both hydro-conversion and hydrogen production plants are susceptible to upset when the critical balance of hydrogen production supply and hydrogen demand between them is disrupted suddenly. In four of these incidents, consequences of underlying hazards included fires in the refinery.[1]

Since switching to HEFA refining is likely to further increase the frequency and magnitude of these already-frequent significant process hazard incidents, and flaring has proven unable to prevent every incident from escalating to catastrophic proportions, catastrophic consequences of HEFA process hazards are foreseeable.

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Table 4. Examples from 100 hydrogen-related process hazard incidents at the Phillips 66 Rodeo and Marathon Martinez refineries, 2010–2020.

Date [a]	Refinery	Hydrodrogen-related causal factors reported by the refiner [a]
3/11/10	Rodeo	A high-level safety alarm during a change in oil feed shuts down Unit 240 hydrocracker hydrogen recycle compressor 2G-202, forcing the sudden shutdown of the hydrocracker
5/13/10	Martinez	A hydrotreater charge pump bearing failure and fire forces #3 HDS hydrotreater shutdown [b]
9/28/10	Martinez	A hydrocracker charge pump trip leads to a high temperature excursion in hydrocracker reactor catalyst beds that forces sudden unplanned hydrocracker shutdown [c]
2/17/11	Martinez	A hydrogen plant fire caused by process upset after a feed compressor motor short forces the hydrogen plant shutdown; the hydrocracker shuts down on sudden loss of hydrogen
9/10/12	Rodeo	Emergency venting of hydrogen to the air from one hydrogen plant to relieve a hydrogen overpressure as another hydrogen plant starts up ignites in a refinery hydrogen fire
10/4/12	Rodeo	A hydrocracker feed cut due to a hydrogen makeup compressor malfunction exacerbates a reactor bed temperature hot spot, forcing a sudden hydrocracker shutdown [d]
1/11/13	Martinez	Cracked, overheated and "glowing" hydrogen piping forces an emergency hydrogen plant shutdown; the loss of hydrogen forces hydrocracker and hydrotreater shutdowns
4/17/15	Martinez	Cooling pumps trip, tripping the 3HDS hydrogen recycle compressor and forcing a sudden shutdown of the hydrotreater as a safety valve release cloud catches fire in this incident [e]
5/18/15	Rodeo	A hydrocracker hydrogen quench valve failure forces a sudden hydrocracker shutdown [f]
5/19/15	Martinez	A level valve failure, valve leak and fire result in an emergency hydrotreater shutdown
3/12/16	Rodeo	A Unit 240 level controller malfunction trips off hydrogen recycle compressor G-202, which forces an immediate hydrocracker shutdown to control a runaway reaction hazard [g]
1/22/17	Martinez	An emergency valve malfunction trips its charge pump, forcing a hydrocracker shutdown
5/16/19	Martinez	A recycle compressor shutdown to fix a failed seal valve forces a hydrocracker shutdown [h]
6/18/19	Martinez	A control malfunction rapidly depressurized hydrogen plant pressure swing absorbers
11/11/19	Rodeo	A failed valve spring shuts down hydrogen plant pressure swing absorbers in a hydrogen plant upset; the resultant loss of hydrogen forces a sudden hydrotreater shutdown [i]
2/7/20	Martinez	An unprotected oil pump switch trips a recycle compressor, shutting down a hydrotreater
3/5/20	Rodeo	An offsite ground fault causes a power sag that trips hydrogen make-up compressors, forcing the sudden shutdown of the U246 hydrocracker [j]
10/16/20	Rodeo	A pressure swing absorber valve malfunction shuts down a hydrogen plant; the emergency loss of hydrogen condition results in multiple process unit upsets and shutdowns [k]

a. Starting date of the environmentally significant flaring incident, as defined by Bay Area Air Quality Management District Regulation § 12-12-406, which requires causal analysis by refiners that is summarized in this table. An incident often results in flaring for more than one day. The 100 "unplanned" hydro-conversion flaring incidents these examples illustrate are given in Table A6 of this report. Notes b–k below further illustrate some of these examples with quotes from refiner causal reports. **b.** "Flaring was the result of an 'emergency' ... the #3 HDS charge pump motor caught fire ... ." **c.** "One of the reactor beds went 50 degrees above normal with this hotter recycle gas, which automatically triggered the 300 lb/minute emergency depressuring system." **d.** "The reduction in feed rates exacerbated an existing temperature gradient ...higher temperature gradient in D-203 catalyst Bed 4 and Bed 5 ... triggered ... shutdown of Unit 240 Plant 2." **e.** "Flaring was the result of an Emergency. 3HDS had to be shutdown in order to control temperatures within the unit as cooling water flow failed." **f.** "Because hydrocracking is an exothermic process ... [t]o limit temperature rise... [c]old hydrogen quench is injected into the inlet of the intermediate catalyst beds to maintain control of the cracking reaction." **g.** "Because G-202 provides hydrogen quench gas which prevents runaway reactions in the hydrocracking reactor, shutdown of G-202 causes an automatic depressuring of the Unit 240 Plant 2 reactor ... ." **h.** "Operations shutdown the Hydrocracker as quickly and safely as possible." **i.** "[L]oss of hydrogen led to the shutdown of the Unit 250 Diesel Hydrotreater." **j.** "U246 shut down due to the loss of the G-803 A/B Hydrogen Make-Up compressors."
k. "Refinery Emergency Operating Procedure (REOP)-21 'Emergency Loss of Hydrogen' was implemented."

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3.2.2 HEFA processing would perpetuate localized episodic air pollution

Refinery flares are episodic air polluters. Every time the depressurization-to-flare safeguard dumps process gases in attempts to avoid even worse consequences, that flaring is uncontrolled open-air combustion. Flaring emits a mix of toxic and smog forming air pollutants—particulate matter, hydrocarbons ranging from polycyclic aromatics to methane, sulfur dioxide, hydrogen sulfide, and others—from partially burning off enormous gas flows. Most of the 100 incidents described above flared more than two million cubic feet of vent gas each, and many flared more than ten million.[1]

The increased risk of process upsets associated with HEFA processing concomitantly creates increased risk to the community of acute exposures to air pollutants, with impacts varying with the specifics of the incident and atmospheric conditions at the time when flaring recurs.

In 2005, flaring was linked to episodically elevated local air pollution by analyses of a continuous, flare activity-paired, four-year series of hourly measurements in the ambient air near the fence lines of four Bay Area refineries.[73] By 2006, the regional air quality management district independently confirmed the link, assessed community-level impacts, and set environmental significance thresholds for refinery flares.[74 75] These same significance thresholds were used to require P66 and MPC to report the hazard data described above.[75] A-40

Thus, each of the hundred hydrogen-related flaring incidents since 2010 at the P66 Rodeo and MPC Martinez refineries discussed above *individually* exceeded a relevant environmental significance threshold for air quality. Therefore, by prolonging the time over which the frequent incidents continue, and likely increasing the frequency of this significant flaring, repurposing refineries for HEFA processing can be expected to cause significant episodic air pollution.

Environmental justice impacts

It bears significant note that the refinery communities currently living with episodic air pollution—which would potentially be worsened by the conversion to HEFA processing—are predominantly populated by people of color. In fact, refineries were found to account for 93% of the statewide population-weighted disparity between people of color and non-Hispanic whites in particulate matter emission burdens associated with all stationary source industries in the state cap-and-trade program.[76] These communities of color tend to suffer from a heavy pre-existing pollution burden, such that additional and disproportionate episodic air pollution exposures would have significant environmental justice implications.

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4. DOWNSTREAM — IMPACT OF BIOFUEL CONVERSIONS ON CLIMATE PATHWAYS

This chapter assesses potential impacts of HEFA biofuels expansion on California climate plans and goals. Primary issues of concern are HEFA biofuel volume, total liquid combustion fuel volume, systemic effects of refining and hydrogen use which could create HEFA lock-in, and the timing of choices between zero-emission *versus* liquid combustion fuels. Benchmarks for assessing these impact issues are taken from state roadmaps for the array of decarbonization technologies and measures to be deployed over time to achieve state climate goals—herein, "climate pathways." The state has developed a range of climate pathways, which rely in large part on strategies for replacing petroleum with zero-emission fuels that HEFA growth may disrupt and which reflect, in part, tradeoffs between zero-emission and liquid combustion fuels. Section 4.1 provides background on these climate pathway benchmarks and strategies.

Section 4.2 compares a foreseeable HEFA growth scenario with state climate pathway benchmarks for HEFA biofuel volume, total liquid fuel volume and systemic effects of refining and hydrogen use through mid-century, and estimates potential greenhouse gas emissions. This assessment shows that HEFA biofuel growth has the potential to impact state climate goals significantly. Section 4.3 addresses the timing of choices between zero-emission and liquid combustion fuels, shows that a zero-emission hydrogen alternative could be deployed during a critical window for breaking carbon lock-in, and assesses HEFA growth impacts on the emission prevention, clean fuels development, and transition mitigation effectiveness of this alternative. A-41

4.1 California climate goals and implementation pathway benchmarks background related to HEFA biofuel impact issues assessed

4.1.1 State climate goals and pathways that HEFA biofuels growth could affect

State climate goals call for cutting greenhouse gas emissions 80% below 1990 emissions to a 2050 target of 86.2 million tons per year,[77] for zero-emission vehicles (ZEVs) to be 100% of

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light-duty vehicle (LDV) sales by 2035 and 100% of the medium- and heavy-duty vehicle (MDV and HDV) fleet by 2045,[78] and for achieving net-zero carbon neutrality by 2045.[79]

Behind the net-zero goal lies a highly consequential tradeoff: deeper emission cuts require transforming hard-to-decarbonize uses of energy. Relying on carbon dioxide removal-and-sequestration (CDR) instead risks failure to cut emissions until too late. The state has begun to confront this tradeoff by developing climate pathways that range from near-zero carbon to high-CDR. These pathways show how various types of biofuels and other technologies and measures fit into lower-emission and higher-emission approaches to achieving state climate goals.

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Pathway scenarios developed by Mahone et al. for the California Energy Commission (CEC),[54] Air Resources Board[55] and Public Utilities Commission,[56] Austin et al. for the University of California,[57] and Reed et al. for UC Irvine and the CEC[58] add semi-quantitative benchmarks to the 2050 emission target, for assessing refinery conversions to biofuels. They join other work in showing the need to decarbonize electricity and electrify transportation.[54–61] Their work "bookends" the zero-carbon to high–CDR range of paths to state climate goals,[55] analyzes the roles of liquid hydrocarbon combustion fuels and hydrogen in this context,[54–58] and addresses potential biomass fuel chain effects on climate pathways.[54 55 57]

4.1.2 State climate pathway liquid fuels volume benchmarks that HEFA biofuels growth could affect

Total liquid transportation fuels benchmark: ~1.6 to 3.3 billion gallons by 2045

All state pathways to net-zero emissions cut liquid petroleum fuels use dramatically, with biofuels replacing only a portion of that petroleum. Chart 2 illustrates the "bookends" of the zero-carbon to high-CDR range of pathways for transportation reported by Mahone et al.[55]

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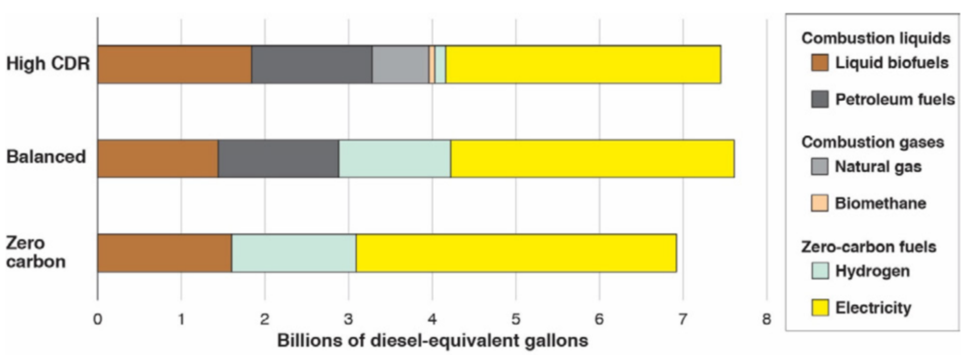

2. California Transportation Fuels Mix in 2045: Balanced and "bookend" pathways to the California net-zero carbon emissions goal.

Adapted from Figure 8 in Mahone et al. (2020a[55]). Fuel shares converted to diesel energy-equivalent gallons based on Air Resources Board LCFS energy density conversion factors. **CDR:** carbon dioxide removal (sequestration).

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Total liquid hydrocarbon combustion fuels for transportation in 2045, including petroleum and biofuels, range among the pathways from approximately 1.6 to 3.3 billion gallons/year (Chart 2), which is roughly 9% to18% of statewide petroleum transportation fuels use from 2013–2017.[55] Liquid biofuels account for approximately 1.4 to 1.8 billion gallons/year, which is roughly 40% to 100% of liquid transportation fuels in 2045 (Chart 2). Importantly, up to 100% of the biofuels in these pathways would be derived from cellulosic biomass feedstocks[57 80 81] instead of purpose-grown lipids which HEFA technology relies upon, as discussed below.

HEFA biofuels volume benchmark: zero to 1.5 billion gallons per year through 2045

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Many State climate pathways exclude or cap HEFA biofuel. Mahone et al. assume biofuels included in the pathways use cellulosic residues that are not purpose-grown—and cap those fuels in most scenarios to the per capita state share of non-purpose-grown U.S. biomass supply.[54 55] This excludes purpose-grown lipids-derived biofuels such as the HEFA biofuels. Austin et al.[57] assume a cap on lipids biomass that limits HEFA jet fuel and diesel use to a maximum of 0.5–0.6 and 0.8–0.9 billion gallons/year, respectively. Both Austin[57] and Mahone[54 55] cite difficult-to-predict land use emissions as reasons to limit purpose-grown crop and lipid-derived biofuels *as pathway development constraints* rather than as problems with the Low Carbon Fuel Standard (LCFS). This report agrees with that view: the need and ability to limit HEFA volume is a climate pathway impact issue—and local land use impact issue—not a criticism of the LCFS. <u>*See*</u> Box below.

4.1.3 <u>Electrolysis hydrogen benchmarks for systemic energy integration that affect the timing of choices between zero-emission *versus* liquid combustion fuels</u>

To replace combustion fuels in hard-to-electrify sectors, state climate pathways rely in part on "energy integration" measures, which often rely on electrolysis hydrogen, as discussed below.

Hydrogen for hard-to-decarbonize energy uses

Hydrogen, instead of HEFA diesel, could fuel long-haul freight and shipping. Hydrogen stores energy used to produce it so that energy can be used *where* it is needed for end-uses of energy that are hard to electrify directly, and *when* it is needed, for use of solar and wind energy at night and during calm winds. Climate pathways use hydrogen for hard-to-electrify emission sources in transportation, buildings and industry, and to support renewable electricity grids.

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What is renewable-powered electrolysis hydrogen?

Electrolysis produces hydrogen from water using electricity. Oxygen is the byproduct, so solar and wind-powered electrolysis produces zero-emission hydrogen. State climate pathways consider three types of electrolysis: alkaline, proton-exchange membrane, and solid oxide electrolyzers.[55 58] The alkaline and proton-exchange membrane technologies have been proven in commercial practice.[58] Renewable-powered electrolysis plants are being built and used at increasing scale elsewhere,[82] and California has begun efforts to deploy this technology.[58]

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Biofuels in the Low Carbon Fuel Standard (LCFS)

What the LCFS does	What we still need to do in other ways
Reduces the carbon intensity (CI) of transportation fuels	Reduce carbon-based fuel volume and volume-related mass emissions
Reduces transportation fuels CI by increments, over increments of time	Avoid committing to fuels that would exceed 2045 climate targets despite early incremental CI cuts
Moves money from higher-CI to lower-CI fuel producers	Build long-lasting production only for those fuels which will not exceed 2045 climate targets
Applies to fuels sold for use in the state, including biofuels, fossil fuels, electricity and hydrogen fuels	Prevent imports that people elsewhere need for their own biomass-based food and fuel
Compares the CI of each biofuel to the CI of the petroleum fuel it could replace across the whole fuel chains of both. To move dollars from higher to lower CI fuel producers, a specific "lifecycle" CI number estimate is made for each biofuel, from each type of biomass production, biofuel production, and fuel combustion in transportation for that biofuel	Directly monitor all the worldwide interactions of biomass fuel and food chains—to find out *before* an impact occurs. For example, what if increasing demand for soy-based biofuel leads farmers to buy pastureland for soybean plantations, leading displaced ranchers to fell rainforest for pastureland in another environment, state, or country?
Relies on currently quantifiable data for carbon emissions from harvesting each specific type of biomass for biofuel. The LCFS *has to* do this to come up with the specific CI numbers it uses to incrementally reduce transportation fuels CI now	Realize that some serious risks need to be avoided before they become realities which can be fully quantified, find out which biofuels pose such risks, and avoid taking those serious risks
This report does not assess the performance of the LCFS for its intended purpose — that is beyond the report scope. *This report should not be interpreted as a criticism or endorsement of the LCFS.*	**HEFA biofuel** risks that the LCFS is not designed to address are assessed in this report. *There are other ways to address these HEFA risks.*

Electrolysis is not the only proven hydrogen production technology considered in state climate pathways; however, it is the one that can store solar and wind energy, and electrolysis hydrogen can decarbonize hard-to-electrify emission sources without relying on CDR.

Renewable-powered electrolysis for zero-emission transportation

Renewable-powered electrolysis hydrogen could be critical for zero-emission transportation. Hydrogen fuel shares shown in Chart 2 represent fuel cell-electric vehicle (FCEV) fueling. Fuel cells in FCEVs convert the hydrogen back into electricity that powers their electric motors. Thus, hydrogen stored in its fuel tank is the "battery" for this type of electric vehicle. FCEVs can decarbonize transportation uses of energy where battery-electric vehicles (BEVs) might be more costly, such as long-haul freight and shipping, in which the size and mass of BEV batteries needed to haul large loads long distances reduce the load-hauling capacity of BEVs.

This zero-emission electrolysis hydrogen also plays a key role because it fuels FCEVs without relying on CDR. These zero-emission FCEVs appear crucial to the feasibility of the

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state climate goal for a 100% ZEV medium- and heavy-duty fleet by 2045.[78] This raises a turnkey issue because—as the difference in hydrogen fuel share between the High-CDR and the Balanced pathways in Chart 2 reflects—both electrolysis and FCEVs are proven technologies, but they nevertheless face significant infrastructure deployment challenges.[54–61]

In state climate pathways, renewable hydrogen use in transportation grows from an average of 1.24 million standard cubic feet per day (MMSCFD) in 2019[83] to roughly 1,020–1,080 MMSCFD by 2045.[56–58] This 2045 range reflects different scenarios for the mix of BEVs and FCEVs in different vehicle classes. The low end excludes FCEV use in LDVs[58] while the high end is a "central scenario" that includes both BEV and FCEV use in all vehicle classes.[57]

Renewable-powered electrolysis for future solar and wind power growth

Hydrogen produced by electrolysis can store solar and wind power energy, which supports the renewable energy growth needed to produce more zero-emission FCEV fuel by electrolysis. Electrolysis hydrogen plays a key role in the further growth of solar and wind energy resources, because it can store that energy efficiently for use overnight as well as over longer windless periods. The direct use of electricity for energy—in grid jargon, the "load"—occurs in the same instant that electricity is generated. This is a challenge for climate pathways because solar and wind power are intermittent electricity generators, while electricity use (load) is continuous, and varies differently from solar and wind power generation over time.

Substantial energy storage will be critical to a renewable electricity grid. There are other storage technologies such as ion batteries, compressed air, hydropower management and power-to-gas turbines, and climate pathways include multiple measures to balance renewable grids.[54–61] However, electrolysis hydrogen is particularly beneficial because it can provide efficient long-term storage over wind cycles as well as short-term storage over solar cycles while fueling ZEV growth. Charts 3 A and B below illustrate the scale of the solar energy storage need. A-43 cont'd

Load, the thick black curve that does not change from Chart A to Chart B, shows how much electric power we need and when we need it. In the renewables scale-up scenario (B), the yellow above the load curve is peak solar generation that could be wasted ("curtailed") if it cannot be stored, and the red below the load curve indicates "blackouts" we could avoid by storage of the otherwise wasted energy for use when it gets dark. This is only an example on one hypothetical day, but to continue the illustration, the energy that storage could shift, from yellow above the load curve to red below it, compares to the energy stored in ~1,500 MMSCF of hydrogen.

State climate pathways assign electrolysis a key role in meeting part of this enormous grid-balancing need. Energy storage would be accomplished by a mix of technologies and measures, including renewable-powered electrolysis hydrogen and others.[54–58] Increasing needs for energy storage in climate pathways become substantial before 2030, and the role of electrolysis hydrogen in this storage grows by up to approximately 420 MMSCFD by 2045.[58]

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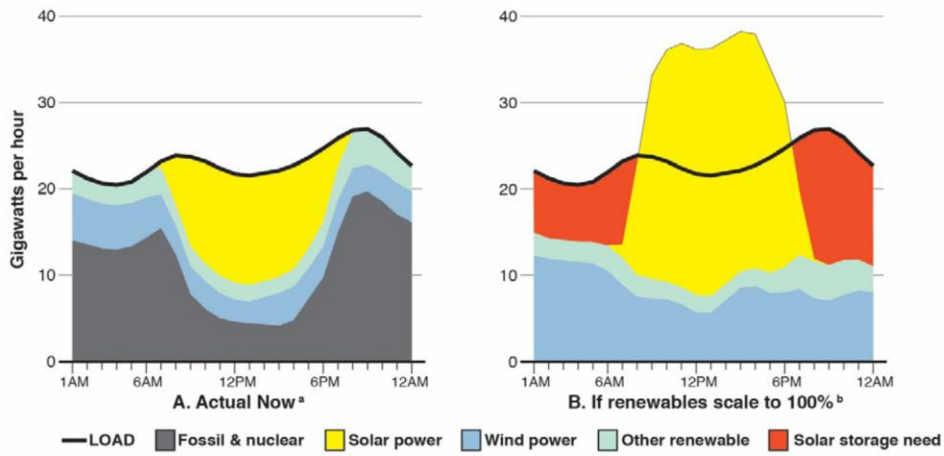

3. California electricity load shape on 20 April: Actual in 2021 *v.* renewable power.

A high-renewables future will require short-term storage of peak solar power generation for use at night. *See* yellow above and red below the black line showing total electricity load that can be used at the time power is generated, in this example. Solar electrolysis hydrogen stored in the fuel tanks of zero-emission trucks could be a needed part of the solution. **a.** Data reported for 20 April 2021.[84] **b.** Example scenario scales up solar and wind data proportionately to replace total fossil and nuclear generation on this day.

A-43 cont'd

Renewable-powered electrolysis hydrogen for least-cost energy integration measures

Climate pathway analyses underscore both the challenge and the benefits of integrating electrolysis hydrogen across the transportation and electricity sectors. The scale-up challenge appears urgent. From ~2.71 MMSCFD by the end of 2021,[58] in-state electrolysis capacity would reach ~1,440–1,500 MMSCFD by 2045 to meet all of the transportation and energy storage needs for hydrogen discussed above.[56–58] Ramping to that scale, however, achieves economies of scale in electrolysis hydrogen production and fueling that overcome significant deployment barriers to growth of this zero-emission FCEV fuel; electrolysis hydrogen costs can be expected to fall from above to below those of steam reforming hydrogen around 2025–2035.[55 56 58 84 85] Policy intervention to meet critical needs for earlier deployment is assumed to drive ramp-up.[58]

Then, once deployed at scale, integration of electrolysis, transportation and the electricity grid can provide multiple systemic benefits. It can cut fuel costs by enabling FCEVs that are more efficient than diesel or biofuel combustion vehicles,[86] cut health costs by enabling zero-emission FCEVs,[57 87] cut energy costs by using otherwise wasted peak solar and wind power,[58 85] and enable priority measures needed to decarbonize hard-to-electrify energy emissions.[54 55 57 58 85] From the perspective of achieving lower-risk climate stabilization pathways, renewable-powered electrolysis hydrogen may be viewed as a stay-in-business investment.

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State climate pathway benchmarks for hydrogen energy storage, transportation fuel, and refining that HEFA biofuel growth could affect

Electrolysis hydrogen production in state pathways could reach ~ 420 MMSCFD for energy storage and approximately 1,020–1,080 MMSCFD for transportation, as noted above, and could grow due to a third need and opportunity, which also could be affected by HEFA biofuel growth. The Hydrogen Roadmap in state climate pathways includes converting petroleum refining to renewable hydrogen production,[58] an enormously consequential measure, given that current hydrogen capacity committed to crude refining statewide totals ~1,216 MMSCFD.[88] A-43 cont'd

4.1.4 Replacement of gasoline with BEVs would idle crude refining capacity for distillates as well, accelerating growth of a petroleum diesel replacement fuels market that ZEVs, biofuels, or both could capture

BEVs could replace gasoline quickly

Gasoline combustion inefficiencies make battery electric vehicle (BEV) replacement of gasoline a cost-saving climate pathway measure. By 2015 BEVs may already have had lower total ownership cost than gasoline passenger vehicles in California.[89] BEVs go three times as far per unit energy as same-size vehicles burning gasoline,[90] have fewer moving parts to wear and fix—for example, no BEV transmissions—have a fast-expanding range, and a mostly-ready fuel delivery grid. Economics alone should make gasoline obsolete as fast as old cars and trucks wear out, strongly supporting the feasibility of state goals for BEVs and other zero-emission vehicles (ZEVs) to comprise 100% of light-duty vehicle (LDV) sales by 2035.[78] State climate pathways show that BEVs can be 30–100% of LDV sales by 2030–2035, 60–100% of LDV and medium-duty vehicle sales by 2030–2045, and comprise most of the California vehicle fleet by 2045.[55 57] Electricity-powered LDVs and MDVs would thus replace gasoline relatively quickly. A-44

Gasoline replacement would idle petroleum distillates production

Crude refining limitations force petroleum distillate production cuts as gasoline is replaced. Existing California refineries cannot make distillates (diesel and jet fuel) without coproducing gasoline. From 2010–2019 their statewide distillates-to-gasoline production volumes ratio was 0.601 and varied annually from only 0.550 to 0.637.[91] This reflects hard limits on refining technology: crude distillation yields a gasoline hydrocarbon fraction, and refineries are designed and built to convert other distillation fractions to gasoline, not to convert gasoline to distillates. During October–December in 2010–2019, when refinery gasoline production was often down for maintenance while distillate demand remained high, the median distillate-to-gasoline ratio rose only to 0.615.[1] That is a conservative estimate for future conditions, as refiners keep crude rates high by short-term storage of light distillation yield for gasoline production after equipment is returned to service.[1 91] When gasoline and jet fuel demand fell over 12 months following the 19 March 2020 COVID-19 lockdown[36] the ratio fell to 0.515.[91] Future permanent loss of gasoline markets could cut petroleum distillate production to less than 0.615 gallons per gallon gasoline. Climate pathways thus replace petroleum distillates along with gasoline.

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Existing distillates distribution infrastructure favors biofuels, emphasizing the need for early deployment of FCEVs and zero-emission electrolysis hydrogen

Fuel cell-electric vehicle (FCEV) transportation faces a challenge in the fact that existing petroleum distillates distribution infrastructure can be repurposed to deliver drop-in biofuels to truck, ship, and jet fuel tanks, while hydrogen fuel infrastructure for FCEVs must ramp up. Hydrogen-fueled FCEV growth thus faces deployment challenges which biofuels do not.[54–61] Those infrastructure challenges underly the urgent needs for early deployment of FCEVs and electrolysis hydrogen identified in state climate pathway analyses.[54–58] Indeed, early deployment is an underlying component of the climate pathway benchmarks identified above. A-44 cont'd

4.2 HEFA biofuels growth could exceed state climate pathway benchmarks for liquid fuels volumes, interfere with achieving electrolysis hydrogen energy integration benchmarks, and exceed the state climate target for emissions in 2050

4.2.1 <u>HEFA biofuels growth could exceed state climate pathway benchmarks for liquid fuels volumes</u>

Proposed projects would exceed HEFA biofuel caps

Current proposals to repurpose in-state crude refining assets for HEFA biofuels could exceed the biofuel caps in state climate pathways by 2025. New in-state HEFA distillate (diesel and jet fuel) production proposed by P66, MPC, AltAir and GCE for the California fuels market would, in combination, total ~2.1 billion gal./y and is planned to be fully operational by 2025.[1–6] If fully implemented, these current plans alone would exceed the HEFA diesel and jet fuel caps of 0.0–1.5 billion gal./y in state climate pathways (§4.1.2). A-45

Continued repurposing of idled crude refining assets for HEFA biofuels could exceed the total liquid combustion fuels volume benchmarks in state climate pathways

Further HEFA biofuels growth, driven by incentives for refiners to repurpose soon-to-be-stranded crude refining assets before FCEVs can be deployed at scale, could exceed total liquid fuels combustion benchmarks for 2045 in state climate pathways. As BEVs replace petroleum distillates along with gasoline, crude refiners could repurpose idled petroleum assets for HEFA distillates before FCEVs ramp up (§ 4.1.4), and refiners would be highly incentivized to protect those otherwise stranded assets (Chapter 1).

Chart 4 illustrates a plausible future HEFA biofuel growth trajectory in this scenario. Declining petroleum diesel and jet fuel production forced by gasoline replacement with BEVs (gray-green, bottom) could no longer be fully replaced by currently proposed HEFA production (black) by 2025–2026. Meanwhile the idled crude refinery hydrogen production and processing assets repurpose for HEFA production (light brown, top). As more petroleum refining assets are stranded, more existing refinery hydrogen production is repurposed for HEFA fuels, increasing the additional HEFA production from left to right in Chart 4.

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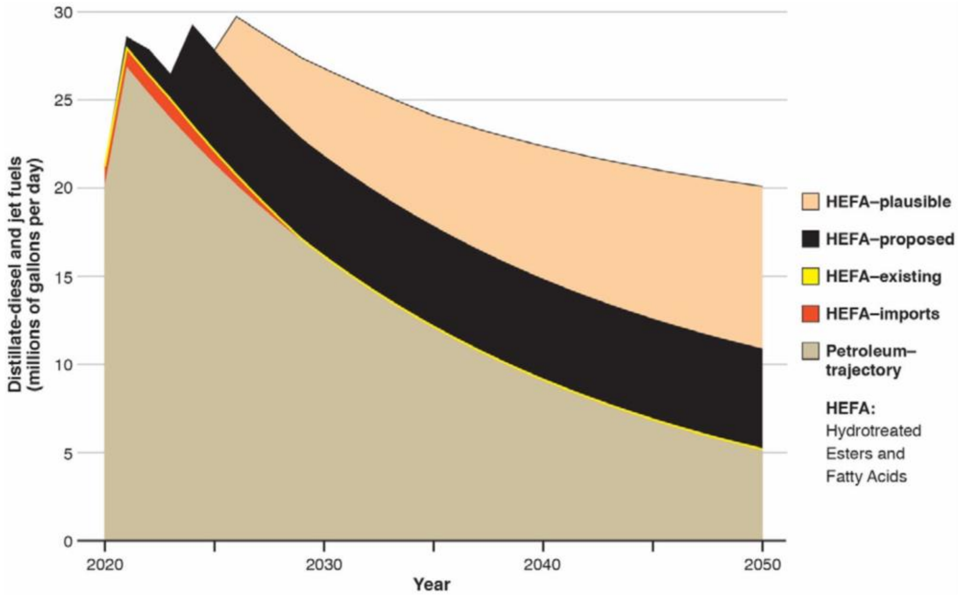

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4. Combustion fuels additive potential of HEFA diesel and jet production in California.

As electric vehicles replace gasoline, stranding petroleum refining assets, continuing HEFA biorefining expansion could add as much as 15 million gallons per day (290%) to the remaining petroleum distillate-diesel and jet fuel refined in California by 2050. Locking in this combustion fuels additive could further entrench the incumbent combustion fuels technology in a negative competition with cleaner and lower-carbon technologies, such as renewable-powered hydrogen fuel cell electric vehicles (FCEVs). That could result in continued diesel combustion for long-haul freight and shipping which might otherwise be decarbonized by zero emission hydrogen-fueled FCEVs.

Petroleum-trajectory for cuts in petroleum refining of distillate (D) and jet (J) fuels that will be driven by gasoline replacement with lower-cost electric vehicles, since petroleum refineries cannot produce as much D+J when cutting gasoline (G) production. It is based on 5.56%/yr light duty vehicle stock turnover and a D+J:G refining ratio of 0.615. This ratio is the median from the fourth quarter of 2010–2019, when refinery gasoline production is often down for maintenance, and is thus relatively conservative. Similarly, state policy targets a 100% zero-emission LDV fleet by 2045 and could drive more than 5.56%/yr stock turnover. Values for 2020–2021 reflect the expected partial rebound from COVID-19.

HEFA-imports and **HEFA-existing** are the mean D+J "renewable" volumes imported, and refined in the state, respectively, from 2017–2019. The potential in-state expansion shown could squeeze out imports.

HEFA-proposed is currently proposed new in-state capacity based on 80.9% D+J yield on HEFA feed including the Phillips 66 Rodeo, Marathon Martinez, Altair Paramount, and GCE Bakersfield projects, which represent 47.6%, 28.6%, 12.8%, and 11.0% of this proposed 5.71 MM gal/day total, respectively.

HEFA-plausible: as it is idled along the petroleum-based trajectory shown, refinery hydrogen capacity is repurposed for HEFA biofuel projects, starting in 2026. This scenario assumes feedstock and permits are acquired, less petroleum replacement than state climate pathways,[55] and slower HEFA growth than new global HEFA capacity expansion plans targeting the California fuels market[92] anticipate. Fuel volumes supported by repurposed hydrogen capacity are based on H_2 demand for processing yield-weighted feedstock blends with fish oil growing from 0% to 25%, and a J : D product slate ratio growing from 1: 5.3 to 1: 2, during 2025–2035.

For data and methodological details see Table A7.[1]

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Refining and combustion of HEFA distillates in California could thus reach ~15.0 million gal./d (5.47 billion gal./y), ~290% of the remaining petroleum distillates production, by 2050.[1.] HEFA distillate production in this scenario (5.47 billion gal./y) would exceed the 1.6–3.3 billion gal./y range of state climate pathways for combustion of *all* liquid transportation fuels, including petroleum and biofuel liquids, in 2045.[55] This excess combustion fuel would squeeze out cleaner fuels, and emit future carbon, from a substantial share of the emergent petroleum distillate fuels replacement market—a fuel share which HEFA refiners would then be motivated to retain. A-45 cont'd

This climate impact of HEFA biofuels growth is reasonably foreseeable

The scenario shown in Chart 4 is an illustration, not a worst case. It assumes slower growth of HEFA biofuel combustion in California than global investors anticipate, less petroleum fuels replacement than state climate pathways, and no growth in distillates demand. Worldwide, the currently planned HEFA refining projects targeting California fuel sales total ~5.2 billion gal./y by 2025.[92] HEFA growth by 2025 in the Chart 4 scenario is less than half of those plans. State climate pathways reported by Mahone et al.[55] replace ~92% of current petroleum use by 2045, which would lower the petroleum distillate curve in Chart 4, increasing the potential volume of petroleum replacement by HEFA biofuel. Further, in all foreseeable pathways, refiners would be incentivized to protect their assets and fuel markets—and there are additional reasons why HEFA biofuel could become locked-in, as discussed below.

4.2.2 Continued use of steam reforming for refinery hydrogen could interfere with meeting state climate pathway benchmarks for electrolysis hydrogen energy integration, and lock HEFA biofuels in place instead of supporting transitions to zero-emission fuels

In contradiction to the conversion of refineries to renewable hydrogen in state climate pathways (§4.1.3), refiners propose to repurpose their high-carbon steam reforming hydrogen production assets for HEFA biofuels refining (chapters 1, 3). This would foreclose the use of that hydrogen for early deployment of ZEVs and renewable energy storage, the use of those sites for potentially least-cost FCEV fueling and renewable grid-balancing, and the future use of that hydrogen by HEFA refiners in a pivot to zero emission fuels. These potential impacts, together with HEFA refiner motivations to retain market share (§ 4.2.1), could result in HEFA diesel becoming a locked-in rather than a transitional fuel.

Repurposing refinery steam reforming for HEFA would circumvent a renewable hydrogen benchmark and interfere with early deployment for FCEVs and energy storage, slowing growth in ZEV hydrogen fuel and renewable energy for ZEV fuels production A-46

Repurposing refinery steam reforming for HEFA fuels, as refiners propose,[2–6] instead of switching crude refining to renewable hydrogen, as the hydrogen roadmap in state climate pathways envisions,[58] could foreclose a very significant deployment potential for zero-emission fuels. Nearly all hydrogen production in California now is steam reforming hydrogen committed to oil refining.[56] Statewide, crude refinery hydrogen capacity totals ~1,216 MMSCFD,[88] some 980 times renewable hydrogen use for transportation in 2019 (1.24 SCFD)[83] and ~450 times planned 2021 electrolysis hydrogen capacity (~2.71 MMSCFD).[58] Repurposing crude refining

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hydrogen production for HEFA refining would perpetuate the commitment of this hydrogen to liquid combustion fuels instead of other potential uses. Importantly, that hydrogen would not be available for early deployment of FCEVs in the hard-to-electrify long haul freight and shipping sectors, or energy storage grid-balancing that will be needed for solar and wind power growth to fuel both zero emission FCEVs and BEVs.

By blocking the conversion of idled refinery hydrogen capacity to renewable hydrogen, repurposing idled crude refinery steam reforming for HEFA biofuels could slow ZEV fuels growth. Chart 5 below illustrates the scale of several potential impacts. Hydrogen demand for HEFA biofuels could exceed that for early deployment of FCEVs (Chart, 2025), exceed hydrogen demand for energy storage grid-balancing (Chart, 2045), and rival FCEV fuel demand for hydrogen in climate pathways through mid-century (*Id.*). ZEV growth could be slowed by foreclosing significant potential for zero-carbon hydrogen and electricity to produce it.

Repurposing refinery steam reforming could foreclose electrolysis deployment in key locations, potentially blocking least-cost FCEV fueling and grid-balancing deployment

Repurposing idled crude refinery steam reforming for HEFA biofuel production would foreclose reuse of otherwise idled refinery sites for renewable-powered electrolysis hydrogen. This site foreclosure impact could be important because of the potential electrolysis sites availability and location. Proximity to end-use is among the most important factors in the feasibility of renewable hydrogen build-out,[58] and refineries are near major California freight and shipping corridors and ports, where dense land uses make the otherwise idled sites especially useful for electrolysis siting. Repurposing crude refineries for HEFA biofuels could thus slow the rapid expansion of renewable-powered electrolysis hydrogen needed in climate pathways. A-46 cont'd

Continued use of steam reforming would lock HEFA refiners out of future ZEV fueling, further contributing to HEFA combustion fuels lock-in

Committing HEFA refineries to carbon-intensive steam reforming hydrogen would lock the refiners, who then would not be able to pivot toward future fueling of zero-emission FCEVs, into continued biofuel production. HEFA refiners would thus compete with hydrogen-fueled FCEVs in the new markets for fuels to replace petroleum diesel. In this HEFA growth scenario, the hydrogen lock-in, electrolysis site lockout, and ZEV fuel impacts described directly above could be expected to reinforce their entrenched position in those markets. This would have the effect of locking refiners into biofuels instead of ZEV fuels, thereby locking-in continued biofuel use at the expense of a transition to zero-emission fuels.

Crucially, multiple state pathway scenario analyses[54–56 58] show that the simultaneous scale-up of FCEVs in hard-to-electrify sectors, renewable-powered electrolysis for their zero-emission fuel, and solar and wind power electricity to produce that hydrogen, already faces substantial challenges—apart from this competition with entrenched HEFA biofuel refiners.

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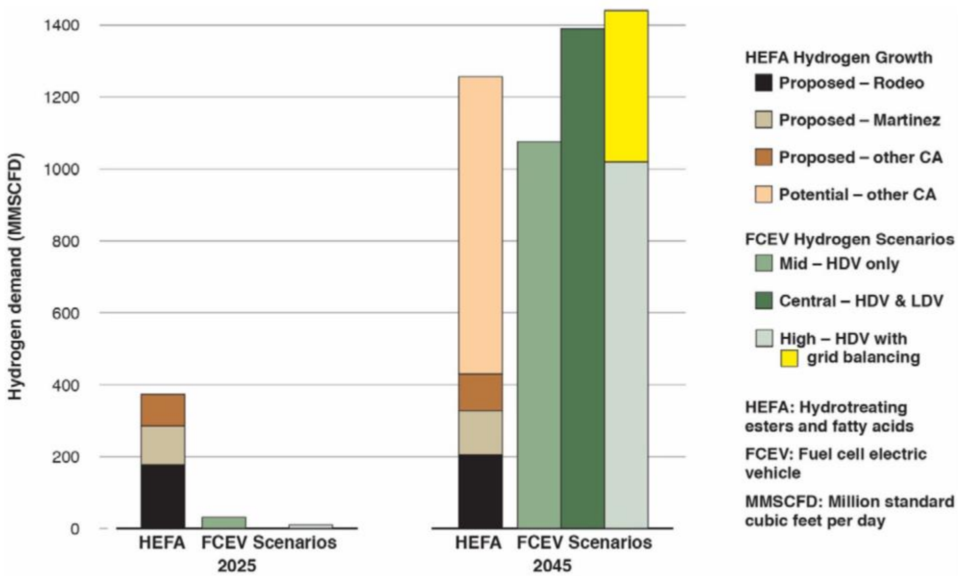

5. Potential growth in hydrogen demand for HEFA biorefineries, fuel cell electric vehicle (FCEV) goods movement, and renewable electricity grid balancing to 2025 and 2045.

A-46 cont'd

HEFA biorefineries could slow the growth of zero-emission goods movement, and of renewable electricity, by committing limited hydrogen supplies to drop-in diesel before the cleaner technologies ramp up (chart, 2025), by rivaling their demand for large new hydrogen supplies through mid-century (chart, 2045), and by committing to the wrong type of hydrogen production technology. H_2 supplied by electrolysis of water with renewable electricity could fuel FCEVs to decarbonize long-haul goods movement, and could store peak solar and wind energy to balance the electricity grid, enabling further growth in those intermittent energy resources. However, nearly all California H_2 production is committed to oil refining as of 2021. Refiners produce this H_2 by carbon-intensive steam reforming, and propose to repurpose that fossil fuel H_2 technology, which could not pivot to zero-emission FCEVs or grid balancing, in their crude-to-biofuel refinery conversions.

HEFA proposed based on H_2 demand estimated for P66 Rodeo, MPC Martinez, and other California HEFA projects proposed or in construction as of May 2021. H_2 demand increases from 2025–2045 as HEFA feedstock, jet fuel, and H_2/b demands increase. For data and methods details *see* Table A7.[1]

HEFA potential based on H_2 production capacity at California petroleum refineries, additional to that for currently proposed projects, which could be idled and repurposed for potential HEFA projects along the trajectory shown in Chart 4. *See* Table A7 for data and details of methods.[1]

FCEV Mid – HDV only from Mahone et al. (2020b),[56] FCEVs are ~2% and 50% of new heavy duty vehicle sales in California and other U.S. western states by 2025 and 2045, respectively.[56]

Central – HDV & LDV from Austin et al. (2021), H_2 for California transportation, central scenario, LC1.[57]

High – HDV with grid balancing from Reed et al. (2020), showing here two components of total demand from their high case in California: non-LDV H_2 demand in ca. 2025 and 2045, and H_2 demand for storage and firm load that will be needed to balance the electricity grid as solar and wind power grow, ca. 2045.[58]

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4.2.3 Potential carbon emissions could exceed the 2050 climate target

CO_2e emissions from the HEFA growth scenario were estimated based on LCFS carbon intensity values[86] weighted by the HEFA fuels mix in this scenario,[1] accounting for emission shifting effects described in Chapter 2. Accounting for this emission shift that would be caused by replacing petroleum with excess HEFA biofuel use in California at the expense of abilities to do so elsewhere—excluding any added land use impact—is consistent with the LCFS and state climate policy regarding emission "leakage."[62] Results show that HEFA diesel and jet fuel CO_2e emissions in this scenario could reach 66.9 million tons (Mt) per year in 2050. *See* Table 5.

Table 5. Potential CO_2e emissions in 2050 from HEFA distillates refined and used in California.

Distillates volume		
HEFA distillates refined and burned in CA [a]	5.47	billion gallons per year
CA per capita share of lipid-based biofuel [b]	0.58	billion gallons per year
Excess lipids shifted to CA for HEFA biofuel [c]	4.89	billion gallons per year
Distillate fuels mix		
HEFA diesel refined and burned in CA [d]	66.7	percentage of distillates
HEFA jet fuel refined and burned in CA [d]	33.3	percentage of distillates
Fuel chain carbon intensity		
HEFA diesel carbon intensity [e]	7.62	kg CO_2e/gallon
HEFA jet fuel carbon intensity [e]	8.06	kg CO_2e/gallon
Petroleum diesel carbon intensity [e]	13.50	kg CO_2e/gallon
Petroleum jet fuel carbon intensity [e]	11.29	kg CO_2e/gallon
Emissions (millions of metric tons as CO_2e)		
From CA use of per capita share of lipids	4.50	millions of metric tons per year
From excess CA HEFA use shifted to CA	37.98	millions of metric tons per year
Emissions shift to other states and nations [f]	24.44	millions of metric tons per year
Total HEFA distillate emissions	66.92	millions of metric tons per year

a. Potential 2050 HEFA distillates refinery production and use in California in the scenario shown in Chart 4.[1]
b. Statewide per capita share of U.S. farm yield for all uses of lipids used in part for biofuels, from data in Table 1, converted to distillates volume based on a feed specific gravity of 0.914 and a 0.809 feed-to-distillate fuel conversion efficiency. Importantly, these purpose-grown lipids have other existing uses (Chapter 2).
c. Excess lipid biomass taken from other states or nations. This share of limited lipid biomass could not be used elsewhere to replace petroleum with HEFA biofuels. Per capita share of total U.S. production for all uses, rather than that share of lipids available for biofuel, represents a conservative assumption in this estimate.
d. Distillate fuels mix in 2050 (1 gallon jet fuel to 3 gallons diesel) as described in Table A7 part f.[1]
e. Carbon intensity (CI) values from tables 3, 7-1, and 8 of the California LCFS Regulation.[86] HEFA values used (shown) were derived by apportioning "fats/oils/grease residues" and "any feedstocks derived from plant oils" at 31% and 69%, respectively, based on the data in Table 1.
f. Future emissions that would not occur if other states and nations had access to the lipid feedstock committed to California biofuel refining and combustion in excess of the state per capita share shown. Shifted emissions based on the difference between HEFA and petroleum CI values for each fuel, applied to its fuels mix percent of excess lipid-based distillates shifted to CA for HEFA biofuel. Accounting for emissions caused by replacing petroleum in CA *instead of* elsewhere, separately from any added land use impact, is consistent with the LCFS and state climate policy regarding "leakage."[62] Total emissions thus include shifted emissions.

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Emissions from the remaining petroleum distillate fuels in this scenario, ~5,113,000 gal./d or 1.87 billion gal./y (Chart 4; Table A7[1]), would add 22.1–24.2 Mt/y, if diesel is 25–75% of the 2050 petroleum distillates mix, at the petroleum carbon intensities in Table 5. Thus, distillate transportation fuel emissions alone (89–91 Mt/y) could exceed the 86.2 Mt/y 2050 state target for CO_2e emissions from all activities statewide.[77] Total 2050 emissions would be larger unless zeroed out in all other activities statewide. Repurposing idled petroleum refinery assets for HEFA biofuels threatens state climate goals. A-46 cont'd

4.3 A zero-emission electrolysis hydrogen alternative can be deployed during a crucial window for breaking carbon lock-in: HEFA biofuels growth could impact the timing, and thus the emission prevention, clean fuels development, and transition benefits, of this zero-emission electrolysis hydrogen alternative.

Potential benefits to climate pathways from converting hydrogen production to renewable-powered electrolysis (electrolysis) at refinery sites were assessed with and without HEFA biofuels expansion. The "HEFA Case" captures proposed and potential HEFA growth; the "No HEFA Case" is consistent state climate pathways that exclude purpose-grown lipids-derived biofuels in favor of cellulosic residue-derived biofuels.[54 55] Conversion to electrolysis is assumed to occur at crude refineries in both cases, consistent with the hydrogen road map in state climate pathways,[58] but as an early deployment measure—assumed to occur during 2021–2026. This measure could reduce refinery carbon intensity, increase zero-emission transportation and electricity growth, and reduce local transition impacts significantly, and would be more effective if coupled with a cap on HEFA biofuels. A-47

4.3.1 <u>Electrolysis would prevent HEFA biofuels from increasing the carbon intensity of hydrocarbon fuels refining</u>

Deployment timing emerges as the crucial issue in this analysis. "It is simpler, less expensive, and more effective to introduce inherently safer features during the design process of a facility rather than after the process is already operating. Process upgrades, rebuilds, and repairs are additional opportunities to implement inherent safety concepts."[70] The design phase for HEFA refinery conversions, and petroleum refinery turnarounds that occur on 3- to 5-year cycles are critical insertion points for electrolysis in place of carbon-intensive steam reforming. This zero-emission measure would cut the carbon intensity of refining at any time, however, climate stabilization benefit is directly related to the cumulative emission cut achieved, so the effectiveness of this measure would also depend upon how quickly it would be deployed. A-48

Refining CI benefits in the HEFA Case

Replacing steam reforming with electrolysis could cut the carbon intensity (CI) of HEFA refining by ~72–79%, from ~76–101 kg/b to ~21 kg/b refinery feed (Chapter 3). This would cut the CI of HEFA fuels processing from significantly above that of the average U.S. petroleum refinery (~50 kg/b crude; *Id.*) to significantly below the CI of the average U.S. crude refinery.

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Refining CI benefits in the No HEFA Case

Replacing steam reforming with electrolysis at petroleum refineries would reduce CI by ~34% based on San Francisco Bay Area data,[66] however, in other states or nations where refiners run less carbon-intensive crude and product slates than in California, this ~34% may not apply.[64]

Refining CI reduction effectiveness

Cumulative emission cuts from hydrogen production would be the same in both cases since hydrogen emissions would be eliminated from HEFA refineries in both cases. Based on the CI values above and the HEFA growth trajectory[1] in Chart 4 this measure could prevent ~194–282 million tons (Mt) of CO_2 emission from HEFA hydrogen production through 2050. Petroleum refinery emissions could be cut by 103 Mt through 2050, based on the median mixed feed CI of steam reforming (24.9 g/SCF, Table 3) and the remaining refinery hydrogen production underlying the distillates trajectory in Chart 4 from 2026–2050.[1] Total direct *cumulative* emissions prevented could be ~297–400 Mt. *Annual* fuel chain emissions from all distillates in transportation in 2050 (89–91 Mt/y) could be cut by ~12–16%, to ~76–78 Mt/y in the HEFA Case. In the No HEFA Case annual fuel chain emissions from petroleum distillates in 2050 (~22–24 Mt/y) could be cut by ~8–9%, to ~20–22 Mt/y, although use of other biofuels along with ZEVs could add to that 20–22 Mt/y significantly. This measure would be effective in all cases, and far more effective in climate pathways that cap HEFA growth and transition to ZEVs. A-48 cont'd

4.3.2 <u>Use of electrolysis would facilitate development of hydrogen for potential future use in transportation and energy storage</u>

Deployment timing again is crucial. Electrolysis can integrate energy transformation measures across transportation and electricity, speeding both FCEV growth and renewable power growth (§ 4.1). Benefits of this energy integration measure could coincide with a window of opportunity to break free from carbon lock-in, which opened with the beginning of petroleum asset stranding shown in Chapter 1 and could close if refiner attempts to repurpose those assets entrench a new source of carbon in the combustion fuel chain. As Seto et al. conclude:

> "Understanding how and when lock-in emerges also helps identify windows of opportunity when transitions to alternative technologies and paths are possible [.] ... either in emergent realms and sectors where no technology or development path has yet become dominant and locked-in or at moments when locked-in realms and sectors are disrupted by technological, economic, political, or social changes that reduce the costs of transition ... ."[93] A-49

Here, in a moment when the locked-in petroleum sector has been disrupted, and neither FCEV nor HEFA technology has yet become dominant and locked into the emergent petroleum diesel fuel replacement sector, this electrolysis energy integration measure could reduce the costs of transition if deployed at scale (§ 4.1). Indeed, state climate pathway analyses suggest that the need for simultaneous early deployment of electrolysis hydrogen, FCEVs, and energy storage load-balancing—and the challenge of scaling it up in time—are hard to overstate (§§ 4.1, 4.2).

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Clean fuels development benefits in the HEFA Case

Converting refinery steam reforming to electrolysis during crude-to-biofuel repurposing before 2026 and at refineries to be idled and repurposed thereafter could provide electrolysis hydrogen capacities in 2025 and 2045 equivalent to the HEFA steam reforming capacities shown in Chart 5. However, HEFA refining would use this hydrogen, foreclosing its use to support early deployment of FCEVs and energy storage, and could further commit the share of future transportation illustrated in Chart 4 to liquid combustion fuel chain infrastructure.

Planned policy interventions could deploy electrolysis[58] and FCEVs[78] separately from refinery electrolysis conversions, although less rapidly without early deployment of this measure. If separate early deployment is realized at scale, this measure would enable HEFA refiners to pivot toward FCEV fueling and energy storage later. However, refinery combustion fuel share lock-in (§4.2) and competition with the separately developed clean hydrogen fueling could make that biofuel-to-ZEV-fuel transition unlikely, absent new policy intervention.

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Clean fuels development benefits in the No HEFA Case

In the No HEFA Case, cellulosic residue-derived instead of HEFA biofuels would be in climate pathways,[55] and crude refinery steam reforming would be converted to electrolysis when it is idled before 2026 and in turnarounds by 2026. Instead of committing converted electrolysis hydrogen to HEFA refining as crude refining capacity is idled, it would be available for FCEVs and energy storage in the same amounts shown in Chart 5. This could fuel greater early FCEV deployment than state climate pathways assume (Chart, 2025), provide more hydrogen energy storage than in the pathways (Chart, 2045), and fuel most of the FCEV growth in the pathways through 2045 (*Id.*). These estimates from Chart 5 are based on the petroleum decline trajectory[1] underlying Chart 4, which is supported by economic drivers as well as climate constraints (§ 4.1) and assumes slower petroleum replacement through 2045 than state climate pathways (§ 4.2).

Clean fuels development benefits effectiveness

Energy integration benefits of this measure could be highly effective in supporting early deployment of zero-emission transportation during a crucial window of opportunity for replacing liquid hydrocarbon combustion fuels, and could fuel hydrogen storage as well as most zero-emission FCEV growth needs thereafter, in the No HEFA Case. In the HEFA Case, however, those benefits could be limited to an uncertain post-2030 future. These results further underscore the importance of limiting HEFA biofuel growth in state climate pathways.

4.3.3 <u>Use of electrolysis could lessen transition impacts from future decommissioning of converted refineries</u>

A-50

Just transitions, tailored to community-specific needs and technology-specific challenges, appear essential to the feasibility of climate stabilization.[66 94] Full just transitions analysis for communities that host refineries is beyond the scope of this report, and is reviewed in more detail elsewhere.[66 94] However, the recent idling of refining capacity, and proposals to repurpose it for HEFA biofuels, raise new transition opportunities and challenges for California communities

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which were identified in this analysis, affect the feasibility of climate pathways, and thus are reported here. Hydrogen plays a pivotal role in the new transition challenges and opportunities which communities that host California refineries now face.

Transition benefits in the HEFA Case

Electrolysis would enable HEFA refineries to pivot from using hydrogen for biofuel to selling it for FCEV fuel, energy storage, or both. Assuming state climate pathways that replace transportation biofuels with ZEVs[57] achieve the state goal for 100% ZEV medium- and heavy-duty vehicles by 2045,[78] this would allow HEFA refiners to transition from HEFA biofuel hydro-conversion processing while continuing uninterrupted hydrogen production at the same sites. Potential benefits would include reduced local job and tax base losses as compared with total facility closure, and eliminating the significant refinery explosion/fire risk and local air pollution impacts from HEFA hydro-conversion processing that are described in Chapter 3.

However, HEFA lock-in could occur before the prospect of such a biofuel-to-ZEV fuel transition could arise (§ 4.2). Conversions to electrolysis would lessen incentives for refiners to protect assets by resisting transition, and yet their fuel shares in emerging petroleum distillates replacement markets and incentives to protect those market shares would have grown (*Id.*).

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Transition benefits in the No HEFA Case

In the No HEFA Case electrolysis hydrogen could pivot to FCEV fueling, energy storage, or both as petroleum refining capacity is idled in state climate pathways. Petroleum asset idling would be driven by economic factors that replace gasoline as well as climate constraints and thus be likely to occur (§ 4.1). Indeed, it has begun to occur (Chapter 1) and is likely to gather pace quickly (§§ 4.1, 4.2). Local job and tax base retention resulting from this hydrogen pivot in the No HEFA Case could be of equal scale as in the HEFA case. Local benefits from elimination of refinery hazard and air pollution impacts upon site transition would be from replacing petroleum refining rather than HEFA refining and would be realized upon crude refinery decommissioning rather than upon repurposed HEFA refinery decommissioning years or decades later.

Transition benefits effectiveness

Electrolysis hydrogen could have a pivotal role in just transitions for communities that host refineries. However, transition benefits of electrolysis would more likely be realized, and would be realized more quickly, in the No HEFA Case than in the HEFA Case. Realization of these potential transition benefits would be uncertain in the HEFA Case, and would be delayed as compared with the No HEFA Case.

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APPENDIX B

Karras, G., *Unsustainable Aviation Fuel*
(Karras, 2021b)

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An assessment of carbon emission and sink impacts from biorefining and feedstock choices for producing jet biofuel in repurposed crude refineries

A Natural Resources Defense Council (NRDC) Report

Prepared for the NRDC by Greg Karras, G. Karras Consulting
www.energy-re-source.com

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Executive Summary

Current climate, energy and aviation policy use the term Sustainable Aviation Fuel (SAF) to mean alternatives to petroleum aviation fuel which could include seven types of biofuels and can replace up to half of petroleum jet fuel under existing aviation fuel blending limits. In practice this definition of SAF favors continued use of existing combustion fuel infrastructure to burn a mix of biofuel and petroleum. That is not a net-zero carbon climate solution in itself, and in this sense, SAF is not sustainable. Rather, the partial replacement of petroleum jet fuel with biofuel is meant to incrementally reduce emissions from the hard-to-decarbonize aviation sector and, in concert with more effective measures in other sectors, help to achieve climate stabilization goals.

A question, then, is whether the type of biofuel favored by the existing combustion fuel infrastructure will, in fact, emit less carbon than petroleum. This, the evidence suggests, is a key question for the sustainability of SAF.

Although it is but one proven technology for the production of SAF, Hydrotreated Esters and Fatty Acids (HEFA) technology is the fastest-growing type of biofuel in the U.S. today. This rapid recent and projected growth is being driven by more than renewable fuels incentives. The crucially unique and powerful driver of HEFA biofuel growth is that oil companies can protect troubled and climate-stranded assets by repurposing petroleum crude refinery hydro-conversion and hydrogen plants for HEFA jet fuel and diesel biofuels production.

Some HEFA biofuels are reported to emit more carbon per gallon than petroleum fuels. This is in part because HEFA technology depends upon and competes for limited agricultural or fishery yields of certain types—oil crops, livestock fats or fish oils—for its biomass feedstocks. Meeting increased demands for at least some of those feedstocks has degraded natural carbon sinks, causing indirect carbon emissions associated with those biofuels. And it is in part because HEFA feedstocks require substantial hydrogen inputs for HEFA processing, resulting in very substantial direct carbon emissions from fossil fuel hydrogen production repurposed for HEFA biorefining. Both processing strategies, i.e., refining configurations to target jet fuel *v.* diesel

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production, and feedstock choices, e.g., choosing to process palm oil *v.* livestock fat feeds, are known factors in these direct and indirect emissions. That is important because HEFA jet fuel yield is limited, and refiners can use various combinations of feeds and processing strategies to boost jet yield with repurposed crude refining equipment. To date, however, the combined effect of these factors in strategies to boost HEFA jet fuel yield has received insufficient attention.

This report focuses on two questions about climate impacts associated with HEFA jet fuel production in repurposed crude refineries. First, could feedstocks that enable refiners to boost jet fuel yield increase the carbon dioxide emission per barrel—the carbon intensity—of HEFA refining relative to the feeds and processing strategy refiners use to target HEFA diesel yield? Second, could the acquisition of feedstocks that refiners can use to increase HEFA jet fuel yield result in comparatively more serious indirect climate impacts?

The scope of the report is limited to these two questions. Its analysis and findings are based on publicly reported data referenced herein. Data and analysis methods supporting feed-specific original research are given and sourced in an attached data and methods table.[1] Data limitations are discussed in the final chapter. This work builds on recent NRDC-sponsored research[2] which is summarized in relevant part as context above, and as referenced in following chapters.

Chapter 1 provides an overview of HEFA technology, including the essential processing steps for HEFA jet fuel production and additional options for maximizing jet fuel yield using repurposed crude refining assets. This process analysis shows that a growing fleet of HEFA refineries could, and likely would, use a combination of strategies in which the use of intentional hydrocracking (IHC) could vary widely. HEFA refiners could produce HEFA jet fuel without intentional hydrocracking (No-IHC), produce more HEFA jet fuel with IHC in the isomerization step needed for all HEFA fuels (Isom-IHC), or produce more HEFA jet fuel while shaving the increased hydrogen costs of intentional hydrocracking (Selective-IHC). The strategies chosen would be influenced by the capabilities of crude refineries repurposed for HEFA processing.

Chapter 2 reviews HEFA feedstock limitations and supply options, presents detailed data relating feedstock properties to effects on HEFA jet fuel yields and process hydrogen demand, and ranks individual feedstocks for their ability to increase HEFA jet fuel yield. Differences in chemistry among feeds result in different feed rankings for jet fuel *versus* diesel yields, different feed rankings for increased jet fuel yield among processing strategies, and different feed rankings for hydrogen demand among processing strategies. Palm oil, livestock fats, and fish oils boost jet fuel yield without intentional hydrocracking, and enable more refiners to further boost jet yield with intentional hydrocracking, which increases HEFA process hydrogen demand.

Chapter 3 describes and quantifies refining strategy-specific and feed-specific carbon dioxide (CO_2) emissions from the repurposed crude refinery steam reformers that produce hydrogen for HEFA processing. Feed-specific carbon intensity (CI) rankings for jet fuel-range feed fractions mask those for whole feed actual CI when refiners use the No-IHC process strategy. Refining CI rankings for some feeds with low *v.* high jet yields (e.g., soybean oil *v.*

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menhaden fish oil) are reversed in the Selective-IHC strategy compared with the other strategies for increasing HEFA jet fuel yield. Some feeds that increase jet fuel yield have relatively higher process CI (fish oils) while others have relatively lower process CI (palm oil and livestock fats). However, palm oil and livestock fat feeds also enable the highest-CI refining strategies, and all strategies for HEFA jet fuel production result in substantially higher refining CI than the average U.S. petroleum refinery CI. This shows that HEFA jet fuel growth would increase the carbon intensity of hydrocarbon fuels processing.

Chapter 4 reviews natural carbon sinks and assesses potential carbon emission impacts from increasing production of the specific food system resources HEFA refiners can use as feedstocks. Palm oil, livestock, and fisheries production emit from these carbon sinks. Present assessments confirm this "indirect" impact of palm oil biofuels, but suggest livestock fat and fish oil biofuels have relatively low feed production emissions due to the assumption that biofuel demand will not expand livestock production or fisheries catch. Some also assume U.S. policies that discourage palm oil biofuels prevent palm oil expansion to fill in for other uses of biomass biofuels displace. Those assumptions, however, are based on historical data, when biofuels demand was far below total production for the type of biomass HEFA refiners can process. HEFA feedstock demand could far exceed total current U.S. production for all uses of that biomass type—including food and fuel—if HEFA jet fuel replaces as little as 18 percent of current U.S. jet fuel consumption.

With HEFA jet fuel growth to replace 18 percent of U.S. jet fuel, world livestock fat and fish oil production could supply only a fraction of U.S. HEFA feedstock demand unless that demand boosts their production, with consequent indirect carbon impacts. Palm oil production could expand to fill other uses for livestock fat and other plant oils which the increased U.S. biofuel demand would displace. Intensified and expanded production of soybean and other oil crops with relatively high indirect carbon impacts would likely be necessary, in addition, to supply the total demand for both food and fuel. Further, given refiner incentives to repurpose climate-stranded crude refining assets, plausible U.S. HEFA growth scenarios by mid-century range above 18 percent and up to 39 percent of U.S. jet fuel replacement with HEFA jet fuel.

Thus, data and analysis in Chapter 4 suggest the potential for significant indirect carbon emission impacts associated with the mix of HEFA jet fuel feedstocks that could meet plausible future SAF demand, and that high-jet yield feeds could contribute to or worsen these impacts.

Crucially, causal factors for these impacts would be inherent and mutually reinforcing. HEFA technology repurposed from crude refineries can process only feedstocks that are co-produced from food resources, it requires large hydrogen inputs that boost refining emissions to marginally improve its low jet fuel yield, and even then, it could require more than two tons of carbon-emitting feedstock production per ton of HEFA jet fuel produced.

Findings and takeaways from this work follow below.

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Findings and Takeaways

Finding 1. Hydrotreated Esters and Fatty Acids (HEFA) biofuel technology has inherent limitations that affect its potential as a sustainable aviation fuel: low jet fuel yield on feedstock, high hydrogen demand, and limited sustainable feedstock supply.

Takeaway Climate-safe plans and policies will need to prioritize alternatives to petroleum jet fuel combustion which do not have known sustainability limitations. B-1

Finding 2. Switching HEFA feedstocks to target increased jet fuel yield could increase the carbon intensity—CO_2 emitted per barrel feed—of HEFA refining, compared with targeting HEFA diesel yield. HEFA refining carbon intensity could increase in 80 percent of plausible feed switch and processing combinations targeting jet fuel. Direct emission impacts could be significant given that the carbon intensity of HEFA refining substantially exceeds that of U.S. petroleum refining.

Takeaway Environmental impact assessments of proposed HEFA projects will need to address potential emissions from future use of HEFA refineries to maximize jet fuel production, and assess lower emitting alternatives to repurposing existing high-carbon refinery hydrogen plants. B-2

Finding 3. One of three feeds that could boost HEFA jet fuel yield causes carbon emissions from deforestation for palm plantations, and the other two cannot meet potential HEFA feedstock demand without risking new carbon emissions from expanded livestock production or fisheries depletion. These indirect impacts could be significant given that feedstock demand for replacing only a small fraction of current U.S. jet fuel with HEFA jet fuel would exceed total U.S. production of HEFA feedstocks biomass—biomass which now is used primarily for food.

Takeaway Before properly considering approvals of proposed HEFA projects, permitting authorities will need to assess potential limits on the use of feedstocks which could result in significant climate impacts. B-3

Finding 4. Natural limits on total supply for the type of feedstock that HEFA technology can process appear to make replacing any significant portion of current petroleum jet fuel with this type of biofuel unsustainable.

Takeaway Sustainable aviation plans will need to consider proactive and preventive limits on HEFA jet fuel, in concert with actions to accelerate development and deployment of sustainable, climate-safe alternatives. B-4

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1. How would refiners rebuild for HEFA jet fuel production?

Oil companies can repurpose existing fossil fuel hydrogen plants, hydrocrackers, and hydrotreaters at their petroleum refineries to produce jet fuel and diesel biofuels using a technology called hydrotreating esters and fatty acids (HEFA). "Hydrotreating" means a hydro-conversion process: the HEFA process reacts biomass with hydrogen over a catalyst at high temperatures and pressures to form hydrocarbons and water. "Esters and fatty acids" are the type of biomass this hydro-conversion can process: the triacylglycerols and fatty acids in plant oils, animal fats, fish oils, used cooking oils, or combinations of these biomass lipids.[1]

HEFA processing requires a sequence of steps, performed in separate hydro-conversion reactors, to deoxygenate and isomerize (restructure) the lipids feedstock, and very substantial hydrogen inputs for those process steps, in order to produce diesel and jet fuels.[2]

One problem with using HEFA technology for Sustainable Aviation Fuel (SAF) is that these hydrodeoxygenation and isomerization steps alone can convert only a fraction of its feedstock into jet fuel—as little as 0.128 pounds of jet fuel per pound of soybean oil feed.[3] Intentional hydrocracking can boost HEFA jet fuel yield to approximately 0.494 pounds per pound of feed,[3] however, that requires even more hydrogen, and can require costly additional refining capacity. This chapter describes the range of processing strategies that refiners could use to increase HEFA jet fuel yields from their repurposed crude refineries. B-5

1.1 Step 1: Hydrodeoxygenation (HDO) of jet fuel (and diesel) hydrocarbons

HEFA processing produces diesel and jet fuels from the hydrocarbon chains of fatty acids. In all HEFA feedstocks, fatty acids are bound in triacylglycerols that contain substantial oxygen, and various numbers of carbon double bonds. To free the fatty acids and make fuels that can burn like petroleum diesel and jet fuel from them, that oxygen must be removed from the whole feed. This first essential step in HEFA processing is called hydrodeoxygenation (HDO).

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HDO reaction chemistry is complex, as reviewed in more detail elsewhere,[2] and its intended reactions all consume hydrogen by forcing it into the feedstock molecules. Process reactions insert hydrogen to free fatty acids from triacylglycerols ("depropanation") and to remove oxygen by bonding it with hydrogen to form water ("deoxygenation"). And along with those reactions, still more hydrogen bonds with the carbon chains to "saturate" the carbon double bonds in them. These reactions proceed at high temperatures and pressures in the presence of a catalyst to yield the intended HDO products: deoxygenated hydrocarbon chains which can be further processed to make diesel and jet fuels.

B-5 cont'd

1.2 Step 2: Isomerization of jet fuel and diesel hydrocarbons

Isomerization restructures the saturated straight-chain hydrocarbons produced by HDO, which are too waxy to burn well or safely in diesel or jet engines, by turning these straight-chain hydrocarbons into their branched-chain isomers. This is the second essential HEFA process step.

Like HDO, isomerization reactions are complex, proceed at high temperatures and pressures in the presence of a catalyst, and require substantial hydrogen inputs.[2] However, isomerization process reactions, conditions, and catalysts differ substantially from those of HDO and, instead of consuming the hydrogen input as in HDO, most of the hydrogen needed for isomerization can be recaptured and recycled.[2] These differences have so far required a separate isomerization processing step, performed in a separate process reactor, to make HEFA diesel and jet fuel.

1.3 Additional option of intentional hydrocracking (IHC)

B-6

Hydrocracking breaks ("cracks") carbon bonds by forcing hydrogen between bonded carbon atoms at high temperature and pressure. This cracks larger hydrocarbons into smaller ones. It is an unwanted side reaction in HDO and some isomerization processing since when uncontrolled, it can produce compounds too small to sell as either diesel or jet fuel. *Intentional* hydrocracking (IHC) uses specialized catalysts and process conditions different from those required by HDO to crack HDO outputs into hydrocarbons in the jet fuel range.

Thus, while HEFA refiners can make jet fuel with HDO and isomerization alone (No-IHC), they could make more jet fuel by adding IHC to their processing strategy. Adding IHC for the HDO output can boost jet fuel yield to approximately 49.4 percent of HEFA feedstock mass (49.4 wt.%).[3] This boost is important, compared with No-IHC jet fuel yield of approximately 12.8 wt.% on soybean oil,[3] the most abundant HEFA feedstock produced in the U.S.[2] However, hydrocrackers are expensive to build for refineries that do not already have them,[4] and IHC increases demand for hydrogen plant production capacity by approximately 1.3 wt.% on feed (800 cubic feet of H_2/barrel).[2 3] New capacity for additional hydrogen production is also costly to refiners that cannot repurpose existing capacity. HEFA refiners that choose the IHC option to maximize jet fuel yield might choose one processing strategy to minimize new hydrocracking capacity cost, or another processing strategy to minimize new hydrogen capacity cost.

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1.3.1 IHC in isomerization process units

Hydrocracking and isomerization can be accomplished in a repurposed crude refinery hydrocracker, given the necessary retooling and catalyst for HEFA HDO output processing.[2] Thus, a crude refinery with sufficient existing hydrocracking and hydrogen capacity for the whole HEFA feed stream it plans to process could repurpose that equipment for IHC in the isomerization step of its repurposed HEFA process configuration. This "Isom-IHC" processing strategy would allow that refiner to maximize HEFA jet fuel yield without the capital expense of building a new hydrocracker. However, combining intentional hydrocracking in isomerization, which is required for all HEFA fuels, cracks the entire output from the HDO step, incurring the 800 cubic feet of hydrogen per barrel cost increment on the entire HEFA feed. If a refiner lacks the existing hydrogen capacity, Isom-IHC could entail building new hydrogen plant capacity.

B-6 cont'd

1.3.2 Selective IHC in separate hydrocracking process units

HEFA refiners separate the components of their HDO and isomerization outputs to re-run portions of the feed through those processes and to sell HEFA diesel and jet fuel as separate products. That distillation, or "fractionation," capacity could be used to separate the jet fuel produced by HDO and isomerization processing from their hydrocarbons output, and feed only those hydrocarbons outside the jet fuel range to a separate intentional hydrocracking unit. This "Selective-IHC" processing strategy could increase jet fuel yield while reducing IHC hydrogen consumption, and new hydrogen plant costs, compared with those of the Isom-IHC strategy. However, it would not eliminate the hydrogen production cost of IHC, and more importantly for refiners that lack the existing hydrocracking capacity before repurposing their crude refineries, it would entail building expensive new hydrocrackers.

1.4 Three potential HEFA jet fuel processing strategies

HEFA feedstock supply limitations,[2] differences in hydrogen production and hydrocracking capacities among U.S. refineries,[5] and the differences between processing strategies described above suggest the broad outlines of a prospective future HEFA jet fuel refining fleet. Refiners that can repurpose sufficient capacity could maximize HEFA jet fuel yield using IHC strategies. The fleet-wide mix would be influenced initially by whether existing hydrocracking or hydrogen production capacity would limit total production by each refinery to be repurposed. Later, the relative costs of hydrogen production *v.* hydrocracking could affect the mix of Selective-IHC *v.* Isom-IHC in the mid-century HEFA refining fleet.

B-7

Refiners that lack sufficient capacity for IHC could repurpose for the No-IHC strategy and coproduce HEFA jet fuel along with larger volumes of HEFA diesel. Then, increasing costs of the much higher feed volume needed per gallon of HEFA jet fuel yield from the No-IHC strategy could limit this strategy to a small portion of the refining fleet by mid-century. Declining HEFA diesel demand, as electric and fuel cell vehicles replace diesel vehicles, could further drive this this limitation of the No-IHC processing strategy. However, refiners that do not use intentional hydrocracking could seek to boost HEFA jet fuel yield in another way.

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2. Can refiners make more HEFA jet fuel from some feedstocks than from others?

HEFA biofuel technology is limited to a particular subset of world biomass supply for its feedstock. Despite that limitation, however, differences among these lipid feeds could affect both HEFA processing and jet fuel yield. This chapter assesses individual HEFA feedstocks for potential differences in HEFA processing and HEFA jet fuel yield.

Results reveal strong interactions between feedstock and processing configuration choices. In essential HEFA process steps, feed choices affect jet fuel yield and hydrogen demand, both of which affect options to further boost jet yield with intentional hydrocracking. Both feedstock and processing choices can increase hydrogen demand, which can affect processing to boost jet fuel yield where hydrogen supply is limited. Feed-driven and process strategy-driven impacts on hydrogen demand overlap, however, feed rankings for hydrogen differ from those for jet yield, and differ among processing configurations. From the lowest to highest impact combinations of feedstock and processing options, jet fuel yield and hydrogen demand increase dramatically. B-8

Palm oil, livestock fat, and fish oil have relatively high jet fuel yields without intentional hydrocracking, and relatively high potentials to enable further boosting jet fuel yields with intentional hydrocracking (IHC).

2.1 <u>HEFA feedstock limitations and supply options</u>

HEFA biofuel technology relies on the fatty acids of triacylglycerols in biomass lipids for its feedstocks, as described in Chapter 1. Sources of these in relevant concentrations and quantities are limited to farmed or fished food system lipids resources. Among its other problems, which are addressed in a subsequent chapter, this technological inflexibility limits feedstock choices for refiners seeking to increase HEFA jet fuel yield.

Historically used lipid biofuel feedstock supplies include palm oil, soybean oil, distillers corn oil, canola (rapeseed) oil, and cottonseed oil among the significant HEFA oil crop feeds; livestock fats, including beef tallow, pork lard, and poultry fats; and fish oils—for which we

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analyze data on anchovy, herring, menhaden, salmon, and tuna oils.[1] Additionally, though it is a secondary product from various mixtures of these primary lipid sources, and its supply is too limited to meet more than a small fraction of current HEFA demand,[2] we include used cooking oil (UCO) in our analysis.[1] B-8 cont'd

2.2 Feedstock properties that affect HEFA jet fuel production

2.2.1 Feedstock carbon chain length

Jet fuel is a mixture of hydrocarbons that are predominantly in the range of eight to sixteen carbon atoms per molecule. In fuel chemistry shorthand, a hydrocarbon with 8 carbons is "C8" and one with 16 carbons is "C16," so the jet fuel range is C8–C16. Similarly, a fatty acid chain with 16 carbons is a C16 fatty acid. Thus, since fuels produced by the essential HEFA process steps—hydrodeoxygenation (HDO) and isomerization—reflect the chain lengths of fatty acids in the feed,[2] the ideal HEFA jet fuel feed would be comprised of C8–C16 fatty acids. But there is no such HEFA feedstock.

In fact, the majority of fatty acids in HEFA lipids feeds, some 53% to 95% depending on the feed, have chain lengths outside the jet fuel range.[1] This explains the low jet fuel yield problem with relying on HEFA technology for Sustainable Aviation Fuel (SAF) described in Chapter 1. However, that 53–95% variability among feeds also reveals that refiners could make more HEFA jet fuel from some HEFA feedstocks than from others. B-9

2.2.2 Feedstock-driven process hydrogen demand

Options to increase HEFA jet fuel yield using intentional hydrocracking could be limited by hydrogen supplies available to refiners, and HDO, an essential HEFA process step, consumes hydrogen to saturate carbon double bonds in feeds and remove hydrogen from them (Chapter 1). HDO accounts for the majority of HEFA process hydrogen demand, and some HEFA feeds have more carbon double bonds, somewhat higher oxygen content, or both, compared with other HEFA feeds.[2] Thus, some HEFA feeds consume more process hydrogen, and thereby have more potential to affect jet fuel yield by limiting high-yield processing options, than other feeds.

2.3 Ranking HEFA feedstocks for jet fuel production

2.3.1 Effects on HDO yield

Table 1 summarizes results of our research for the chain length composition of fatty acids in HEFA feedstocks.[1] This table ranks feeds by their jet fuel range (C8–C16) fractions. Since fuels produced by the essential HDO and isomerization steps in HEFA processing reflect the chain lengths of HEFA feeds, the volume percentages shown in Table 1 represent potential jet fuel yield estimates for the processing strategy without intentional hydrocracking (No-IHC). B-10

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Table 1. Chain length* composition of fatty acid chains in HEFA feedstocks, ranked by jet fuel fraction.

	Jet fuel fraction (C8–C16) (volume % on whole feed)	Diesel fraction (C15–C18) (vol. %)	> C16 (vol. %)	>C18 (vol. %)
Palm oil	46.5	95.6	53.5	0.5
Menhaden oil	42.3	59.8	57.7	31.2
Tallow fat	33.3	95.2	66.7	0.4
Herring oil	32.7	49.3	67.3	42.7
Poultry fat	32.7	98.1	67.3	1.1
Anchovy oil	32.6	52.2	67.4	40.9
Tuna oil	31.5	48.9	68.5	44.5
Lard fat	30.0	96.5	70.0	2.1
Salmon oil	27.5	49.7	72.5	44.0
UCO 10th P.*	26.8	97.9	73.2	1.1
Cottonseed oil	25.7	98.7	74.3	0.4
Corn oil (DCO)*	13.6	98.9	86.4	1.1
UCO 90th P.*	12.9	99.2	87.1	0.8
Soybean oil	11.7	99.5	88.3	0.4
Canola oil	4.8	96.8	95.2	3.1
Yield-wtd. Average	**26.3**	**97.4**	**73.7**	**1.0**

*__Cx:__ fatty acid chain of x carbons. **UCO:** used cooking oil. **10th P.:** 10th Percentile. **DCO:** Distillers corn oil. Data from Table 8, except world yield data by feed type for yield-weighted average shown from Table 7. Percentages do not add; fractions overlap.

Potential feed-driven effects on jet fuel yield shown in Table 1 range tenfold among feeds, from approximately 4.8% on feed volume for canola oil to approximately 46.5% for palm oil. For context, since supplies of some feeds shown are relatively low, it may be useful to compare high jet fuel yield feeds with soybean oil, the most abundant HEFA feed produced in the U.S.[2] Palm oil, the top ranked feed for jet fuel yield, could potentially yield nearly four times as much HEFA jet fuel as soybean oil, while menhaden fish oil and tallow might yield 3.6 times and 2.8 times as much jet fuel as soy oil, respectively. Again, this is for the No-IHC processing strategy.

2.3.2 Effects on IHC strategies yields

Feed-driven jet fuel yield effects could allow intentional hydrocracking (IHC) to further boost HEFA jet fuel yield, depending on the IHC processing strategy that refiners may choose. At 49.4 wt.% on feed (Chapter 1), or approximately 58 volume percent given the greater density of the feed than the fuel, IHC jet fuel yield exceeds those of the feed-driven effects shown in Table 1. But IHC adds substantially to the already-high hydrogen demand for essential HEFA process steps (Chapter 1). In this context, the eight highest-ranked feeds for jet fuel yield in Table 1 may allow a refiner without the extra hydrogen supply capacity to use IHC on its entire feed to use Selective-IHC on 53.5% to 70% of its feed. This indirect effect of feed-driven jet fuel yield on process configuration choices has the potential to further boost HEFA jet fuel yield. B-10 cont'd

Direct feedstock-driven effects on process hydrogen demand, which can vary by feed as described above, must be addressed along with this indirect effect. *See* Table 2 below.

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Table 2. Hydrogen demand for hydrodeoxygenation (HDO) of HEFA feedstocks, grouped by HDO jet fuel and diesel hydrocarbon yields. Data in kilograms hydrogen per barrel of feed fraction (kg H_2/b)

Feedstock grouping	Jet fraction (C8–C16)[a]		Diesel fraction (C15–C18)[a]		Longer chains (> C18)[a b]	
	HDO kg/b[c]	Sat kg/b[d]	HDO kg/b[c]	Sat kg/b[d]	HDO kg/b[c]	Sat kg/b[d]
High jet/high diesel						
Palm oil	4.38	< 0.01	4.77	0.64	3.52	0.15
Tallow fat	4.53	0.14	4.70	0.62	3.62	0.19
Poultry fat	4.58	0.25	5.04	0.92	3.99	0.67
Lard fat	4.43	0.11	4.84	0.75	5.39	1.68
UCO (10th Pc.)	4.52	0.20	5.02	0.92	4.30	0.75
Cottonseed oil	4.30	0.02	5.47	1.34	3.51	0.16
High jet/low diesel						
Menhaden oil	4.72	0.28	5.07	0.85	8.64	4.83
Herring oil	4.77	0.30	5.09	0.89	6.11	2.52
Anchovy oil	4.72	0.28	5.22	1.02	8.07	4.31
Tuna oil	4.67	0.24	4.81	0.64	8.06	4.34
Salmon oil	4.51	0.09	5.18	1.01	7.99	4.27
Low jet/high diesel						
Corn (DCO) oil	4.27	0.01	5.60	1.48	4.87	1.38
UCO (90th Pc.)	4.35	0.09	5.56	1.45	3.38	0.00
Soybean oil	4.28	0.01	5.70	1.59	3.31	0.00
Canola oil	4.35	0.07	5.45	1.37	3.98	0.55

a. Feedstock component fractions based on carbon chain lengths of fatty acids in feeds. **b.** Fatty acid chains with more than 18 carbons (> C18), which might be broken into two hydrocarbon chains in the jet fuel range (C8–C16) by intentional hydrocracking (IHC). **c.** HDO: hydrodeoxygenation; hydrogen consumed in HDO reactions, including saturation. **d.** Sat: saturation, H_2 needed to saturate carbon double bonds in the feedstock component, included in HDO total as well and broken out here for comparisons between types of feeds. *See* Table 8 for details of data, methods, and data sources. Note that fatty acids with 15–16 carbons (C15–C16) are included in both the jet fuel and the diesel fuel ranges. **UCO:** Used cooking oil, a highly variable feed; the 10th and 90th percentiles of this range of variability are shown.

2.3.3 Effects on process hydrogen demand

Table 2 shows process hydrogen demand for HDO, and the portion of HDO accounted for by saturation of carbon double bonds, for fractions of each feedstock. The important detail this illustrates is that saturation of carbon double bonds—especially in the larger-volume diesel fraction and, for fish oils, the longer chain fraction—explains most of the differences in direct effects on hydrogen demand among feeds. At less than 1% to more than half of HDO hydrogen demand, saturation drives differences in hydrogen demand among feed fractions (Table 2). Further, these differences peak in the diesel and longer chain fractions of feeds (*Id.*), and the combined volumes of these diesel and longer chain fractions are both high for all feeds and variable among feeds (Table 1).

Since HDO is an essential step in all HEFA processing strategies (Chapter 1), this evidence that process hydrogen demand varies among feeds because of the processing characteristics of whole feeds means we can compare hydrogen demand across processing strategies based on whole feeds. Table 3 shows results from this comparison across processing strategies.

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cont'd

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Table 3. Hydrogen demand in the no intentional hydrocracking (No-IHC), Selective IHC and Isom-IHC processing strategies by feed grouping and feed. ***kg H_2/b:*** *kilograms hydrogen/barrel whole feed*

Feedstock grouping	No-IHC [a] (kg H_2/b)	Selective-IHC [b] (kg H_2/b)	Isom-IHC [c] (kg H_2/b)
High jet/high diesel			
Palm oil	4.79	5.79	6.60
Tallow fat	4.71	6.11	6.70
Poultry fat	5.03	6.28	6.85
Lard fat	4.85	6.13	6.65
UCO (10th P.)	5.01	6.37	6.83
Cottonseed oil	5.44	6.84	7.28
High jet/low diesel			
Menhaden oil	6.18	7.30	8.02
Herring oil	5.50	6.76	7.33
Anchovy oil	6.37	7.67	8.23
Tuna oil	6.29	7.62	8.16
Salmon oil	6.40	7.78	8.25
Low jet/high diesel			
Corn (DCO) oil	5.58	7.19	7.42
UCO (90th P.)	5.55	7.17	7.39
Soybean oil	5.68	7.33	7.52
Canola oil	5.40	7.16	7.24
Feed-wtd. Average	5.24	6.62	7.07

a. Intentional hydrocracking (IHC) is not used. **b.** Intentional hydrocracking (IHC) is selective because in this strategy HDO output is separately isomerized, and only the non-jet fuel hydrocarbons from HDO are fed to IHC. **c.** Isomerization and IHC are accomplished in the same process step in this strategy; all HDO output, including the jet fuel fraction, is fed to intentional hydrocracking in this strategy. *See* Table 8 for details of data, methods, and data sources;[1] Table 7 for world feed data used to derive feed-weighted averages. **UCO:** Used cooking oil, a highly variable feed; 10th and 90th percentiles of range shown.

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2.3.4 Interactions between feedstock and processing choices

Feedstock and process strategy choices combined can impact HEFA process hydrogen demand dramatically (Table 3). As expected, IHC increases hydrogen demand for all feeds, however, feed-driven and process strategy-driven effects overlap. The maximum feed-driven impact in the No-IHC strategy (6.40 kg H_2/b) exceeds the minimum (5.79 kg H_2/b) in the Selective-IHC strategy (*Id.*). Similarly, the maximum feed-driven impact in the Selective-IHC strategy (7.78 kg H_2/b) exceeds the minimum (6.60 kg H_2/b) in the Isom-IHC strategy (*Id.*). Hydrogen demand increases by approximately 75% from the lowest impact (4.71 kg H_2/b) to the highest impact (8.25 kg H_2/b) combination of feedstock and processing strategy (*Id.*).

Feed rankings for hydrogen demand differ from feed rankings for jet fuel yield (tables 1, 3). Palm oil ranks at the top for jet fuel yield and at or near the bottom for hydrogen demand while in contrast, fish oils are among the highest ranked feeds for both jet yield and hydrogen demand. Livestock fats are among the highest ranked feeds for jet fuel yield and among the lowest ranked feeds for hydrogen demand. The lowest ranked feeds for jet fuel yield, soybean and canola oils, are medium-ranked to high-ranked feeds for hydrogen demand.

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Relatively lower hydrogen demand for palm oil and livestock fats across the columns in Table 3 further illustrates how interactions of feedstock and processing strategies can contribute to increased jet fuel yields. For example, the relative Isom-IHC hydrogen demand reduction achievable by switching from soybean oil to tallow (-0.82 kg/b; -10.9%) or from soybean oil to palm oil (-0.92 kg/b; -12.2%) can help to support the highest jet fuel yield processing strategy in situations where refinery hydrogen production capacity is marginally limited.

Results in Table 3 also reveal that some feedstocks switch rankings between the Selective-IHC strategy and other processing strategies. In one example, canola oil feedstock demands more hydrogen than cottonseed oil feedstock for Selective-IHC but slightly less than cottonseed oil for the No-IHC and Isom-IHC strategies (Table 3). This corresponds to the greater fraction of canola oil than cottonseed oil sent to intentional hydrocracking for the Selective-IHC strategy (*see* Table 1, > C16 vol. %).

Another example: Only some 57.7% of the total Menhaden oil feed volume goes to intentional hydrocracking for Selective-IHC, as compared with 88.3% of the soybean oil feed (*Id.*). Consequently, Menhaden oil demands less hydrogen than soybean oil for Selective-IHC but more hydrogen than soybean oil for the other processing strategies (Table 3). B-10 cont'd

Putting these direct and indirect feed-driven effects together, consider switching from soybean oil to tallow for Selective-IHC at a 50,000 to 80,000 b/d refinery—which is in the range of projects now proposed in California.[2] The direct effect on HDO from this soy oil-to-tallow switch, shown in the No-IHC column of Table 3 (-0.97 kg H_2/b), carries over to Selective-IHC. The indirect effect sends 21.6% less of the total tallow feed to hydrogen-intensive cracking for Selective IHC than that of soy oil (Table 1, > C16 fractions), further boosting hydrogen savings from the switch to -1.22 kg/b on total feed (Table 3). At feed rates of 50,000–80,000 b/d, this might save the refiner construction and operating costs for 61,000 to 97,600 kg/d of hydrogen capacity. Expressed as volume in millions of standard cubic feet per day (MMSCFD), that is the equivalent of a 24 to 38 MMSCFD hydrogen plant.

At the same time that switching from soy with No-IHC to tallow with Selective-IHC could enable the higher-yield processing strategy, however, net process hydrogen demand would increase by 0.43 kg/b (Table 3), an increase in this example of 8.4 to 13.5 MMSCFD.

Thus, examining feed and processing interactions reveals that switching to feeds with higher jet-range fractions, lower HDO hydrogen demand, or both enables refiners with limited hydrogen supplies to use intentional hydrocracking and thereby further boost jet fuel yields. More broadly, these results show refiners can make more HEFA jet fuel from some feedstocks than from others, but that doing so could result in substantially increased hydrogen demand for some combinations of feedstock and processing choices.

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3. Does switching from one HEFA feedstock to another change processing carbon intensity differently when refiners target jet fuel instead of diesel production?

Switching feedstocks and production targets can affect the per-barrel emissions—the *carbon intensity*—of HEFA refining dramatically. The vast majority of direct CO_2 emission from HEFA refining emits from petroleum refinery steam reformers that refiners repurpose to supply HEFA process hydrogen demand.[2] The reformer emissions further increase with increasing hydrogen production.[2] As shown in Chapter 2, refiners could switch feeds to boost HEFA jet fuel yield in ways that increase refinery hydrogen demand differently compared with targeting HEFA diesel yield. This chapter evaluates the carbon intensity (CI) impacts of HEFA refining that could result from targeting HEFA jet fuel yield instead of diesel yield, and weighs their significance against the CI of petroleum refining. B-11

3.1 <u>CO_2 co-production and emission from hydrogen production by steam reforming</u>

3.1.1 How steam reforming makes hydrogen

Steam reforming is a fossil fuel hydrogen production technology that co-produces CO_2. The process reacts a mixture of superheated steam and hydrocarbons over a catalyst to form hydrogen and CO_2. Hydrocarbons used include methane from natural gas, and it is often called steam methane reforming (SMR), but crude refiners use hydrocarbon byproducts from refining such as propane, along with methane from purchased natural gas, as feeds for the steam reformers that they could repurpose for HEFA processing. B-12

3.1.2 How steam reforming emits CO_2

Both its CO_2 co-product and CO_2 formed in its fuel combustion emit from steam reforming. An energy-intensive process, steam reforming burns fuel to superheat process steam and feed, and burns more fuel for energy to drive pumps and support process reactions. Steam reforming fuel combustion emissions are reformer-specific and vary by plant. Based on verified permit data for 11 San Francisco Bay Area crude refinery steam reforming plants, we estimate median

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fuel combustion emissions of approximately 3.93 grams of CO_2 emitted per gram of hydrogen produced (g CO_2/g H_2), conservatively assuming methane fuel.[2] Co-product emissions are larger still, and vary by feed, with approximately 5.46 g CO_2/g H_2 emitting from methane feed and 6.56 g CO_2/g H_2 emitting from propane feed.[2] The coproduct and combustion emissions are additive.

3.1.3 Steam reforming CO_2 emission estimate

HEFA refinery steam reforming can be expected to use a feed and fuel mix that includes the propane byproduct from the process reactions discussed in Chapter 1 and natural gas methane. Based on process chemistry we conservatively assume 79% methane/21% propane feed with 100% methane fuel. From these figures we estimate typical HEFA steam reforming emissions of approximately 9.82 g CO_2/g H_2. This estimate is for repurposed crude refinery steam reformers, which are aging and may not be as efficient as newer steam reformers.[2] For context, however, our estimate is within 2.5% of a recent independent estimate of median emissions from newer merchant steam methane reforming plants, when compared on a same-feed basis.[2] B-12 cont'd

Thus, repurposed refinery steam reforming emits CO_2 at nearly ten times its weight in hydrogen supplied. With the high hydrogen demand for HEFA processing shown in Chapter 2, that is a problem. Since steam reforming emissions increase with increased production to meet increased hydrogen demand, the refining CI values reported below are based on the emission factor described above (9.82 g CO_2/g H_2) and the hydrogen demand data from Chapter 2.

3.2 Feedstock effects on CI resulting from HDO hydrogen demand

Hydrodeoxygenation (HDO) is an essential step, and is the major hydrogen consuming step, in all HEFA processing strategies (chapters 1 and 2). The data in Table 4 represent the HEFA processing strategy that uses HDO without intentional hydrocracking (No-IHC).

3.2.1 Feedstock HDO chemistry impact on HEFA refining CI

Table 4 shows effects of feedstock HDO chemistry on HEFA steam reforming emissions. Steam reforming-driven CI (kg/b: kg CO_2 per barrel feed) is substantially higher for whole feeds than for their jet fuel fractions. This is because the non-jet fractions need more hydrogen to saturate carbon double bonds and their combined volumes are larger than that of the jet fuel fraction (tables 1 and 2). Further, the extent of these differences between fractions varies among feeds (*Id.*). This is why feeds change ranks between the columns in Table 4. For example, the jet fuel fraction of palm oil has higher CI than that of soybean oil even though the whole feed data show that soybean oil is a higher CI feed. This variability among feed fractions also is why fish oil CI is high for both the jet fraction and the whole feed. B-13

3.2.2 Need to account for whole feed impact

Does Table 4 show that palm oil could be a higher refining CI feed than soybean oil? No. Since the HDO step is essential for removing oxygen from the whole feed to co-produce both HEFA jet fuel and HEFA diesel, choosing any feed results in the CI impact of that whole feed.

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Table 4. Hydrogen steam reforming emissions associated with the jet fuel fraction *v.* whole HEFA feeds in the HDO (No IHC) refining strategy; comparison of feed ranks by emission rate.

Jet fuel fraction (C8–C16)		Whole feed (≥ C8)	
Feed (rank)	CO_2 (kg/b feed)	Feed (rank)	CO_2 (kg/b feed)
Herring oil	46.8	Salmon oil	62.8
Menhaden oil	46.4	Anchovy oil	62.5
Anchovy oil	46.4	Tuna oil	61.7
Tuna oil	45.9	Menhaden oil	60.7
Poultry fat	45.0	Soybean oil	55.8
Tallow fat	44.5	Distillers corn oil	54.8
UCO (10th Percentile)	44.4	UCO (90th Percentile)	54.4
Salmon oil	44.3	Herring oil	54.0
Lard fat	43.5	Cottonseed oil	53.4
Palm oil	43.0	Canola oil	53.1
Canola oil	42.7	Poultry fat	49.4
UCO (90th Percentile)	42.7	UCO (10th Percentile)	49.2
Cottonseed oil	42.2	Lard fat	47.6
Soybean oil	42.0	Palm oil	47.1
Distillers corn oil	41.9	Tallow fat	46.2

C8–C16: fatty acid chains with 8 to 16 carbon atoms. **≥ C8:** fatty acid chains with 8 or more carbon atoms. **Menhaden:** a fish. **UCO:** used cooking oil, a variable feed; 10th and 90th percentiles shown. Data from Table 2 at 9.82 g CO_2/g H2 steam reforming.

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While the jet fuel fraction data in this table helps to inform why feed quality impacts refining CI, we need to account for those CI impacts of whole feeds shown in Table 4.

3.2.3 High-jet feeds can increase or decrease HDO-driven CI

HDO-driven CI findings for whole feeds reveal mixed CI results for high-jet fuel yield feedstocks in No-IHC processing. Fish oils rank highest for steam reforming-driven CI while livestock fats and palm oil rank lowest (Table 4). Thus, for this processing strategy, switching feeds to boost jet fuel yield can increase or decrease refining CI. However, No-IHC also is the processing strategy that HEFA refiners use to maximize diesel yield rather than jet fuel yield. Feedstock quality interacts with other processing choices in different ways that could further boost HEFA refining CI along with jet fuel yield, as shown below.

3.3 <u>Feedstock effects on CI resulting from Selective-IHC hydrogen demand</u>

3.3.1 Process strategy impact of high-jet feeds

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High jet yield feeds result in less input to Selective-IHC, enabling marginally hydrogen-limited refiners to further boost jet fuel yield via Selective-IHC, but this requires additional hydrogen (chapters 1 and 2). Intentional hydrocracking (IHC) thus increases hydrogen steam reforming rates and emissions, increasing refining CI for all feeds, as shown in Table 5. This impact overlies the HDO impact, so that feed CI values overlap between columns. For example, the tuna oil No-IHC CI (61.7 kg/b) exceeds the tallow Selective-IHC CI (60.0 kg/b), and the anchovy oil Selective-IHC CI (75.3 kg/b) exceeds the soy oil Isom-IHC CI (73.9 kg/b).

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Table 5. Hydrogen steam reforming emissions from the No-IHC, Selective-IHC, and Isomerization IHC refining strategies: comparisons of whole HEFA feed ranks by emission rate.

No-IHC		Selective-IHC		Isomerization-IHC	
Feed (rank)	(kg CO_2/b)	Feed (rank)	(kg CO_2/b)	Feed (rank)	(kg CO_2/b)
Salmon oil	62.8	Salmon oil	76.4	Salmon oil	81.0
Anchovy oil	62.5	Anchovy oil	75.3	Anchovy oil	80.8
Tuna oil	61.7	Tuna oil	74.8	Tuna oil	80.1
Menhaden oil	60.7	Soybean oil	72.0	Menhaden oil	78.8
Soybean oil	55.8	Menhaden oil	71.6	Soybean oil	73.9
Corn oil–DCO	54.8	Corn oil-DCO	70.6	Corn oil-DCO	72.8
UCO 90th P.	54.4	UCO 90th P.	70.4	UCO 90th P.	72.6
Herring oil	54.0	Canola oil	70.3	Herring oil	72.0
Cottonseed oil	53.4	Cottonseed oil	67.2	Cottonseed oil	71.5
Canola oil	53.1	Herring oil	66.4	Canola oil	71.1
Poultry fat	49.4	UCO 10th P.	62.5	Poultry fat	67.2
UCO 10th P.	49.2	Poultry fat	61.7	UCO 10th P.	67.1
Lard fat	47.6	Lard fat	60.2	Tallow fat	65.7
Palm oil	47.1	Tallow fat	60.0	Lard fat	65.3
Tallow fat	46.2	Palm oil	56.9	Palm oil	64.8

IHC: Intentional hydrocracking. **No-IHC:** CO_2 from hydrodeoxygenation (HDO). **Selective-IHC:** CO_2 from HDO plus IHC of HDO output hydrocarbons > C16. **Isomerization-IHC:** CO_2 from HDO plus IHC of all HDO output (> C8). **Menhaden:** a fish. **UCO:** used cooking oil, 10th, 90th percentiles shown. **DCO:** distillers corn oil. Figures shown exclude emissions associated with H_2 losses, depropanation, and inadvertent cracking. Data from Table 3 at 9.82 g CO2/g H2 steam reforming.

3.3.2 Feed chemistry effects on feed rankings for CI

Feedstock CI rankings differ between No-IHC and Selective-IHC processing (Table 5). This is a feed quality impact driven primarily by the different volumes of non-jet fractions sent to IHC among feeds. It boosts the CI of soybean oil from 4.9 kg/b below to 0.4 kg/b above the CI of menhaden oil with the addition of Selective-IHC (*Id.*). With 88.3% of its volume outside the jet fuel range compared with 57.7% of menhaden oil (Table 1, > C16 fractions), soy oil sends 30.6% more feed to Selective-IHC than menhaden oil. More IHC feed requires more hydrogen, boosting steam reforming emissions more with soy than with menhaden oil. Similarly, canola oil sends 27.9% more feed to Selective-IHC than herring oil (*Id.*). This boosts canola oil CI from 0.9 kg/b below to 3.9 kg/b above herring oil CI with the addition of Selective-IHC (Table 5).

3.3.3 How livestock fat feeds could affect soy oil and canola oil refining CI

When switching from soy or canola oil to livestock fat enables a refiner to boost jet fuel yield by repurposing its refinery for Selective-IHC processing, that intentional hydrocracking can boost jet yield from soy and canola oil feeds as well. Thus, instead of shutting down when, for any reason at any time, livestock fat becomes too scarce or expensive, the refiner could make jet fuel by going back to soybean oil or canola oil feedstock. This could increase refining CI by 16.2 kg/b (29%) for soy oil, and 17.2 kg/b (32%) for canola oil, based on our results for the Selective-IHC *versus* No-IHC processing strategies in Table 5.

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3.4 Feedstock effects on CI resulting from Isom-IHC hydrogen demand

Livestock fat and palm oil could maximize jet fuel yield by enabling Isom-IHC processing, since these feeds minimize HDO hydrogen demand (chapters 1 and 2). Their relatively lower non-jet fractions do not contribute to this effect on Isom-IHC because, in contrast to Selective-IHC, Isom-IHC processes the entire feed stream output from HDO. Direct effects of feed quality variability on Isom-IHC cracking are relatively weak, since HDO both saturates and removes oxygen from Isom-IHC inputs. Thus, the relative feed rankings for CI from No-IHC processing carry over to the Isom-IHC feed rankings with only minor differences (Table 5). However, by cracking of the entire HDO output, Isom-IHC further boosts hydrogen demand, thus hydrogen steam reforming emissions, resulting in the highest HEFA refining CI for all feeds (*Id.*). B-14 cont'd

Across feeds and process options, from the lowest to the highest impact combinations of feeds and processing, HEFA refining CI increases by 34.8 kg CO_2/b (75%), and CI increases in 122 (79.7%) of 153 feed switching combinations that could boost jet fuel yield (tables 1, 3, 5).

3.5 Comparison with petroleum refining CI by feedstock and processing strategy

Chart 1 plots results for feedstock-related impacts on the variability of HEFA refining CI from HEFA steam reforming emissions against the CI of U.S. petroleum refining. Our results in Table 5 are shown by processing strategy and, within each strategy, each feed is represented by a color-coded column. The height of the column represents the contribution of steam reforming to HEFA refining CI for that particular feed and processing strategy. The solid black line shown at approximately 41.8 kg/b (kg CO_2/barrel crude processed) represents the average U.S. petroleum refining CI from 2015 through 2017.[6] We use this (41.8 kg/b) as our benchmark. For added context, average U.S. petroleum refining CI from 2006–2008,[7] a period when the U.S. refinery crude slate was denser and higher in sulfur than during 2015–2017[8] resulting in higher historic U.S. crude refining industry CI,[7] is represented by the dashed line at 50 kg/b in the chart.

Please note what HEFA emissions Chart 1 does and does not show. It shows HEFA refining steam reforming emissions only. This helps us focus on our question about refining CI impacts from HEFA feedstock switching to target jet fuel, which are directly related to HEFA steam reforming rates. It *does not* show total direct emissions from HEFA refining. B-15

3.5.1 HEFA refining CI impacts are significant compared with crude refining

Other HEFA refining emissions besides those from steam reforming—from fuel combustion to heat and pressurize HEFA hydro-conversion reactors, precondition and pump their feeds, and distill and blend their products—could add roughly 21 kg/b of additional HEFA refining CI.[2] Thus, for a rough comparison of petroleum refining CI with total HEFA refining CI, imagine adding 21 kg/b to the top of each column in Chart 1. HEFA refining CI approaches or exceeds *double* the CI of petroleum refining. Clearly, expanding HEFA jet fuel would increase the CI of hydrocarbon fuels processing substantially.

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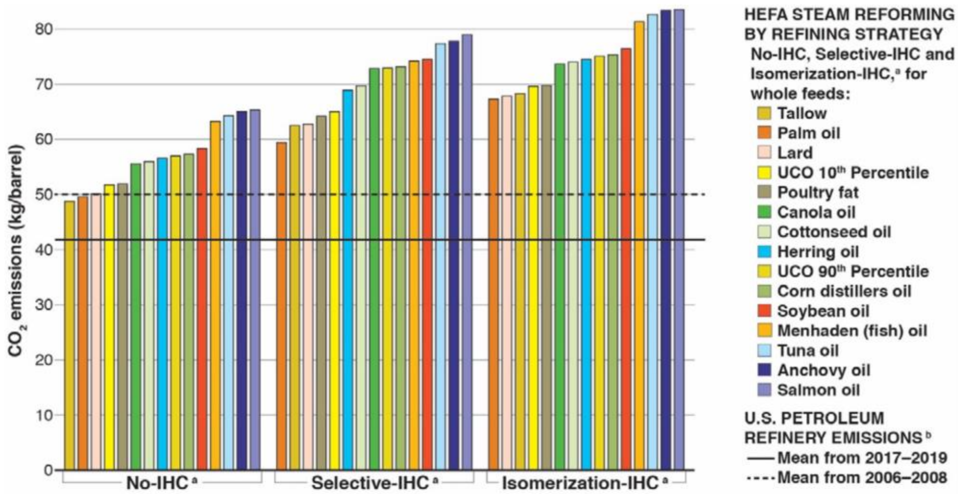

1. HEFA Steam Reforming Emissions *v.* Total U.S. Petroleum Refining Emissions, kg CO_2/barrel feed input.

a. HEFA steam reforming emissions only: values shown exclude CO_2 emitted by other HEFA refining process and support equipment. This contrasts with the petroleum refining emissions shown, which include all direct emissions from crude refining. Including all direct emissions from HEFA refining could increase the HEFA estimates shown by approximately 21 kg/barrel.[2] The "No-IHC" strategy excludes intentional hydrocracking (IHC); the "Selective-IHC" strategy adds emission from producing hydrogen consumed by intentional hydrocracking of feed fractions comprised of hydrocarbons outside the jet fuel range; the "Isomerization-IHC" strategy adds emissions from intentional hydrocracking of whole feeds in the isomerization step of HEFA fuels production. HEFA data shown include feed-driven emissions in Table 5 plus additional steam reforming emissions (2.5 kg/b) from producing the additional hydrogen that is lost to unintended side-reaction cracking, solubilization, scrubbing and purging (*see* Table 8).[1]

b. U.S. petroleum refinery emissions including total direct CO_2 emitted from steam reforming and all other petroleum refinery process and support equipment at U.S. refineries. Mean from 2015 through 2017 based on total refinery emissions and distillation inputs reported by the U.S. Energy Information Administration (EIA).[6] Mean from 2006 through 2008 represents a period of historically high-carbon U.S. refining industry crude inputs.[7 8]

3.5.2 High-jet feed impacts on processing targeting jet fuel can increase refining CI

Feeds that enable intentional hydrocracking to boost jet fuel yield could increase HEFA refining CI significantly (Chart 1). Here we report feed switching CI increments compared with No-IHC processing of soy and canola oils to target diesel yield (*see* Table 5) as percentages of our petroleum crude refining benchmark: Switching to Selective IHC with anchovy and salmon oils increases CI by 47% to 56% (of crude refining CI) while switching to Selective IHC with menhaden oil increases CI by 38% to 44%. Switching to Isom-IHC with tallow increases CI by 24% to 30% while switching to Isom-IHC with palm oil increases HEFA refining CI by 21% to 28% of crude refining CI. Switching to Selective-IHC with tallow increases CI by 10% to 17%. Only Selective-IHC with palm oil has similar CI to that of No-IHC with soy oil (+3%). B-15 cont'd

3.5.3 High-jet feed CI impacts are mixed in processing targeting HEFA diesel yield

Compared with No-IHC processing of soy or canola oils, which are the combinations of processing and feeds that maximize HEFA diesel yield, No-IHC with fish oils could increase refining CI while No-IHC with palm oil or livestock fats could decrease CI. For example,

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switching to anchovy oil could increase No-IHC HEFA refining CI over that of canola and soy oils by 16% to 23% of crude refining CI while switching to tallow could decrease it by 16% to 23% of crude refining CI. But there is a caveat to those estimates.

In theory, feeding tallow to No-IHC processing could boost jet fuel yield to one-third of feedstock volume (Table 1) while lowering CI by 6.8 or 9.5 kg/b below canola or soy oil in No-IHC processing, the strategies refiners use to maximize HEFA diesel yield. However, this would require three barrels of tallow feed per barrel of jet fuel yield, emphasizing a crucial assumption about HEFA biofuel as a sustainable jet fuel solution—it assumes a sustainable feedstock supply. That assumption could prove dangerously wrong, as shown in Chapter 4.

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4. HEFA jet fuel feedstock and carbon sinks: Could the feedstocks that maximize HEFA jet fuel instead of diesel yield have comparatively high indirect climate impacts?

Increasing demand for limited supplies of feedstocks that refiners could use to boost HEFA jet fuel yield and make more HEFA jet fuel risks increasing deforestation and other serious indirect climate impacts. HEFA biofuel feedstocks are purpose-derived lipids also needed for food and other uses,[9 10] are globally traded, and can increase in price with increased biofuel demand for their limited supply.[2] Ecological degradation caused by expanded production and harvesting of the extra lipids for biofuels has, in documented cases, led to emissions from natural carbon sinks due to biofuels. Those emissions have traditionally been labeled as an "indirect land use impact," but as shown above, refiners seeking to maximize HEFA jet fuel production also could use fish oil feedstocks. The term "indirect carbon impacts," meant to encompass risks to both terrestrial and aquatic carbon sinks, is used in this chapter. B-16

4.1 Natural carbon sinks that HEFA jet fuel feedstock acquisition could affect

Feedstocks that increase HEFA jet fuel production could have indirect impacts on land-based carbon sinks, aquatic carbon sinks, or both. At the same time the impact mechanisms differ between terrestrial and aquatic ecosystems. Part 4.1.1 below discusses carbon sink risks due to land degradation, and part 4.1.2 discusses carbon sink risks due to fishery depletion.

4.1.1 Land degradation risks: Carbon sinks in healthy soils and forests B-17

Even before new Sustainable Aviation Fuel plans raised the potential for further expansion of HEFA feedstock acquisition, biofuel demand for land-based lipids production was shown to cause indirect carbon impacts. A mechanism for these impacts was shown to be global land use change linked to prices of commodities tapped for both food and fuel.[11] Instead of cutting carbon emissions, increased use of some biofuel feedstocks could boost crop prices, driving crop and pasture expansion into grasslands and forests, and thereby degrading natural carbon sinks to result in biofuel emissions which could exceed those of petroleum fuels.[11]

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Indirect carbon impacts of lipid feedstocks which further HEFA biofuel expansion could tap have been observed and documented in specific cases. International price dynamics involving palm oil, soybean oil, biofuels and food were linked as factors in the deforestation of Southeast Asia for palm oil plantations.[12] Soy oil prices were linked to deforestation of the Amazon and Pantanal in Brazil for soybean plantations.[13 14 15] Demand-driven changes in European and U.S. prices were shown to act across the oil crop and animal fat feedstocks for HEFA biofuels.[16] Rapeseed (canola) and soy biofuels demand drove palm oil expansion in the Global South as palm oil imports increased for other uses of those oils displaced by biofuels in the Global North.[17] Indirect land use impacts of some soy oil—and most notably, palm oil—biofuels were found to result in those biofuels emitting more carbon than petroleum fuels they are meant to replace.[17 18 19] Current U.S. policy discourages palm oil-derived biofuel for this reason.[20]

As of 2021, aerial measurements suggest that combined effects of deforestation and climate disruption have turned the southeast of the great Amazonian carbon sink into a carbon source.[21] Market data suggest that plans for further HEFA biofuels expansion have spurred an increase in soybean and tallow futures prices.[22 23 24] A joint report by two United Nations-sponsored bodies, the Intergovernmental Panel on Climate Change and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, warns that expansion of industrial biofuel feedstock plantations risks inter-linked biodiversity and climate impacts.[25]

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Moreover, these risks are mutually reinforcing. Potential pollinator declines,[26] climate heating-driven crop losses,[27] biofuel policy-driven food insecurity,[28] and the prospect that, once a biofuel also needed for food is locked into place, retroactive limits on land use conversion could worsen food insecurity,[11] reveal another aspect of this carbon sink risk. Namely, the assumption asserted by HEFA biofuel proponents, that we can "grow our way out" of limits on biomass diversion to biofuels by increasing crop yields and reverse course later if that does not work, risks lasting harm.

4.1.2 Fishery depletion risks: The biological carbon pump in world oceans

Increasing demand for fish products could further drive fisheries depletion, thereby risking substantial emissions from the oceanic carbon sink. This potential impact, like that on terrestrial carbon sinks, has received intensifying scientific attention in recent years, but appears to remain less widely known to the general public. Fished species have crucial roles in the mechanisms that send carbon into the oceanic carbon sink, as shown below.

Oceans account for 71% of the Earth surface[29] and remove roughly one-fourth to one-third of total carbon emissions from all human activities annually.[30 31] A portion of the CO_2 exchange between air and water at the sea surface is sequestered in the deep seas via inter-linked shallow, mid-reach, and benthic ecosystems that comprise a "biological pump" in which fished species play key roles. *See* Illustration 1.

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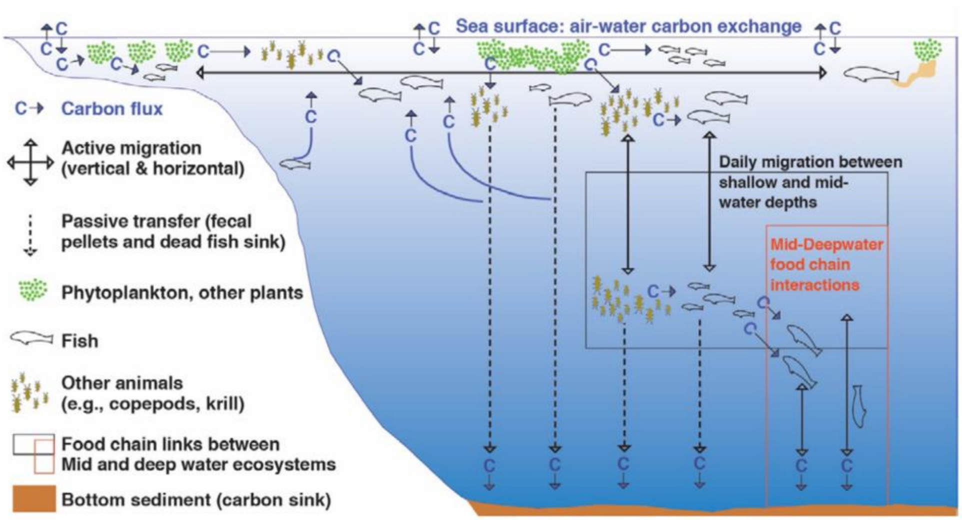

Illustration 1. Biological pump to the deep oceans carbon sink

Fish have key roles in the inter-linked shallow, mid-reach, and benthic ecosystems that drive a "biological pump" which sends carbon into the deep seas. In well-lit shallow waters, photosynthesis converts CO_2 into organic carbon that is taken up by plants, then by animals in aquatic food webs, and horizontal migration of faster-swimming species fertilizes phytoplankton blooms in the nutrient-poor open oceans, reinforcing the carbon uptake. Some of this carbon falls to the deep sea in fecal pellets and carcasses of fish and other animals (dashed lines shown), while respiration releases CO_2 from aquatic animals and from bacterial degradation of fecal matter (upward-curving lines), some of which re-enters the atmosphere at the sea surface. Active vertical migration (solid vertical lines) further drives the biological pump. A substantial portion of both fish and their invertebrate prey biomass feeds near the surface at night and in much deeper mid-reaches of the ocean during daylight—where deep-sea fish species migrate and feed as well (black and red boxes). Here in the mid-reaches, a greater portion of the carbon in fecal pellets and dead fish sinks to the bottom, and active migration feeding by deep sea fish transfers additional carbon to the deep sea. The organic carbon that reaches the deep sea can be sequestered in sediments for hundreds to thousands of years.

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In well-lit shallow waters, photosynthesis converts CO_2 into organic carbon that is taken up by plants and then by animals in ocean food webs. (Illustration, top.) Horizontal migration of faster-swimming species fertilizes phytoplankton blooms in the nutrient-poor open oceans, reinforcing the carbon uptake (*Id.*).[25 31] Some of this carbon sinks to the deep sea in fecal pellets and carcasses of fish and other animals (dashed lines shown)[25 32] but not all of it; some of the CO_2 released in respiration by aquatic animals and bacterial degradation of fecal matter re-enters the atmosphere at the sea surface (upward-curving lines).[30 32] That sea surface carbon exchange emphasizes the role of active vertical migration (solid vertical lines) in the biological pump.

For both fish and their invertebrate prey, a substantial portion of their ocean biomass feeds near the surface at night and in much deeper mid-reaches of the ocean during daylight[25]—where deep-sea fish species migrate and feed as well.[32] Here in the mid-reaches, a greater portion of the carbon in fecal pellets and dead fish sinks to the bottom, and active migration feeding by

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deep sea fish transfers additional carbon to the deep sea.[25 30 32] The organic carbon that reaches the deep sea can be sequestered in sediments for hundreds to thousands of years.[25 30 32]

Although impacts are not yet fully quantified,[25] at present—even at "maximum sustainable yield"—fishery depletion impacts the oceanic carbon sink by removing roughly half of the fisheries biomass that would otherwise be in world oceans.[25 31] This exports the carbon in fish from ocean sequestration to land, where that exported carbon then enters the atmosphere.[25 31] Fished species are targeted selectively, disrupting ecosystems involved in the biological pump and potentially reducing both the passive and the active transport of carbon to deep sea carbon sequestration.[25 32] Worse, as demands for limited fisheries catches have grown, bottom trawling, which directly disrupts and releases carbon from ocean sediments, may already have reduced the oceanic carbon sink by as much as 15–20%.[25] In this context fish oil demand, while only a small fraction of total fisheries catch, is still supplied more from whole fish than from fish byproducts, and is projected to grow by a few percentage points through 2030.[10] Thus, potential additional fish oil demand for biofuel poses an indirect carbon impact risk.

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4.2 Historic impact assessments for high jet fuel yield HEFA feedstocks

HEFA refiners could maximize jet fuel instead of diesel production using palm oil, fish oil, or livestock fats for feedstocks, as shown in Chapter 2 above. Historic demand for these specific feedstocks has resulted in relatively high indirect carbon impacts from one of them, and raises questions about future impacts from increased demand for the other two high jet fuel yield feeds.

4.2.1 Palm oil: High jet fuel yield, high impact and current use restriction

With 46.5% of its fatty acid feedstock volume comprised of carbon chains in the jet fuel range, palm oil ranks first among major HEFA feedstocks for the potential to increase HEFA jet fuel production. *See* Table 1. Palm oil also has perhaps the highest known potential among HEFA feedstocks for indirect land use impacts on natural carbon sinks (§ 4.1.1). Some palm oil-derived biofuels have reported fuel chain carbon intensities that exceed those of the petroleum fuels they are meant to replace (*Id.*). However, current U.S. policy restricts the use of palm oil-derived biofuels to generate carbon credits due in large part to this high indirect carbon impact.[20] Future biofuel demand could affect the efficacy of this use restriction.

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4.2.2 Fish oil: High jet fuel yield and low carbon impact assumed for residual supply

Fish oils rank second, fourth, sixth, seventh and ninth for jet fuel-range fractions at 42.3%, 32.7%, 32.6% and 27.5% of their feed volumes. *See* Table 1. Moreover, their relatively low diesel fractions (48.9–59.8%) and relatively high feed fractions with carbon chains longer than the ideal diesel range, which could be broken into twin jet fuel hydrocarbons (*Id.*), might favor jet fuel production by intentional hydrocracking strategies. Current biofuel use of fish oil is low, and is assumed to be residual biomass, and thus to have relatively low indirect carbon impact. However, that assumption is based on historic fish oil usage patterns at historic biofuel demand. If HEFA refiners seek to maximize jet fuel production by tapping fish oil in larger amounts, this

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has a potential to result in high indirect carbon sink risk by further depleting fisheries that contribute to the biological pump which sequesters carbon in the deep sea (§ 4.1.2).

4.2.3 Livestock fat: High jet fuel yield and low carbon impact assumed for residual supply

Tallow, poultry fat, and lard rank third, fifth, and eighth for jet fuel-range fractions at 33.3%, 32.7%, and 30% of their feed volumes, respectively. *See* Table 1. For these livestock fats, HEFA feedstock acquisition impact and supply estimates are linked by the assumption that only "waste" residues of livestock fat biomass will be used for biofuels.[33 34] This results in lower estimates for feedstock acquisition impacts by assuming that impacts from using farm and pastureland to feed the livestock are assigned to other uses of the livestock, such as food. At the same time, this assumption limits the supply for biofuels to only "waste" which, it is assumed, will not result in using more land for livestock feed in response to increased HEFA feedstock demand. These current assumptions—that increased demand will not cause land use impacts because it will not increase livestock production—limit current estimates of both supply and indirect carbon impact. Again, however, the current assumptions driving indirect carbon impact estimates are based on historic lipids usage patterns, which may change with increasing HEFA feedstock demand. B-18 cont'd

4.3 Feedstock acquisition risks to carbon sinks could be substantial at usage volumes approaching the current HEFA jet fuel blend limit

Impacts of these differences among feedstocks—and HEFA feedstock acquisition impacts overall—depend in large part upon future HEFA demand for limited current feedstock supplies. Moreover, indirect carbon impacts can include impacts associated with displacing other needs for these lipid sources, notably to feed humans directly and to feed livestock or aquaculture fish. This section compares potential HEFA SAF feedstock demand with limited current lipid supplies to assess potential indirect carbon impacts of specific and combined HEFA feedstocks. B-19

4.3.1 Potential future HEFA jet fuel feedstock demand in the U.S.

SAF implementation could drive dramatic HEFA feedstock demand growth. In 2019, the most recent year before COVID-19 disrupted air travel, U.S. SAF consumption was estimated at 57,000 barrels,[35] only 0.009% of the 636 million barrels/year (MM b/y) U.S. jet fuel demand.[36] Since SAF must be blended with petroleum jet fuel and can be a maximum of half the total jet fuel,[35] implementation of SAF goals could result in future jet biofuel production of as much as 318 MM b/y assuming no growth in jet fuel demand. This would represent SAF growth to approximately 5,580 *times* the 2019 SAF biomass demand. HEFA technology is on track to claim the major share of this prospective new biomass demand.

Since 2011, "renewable" diesel production used in California alone, a surrogate for U.S. HEFA biofuel use,[35] grew by a factor of 65 times to 2.79 MM b/y as of 2013, by 142 times to 6.09 MM b/y as of 2016, and 244 times to 10.5 MM b/y as of the end of 2019.[37] Planned new HEFA capacity targeting the California fuels market and planned for production by 2025 totals approximately 124 MM b/y,[38] another potential increase of more than tenfold from 2019–2025.

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Financial incentives for oil companies to protect their otherwise stranded refining assets are a major driver of HEFA growth—for example, in the two biggest biorefineries to be proposed or built worldwide to date.[2] More crude refining asset losses can thus spur more HEFA growth.[2]

Further idling of crude refining assets is indeed likely. Climate constraints drive the need to replace gasoline, with most credible expert assessments showing approximately 90% of gasoline to be replaced in mid-century climate stabilization scenarios.[39 40 41 42] More efficient electric vehicles with lower total ownership costs will force gasoline replacement as vehicle stock rolls over, and this independent driver could replace approximately 80% of U.S. gasoline vehicles by mid-century.[2] Designed and built to co-produce gasoline and maximize gasoline production, U.S. crude refineries cannot produce distillates alone and will be idled as gasoline is replaced.[2]

Refiners can—and would be highly incentivized to—protect those otherwise stranded assets by repurposing their crude refining equipment for HEFA biofuel production. Assuming the low end of the mid-century crude refining asset loss projections noted above, 80% of existing U.S. refinery hydrogen production capacity could be repurposed to supply approximately 2.66 million metric tons per year (MM t/y) of hydrogen for HEFA production at idled and repurposed crude refineries. *See* Table 6 below. B-19 cont'd

Depending on the mix of HEFA jet fuel processing strategies that the prospective new HEFA refining fleet might employ, this much repurposed hydro-conversion capacity could make enough HEFA jet fuel to replace 36% to 39% of total U.S. jet fuel demand, assuming no growth from 2019 demand. *Id.* Notably, if the existing[37] and planned[38] capacity through 2025 is built and tooled for the same jet fuel yields, this mid-century projection implies a threefold HEFA capacity growth rate from 2026–2050, slower than the tenfold growth planned from 2019–2025.

In order to "book-end" an uncertainty previewed in chapters 1 and 2 above, Table 6 shows two potential HEFA jet fuel growth scenarios. Scenario S-1 assumes a future U.S. HEFA refining fleet with 30% of refineries using the No-IHC strategy and 70% using the Isom-IHC strategy. This scenario assumes many refiners that repurpose for HEFA production lack existing equipment to repurpose for intentional hydrocracking separately and in addition to the hydro-deoxygenation and isomerization reactors needed for all HEFA processing, and refiners choose not to build new hydrocracking capacity into their asset repurposing projects. Scenario S-2 assumes the opposite: many refiners have that existing capacity or choose to build new capacity into their repurposing projects, resulting in a mix with 20% of refineries using the No-IHC strategy, 70% using the Selective-IHC strategy, and 10% using the Isom-IHC strategy.

Relying mainly on Selective-IHC, which cuts hydrogen demand compared with Isom-IHC, Scenario S-2 makes more jet fuel from the same amount of repurposed hydrogen capacity, but nevertheless, at 71–72 MM t/y, feedstock demand is very high in both scenarios (Table 6).

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Table 6. Potential HEFA jet fuel growth scenarios to mid-century in the U.S.

t: metric ton **MM t/y:** million metric tons/year

Total U.S. crude refining hydrogen plants capacity in 2021 (MM t/y) [a]					3.32
Assumption by 2050: 80% repurposed for HEFA biofuel (MM t/y)					2.66
Scenario S-1: No use of selective and intentional hydrocracking (Selective-IHC) [a]					
Process strategy		No-IHC	Selective-IHC	Isom-IHC	Total
Refineries breakdown	(% feed)	30 %	0 %	70 %	100 %
Hydrogen input [b]	(kg/t feed)	9.04	0.00	28.5	37.5
Feed input [b]	(MM t/y)	21.3	0.00	49.7	71.0
Jet fuel yield [c]	(MM t/y)	4.75	0.00	24.5	29.3
HEFA jet fuel production in the U.S. as a percentage of total 2019 U.S. jet fuel demand:					36 %
Scenario S-2: High use of selective and intentional hydrocracking (Selective-IHC) [a]					
Process strategy		No-IHC	Selective-IHC	Isom-IHC	Total
Refineries breakdown	(% feed)	20 %	70 %	10 %	100 %
Hydrogen input [b]	(kg/t feed)	6.02	26.6	4.06	36.7
Feed input [b]	(MM t/y)	14.5	50.7	7.25	72.4
Jet fuel yield [c]	(MM t/y)	3.23	25.0	3.58	31.8
HEFA jet fuel production in the U.S. as a percentage of total 2019 U.S. jet fuel demand:					39 %

Absent policy intervention, given renewable incentives and assuming severe feed supply limitations are overcome, U.S. HEFA jet fuel production could replace 36–39% of current U.S. petroleum jet fuel, and demand 71–72 million tons/year of lipids feedstock annually, by mid-century. Crude refiners could be highly incentivized to repurpose assets, which would be stranded by climate constraints and electric vehicles, for HEFA biofuels; less clear is the mix of processing strategies the repurposed HEFA refining fleet would use. Refiners could boost jet fuel yield by intentional hydrocracking of HEFA isomerization feeds (Isom-IHC), or do so while limiting hydrogen costs by intentional hydrocracking of selected feed fractions separately from the isomerization step needed for all fractions (Selective-IHC). However, some refineries lack existing equipment for one or both IHC options and may not choose to build onto repurposed equipment. Scenarios in this table span a conservatively wide range of fleet-wide processing strategies in order to "book-end" this uncertainty, resulting in the feed and fuel ranges shown above. The 80% petroleum capacity idling assumed by 2050[2] is generally consistent with highly credible techno-economic analyses, which, however, generally assume a different biofuel technology and feedstock source.[40–42] **a.** U.S. refinery hydrogen capacity from *Oil & Gas Journal*.[5] **b.** Hydrogen and feed inputs based on feed-weighted data from Table 3 and a feed blend SG of 0.914. **c.** Jet fuel yields based on yield-wtd. data from Table 1 at 0.775/0.914 jet/feed SG (No-IHC) and Pearlson et al. (IHC).[3] U.S. jet fuel demand in 2019 from USEIA (636.34 MM bbl),[36] or 81.34 MM t/y at the petroleum jet fuel density in the survey reported by Edwards (0.804 SG).[43] Diesel is the major HEFA jet fuel coproduct. Figures shown may not add due to rounding.

4.3.2 Limited HEFA jet fuel feedstock supplies in the U.S. and world

Current feedstock supplies limit the sustainability of HEFA jet fuel as a substantial component of U.S. jet fuel at rates well below the 50% SAF blend limit. Total current U.S. lipids production for all uses could supply only 29% of the feedstock needed for HEFA jet fuel to replace 36% to 39% of 2019 U.S. jet fuel use, as shown for scenarios S-1 and S-2 in Table 7 below. Other uses of these lipids crucially involve direct and indirect human needs for food, and in these scenarios, U.S. HEFA biofuel alone displaces one-third of all other existing lipids usage globally (Table 7).

Further, at even half the HEFA jet fuel production rates shown in Table 7, current global production of no one lipid source can supply the increased biofuel feedstock demand without displacing significant food system resources. This observation reveals the potential for impacts that cut across multiple prospective HEFA feedstock sources.

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Table 7. HEFA feedstock demand in potential U.S. petroleum jet fuel replacement scenarios compared with total current U.S. and world production for all uses of lipids.

MM t/y: million metric tons/year

U.S. Feedstock Demand Scenarios [a]	No 100% Replacement		36% Scenario S-1		39% Scenario S-2	
	NA: blend limit		71.0 MM t/y		72.4 MM t/y	
Current Feed-stock Supply	U.S. (MM t/y)	World (MM t/y)	Supply / Demand (%) U.S.	World	Supply / Demand (%) U.S.	World
Palm oil [b]	0.00	70.74	0%	99%	0%	98%
Fish oil [c]	0.13	1.00	0.18%	1.4%	0.18%	1.4%
Livestock fat [d]	4.95	14.16	7%	20%	7%	20%
Soybean oil [e]	10.69	55.62	15%	78%	15%	77%
Other oil crops [e]	5.00	73.07	7%	103%	7%	101%
Total Supply	20.77	214.59	29%	309%	29%	302%

Total current U.S. production for all uses of lipids also tapped for biofuel could supply only 29% of potential U.S. HEFA jet fuel feedstock demand in 2050. **a.** HEFA feedstock demand data from Table 6. **b.** Palm oil data from Oct 2016–Sep 2020.[44] **c.** Fish oil data from 2009–2019 (U.S.)[45] and unspecified recent years (world).[46] **d.** Livestock fat data from various dates (US)[9] and 2018 (world).[47] **e.** Soybean oil, palm oil, and other oil crops data from unspecified dates for used cooking oil (US),[9] Oct 2016–Sep 2020 for oil crops also used for biofuel (US),[48] and Oct 2016–Sep 2020 for oilseed crops (world).[44]

4.3.3 Feed-specific and total feed-blend indirect carbon impact potentials

As shown in Table 7 and discussed above, the scale of potential HEFA feedstock demand affects the answer to our question about whether feedstocks refiners could use to increase HEFA jet fuel yield could result in relatively more serious indirect carbon impacts.

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Palm oil: High volume displacement and international fueling impacts potential

With the highest global availability of any current HEFA feed (Table 7), palm oil is likely to fill in for current uses of other HEFA feeds that growing U.S. feedstock demand for HEFA jet fuel would displace from those uses. This could occur regardless of restrictions on palm oil biofuel, increasing the indirect carbon impacts associated with palm oil expansion. Deforestation in Southeast Asia caused by palm oil expansion has been linked to biofuel demand for soy and rapeseed (canola) oils in the U.S. and Europe at past, much lower, biofuel feedstock demand, as described in section 4.1.1. Its high global availability also increases the likelihood that, despite U.S. policy, palm oil derived HEFA jet fuel could burn in many commercial flights. Jets may fuel this palm biofuel in various nations—including fueling for the return legs of international flights originating in the U.S. Palm oil can thus be considered a high jet fuel yield and relatively high indirect carbon impact HEFA feedstock.

Fish oil: Unique risk at low HEFA feed blend volume

In contrast to palm oil, fish oil is an extremely low availability HEFA feedstock and is unique among HEFA feeds in raising risks to the oceanic carbon sink. Equally important, fish oil has hard-to-replace aquaculture and pharmaceutical uses.[10] At 1.4% of current world supply for HEFA jet fuel demand scenarios in Table 7, fish oil is unlikely to be targeted as a major

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HEFA feedstock industry wide. But this also means that existing uses of fish oil that are hard to replace could be fully displaced, driving further fisheries depletion, even if fish oil comprises as little as 1.4% of potential future HEFA feeds. Increased fishing pressure for fish oil is difficult to discount in demand scenarios approaching those shown (*Id.*), as significant upward pressure on lipids prices could impact lipids markets globally. Indeed, world fish oil demand for all uses is projected to grow and continue to be produced in substantial part from whole fish catch.[10] That fish biomass would essentially be extracted from the oceanic carbon sink to emit carbon from land-based uses, however, the larger and more uncertain impact could be on the effectiveness of ocean carbon sequestration via the biological pump (§ 4.1.2).

Available information thus identifies the potential for a future fish oil biofuel impact which may or may not materialize but nevertheless poses significant risk. Fish oil can be considered a high jet fuel yield and relatively high indirect carbon risk HEFA feedstock.

Livestock fat: likely displacement and possible supply growth impacts

While total current livestock fat production could supply only 20% of potential HEFA feedstock demand (Table 7), its relatively high jet fuel yield and relatively low (assumed) indirect carbon impacts could make livestock fat an important fraction of the expanding HEFA feeds mix. This would displace its existing uses, where the fats would likely be replaced by expanded demand for other lipids with relatively higher indirect carbon impacts. High-availability replacements such as palm and soy oils (*Id.*) would likely fill those displaced uses, and both palm and soy oils have relatively high indirect carbon impacts (§ 4.1.1). **B-19** cont'd

Additionally—and notwithstanding the likelihood that livestock protein production would remain the priority—it is possible that the unprecedented growth in livestock fat demand might alter the balance among choices for producing human protein intake in favor of this high jet fuel yield "byproduct" feedstock. This balance is dynamic, as suggested by trends either toward or away from vegetarian diets in various human populations globally, such that this possibility is difficult to discount given the potential for unprecedented livestock fat demand growth. And if HEFA demand were to drive livestock production growth, livestock production is, in fact, a high carbon emission enterprise.[31 49] In view of these likely and possible impacts, livestock fat can be considered a high jet fuel yield and relatively high indirect carbon risk HEFA feedstock.

Feed blends: limited residue supply worsens indirect carbon impacts

Impacts and risks of high jet fuel yield feedstock add to those of feed blends that could be used for HEFA jet fuel, and limited global "residue" feedstock supply heightens these impacts.

HEFA feedstock demand to replace just 18% of 2019 U.S. jet fuel use—half that shown in Table 7—would far exceed current total U.S. production for *all uses* of lipids also tapped for biofuels. One implication of this is the need to consider food and fuel uses of the global lipids supply by other nations. Importantly, at 4.28% of world population, the U.S. per capita share of world production for low impact "residue" feeds from livestock fat and fish oil (Table 7) is less

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than 0.65 MM t/y, less than 1% of potential U.S. HEFA jet fuel feedstock demand (*Id.*). The limited supply of low impact "residue" feedstocks, in turn, limits alternatives to palm oil or livestock production growth that can feed potential HEFA jet fuel growth. Current major feed alternatives for HEFA jet fuel are limited to soybean oil and other oil crops (*Id.*).

For example, what if U.S. palm biofuel is prohibited, livestock and fish oil production do not grow, and U.S. HEFA "residue" feedstock acquisition grows to eight times its per capita share (5.2 MM t/y)? At half of its minimum potential mid-century growth, HEFA feedstock demand for SAF in the U.S. would be approximately 35.5 MM t/y (Table 7). This 5.2 MM t/y of low-impact feed would meet only 15% of that demand and leave 30.3 MM t/y of that demand unmet. Supplying the 30.3 MM t/y of unmet demand for just half of potential U.S. HEFA jet fuel growth could induce growth of 23.5% in current combined global production for soy and other oil crops, excluding palm oil (*Id.*).

Moreover, the excess U.S. use of limited global residue supply in the example above could have an impact. It could displace the lower-impact HEFA jet fuel feed for SAF fueled in other nations, which could replace residue feeds with higher indirect carbon impact feeds. This would only shift emissions to HEFA jet fueling elsewhere, without providing a global climate benefit. **B-19** cont'd

Thus, even if U.S. policy effectively discourages palm oil biofuel and livestock production does not grow, the potential HEFA jet fuel expansion could be expected to spur an expansion of soybean, corn, and other plant oil crops. Significant indirect carbon impacts have been linked to biofuels demand for soybean and other plant oil feedstocks at past biofuel demand levels that were substantially lower than current and potential future HEFA demand (§ 4.1.1). While this complicates the answer to our question about indirect carbon impacts of feeds to boost HEFA jet fuel yield, importantly, it further informs our answer. It shows that these heightened impacts and risks would add to significant potential impacts of increased total HEFA feedstock demand.

In plausible future SAF implementation scenarios, among the relatively high jet fuel yield feedstocks, palm oil could have relatively serious indirect carbon impacts, and both fish oil and livestock fat could pose relatively serious but currently uncertain indirect carbon impact risks. Those impacts and risks would add to significant potential carbon sink impacts from the blends of feedstocks that could supply HEFA refineries, in which lower impact "residue" feedstocks could supply only a small fraction of total HEFA feedstock growth. Natural limits on total supply for the type of feedstock that HEFA technology can process appear to make replacing any significant portion of current petroleum jet fuel use with this type of biofuel unsustainable.

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5. Limitations and suggestions for future work

Two types of data limitations which may affect potential outcomes for SAF were identified in the course of this research. The first involves HEFA technology: interchangeability among other uses of its feedstocks; and its potential future evolution. These HEFA-specific limitations are discussed in Section 5.1 below. The second involves other alternatives to petroleum jet fuel combustion which, though they are outside the scope of this report, warrant mention due to limitations of HEFA technology identified by this research. These are discussed briefly as suggested priorities for future work in Section 5.2.

B-20

5.1 HEFA biofuel impact assessment data limitations

5.1.1 Limited cross-feed displacement quantification data

HEFA feedstocks are not "wastes." All of them are lipids, and more specifically, triacylglycerols of fatty acids, which can be converted to functionally similar biological or chemical uses by many biological processes (e.g., digesting food) and chemical processes (e.g., HEFA processing with hydrocracking). Further, these lipids have interchangeable and largely competing uses now, including food for human populations, livestock feeds, pet food, aquaculture feeds, and feedstocks for making soap, wax, lubricants, plastics, natural pigments, cosmetic products and pharmaceutical products.[9 10] Accordingly, increased biofuel demand for one source of these lipids displaces another existing use of that feedstock, thereby increasing demand and prices for other sources of lipids as well. Indeed, this has occurred, leading to indirect land use impacts that increased carbon emissions associated with biofuels (§ 4.1.1).

For example, if diverting tallow from soap making to HEFA jet fuel forces soap makers to use more palm oil, that jet fuel indirectly emits carbon associated with that extra production of palm oil. The livestock fat biofuel would cause an indirect carbon impact that current biofuel impact accounting practices for "waste" residue feedstocks assume it does not cause.

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However, the hypothetical extreme wherein all lipids are 100% fungible, and any increase in HEFA demand for any of these feedstocks would have the same indirect impact by increasing collective demand for all other feeds by the same amount, also seems unrealistic. Some types of lipids, such as those that increase jet fuel production and those people eat directly, could attract relatively higher demand and command relatively higher prices. At present, *how much* demand increase for each lipid source increases indirect carbon impacts associated with cross-feed demand increase has not yet been quantified by universally accepted estimates.

Herein, we take the view that the uses of lipids also tapped for HEFA biofuels are fungible to a significant extent which varies among specific lipids sources and uses. In this view, indirect carbon impacts of future demand for palm oil exceed those of other HEFA feeds which would not be favored by refiners seeking to boost jet fuel production, but by amounts that are not yet fully quantifiable. That quantitative uncertainty results from the data limitations discussed above and explains why this report does not attempt to quantify the feed-specific indirect carbon impacts documented in Chapter 4.

5.1.2 Renewable fuel hydrogen specification error

Splitting water with electricity supplied by solar or wind power—renewable powered electrolysis—produces zero-emission hydrogen fuel. Unfortunately, renewable fuel standards incentivize HEFA fuels even though much of the hydrogen in those hydrocarbons is produced from non-renewable fossil fuels. This is a mistake. This mistake has led to an important limitation in the data for assessing the future potential of HEFA jet fuel. B-20 cont'd

Hydrogen steam reforming repurposed from crude refining drives the high CI of HEFA refining and its variability among HEFA feedstocks and processing strategies (Chapter 3). Renewable-powered electrolysis could eliminate those steam reforming emissions and result in HEFA refining CI lower than that of petroleum refining.[2] However, the combination of public incentives to refiners for HEFA biofuel, and their private incentives to avoid costs of stranded steam reforming assets they could repurpose and electrolysis they need not build to reap those public incentives, has resulted in universal reliance on steam reforming in HEFA processing. Would the public incentives outweigh the private incentives and cut refining CI if this mistake were corrected, or would the companies decide that another alternative to HEFA jet fuel is more profitable? Since current fuel standards allow them to maximize profits by avoiding the question, there are no observational data to support either potential outcome.

Additionally, if refiners were to replace their steam reformers with renewable-powered electrolysis, energy transition priorities could make that zero-emission hydrogen more valuable for other uses than for biofuel,[2] and biomass feed costs also would weigh on their decisions.[19] Thus, for purposes of the potential impacts assessment herein, and in the absence of observational data on this question, we take the view that assuming HEFA refining without steam reforming emissions would be speculative, and would risk significant underestimation of potential HEFA jet fuel impacts.

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5.1.3 Proprietary catalyst development data

Catalysts are crucial in HEFA refining, and although many catalyst data are claimed as trade secrets, their refining benefits are typically advertised, especially if new catalysts improve yields. The search for a new catalyst that can withstand the severe conditions in HEFA reactors and improve processing and yields has been intensive since at least 2013.[50 51 52 53 54 55 56]

From this we can infer two things. First, given the maturity of the hydro-conversion technology crude refiners repurpose for HEFA refining, and that long and intensive search, a newly invented catalyst formulation which improves reported HEFA jet fuel yield significantly appears unlikely. Second, given the incentive, the invention of such a new catalyst is possible. Again, however, many specific catalyst data are not reported publicly. Our findings herein are based on publicly reported, independently verifiable data. This limitation in publicly reported catalysis data thus has the potential to affect our yields analysis.

5.2 Priorities for future work

5.2.1 Cellulose biomass alternatives—what is holding them back?

Cellulosic residue biomass such as cornstalks, currently composted yard cuttings, or sawdust can be used as feedstock by alternative technologies which qualify as SAF.[19 35] Using this type of feedstock for SAF could lessen or avoid the indirect carbon impacts from excessive HEFA jet fuel demand for limited lipids biomass that are described in Chapter 4. Indeed, economy-wide analyses of the technologies and measures to be deployed over time for climate stabilization suggest prioritizing cellulosic biomass, to the extent that biofuels will be needed in some hard-to-decarbonize sectors.[42 57 58] Despite its promise, however, the deployment of cellulosic distillate biofuel has stalled compared with HEFA biofuel. Less clear are the key barriers to its growth, the measures needed to overcome those barriers, and whether or not those measures and the growth of cellulosic jet fuel resulting from them could ensure that SAF goals will be met sustainably. This points to a priority for future work.

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5.2.2 Alternatives to burning jet fuel—need and potential to limit climate risks

Even complete replacement of petroleum jet fuel with SAF biofuel combustion would result in ongoing aviation emissions, and would thus rely on additional and separate carbon capture-sequestration to give us a reasonable chance of stabilizing our climate. At the current jet fuel combustion rate the scale of that reliance on "negative emission" technologies, which remain unproven at that scale, is a risky bet. Meanwhile, besides alternative aircraft propulsion systems, which are still in the development stage, there are alternatives to jet fuel combustion which are technically feasible now and can be used individually or in combination.

Technically feasible alternatives to burning jet fuel include electrified high-speed rail, fuel cell powered freight and shipping to replace air cargo, and conservation measures such as virtual business meetings and conserving personal air-miles-traveled for personal visits. While we should note that such travel pattern changes raise social issues, so does climate disruption, and

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most people who will share our future climate are not frequent fliers. Importantly as well, public acceptance of new travel alternatives is linked to experiencing them. Thus, biofuel limitations, climate risks, and human factors suggest needs to prioritize the development and deployment of alternatives to petroleum jet fuel that do not burn carbon.

5.2.3 Limited safety data record for flying with new fuels

Jet biofuels appear to differ from petroleum jet fuels in their cold flow properties at high altitude, combustion properties, and potential to damage fuel system elastomer material.[19] Those that can be used as SAF have been approved subject to blending limits, which permit SAF to be "dropped-in" to conventional jet fuel up to a maximum of 50% of the blend.[59] All seven types of biofuels approved for SAF are subject to this condition.[59] SAF/petroleum jet fuel blends that do not meet this condition are deemed to present potential safety issues.[59]

B-20 cont'd

However, remarkably limited historical use of SAF (§4.3.1) has resulted in a limited data record for assessing its safety in actual operation. That is important because new hazards which result in dangerous conditions over long periods of operation have repeatedly been discovered only by rigorous post-operational inspection or post-incident investigation, the histories of both industrial and aviation safety oversight show. There is an ongoing need to ensure flight safety risks of biofuels are closely monitored, rigorously investigated, transparently communicated, and proactively addressed by "inherent safety measures"[60] designed to eliminate any specific hazards identified by that future work.

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Table 8. Data and methods table for feed-specific estimates.[a]

Fatty acid (FA) in HEFA oil feed common name	Shorthand	Formula[b]	Density (kg/b)*	Oxygen content (wt. %)*	Carbon double bonds	FA-specific hydrogen inputs Deoxygenation[c] (kg H_2/b)	Saturation[d, e] (kg H_2/b)
Caprylic Acid	C8:0	$C_8H_{16}O_2$	145	22.2	0	8.09	0.00
Capric Acid	C10:0	$C_{10}H_{20}O_2$	142	18.6	0	6.65	0.00
Lauric Acid	C12:0	$C_{12}H_{24}O_2$	140	16.0	0	5.63	0.00
Myristic Acid	C14:0	$C_{14}H_{28}O_2$	137	14.0	0	4.84	0.00
Myristoleic Acid	C14:1	$C_{14}H_{26}O_2$	143	14.1	1	5.10	1.27
Pentadecanoic Acid	C15:0	$C_{15}H_{30}O_2$	134	13.2	0	4.45	0.00
Palmitic Acid	C16:0	$C_{16}H_{32}O_2$	135	12.5	0	4.26	0.00
Palmitoleic Acid	C16:1	$C_{16}H_{30}O_2$	142	12.6	1	4.50	1.13
Margaric Acid	C17:0	$C_{17}H_{34}O_2$	136	11.8	0	4.04	0.00
Stearic Acid	C18:0	$C_{18}H_{36}O_2$	134	11.2	0	3.79	0.00
Oleic Acid	C18:1	$C_{18}H_{34}O_2$	141	11.3	1	4.04	1.01
Linoleic Acid	C18:2	$C_{18}H_{32}O_2$	143	11.4	2	4.12	2.06
Linolenic Acid	C18:3	$C_{18}H_{30}O_2$	145	11.5	3	4.21	3.16
Stearidonic Acid	C18:4	$C_{18}H_{28}O_2$	148	11.6	4	4.33	4.33
Arachidic Acid	C20:0	$C_{20}H_{40}O_2$	131	10.2	0	3.38	0.00
Gondoic Acid	C20:1	$C_{20}H_{38}O_2$	140	10.3	1	3.65	0.91
Eicosadienoic Acid	C20:2	$C_{20}H_{36}O_2$	144	10.4	2	3.76	1.88
Homo-γ-linoleic Acid	C20:3	$C_{20}H_{34}O_2$	146	10.4	3	3.84	2.88
Arachidonic Acid	C20:4	$C_{20}H_{32}O_2$	147	10.5	4	3.88	3.88
Eicosapentaenoic Acid	C20:5	$C_{20}H_{30}O_2$	150	10.6	5	4.00	5.00
Henicosanoic Acid	C21:0	$C_{21}H_{42}O_2$	142	9.80	0	3.50	0.00
Heneicosapentaenoic Acid	C21:5	$C_{21}H_{32}O_2$	149	10.1	5	3.79	4.74
Behenic Acid	C22:0	$C_{22}H_{44}O_2$	131	9.39	0	3.09	0.00
Erucic Acid	C22:1	$C_{22}H_{42}O_2$	137	9.45	1	3.26	0.81
Docosadienoic Acid	C22:2	$C_{22}H_{40}O_2$	143	9.51	2	3.43	1.71
Docosatetraenoic Acid	C22:4	$C_{22}H_{36}O_2$	151	9.62	4	3.66	3.66
Docosapentaenoic Acid	C22:5	$C_{22}H_{34}O_2$	148	9.68	5	3.62	4.52
Docosahexaenoic Acid	C22:6	$C_{22}H_{32}O_2$	150	9.74	6	3.68	5.52
Lignoceric Acid	C24:0	$C_{24}H_{48}O_2$	140	8.68	0	3.06	0.00
Tetracosenoic Acid	C24:1	$C_{24}H_{46}O_2$	141	8.73	1	3.11	0.78

* **b (barrel):** 42 U.S. gallons; **wt. %:** weight percent on fatty acid

a. See notes to this table for feedstock-specific data sources.

b. Formula symbols; carbon: C (12.011 g/mol); hydrogen: H (1.00794 g/mol); oxygen: O (15.995 g/mol).

c. Deoxygenation: Hydrogen consumed to remove and replace oxygen and propane knuckle-fatty acid bonds.

b. Saturation: Hydrogen consumed to saturate carbon double bonds in HEFA processing.

e. Additional process hydrogen consumption in side-reaction cracking, solubilization, scrubbing **and** purge losses not shown.

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Table 8. Data and methods table for feed-specific estimates continued.[a]

Whole feed fatty acids		Selected plant oils, livestock fats and fish oils						
Fatty acid	FA	Median of sample analysis profile data reported based on C18:2, in wt. % [a]						
Common name	Shorthand	Soybean	Corn	Canola	Cottonseed	Palm	Tallow	Lard
Caprylic	C8:0					0.186		
Capric	C10:0					0.324		0.070
Lauric	C12:0					2.284	1.010	
Myristic	C14:0	0.100		0.040	0.860	1.108	3.384	1.280
Myristoleic	C14:1							
Pentadecanoic	C15:0							
Palmitic	C16:0	11.000	12.860	4.248	23.600	41.480	24.495	25.000
Palmitoleic	C16:1	0.100	0.100	0.287	0.360	0.167	4.040	3.000
Margaric	C17:0			0.069		0.059	2.020	0.330
Stearic	C18:0	4.000	1.760	1.752	2.400	4.186	17.525	12.540
Oleic	C18:1	23.400	26.950	60.752	17.740	39.706	42.121	44.000
Linoleic	C18:2	53.200	55.880	20.713	54.420	9.902	3.293	11.000
Linolenic	C18:3	7.800	1.260	8.980	0.600	0.196	1.818	0.550
Stearidonic	C18:4							
Arachidic	C20:0	0.300	0.390	0.713	0.220	0.304	0.313	0.190
Gondoic	C20:1		0.280	1.277	0.070	0.078	0.081	0.800
Eicosadienoic	C20:2							0.740
Homo-γ-linoleic	C20:3							0.110
Arachidonic	C20:4							0.300
Eicosapentaenoic	C20:5							
Henicosanoic	C21:0							
Heneicosapentaenoic	C21:5							
Behenic	C22:0	0.100	0.120	0.307	0.110	0.039		
Erucic	C22:1			0.594				
Docosadienoic	C22:2							
Docosatetraenoic	C22:4		0.120					
Docosapentaenoic	C22:5		0.180					
Docosahexaenoic	C22:6							
Lignoceric	C24:0			0.099		0.049		
Tetracosenoic	C24:1							
Whole feed FAs	O_2 wt. %	11.50	11.50	11.35	11.71	11.99	11.80	11.66
	Deoxygenation (kg H_2 /b)	4.11	4.11	4.06	4.14	4.19	4.11	4.13
	Saturation (kg H_2 /b)	1.58	1.48	1.35	1.32	0.61	0.60	0.76
C8–C16 Fraction	(vol. %)	11.71	13.56	4.78	25.67	46.47	33.34	30.00
	Deoxygenation (kg H_2 /b)	4.27	4.26	4.28	4.28	4.38	4.39	4.32
	Saturation (kg H_2 /b)	0.01	0.01	0.07	0.02	0.004	0.14	0.12
C15–C18 Fraction	(vol. %)	99.46	98.88	96.85	98.70	95.63	95.18	96.53
	Deoxygenation (kg H_2 /b)	4.11	4.11	4.08	4.13	4.13	4.08	4.09
	Saturation (kg H_2 /b)	1.59	1.48	1.37	1.34	0.64	0.63	0.75
> C18 Fraction	(vol. %)	0.43	1.12	3.11	0.42	0.49	0.41	2.10
	Deoxygenation (kg H_2 /b)	3.31	3.49	3.43	3.35	3.37	3.43	3.70
	Saturation (kg H_2 /b)	0.00	1.38	0.55	0.16	0.15	0.19	1.68

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Table 8. Data and methods table for feed-specific estimates continued.[a]

Whole feed fatty acids		Selected plant oils, livestock fats and fish oils, *continued*					
Fatty acid	FA	Median of sample analysis profile data reported based on C18:2, wt. % [a]					
Common name	Shorthand	Poultry	Anchovy	Herring	Menhaden	Salmon	Tuna
Caprylic	C8:0						
Capric	C10:0						
Lauric	C12:0						
Myristic	C14:0	0.618	6.636	7.755	8.602	6.044	5.903
Myristoleic	C14:1	0.206					0.447
Pentadecanoic	C15:0		0.701	0.408	0.538	0.769	0.359
Palmitic	C16:0	24.206	16.355	15.306	21.505	17.143	17.670
Palmitoleic	C16:1	6.951	7.757	8.469	10.108	2.198	5.961
Margaric	C17:0	0.108	0.935	0.510	1.075	1.099	0.650
Stearic	C18:0	5.814	3.738	2.143	3.333	2.637	4.155
Oleic	C18:1	42.157	12.150	17.245	15.000	15.385	16.078
Linoleic	C18:2	18.137	1.636	1.633	2.151	1.648	1.068
Linolenic	C18:3	0.657	5.607	0.612	1.398	4.451	1.748
Stearidonic	C18:4		2.336	2.551	3.333	3.077	
Arachidic	C20:0		0.841		0.323	0.385	0.408
Gondoic	C20:1	0.392	3.738	11.224	1.075	1.978	4.922
Eicosadienoic	C20:2						0.272
Homo-γ-linoleic	C20:3						3.437
Arachidonic	C20:4		2.103	0.408	1.720	2.967	0.184
Eicosapentaenoic	C20:5		14.486	8.776	13.441	12.637	9.282
Henicosanoic	C21:0						
Heneicosapentaenoic	C21:5		1.869		0.806	2.582	
Behenic	C22:0	0.118					0.078
Erucic	C22:1	0.098	3.224	15.102	0.645	6.099	0.311
Docosadienoic	C22:2						
Docosatetraenoic	C22:4						
Docosapentaenoic	C22:5		1.869	1.327	2.258	3.077	5.252
Docosahexaenoic	C22:6		14.252	6.327	12.366	15.385	20.670
Lignoceric	C24:0	0.098					0.845
Tetracosenoic	C24:1	0.363					0.583
Whole feed FAs	O_2 wt. %	11.70	11.33	11.22	11.53	11.11	11.20
	Deoxygenation (kg H_2 /b)	4.13	4.06	3.99	4.13	4.01	4.01
	Saturation (kg H_2 /b)	0.91	2.34	1.52	2.08	2.42	2.31
C8–C16 Fraction	(vol. %)	32.69	32.56	32.73	42.26	27.48	31.46
	Deoxygenation (kg H_2 /b)	4.33	4.45	4.47	4.45	4.42	4.44
	Saturation (kg H_2 /b)	0.25	0.28	0.30	0.28	0.09	0.24
C15–C18 Fraction	(vol. %)	98.09	52.19	49.34	59.81	49.73	48.92
	Deoxygenation (kg H_2 /b)	4.13	4.20	4.20	4.21	4.17	4.17
	Saturation (kg H_2 /b)	0.92	1.02	0.89	0.85	1.01	0.64
> C18 Fraction	(vol. %)	1.07	40.93	42.68	31.25	43.96	44.52
	Deoxygenation (kg H_2 /b)	3.31	3.76	3.59	3.81	3.72	3.72
	Saturation (kg H_2 /b)	0.67	4.31	2.52	4.83	4.27	4.34

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Table 8. Data and methods table for feed-specific estimates continued.[a]

Whole feed fatty acids		Used cooking oil (UCO) variability			
Fatty acid	FA	Percentiles on C18:2, in wt. % *			
Common name	Shorthand	10th Percentile	25th Percentile	75th Percentile	90th Percentile
Caprylic	C8:0				
Capric	C10:0				
Lauric	C12:0				
Myristic	C14:0	0.909	2.479	1.735	
Myristoleic	C14:1				
Pentadecanoic	C15:0				
Palmitic	C16:0	20.606	20.248	16.412	12.420
Palmitoleic	C16:1	4.646		1.735	
Margaric	C17:0				
Stearic	C18:0	4.848	12.810	5.235	5.760
Oleic	C18:1	53.434	38.017	29.843	26.930
Linoleic	C18:2	13.636	23.967	41.324	49.600
Linolenic	C18:3	0.808	2.066	3.500	4.930
Stearidonic	C18:4				
Arachidic	C20:0	0.121			0.750
Gondoic	C20:1	0.848			
Eicosadienoic	C20:2				
Homo-γ-linoleic	C20:3				
Arachidonic	C20:4				
Eicosapentaenoic	C20:5				
Henicosanoic	C21:0				
Heneicosapentaenoic	C21:5				
Behenic	C22:0	0.030			
Erucic	C22:1	0.071			
Docosadienoic	C22:2				
Docosatetraenoic	C22:4				
Docosapentaenoic	C22:5				
Docosahexaenoic	C22:6				
Lignoceric	C24:0	0.040			
Tetracosenoic	C24:1				
Whole feed FAs	O_2 wt. %	11.64	11.59	11.59	11.55
	Deoxygenation (kg H_2 /b)	4.11	4.09	4.12	4.10
	Saturation (kg H_2 /b)	0.91	0.95	1.29	1.44
C8–C16 Fraction	(vol. %)	26.81	23.49	20.61	12.90
	Deoxygenation (kg H_2 /b)	4.32	4.32	4.33	4.26
	Saturation (kg H_2 /b)	0.20	0.00	0.10	0.09
C15–C18 Fraction	(vol. %)	97.95	97.46	98.21	99.19
	Deoxygenation (kg H_2 /b)	4.11	4.08	4.11	4.10
	Saturation (kg H_2 /b)	0.92	0.97	1.31	1.46
> C18 Fraction	(vol. %)	1.12	0.00	0.00	0.81
	Deoxygenation (kg H_2 /b)	3.56	0.00	0.00	3.38
	Saturation (kg H_2 /b)	0.75	0.00	0.00	0.00

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Table 8. Data and methods table for feed-specific estimates continued.[a]

Data for feedstock fractions outside the jet fuel range (> C16)

Feedstock		Soybean	Corn	Canola	Cottonseed	Palm	Tallow	Lard
> C16 Fraction	(vol. %)	88.29	86.44	95.22	74.33	53.53	66.66	70.00
Deoxygenation	(kg H_2 /b)	4.09	4.08	4.05	4.09	4.03	3.98	4.00
Saturation	(kg H_2 /b)	1.78	1.70	1.41	1.75	1.12	0.82	1.03

Feedstock		Poultry	Anchovy	Herring	Menhaden	Salmon	Tuna
> C16 Fraction	(vol. %)	67.31	67.44	67.27	57.74	72.52	68.54
Deoxygenation	(kg H_2 /b)	4.03	3.88	3.76	3.92	3.86	3.82
Saturation	(kg H_2 /b)	1.22	3.29	2.10	3.33	3.25	3.21

Feedstock		Used Cooking Oil (UCO			
Percentile on C18:2 in wt.%		10th	25th	75th	90th
> C16 Fraction	(vol. %)	73.19	76.51	79.39	87.10
Deoxygenation	(kg H_2 /b)	4.03	4.03	4.07	4.07
Saturation	(kg H_2 /b)	1.16	1.23	1.58	1.65

Continued next page

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Table 8. Data and methods table for feed-specific estimates continued.[a]

Process hydrogen consumption by feedstock and processing strategy (kg/b feed)

HDO Δ ONLY	Jet range (C8–C16)			Diesel range (C15–C18)			Longer chains (> C18)		
(No-IHC)	(vol.%)	Ox (kg/b)	Sat (kg/b)	(vol.%)	Ox (kg/b)	Sat (kg/b)	(vol.%)	Ox (kg/b)	Sat (kg/b)
High jet/high diesel									
Palm oil	46.47	4.38	0.004	95.63	4.13	0.64	0.49	3.37	0.15
Tallow fat	33.34	4.39	0.14	95.18	4.08	0.63	0.41	3.43	0.19
Poultry fat	32.69	4.33	0.25	98.09	4.13	0.92	1.07	3.31	0.67
Lard fat	30.00	4.32	0.12	96.53	4.09	0.75	2.10	3.70	1.68
UCO 10th P.	26.81	4.32	0.20	97.95	4.11	0.92	1.12	3.56	0.75
Cottonseed oil	25.67	4.28	0.02	98.70	4.13	1.34	0.42	3.35	0.16
High jet/low diesel									
Menhaden oil	42.26	4.45	0.28	59.81	4.21	0.85	31.25	3.81	4.83
Herring oil	32.73	4.47	0.30	49.34	4.20	0.89	42.68	3.59	2.52
Anchovy oil	32.56	4.45	0.28	52.19	4.20	1.02	40.93	3.76	4.31
Tuna oil	31.46	4.44	0.24	48.92	4.17	0.64	44.52	3.72	4.34
Salmon oil	27.48	4.42	0.09	49.73	4.17	1.01	43.96	3.72	4.27
Low jet/high diesel									
Corn (DCO) oil	13.56	4.26	0.01	98.88	4.11	1.48	1.12	3.49	1.38
UCO 90th P.	12.90	4.26	0.09	99.19	4.10	1.46	0.81	3.38	0.00
Soybean oil	11.71	4.27	0.01	99.46	4.11	1.59	0.43	3.31	0.00
Canola oil	4.78	4.28	0.07	96.85	4.08	1.37	3.11	3.43	0.55

HDO & INTENTIONAL	HDO Δ (Ox + Sat)			Intentional Hydrocracking (IHC)			Jet target H2 Δ by processing case		
HYDROCRACKING	Jet rg.	Diesel rg.	> C18	Selective-IHC		Isom IHC	No-IHC	Select-IHC	Isom-IHC
vol. weighted data	(kg/b)	(kg/b)	(kg/b)	(b fraction)	(kg/b)	(kg/b)	(kg/b)	(kg/b)	(kg/b)
High jet/high diesel	—fractions do not add—			> C16	(factor)*	(factor)*	whole feed	whole feed	whole feed
Palm oil	2.04	4.57	0.02	0.535	1.87	1.80	4.79	5.79	6.60
Tallow fat	1.51	4.47	0.01	0.667	2.10	1.99	4.71	6.11	6.70
Poultry fat	1.50	4.95	0.04	0.673	1.85	1.82	5.03	6.28	6.85
Lard fat	1.33	4.67	0.11	0.700	1.84	1.81	4.85	6.13	6.65
UCO 10th P.	1.21	4.92	0.05	0.732	1.85	1.82	5.01	6.37	6.83
Cottonseed oil	1.10	5.40	0.01	0.743	1.88	1.84	5.44	6.84	7.28
High jet/low diesel									
Menhaden oil	2.00	3.03	2.70	0.577	1.93	1.84	6.18	7.30	8.02
Herring oil	1.56	2.51	2.61	0.673	1.87	1.83	5.50	6.76	7.33
Anchovy oil	1.54	2.72	3.30	0.674	1.93	1.86	6.37	7.67	8.23
Tuna oil	1.47	2.35	3.59	0.685	1.94	1.87	6.29	7.62	8.16
Salmon oil	1.24	2.57	3.51	0.725	1.91	1.85	6.40	7.78	8.25
Low jet/high diesel									
Corn (DCO) oil	0.58	5.53	0.05	0.864	1.86	1.84	5.58	7.19	7.42
UCO 90th P.	0.56	5.51	0.03	0.871	1.87	1.84	5.55	7.17	7.39
Soybean oil	0.50	5.67	0.01	0.883	1.86	1.84	5.68	7.33	7.52
Canola oil	0.21	5.28	0.12	0.952	1.85	1.84	5.40	7.16	7.24

Note: H_2 inputs shown exclude side-reaction cracking, solubilization, scrubbing and purge gas losses.

* IHC H_2 consumption at 1.3 wt. % feed (Pearlson et al.), in kg/b IHC input.

See table notes next page

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Explanatory notes and data sources for Table 8.

Feeds shown have been processed in the U.S. except for palm oil, which is included because it is affected indirectly by U.S. feedstock demand and could be processed in the future, possibly in the U.S. and more likely for fueling international flights in various nations. Median values shown for feed composition were based on the median of the data cluster centered by the median value for C18:2 (linoleic acid) for each individual whole feed. Blend data were not available for used cooking oil (UCO), except in the form of variability among UCO samples collected, which showed UCO to be uniquely variable in terms of HEFA processing characteristics. The table reports UCO data as percentiles of the UCO sample distribution.

Data for feedstock composition were taken from the following sources:

Soybean oil[54 55 61 62 63 64 65 66]

Corn oil (distillers corn oil)[54 61 63 65 67 68 69 70]

Canola oil (includes rapeseed oil)[54 55 61–65 67 69 71 72 73]

Cottonseed oil[54 55 63 65 67]

Palm oil[54 55 62–65 67 68 74]

Tallow (predominantly beef fat)[54 64 69 71 75 76 77 78 79]

Lard (pork fat)[68 76 79]

Poultry fat[54 69 76 79 80]

Anchovy[81]

Herring[82 83]

Menhaden[54 81 82]

Salmon[81 83]

Tuna[81 84 85]

Used cooking oil (UCO)[74 78 86 87 88 89 90 91 92]

Hydrogen consumption to deoxygenate and saturate feeds was calculated from fatty acids composition data for each feed and feed fraction shown. Note that O_2 wt.% data shown are for fatty acids excluding the triacylglycerol propane knuckle; O_2 molar data rather than wt.% data were used to calculate hydrogen demand. Added hydrogen consumption by intentional hydrocracking was calculated at 1.3 wt.% on feed from Pearlson et al.[3] and the inputs to each intentional hydrocracking strategy type (Chapter 1), which were taken from the data in Table 8 and used as shown at the end of Table 8 above. Selective-IHC input volume differs among feeds, as described in chapters 1–3.

Hydrogen losses to side-reaction cracking, solubilization in process fluids, and scrubbing and purging of process gases (not shown in Table 8) result in additional hydrogen production, and thus steam reforming emissions. This was addressed for the steam reforming emissions illustrated in Chart 1 by adding 2.5 kg CO_2/b feed to the emissions shown in Table 5, based on steam reforming emissions of 9.82 g CO_2/g H_2 (Chapter 3) and assumed additional hydrogen production of 0.26 kg H_2/b feed. This is a conservative assumption for hydrogen which reflects a lower bound estimate for those losses. Hydrogen losses through side-reaction cracking, solubilization, scrubbing and purging combined would likely range from 102 SCFB (0.26 kg/b) to more than 196 SCFB (0.5 kg/b),[2] based on analysis of data from a range of published HEFA processing and petroleum processing hydro-conversion process analyses and professional judgment.[2 4 50–56 93 94 95 96]

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UNSUSTAINABLE AVIATION FUEL

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APPENDIX C

Karras, G., *Technical Report in Support of Comments* (Karras, 2021c)

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Technical Report by Greg Karras
G. Karras Consulting (Community Energy reSource)[1]
16 December 2021

Regarding the
Phillips 66 Company Rodeo Renewed Project
Draft Environmental Impact Report,
County File No. CDLP20-0240,
State Clearinghouse No. 2020120330

Lead Agency
Contra Costa County

Contents

Scope of Review

In October 2021 Contra Costa County ("the County") made available for public review a Draft Environmental Impact Report ("DEIR") for the Phillips 66 Rodeo Renewed Project ("project"). The project would, among other things, repurpose selected petroleum refinery process units and equipment in the Rodeo Facility of the Phillips 66 San Francisco Refinery for processing lipidic (oily) biomass to produce biofuels. Prior to DEIR preparation, people in communities adjacent to the project, environmental groups, community groups, environmental justice groups and others raised numerous questions about potential environmental impacts of the project in scoping comments.

This report reviews the DEIR project description, its evaluations of potential impacts associated with emission-shifting on climate and air quality, refinery process changes on hazards, and refinery flaring on air quality, and its analysis of the project baseline.

[1] The author's curriculum vitae and publications list are appended hereto as Attachment 1.

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Phillips 66 Rodeo Refinery Project DEIR SCH #2020120330

1. PROJECT DESCRIPTION AND SCOPE

Accurate and complete description of the project is essential to accurate analysis of its potential environmental impacts. In numerous important instances, however, the DEIR does not provide this essential information. Available information that the DEIR does not disclose or describe will be necessary to evaluate potential impacts of the project.

1.1 Type of Biofuel Technology Proposed

Biofuels—hydrocarbons derived from biomass and burned as fuels for energy—are made via many different technologies, each of which features a different set of capabilities, limitations, and environmental consequences. See the introduction to *Changing Hydrocarbons Midstream*, appended hereto as Attachment 2, for examples.[2] [3] However, the particular biofuel technology that the project proposes to use is not identified explicitly in the DEIR. Its reference to "renewable fuels" provides experts in the field a hint, but even then, several technologies can make "renewable fuels,"[4] [5] and the DEIR does not state which is actually proposed.

Additional information is necessary to infer that, in fact, the project as proposed would use a biofuel technology called "Hydrotreated Esters and Fatty Acids" (HEFA).

C-1

1.1.1 Available evidence indicates that the project would use HEFA technology.

That this is a HEFA conversion project can be inferred based on several converging lines of evidence. First, the project proposes to repurpose the same hydro-conversion processing units that HEFA processing requires along with hydrogen production required by HEFA processing,[6] hydrotreating, hydrocracking and hydrogen production units.[7] Second, it does not propose to

[2] Karras, 2021a. *Changing Hydrocarbons Midstream: Fuel chain carbon lock-in potential of crude-to-biofuel petroleum refinery repurposing;* prepared for the Natural Resources Defense Council (NRDC) by Greg Karras, G. Karras Consulting. Appended hereto as Attachment 2 (Att. 2).
[3] Attachments to this report hereinafter are cited in footnotes.
[4] Karras. 2021b. *Unsustainable Aviation Fuels: An assessment of carbon emission and sink impacts from biorefining and feedstock choices for producing jet biofuel from repurposed crude refineries;* Natural Resources Defense Council (NRDC). Prepared for the NRDC by Greg Karras, G. Karras Consulting. Appended hereto as Attachment 3.
[5] See USDOE, 2021. *Renewable Hydrocarbon Biofuels;* U.S. Department of Energy, accessed 29 Nov 2021 at https://afdc.energy.gov/fuels/emerging_hydrocarbon.html and appended hereto as Attachment 3 ("Renewable diesel is a hydrocarbon produced through various processes such as hydrotreating, gasification, pyrolysis, and other biochemical and thermochemical technologies").
[6] Karras, 2021a (Att. 2).
[7] DEIR p.p. 3-28, 3-29 including Table 3-3 (hydrocracking units 240, hydrotreating/jet aromatics saturation units 250 and 248, and hydrogen plant Unit 110 to be repurposed) and pp. 4.3-48, 4.6-205, 4.6-210, and 4.8-257 (the onsite Air Liquide "Unit 210" hydrogen plant to be repurposed) for the project

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repurpose, build or use biomass feedstock gasification,[8] which is required by commercially proven alternative renewable fuels technologies but is not needed for HEFA processing. Third, the project proposes to acquire and pretreat lipidic (oily) biomass such as vegetable oils, animal fats and their derivative oils,[9] a class of feedstocks required for HEFA processing but not for the alternative biomass gasification technologies, which is generally more expensive than the cellulosic biomass feedstocks those technologies can run.[10] Fourth, the refiner would be highly incentivized to repurpose idled refining assets for HEFA technology instead of using another "renewable" fuel technology, which would not use those assets.[11] Finally, in other settings HEFA has been widely identified as the biofuel technology that this and other crude-to-biofuel refinery conversion projects have in common.

With respect to the DEIR itself, however, people who do not already know what biofuel technology is proposed may never learn that from reading it, without digging deeply into the literature outside the document for the evidence described above.

C-1 cont'd

1.1.2 <u>Inherent capabilities and limitations of HEFA technology</u>.

Failure to clearly identify the technology proposed is problematic for environmental review because choosing to rebuild for a particular biofuel technology will necessarily afford the project the particular capabilities of that technology while limiting the project to its inherent limitations.

A unique capability of HEFA technology is its ability to use idled petroleum refining assets for biofuel production—a crucial environmental consideration given growing climate constraints and crude refining overcapacity.[12] Another unique capability of HEFA technology is its ability to produce "drop-in" diesel biofuel that can be added to and blended with petroleum distillates in the existing liquid hydrocarbon fuels distribution and storage system, and internal combustion transportation infrastructure.[13] In this respect, the DEIR omits the basis for evaluating whether

C-2

[8] DEIR Table 3-3 (new or repurposed equipment to gasify biomass excluded).
[9] DEIR p. 3-25 ("anticipated project feedstocks ... include, but [are] not limited to" UCO [used cooking oil], FOG [fats oils and grease], tallow [animal fat], inedible corn oil, canola oil, soybean oil, other vegetable-based oils, and/or emerging and other next-generation feedstocks).
[10] Karras, 2021a (Att. 2).
[11] *Id.*
[12] *Id.*
[13] *Id.*

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the project could result in combustion emission impacts by adding biofuel to the liquid combustion fuel chain infrastructure of petroleum.

Inherent limitations of HEFA technology that are important to environmental review include high process hydrogen demand, low fuels yield on feedstock—especially for jet fuel and gasoline blending components—and limited feedstock supply.[14]

The DEIR does not disclose or describe these uniquely important capabilities and limitations of HEFA technology, and thus the project. Environmental consequences of these undisclosed project capabilities and limitations are discussed throughout this report below.

C-2 cont'd

1.1.3 Potential project hydrogen production technologies.

Despite the inherently high process hydrogen demand of proposed project biorefining the DEIR provides only a cursory and incomplete description of proposed and potential hydrogen supply technologies. The DEIR does not disclose that the technology used by existing onsite hydrogen plants to be repurposed by the project, fossil gas steam reforming, co-produces and emits roughly ten tons of carbon dioxide (CO_2) per ton of hydrogen supplied to project biofuel processing.[15]

C-3

The DEIR identifies a non-fossil fuel hydrogen production technology—splitting water to co-produce hydrogen and oxygen using electricity from renewable resources—then rejects this solar and wind powered alternative in favor of fossil gas steam reforming, without describing either of those hydrogen alternatives adequately to support a reasonable environmental comparison. Reading the DEIR, one would not know that electrolysis can produce zero-emission hydrogen while steam reforming emits some ten tons of CO_2 per ton of hydrogen produced.

C-4

Another hydrogen supply option is left undisclosed. The DEIR does not disclose that existing naphtha reforming units co-produce hydrogen[16] as a byproduct of their operation, or describe the potential that the reformers might be repurposed to process partially refined petroleum while supplying additional hydrogen for expanded HEFA biofuel refining onsite.[17]

C-5

[14] Karras, 2021b (Att. 3).
[15] *Id.* (median value from multiple Bay Area refinery steam reforming plants of 9.82 g CO_2/g H_2 produced)
[16] *See* Chevron Refinery Modernization Project, SCH# 2011062042, DEIR Appendix 4.3–URM: Unit Rate Model, appended hereto as Attachment 5.
[17] The naphtha reformers could supply additional hydrogen for project biorefining if repurposed to process petroleum gasoline feedstocks imported to ongoing refinery petroleum storage and transfer operations.

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1.2 Process Chemistry and Reaction Conditions

HEFA processing reacts lipidic (oily) biomass with hydrogen over a catalyst at high temperatures and extremely high pressures to produce deoxygenated hydrocarbons, and then restructures the hydrocarbons so that they can be burned as diesel or jet fuel.[18] The DEIR does not describe the project biofuel processing chemistry or reaction conditions; differences in HEFA refining compared with petroleum refining, impacts of feed choices and product targets in HEFA processing, or changes in the process conditions of repurposed refinery process units.[19]

1.2.1 Key differences in processing compared with petroleum refining

HEFA technology is based on four or five central process reactions which are not central to or present in crude petroleum processing. Hydrodeoxygenation (HDO) removes the oxygen that is concentrated in HEFA feeds: this reaction is not present in refining crude, which contains little or no oxygen.[20] Depropanation is a precondition for completion of the HDO reaction: a condition that is not present in crude refining but needed to free fatty acids from the triacylglycerols in HEFA feeds.[21] Saturation of the whole HEFA feed also is a precondition for complete HDO: this reaction does not proceed to the same extent in crude refining.[22] Each of those HEFA process steps react large amounts of hydrogen with the feed.[23]

C-6

Isomerization is then needed in HEFA processing to "dewax" the long straight-chain hydrocarbons from the preceding HEFA reactions in order to meet fuel specifications, and is performed in a separate process reactor: isomerization of long-chain hydrocarbons is generally absent from petroleum refining.[24] Fuel products from those HEFA process reaction steps include HEFA diesel, a much smaller volume of HEFA jet fuel (without intentional hydrocracking), and little or no gasoline: petroleum crude refining in California yields mostly gasoline with smaller but still significant volumes of diesel and jet fuel.[25] The remarkably low HEFA jet fuel yield can

[18] Karras, 2021a (Att. 2)
[19] Karras 2021a (Att. 2) and 2021b (Att. 3) provide examples of that show the DEIR could have described changes in processing chemistry and conditions that would result from the project switch to HEFA technology in relevant detail for environmental analysis. Key points the DEIR omitted are summarized in this report section.
[20] Karras, 2021a (Att. 2).
[21] *Id.*
[22] *Id.*
[23] *Id.*
[24] *Id.*
[25] *Id.*

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be boosted to roughly 49% by mass on HEFA feed, via adding intentional hydrocracking in or separately from the isomerization step, but at the expense of lower overall liquid fuels yield and a substantial further increase in the already-high hydrogen process demand of HEFA refining.[26]

C-6 cont'd

None of these unique aspects of HEFA biofuel processing is described in the DEIR, though each must be evaluated for potential project impacts, as discussed below.

1.2.2 Relationships between feedstock choices, product targets and hydrogen inputs

Both HEFA feedstock choices and HEFA product targets can affect project hydrogen demand for biofuel processing significantly. Among other potential impacts, increased hydrogen production to supply project biorefining would increase CO_2 emissions as discussed in § 1.1.3. The DEIR, however, does not describe these environmentally relevant effects of project feed and product target choices on project biofuel refining.

Available information excluded from the DEIR suggests that choices between potential feedstocks identified in the DEIR[27] could result in a difference in project hydrogen demand of up to 0.97 kilograms per barrel of feed processed (kg H_2/b), with soybean oil accounting for the high end of this range.[28] Meanwhile, targeting jet fuel yield via intentional hydrocracking could increase project hydrogen demand by up to 1.99 kg H_2/b.[29] Choices of HEFA feedstock and product targets in combination could change project hydrogen demand by up to 2.81 kg H_2/b.[30]

C-7

Climate impacts that are identifiable from this undisclosed information appear significant. Looking only at hydrogen steam reforming impacts alone, at its 80,000 b/d capacity[31] the feed choice (0.97 kg H_2/b), products target (1.99 kg H_2/b), and combined effect (2.81 kg H_2/b) impacts estimated above could result in emission increments of 280,000, 569,000, and 809,000 metric tons of CO_2 emission per year, respectively, from project steam reforming alone. These potential emissions compare with the DEIR significance threshold of 10,000 metric tons/year.[32] Most significantly, even the low end of the emissions range for combined feed choice and

[26] Karras, 2021a (Att. 2); Karras, 2021b (Att. 3).
[27] DEIR p. 3-25 (identifying used cooking oil, fats oils and grease, tallow, inedible corn oil, canola oil, soybean oil, other vegetable-based oils, "and/or emerging and other next-generation" feedstocks).
[28] Karras, 2021b (Att. 3).
[29] *Id.*
[30] *Id.*
[31] An undisclosed project component would debottleneck project biorefining capacity as discussed in § 1.7 below.
[32] HEFA emission estimates based on per-barrel steam reforming CO_2 emissions from Table 5 in Attachment 3.

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product target effects, for feeds identified by the DEIR and HEFA steam reforming alone, exceeds the average total carbon intensity of U.S. petroleum crude refining by 4.4 kg CO_2/b (10%) while the high end exceeds that U.S. crude refining CI by 32 kg CO_2/b (77%).[33] [34]

The DEIR project description obscures these potential impacts of the project, among others.

C-7 cont'd

1.2.3 Changes in process conditions of repurposed equipment

With the sole exception of maximum fresh feed input, the DEIR does not disclose design specifications for pre-project or post-project hydro-conversion process unit temperature, pressure, recycle rate, hydrogen consumption, or any other process unit-specific operating parameter. This is especially troubling because available information suggests that the project could increase the severity of the processing environment in the reactor vessels of repurposed hydro-conversion process units significantly.

In one important example, the reactions that consume hydrogen in hydro-conversion processing are highly exothermic: they release substantial heat.[35] Further, when these reactions consume more hydrogen the exothermic reaction heat release increases, and HEFA refining consumes more hydrogen per barrel of feed than petroleum refining.[36] Hydro-conversion reactors of the types to be repurposed by the project operate at temperatures of some 575–780 ºF and pressures of some 600–2,800 pound-force per square inch in normal conditions, when processing petroleum.[37] These severe process conditions could become more severe processing HEFA feeds. The project could thus introduce new hazards. Sections 3 and 4 herein review potential process hazards and flare emission impacts which could result from the project, but yet again, information the DEIR does not disclose or describe will be essential to full impacts evaluation.

C-8

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[33] *Id.*
[34] Average U.S. petroleum refining carbon intensity from 2015–2017 of 41.8 kg CO_2/b crude from Attachments 2, 3.
[35] Karras, 2021a (Att. 2).
[36] *Id.*
[37] *Id.*

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1.3 Process Inputs

The project would switch the oil refinery from crude petroleum to a new and very different class of oil feeds—triacylglycerols of fatty acids. Switching to new and different feedstock has known potential to increase refinery emissions[38] and to create new and different process hazards[39] [40] and feedstock acquisition impacts.[41] Such impacts are known to be related to either the chemistries and processing characteristics of the new feeds, as discussed above, or to the types and locations of extraction activities to acquire the new feeds. However, the DEIR does not describe the chemistries, processing characteristics, or types and locations of feed extraction sufficiently to evaluate potential impacts of the proposed feedstock switch.

1.3.1 Change and variability in feedstock chemistry and processing characteristics

Differences in project processing impacts caused by differences in refinery feedstock, as discussed above, are caused by differences in the chemistries and processing characteristics among feeds that the DEIR does not disclose or describe. For example, feed-driven differences in process hydrogen demand discussed above both boost the carbon intensity of HEFA refining above that of petroleum crude refining, and boost it further still for processing one HEFA feed instead of another. The first impact is driven mainly by the uniformly high oxygen content of HEFA feedstocks, while the second—also environmentally significant, as shown—is largely driven by differences in the number of carbon double bonds among HEFA feeds.[42] This difference in chemistries among HEFA feeds which underlies that significant difference in their processing characteristics can be quantified based on available information. Charts 1.A–1.F, excerpted from Attachment 2, show the carbon double bond distributions across HEFA feeds. C-9

The DEIR could have reported and described this information that allows for process impacts of potential project feedstock choices to be evaluated, but unfortunately, it did not.

[38] *See* Karras, 2010. Combustion Emissions from Refining Lower Quality Oil: What is the global warming potential? *Environ. Sci. Technol.* 44(24): 9584–9589. DOI: 10.1021/es1019965. Appended hereto as Attachment 6.
[39] *See* CSB, 2013. *Interim Investigation Report, Chevron Richmond Refinery Fire;* U.S. Chemical Safety Board: Washington, D.C. https://www.csb.gov/file.aspx?Documentid=5913. Appended hereto as Attachment 7.
[40] *See* API, 2009. *Guidelines for Avoiding Sulfidation (Sulfidic) Corrosion Failures in Oil Refineries;* API Recommended Practice 939-C. First Edition, May 2009. American Petroleum Institute: Washington, D.C. Appended hereto as Attachment 8.
[41] *See* Krogh et al., 2015. *Crude Injustice on the Rails: Race and the disparate risk from oil trains in California;* Communities for a Better Environment and ForestEthics. June 2015. Appended hereto as Attachment 9.
[42] *See* Karras, 2021a (Att. 2); Karras, 2021b (Att. 3).

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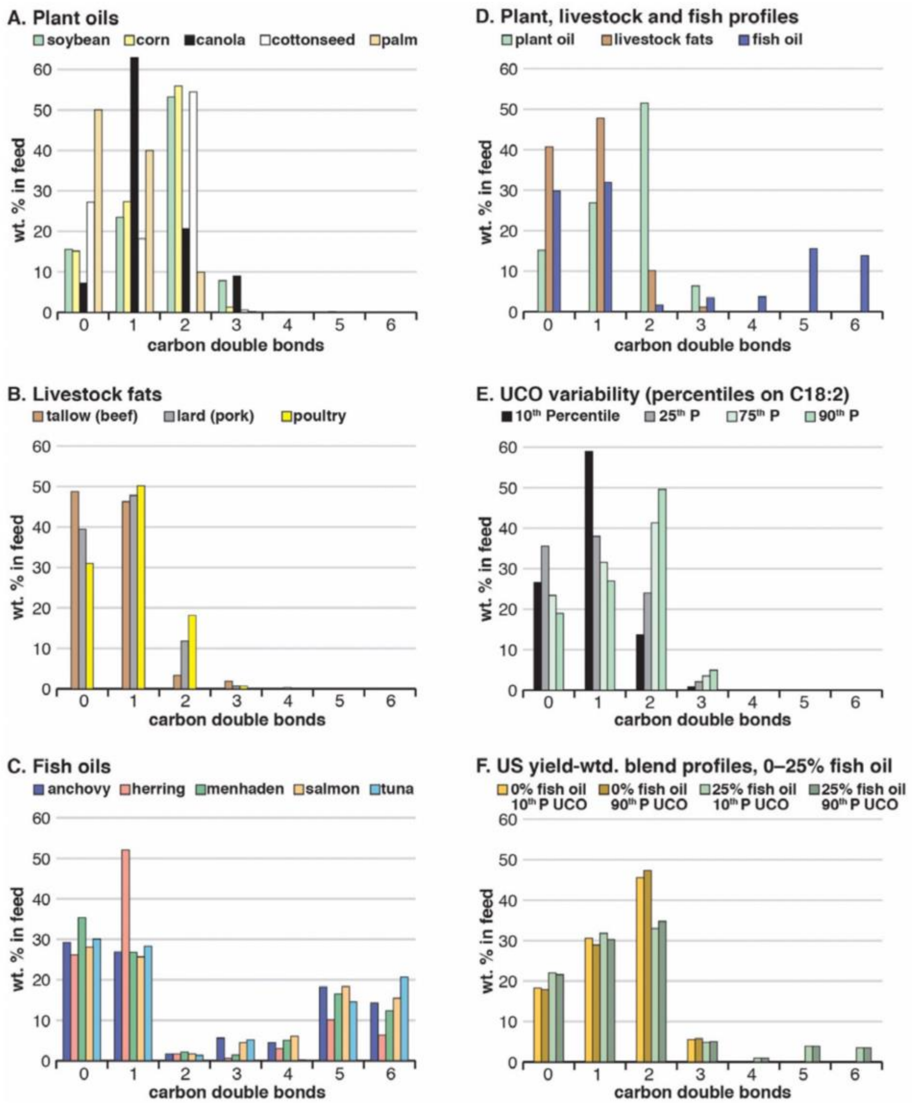

1. HEFA feed fatty acid profiles by number of carbon double bonds.
Carbon double bonds require more hydrogen in HEFA processing. **A–C.** Plant oil, animal fat and fish oil profiles. **D.** Comparison of weighted averages for plant oils (US farm yield-wtd. 70/20/7/3 soy/corn/canola/cottonseed blend), livestock fats (40/30/30 tallow/lard/poultry blend) and fish oils (equal shares for species in Chart 1C). **E.** UCO: used cooking oil, a highly variable feed. **F.** US yield-weighted blends are 0/85/10/5 and 25/60/10/5 fish/plant/livestock/UCO oils. Profiles are median values based on wt.% of linoleic acid. *See* Table A1 for data and sources.[1]

C-9 cont'd

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1.3.2 Types and locations of potential project biomass feed extraction

HEFA biofuel technology is limited to lipidic (oily) feedstocks produced almost exclusively by land-based agriculture, and some of these feeds are extracted by methods that predictably cause deforestation and damage carbon sinks in Amazonia and Southeast Asia.[43] However, the DEIR does not describe the types and locations of potential project biomass feed extraction activities. C-10

1.4 Project Scale

Despite the obvious relationship between the scale of an action and its potential environmental impacts, the DEIR does not describe the scale of the project in at least two crucial respects. First, the DEIR does not describe its scale relative to other past and currently operating projects of its kind. This omission is remarkable given that available information indicates that project is by far the largest HEFA refinery ever to be proposed or built worldwide.[44] C-11

Second, the DEIR does not describe the scale of proposed feedstock demand. Again, the omission is remarkable. As documented in Attachment 3 hereto, total U.S. production (yield) for all uses of the specific types of lipids which also have been tapped as HEFA feedstocks—crop oils, livestock fats and, to a much lesser degree, fish oils, can be compared with the 80,000 b/d (approximately 4.25 million metric tons/year) proposed project feedstock capacity. *See* Table 1. C-12

This feedstock supply-demand comparison (Table 1) brings into focus the scale of the project, and the related project proposed by Marathon in Martinez, emphasizing the feedstock supply limitation of HEFA technology discussed in § 1.1.2. Several points bear emphasis for context: The table shows total U.S. yields for *all uses* of lipids that also have been HEFA feedstocks, including use as food, livestock feed, pet food, and for making soap, wax, cosmetics, lubricants and pharmaceutical products, and for exports.[45] These existing uses represent commitments of finite resources, notably cropland, to human needs. Used cooking oils derived from primary sources shown are similarly spoken for and in even shorter supply. Lastly, HEFA feeds are limited to lipids (shown) while most other biofuels are not, but multiple other HEFA refineries are operating or proposed besides the two Contra Costa County projects shown. C-13

[43] *See* Karras, 2021a (Att. 2); Karras, 2021b (Att. 3).
[44] Karras, 2021a (Att. 2).
[45] Karras, 2021b (Att. 3).

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Table 1. Project Feed Demand *v.* U.S. Total Yield of Primary HEFA Feed Sources for All Uses.

MM t/y: million metric tons/year

HEFA Feed-stock Type	U.S. Yield [a] (MM t/y)	Project and County-wide feedstock demand (% of U.S. Yield)		
		Phillips 66 Project [b]	Marathon Project [b]	Both Projects
Fish oil	0.13	3269 %	1961 %	5231 %
Livestock fat	4.95	86 %	51 %	137 %
Soybean oil	10.69	40 %	24 %	64 %
Other oil crops	5.00	85 %	51 %	136 %
Total yield	20.77	20 %	12 %	33 %

a. Total U.S. production for all uses of oils and fats also used as primary sources of HEFA biofuel feedstock. Fish oil data for 2009–2019, livestock fat data from various dates, soybean oil and other oil crops data from Oct 2016–Sep 2020, from data and sources in Att. 3. **b.** Based on project demand of 4.25 MM t/y (80,000 b/d from DEIR), related project demand of 2.55 MM t/y (48,000 b/d from related project DEIR), given the typical specific gravity of soy oil and likely feed blends (0.916) from Att. 2.

In this context, the data summarized in Table 1 indicate the potential for environmental impacts. For example, since the project cannot reasonably be expected to displace more than a fraction of existing uses of any one existing lipids resource use represented in the table, it would likely process soy-dominated feed blends that are roughly proportionate to the yields shown.[46] This could result in a significant climate impact from the soybean oil-driven increase in hydrogen steam reforming emissions discussed in § 1.2.2.

C-13 cont'd

Another example: Feedstock demand from the Contra Costa County HEFA projects alone represents one-third of current total U.S. yield for all uses of the lipids shown in Table 1, including food and food exports. Much smaller increases in biofuel feedstock demand for food crops spurred commodity price pressures that expanded crop and grazing lands into pristine areas globally, resulting in deforestation and damage to natural carbon sinks.[47] The unprecedented cumulative scale of potential new biofuel feedstock acquisition thus warrants evaluation of the potential for the project to contribute to cumulative indirect land use impacts at this new scale.

The DEIR, however, does not attempt either impact evaluation suggested in these examples. Its project description did not provide a sufficient basis for evaluating feedstock acquisition impacts that are directly related to the scale of the project, which the DEIR did not disclose or describe.

[46] Data in Table 1 thus rebut the unsupported DEIR assertion that future project feeds are wholly speculative.
[47] *See* Karras, 2021a (Att. 2); Karras, 2021b (Att. 3).

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1.5 Project Operational Duration

The anticipated and technically achievable operational duration of the project, hence the period over which potential impacts of project operation could occur, accumulate, or worsen, is not disclosed or described in the DEIR. This is a significant deficiency because accurate estimation of impacts that worsen over time requires an accurately defined period of impact review.

Contra Costa County could have accessed many data on the operational duration of the project. The refiner would have designed and financed the project based on a specified operational duration. Since this is necessary data for environmental review it could have and should have been requested and supplied. Technically achievable operational duration data for the types of process units the project proposes to use were publicly available as well. For example, process unit-specific operational data for Bay Area refineries, including the subject refinery, have been compiled, analyzed and reported by Communities for a Better Environment.[48] Information to estimate the anticipated operational duration of the project also can be gleaned from technical data supporting pathways to achieve state climate protection goals,[49] which include phasing out petroleum and biofuel diesel in favor of zero-emission vehicles.

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1.6 Project Fuels Market

The DEIR asserts an incomplete and inaccurate description of project fuels markets. It describes potential impacts that could result from conditions which it asserts will increase fuel imports into California[50] while omitting any discussion whatsoever of exports from California refineries or the conditions under which these exports could occur. California refineries are net fuel exporters due in large part to structural conditions of statewide overcapacity coupled with declining in-state petroleum fuels demand.[51] [52] [53] The incomplete description of the project fuels market setting led to flawed environmental impacts evaluation, as discussed in sections 2 and 5 herein.

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[48] Karras, 2020. *Decommissioning California Refineries: Climate and Health Paths in an Oil State;* A Report for Communities for a Better Environment. Prepared by Greg Karras. Includes Supporting Material Appendix. www.energy-re-source.com/decomm Appended hereto as Attachment 10.
[49] Karras, 2021a (Att. 2).
[50] DEIR pp. 5-3 though 5-7, 5-9, 5-10, 5-19, 5-22 through 5-24.
[51] Karras, 2020 (Att. 10).
[52] USEIA, 2015. West Coast Transportation Fuels Markets; U.S. Energy Information Administration: Washington, D.C. https://www.eia.gov/analysis/transportationfuels/padd5/ Appended hereto as Attachment 11.
[53] USEIA, *Supply and Disposition: West Coast (PADD 5);* U.S. Energy Information Administration: Washington, D.C. ww.eia.gov/dnav/pet/pet_sum_snd_d_r50_mbbl_m_cur.htm. Appended hereto as Attachment 12.

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1.7 Project Scope

The DEIR does not disclose or describe three components of the proposed project that would expand the project scope and its environmental impacts. One of these components directly expands project biofuel refining capacity. Another expands project biofuel refining feedstock input capacity. The third undisclosed component would debottleneck the project biofuel refining capacity by repurposing additional refinery equipment to produce additional hydrogen needed for the expanded biorefining from processing imported petroleum gasoline feedstocks.

1.7.1 The Unit 250 diesel hydrotreater biofuel processing component

During 2021 Phillips 66 implemented the conversion of diesel hydrotreater Unit 250 within the Rodeo facility from petroleum distillate to soybean oil processing[54] without a Clean Air Act permit[55] and without any public review. The DEIR asserts there is no connection between Unit 250 and the project because, it says, no further changes are proposed to the unit.[56] But whether or not *further* change to Unit 250 is proposed is not relevant to the question of whether the *previous* changes to that unit, completed after the project application was filed, should have been considered as part of the project.

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The relevant question is whether the changes to Unit 250 are, *functionally*, part of the project, and they are. The project would depend on Unit 250 to maximize onsite refining of the feed pretreatment unit output; and in turn, Unit 250 would depend on the project. It would depend on project feed pretreatment for economical access to pretreated feed, as the DEIR itself concludes in considering project biorefining without that project component.[57] Even more clearly, since the deoxygenated output of HEFA hydrotreating is too waxy to meet fuel specifications and must be isomerized in a separate processing step before it can be sold as transportation fuel,[58] Unit 250 depends on the project isomerization component to make its output sellable. The Unit 250

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[54] Phillips 66 1Q 2021 Earnings Transcript. First Quarter 2021 Earnings Call; Phillips 66 (NYSE: PSX) 30 April 2021, 12 p.m. ET. Transcript. Appended hereto as Attachment 13.

[55] BAAQMD, 2021. 9 Sep 2021 email from Damian Breen, Senior Deputy Executive Officer – Operations, Bay Area Air Quality Management District, to Ann Alexander, NRDC, regarding Phillips 66 refinery (no. 21359) – possible unpermitted modifications. Appended hereto as Attachment 14.

[56] DEIR p. 5-11.

[57] DEIR p. 5-6 (alternative without a feed pretreatment unit "considered to be infeasible because it would reduce transportation fuels production at the Rodeo Refinery and severely underuse existing refinery facilities for the production of renewable fuels").

[58] *See* subsection1.2.1 above; for more detail *see* Karras, 2021a (Att. 2).

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HEFA conversion is an interdependent component of the project that is essential to achieve a project objective to maximize project-supplied California biofuels.

The conversion of Unit 250 from petroleum to HEFA feedstock processing is currently under investigation by the Bay Area Air Quality Management District (BAAQMD) for potentially illegal construction, operation, or both without required notice, review, and/or permits.[59]

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The failure to include and disclose the Unit 250 HEFA conversion as part of the project appears to be related to a County decision to permit the Nustar biofuel action separately from the subject project before allowing public comment on either action, as discussed below.

1.7.2 The Nustar Shore Terminals biofuel feedstock import conversion

Nustar Shore Terminals—a liquid hydrocarbons transfer and storage facility contiguous with the Phillips 66 facility—and Contra Costa County have taken actions to advance the "Nustar Soybean Oil Project" contemporaneously with the project. According to a 2 December 2020 email from the County, this Nustar action would:

> [I]nstall an approximately 2300-foot pipeline from Nustar to Phillips 66 to carry pretreated soybean oil feedstock to existing tankage and the Unit 250 hydrotreater at the Phillips 66 refinery, which can already produce diesel from both renewable and crude feedstocks (see attached site plan). The soybean feedstock will be unloaded at existing Nustar rail facilities which will be modified with 33 offload headers to accommodate the soybean oil. ... it was determined that the modifications proposed by Nustar would not require a land use permit. The appropriate building permits have been issued. [60]

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The site plan referenced by the County[61] is reproduced in its entirety below. Color-coding of the pipeline sections shown on the site plan indicates that the new feedstock pipeline sections reach far into the Phillips 66 refinery; and that the vast majority of new pipeline segments by length is "Phillips 66" rather than "Nustar" pipe.[62]

Interestingly as well, a closer look at the site map reveals the converted Unit 250 HEFA hydro-conversion processing plant at the terminus of the "Nustar Soybean Oil Project" in the refinery.

[59] BAAQMD, 2021 (Att. 14).
[60] Kupp, 2020a. Email text and attached site map from Gary Kupp, Contra Costa County, to Charles Davidson, incoming Rodeo-Hercules Fire Protection District director. 2 December 2020. Appended hereto as Attachment 15.
[61] *Id.*
[62] *Id.*

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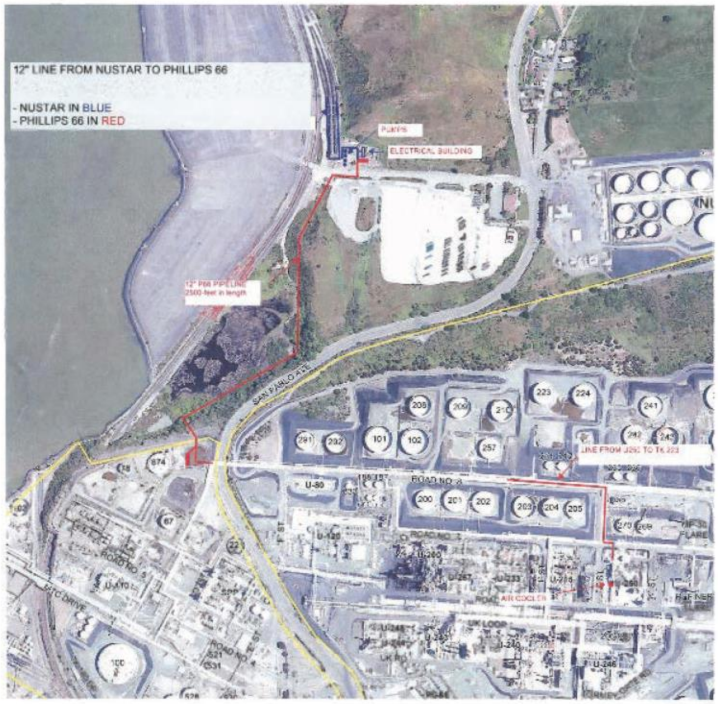

"Nustar Soybean Oil Project" Site Plan, Contra Costa County (Att. 15),

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Accordingly, the available data and information would appear to provide sufficient basis to conclude that the Nustar Shore Terminals project is a component of the project. The DEIR, however, did not disclose or describe the relationship of these concurrently proposed actions at all, and consequently did not take account of potential impacts from a larger project scope.

1.7.3 <u>The component to debottleneck hydrogen-limited refining capacity</u>

Phillips 66 added a project component after the public scoping process that is not disclosed in the DEIR. This component would relieve a bottleneck in hydrogen-limited biofuel refining at the refinery by repurposing additional existing equipment to co-produce hydrogen as a byproduct of processing gasoline feedstocks derived from semi-refined petroleum imported to Rodeo. The DEIR identifies the physical changes integrated into the project post-scoping, but it does not C-18

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identify their debottlenecking effect, and hence does not disclose or describe the additional onsite processing of additional petroleum and biomass or evaluate resultant impacts.

As discussed in sections 1.1 through 1.4, the DEIR does not describe and hence does not evaluate HEFA process demand for hydrogen. It thus failed to identify a hydrogen bottleneck in the disclosed project configuration which, if relieved, would enable processing the additional pretreated feedstock the revised project would produce. The County could have identified this bottleneck by comparing available hydrogen production capacity and process hydrogen demand data for the disclosed project components.[63] Had it done so it would have found that the repurposed hydrogen plants cannot actually supply enough hydrogen to refine 80,000 b/d of pretreated vegetable oils; and that this hydrogen bottleneck is particularly severe for jet fuel production. Targeting HEFA jet fuel, a more hydrogen-intensive refining mode,[64] the hydrogen bottleneck could limit project refining to only about 60% to 70% of pretreated feed capacity.[65]

The debottlenecking traces back to changes Phillips 66 made with respect to permit retention. The company changed its original project description so as to retain permits for existing refinery coking and naphtha reforming units, so that those units could continue or resume operation as part of the project.[66] Refinery crude distillation units would be shuttered upon full project implementation,[67] and the coking and reforming units would not process HEFA feedstock or whole crude. Instead, repurposing the coking and reforming units would involve processing semi-refined petroleum acquired from other refineries.[68] Phillips 66 recently stated in other contexts that it is shifting the specialty coke production from its petroleum refining to produce graphite for batteries,[69] and planning to use the Rodeo coking unit for that purpose.[70] The coking would co-produce light oils its reformers would then convert to gasoline blend stocks.

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cont'd

[63] Karras, 2021b (Att. 3).
[64] *Id.*
[65] Based on 80,000 b/d project pretreated feed capacity (DEIR); 148,500,000 SCF/d H_2 production capacity of Rodeo units 110 and 120 (Att. 2); H_2 demand targeting jet fuel yield on tallow, and soybean oil, of 2,632, and 2,954 SCF/b feed (Att. 3); and the calculations (targeting jet fuel yield from on soy oil feed, for example): 148,500,000 SCF/d ÷ 2,954 SCF/b = 50,270 b/d of soy oil processed, and 50,270 b/d ÷ 80,000 b/d = 0.628 (63%).
[66] BAAQMD Application, 2021. *Compare* also Phillips 66 initial Project Description; DEIR pp. 3-28, 3-29.
[67] DEIR pp. 3-28. 3-29.
[68] Only whole crude processing is specifically precluded by the project objectives asserted. *See* DEIR p. 3-22.
[69] Phillips 66 3Q 2021 Earnings Conference Call; 29 Oct 2021, 12 p.m. ET. Appended hereto as Attachment 16.
[70] Weinberg-Lynn, 2021. 23 July 2021 email from Nikolas Weinberg-Lynn, Manager, Renewable Energy Projects, Phillips 66, to Charles Davidson. Appended hereto as Attachment 17.

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The debottlenecking element—an important impact of the retained permits that is not identified in the DEIR—is that the light oil reforming would co-produce hydrogen,[71] thereby alleviating the jet biofuel production bottleneck described above.

This undisclosed hydrogen debottleneck action and the disclosed project components would be interdependent components of the project. The hydrogen debottleneck component depends upon the repurposing coking and reforming units that the project would free from crude refining support service. The disclosed project components, in turn, depend on the undisclosed hydrogen debottleneck for the ability to use their full capacity to produce biofuels, and especially HEFA jet fuel. Indeed, without relieving the hydrogen bottleneck the project might not long be viable. The hydrogen debottleneck component would afford the ability to engage in more hydrogen-intensive jet fuel processing, which could boost jet biofuel yield on biomass feedstock from as little as 13% to as much as 49%.[72] That could allow shifting to jet biofuel production without more drastic cuts in total project biofuel production as State zero-emission vehicle policies phase out diesel biofuels along with petroleum diesel demand.

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Thus, Phillips 66 would be highly incentivized to debottleneck its biorefinery; has asserted informal plans *and* formal project objectives[73] consistent with that result; and crucially, has changed its project to include the specific equipment which would be used to debottleneck the project in the project. Absent a binding commitment not to implement this action, it would be reasonable to conclude that it is a project component. The DEIR, however, did not disclose or describe this project component, and consequently did not evaluate its potential impacts.

CONCLUSION: The DEIR provides an incomplete, inaccurate, and truncated description of the proposed project. Available information that the DEIR does not describe or disclose will be necessary for sufficient review of environmental impacts that could result from the project.

[71] See Chevron Refinery Modernization Project DEIR Appendix 4.3–URM: Unit Rate Model (Att. 5). See also Bredeson et al., 2010. Factors driving refinery CO_2 intensity, with allocation into products. *Int. J. Life Cycle Assess.* 15:817–826. DOI: 10.1007/s11367-010-0204-3. Appended hereto as Attachment 18; and Abella and Bergerson, 2012. Model to Investigate Energy and Greenhouse Gas Emissions Implications of Refining Petroleum: Impacts of Crude Quality and Refinery Configuration. *Environ. Sci. Technol.* 46: 13037–13047. dx.doi.org/10.1021/es3018682. Appended hereto as Attachment19.
[72] Karras, 2021b (Att. 3).
[73] DEIR p. 3-22 (objectives to maximize production of renewable fuels and reuse existing equipment).

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2. THE DEIR DID NOT CONSIDER A SIGNIFICANT POTENTIAL CLIMATE EMISSION-SHIFTING IMPACT LIKELY TO RESULT FROM THE PROJECT

Instead of replacing fossil fuels, adding renewable diesel to the liquid combustion fuel chain in California resulted in refiners protecting their otherwise stranded assets by increasing exports of petroleum distillates burned elsewhere, causing a net increase in greenhouse gas[74] emissions. The DEIR improperly concludes that the project would decrease net GHG emissions[75] without disclosing this emission-shifting, or evaluating its potential to further increase net emissions. A series of errors and omissions in the DEIR further obscures causal factors for the emission shifting by which the project would cause and contribute to this significant potential impact. C-19

2.1 The DEIR Does Not Disclose or Evaluate Available Data Which Contradict its Conclusion That the Project Would Result in a Net Decrease in GHG Emissions

State law warns against "a reduction in emissions of greenhouse gases within the state that is offset by an increase in emissions of greenhouse gases outside the state."[76] However, the DEIR does not evaluate this emission-shifting impact of the project. Relevant state data that the DEIR failed to disclose or evaluate include volumes of petroleum distillates refined in California[77] and total distillates—petroleum distillates and diesel biofuels—burned in California.[78] Had the DEIR evaluated these data the County could have found that its conclusion regarding net GHG emissions resulting from the project was unsupported. C-20

As shown in Chart 2, distillate fuels refining for export continued to expand in California as biofuels that were expected to replace fossil fuels added a new source of carbon to the liquid combustion fuel chain. Total distillate volumes, including diesel biofuels burned in-state, petroleum distillates burned in-state, and petroleum distillates refined in-state and exported to other states and nations, increased from approximately 4.3 billion gallons per year to approximately 6.4 billion gallons per year between 2000 and 2019.[79] [80]

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[74] "Greenhouse gas (GHG)," in this section, means carbon dioxide equivalents (CO_2e) at the 100-year horizon.
[75] "Project operations would decrease emissions of GHGs that could contribute to global climate change" (DEIR p. 2-5) including "indirect emissions" (DEIR p. 4.8-258) and "emissions from transportation fuels" (DEIR p. 4.8-266).
[76] CCR §§ 38505 (j), 38562 (b) (8).
[77] CEC *Fuel Watch*. Weekly Refinery Production. California Energy Commission: Sacramento, CA. https://ww2.energy.ca.gov/almanac/petroleum_data/fuels_watch/output.php Appended hereto as Attachment 20.
[78] CARB GHG Inventory. *Fuel Activity for California's Greenhouse Gas Inventory by Sector and Activity; 14th ed.: 2000 to 2019;* California Air Resources Board: Sacramento, CA. Appended hereto as Attachment 21.

[79] *Id.*
[80] CEC Fuel Watch (Att. 21).

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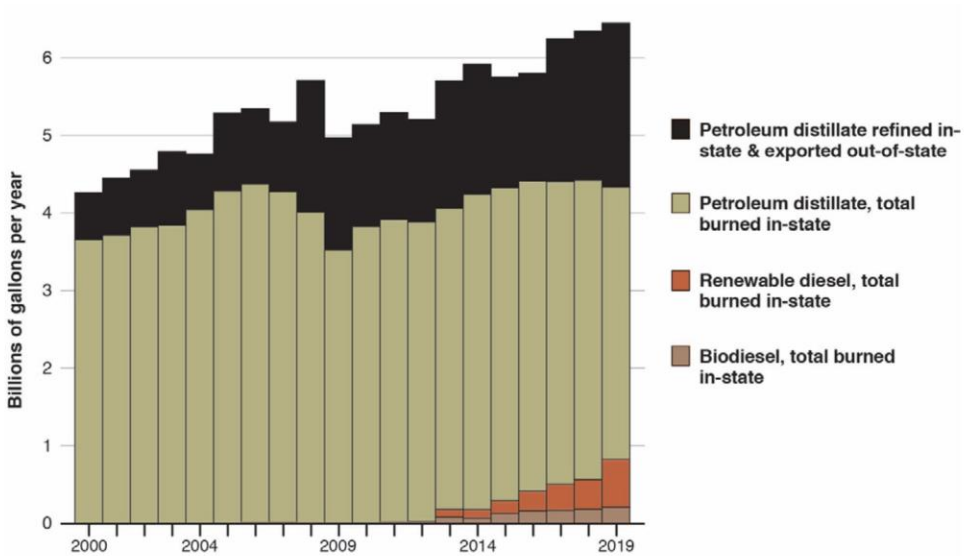

Distillate fuel shares associated with all activities in California, 2000–2019.
Growth in total distillates excluding jet fuel and kerosene from State data.
CHART 2. Data from CEC Fuel Watch (Att. 20) and CARB GHG Inventory (Att. 21).

Petroleum distillates refining for export (black in the chart) expanded after in-state burning of petroleum distillate (olive) peaked in 2006, and the exports expanded again from 2012 to 2019 with more in-state use of diesel biofuels (dark red and brown). From 2000 to 2012 petroleum-related factors alone drove an increase in total distillates production and use associated with all activities in California of nearly one billion gallons per year. Then total distillates production and use associated with activities in California increased again, by more than a billion gallons per year from 2012 to 2019, with biofuels accounting for more than half that increment. These state data show that diesel biofuels did not replace petroleum distillates refined in California during the eight years before the project was proposed. Instead, producing and burning more renewable diesel *along with* the petroleum fuel it was supposed to replace emitted more carbon.

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2.2 The DEIR Presents an Incomplete and Misleading Description of the Project Market Setting that Focuses on Imports and Omits Structural Overcapacity-driven Exports, Thereby Obscuring a Key Causal Factor in the Emission-shifting Impact

The DEIR focuses on potential negative effects of reliance on imports if the proposed project is rejected in favor of alternatives,[81] while ignoring fuels exports from in-state refineries and conditions under which these exports occur. As a result the DEIR fails to disclose that crude refineries here are net fuels exporters, that their exports have grown as in-state and West Coast demand for petroleum fuels declined, and that the structural overcapacity resulting in this export emissions impact would not be resolved and could be worsened by the project.

Due to the concentration of petroleum refining infrastructure in California and on the U.S. West Coast, including California and Puget Sound, WA, these markets were net exporters of transportation fuels before renewable diesel flooded into the California market.[82] Importantly, before diesel biofuel addition further increased refining of petroleum distillates for export, the structural overcapacity of California refineries was evident from the increase in their exports after in-state demand peaked in 2006. *See* Chart 2 above. California refining capacity, especially, is overbuilt.[83] Industry reactions seeking to protect those otherwise stranded refining assets through increased refined fuels exports as domestic markets for petroleum fuels declined resulted in exporting fully 20% to 33% of statewide refinery production to other states and nations from 2013–2017.[84] West Coast data further demonstrate the strong effect of changes in domestic demand on foreign exports from this over-built refining center.[85] *See* Table 2. C-21

Table 2. West Coast (PADD 5) Finished Petroleum Products: Decadal Changes in Domestic Demand and Foreign Exports, 1990–2019.

Total volumes reported for ten-year periods

	Volume (billions of gallons)		Decadal Change (%)	
Period	Demand	Exports	Demand	Exports
1 Jan 1990 to 31 Dec 1999	406	44.2	—	—
1 Jan 2000 to 31 Dec 2009	457	35.1	+13 %	–21 %
1 Jan 2010 to 31 Dec 2019	442	50.9	–3.3 %	+45 %

Data from USEIA, *Supply and Disposition* (Att. 12).

[81] DEIR pp. 5-3 though 5-7, 5-9, 5-10, 5-19, 5-22 through 5-24.
[82] USEIA, 2015 (Att. 11).
[83] Karras, 2020 (Att. 10).
[84] *Id.*
[85] USEIA, *Supply and Disposition* (Att. 12).

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Comparisons of historic with recent California and West Coast data further demonstrate that this crude refining overcapacity for domestic petroleum fuels demand that drives the emission-shifting impact is unresolved and would not be resolved by the proposed project and the related Contra Costa County crude-to-biofuel conversion project. Fuels demand has rebounded, at least temporarily, from pre-vaccine pandemic levels to the range defined by pre-pandemic levels, accounting for seasonal and interannual variability. In California, from April through June 2021 taxable fuel sales[86] approached the range of interannual variability from 2012–2019 for gasoline and reached the low end of this pre-COVID range in July, while taxable jet fuel and diesel sales exceeded the maximum or median of the 2012–2019 range in each month from April through July of 2021. *See* Table 3.

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Table 3. California Taxable Fuel Sales Data: Return to Pre-COVID Volumes

Fuel volumes in millions of gallons (MM gal.) per month

	Demand in 2021	Pre-COVID range (2012–2019) Minimum	Median	Maximum	Comparison of 2021 data with the same month in 2012–2019
Gasoline (MM gal.)					
Jan	995	1,166	1,219	1,234	Below pre-COVID range
Feb	975	1,098	1,152	1,224	Below pre-COVID range
Mar	1,138	1,237	1,289	1,343	Below pre-COVID range
Apr	1,155	1,184	1,265	1,346	Approaches pre-COVID range
May	1,207	1,259	1,287	1,355	Approaches pre-COVID range
Jun	1,196	1,217	1,272	1,317	Approaches pre-COVID range
Jul	1,231	1,230	1,298	1,514	Within pre-COVID range
Jet fuel (MM gal.)					
Jan	10.74	9.91	11.09	13.69	Within pre-COVID range
Feb	10.80	10.13	11.10	13.58	Within pre-COVID range
Mar	13.21	11.23	11.95	14.53	Exceeds pre-COVID median
Apr	13.84	10.69	11.50	13.58	Exceeds pre-COVID range
May	15.14	4.84	13.07	16.44	Exceeds pre-COVID median
Jun	17.08	8.67	12.75	16.80	Exceeds pre-COVID range
Jul	16.66	11.05	13.34	15.58	Exceeds pre-COVID range
Diesel (MM gal.)					
Jan	203.5	181.0	205.7	217.8	Within pre-COVID range
Feb	204.4	184.1	191.9	212.7	Exceeds pre-COVID median
Mar	305.4	231.2	265.2	300.9	Exceeds pre-COVID range
Apr	257.1	197.6	224.0	259.3	Exceeds pre-COVID median
May	244.5	216.9	231.8	253.0	Exceeds pre-COVID median
Jun	318.3	250.0	265.0	309.0	Exceeds pre-COVID range
Jul	248.6	217.8	241.5	297.0	Exceeds pre-COVID median

Data from CDTFA, (Att. 22). Pre-COVID statistics are for the same months in 2012–2019. The multiyear monthly comparison range accounts for seasonal and interannual variability in fuels demand. Jet fuel totals may exclude fueling in California for fuels presumed to be burned outside the state during interstate and international flights.

[86] CDTFA, various years. *Fuel Taxes Statistics & Reports;* Cal. Dept. Tax and Fee Admin: Sacramento, CA. https://www.cdtfa.ca.gov/taxes-and-fees/spftrpts.htm. Appended hereto as Attachment 22.

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West Coast fuels demand in April and May 2021 approached or fell within the 2010–2019 range for gasoline and jet fuel and exceeded that range for diesel.[87] In June and July 2021 demand for gasoline exceeded the 2010–2019 median, jet fuel fell within the 2010–2019 range, and diesel fell within the 2010–2019 range or exceeded the 2010–2019 median.[88] *See* Table 4.

Table 4. West Coast (PADD 5) Fuels Demand Data: Return to Pre-COVID Volumes

Fuel volumes in millions of barrels (MM bbl.) per month

	Demand in 2021	Pre-COVID range (2010–2019) Minimum	Median	Maximum	Comparison of 2021 data with the same month in 2010–2019
Gasoline (MM bbl.)					
Jan	38.59	42.31	45.29	49.73	Below pre-COVID range
Feb	38.54	40.94	42.75	47.01	Below pre-COVID range
Mar	45.14	45.23	48.97	52.53	Approaches pre-COVID range
Apr	44.97	44.99	47.25	50.20	Approaches pre-COVID range
May	48.78	46.79	49.00	52.18	Within pre-COVID range
Jun	48.70	45.61	48.14	51.15	Exceeds pre-COVID median
Jul	50.12	47.33	49.09	52.39	Exceeds pre-COVID median
Jet fuel (MM bbl.)					
Jan	9.97	11.57	13.03	19.07	Below pre-COVID range
Feb	10.35	10.90	11.70	18.33	Below pre-COVID range
Mar	11.08	11.82	13.68	16.68	Below pre-COVID median
Apr	11.71	10.83	13.78	16.57	Within pre-COVID range
May	12.12	12.80	13.92	16.90	Approaches pre-COVID range
Jun	14.47	13.03	14.99	17.64	Within pre-COVID range
Jul	15.31	13.62	15.46	18.41	Within pre-COVID range
Diesel (MM bbl.)					
Jan	15.14	12.78	14.41	15.12	Exceeds pre-COVID range
Feb	15.01	12.49	13.51	15.29	Exceeds pre-COVID median
Mar	17.08	14.12	15.25	16.33	Exceeds pre-COVID range
Apr	15.76	14.14	14.93	16.12	Exceeds pre-COVID median
May	16.94	15.11	15.91	17.27	Exceeds pre-COVID median
Jun	14.65	14.53	16.03	16.84	Within pre-COVID range
Jul	16.94	15.44	16.40	17.78	Exceeds pre-COVID median

Data from USEIA *Supply and Disposition* (Att. 12). "Product Supplied," which approximately represents demand because it measures the disappearance of these fuels from primary sources, i.e., refineries, gas processing plants, blending plants, pipelines, and bulk terminals. PADD 5 includes AK, AZ, CA, HI, NV, OR, and WA. Pre-COVID statistics are for the same month in 2010–2019, thus accounting for seasonal and interannual variability.

Despite this several-month surge in demand the year after the Marathon Martinez refinery closed, California and West Coast refineries supplied the rebound in fuels demand while running well below capacity. Four-week average California refinery capacity utilization rates from 20 March through 6 August 2021 ranged from 81.6% to 87.3% (Table 5), similar to those across the

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[87] USEIA, *Supply and Disposition* (Att. 12).
[88] *Id.*

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Table 5. Total California Refinery Capacity Utilization in Four-week Periods of 2021.

barrel (oil): 42 U.S. gallons **barrels/calendar day:** see table caption below

Four-week period	Calif. refinery crude input (barrels/day)	Operable crude capacity (barrels/calendar day)	Capacity utilized (%)
12/26/20 through 01/22/21	1,222,679	1,748,171	69.9 %
01/23/21 through 02/19/21	1,199,571	1,748,171	68.6 %
02/20/21 through 03/19/21	1,318,357	1,748,171	75.4 %
03/20/21 through 04/16/21	1,426,000	1,748,171	81.6 %
04/17/21 through 05/14/21	1,487,536	1,748,171	85.1 %
05/15/21 through 06/11/21	1,491,000	1,748,171	85.3 %
06/12/21 through 07/09/21	1,525,750	1,748,171	87.3 %
07/10/21 through 08/06/21	1,442,750	1,748,171	82.5 %
08/07/21 through 09/03/21	1,475,179	1,748,171	84.4 %
09/04/21 through 10/01/21	1,488,571	1,748,171	85.1 %
10/02/21 through 10/29/21	1,442,429	1,748,171	82.5 %

Total California refinery crude inputs from Att. 20. Statewide refinery capacity as of 1/1/21, after the Marathon Martinez refinery closure, from Att. 23. Capacity in barrels/calendar day accounts for down-stream refinery bottlenecks, types and grades of crude processed, operating permit constraints, and both scheduled and unscheduled downtime for inspection, maintenance, and repairs.

West Coast, and well below maximum West Coast capacity utilization rates for the same months in 2010–2019 (Table 6).[89] [90] [91] Moreover, review of Table 5 reveals 222,000 b/d to more than 305,000 b/d of spare California refinery capacity during this fuels demand rebound. C-21 cont'd

Table 6. West Coast (PADD 5) Percent Utilization of Operable Refinery Capacity.

Month	Capacity Utilized **in 2021**	Pre-COVID range for same month in 2010–2019: Minimum	Median	Maximum
January	73.3 %	76.4 %	83.7 %	90.1 %
February	74.2 %	78.2 %	82.6 %	90.9 %
March	81.2 %	76.9 %	84.8 %	95.7 %
April	82.6 %	77.5 %	82.7 %	91.3 %
May	84.2 %	76.1 %	84.0 %	87.5 %
June	88.3 %	84.3 %	87.2 %	98.4 %
July	85.9 %	83.3 %	90.7 %	97.2 %
August	87.8 %	79.6 %	90.2 %	98.3 %
September	—	80.4 %	87.2 %	96.9 %
October	—	76.4 %	86.1 %	91.2 %
November	—	77.6 %	85.3 %	94.3 %
December	—	79.5 %	87.5 %	94.4 %

Utilization of operable capacity in barrels/calendar day from Att. 24. PADD 5 includes AK, AZ, CA, HI, NV, OR, and WA. Pre-COVID data for the same month in 2010–2019 accounts for seasonal and interannual variability.

[89] CEC Fuel Watch (Att. 20).
[90] USEIA *Refinery Capacity by Individual Refinery*. Data as of Jan 1, 2021; U.S. Energy Information Administration: Washington, D.C. www.eia.gov/petroleum/refinerycapacity Appended hereto as Attachment 23.
[91] USEIA *Refinery Utilization and Capacity*. PADD 5 data as of Sep 2021. U.S. Energy Information Administration: Washington, D.C. www.eia.gov/dnav/pet/pet_pnp_unc_dcu_r50_m.htm Appended hereto as Attachment 24.

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Spare California refining capacity during this period when fuels demand increased to reach pre-COVID levels and crude processing at the Marathon Martinez refinery was shut down (222,000 to 305,000 b/cd) exceeded the total 120,200 b/cd crude capacity of the Phillips 66 refinery.[92] Thus, the project could not fully alleviate the growing condition of overcapacity that drives refined fuels export emission-shifting; rather, it would produce and sell an unprecedented amount of California-targeted HEFA diesel into the California fuels market.

Accordingly, the project can be expected to worsen in-state petroleum refining overcapacity, and hence the emission shift, by adding a very large volume of HEFA diesel to the California liquid combustion fuels mix. Indeed, maximizing additional "renewable" fuels production for the California market is a project objective.[93] The DEIR, however, does not disclose or evaluate this causal factor for the observed emission-shifting impact of recent "renewable" diesel additions.

C-21 cont'd

2.3 The DEIR Does Not Describe or Evaluate Project Design Specifications That Could Cause and Contribute to Significant Emission-shifting Impacts

Having failed to describe the unique capabilities and limitations of the proposed biofuel technology (§§ 1.1.1, 1.1.2), the DEIR does not evaluate how fully integrating renewable diesel into petroleum fuels refining, distribution, and combustion infrastructure could worsen emission shifting by more directly tethering biofuel addition here to petroleum fuel refining for export. Compounding its error, the DEIR does not evaluate the impact of another basic project design specification—project fuels production capacity. The DEIR does not estimate how much HEFA diesel the project could add to the existing statewide distillates production oversupply, or how much that could worsen the emission shifting impact. Had it done so, using readily available state default factors for the carbon intensities of these fuels, the County could have found that the project would likely cause and contribute to significant climate impacts. *See* Table 7 below.

C-22

Accounting for yields on feeds targeting renewable diesel[94] and typical feed and fuel densities shown in Table 7, operating below capacity at 55,000 b/d the project could make approximately 1.86 million gallons per day of renewable diesel, resulting in export of the equivalent petroleum

[92] Though USEIA labels the San Francisco Refinery site as Rodeo, both the Rodeo Facility and the Santa Maria Facility capacities are included in the 120,200 barrels/calendar day (b/cd) cited: USEIA *Refinery Capacity by Individual Refinery* (Att. 23).
[93] DEIR p. 3-22.
[94] Pearlson et al., 2013. A techno-economic review of hydroprocessed renewable esters and fatty acids for jet fuel production. *Biofuels, Bioprod. Bioref.* 7: 89–96. DOI: 10.1002/bbb.1378. Appended hereto as Attachment 25.

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distillates volume. State default factors for full fuel chain "life cycle" emissions associated with the type of renewable diesel proposed account for a range of potential emissions, from lower emission ("residue") to higher emission ("crop biomass") feeds, which is shown in the table.[95] The net emission shifting impact of the project based on this range of factors could thus be approximately 3.96 to 5.72 *million* metric tons (Mt) of CO_2e emitted per year. Table 7. Those potential project emissions would exceed the 10,000 metric tons per year (0.01 Mt/year) significance threshold in the DEIR by 395 to 571 times.

A *conservative* estimate of net cumulative emissions from this impact of the currently proposed biofuel refinery projects in the County, *if* state goals to replace all diesel fuels are achieved more quickly than anticipated, is in the range of approximately 74 Mt to 107 Mt over ten years. *Id.*

C-22 cont'd

Table 7. Potential GHG Emission Impacts from Project-induced Emission Shifting: Estimates Based on Low Carbon Fuel Standard Default Emission Factors.

RD: renewable diesel **PD:** petroleum distillate **CO_2e:** carbon dioxide equivalents **Mt:** million metric tons

Estimate Scope	Phillips 66 Project	Marathon Project	Both Projects
Fuel Shift (millions of gallons per day)[a]			
RD for in-state use	1.860	1.623	3.482
PD equivalent exported	1.860	1.623	3.482
Emission factor (kg CO_2e/galllon)[b]			
RD from residue biomass feedstock	5.834	5.834	5.834
RD from crop biomass feedstock	8.427	8.427	8.427
PD (petroleum distillate [ULSD factor])	13.508	13.508	13.508
Fuel-specific emissions (Mt/year)[c]			
RD from residue biomass feedstock	3.96	3.46	7.42
RD from crop biomass feedstock	5.72	4.99	10.7
PD (petroleum distillate)	9.17	8.00	17.2
Net emission shift impact[d]			
Annual minimum (Mt/year)	3.96	3.46	7.42
Annual maximum (Mt/year)	5.72	4.99	10.7
Ten-year minimum (Mt)	39.6	34.6	74.2
Ten-year maximum (Mt)	57.2	49.9	107

a. Calculated based on DEIR project feedstock processing capacities,* yield reported for refining targeting HEFA diesel by Pearlson et al., 2013, and feed and fuel specific gravities of 0.916 and 0.775 respectively. **b.** CARB default emission factors from tables 2, 4, 7-1, 8 and 9, Low Carbon Fuel Standard Regulation, CCR §§ 95484–95488. **c.** Fuel-specific emissions are the products of the fuel volumes and emission factors shown. **d.** The emission shift impact is the net emissions calculated as the sum of the fuel-specific emissions minus the incremental emission from the petroleum fuel *v.* the same volume of the biofuel. Net emissions are thus equivalent to emissions from the production and use of renewable diesel that *does not* replace petroleum distillates, as shown. Annual values compare with the DEIR significance threshold (0.01 Mt/year); ten-year values provide a conservative estimate of cumulative impact assuming expeditious implementation of State goals to replace all diesel fuels.
* Phillips 66 Project data calculated at 55,000 b/d feed rate, less than its proposed 80,000 b/d project feed capacity.

[95] Low Carbon Fuel Standard Regulation, tables 2, 4, 7-1, 8 and 9. CCR §§ 95484–95488.

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2.4 The DEIR Does Not Consider Air Quality or Environmental Justice Impacts From GHG Co-Pollutants that Could Result from Project Emission Shifting

Having neglected to consider emission shifting that could result from the project, the DEIR does not evaluate air quality or environmental justice impacts that could result from GHG co-emissions. Had it considered the emission-shifting impact the County could have evaluated substantial relevant information regarding potential impacts of GHG co-pollutants.

Among other relevant available information: Pastor and colleagues found GHG co-pollutants emissions of particulate matter from large industrial GHG emitters in general, and refineries in particular, result in substantially increased emission burdens in low-income communities of color throughout the state.[96] Clark and colleagues found persistent disparately elevated exposures to refined fuels combustion emissions among people of color along major roadways in California and the U.S.[97] Zhao and colleagues showed that exposures to the portion of those emissions that could result from climate protection decisions to use more biofuel, instead of more electrification of transportation among other sectors, would cause very large air pollution-induced premature death increments statewide.[98]

C-23

Again, however, the DEIR did not evaluate these potential project emission-shifting impacts.

CONCLUSION: A reasonable potential exists for the project to result in significant climate and air quality impacts by increasing the production and export of California-refined fuels instead of replacing petroleum fuels. This impact would be related to the particular type and use of biofuel proposed. Resultant greenhouse gases and co-pollutants would emit in California from excess petroleum and biofuel refining, and emit in California as well as in other states and nations from petroleum and biofuel feedstock extraction and end-use fuel combustion. The DEIR does not identify, evaluate, or mitigate these significant potential impacts of the project.

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[96] Pastor et al., 2010. *Minding the Climate Gap: What's at stake if California's climate law isn't done right and right away;* College of Natural Resources, Department of Environmental Science, Policy, and Management, University of California, Berkeley: Berkeley, CA; and Program for Environmental and Regional Equity, University of Southern California: Los Angeles, CA. Appended hereto as Attachment 26.
[97] Clark et al, 2017. Changes in transportation-related air pollution exposures by race-ethnicity and socioeconomic status: Outdoor nitrogen dioxide in the United States in 2000 and 2010. *Environmental Health Perspectives* 097012-1 to 097012-10. 10.1289/EHP959. Appended hereto as Attachment 27.
[98] Zhao et al., 2019. Air quality and health co-benefits of different deep decarbonization pathways in California. *Environ. Sci. Technol.* 53: 7163–7171. DOI: 10.1021/acs.est.9b02385. Appended hereto as Attachment 28.

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3. THE DEIR DOES NOT PROVIDE A COMPLETE OR ACCURATE ANALYSIS OF PROCESS HAZARDS AND DOES NOT IDENTIFY, EVALUATE, OR MITIGATE SIGNIFICANT POTENTIAL PROJECT HAZARD IMPACTS

Oil refining is an exceptionally high-hazard industry in which switching to a new and different type of oil feed has known potential to introduce new hazards, intensify existing hazards, or both. Switching from crude petroleum to HEFA feedstock refining introduces specific new hazards that could increase the incidence rate of refinery explosions and uncontrolled fires, hence the likelihood of potentially catastrophic consequences of the project over its operational duration. The DEIR does not identify, evaluate, or mitigate these specific process hazards or significant potential process hazard impacts. A series of errors and omissions in the DEIR further obscures these process hazards and impacts. C-24

3.1 The DEIR Does Not Provide a Complete or Accurate Analysis of Project Hazards

The DEIR states that its process hazard analysis "approach involves examining the potential hazards produced by the inventory of hazardous materials and comparing the baseline with the Project level of hazardous materials use and storage."[99] This comparison is further limited to "how readily the material produces a vapor cloud and how readily the material will ignite and burn,"[100] and to comparing only raw feedstocks or finished refined products.[101] The DEIR then concludes that project feedstocks present substantially lower hazards, "do not end up producing as much lighter-ends at the refinery for storage and processing ... [and] in general, the Project would present less hazards to the public and the impacts would be less than significant."[102] C-25

However, this DEIR analysis is incomplete and inaccurate in ways that obscure rather than identify potential process hazard impacts. In the first instance, its comparison of raw feeds and finished products omits consideration of explosive and flammable mixtures of semi-processed hydrocarbons and hydrogen at high temperature and extreme pressure in project hydro-conversion reactors.[103] This alone shows the DEIR conclusion regarding project process hazards to be unsupported. Yet it is but one omission from the DEIR hazards analysis. The DEIR does

[99] DEIR p. 4.9-321.
[100] DEIR p. 4.9-336.
[101] DEIR p. 4.9-337, Table 4.9-5 (hydrogen; methane; propane; gasoline; jet fuel; diesel fuel; un-weathered light, medium, and heavy crude oil; crude bitumen; cooking oil; and Grade 1 Tallow).
[102] DEIR p. 338.
[103] *See* subsections 1.2 and 1.3 herein above.

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not include, and does not report substantively on results from, any of several standard process hazard analysis requirements applicable to petroleum crude refining. C-25 cont'd

The DEIR did not include or report substantive results of any Process Hazard Analysis (PHA);[104] Hierarchy of Hazard Controls Analysis; Inherent Safety Measure analysis; recommendations to prioritize inherent safety measures and then include safeguards as added layers of protection from any potential project process hazard, or Management of Change (MOC) to manage potential hazards of process change[105] during the proposed feedstock switch.

Although the DEIR mentions some of these standard refinery process safety requirements and safeguards, its description of them is incomplete. PHA, Hierarchy of Hazard Controls Analysis, and Inherent Safety Measure, Safeguard, and Layer of Protection analyses are a sequence of rigorous formal analyses. Together they are designed to identify and evaluate specific hazards in specific processes and processing systems, ensure that the most effective types of measures which can eliminate each identified hazard are prioritized, then add safeguards, in declining order of effectiveness, to reduce any remaining hazard.[106] C-26

PHAs seek to identify and evaluate the potential severity of specific hazards in specific project processes or processing systems.[107] These are the types of hazards the DEIR analysis method cannot identify, as discussed above. Hierarchy of Hazard Controls Analysis then seeks to ensure Inherent Safety Measures, designed to eliminate specific hazards and thus the most effective type of process hazard mitigation, are prioritized to the maximum extent feasible.[108] In contrast, the DEIR analysis fails to identify process hazards evidenced by proposed project use of "safety" flaring,[109] evaluate the significance of hazardous releases from flaring, or analyze mitigation measures which may be necessary in addition to the flaring safeguard and could reduce flaring.

The DEIR could have used an appropriate and established standard method to identify, evaluate, and analyze ways to lessen or avoid process hazards that could result from the project. Had it done so significant process hazards could have been identified, as discussed below. C-27

[104] A PHA is a hazard evaluation to identify, evaluate, and control the hazards involved in a process.
[105] See California refinery process safety management regulation, CCR § 5189.
[106] *Id.*
[107] *Id.*
[108] *Id.*
[109] DEIR p. 3-17.

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3.2 The DEIR Does Not Identify or Evaluate Significant Process Hazard Impacts, Including Refinery Explosions and Fires, That Could Result from the Project

C-28

Had the DEIR provided a complete and accurate process hazard evaluation the County could have identified significant impacts that would result from project process hazards.[110]

3.2.1 <u>The DEIR does not disclose or evaluate available information which reveals that the project could increase refinery explosion and fire risks compared with crude refining</u>

C-29

After a catastrophic pipe failure ignited in the Richmond refinery sending 15,000 people to hospital emergency rooms, a feed change was found to be a causal factor in that disaster—and failures by Chevron and public safety officials to take hazards of that feed change seriously were found to be its root causes. The oil industry knew that introducing a new and different crude into an existing refinery can introduce new hazards. More than this, as it has long known, side effects of feed processing can cause hazardous conditions in the same types of hydro-conversion units now proposed to be repurposed for HEFA biomass feeds, and feedstock changes are among the most frequent causes of dangerous upsets in these hydro-conversion reactors.[111]

Differences between the new biomass feedstock proposed and crude oil are more extreme than those among crudes which Chevron ignored the hazards of before the August 2012 disaster in Richmond, and involve oxygen in the feed, rather than sulfur as in that disaster. This categorical difference between oxygen and sulfur, rather than a degree of difference in feed sulfur content, risks further minimizing the accuracy, or even feasibility, of predictions based on historical data. At 10.8–11.5 wt. %, HEFA feeds have very high oxygen content, while the petroleum crude fed to refinery processing has virtually none.[112] Carbonic acid forms from that oxygen in HEFA processing.[113] Carbonic acid corrosion is a known hazard in HEFA processing.[114] But this corrosion mechanism, and the specific locations it attacks in the refinery, differ from those of the sulfidic corrosion involved in the 2012 Richmond incident. Six decades of industry experience with sulfidic corrosion cannot reliably guide—and could misguide—the refiner as it attempts to find, then fix, damage from this new hazard before it causes equipment failures.[115]

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[110] My recent work has included in-depth review and analysis of process hazards associated with crude-to-biofuel refinery conversions; summaries of this work are excerpted from Karras, 2021a (Att. 2) in §§ 3.2.1–3.2.5 herein.
[111] Karras, 2021a (Att. 2).
[112] *Id.*
[113] Chan, 2020. *Converting a Petroleum Diesel Refinery for Renewable Diesel;* White Paper / Renewable Diesel. Burns McDonnell. www.burnsmcd.com. Appended hereto as Attachment 29.
[114] *Id.*
[115] Karras, 2021a (Att. 2).

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Worse, high-oxygen HEFA feedstock can boost hydrogen consumption in hydro-conversion reactors dramatically. That creates more heat in reactors already prone to overheating in petroleum refining. Switching repurposed hydrocrackers and hydrotreaters to HEFA feeds would introduce this second new oxygen-related hazard.[116]

A specific feedback mechanism underlies this hazard. The hydro-conversion reactions are exothermic: they generate heat.[117] [118] [119] When they consume more hydrogen, they generate more heat.[120] Then they get hotter, and crack more of their feed, consuming even more hydrogen,[121] [122] so "the hotter they get, the faster they get hot."[123] And the reactions proceed at extreme pressures of 600–2,800 pound-force per square inch,[124] so the exponential temperature rise can happen fast.

Refiners call these runaway reactions, temperature runaways, or "runaways" for short. Hydro-conversion runaways are remarkably dangerous. They have melted holes in eight-inch-thick, stainless steel, walls of hydrocracker reactors,[125] and worse. Consuming more hydrogen per barrel in the reactors, and thereby increasing reaction temperatures, HEFA feedstock processing can be expected to increase the frequency and magnitude of runaways.[126]

C-29 cont'd

High temperature hydrogen attack or embrittlement of metals in refining equipment with the addition of so much more hydrogen to HEFA processing is a third known hazard.[127] And given the short track record of HEFA processing, the potential for other, yet-to-manifest, hazards cannot be discounted.[128]

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[116] *Id.*
[117] Robinson and Dolbear, 2007. Commercial Hydrotreating and Hydrocracking. *In:* Hydroprocessing of heavy oils and residua. Ancheyta, J., and Speight, J., eds. CRC Press, Taylor & Francis Group: Boca Raton, FL. ISBN-13: 978-0-8493-7419-7. Appended hereto as Attachment 30.
[118] van Dyk et al., 2019. Potential synergies of drop-in biofuel production with further co-processing at oil refineries. *Biofuels Bioproducts & Biorefining* 13: 760–775. DOI: 10.1002/bbb.1974. Appended hereto as Attachment 31.
[119] Chan, 2020 (Att. 29).
[120] van Dyk et al., 2019 (Att. 31).
[121] *Id.*
[122] Robinson and Dolbear, 2007 (Att. 30).
[123] *Id.*
[124] *Id.*
[125] *Id.*
[126] Karras, 2021a (Att 2).
[127] Chan, 2020 (Att. 29).
[128] Karras, 2021a (Att. 2).

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On top of all this, interdependence across the process system—such as the critical need for real-time balance between hydro-conversion units that feed hydrogen and hydrogen production units that make it—magnifies these hazards. Upsets in one part of the system can escalate across the refinery. Hydrogen-related hazards that manifest at first as isolated incidents can escalate with catastrophic consequences.[129] C-29 cont'd

3.2.2 The DEIR does not disclose or evaluate available information about potential consequences of hydrogen-related hazards that the project could worsen

Significant and sometimes catastrophic incidents involving the types of hydrogen processing proposed by the project are unfortunately common in crude oil refining, as reflected in the following incident briefs posted by *Process Safety Integrity*[130] report:

- Eight workers are injured and a nearby town is evacuated in a 2018 hydrotreater reactor rupture, explosion and fire.
- A worker is seriously injured in a 2017 hydrotreater fire that burns for two days and causes an estimated $220 million in property damage.
- A reactor hydrogen leak ignites in a 2017 hydrocracker fire that causes extensive damage to the main reactor. C-30
- A 2015 hydrogen conduit explosion throws workers against a steel refinery structure.
- Fifteen workers die, and 180 others are injured, in a series of explosions when hydrocarbons flood a distillation tower during a 2005 isomerization unit restart.
- A vapor release from a valve bonnet failure in a high-pressure hydrocracker section ignites in a major 1999 explosion and fire at the Chevron Richmond refinery.
- A worker dies, 46 others are injured, and the community must shelter in place when a release of hydrogen and hydrocarbons under high temperature and pressure ignites in a 1997 hydrocracker explosion and fire at the Tosco (now Marathon) Martinez refinery.
- A Los Angeles refinery hydrogen processing unit pipe rupture releases hydrogen and hydrocarbons that ignite in a 1992 explosion and fires that burn for three days.
- A high-pressure hydrogen line fails in a 1989 fire which buckles the seven-inch-thick steel of a hydrocracker reactor that falls on other nearby Richmond refinery equipment.
- An undetected vessel overpressure causes a 1987 hydrocracker explosion and fire.

These incidents all occurred in the context of crude oil refining. For the reasons described in this section, there is cause for concern that the frequency and severity of these types of hydrogen-related incidents could increase with HEFA processing.

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[129] *Id.*

[130] Process Safety Integrity *Refining Incidents;* accessed Feb–Mar 2021; available for download at: https://processsafetyintegrity.com/incidents/industry/refining. Appended hereto as Attachment 32.

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3.2.3 The DEIR does not disclose or evaluate the limited effectiveness of current and proposed safeguards against hydrogen-related hazards that the project could worsen

Refiners have the ability to use extra hydrogen to quench, control, and guard against runaway reactions, a measure which has proved partially effective and appears necessary for hydro-conversion processing to remain profitable. As a safety measure, however, it has proved ineffective so often that hydro-conversion reactors are equipped to depressurize rapidly to flares.[131] [132] And that last-ditch safeguard, too, has repeatedly failed to prevent catastrophic incidents. The Richmond and Martinez refineries were equipped to depressurize to flares, for example, during the 1989, 1997, 1999 and 2012 incidents described above.[133] C-31

3.2.4 The DEIR does not disclose or evaluate available site-specific data informing the frequency with which hydrogen-related hazards of the project could manifest

In fact, precisely because it is a last-ditch safeguard, to be used only when all else fails, flaring reveals how frequently these hazards manifest as potentially catastrophic incidents. Despite current safeguards, hydro-conversion and hydrogen-related process safety hazards which their HEFA conversion projects could worsen contribute to significant flaring incidents at the Phillips 66 Rodeo and Marathon Martinez refineries frequently. C-32

Table 8 summarizes specific examples of causal analysis reports for significant flaring which show that hydrogen-related hazard incidents occurred at the refineries a combined total of 100 times from January 2010 through December 2020. This is a conservative estimate, since incidents can cause significant impact without causing environmentally significant flaring. Nevertheless, it represents, on average, and accounting for the Marathon plant closure since 28 April 2020, a hydrogen-related incident frequency at one of these refineries every 39 days.[134]

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[131] Robinson and Dolbear, 2007 (Att. 30).
[132] Chan, 2020 (Att. 29).
[133] Karras, 2021a (Att. 2).
[134] *Id.*; and BAAQMD *Causal Analysis Reports for Significant Flaring*; Bay Area Air Quality Management District: San Francisco, CA. Reports submitted by Phillips and former owners of the Phillips 66 San Francisco Refinery at Rodeo, and submitted by Marathon and formers owners of the Marathon Martinez Refinery, pursuant to BAAQMD Regulation 12-12-406. Appended hereto as Attachment 33;

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Table 8. Examples from 100 hydrogen-related process hazard incidents at the Phillips 66 Rodeo and Marathon Martinez refineries, 2010–2020.

Date [a]	Refinery	Hydrogen-related causal factors reported by the refiner [a]
3/11/10	Rodeo	A high-level safety alarm during a change in oil feed shuts down Unit 240 hydrocracker hydrogen recycle compressor 2G-202, forcing the sudden shutdown of the hydrocracker
5/13/10	Martinez	A hydrotreater charge pump bearing failure and fire forces #3 HDS hydrotreater shutdown [b]
9/28/10	Martinez	A hydrocracker charge pump trip leads to a high temperature excursion in hydrocracker reactor catalyst beds that forces sudden unplanned hydrocracker shutdown [c]
2/17/11	Martinez	A hydrogen plant fire caused by process upset after a feed compressor motor short forces the hydrogen plant shutdown; the hydrocracker shuts down on sudden loss of hydrogen
9/10/12	Rodeo	Emergency venting of hydrogen to the air from one hydrogen plant to relieve a hydrogen overpressure as another hydrogen plant starts up ignites in a refinery hydrogen fire
10/4/12	Rodeo	A hydrocracker feed cut due to a hydrogen makeup compressor malfunction exacerbates a reactor bed temperature hot spot, forcing a sudden hydrocracker shutdown [d]
1/11/13	Martinez	Cracked, overheated and "glowing" hydrogen piping forces an emergency hydrogen plant shutdown; the loss of hydrogen forces hydrocracker and hydrotreater shutdowns
4/17/15	Martinez	Cooling pumps trip, tripping the 3HDS hydrogen recycle compressor and forcing a sudden shutdown of the hydrotreater as a safety valve release cloud catches fire in this incident [e]
5/18/15	Rodeo	A hydrocracker hydrogen quench valve failure forces a sudden hydrocracker shutdown [f]
5/19/15	Martinez	A level valve failure, valve leak and fire result in an emergency hydrotreater shutdown
3/12/16	Rodeo	A Unit 240 level controller malfunction trips off hydrogen recycle compressor G-202, which forces an immediate hydrocracker shutdown to control a runaway reaction hazard [g]
1/22/17	Martinez	An emergency valve malfunction trips its charge pump, forcing a hydrocracker shutdown
5/16/19	Martinez	A recycle compressor shutdown to fix a failed seal valve forces a hydrocracker shutdown [h]
6/18/19	Martinez	A control malfunction rapidly depressurized hydrogen plant pressure swing absorbers
11/11/19	Rodeo	A failed valve spring shuts down hydrogen plant pressure swing absorbers in a hydrogen plant upset; the resultant loss of hydrogen forces a sudden hydrotreater shutdown [i]
2/7/20	Martinez	An unprotected oil pump switch trips a recycle compressor, shutting down a hydrotreater
3/5/20	Rodeo	An offsite ground fault causes a power sag that trips hydrogen make-up compressors, forcing the sudden shutdown of the U246 hydrocracker [j]
10/16/20	Rodeo	A pressure swing absorber valve malfunction shuts down a hydrogen plant; the emergency loss of hydrogen condition results in multiple process unit upsets and shutdowns [k]

a. Starting date of the environmentally significant flaring incident, as defined by Bay Area Air Quality Management District Regulations § 12-12-406, which requires causal analysis by refiners that is summarized in this table. An incident often results in flaring for more than one day. The 100 "unplanned" hydro-conversion flaring incidents these examples illustrate are provided in Attachment 33 (*see* Att. 2 for list). Notes b–k below further describe some of these examples with quotes from refiner causal reports. **b.** "Flaring was the result of an 'emergency' ... the #3 HDS charge pump motor caught fire ... ." **c.** "One of the reactor beds went 50 degrees above normal with this hotter recycle gas, which automatically triggered the 300 lb/minute emergency depressuring system." **d.** "The reduction in feed rates exacerbated an existing temperature gradient ...higher temperature gradient in D-203 catalyst Bed 4 and Bed 5 ... triggered ... shutdown of Unit 240 Plant 2." **e.** "Flaring was the result of an Emergency. 3HDS had to be shutdown in order to control temperatures within the unit as cooling water flow failed." **f.** "Because hydrocracking is an exothermic process ... [t]o limit temperature rise... [c]old hydrogen quench is injected into the inlet of the intermediate catalyst beds to maintain control of the cracking reaction." **g.** "Because G-202 provides hydrogen quench gas which prevents runaway reactions in the hydrocracking reactor, shutdown of G-202 causes an automatic depressuring of the Unit 240 Plant 2 reactor ... ." **h.** "Operations shutdown the Hydrocracker as quickly and safely as possible." **i.** "[L]oss of hydrogen led to the shutdown of the Unit 250 Diesel Hydrotreater." **j.** "U246 shut down due to the loss of the G-803 A/B Hydrogen Make-Up compressors."
k. "Refinery Emergency Operating Procedure (REOP)-21 'Emergency Loss of Hydrogen' was implemented."

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Sudden unplanned or emergency shutdowns of major hydro-conversion or hydrogen production plants occurred in 84 of these 100 reported process safety hazard incidents.[135] Such sudden forced shutdowns of *both* hydro-conversion and hydrogen production plants occurred in 22 of these incidents.[136] In other words, incidents escalated to refinery-level systems involving multiple plants frequently—a foreseeable consequence, given that both hydro-conversion and hydrogen production plants are susceptible to upset when the critical balance of hydrogen production supply and hydrogen demand between them is disrupted suddenly. In four of these incidents, consequences of underlying hazards included fires in the refinery.[137] C-32 cont'd

3.2.5 The DEIR did not identify significant hydrogen-related process hazard impacts that could result from the project

Since switching to HEFA refining is likely to further increase the frequency and magnitude of these already-frequent significant process hazard incidents, and flaring has proven unable to prevent every incident from escalating to catastrophic proportions, catastrophic consequences of HEFA process hazards are foreseeable.[138] The DEIR did not identify, evaluate, or mitigate these significant potential impacts of the project. C-33

3.2.6 The DEIR did not identify or evaluate the potential for deferred mitigation of process hazards to foreclose currently feasible hazard prevention measures

As the U.S. Chemical Safety Board found in its investigation of the 2012 Richmond refinery fire: "It is simpler, less expensive, and more effective to introduce inherently safer features during the design process of a facility rather than after the process is already operating. Process upgrades, rebuilds, and repairs are additional opportunities to implement inherent safety concepts."[139] Thus, licensing or building the project without first specifying inherently safer features to be built into it has the potential to render currently feasible mitigation measures infeasible at a later date. The DEIR does not address this potential. Examples of specific inherently safer measures which the DEIR could have but did not identify or analyze as mitigation for project hazard impacts include, but are not limited to, the following: C-34

[135] Karras, 2021a (Att. 2); BAAQMD *Causal Analysis Reports for Significant Flaring* (Att. 33).
[136] Karras, 2021a (Att. 2); BAAQMD *Causal Analysis Reports for Significant Flaring* (Att. 33).
[137] Karras, 2021a (Att. 2); BAAQMD *Causal Analysis Reports for Significant Flaring* (Att. 33).
[138] Karras, 2021a (2021).
[139] CSB, 2015 (Att. 7).

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Feedstock processing hazard condition. The County could adopt a project condition to forgo or minimize the use of particularly high process hydrogen demand feedstocks. Since increased process hydrogen demand would be a causal factor for the significant process hazard impacts (§§ 3.2.1–3.2.5) and some HEFA feedstocks increase process hydrogen demand significantly more than other others (§§ 1.2.2, 1.3.1), avoiding feedstocks with that more hazardous processing characteristic would lessen or avoid the hazard impact.

Product slate processing hazard condition. The County could adopt a project condition to forgo or minimize particularly high-process hydrogen demand product slates. Minimizing or avoiding HEFA refining to boost jet fuel yield, which significantly increases hydrogen demand (§§ 1.2.1, 1.2.2), would thereby lessen or avoid further intensified hydrogen reaction hazard impacts.

Hydrogen input processing hazard condition. The County could adopt a project condition to limit hydrogen input per barrel, which could lessen or avoid the process hazard impacts from particularly high-process hydrogen demand feedstocks, product slates, or both.

Hydrogen backup storage processing hazard condition. The County could adopt a project condition to store hydrogen onsite for emergency backup use. This would lessen or avoid hydro-conversion plant incident impacts caused by the sudden loss of hydrogen inputs when hydrogen plants malfunction, a significant factor in escalating incidents as discussed in §§ 3.2.1 and 3.2.4.

Rather than suggesting how or whether the subject project hazard impact could adequately be mitigated, the examples illustrate that the DEIR could have analyzed mitigation measures that are feasible now, and whether deferring those measures might render them infeasible later.

C-34 cont'd

3.3 Uncertain Degree of Project Safety Oversight

Of additional concern, it is not clear at present whether the process safety requirements currently applicable to petroleum refineries in California will be fully applicable requirements applied to the proposed biofuel refinery, and the DEIR does not disclose this uncertainty.

CONCLUSION: There is a reasonable potential for the proposed changes in refinery feedstock processing to result in specific hazard impacts involving hydro-conversion processing, including explosion and uncontrolled refinery fire, in excess of those associated with historic petroleum crude refining operations. The DEIR did not identify, evaluate, or mitigate these significant process hazard impacts that could result from the project.

C-35

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4. AIR QUALITY AND HAZARD RELEASE IMPACTS OF PROJECT FLARING THAT AVAILABLE EVIDENCE INDICATES WOULD BE SIGNIFICANT ARE NOT IDENTIFIED, EVALUATED, OR MITIGATED IN THE DEIR

For the reasons discussed above, the project would introduce new hazards that can be expected to result in new hazard incidents that involve significant flaring, and would be likely increase the frequency of significant flaring. Based on additional available evidence, the episodic releases of hazardous materials from flares would result in acute exposures to air pollutants and significant impacts. The DEIR does not evaluate the project flaring impacts or their potential significance and commits a fundamental error which obscures these impacts. C-36

4.1 The DEIR Did Not Evaluate Environmental Impacts of Project Flaring

Use of refinery flare systems—equipment to rapidly depressurize process vessels and pipe their contents to uncontrolled open-air combustion in flares—is included in the project.[140] The DEIR acknowledges this use of flaring to partially mitigate process hazard incidents[141] and that the flares emit combusted gases.[142] However, the DEIR does not discuss potential environmental impacts of project flaring anywhere in its 628 pages. The DEIR does not disclose or mention readily available data showing frequently recurrent significant flaring at the refinery that is documented and discussed in §3.2.4 above, or any other site-specific flare impact data. This represents an enormous gap in its environmental analysis. C-37

4.2 The DEIR Did Not Identify, Evaluate, or Mitigate Significant Potential Flare Impacts That Could Result from the Project

Had the DEIR assessed available flare frequency, magnitude and causal factors information, the County could have found that project flaring impacts would be significant, as discussed below. C-38

4.2.1 <u>The DEIR did not consider incidence data that indicate the potential for significant project flaring impacts</u>

Flaring emits a mix of many toxic and smog forming air pollutants—particulate matter, hydrocarbons ranging from polycyclic aromatics to methane, sulfur dioxide, hydrogen sulfide, and others—from partially burning off enormous gas flows. Most of the 100 significant flaring incidents documented and described in subsection 3.2.4 above flared more than two million C-39

[140] DEIR p. 3-29.
[141] DEIR pp. 3-15, 3-17.
[142] DEIR p. 3-17.

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standard cubic feet (SCF) of vent gas each, and many flared more than ten million SCF.[143] The plumes cross into surrounding communities, where people experience acute exposures to flared pollutants repeatedly, at levels of severity and at specific locations which vary with the specifics of the incident and atmospheric conditions at the time when flaring recurs.

In 2005, flaring was linked to episodically elevated localized air pollution by analyses of a continuous, flare activity-paired, four-year series of hourly measurements in the ambient air near the fence lines of four Bay Area refineries.[144] By 2006, the regional air quality management district independently confirmed the link, assessed community-level impacts, and set environmental significance thresholds for refinery flares.[145] [146] These same significance thresholds were used to require Phillips 66 and Marathon to report the flare incident data described in subsection 3.2.4 and in this subsection above.[147] [148]

Thus, each of the hundred hydrogen-related flaring incidents since 2010 at the Phillips 66 Rodeo and Marathon Martinez refineries *individually* exceeded a relevant significance threshold for air quality. New hazard incidents, and hence flare incidents, can be expected to result from repurposing the same process units that flared without removing the underlying causes for that flaring, which is what implementing the project would do.[149] Consequently, the proposed project can be expected to result in significant episodic air pollution impacts.

C-39 cont'd

4.2.2 The DEIR did not consider causal evidence that indicates project flare incident rates have the potential to exceed those of historic petroleum crude refining

Further, the project would do more than repurpose the same process units that flare without removing the underlying causes for that flaring. The project would switch to new and very different feeds with new corrosion and mechanical integrity hazards, new chemical hydrogen

C-40

[143] Karras, 2021a (Att. 2).
[144] Karras and Hernandez, 2005. *Flaring Hot Spots: Assessment of episodic local air pollution associated with oil refinery flaring using sulfur as a tracer;* Communities for a Better Environment: Oakland and Huntington Park, CA. Appended hereto at Attachment 34.
[145] Ezersky, 2006. *Staff Report: Proposed Amendments to Regulation 12, Miscellaneous Standards of Performance, Rule 12, Flares at Petroleum Refineries;* 3 March 2006. Planning and Research Division, Bay Area Air Quality Management District: San Francisco, CA. *See esp.* pp. 5–8, 13, 14. Appended hereto as Attachment 35.
[146] BAAQMD Regulations, § 12-12-406. Bay Area Air Quality Management District: San Francisco, CA. *See* Regulation 12, Rule 12, at: https://www.baaqmd.gov/rules-and-compliance/current-rules
[147] *Id.*
[148] BAAQMD *Causal Reports for Significant Flaring* (Att. 33).
[149] Section 3 herein; Karras, 2021a (Att. 2).

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demands and extremes in reaction heat runaways, in processes and systems prone to potentially severe damage from these very causal mechanisms; damage it would attempt to avoid by flaring. *See* Section 3. It is thus reasonably likely that compared with historic crude refining, the new HEFA process hazards might more frequently manifest in refinery incidents (*Id.*), hence flaring. C-40 cont'd

4.2.3 The DEIR did not assess flare impact frequency, magnitude, or causal factors

As stated, the DEIR does not discuss potential environmental impacts of project flaring. It does not disclose, discuss, evaluate or otherwise address any of the readily available data, evidence or information described in this subsection (§ 4.2). C-41

4.3 An Exposure Assessment Error in the DEIR Invalidates its Impact Conclusion and Obscures Project Flare Impacts

A fundamental error in the DEIR obscures flare impacts. The DEIR ignores acute exposures to air pollution from episodic releases entirely to conclude that air quality impacts from project refining would not be significant based only on long-term annual averages of emissions.[150] The danger in the error may best be illustrated by example: The same mass of hydrogen sulfide emission into the air that people nearby breathe without perceiving even its noxious odor when it is emitted continuously over a year can kill people *in five minutes* when that "annual average" emits all at once in an episodic release.[151] Acute and chronic exposure impacts differ. C-42

4.3.1 The DEIR air quality analysis failed to consider the environmental setting of the project

An episodic refinery release can cause locally elevated ambient air pollution for hours or days with little or no effect on refinery emissions averaged over the year. At the same time, people in the plume released cannot hold their breath more than minutes and can experience toxicity due to inhalation exposure. In concluding the project would cause no significant air quality impact without considering impacts from acute exposures to episodic releases, the DEIR did not properly consider these crucial features of the project environmental setting. C-43

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[150] DEIR pp. 4.3-52 through 4.3-56 and 4.3-69 through 4.3-72. *See* also pp. 3-37 through 3.39.

[151] Based on H_2S inhalation thresholds of 0.025–8.00 parts per million for perceptible odor and 1,000–2,000 ppm for respiratory paralysis followed by coma and death within seconds to minutes of exposure. *See* Sigma-Aldrich, 2021. *Safety Data Sheet: Hydrogen Sulfide;* Merck KGaA: Darmstadt, DE. Appended hereto as Attachment 36.

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4.3.2 The DEIR air quality analysis failed to consider toxicological principles and practices

The vital need to consider both exposure concentration and exposure duration has been a point of consensus among industrial and environmental toxicologists for decades. This consensus has supported, for example, the different criteria pollutant concentrations associated with a range of exposure durations from 1-hour to 1-year in air quality standards that the DEIR itself reports.[152] Rather than providing any factual support for concluding impacts are not significant based on analysis that excludes acute exposures to episodic releases, the science conclusively rebuts that analytical error in the DEIR. C-44

4.3.3 The DEIR air quality analysis failed to consider authoritative findings and standards that indicate project flaring would exceed a community air quality impact threshold

Crucially, the Bay Area Air Quality Management District adopted the significance threshold for flaring discussed above based on *one-hour* measurements and modeling of flare plumes, which, it found, "show an impact on the nearby community." [153] On this basis the District further found that its action to adopt that significance threshold "will lessen the emissions impact of flaring on those who live and work within affected areas."[154] Thus the factual basis for finding flaring impacts significant is precisely the evidence that the DEIR ignores in wrongly concluding that project refining impacts on air quality are not significant. C-45

CONCLUSION: The project is likely to result in a significant air quality impact associated with flaring, and has reasonable potential to worsen this impact compared with historic petroleum crude refining operations at the site. The DEIR does not identify, evaluate, or analyze measures to lessen or avoid this significant potential impact.

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[152] DEIR pp. 4.3-37, 4.3-38; tables 4.3-1, 4.3-2.
[153] Ezersky, 2006 (Att. 35).
[154] *Id.*

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5. THE DEIR OBSCURES THE SIGNIFICANCE OF PROJECT IMPACTS BY ASSERTING AN INFLATED ALTERNATIVE BASELINE WITHOUT FACTUAL SUPPORT

Finding the San Francisco Refining Complex (SFC)[155] emitted at lower than historic rates in 2020, the DEIR compares project impacts with near-term future conditions based on historic emissions.[156] Its baseline does not represent existing conditions when the project was proposed; it looks backward for snapshots of historic conditions to compare with project impacts. C-46

The DEIR argues that its backward-looking baseline better represents future conditions than 2020 due to COVID-19.[157] But it provides no factual support for assuming that COVID-19 caused all of the SFC crude rate cut in 2020, or that the past represents the future. The DEIR baseline analysis does not disclose, accurately describe, or evaluate available evidence that a worsening crude supply limitation, unique to the SFC, forced it to cut feed rate. As a result the DEIR compares project impacts with an inflated baseline, which obscures the significance of project impacts, and causes its environmental impacts evaluation to be inaccurate.

5.1 The DEIR Baseline Analysis Does Not Provide or Evaluate a Complete or Accurate Description of the Unique SFC Configuration and Setting Which Affect Baseline Operations by Creating a Unique Feedstock Supply Limitation C-47

5.1.1 <u>The DEIR baseline analysis provides an incomplete, inaccurate and misleading description of the unique physical SFC configuration, its unique geographic setting, and its resultant limited access to petroleum resources for refinery feedstock</u>

The DEIR does not disclose, evaluate, or accurately describe the functional interdependence of SFC components, their unique geography, and the resultant unique limitations in accessible crude feedstock for the SFC. Map 1 illustrates the unique geographic distribution of SFC components in relation to the landlocked crude resources that the SFC was uniquely designed to access for feedstock.[158] The Rodeo Refining Facility (RF) of the SFC ("A" in Map 1) receives most of its oil feed as crude from San Joaquin Valley oilfields ("E") that is blended with, and crucially, thinned by, oils processed in its Santa Maria Refining Facility (SMF) ("B") from crude that its pipeline system collects from offshore ("C") and onshore ("D") Central Coast oilfields. C-48

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[155] The San Francisco Refining Complex (SFC) includes its Rodeo Refining Facility (RF), Santa Maria Refining Facility (SMF) and pipelines that feed crude to the SMF and crude blended with semi-refined oil to the RF.

[156] DEIR pp. 3-37 through 3-39; see also pp. 3-21, 5-12. Note that the DEIR picks different historic baseline periods for comparison with refinery (2019) and marine vessel (2017–2019) emissions.

[157] *Id.*

[158] Map 1 is only approximately to scale, but otherwise consistent with facility and pipeline maps in the DEIR.

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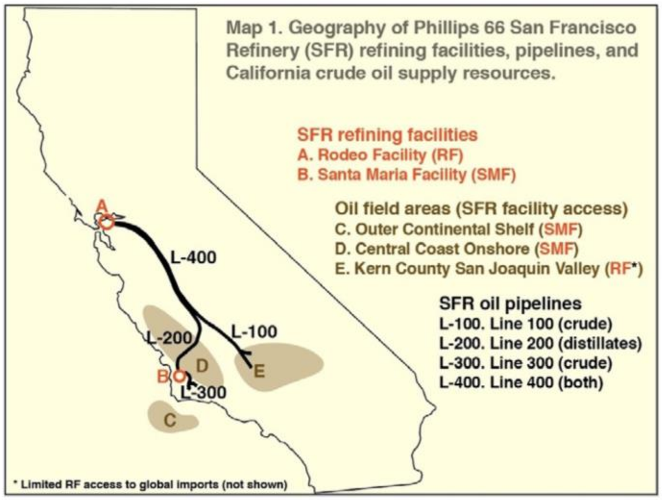

The SMF ("B") has no seaport access to import foreign or Alaskan crude via marine vessels[159] which other refineries rely on for most of the crude refined statewide.[160] It receives crude only via its locally-connected pipeline, limiting its access to crude from outside the local area almost entirely.[161] Onshore oilfields in San Luis Obispo, northern Santa Barbara and southern Monterey counties ("D") feed the SMF through the local pipeline system, either via other local pipelines connected to it or via trucks unloading into a pump station, which is limited to roughly half of the SMF capacity.[162] Outer Continental Shelf (OCS) oilfields off northern Santa Barbara County supplied up to 85% of SMF crude as of 2014,[163] but that 85% came from only a few OCS fields ("C") which had pipeline connections to the local SMF pipeline system ("L-300").[164] C-48 cont'd

The DEIR does not disclose the lack of SMF seaport access—which crucially limits its feed access almost entirely to local OCS and onshore crude—then obscures the larger effect of this on

[159] SLOC, 2014. *Phillips 66 Company Rail Spur Extension and Crude Unloading Project Revised Public Draft Environmental Impact Report;* prepared for San Luis Obispo County (SLOC) by Marine Research Specialists (MRS). October 2014. SCH# 2013071028. Excerpt including title page and project description. Appended hereto as Attachment 37.
[160] *Crude Oil Sources for California Refineries;* California Energy Commission: Sacramento, CA. (CEC, 2021a). Appended hereto as Attachment 38.
[161] SLOC, 2014 (Att. 37).
[162] *Id.*
[163] *Id.*
[164] These OCS oilfields that the SMF could historically or currently access via pipelines are the Point Pedernales, Point Arguello, Hondo, Pescado, and Sacate fields. See BOEM, 2021b (map appended hereto as Attachment 44).

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the project baseline through clear error in its setting description. SFC pipeline system Line 100 ("L-100" in Map 1) runs from Kern County oilfields in the San Joaquin Valley ("E") north to the junction with Line 200 from the SMF and Line 400 to the RF, where the Kern crude and semi-refined SMF output flow north through Line 400 to the RF.[165] But the DEIR describes Line 100 as directly supplying the SMF: "Two other pipelines—Line 100 and Line 300—*connect the Santa Maria Site* to crude oil collection facilities elsewhere in California ... [including] Kern County ... ." DEIR at 3-21 (*emphasis added*). This clear error in the DEIR obscures the fact that the SMF lacks economic access to San Joaquin oilfields—and further obscures the mix of oils flowing through Line 400 to the RF.

These existing conditions in the project setting that the DEIR omits or describes inaccurately have a profound systemic effect on the project baseline. Instead of pipeline access to the largest regional crude resource in California[166] as the DEIR wrongly describes, the SMF lacks both that access, and seaport access to imports that provide the largest source of crude refined statewide,[167] which the DEIR also fails to disclose. That doubly limited access makes SMF operations exceptionally vulnerable to loss of local crude supply. The systemic effect has to do with how changes in the mix of San Joaquin Valley crude and semi-refined oils from the SMF flowing to the RF—that mix in the pipe to the RF being a fact the error in the DEIR described above also obscures—could limit crude supply for the RF.

C-48 cont'd

The DEIR states that the entire pipeline system would shutter in place when the SMF closes, providing that conclusion as a reason for the "transitional" increase in permitted crude inputs to the RF through its marine terminal. It further concludes that continued crude refining would be infeasible at the RF if the RF loses access to crude and semi-refined oils from the SMF and pipeline system.[168] Although the DEIR does not explain this, a reason the pipeline system may not continue to function after closure of the SMF is that lines 100 and 400 cannot physically

[165] Careful review of DEIR Figure 3-5 confirms this description of pipeline flows, once the reader knows that crude *does not* flow to the SMF through Line 200. Without knowing that, however, the erroneous assertion in the text on page 3-21 of the DEIR and its Figure 3-5 can only be viewed to make sense together by assuming the opposite.
[166] San Joaquin Valley extraction in District 4 (Kern, Tulare, and Inyo counties) comprised 71% of California crude extracted, 445% more than any other oil resource district in the state, in 2017. See DOGGR, 2017. *2017 Report of California Oil and Gas Production Statistics;* California Department of Conservation, Division of Oil, Gas, & Geothermal Resources: Sacramento, CA. Appended hereto as Attachment 39.
[167] CEC, 2021a (Att. 38).
[168] DEIR p. 5-3.

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function effectively without input from the SMF. The less viscous SMF output[169] thins the viscous (thick like molasses) San Joaquin Valley Heavy crude ("E" in Map 1), enabling it to move efficiently through Line 400 ("L-400") to the RF. Loss of SMF feed input and hence Line 400 thinning oil could effectively *disable* the pipeline feedstock supply for the RF. This is the profound systemic effect that severely limited SMF access to crude could cause.

C-48 cont'd

Thus, the exceptional vulnerability to local crude supply loss described above is a critical condition affecting the SMF, RF, and entire San Francisco Refining Complex.

No other California refinery is built to access isolated crude resources for its feed with land-locked front-end refining hundreds of pipeline miles from its back-end refining, and no other faces the feed supply crisis this built-in reliance on geographically limited and finite resources has wrought. The DEIR does not disclose or evaluate this crisis in its baseline analysis.

5.2 The DEIR Baseline Analysis Does Not Disclose or Evaluate Actions by the Refiner and Others Which Demonstrate Their Concerns that Feedstock Supply Limitations Could Affect Near Term Future Refinery Operating Conditions

C-49

Actions by Phillips 66 and others prior to and outside the project review demonstrated their concerns that the feedstock supply limitation discussed above could affect near-term future operating conditions. The DEIR does not disclose or evaluate the actions discussed below.

5.2.1 <u>Phillips 66 action to expand marine vessel imports warned of refinery curtailment risk</u>

C-50

On 6 September 2019 Carl Perkins, then the Phillips 66 Rodeo Facility manager, wrote Jack Broadbent, the Executive Director of the Bay Area Air Quality Management District, offering "concessions" in return for advancing a proposal by the refiner to increase crude and gas oil imports to the RF via marine vessels.[170] Perkins stated that proposal—which was never approved or implemented—would "greatly enhance the continued viability of the Rodeo Refinery if and when California-produced crude oil becomes restricted in quantity or generally unavailable as a refinery process input."[171] Perkins further stated that the refiner "seeks to ensure

[169] Naphtha, distillates and gas oil ("pressure distillate") from crude accessed and partially refined by the SMF, then sent through lines 200 and 400 to the RF for gasoline, diesel, and jet fuel production.
[170] Perkins, 2019. Phillips 66 correspondence regarding Bay Area Air Quality Management District Permit Application No. 25608. Appended hereto as Attachment 40.
[171] *Id.*

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a reliable crude oil supply for the future. If this potential process input problem is not resolved, it could lead to processing rate curtailments at the refinery ... ."[172]

C-50 cont'd

5.2.2 Army Engineers proposal to improve access to crude imports by dredging Bay

On 17 May 2019 the U.S. Army Corps of Engineers released a Draft Environmental Impact Statement for its proposal to relieve a shipping bottleneck affecting the Phillips 66 RF and three other refineries that import crude through the San Francisco Bay by dredging to deepen some shipping channels between Richmond to east of Martinez (Avon).[173] Benefits to the refiners from the proposal—which was never approved or implemented—including improved access to crude imports and fuels exports, but excluding the anticipated growth in their petroleum tanker cargoes, could have exceeded $11,300,000 per year.[174]

C-51

5.2.3 Phillips 66 action to expand access to crude imports via oil trains

Before its warning to the Bay Area Air Quality Management District described above, and before applying to that air district for expanded crude imports through the RF marine terminal, Phillips 66 sought access to new sources of crude via oil trains which would unload crude imported from other U.S. states and Canada at a proposed new SMF rail spur extension.[175]

C-52

5.2.4 San Luis Obispo County review of proposed Phillips 66 SMF rail spur extension

Permits for that rail spur extension were denied and it was never built. In its review of the proposed rail spur, San Luis Obispo County described the limited SMF access to competitively priced crude. Its report previewed, during 2014, the 2019 warning by Phillips 66 described herein above: "Phillips 66 would like to benefit from these competitively priced crudes. In the short-term (three to five years), the availability of these competitively priced crudes would be the main driver ... . Production from offshore Santa Barbara County (OCS crude) has been in decline for a number of years. ... . In the long-term, the ... remaining life of the refinery is dependent on crude oil supplies, prices and overall economics."[176]

C-53

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[172] *Id.*
[173] ACOE, 2019, Draft Integrated General Reevaluation Report and Environmental Impact Statement, San Francisco Bay to Stockton, California Navigation Study. Army Corps of Engineers: Jacksonville, FL. EIS and Appendix D to EIS. Appended hereto as Attachment 41. *See* pp. ES-3, D-22, D-24, maps.
[174] *Id.*
[175] SLOC, 2014 (Att. 37).
[176] *Id.*

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Other more recent actions, which the DEIR likewise does not disclose or evaluate, suggest that the lack of access to crude has now become acute for the SMF. By 2017, ExxonMobil proposed to temporarily truck crude to the SMF, a proposal that the Santa Barbara County Planning Commission later voted to deny.[177] Finally, Phillips 66 abandoned its proposed SMF pipeline replacement project in August 2020.[178] This fact strongly suggests that the company's plan to decommission the SMF was developed independently from the subject project, and was already underway before Phillips 66 filed its Application for the project with the County. C-53 cont'd

5.3 The DEIR Does Not Disclose or Evaluate Available Data and Information That Confirm the Crude Supply Limitation Affects Current SFC Operating Conditions and Strongly Suggest the Potential for Near Term SFC Facilities Closure

Abundant relevant data that the DEIR did not disclose or evaluate have been reported publicly by the state and federal governments. Together with the data and information provided herein above, these data support findings that available evidence indicates crude supply limitations have forced SFC refining rates below historic pre-2020 conditions, and that the SFC would be more likely to shutter crude refining operations in the near future than return to and maintain historic refining rates. Had the DEIR properly disclosed and evaluated this evidence, the County could have found that the comparison in the DEIR of project impacts with impacts caused at historic refining rates is unsupported, and inaccurate. C-54

5.3.1 Federal crude extraction data pertinent to the project baseline confirm a sharp decline in the major historic source of crude refined by the SMF

Chart 3 illustrates U.S. Bureau of Ocean Energy Management (BOEM) crude production data[179] for OCS oilfields that the SMF historically and currently could access via pipelines connected to the local SMF pipeline system.[180] Crude production from OCS oilfields that historically supplied the vast majority of SMF crude feed (§ 5.1.1) continued in steep long-term decline after the 2014 San Luis Obispo County analysis (§ 5.2.4). *See* Chart 3. C-55

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[177] SBC, 2021. *ExxonMobil Interim Trucking for SYU Phased Restart Project Status, Description, Timeline;* Santa Barbara County Department of Planning & Development. Website page accessed 18 November 2021. Appended hereto as Attachment 42.

[178] Scully, J., 2020. Phillips 66 Plans 2023 Closure of Santa Maria Refinery, Pulls Application for Pipeline Project. https://www.noozhawk.com/article/phillips_66_closure_of_santa_maria_refinery_planned_for_2023_20200813

[179] BOEM, 2021a. U.S. Bureau of Ocean Energy Management. *Pacific Production;* data Pacific OCS Region data, 1996–2021. https://www.data.boem.gov/Main/PacificProduction.aspx#ascii. Appended hereto as Attachment 43.

[180] BOEM, 2021b. U.S. Department of the Interior, Bureau of Safety and Environmental Enforcement/Bureau of Ocean Energy Management, Pacific OCS Region. Map updated May 2021. Appended hereto as Attachment 44.

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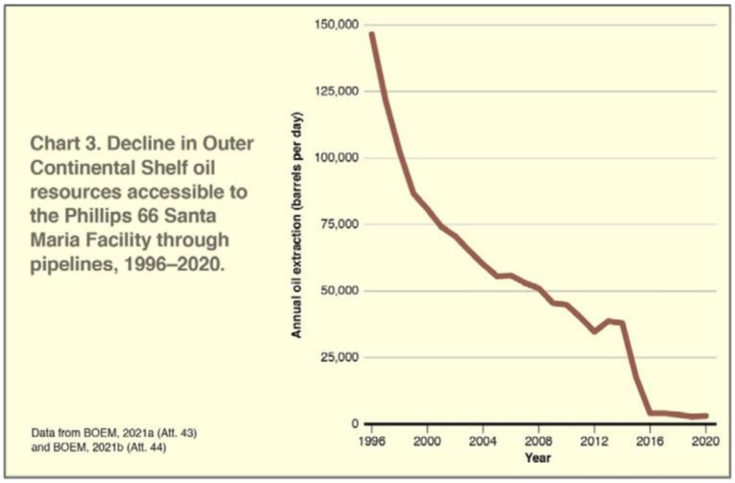

C-55 cont'd

From an annual average of approximately 146,000 b/d in 1996, OCS oil production in these oilfields,[181] collectively, fell by 98% to approximately 3,000 b/d in 2020.[182]

5.3.2 <u>State crude refining data pertinent to the project baseline confirm that declining access to crude feedstock forced SFC refining rates below historic rates and, together with other relevant available data, strongly suggest the potential for the crude refinery to shutter</u>

C-56

The California Air Resources Board (CARB)[183] and Geologic Energy Management Division (CalGEM, formerly DOGGR)[184] each collected data that in combination quantify and locate the annual amounts of crude refined in California from each OCS and State offshore and onshore oilfield. Chart 4 illustrates these state data for the annual volumes of crude refined in California which were derived from OCS and onshore oilfields that the SMF can access.[185]

[181] These OCS oilfields that the SMF could historically or currently access via pipelines are the Point Pedernales, Point Arguello, Hondo, Pescado, and Sacate fields. *See* BOEM, 2021b (Att. 44).
[182] BOEM, 2021a (Att. 43).
[183] CARB, various years. *Calculation of Crude Average Carbon Intensity Values;* California Air Resources Board: Sacramento, CA. *In* LCFS Crude Oil Life Cycle Assessment, Final California Crude Average Carbon Intensity Values. Accessed October 2021. https://ww2.arb.ca.gov/resources/documents/lcfs-crude-oil-life-cycle-assessment. Appended hereto as Attachment 45.
[184] DOGGR, 2017 (Att. 39).
[185] Based on evidence described in §§ 5.1 and 5.2 herein, Chart 4 includes all onshore and State offshore fields identified by DOGGR, 2017 (Att. 46) in District 3, and OCS oilfields included in Chart 3 as noted above, and optimistically assumes that no other California refiner competes for access to their production.

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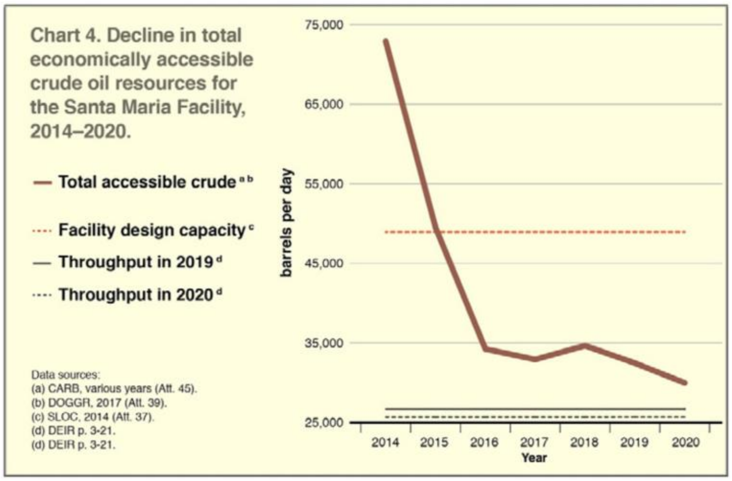

C-56 cont'd

The falling brown curve in Chart 4 illustrates the rapid decline in total crude accessible to the SMF that was refined statewide since 2014. Most importantly, its fall below the dashed red line indicates that this dwindling crude supply could no longer support Santa Maria Facility operation at or even near its design capacity.

From approximately 73,000 b/d in 2014, total refining of Central Coast onshore, offshore, and OCS crude accessible to the SMF via truck and pipeline fell by 59%, to approximately 30,000 b/d in 2020.[186]

In 2019, before COVID-19, the SMF was operating at only 26,700 b/d,[187] 45% below its 48,950 b/d capacity.[188] [189] In 2020, as accessible crude fell by roughly another 2,000 b/d,[190] the SMF cut rate by another 1,000 b/d to 25,700 b/d,[191] fully 47% below its design capacity.

[186] CARB, various years (Att. 45); DOGGR, 2017 (Att. 39).
[187] DEIR p. 3-21.
[188] SLOC, 2014 (Att. 37).
[189] This very low SMF refining rate in 2019 reduced SMF output to the RF and likely reduced its capacity to thin and enable movement of viscous San Joaquin Valley crude through Line 400 to the RF. The County could have evaluated this likelihood had it requested the data to do so from Phillips 66 as necessary for project review.
[190] CARB, various years (Att. 45); DOGGR, 2017 (Att. 39).
[191] DEIR p. 3-21.

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Phillips 66 Rodeo Refinery Project DEIR SCH #2020120330

5.3.3 Baseline analysis errors in the DEIR inflated the project baseline, obscured the significance of project impacts in comparison with that inflated baseline, and resulted in a deficient environmental impacts evaluation

As stated, its errors and omissions resulted in the DEIR comparing project impacts with those from refining crude at a greater rate than observed when the project was proposed and a greater rate than the SFC can reasonably be expected to reach and maintain in the near future. Comparing project impacts with this inflated baseline artificially reduced the significance of project impacts it predicted. This erroneously reduced the significance of DEIR impact findings. C-57

5.4 The DEIR No Project Analysis Commits a Categorical Error that Conflates the Crude Supply Limitation with Fuel Supply Limits Irrelevant to Project Baseline

Elsewhere in the DEIR it asserts that decommissioning the refinery is not the "no project" alternative since shuttering the refinery is infeasible at least in part because petroleum fuels market forces would not allow that result. In point of fact the DEIR has it exactly backwards: fuels demand cannot cause a refinery to make fuels when the refinery cannot get the crude to make the fuels due to structural rather than market-based factors. The DEIR commits a categorical error that conflates the causal factor affecting specific baseline conditions with another factor that is irrelevant to these specific conditions because it could not affect them. In other contexts fears that imports and prices could soar without the SCF can be eased by pointing out that statewide refining overcapacity far exceeds its capacity (§ 2.2), but here, the DEIR fuels supply-demand question itself is not relevant to project baseline conditions. C-58

CONCLUSION: The DEIR did not disclose or evaluate abundant evidence that worsening crude supply losses drove the refinery feed rates below historic levels by the time the project was proposed. This evidence further suggests the refinery would be more likely to close than return to and maintain historic crude rates in the near future. Instead of evaluating this evidence, the DEIR concluded that historic conditions it explicitly found to result in more severe impacts than conditions at the time the project was proposed should be compared with potential impacts that could result from the project. Reliance on that factually unsupported and inflated baseline would systematically and artificially reduce the significance of project impacts findings.

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Phillips 66 Rodeo Refinery Project DEIR SCH #2020120330

CONCLUSIONS

1. The DEIR provides an incomplete, inaccurate, and truncated description of the proposed project. Available information that the DEIR does not describe or disclose will be necessary for sufficient review of environmental impacts that could result from the project.

2. A reasonable potential exists for the project to result in significant climate and air quality impacts by increasing the production and export of California-refined fuels instead of replacing petroleum fuels. This impact would be related to the particular type and use of biofuel proposed. Resultant greenhouse gases and co-pollutants would emit in California from excess petroleum and biofuel refining, and emit in California as well as in other states and nations from petroleum and biofuel feedstock extraction and end-use fuel combustion. The DEIR does not identify, evaluate, or mitigate these significant potential impacts of the project.

3. There is a reasonable potential for the proposed changes in refinery feedstock processing to result in specific hazard impacts involving hydro-conversion processing, including explosion and uncontrolled refinery fire, in excess of those associated with historic petroleum crude refining operations. The DEIR did not identify, evaluate, or mitigate these significant process hazard impacts that could result from the project. C-59

4. The project is likely to result in a significant air quality impact associated with flaring, and has reasonable potential to worsen this impact compared with historic petroleum crude refining operations at the site. The DEIR does not identify, evaluate, or analyze measures to lessen or avoid, this significant potential impact.

5. The DEIR did not disclose or evaluate abundant evidence that worsening crude supply losses drove the refinery feed rates below historic levels by the time the project was proposed. This evidence further suggests the refinery would be more likely to close than return to and maintain historic crude rates in the near future. Instead of evaluating this evidence, the DEIR concluded that historic conditions it explicitly found to result in more severe impacts than conditions at the time the project was proposed should be compared with potential impacts that could result from the project. Reliance on that factually unsupported and inflated baseline would systematically and artificially reduce the significance of project impacts findings.

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COMMENT LETTER: 36

Phillips 66 Rodeo Refinery Project DEIR SCH #2020120330

Attachments List

1. Curriculum Vitae and Publications List

2. Karras, 2021a. *Changing Hydrocarbons Midstream: Fuel chain carbon lock-in potential of crude-to-biofuel petroleum refinery repurposing;* prepared for the Natural Resources Defense Council (NRDC) by Greg Karras, G. Karras Consulting. August 2021.

3. Karras. 2021b. *Unsustainable Aviation Fuels: An assessment of carbon emission and sink impacts from biorefining and feedstock choices for producing jet biofuel from repurposed crude refineries;* Natural Resources Defense Council (NRDC). Prepared for the NRDC by Greg Karras, G. Karras Consulting.

4. USDOE, 2021. *Renewable Hydrocarbon Biofuels;* U.S. Department of Energy, accessed 29 Nov 2021 at https://afdc.energy.gov/fuels/emerging_hydrocarbon.html

5. Chevron Refinery Modernization Project, SCH# 2011062042, DEIR Appendix 4.3–URM: Unit Rate Model.

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9. Krogh et al., 2015. *Crude Injustice on the Rails: Race and the disparate risk from oil trains in California;* Communities for a Better Environment and ForestEthics. June 2015.

10. Karras, 2020. *Decommissioning California Refineries: Climate and Health Paths in an Oil State;* A Report for Communities for a Better Environment. Prepared by Greg Karras. Includes Supporting Material Appendix.

11. USEIA, 2015. West Coast Transportation Fuels Markets; U.S. Energy Information Administration: Washington, D.C. https://www.eia.gov/analysis/transportationfuels/padd5/

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14. BAAQMD, 2021. 9 Sep 2021 email from Damian Breen, Senior Deputy Executive Officer – Operations, Bay Area Air Quality Management District, to Ann Alexander, NRDC, regarding Phillips 66 refinery (no. 21359) – possible unpermitted modifications.

Technical Report of G. Karras 50

COMMENT LETTER: 36

Phillips 66 Rodeo Refinery Project DEIR SCH #2020120330

15. Kupp, 2020a. Email text and attached site map from Gary Kupp, Contra Costa County, to Charles Davidson, incoming Rodeo-Hercules Fire Protection District director. 2 December 2020.

16. Phillips 66 3Q 2021 Earnings Conference Call; 29 Oct 2021, 12 p.m. ET. Transcript.

17. Weinberg-Lynn, 2021. 23 July 2021 email from Nikolas Weinberg-Lynn, Manager, Renewable Energy Projects, Phillips 66, to Charles Davidson.

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22. CDTFA, various years. *Fuel Taxes Statistics & Reports;* California Department of Tax and Fee Administration: Sacramento, CA. https://www.cdtfa.ca.gov/taxes-and-fees/spftrpts.htm.

23. USEIA *Refinery Capacity by Individual Refinery*. Data as of January 1, 2021; U.S. Energy Information Administration: Washington, D.C. www.eia.gov/petroleum/refinerycapacity

24. USEIA *Refinery Utilization and Capacity*. PADD 5 data as of Sep 2021. U.S. Energy Inf. Administration: Washington, D.C. www.eia.gov/dnav/pet/pet_pnp_unc_dcu_r50_m.htm

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27. Clark et al, 2017. Changes in transportation-related air pollution exposures by race-ethnicity and socioeconomic status: Outdoor nitrogen dioxide in the United States in 2000 and 2010. *Environmental Health Perspectives* 097012-1 to 097012-10. 10.1289/EHP959.

28. Zhao et al., 2019. Air quality and health co-benefits of different deep decarbonization pathways in California. *Environ. Sci. Technol.* 53: 7163–7171. DOI: 10.1021/acs.est.9b02385.

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31. van Dyk et al., 2019. Potential synergies of drop-in biofuel production with further co-processing at oil refineries. *Biofuels Bioproducts & Biorefining* 13: 760–775. DOI: 10.1002/bbb.1974.

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33. BAAQMD *Causal Analysis Reports for Significant Flaring;* Bay Area Air Quality Management District: San Francisco, CA. Reports submitted by Phillips and former owners of the Phillips 66 San Francisco Refinery at Rodeo, and submitted by Marathon and formers owners of the Marathon Martinez Refinery, pursuant to BAAQMD Regulation 12-12-406.

34. Karras and Hernandez, 2005. *Flaring Hot Spots: Assessment of episodic local air pollution associated with oil refinery flaring using sulfur as a tracer;* Communities for a Better Environment: Oakland and Huntington Park, CA.

35. Ezersky, 2006. *Staff Report: Proposed Amendments to Regulation 12, Miscellaneous Standards of Performance, Rule 12, Flares at Petroleum Refineries;* 3 March 2006. Planning and Research Division, Bay Area Air Quality Management District: San Francisco, CA.

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37. SLOC, 2014. *Phillips 66 Company Rail Spur Extension and Crude Unloading Project Revised Public Draft Environmental Impact Report;* prepared for San Luis Obispo County (SLOC) by Marine Research Specialists (MRS). October 2014. SCH# 2013071028. Excerpt including title page and project description.

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39. DOGGR, 2017. *2017 Report of California Oil and Gas Production Statistics;* California Department of Conservation, Division of Oil, Gas, & Geothermal Resources: Sacramento, CA.

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44. BOEM, 2021b. U.S. Department of the Interior, Bureau of Safety and Environmental Enforcement/Bureau of Ocean Energy Management, Pacific OCS Region. Map updated May 2021.

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Response to Comment 1

The County disagrees with the comment. Comments related to inadequacy of the Draft EIR are responded to throughout this document.

Also refer to Master Response No. 2, CEQA Alternatives, Master Response No. 4, Land Use and Feedstocks, and the following responses.

Response to Comment 2

The County disagrees with the comment. Comments related to inadequacy of the Draft EIR are responded to throughout this document.

Refer to Master Response No. 4 Land Use and Feedstocks and Master Response No. 5, Renewable Fuels Processing.

Response to Comment 3

Refer to Master Response No. 1, CEQA Baseline, Master Response No. 2, CEQA Alternatives, and Master Response No. 4, Land Use and Feedstocks.

Response to Comment 4

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 5, Renewable Fuels Processing.

Response to Comment 5

The County disagrees with the comment. Comments related to inadequacy of the Draft EIR are responded to throughout this document.

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 5, Renewable Fuels Processing.

Response to Comment 6

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 7

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Refer to Master Response No. 4, Land Use and Feedstocks

Response to Comment 8

Refer to Responses to Comments 157 through 174 and Master Response No. 4, Land Use and Feedstocks.

Response to Comment 9

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 5, Renewable Fuels Processing.

Response to Comment 10

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 6, Purpose of Project.

Response to Comment 11

Refer to Responses to Comments 150 through 156 and Master Response No. 2, CEQA Alternatives.

Response to Comment 12

Refer to Responses to Comments 150 through 156 and Master Response No. 2, CEQA Alternatives.

Response to Comment 13

Refer to Master Response No. 2, CEQA Alternatives and Master Response No. 3, Cumulative Impacts

Response to Comment 14

Refer to Responses to Comments150 through 156 and Master Response No. 2, CEQA Alternatives.

Response to Comment 15

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 16

The County disagrees with the comment. Comments related to inadequacy of the Draft EIR are responded to throughout this document.

The comments assert that the County "chose to ignore" the scoping comments submitted by the comments in the Draft EIR. However, the Draft EIR includes environmental analysis of the topics raised in the scoping comments, including feedstocks (Draft EIR, Section 3.8), transportation (Draft EIR, Section 4.13), risks (Draft EIR, Section 3.9), alternatives (Draft EIR, Sections 5.4 and 5.5). These responses to comments provide additional information on these topics.

Response to Comment 17

The County has determined that recirculation of the EIR is unnecessary. Comments related to inadequacy of the Draft EIR are responded to throughout this document.

Response to Comment 18

Comment noted. For responses related to Greg Karras' analysis, refer to responses to Comment Letter 36 (NRDC).

Response to Comment 19

Comment noted.

Response to Comment 20

Comment noted.

Response to Comment 21

Comment noted.

The County acknowledges the statements of interest, but does not concede that these statements of interest are sufficient to establish a beneficial interest or to confer standing for purposes of any litigation.

Response to Comment 22

The County disagrees with this assessment.

Refer to Master Response No. 7, Project Description–Piecemealing.

Response to Comment 23

Refer to Master Response No. 7, Project Description– Piecemealing.

Response to Comment 24

Refer to Master Response No. 7, Project Description– Piecemealing.

Response to Comment 25

Refer to Master Response No. 7, Project Description– Piecemealing.

Response to Comment 26

Refer to Master Response No. 7, Project Description– Piecemealing.

Response to Comment 27

Refer to Master Response No. 7, Project Description– Piecemealing.

Response to Comment 28

Refer to Master Response No. 7, Project Description– Piecemealing.

Response to Comment 29

Refer to Master Response No. 7, Project Description– Piecemealing.

Response to Comment 30

Refer to Master Response No. 7, Project Description– Piecemealing.

Response to Comment 31

Refer to Master Response No. 7, Project Description– Piecemealing.

Response to Comment 32

Refer to Master Response No. 5, Renewable Fuels Processing.

Comment noted.

Response to Comment 33

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 34

Refer to Master Response No. 5 Renewable Fuels Processing.

Response to Comment 35

Refer to Master Response No. 5 Renewable Fuels Processing.

Response to Comment 36

Refer to Master Response No. 5 Renewable Fuels Processing.

Response to Comment 37

Refer to Master Response No. 5 Renewable Fuels Processing.

Response to Comment 38

Refer to Master Response No. 5 Renewable Fuels Processing.

Response to Comment 39

Refer to Master Response No. 5 Renewable Fuels Processing.

Response to Comment 40

Refer to Master Response No. 5 Renewable Fuels Processing.

Response to Comment 41

This comment appears to be for a different project. See also Master Response No. 5 Renewable Fuels Processing.

Response to Comment 42

Refer to Master Response No. 5, Renewable Fuels Processing and Master Response No. 4, Land Use and Feedstocks.

Response to Comment 43

Refer to Master Response No. 5, Renewable Fuels Processing and Master Response No. 4, Land Use and Feedstocks.

Response to Comment 44

Refer to Master Response No. 5 Renewable Fuels Processing.

Response to Comment 45

Refer to Master Response No. 5 Renewable Fuels Processing.

Response to Comment 46

Refer to Master Response No. 5, Renewable Fuels Processing.

In addition, the EIR explained the status of retained permits in the Notes to Table 3-3: "The permits for Unit 267, the Carbon Plant, and Units 236/238 will be relinquished upon startup of the Project. The permits for Unit 244, Unite 200, MP-30, Unit 215 and Unit 228 are being maintained for the possibility of future use, depending on economic and regulatory conditions. Therefore, the potential use of these units has been included as a part of the environmental analysis, and no reductions in emissions have been taken to account for the non-operational status of the units. Any future use of the units would be evaluated in accordance with CEQA and all applicable laws and regulations." Although Phillips 66 is retaining permits to operate certain pieces of equipment, any use of that equipment in the future is speculative and not part of this Project. Any potential use of that equipment in the future would be evaluated at the time and any permits or approvals necessary would be obtained at the time.

Response to Comment 47

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 48

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 49

Commenters claim that the Draft EIR fails to disclose the "operational duration" of the Project. (NRDC, Comment 35-49, page 14, Comment 35-C-14, Appendix C, page 12.) Commenters suggest evaluating the duration of process units or the State's goals of "phasing out" petroleum and biofuel diesel "in favor of zero-emission vehicles." Commenters do not suggest a duration, nor do they identify any specific deficiencies in the environmental analyses related to the duration of the project.

Contrary to the comment's claims, the Draft EIR does evaluate an appropriate duration of the Project's environmental effects depending on the environmental topic. For example, some environmental topics evaluate daily or annual emissions, such as air quality or greenhouse gas emissions. For the Health Risk Assessment in the air quality analysis, the exposure period is 30 years (Revised Draft EIR, Appendix B, pdf page 20 of 4281). For Sea Level Rise, the Draft EIR considers a 100-year event. (Draft EIR, page 4.8-271.) Process units have an unlimited life as does the facility, subject to any permit requirements, and the Draft EIR properly evaluated an ongoing Project in accordance with appropriate methods depending on the topic.

Commenters refer to the County's commitment to Diesel Free by '33, which is a Statement of Purpose issued by BAAQMD encouraging local communities to reduce diesel emissions (https://dieselfree33.baaqmd.gov/statement-of-purpose). The website makes clear that "diesel" refers to petroleum-based diesel: "For purposes of this Statement, "diesel emissions" and "diesel exhaust" means emissions or exhaust emitted from the combustion of petroleum-based diesel fuel." Therefore, the Rodeo Renewed Project serves to support this effort by contributing to the supply of renewable diesel to replace petroleum-based diesel. Furthermore, the State's goals include refinery conversions as was emphasized in Governor Newsom's Executive Order N-79-20, which directed State agencies to "expedite regulatory processes to repurpose and transition upstream and downstream oil production facilities . . . ."

The comments seem to imply that a shorter duration of the Project would be appropriate, but from a CEQA perspective, an evaluation of the Project for a shorter duration would likely result in fewer or lesser environmental effects.

Response to Comment 50

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 51

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 52

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 53

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 54

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 55

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 56

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 57

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 58

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 59

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 60

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 61

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 62

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 63

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 64

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 65

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 66

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 67

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 68

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 69

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 70

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 71

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 72

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 73

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 74

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 75

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 76

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Response to Comment 77

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Response to Comment 78

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Response to Comment 79

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Response to Comment 80

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 81

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 82

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 83

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 84

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 85

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 86

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 87

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 88

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 89

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 90

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 91

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 92

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 93

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 94

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 95

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 96

Phillips 66 is required to meet, and will continue to do so under the Project, multiple regulations aimed at protection public health and the environment. Refer to the regulatory setting of Section 4.9, Hazards and Hazardous Materials.

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 97

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 98

Comment noted. Suggested potential mitigation measures related to these issues, however, are not required for the Project.

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 99

Refer to Master Response No., 1 CEQA Baseline.

Response to Comment 100

As proposed, the Project would lower facility-wide GHG emissions by about 24,000 MT per year compared to baseline operations. Refer to Table 4.8-5 in the Draft EIR “Annual Project Operational GHG Emissions”. The Project would not generate significant GHG because the net change in GHG emissions would be negative.

See also Master Response No. 5, Renewable Fuels Processing.

Response to Comment 101

See Response to Comment 100. Because the Project would reduce the amount of GHGs from the facility, it would not conflict with plans to reduce GHG.

See also Master Response No. 4, Land Use and Feedstocks and Master Response No. 6, Purpose of Project and Response to Comment 49

Response to Comment 102

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 5 Renewable Fuels Processing.

Response to Comment 103

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 104

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 5 Renewable Fuels Processing.

Response to Comment 105

See also Master Response No. 5, Renewable Fuels Processing.

Response to Comment 106

Hydrogen production GHGs (including methane) from Air Liquide were accounted for in the Draft EIR. The Project emissions were estimated assuming that the Baseline emissions (obtained from 2019 California Mandatory Reporting Rule data) scale with the planned increase in hydrogen production rate. Note that fugitive emissions would not increase with the production rate as fugitive emissions are a function of component counts (which remain constant between Baseline and Project) and not activity levels (see CAPCOA’s California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities (1999)).

Hydrogen production also occurs at Unit 110. Emissions from Unit 110 include GHGs from the unit operation and VOCs and GHGs from fugitive leaks. Project GHGs were estimated assuming that the

Baseline emissions (as reported in the facility's 2019 Regulation 12 Rule 15 Inventory) scale with the planned increase in hydrogen production rate. Project VOCs due to fugitive leaks were estimated for the net increase in component count with an expected net increase of 0.24 lb/day VOC (equal to 87 lb/yr) as shown in Appendix A Attachment B Stationary Source Table 9 of the Draft EIR. If these VOCs were assumed to be 100 percent speciated into methane (a GHG), as opposed to the current speciations shown in Appendix A Attachment B Stationary Source Table 10 of the Draft EIR, then the net increase in GHGs from Unit 110 would be 0.98 MT CO2e/yr using a global warming potential of 25 (IPCC AR4). However, there are other VOCs, in addition to methane in the fugitive leak calculation that are not GHGs. Therefore, this is a conservative estimate. See also Master Response No. 4, Land Use and Feedstocks and Master Response No. 5, Renewable Fuels Processing.

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 107

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 5, Renewable Fuels Processing. Estimated emissions were conservative and based on the processing capability of the equipment.

Response to Comment 108

The Draft EIR does not insist the Project is necessary for the 2017 Scoping Plan. As discussed throughout Section 4.8, Greenhouse Gas Emissions, specifically Impact 4.8-3, the Project would *advance* the objectives of the 2017 Scoping Plan Update as it transforms an oil and gas refinery to one that produces renewable fuels, and although it would continue to provide gasoline and gasoline blendstocks to meet regional demand, the facility would cease to refine crude oil feedstocks. The Project would also result in the shutdown of the Santa Maria Refinery and the Carbon Plant. The Project would reduce GHG emissions overall even without accounting for the Santa Maria shutdown, and its production of renewable fuels is expressly supported by the Climate Change Scoping Plan. Importantly, the use of renewable fuels with their associated lower CI also reduces GHG emissions. The Project would repurpose an existing industrial site for renewable fuels technology and production, keeping an important segment of the clean fuels industry in California. Further, the Project would maintain jobs at the Rodeo Site, thereby supporting a strong work force while reducing GHG emissions.

Also refer to Master Response No. 5, Renewable Fuels Processing for a discussion regarding market issues.

Response to Comment 109

Comment noted.

Refer to Master Response No. 6, Purpose of Project.

Response to Comment 110

Comment noted.

As noted in the comments, the Mahone 2020 report was presented to CARB for consideration at a public workshop. (See https://ww2.arb.ca.gov/sites/default/files/2020-08/Carbon%20Neutrality%20Report%20by%20E3%20Workshop-Agenda.pdf.) All of the scenarios presented rely on "low-carbon fuels" (See Mahone 2020, page 10 -- https://ww2.arb.ca.gov/sites/default/files/2020-08/e3_cn_report_aug2020.pdf.)

See also Response to Comment 36-111.

Section 4.9.7, page 4.9-330 is revised as follows:

> …Appendix C-2, ~~CEQA PM2.5 Modeling Analysis~~ Rodeo Renewed Spill Modeling Report.

Response to Comment 111

Courts have expressly recognized that a project-level EIR is an inappropriate vehicle for conducting such comprehensive regulatory analyses under the auspices of CEQA. See Citizens of Goleta Valley v. Bd. of Supervisors (1990) 52 Cal.3d 553, 574 (explaining that requiring even regional comprehensive planning analysis as part of any individual project's permit process "would impose an unnecessary and wasteful burden on local governments"). CARB has been provided the Mahone studies for its consideration as a part of its regulatory authority regard the LCFS program and other related GHG programs.

See Master Response No. 4, Land Use and Feedstocks, Master Response No. 5, Renewable Fuels Processing, and Master Response No. 6, Purpose of Project.

Response to Comment 112

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 113

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 114

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 115

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 5, Renewable Fuels Processing.

Response to Comment 116

Refer to Master Response No. 1, CEQA Baseline

Response to Comment 117

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 5, Renewable Fuels Processing.

Response to Comment 118

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 119

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 120

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 121

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 122

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 123

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 124

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 125

Refer to Response to Comment 1-3, which revises Mitigation Measure AQ-4.

Response to Comment 126

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 127

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 128

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 2, CEQA Alternatives.

Response to Comment 129

Refer to Master Response No. 1, CEQA Baseline, Master Response No. 2, CEQA Alternatives, Master Response No. 4, Land Use and Feedstocks, and Master Response No. 7, Project Description – Piecemealing.

Response to Comment 130

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 131

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 132

The position of NRDC, et. al. (NDRC) with regards to the reduced production alternatives analyzed in the Draft EIR can be summarized as follows:

1. The reduced production alternatives, as well as the no project alternative, were rejected in the Draft EIR based, in part, on an assumption that the fuel production and import capabilities included in the project would be necessary to meet regional refined product demand.
2. NRDC presents data showing:
   a. a purported return of refined product demand to near pre-COVID historical levels in 2021
   b. reduced regional refinery capacity, driven in part by the idling of the Marathon Martinez refinery in 2020
   c. California refinery utilization data indicating significant refinery capacity available to produce more refined product in 2021

3. The NRDC then concludes that regional refined product demand was being met, at pre-COVID demand levels, with significant extra production capacity, and demand would continue to be met without the production / import capacity described in the Rodeo Renewed Project Draft EIR

Commenter's reasoning and conclusions are incorrect for the following reasons:

1. NRDC omits any analysis of refined product imports and exports during this time period. PADD V import / export data clearly show that the overall PADD moved from net exports of refined product to net imports between 2018 and 2021. This decrease in exports and increase in imports impacted all primary refined products (gasoline, jet fuel, and diesel), and totaled approximately 100 MBD.
   a. This PADD-level data obscures a greater shift to importing product into California, as the other major refining center in the PADD (the Pacific Northwest) continues to export product from the region. Sub-PADD level data is not easily obtainable to quantify this impact.
2. NRDC's claim that product demand has returned to pre-COVID levels reflects a selective view of the available data:
   a. NRDC used demand data from 2012-2019 to define a "pre-COVID" data set, thereby including lower-demand periods from several years ago.
   b. Gasoline: demand in mid-2021 reached the very lowest level seen in the "pre-COVID" date range used by NRDC for one month (July 2021.) A broader look at the available data shows gasoline demand remaining below pre-COVID levels by an average of 100 MBD.
   c. Diesel: NRDC's claim that demand has returned to pre-COVID levels is supported by the data.
   d. Jet: NRDC claims that jet demand has returned to pre-COVID levels; however, NRDC uses "taxable fuel sales" as their demand data. This excludes jet for international travel, which is a significant portion of the jet demand in the PADD V region (driven by international flights at LAX, SFO, and SEA airports.) A broader look at the available data shows jet demand remaining below pre-COVID levels by an average of 130 MBD
3. NRDC claims that regional refinery utilization data indicate significant underutilized refinery capacity (220 – 305 MBD), sufficient to meet regional product demand even if the P66 Rodeo refinery shuts down in addition to the Marathon Martinez refinery shutdown. NRDC claims that *"other refiners could have used that idled capacity to meet this temporary surge in demand and reduction in supply, and would have been incented to do so, had the hypothesized market tightening necessitated it. Yet this is not what actually happened."*
   a. Regional refinery utilization in 2021 was indeed historically low; however, this was not because of sufficient capacity to meet regional demand. Instead, utilization was driven low by several planned and unplanned refinery outages during 2021, reducing the effective capacity of the local refineries to produce refined product. The local refineries *were* incented to increase production to meet regional demand; however, they could not do so. Instead, the demand increase (still below pre-COVID levels) was met by the aforementioned increase in net product imports.
4. NRDC omits any analysis of refined product inventory impacts during this time period. Overall, PADD V product inventories increased in 2020 to significantly above historical levels, driven by COVID-related demand declines. As product demand has increased (as mentioned above, still not to pre-COVID levels), product inventories, and especially "days cover" (inventory divided by average daily demand) have declined to be within historic ranges.

a. This drawdown of excess inventory was also a component of how the market met increased demand in 2021, and in fact partially offset the requirement for increased product imports. This excess inventory has essentially been consumed, and as such will be unavailable to meet increased demand in the future, increasing the reliance on product imports as product demand increases to pre-COVID levels.

Therefore, instead of refuting the Draft EIR's claim that the Rodeo production / import capabilities will be necessary to meet regional product demand, a correct analysis of the relevant market data actually confirms the Draft EIR's claim. The idling of Marathon's Martinez refinery has already caused PADD V to shift from a net exporter of product to a net importer, with this shift occurring before a return to full pre-COVID demand levels. The alternate projects considered in the Draft EIR would all further reduce P66 Rodeo production, further increasing reliance on imports to meet regional demand.

Refer to Master Response No. 2 CEQA Alternatives, Master Response No. 4, Land Use and Feedstocks, and Master Response No. 5, Renewable Fuels Processing.

Response to Comment 133

See Response to Comment 132.

Response to Comment 134

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 135

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 136

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 137

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 138

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 139

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 140

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 141

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 142

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 143

Refer to Master Response No. 3, Cumulative Impacts.

Response to Comment 144

The Cumulative Impacts section does refer to the Marathon Martinez Refinery. As provided in Response to Comment 35-149, the description of the project is expanded to provide additional information particularly pertaining to total feedstock used and the increase in marine vessel traffic. In addition, the air quality and GHG impacts modeling included emissions expected from the Marathon Martinez Refinery.

Refer to Response to Comment 149 and Master Response No. 3, Cumulative Impacts.

Response to Comment 145

Refer to Master Response No. 3, Cumulative Impacts.

Response to Comment 146

Refer to Master Response No. 4 Land Use and Feedstocks. See also Response to Comment 111.

Response to Comment 147

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 3, Cumulative Impacts.

See also Response to Comment 111.

Response to Comment 148

The State supports the production of renewable low-carbon fuels through the LCFS program along with the transformation of refineries to produce renewable fuels, and has determined that these efforts support the State's climate goals. See Master Response No. 6, Purpose of Project. Furthermore, the scenario presented is speculative and an EIR need only analyze the significance of potential impacts that are reasonably foreseeable. 14 Cal. Code Regs. § 15064(d). "A change which is speculative or unlikely to occur is not reasonably foreseeable." Id. § 15064(d)(3).

Response to Comment 149

The following text is added to the existing description of the Martinez Refinery Renewable Fuels Project in Chapter 6, CEQA Statutory Sections, Section 6.4.4.1, Contra Costa County, page 6-4:

> **Martinez Refinery Renewable Fuels Project** (File No. CDLP20-02046) is an application for an LUP to implement the Martinez Refinery Renewable Fuels Project located at 150 Solano Way, Martinez. The project would allow the conversion of Marathon's Martinez Refinery facility from the processing of crude oil to the processing of treated and untreated renewable feedstocks. Approximately 48,000 bpd of ~~The~~ renewable feedstocks are expected to include biological based oils (i.e., soybean oil and corn oil), rendered fats, and other miscellaneous renewable feedstocks including used cooking oils or other vegetable oils. The feedstocks would be processed into renewable diesel, naphtha, propane and treated fuel gas. The conversion would include modifications to existing processing units, the installation of new units, and removal of obsolete units. New facilities include a renewable feedstock pretreatment unit, wastewater treatment equipment, and an advanced 3-stage low-NOx thermal oxidizer. All construction, demolition, and addition of new equipment would be within the existing boundaries of the refinery.
>
> Initially, product from the Refinery would be distributed by truck to the Bay Area as well as Central and Northern California. Product would also be transported to destinations outside of the Bay Area by

> ship via the Avon MOT and Amorco MOT, located approximately 0.5 mile north of the Refinery and approximately 2.5 miles west of the Refinery, respectively. Both terminals would undergo modifications to facilitate receipt of renewable feedstocks and distribution of renewable fuels associated with the proposed Project. Annual vessel traffic would increase from 143 vessels to 400 vessels.

Refer to Master Response No. 3, Cumulative Impacts.

Response to Comment 150

(See Cal. Bldg. Indus. Ass'n v. Bay Area Air Quality Mgmt. Dist., 62 Cal. 4th 369, 392 (2015) "CEQA does not generally require an agency to consider the effects of existing environmental conditions on a proposed project's future users or residents. What CEQA does mandate, consistent with a key element of the Resources Agency's interpretation, is an analysis of how a project might exacerbate existing environmental hazards.") The Project does not exacerbate existing environmental hazards or conditions. See Responses to Comments 151 through 153 for responses to specific comments. See also Master Response No. 2, CEQA Alternatives.

Response to Comment 151

The Project does not physically involve the deed restricted areas, which affect less than 10 acres or property, and Project activities do not physically relate to any activities required under the Post-Closure Facility Permit. See Responses to Comments 152 and 153 for Water Board actions.

Response to Comment 152

Comment noted.

The tar seep issue was fully investigated and remediated as documented in the following reports that were submitted and approved by RWQCB: 1) “Tar Seep Investigation Summary” dated January 31, 2017; 2) “Interim Tar Seep Mitigation Report” dated April 26, 2018; 3) RWQCB Concurrence Letter dated July 16, 2018; 4) Tar Drums Removal Remedial Action Plan dated February 5, 2019; 5) Tar Drums Removal Summary Report dated September 22, 2020; and 6) RWQCB Email dated September 29, 2020. All of these documents are publicly available. With respect to the comment regarding the 55-gallon drum, this drum was discovered during remediation system upgrade activities, and was removed and properly disposed at a licensed offsite landfill facility. These activities were documented in a report titled “Tank 302 Groundwater Barrier System Construction – Buried Drum Removal Summary” dated June 9, 2021, which is also publicly available.

Response to Comment 153

The Water Board has conditionally approved the construction of the PTU as it relates to the Inactive Waste Site (IWS) 4. See August 6, 2021 letter from Water Board to Phillips 66. Phillips 66 has advised the Water Board that the construction of the new Sulfur Treatment Unit (Unit 237) would not physically interact with "engineered fill" of IWS 4, and the Water Board is currently considering the matter.

Response to Comment 154

Refer Master Response No. 1, CEQA Baseline. Responses to Comments 49 and 36 C-14.

Response to Comment 155

As stated in Section 1.4.1.2 Santa Maria Site Approach:

> While the Santa Maria Refinery demolition activities are included in the EIR, future use and required level of remediation of the Santa Maria Site is unknown, and therefore not addressed in

this EIR. Any potential future development of the Santa Maria Site, and the associated level of required remediation, is speculative at this time, and would be a separate project and evaluated in a separate CEQA process by San Luis Obispo County. The EIR acknowledges this uncertainty and incorporates these realities into the methodology to evaluate the environmental effects of demolition of the Santa Maria Refinery.

Each section of Draft EIR Chapter 4, Environmental Setting, Impacts, and Mitigation Measures, analyzes impacts associated with the demolition of the Carbon Plant, Pipeline Sites and Santa Maria Refinery. The Draft EIR describes that the equipment at the Carbon Plant and Santa Maria Refinery will be demolished. Refer to Sections 4.3 Air Quality, 4.8 Geology and Soils, 4.8 Greenhouse Gas Emissions, 4.9 Hazards and Hazardous Materials, and 4.10 Hydrology and Water Quality that specifically address impacts associated with demolition.

In addition, as stated in Section 3.12.6, Shutdown Process and Decontamination Procedures, Phillips 66 is required to develop and implement approved demolition plans for units that will be demolished. These plans will be developed in consultation with the relevant permitting agencies.

Response to Comment 156

How any potential site contamination will be managed with respect to the ultimate decommissioning of the Rodeo Refinery once it is no longer operating is beyond the scope of this Project. See also Responses to Comments 150 and 151.

Response to Comment 157

The Draft EIR specifically addresses the increase in vessel traffic and the associated impacts to marine biological resources. Refer to Section 4.4.9, Discussion of Aquatic Biological Resources.

Response to Comment 158

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 159

It is assumed the comment is referring to analysis of all upstream and downstream indirect impacts. Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 160

As indicated in the Draft EIR (Section 4.9-331) "*The CSLC EIRs used a large spill size of 10,000–20,000 barrels for modeling as representative of a potential worst case associated with tanker, barge and Marine Terminal spills. This volume is therefore utilized in this analysis.*" The Draft EIR used this large sized spill of 20,000 barrels in order to be consistent with previous EIRs prepared for Marine Terminals in the area and to account for potential response activities. As per the TAPII modeling, no cleanup efforts are included in the TAPII model and therefore the large spill of 20,000 barrels, which is larger than the estimated worst-case spill from OSPR based on 33 CFR Part 154 definition (3,947 barrels, see page 4.9-304), is used to estimate the anticipated extent of oiling from spills. Note also that the TAPII modeling indicates that the extents, or the distance that spill effects would travel and the areas that could be impacted, would be similar for a very large spill as they would be for the spill modeled in the EIR (page 4.9-331). It is the extent of the spill and the area that could be impacted that is the important issue in determining impacts, more than the magnitude of the spill size.

CEQA does not require the County to generate a worst case scenario in order to evaluate the Project's impacts. "[I]t has been [repeatedly] held that an EIR is not required to engage in speculation in order to analyze a 'worst case scenario.'" High Sierra Rural Alliance v. Cnty. of Plumas (2018) 29 Cal.App.5th

102, 122 (quoting Napa Citizens for Honest Gov't v. Napa Cnty. Bd. of Supervisors (2001) 91 Cal.App.4th 342, 373). A lead agency is entitled to use its experience and the available information to identify whether and what impacts might occur within the reasonably foreseeable future. See id. In so doing, the lead agency should "use its best efforts to find out and disclose all that it reasonably can," 14 Cal. Code Regs. § 15144, but must avoid speculating when the information necessary to predict the requested likelihoods is unavailable. Id. § 15145. CEQA by no means requires a lead agency to use an extreme, maximum possible worst case scenario—it requires analysis of reasonably foreseeable impacts "in terms of what is reasonably feasible." Id. § 15204(a); § 15064(d) (explaining that only reasonably foreseeable impacts need be evaluated).

The following is moved from the last paragraph of Section 4.9.7, page 4.9-330:

> …Appendix C-2, ~~CEQA PM2.5 Modeling Analysis~~ Rodeo Renewed Spill Modeling Report.

Response to Comment 161

The evaluation of socioeconomic impacts of an oil spill is not required by CEQA and the scope of CEQA is determining the potential impacts on the environment, including hydrology, water quality and terrestrial and marine biological impacts. These are discussed in sections 4.10 and 4.4, respectively.

"An EIR must set forth in detail "[a]ll significant effects on the environment of the proposed project." (Pub. Resources Code, § 21100, subd. (b).) "'Significant effect on the environment' means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project … ." (Guidelines, § 15382, italics added.) Because of the physicality requirement, "[a]n economic or social change by itself shall not be considered a significant effect on the environment." As a result, "[e]vidence of economic and social impacts that do not contribute to … physical changes in the environment is not substantial evidence that the project may have a significant effect on the environment." (Guidelines, § 15064, subd. (f)(6).) But "[w]here a physical change is caused by economic or social effects of a project, the physical change may be regarded as a significant effect in the same manner as any other physical change resulting from the project." (Guidelines, § 15064, subd. (e), italics added.)" Visalia Retail, LP v. City of Visalia, 20 Cal. App. 5th 1, 13 (2018). The Draft EIR evaluates the potential risks of vessel spills, and any potential economic impacts or associated physical impacts would be speculative.

Response to Comment 162

The Draft EIR examines the potential range of spill sizes, quantifies the potential frequency of spills, both in transit and at the marine terminal facilities, and documents the extent of areas that could be impacted by a spill. Areas impacted by a spill include direct impacts, such as smothering, as well as potential impacts related to response activities (see page 4.4-138). The impacts of a spill are determined to be significant and unavoidable, and this is provided in the Draft EIR as full disclosure to the public and the decision makers. Regarding transportation corridors, refer to Response to Comment 8-14.

Response to Comment 163

Refer to Response 162.

Response to Comment 164

The mitigation measures identified in the Draft EIR are based guidance from the CSLC. The CSLC did not identify the need for additional mitigation such as that suggested by the comment. Phillips 66 will continue to operate the terminal per CSLC MOTEMS. Refer to Responses to Comments for Letter 2 from the CSLC, which address clarifications to the Draft EIR MOTEMS discussions.

Response to Comment 165

Information on the 2016 spill and subsequent response issues has been added to the Draft EIR to ensure the full disclosure of potential impacts.

As discussed in the Draft EIR (page 4.9-338), "*Under the Project, the processing of crude oil, with a flash point of between -30 to -3°F and, therefore, readily able to produce flammable vapor clouds and cause fires, etc., would be replaced with oils and potentially tallow, which both have very high flash points and therefore present substantially lower hazards in terms of fires and potential hazards to the public.*" Therefore, impacts associated with the project would actually be less than historical operations due to the lower propensity for a spill to create vapor clouds. In addition, the transitional phase would involve the movement of some petroleum materials, but these potential impacts in terms of areas potentially impacted and the extent of impacts and hazards would be similar to those that existed under the baseline operations. Impacts related to odors are discussed under the air quality section, Section 4.3.

Section 4.9.2.1, page 4.9-296 second paragraph, is revised as follows.

> " … prompted a response by the appropriate agencies, *and led to 1,400 odor complaints and sent over 100 people to the hospital (KQED 2017, BAAQMD 2017, ME 2016). Although the Coast Guard An investigation indicated "no conclusive determination" for the source, the financial responsibility for the cleanup costs was divided between the refinery and the vessel.* ~~ruled out the Marine Terminal and the Rodeo Refinery as the source, but~~ *In addition*, a laboratory analysis indicated that the spilled material was chemically identical to the Yamuna Spirit's crude oil cargo. *The BAAQMD issued an NOV to Phillips 66 and the vessel operator. The operators disputed the findings.*

Section 4.9.8, References is revised to add the following new references:

BAAQMD. 2016. Incident Report, https://www.baaqmd.gov/~/media/files/compliance-and-enforcement/incident-reports/2016/i092016_phillips66_incidentrpt-pdf.pdf?la=en&rev=fcde88bd49aa459aa16f3242859864fd

KQED. 2017. Refinery, Tanker Firm Cited for Fumes That Sickened Scores in Vallejo, June 16, 2017, https://www.kqed.org/news/11514480/refinery-tanker-firm-cited-for-fumes-that-sickened-scores-in-vallejo

Marine Exchange. 2016. Maritime Executive, Coast Guard Solves Mystery of the Vallejo Spill, Published October 21, 2016, https://www.maritime-executive.com/article/coast-guard-solves-mystery-of-the-vallejo-spill

Response to Comment 166

Refer to Master Response No. 4, Land Use and Feedstocks.

Refer to Response to Comment 160 regarding CEQA and absence of requirement to evaluate "worst case" scenario.

Response to Comment 167

Comment noted.

Refer to Response to Comment 111 regarding CEQA's limits on requiring regulatory analysis in context of project EIR.

Response to Comment 168

The Draft EIR acknowledges that Phillips 66 must update their NPDES permits, and discusses the applicability of each permit throughout the document. Refer to Section 4.10, Hydrology and Water Quality. This section of the Draft EIR specifically discusses the requirements of RWQCB permits.

CEQA does not require the EIR for this project to analyze future NPDES or other permits, particularly because the content of those permits is currently unknown (including whether certain such future permits will ever need to be issued or, if already in existence, modified). With respect to the Project's reasonably foreseeable impacts on wastewater effluent, the Draft EIR analyzed potential such impacts on page 4.10-365:

> Operation of the Project would produce discharges of treated wastewater, stormwater, and cooling water that would continue to be discharged through the existing outfalls E-002 (storm and wastewater), E-003 (cooling water), and E-004 (Marine Terminal stormwater). Once the Project is implemented the volume of treated water discharged would decrease by approximately 20 percent from baseline conditions (from 1,659 to 1,357 gallons per minute). It is expected that the quality of water discharged to San Pablo Bay would improve over baseline conditions since processing renewable feedstock versus hydrocarbon feedstock would result in lower toxicity levels in waste streams. The safety data sheets were reviewed for the proposed feedstock sources to determine whether the compositions of the renewable feedstocks raise process concerns in potential changes in the constituents of process and surface water. As a result of these changes, the composition of discharge to the Bay would be somewhat different from baseline conditions, containing higher concentrations of sulfate and lower concentrations of nitrates. Sulfate is not listed as a water pollutant requiring regulation under the Basin Plan (RWQCB 2019a) and is not considered to be toxic to aquatic organisms except at concentrations considerably above typical values (e.g., Wang et al. 2015). The RWQCB would continue to have oversight responsibilities for the NPDES permit (and is identified as a responsible agency in this analysis). NPDES requirements are expected to maintain water quality at acceptable constituent levels. Since the Project would result in a reduction in the volume of treated water discharged to San Pablo Bay, and continued compliance with the NPDES permit requirements would ensure that impacts to surface water quality from refinery process discharges would be less than significant, and no mitigation is required. For the Rodeo Site, impacts related to construction, including the Transitional Phase, would be significant and unavoidable related to marine vessel traffic. Impacts related to demolition of the Santa Maria Site would be less than significant, and no mitigation is required.

Phillips 66 will meet and work with San Francisco Regional Water Quality Board personnel to determine what, if any, changes need to be made to the Rodeo Refinery's NDPES Permit as part of the permitting process.

It is not accurate that the increase of vessel traffic, with its commensurate small increase in spill risk, results in a requirement for the San Francisco RWCB to issue a NPDES Permit for "Marine Terminal discharges." This is a supposition of regulatory authority that is not required to be evaluated in the Draft EIR.

Response to Comment 169

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 5 Renewable Fuels Processing.

Response to Comment 170

The Draft EIR examines the potential range of spill sizes, quantifies the potential frequency of spills, both in transit and at the marine terminal facilities, and documents the extent of areas that could be impacted by a spill in the Bay area. Areas impacted by a spill include direct impacts and are used in Section 4.4, Biological Resources, to examine the potential impacts to biological resources (see Figure 4.4-4 on page 4.4-100). The impacts of a spill are determined to be significant and unavoidable and is provided in the Draft EIR as full disclosure to the public and the decision makers.

The evaluation of socioeconomic impacts of an oil spill is not required by CEQA, and the scope of CEQA is determining the potential impacts on the environment, including hydrology, water quality and terrestrial and marine biological impacts. These are discussed in sections 4.10 and 4.4, respectively.

See Response to Comment 111 regarding CEQA's limits on requiring regulatory analysis in context of project EIR.

Response to Comment 171

Oil spill response requirements are overseen by USCG, the CDFW and OSPR and include the use of OSROs such as the MSRC. Detailed response plans are developed for both vessels and marine terminals. These response capabilities are summarized in the Draft EIR Section 4.9.2.8 on page 4.9-302. The Project would continue the use of an existing marine terminal and would not change the extent of operations in terms of vessel sizes and potential spill sizes. The increased vessel visits associated with the Project would increase the potential frequency of a spill, but the actual response requirements to an individual spill would be the same as the historical operations.

See Response to Comment 111 regarding CEQA's limits on requiring regulatory analysis in context of project EIR.

Response to Comment 172

Refer to Response to Comment 2-23. Mitigation measure HAZ-1 is revised to require the marine terminal to be completely under the requirements of MOTEMS, including all product and feedstock, and that the CSLC will ensure compliance with these requirements. Assurance of response activities and jurisdiction under the Lempert-Keene-Seastrand Act has been added to MM HAZ-1. See Response to Comment 111 regarding CEQA's limits on requiring regulatory analysis in context of project EIR.

Response to Comment 173

Phillips 66 is not required to dredge the channel for purposes of the Project.

Response to Comment 174

Vessel maintenance activities are not necessarily a function of the vessel calls at this particular marine terminal, but the extent of use of the vessels themselves, which may be flagged in a range of different locations and have various different use levels. Note that there would be a decrease in the amount of crude oil shipped. It is speculative to say that Bay Area maintenance yards would experience increases in activity associated with the Project. In addition, shipyards operate under existing permits and requirements and any additional activities would be required to comply with those existing permits and operational limits.

Response to Comment 175

The comment mis-represents the Project’s increase in vessel traffic as “drastic” and mis-represents the Draft EIR’s impact conclusion as conceding that the area’s aesthetic setting is “degraded”. In fact, Project-related vessel traffic would increase from one vessel every 2 days (170 ships and barges per year) to one vessel every day (362 per year; Draft EIR Table 3-2) -not, contrary to the comment’s statement, a “tripling,” and would not constitute a “drastic” increase. These vessels would be added to the background vessel traffic of oceangoing vessels, barges, ferry boats, and pleasure craft transiting San Pablo Bay, a traffic volume of several tens of thousands of transits per year (Draft EIR page 4.9-294 and Table 4.9-1), and would thus be imperceptible as an increase to viewers along the shoreline or as a source of additional light or glare. As stated in the Draft EIR, the "proposed increase in marine traffic may result in a slight degradation of the natural views" but "given the existing industrial visual character of the Rodeo Refinery and current Marine Terminal activity, the increase in marine traffic would not be highly noticeable." (Draft EIR, page 4.2-27.) In addition, many people may regard vessel traffic as an integral and valuable component of the view – an oceangoing vessel moving slowly across an expanse of water and a background of rolling hills does not necessarily represent a "degraded" view but may rather be regarded as a "picturesque" view. Accordingly, the Draft EIR's conclusion that the aesthetic impacts of increased vessel traffic would be less than significant is appropriate and complies with CEQA.

Response to Comment 176

CEQA Section 15130 allows the lead agency, "… to define the geographic scope of the area affected by the cumulative effect and provide a reasonable explanation for the geographic limitation used." To evaluate cumulative air quality impacts, the geographic area is regional to account for the dispersion of certain pollutants over a large area, including navigable waters. To set the analysis boundary, planning documents and projections for the affected air basins were used to evaluate whether the Project, together with the cumulative projects, would affect compliance with air quality standards.

Use of the BAAQMD regulatory guidance provides the appropriate study area for vessel related emissions. Marine transit emissions were analyzed out to 11 nautical miles (12.66 statute miles) outside of Golden Gate Bridge as required per BAAQMD Regulation 2-2-610. This is reflected in Marine Table 49 of Revised Draft EIR Appendix B that includes the marine transit zones. Unlike the rail impacts that occur along exact routes (i.e., railroad tracks), the routes outside the Bay Area traveled by marine vessels transiting to or from the Marine Terminal are variable, substantially unknown, and cannot be determined with precision.

The Project's feedstock mixes and sources cannot be predicted at this time without speculation (refer to Master Response No. 4, Land Use and Feedstocks). In turn, because the identities, sources, and availability of the Project's feedstocks cannot be determined at this time, the County cannot reasonably evaluate the air quality effects of marine vessels transporting such feedstocks beyond the information provided in the Draft EIR. Assessment of the Project's incremental contribution to cumulative impacts related to feedstocks, including vessels transporting feedstocks, would necessarily involve several layers of speculation (i.e., assumptions). Because speculation precludes assessment of this Project's own feedstock cultivation impacts, it is unknowable how the Project's feedstock demands will define marine transport needs, including routes taken by vessels.

An EIR needs only to analyze the significance of potential impacts that are reasonably foreseeable. 14 Cal. Code Regs. § 15064(d). "A change which is speculative or unlikely to occur is not reasonably foreseeable." Id. § 15064(d)(3). Because the County is unable to forecast whether this particular activity will occur (i.e., vessel transit outside the Bay Area), where the activity will occur, and/or what environmental impacts that activity may have, the County will not engage in speculation to carry the analysis further.

Response to Comment 177

CEQA is not the forum for the evaluation of prior conduct of an applicant. See Eureka Citizens for Responsible Gov't v. City of Eureka, 147 Cal. App. 4th 357, 370-71 (2007) (historic zoning and code violations were "not a CEQA consideration").

Response to Comment 178

The Draft EIR properly addresses potential Project impacts and associated mitigation measures. Consideration of shore power is not necessary to address Project impacts; however, the comment is noted and will be considered during the decision-making process.

Response to Comment 179

The Draft EIR concludes, properly, that the Rodeo Renewed Project would not affect recreational facilities. The comment states that "Increased ship traffic qualifies as substantial physical deterioration of an existing facility" without providing any evidence to that effect. The County is unaware of any studies that would support such a statement. In the 2014 Downtown San Francisco Ferry Terminal Expansion Final EIR/EIS, the potential impacts on recreational boating activities in the Bay due to the increase in vessel traffic from the project was described in the following:

> The proposed project improvements would accommodate an increase in water transit vessel traffic in the project area, from 14 to approximately 52 to 57; and the potential for conflicts with recreational users of San Francisco Bay in the project area could increase due to the increased vessel traffic. However, existing users of San Francisco Bay near the project area are accustomed to high vessel traffic, including water transit vessels, recreational boats, and large shipping vessels. (https://weta.sanfranciscobayferry.com/sites/default/files/weta/currentprojects/DFTX/files/DFTXFinalEISEIR/WETA%20DFTX%20Final%20EIS-EIR%20Vol%20I%20Sept%202014.pdf pg. 3.4-15)

Accordingly, the Draft EIR's analysis of recreational impacts is appropriate and complies with CEQA.

Response to Comment 180

The comment states, without providing any evidence, that "Increased ship traffic would accelerate deterioration of existing facilities," and does not describe what facilities are being considered. Given that the Project would add fewer than 200 vessel trips per year to a volume of traffic that is in the thousands per year (oceangoing vessels alone total approximately 3,500 per year [Draft EIR Table 4.9-1]), it is not reasonable to conclude that the Project would substantially exacerbate deterioration of existing facilities.

Similarly, the comment's characterization of the Project as resulting in "a huge increase in the amount of product carried by ship across the Pacific Ocean and through San Francisco Bay" is misleading. Given that San Francisco Bay averages 3,500 arrivals per year of vessels carrying products (Draft EIR Table 4.9-1), the addition of fewer than 200 vessels per year – vessels that would be smaller than those currently calling at the Rodeo Marine Terminal -- can only be characterized as an incremental increase, not a huge increase.

Finally, it is unclear what impacts a spill would have on utility systems, and absent the comment specifying such impacts, any response would be speculative.

Also refer to Responses to Comments 2-33 and Response 171.

Response to Comment 181

Vessel shear velocities that may scour and lift bottom sediments, resulting in direct impacts to bottom-dwelling invertebrates (displace, injure or kill) as well as indirect effects of sediment resuspension and turbidity were evaluated for special status, candidate and sensitive species (Biology Impact 4.4-3), special aquatic sites (Biology Impact 4.4-6), and native resident or migratory fish and wildlife (Biology Impact 4.4-8). Additional consideration of the NRDC cited references (Gabel et al. 2008, 2011) do not alter these impact conclusions.

Response to Comment 182

Noise impacts were evaluated for special status, candidate and sensitive species (Biology Impact 4.4-2) and native resident or migratory fish and wildlife (Biology Impact 4.4-8). It was clarified on page 4.4-131 that the stated median vessel noise levels were based on measurements within 3.3 feet of the vessel and that noise levels would be lower at greater distance from the ship. The median ship noise levels were used to compute cumulative sound exposure levels over the time associated for ship transit and compared to promulgated and interim guidance noise levels associated with injury or disturbance. The cumulative sound exposure levels are found to be below injury thresholds. Mitigation measure BIO-1(a) addresses vessel speed reduction and incentives. In addition, BIO-4(b) addresses hull husbandry aimed at reducing cavitation.

Response to Comment 183

Refer to Comment Letter 2.

The Draft EIR does consider petroleum cargo and renewable feedstock cargo as similar (but not identical) insofar as spill response efforts are concerned. It does so because the available evidence, as cited in the Draft EIR (p 4.4-137 and 138) is that the physical behavior of spilled renewable feedstocks is expected to be roughly similar to that of spilled crude oil, at least in the early stages of a spill. Accordingly, similar spill response strategies and equipment would be appropriate. However, the Draft EIR does not assume that the two types of cargo are the same: it specifically describes the differences between petroleum oil and feedstocks in their effects on wildlife.

See Response to Comment 2-23, which revises Draft EIR Mitigation Measure HAZ-1. As stated in the Draft EIR, despite mitigation impacts would be significant and unavoidable. The comment offers no suggestions for additional mitigation, simply claiming that the mitigation measures imposed in the Draft EIR are “insufficient”. Without a more specific suggestion, any further response would be speculative.

Response to Comment 184

Invasive species impacts were evaluated for special status, candidate and sensitive species (Biology Impact 4.4-5), special aquatic sites (Biology Impact 4.4-7), and native resident or migratory fish and wildlife (Biology Impact 4.4-9). The comment is inaccurate relative to mitigation as the proposed mitigation measures address and exceed those recommended by the NRDC. BIO-4(a) prohibits ballast water exchange at the Rodeo Facility marine terminal, and BIO-4(b) requires vessel operators to provide documentation of ballast water management forms and compliance with hull husbandry cleaning/inspections.

Response to Comment 185

Comment noted

Response to Comment 186

See Response to comment 182. Noise impacts were evaluated for special status, candidate and sensitive species (Biology Impact 4.4-2) and native resident or migratory fish and wildlife (Biology Impact 4.4-8). Noise impacts were evaluated for special status marine species and wildlife based on exposure considerations (sound levels, duration) given that these are mobile species.

The comment that the proposed mitigation measures amount to nothing more than sending some flyers is inaccurate. Implementation of Mitigation Measure BIO-1(a) would require Phillips 66 to Update Pre-Arrival Documents sent to each vessel operator scheduled to call at the Rodeo Facility. The updates would request compliance with the voluntary 10 knot speed reduction requested by the U.S. Coast Guard and National Marine Fisheries Service within the Traffic Separation Scheme shipping lanes approaching San Francisco Bay, inform and encourage their participation in the existing vessel speed reduction incentive program, and request extra vigilance by the vessel crews when entering the Traffic Separation Scheme shipping lanes to further minimize the potential for ship strikes on protected species. Because there are no regulations that require mandatory compliance with the existing voluntary vessel speed reduction and incentive programs, BIO-1(a) contemplates and builds upon existing measures by ensuring all vessel operators calling upon the Rodeo Facility are not only aware of, but also encouraged to comply and participate in the vessel speed reduction program.

As noted in the discussion of Impact 4.4-1, limited information is available with respect to sturgeon ship strikes in the bay and their vulnerability is not necessarily associated with vessel speed. Mitigation Measure BIO-1(b) seeks to improve understanding of sturgeon vulnerability to ship strikes in San Francisco Bay through coordination with CDFW, Research Sturgeon and public engagement.

Regarding oil spills, impacts were evaluated for special status, candidate and sensitive species (Biology Impact 4.4-4), special aquatic sites (Biology Impact 4.4-7), and native resident or migratory fish and wildlife (Biology Impact 4.4-9). Contrary to the comment, the EIR mitigation measure BIO-3 includes updating the Facility Plan and Spill Prevention, Control and Countermeasure (SPCC) Plan to address the change in feedstocks and require Phillips 66 to consult with OSPR during update of the SPCC Plan (especially with respect to adequacy of booms). Additionally, Phillips 66 will increase the frequency of drills to increase preparedness for quick response and site-specific deployment of equipment under different environmental conditions.

Regarding impacts to marine biological resource related to climate change, this comment speculates on climate change ocean temperature changes and ocean acidification may make ship strikes more likely in some areas. Due to the speculative and non-specific nature of this comment, no mitigation measure is warranted.

Response to Comment 187

It is unnecessary for the County to predict, beginning in year 2024 and beyond, what vessels the project applicant will use, the ports where those vessels will be loaded, the times and dates those vessels will be loaded, and the routes those vessels will take to the project applicant's marine terminal. Such predictions with respect to this Project exceed CEQA's scope and would detract from the County's directive to provide informed, reasoned, and meaningful analyses.

Commenters' allegation that the Draft EIR's Transportation and Traffic Analysis is deficient is not correct for several reasons. First, as stated in the Draft EIR, the Transportation and Traffic Analysis evaluates the Project's potential to have significant impacts on local and regional traffic. Pursuant to CEQA Guidelines Appendix G and Contra Costa County's Transportation Analysis Guidelines (Appendix G), the Project will have a significant impact to transportation and traffic conditions if it would:

a. conflict with a plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, including transit, roadway, bicycle, and pedestrian facilities;
b. conflict with or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b);
c. substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g.,, farm equipment); and
d. result in inadequate emergency vehicle access.

The County added an additional criterion, derived from common engineering practice, which is to evaluate whether Project transportation and traffic would cause substantial damage or wear of public roadways because of increase movement of heavy vehicles. Clearly, this chapter of the Draft EIR and its scope of analysis, as set forth in the CEQA Guidelines and the County's Transportation Analysis Guidelines, pertains to on-road and other land-based traffic. Marine vessel traffic is not within the scope of analysis and its omission does not render the Draft EIR legally deficient.

In addition, potential impacts associated with certain on-road traffic of a local and regional nature is reasonably foreseeable and, thus, those impacts are included in the Draft EIR analysis. As indicated in Section 3.8 of the Draft EIR (pages 3-25 through 3-28) and further explained in Master Response – Feedstocks), it is not feasible to predict with any degree of certainty the source locations and the specific types of renewable feedstocks or combination of feedstocks that will be processed in any particular year. Therefore, even if the CEQA Transportation and Traffic Analysis was required to include within its scope potential impacts associated with global maritime shipping traffic, which it is not, the types of impacts that the comments suggest are not reasonably foreseeable and, therefore, are speculative. ("While a lead agency must use its 'best efforts' to evaluate environmental effects, including the use of reasonable forecasting, 'foreseeing the unforeseeable' is not required, nor is predicting the unpredictable or quantifying the unquantifiable." *Citizens for a Sustainable Treasure Island v. City & Cty. of San Francisco* (2014) 227 Cal.App.4th 1036, 1058 (quoting 14 Cal. Code Regs. § 15064(d)(3)). "CEQA gives lead agencies discretion to design an EIR . . . and the agency is not required to conduct every recommended test or perform all requested research or analysis." *Rodeo Citizens Ass'n v. Cty. of Contra Costa* (2018) 22 Cal.App.5th 214, 226.)

Lastly, the Draft EIR does consider and evaluate marine tank vessel accident and collision rates, as well as the possibilities of spills (Draft EIR, Section 4.9, Hazards and Hazardous Materials). The analysis properly analyzed potential environmental impacts, including the expected probability of oil spill accidents in transit and at the Marine Terminal, and possible consequences if a spill occurred. The Draft EIR's conclusion resulted in a finding of significant impacts and set forth all feasible mitigation.

Response to Comment 188

The County reached out to several tribes in the region that could be affected by the Project. One tribe responded with suggested mitigation, which the Draft EIR incorporated. Refer to Section 4.14, Tribal Cultural Resources.

Response to Comment 189

Comment noted. Refer to Section 4.17, Environmental Justice. Analysis of socioeconomic impacts is not a requirement of CEQA. See also Response to Comment 161.

Response to Comment 190

Analysis of economic impacts is not a requirement of CEQA. See also Response to Comment 161.

Response to Comment 191

Refer to responses prepared for Comment Letter 3 from the CSLC.

Response to Comment 192

Refer to Master Response No. 4 Land Use and Feedstocks

See Response to Comment 187 regarding CEQA's requirement to evaluate reasonably foreseeable impacts and not to engage in speculation.

Response to Comment 193

The County does not agree that terrorism impacts be evaluated, nor does CEQA require this assessment.

Response to Comment 194

The County has determined that the Draft EIR does not require recirculation.

Response to Comment A-1

Refer to Master Response No. 2, CEQA Alternatives

Refer to Master Response No. 5, Renewable Fuels Processing and Master Response No. 6, Purpose of Project. The State supports the production of renewable fuels and the transformation of petroleum refineries to renewable fuels facilities. Appendix A is not a peer-reviewed paper.

Response to Comment A-2

Comment noted.

Response to Comment A-3

Refer to Master Response No. 5, Renewable Fuels Processing. Courts have expressly recognized that a project-level EIR is an inappropriate vehicle for conducting such comprehensive regulatory analyses under the auspices of CEQA. See Citizens of Goleta Valley v. Bd. of Supervisors (1990) 52 Cal.3d 553, 574 (explaining that requiring even regional comprehensive planning analysis as part of any individual project's permit process "would impose an unnecessary and wasteful burden on local governments"). The federal and State government have numerous regulatory programs addressing transportation, including transportation fuels.

Response to Comment A-4

Comment noted.

Response to Comment A-5

Comment noted. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment A-6

Refer to Master Response No. 5, Renewable Fuels Processing. See also Responses to Comments to Comment Letter 36.

Response to Comment A-7

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment A-8

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment A-9

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment A-10

Comment noted. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment A-11

Refer to Master Response No. 2, CEQA Alternatives and Master Response No. 5, Renewable Fuels Processing.

Response to Comment A-12

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment A-13

Comment noted.

Refer to Master Response No. 5, Renewable Fuels Processing

Response to Comment A-14

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment A-15

Refer to Master Response No. 2, CEQA Alternatives

Response to Comment A-16

Refer to Master Response No. 2, CEQA Alternatives

Response to Comment A-17

Refer to Master Response No. 2, CEQA Alternatives

Response to Comment A-18

Refer to Master Response No. 2, CEQA Alternatives

Response to Comment A-19

Refer to Master Response No. 2, CEQA Alternatives

Response to Comment A-20

Comment noted.

Response to Comment A-21

Comment noted.

Response to Comment A-22

Comment noted.

Response to Comment A-23

Comment noted.

Response to Comment A-24

Comment noted.

Response to Comment A-25

Refer to Master Response No. 4, Land use and Feedstocks.

Response to Comment A-26

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment A-27

Comment noted.

Response to Comment A-28

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment A-29

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment A-30

Comment noted.

Response to Comment A-31

Comment noted.

Response to Comment A-32

Comment noted.

Response to Comment A-33

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment A-34

Refer to Master Response No. 5, Renewable Feedstocks Processing.

Response to Comment A-35

Comment noted.

Response to Comment A-36

Comment noted.

Response to Comment A-37

Comment noted.

Response to Comment A-38

Comment noted.

Response to Comment A-39

Comment noted.

Response to Comment A-40

Comment noted.

Response to Comment A-41

Comment noted.

Response to Comment A-42

Comment noted.

Response to Comment A-43

Comment noted.

Response to Comment A-44

Comment noted.

Response to Comment A-45

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment A-46

Comment noted.

Response to Comment A-47

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment A-48

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment A-49

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment A-50

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment B-1

Comment noted.

Response to Comment B-2

Comment noted.

Response to Comment B-3

Comment noted.

Response to Comment B-4

Comment noted.

Response to Comment B-5

Comment noted.

Response to Comment B-6

Comment noted.

Response to Comment B-7

Comment noted.

Response to Comment B-8

Comment noted.

Response to Comment B-9

Comment noted.

Response to Comment B-10

Comment noted.

Response to Comment B-11

Comment noted.

Response to Comment B-12

Comment noted.

Response to Comment B-13

Comment noted.

Response to Comment B-14

Comment noted.

Response to Comment B-15

Comment noted.

Response to Comment B-16

Comment noted.

Response to Comment B-17

Comment noted.

Response to Comment B-18

Comment noted.

Response to Comment B-19

Comment noted.

Response to Comment B-20

Comment noted.

Response to Comment C-1

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-2

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-3

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-4

Refer to Master Response No. 4, Land Use and Feedstocks, Master Response No. 5, Renewable Fuels Processing and Master Response No. 2, CEQA Alternatives.

Response to Comment C-5

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-6

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-7

Refer to Master Response No. 5, Renewable Fuels Processing and Master Response No. 4, Land Use and Feedstocks.

Response to Comment C-8

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-9

Refer to Master Response No. 5, Renewable Fuels Processing and Master Response No. 4 Land Use and Feedstocks.

Response to Comment C-10

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment C-11

CEQA does not require the evaluation of similar facilities globally to determine appropriate regulatory program. Courts have expressly recognized that a project-level EIR is an inappropriate vehicle for conducting such comprehensive regulatory analyses under the auspices of CEQA. See Citizens of Goleta Valley v. Bd. of Supervisors (1990) 52 Cal.3d 553, 574 (explaining that requiring even regional comprehensive planning analysis as part of any individual project's permit process "would impose an unnecessary and wasteful burden on local governments").

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment C-12

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-13

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-14

Comments claim that the Draft EIR fails to disclose the "operational duration" of the Project. (NRDC, Comment 35-49, page 14, Comment 35-C-14, Appendix C, page 12.) Comments suggest evaluating the duration of process units or the State's goals of "phasing out" petroleum and biofuel diesel "in favor of zero-emission vehicles." Comments do not suggest a duration, nor do they identify any specific deficiencies in the environmental analyses related to the duration of the project.

Contrary to these claims, the Draft EIR does evaluate an appropriate duration of the Project's environmental effects depending on the environmental topic. For example, some environmental topics evaluate daily or annual emissions, such as air quality or greenhouse gas emissions. For the Health Risk Assessment in the air quality analysis, the exposure period is 30 years (Revised Draft EIR, Appendix B, pdf page 20 of 4281). For Sea Level Rise, the Draft EIR considers a 100-year event. (Draft EIR, page 4.8-271.) Process units have an unlimited life as does the facility, subject to any permit requirements, and the Draft EIR properly evaluated an ongoing Project in accordance with appropriate methods depending on the topic.

Comments refer to the County's commitment to Diesel Free by '33, which is a Statement of Purpose issued by BAAQMD encouraging local communities to reduce diesel emissions (https://dieselfree33.baaqmd.gov/statement-of-purpose). The website makes clear that "diesel" refers to petroleum-based diesel: "For purposes of this Statement, "diesel emissions" and "diesel exhaust" means emissions or exhaust emitted from the combustion of petroleum-based diesel fuel." Therefore, the Rodeo Renewed Project serves to support this effort by contributing to the supply of renewable diesel to replace petroleum-based diesel. Furthermore, the State's goals include refinery conversions as was emphasized in Governor Newsom's Executive Order N-79-20, which directed State agencies to "expedite regulatory processes to repurpose and transition upstream and downstream oil production facilities . . . ."

The comments seem to imply that a shorter duration of the Project would be appropriate, but from a CEQA perspective, an evaluation of the Project for a shorter duration would likely result in fewer or lesser environmental effects.

Response to Comment C-15

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-16

Refer to Master Response No. 7, Project Description– Piecemealing and Master Response No. 5 Renewable Fuels Processing.

Response to Comment C-17

Refer to Master Response No. 7, Project Description– Piecemealing.

Response to Comment C-18

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-19

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-20

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 5, Renewable Fuels Processing. In addition, comments cite Sections 38505 and38562(b)(8) of the California Health and Safety Code (incorrectly cited as CCR or California Code of Regulations in footnote 76), stating that "State law warns against "a reduction in emissions of greenhouse gases within the state this is offset by an increase in emissions of greenhouse gases outside of the state." " (Appendix C, page 18.) However, these laws pertain to the development of regulations by CARB, mandating that it minimize "leakage" which is defined in Section 38505 and is the quotation cited by comments. These sections do not require any evaluation under CEQA for a project level EIR.

Response to Comment C-21

Refer to Master Response No. 4, Land Use and Feedstocks, Master Response No. 5, Renewable Fuels Processing, and Response to Comments 35-132 and 35-133.

Response to Comment C-22

Refer to Master Response No. 4, Land Use and Feedstocks, Master Response No. 5, Renewable Fuels Processing, and Response to Comments 35-132 and 35-133.

Response to Comment C-23

The Draft EIR specifically addresses air quality and environmental justice impacts in Sections 4.3, *Air Quality* and Section 4.17, *Environmental Justice*.

Response to Comment C-24

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-25

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-26

The analyses identified in comments, such as PHAs, Hierarchy of Hazard Controls Analyses, Inherent Safety Measure analyses, and MOCs, to the extent they are applicable and/or required as part of facility operations, will be conducted in accordance with applicable regulatory and industry requirements and timeframes.

See also Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-27

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-28

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-29

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-30

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-31

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-32

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-33

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-34

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-35

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-36

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-37

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-38

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-39

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-40

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-41

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-42

The Health Risk Analysis in the Air Quality section of the Draft EIR evaluates "acute" health effects for the Project's construction and operational effects. (Draft EIR, Section 4.3.7.3, including Table 4.3-18 and Table 4.3-19.) The Impact Summary on page 4.3-78 states: As shown above, the HRA results of Project construction and operation do not indicate exceedances of applicable cancer risk, non-cancer chronic hazard index, annual average PM2.5 concentration, and acute hazard index thresholds and the project-level or community cumulative-level. Thus, the impact would be less than significant and no mitigation is required."

See also Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-43

The environmental setting is taken into account in the air quality analysis. See Draft EIR, Air Quality, Section 4.3.2.

Response to Comment C-44

The Health Risk Assessment (HRA) contained in Section 4.3, with results in Table 4.3.18, of the Draft EIR was conducted consistent with OEHHA and BAAQMD standards as described in the Draft EIR, Section 4.3.7.3. That HRA included risks and impacts for both short-term (1-hr) and long term (annual and lifetime) risks resulting from the Project.

Response to Comment C-45

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment C-46

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment C-47

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment C-48

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment C-49

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment C-50

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment C-51

Comment noted.

Response to Comment C-52

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment C-53

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment C-54

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment C-55

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment C-56

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment C-57

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment C-58

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment C-59

Refer to Responses to Comments 35-C1 through 35-C58.

Comment Letter 37. New Horizons Career Development Center

COMMENT LETTER: 37

Gary Kupp

From: Anthony Hodge <anthonyakhodge@newhorizonscdc.com>
Sent: Friday, December 17, 2021 2:04 PM
To: Gary Kupp
Subject: New Horizons Career Development Center Letter of Support
Attachments: New Horizons CDC Lettter of Support.docx

Good afternoon, I hope that this message finds you well. Below I have attached a letter of support on behalf of New Horizons Career Development Center.

Regards,

Dr. Anthony A.K. Hodge,
Executive Director
New Horizons Career Development Center
199 Parker Ave
Rodeo, CA 94572
(510) 799-2916

1

COMMENT LETTER: 37

12/17/2021

Gary Kupp
Department of Conservation and Development &
Community Development Division
30 Muir Road
Martinez, CA 94553
Via email to: Gary.Kupp@dcd.cccounty.us

Re: Support of Phillips 66 Rodeo Renewed Project

Dear Mr. Kupp:

On behalf of the *New Horizons Career Development Center*, I am writing to confirm our strong support of the Phillips 66 Rodeo Renewed project. Phillips 66 has been an important member of our community for many years. Please add our public comment in support of the Rodeo Renewed project. The Draft EIR demonstrates this project will benefit our community by reducing criteria pollutants while maintaining family-wage jobs.

Throughout the years we have forged a partnership and we are proud to work alongside Phillips 66 towards the betterment of our shared community. With the approval of the Rodeo Renewed project we can continue this great work which benefits residents, businesses, and community groups. As one of the largest employers in our area, we implore you to do all that you can to ensure their continued success which, in turn, supports Phillips 66 San Francisco Refinery.

The Rodeo Renewed Project is what the future *can* look like: industry, labor, local business and the community working together to help our State meet its renewable energy goals while maintaining solid economic growth. Phillips 66 has shown how innovative and well-designed technologies can reduce local criteria pollutants and produce lower carbon intensive fuels. What a great thing to celebrate here at home! 1

As shown in the Draft EIR, Rodeo Renewed plans to use existing facilities, repurposing the existing equipment currently in use today while also creating hundreds of construction jobs. These family-wage jobs not only benefit the worker, they also benefit the immediate community through the purchase of goods and services. Our local businesses count on this multiplier effect and we ask you to carefully consider these economic drivers and the impacts they have on our community.

Therefore, on behalf of New Horizons Career Development Center, we enthusiastically support and urge you to approve the Rodeo Renewed project

Sincerely,

Dr. Anthony Hodge
Executive Director; New Horizons Career Development Center

Response to Comment

Comment noted.

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Comment Letter 38. Pacific Gas and Electric Company

COMMENT LETTER: 38

Gary Kupp

From: PGE Plan Review <PGEPlanReview@pge.com>
Sent: Tuesday, October 19, 2021 6:43 AM
To: Gary Kupp
Subject: RE: Contra Costa mail- PHILLIPS
Attachments: Initial_Response_Letter_10-19-2021.pdf

Dear Gary Kupp,

Thank you for submitting the Phillips 66 Rodeo Renewed Project plans. The PG&E Plan Review Team is currently reviewing the information provided. Should we find the possibility this project may interfere with our facilities, we will respond to you with project specific comments on or prior to the provided deadline. Attached is general information regarding PG&E facilities for your reference. **If you do not hear from us, within 45 days, you can assume we have no comments at this time.**

This email and attachment does not constitute PG&E's consent to use any portion of its easement for any purpose not previously conveyed. If there are subsequent modifications made to your design, we ask that you resubmit the plans to the email address listed below.

If you have any questions regarding our response, please contact the PG&E Plan Review Team at (877) 259-8314 or pgeplanreview@pge.com.

Thank you,

Pacific Gas and Electric Company
Plan Review Team
(877) 259-8314
Email: pgeplanreview@pge.com

From: Larrabee, Craig <CJLc@pge.com>
Sent: Monday, October 18, 2021 6:08 PM
To: PGE Plan Review <PGEPlanReview@pge.com>
Subject: Contra Costa mail- PHILLIPS

TO PGE PLAN REVIEW

Here is some mail from Contra Costa regarding a PHILLIPS project.

Thanks,

Craig

1

COMMENT LETTER: 38

October 19, 2021

Gary Kupp
Contra Costa County Dept of Conservation & Development
30 Muir Road
Martinez, CA 94553

Ref: Gas and Electric Transmission and Distribution

Dear Gary Kupp,

Thank you for submitting the 1380 San Pablo Avenue plans for our review. PG&E will review the submitted plans in relationship to any existing Gas and Electric facilities within the project area. If the proposed project is adjacent/or within PG&E owned property and/or easements, we will be working with you to ensure compatible uses and activities near our facilities.

Attached you will find information and requirements as it relates to Gas facilities (Attachment 1) and Electric facilities (Attachment 2). Please review these in detail, as it is critical to ensure your safety and to protect PG&E's facilities and its existing rights. 1

Below is additional information for your review:

1. This plan review process does not replace the application process for PG&E gas or electric service your project may require. For these requests, please continue to work with PG&E Service Planning: https://www.pge.com/en_US/business/services/building-and-renovation/overview/overview.page.

2. If the project being submitted is part of a larger project, please include the entire scope of your project, and not just a portion of it. PG&E's facilities are to be incorporated within any CEQA document. PG&E needs to verify that the CEQA document will identify any required future PG&E services. 2

3. An engineering deposit may be required to review plans for a project depending on the size, scope, and location of the project and as it relates to any rearrangement or new installation of PG&E facilities.

Any proposed uses within the PG&E fee strip and/or easement, may include a California Public Utility Commission (CPUC) Section 851 filing. This requires the CPUC to render approval for a conveyance of rights for specific uses on PG&E's fee strip or easement. PG&E will advise if the necessity to incorporate a CPUC Section 851filing is required. 3

This letter does not constitute PG&E's consent to use any portion of its easement for any purpose not previously conveyed. PG&E will provide a project specific response as required.

Sincerely,

Plan Review Team
Land Management

COMMENT LETTER: 38

Attachment 1 – Gas Facilities

There could be gas transmission pipelines in this area which would be considered critical facilities for PG&E and a high priority subsurface installation under California law. Care must be taken to ensure safety and accessibility. So, please ensure that if PG&E approves work near gas transmission pipelines it is done in adherence with the below stipulations. Additionally, the following link provides additional information regarding legal requirements under California excavation laws: https://www.usanorth811.org/images/pdfs/CA-LAW-2018.pdf

1. Standby Inspection: A PG&E Gas Transmission Standby Inspector must be present during any demolition or construction activity that comes within 10 feet of the gas pipeline. This includes all grading, trenching, substructure depth verifications (potholes), asphalt or concrete demolition/removal, removal of trees, signs, light poles, etc. This inspection can be coordinated through the Underground Service Alert (USA) service at 811. A minimum notice of 48 hours is required. Ensure the USA markings and notifications are maintained throughout the duration of your work.

2. Access: At any time, PG&E may need to access, excavate, and perform work on the gas pipeline. Any construction equipment, materials, or spoils may need to be removed upon notice. Any temporary construction fencing installed within PG&E's easement would also need to be capable of being removed at any time upon notice. Any plans to cut temporary slopes exceeding a 1:4 grade within 10 feet of a gas transmission pipeline need to be approved by PG&E Pipeline Services in writing PRIOR to performing the work.

3. Wheel Loads: To prevent damage to the buried gas pipeline, there are weight limits that must be enforced whenever any equipment gets within 10 feet of traversing the pipe. 4

Ensure a list of the axle weights of all equipment being used is available for PG&E's Standby Inspector. To confirm the depth of cover, the pipeline may need to be potholed by hand in a few areas.

Due to the complex variability of tracked equipment, vibratory compaction equipment, and cranes, PG&E must evaluate those items on a case-by-case basis prior to use over the gas pipeline (provide a list of any proposed equipment of this type noting model numbers and specific attachments).

No equipment may be set up over the gas pipeline while operating. Ensure crane outriggers are at least 10 feet from the centerline of the gas pipeline. Transport trucks must not be parked over the gas pipeline while being loaded or unloaded.

4. Grading: PG&E requires a minimum of 36 inches of cover over gas pipelines (or existing grade if less) and a maximum of 7 feet of cover at all locations. The graded surface cannot exceed a cross slope of 1:4.

5. Excavating: Any digging within 2 feet of a gas pipeline must be dug by hand. Note that while the minimum clearance is only 12 inches, any excavation work within 24 inches of the edge of a pipeline must be done with hand tools. So to avoid having to dig a trench entirely with hand tools, the edge of the trench must be over 24 inches away. (Doing the math for a 24 inch

COMMENT LETTER: 38

wide trench being dug along a 36 inch pipeline, the centerline of the trench would need to be at least 54 inches [24/2 + 24 + 36/2 = 54] away, or be entirely dug by hand.)

Water jetting to assist vacuum excavating must be limited to 1000 psig and directed at a 40° angle to the pipe. All pile driving must be kept a minimum of 3 feet away.

Any plans to expose and support a PG&E gas transmission pipeline across an open excavation need to be approved by PG&E Pipeline Services in writing PRIOR to performing the work.

6. Boring/Trenchless Installations: PG&E Pipeline Services must review and approve all plans to bore across or parallel to (within 10 feet) a gas transmission pipeline. There are stringent criteria to pothole the gas transmission facility at regular intervals for all parallel bore installations.

For bore paths that cross gas transmission pipelines perpendicularly, the pipeline must be potholed a minimum of 2 feet in the horizontal direction of the bore path and a minimum of 12 inches in the vertical direction from the bottom of the pipe with minimum clearances measured from the edge of the pipe in both directions. Standby personnel must watch the locator trace (and every ream pass) the path of the bore as it approaches the pipeline and visually monitor the pothole (with the exposed transmission pipe) as the bore traverses the pipeline to ensure adequate clearance with the pipeline. The pothole width must account for the inaccuracy of the locating equipment.

7. Substructures: All utility crossings of a gas pipeline should be made as close to perpendicular as feasible (90° +/- 15°). All utility lines crossing the gas pipeline must have a minimum of 12 inches of separation from the gas pipeline. Parallel utilities, pole bases, water line 'kicker blocks', storm drain inlets, water meters, valves, back pressure devices or other utility substructures are not allowed in the PG&E gas pipeline easement. 4 cont'd

If previously retired PG&E facilities are in conflict with proposed substructures, PG&E must verify they are safe prior to removal. This includes verification testing of the contents of the facilities, as well as environmental testing of the coating and internal surfaces. Timelines for PG&E completion of this verification will vary depending on the type and location of facilities in conflict.

8. Structures: No structures are to be built within the PG&E gas pipeline easement. This includes buildings, retaining walls, fences, decks, patios, carports, septic tanks, storage sheds, tanks, loading ramps, or any structure that could limit PG&E's ability to access its facilities.

9. Fencing: Permanent fencing is not allowed within PG&E easements except for perpendicular crossings which must include a 16 foot wide gate for vehicular access. Gates will be secured with PG&E corporation locks.

10. Landscaping: Landscaping must be designed to allow PG&E to access the pipeline for maintenance and not interfere with pipeline coatings or other cathodic protection systems. No trees, shrubs, brush, vines, and other vegetation may be planted within the easement area. Only those plants, ground covers, grasses, flowers, and low-growing plants that grow unsupported to a maximum of four feet (4') in height at maturity may be planted within the easement area.

COMMENT LETTER: 38

11. Cathodic Protection: PG&E pipelines are protected from corrosion with an "Impressed Current" cathodic protection system. Any proposed facilities, such as metal conduit, pipes, service lines, ground rods, anodes, wires, etc. that might affect the pipeline cathodic protection system must be reviewed and approved by PG&E Corrosion Engineering.

12. Pipeline Marker Signs: PG&E needs to maintain pipeline marker signs for gas transmission pipelines in order to ensure public awareness of the presence of the pipelines. With prior written approval from PG&E Pipeline Services, an existing PG&E pipeline marker sign that is in direct conflict with proposed developments may be temporarily relocated to accommodate construction work. The pipeline marker must be moved back once construction is complete. **4** cont'd

13. PG&E is also the provider of distribution facilities throughout many of the areas within the state of California. Therefore, any plans that impact PG&E's facilities must be reviewed and approved by PG&E to ensure that no impact occurs which may endanger the safe operation of its facilities.

COMMENT LETTER: 38

Attachment 2 – Electric Facilities

It is PG&E's policy to permit certain uses on a case by case basis within its electric transmission fee strip(s) and/or easement(s) provided such uses and manner in which they are exercised, will not interfere with PG&E's rights or endanger its facilities. Some examples/restrictions are as follows:

1. Buildings and Other Structures: No buildings or other structures including the foot print and eave of any buildings, swimming pools, wells or similar structures will be permitted within fee strip(s) and/or easement(s) areas. PG&E's transmission easement shall be designated on subdivision/parcel maps as "**RESTRICTED USE AREA – NO BUILDING.**"

2. Grading: Cuts, trenches or excavations may not be made within 25 feet of our towers. Developers must submit grading plans and site development plans (including geotechnical reports if applicable), signed and dated, for PG&E's review. PG&E engineers must review grade changes in the vicinity of our towers. No fills will be allowed which would impair ground-to-conductor clearances. Towers shall not be left on mounds without adequate road access to base of tower or structure.

3. Fences: Walls, fences, and other structures must be installed at locations that do not affect the safe operation of PG&'s facilities. Heavy equipment access to our facilities must be maintained at all times. Metal fences are to be grounded to PG&E specifications. No wall, fence or other like structure is to be installed within 10 feet of tower footings and unrestricted access must be maintained from a tower structure to the nearest street. Walls, fences and other structures proposed along or within the fee strip(s) and/or easement(s) will require PG&E review; submit plans to PG&E Centralized Review Team for review and comment. 5

4. Landscaping: Vegetation may be allowed; subject to review of plans. On overhead electric transmission fee strip(s) and/or easement(s), trees and shrubs are limited to those varieties that do not exceed 15 feet in height at maturity. PG&E must have access to its facilities at all times, including access by heavy equipment. No planting is to occur within the footprint of the tower legs. Greenbelts are encouraged.

5. Reservoirs, Sumps, Drainage Basins, and Ponds: Prohibited within PG&E's fee strip(s) and/or easement(s) for electric transmission lines.

6. Automobile Parking: Short term parking of movable passenger vehicles and light trucks (pickups, vans, etc.) is allowed. The lighting within these parking areas will need to be reviewed by PG&E; approval will be on a case by case basis. Heavy equipment access to PG&E facilities is to be maintained at all times. Parking is to clear PG&E structures by at least 10 feet. Protection of PG&E facilities from vehicular traffic is to be provided at developer's expense AND to PG&E specifications. Blocked-up vehicles are not allowed. Carports, canopies, or awnings are not allowed.

7. Storage of Flammable, Explosive or Corrosive Materials: There shall be no storage of fuel or combustibles and no fueling of vehicles within PG&E's easement. No trash bins or incinerators are allowed.

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8. Streets and Roads: Access to facilities must be maintained at all times. Street lights may be allowed in the fee strip(s) and/or easement(s) but in all cases must be reviewed by PG&E for proper clearance. Roads and utilities should cross the transmission easement as nearly at right angles as possible. Road intersections will not be allowed within the transmission easement.

9. Pipelines: Pipelines may be allowed provided crossings are held to a minimum and to be as nearly perpendicular as possible. Pipelines within 25 feet of PG&E structures require review by PG&E. Sprinklers systems may be allowed; subject to review. Leach fields and septic tanks are not allowed. Construction plans must be submitted to PG&E for review and approval prior to the commencement of any construction.

10. Signs: Signs are not allowed except in rare cases subject to individual review by PG&E.

11. Recreation Areas: Playgrounds, parks, tennis courts, basketball courts, barbecue and light trucks (pickups, vans, etc.) may be allowed; subject to review of plans. Heavy equipment access to PG&E facilities is to be maintained at all times. Parking is to clear PG&E structures by at least 10 feet. Protection of PG&E facilities from vehicular traffic is to be provided at developer's expense AND to PG&E specifications.

12. Construction Activity: Since construction activity will take place near PG&E's overhead electric lines, please be advised it is the contractor's responsibility to be aware of, and observe the minimum clearances for both workers and equipment operating near high voltage electric lines set out in the High-Voltage Electrical Safety Orders of the California Division of Industrial Safety (https://www.dir.ca.gov/Title8/sb5g2.html), as well as any other safety regulations. Contractors shall comply with California Public Utilities Commission General Order 95 (http://www.cpuc.ca.gov/gos/GO95/go_95_startup_page.html) and all other safety rules. No construction may occur within 25 feet of PG&E's towers. All excavation activities may only commence after 811 protocols has been followed. 5 cont'd

Contractor shall ensure the protection of PG&E's towers and poles from vehicular damage by (installing protective barriers) Plans for protection barriers must be approved by PG&E prior to construction.

13. PG&E is also the owner of distribution facilities throughout many of the areas within the state of California. Therefore, any plans that impact PG&E's facilities must be reviewed and approved by PG&E to ensure that no impact occurs that may endanger the safe and reliable operation of its facilities.

Response to Comment 1

The Rodeo Renewed Project does not include uses within PG&E's fee strip or easement.

Comment noted.

Response to Comment 2

Comment noted.

Response to Comment 3

The Rodeo Renewed Project does not include uses within PG&E's fee strip or easement.

Response to Comment 4

The Rodeo Renewed Project does not include uses within PG&E's fee strip or easement.

Response to Comment 5

The Rodeo Renewed Project does not include uses within PG&E's fee strip or easement.

Comment Letter 39. Phillips 66 Community Advisory Panel

COMMENT LETTER: 39

Gary Kupp

From: darrell.foote@sbcglobal.net
Sent: Thursday, December 16, 2021 11:33 PM
To: Gary Kupp
Cc: SupervisorMitchoff; District5; Supervisor Candace Andersen; Supervisor_Burgis; John Gioia
Subject: Phillips 66 CAP Members Rodeo Renewed Project Comment
Attachments: P66 CAP Members Rodeo Renewed Comment.pdf

Dear Mr. Kupp,

Several Members of the Phillips 66 Community Advisory Panel would like to provide comment on the Rodeo Renewed Project. Please find their letter attached as a pdf.

Thank you,
Darrell Foote
Facilitator, P66 CAP

1

COMMENT LETTER: 39

Phillips 66
Community Advisory Panel

December 10, 2021

Contra Costa County
Department of Conservation & Development Community Development Division
30 Muir Road, Martinez, California 94553
Attention: Gary Kupp, Senior Planner

Dear Mr. Kupp,

This letter is on behalf of the following individual members of the Phillips 66 Community Advisory Panel (CAP) who seek to advise you that they support the proposed Rodeo Renewed Project as evaluated in the Project Environmental Impact Report (EIR).

Established in 1995, the CAP is an independent, self-governing body whose members include local residents, community organizations, emergency responders, and others from the communities surrounding the refinery. The CAP meets monthly with management representatives of Phillips 66 Refinery to discuss matters of interest and concern, and to receive updates on refinery operations. The CAP places a priority on matters dealing with health and safety and the environment, such as the proposed Rodeo Renewed Project.

In addition to receiving periodic presentations at CAP meetings, we have independently reviewed and discussed the Environmental Impact Report for the proposed Rodeo Renewed project preparatory to considering a recommendation supporting the project. 1

As CAP members we were able to ask questions regarding potential impacts and mitigations related to the project. Based on this information the following CAP members strongly urge the certification of the EIR and the approval of the company proposed project

Certification and approval will allow the refinery to continue to fuel the California and Bay Area economies in a safe and environmentally responsible manner. As CAP members, residents, and community-based organizations, we support Phillips 66's proposed project as it has been designed to protect both the proximate environment and the nearby communities.

We recommend that the County certify the EIR and approve the Rodeo Renewed project.

If you have any questions, please contact Darrell Foote, CAP Facilitator, at 925-229-0440 or email him at informpr@sbcglobal.net.

Sincerely,

Deborah Brandon

Dean Columbo

Culoz Davis

Barbara Vargen-Kotchevar

Deborah Drake

Barbara Vargen-Kotchevar

Ron Wilson

Ed Gray

Ed Gray

Response to Comment

Comment noted.

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Comment Letter 40. Plumbers & Steamfitters Local Union 342

COMMENT LETTER: 40

Gary Kupp

From:	Charlene Walton <charlenew@ua342.org>
Sent:	Wednesday, December 15, 2021 3:45 PM
To:	Gary Kupp
Cc:	SupervisorMitchoff; District5; Supervisor Candace Andersen; Supervisor_Burgis; John Gioia; Che Timmons; Chuck Leonard
Subject:	Rodeo Renewed Project - Phillips 66
Attachments:	2021_1214 P66 support letter.pdf

Please see attached letter from UA Local 342 Business Manager Ché Timmons.

Thank you.

Charlene Walton – Executive Secretary and Office Coordinator
Plumbers & Steamfitters Local Union 342
Phone: (925) 686-5880, ext. 250 | Fax: (925) 686-5815 | charlenew@ua342.org

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Plumbers & Steamfitters Local Union 342

935 Detroit Avenue, Concord, CA 94518-2501 ♦ Phone (925) 686-5880 ♦ Fax (925) 685-3710

CHÉ TIMMONS - BUSINESS MANAGER

ASST. BUSINESS MANAGER ROBBIE NASH
BUSINESS REPRESENTATIVE MARC LOPEZ
BUSINESS REPRESENTATIVE STEVE ECKLEY
BUSINESS REPRESENTATIVE CHUCK LEONARD
PIPELINE REPRESENTATIVE CHAD MARTIN
PLUMBER REPRESENTATIVE TIM KNIGHT
REFRIGERATION REPRESENTATIVE MAT HATTICH
ORGANIZER RODDY AUER

December 14, 2021

Department of Conservation and Development &
Community Development Division
Attn: Gary Kupp
30 Muir Road
Martinez, CA 94553

Dear Mr. Kupp:

On behalf of the 4000 members of Plumbers & Steamfitters Union Local 342 (UA Local 342) we offer our strong support of Phillips 66's Rodeo Renewed project at the San Francisco Refinery in Rodeo. In response to the Draft EIR, we officially submit these public comments to be entered into the record.

Rodeo Renewed is among the first renewable transportation fuels projects in Contra Costa County and positions Phillips 66 to be a world leader in renewable energy production while preserving, family-wage jobs and helping to improve local air quality. **We fully support Rodeo Renewed and believe the Draft EIR is an accurate representation of this positive and responsible plan.**

Approval of this project will not only serve the best interests of the working men and women of UA Local 342, but Contra Costa County, the Bay Area and California as a whole. Rodeo Renewed will help achieve California's low-carbon goals while also creating renewable energy jobs. 1

Phillips 66's Rodeo Refinery is celebrating their 125th Anniversary this year, and we want to ensure its ability to contribute to the Contra Costa County economy for many years to come is retained. This includes its long legacy of providing family-wage jobs, not only for the men and women within the refinery, but also for the members of UA Local 342, numerous contractors, vendors, and the surrounding community.

Rodeo Renewed, will help support our local economy by creating more than 500 construction jobs, during the conversion, and supporting ~650 renewable energy jobs upon completion. As essential workers, the refinery is vital to keeping California moving. Projects like this also have multiplier effects, meaning for each job the refinery provides, many additional jobs are supported. The benefits extend well beyond the immediate employment within the refinery.

Rodeo Renewed Letter of Support 1

COMMENT LETTER: 40

We appreciate the robust discussions surrounding the overall energy transition in California, and we want to be part of this great effort. But we must be thoughtful in our approach and utilize new technologies that support the transition while preserving local, family-wage jobs and supporting the local economy.

Therefore, the members of UA Local 342 stand in solidarity with Phillips 66 as it ushers in the next generation of renewable fuel production in California. We ask that Contra Costa County approve the Rodeo Renewed project. 1 cont'd

Thank you for your consideration.

Sincerely,

Ché Timmons
Business Manager & Financial Secretary
CT:cjw

Cc: Honorable Contra Costa County Supervisor Diane Burgis, Chair
Honorable Contra Costa County Supervisor Federal D. Glover, Vice Chair
Honorable Contra Costa County Supervisor John M. Gioia
Honorable Contra Costa County Supervisor Candace Andersen
Honorable Contra Costa County Supervisor Karen Mitchoff
Honorable California Governor Gavin Newsom
Honorable United States Senator Dianne Feinstein
Honorable United States Senator Alex Padilla
Honorable United States Congressman Mike Thompson
Honorable United States Congressman Mark DeSaulnier
Honorable United States Congressman Jerry McNerney
Honorable United States Congressman Eric Swalwell
Honorable California State Senator Nancy Skinner
Honorable California State Senator Bill Dodd
Honorable California State Senator Steven Glazer
Honorable California State Assemblymember Tim Grayson
Honorable California State Assemblymember Jim Frazier
Honorable California State Assemblymember Buffy Wicks
Honorable California State Assemblymember Rebecca Bauer-Kahan

Rodeo Renewed Letter of Support 2

Response to Comment

Comment noted.

Comment Letter 41. PSC Primoris 12/16

COMMENT LETTER: 41

Gary Kupp

From: Christopher Anderson <canderson@prim.com>
Sent: Friday, December 17, 2021 10:12 AM
To: Gary Kupp; SupervisorMitchoff; District5; Supervisor Candace Andersen; Supervisor_Burgis; John Gioia
Subject: Support letter for the Rodeo Renewed Project
Attachments: Contractor_Letter of Support for BOS.docx.pdf

CCC Supervisors

Attached please find letter in support of the Rodeo Renewed Project

Chris Anderson
VP – Industrial Group
ARB, Inc
1875 Loveridge Road
Pittsburg, CA 94565
Ph 925-432-3563
www.prim.com

PSC Primoris
"Primoris, building America's future, today"

1

COMMENT LETTER: 41

Contra Costa County Dept. of Conservation & Development Community: Development Division
Attention Gary Kupp, Senior Planner
30 Muir Road
Martinez, CA 94553

12/16/21

Dear Mr. Kupp:

I write to offer my strong support of the Rodeo Renewed project at Phillips 66 Refinery in Rodeo. In response to the Draft EIR, I am submitting this letter to be entered into the administrative record.

I am Chris Anderson, a contractor who has worked in Contra Costa County for 31 years. Primoris supports Phillips 66 and its Rodeo Renewed project to produce renewable fuels. We are proud to be part of this project that will create jobs, improve air quality, and help California advance its low-carbon goals. Primoris subsidiary, ARB, Inc with its well-trained, long-standing workforce in the Bay Area is poised to assist Phillips 66 in California's transition to renewable and sustainable fuels. We wish Phillips 66 success as they move forward with pioneering this transition in California. I fully support Rodeo Renewed and believe the Draft EIR accurately represents this positive and responsible project.

Rodeo Renewed serves the best interests of our employees, and the working men and women of Contra Costa County. The refinery's direct and indirect employment have an economic multiplying effect that impacts the entire Bay Area and California as a whole. 1

Rodeo Renewed positions Phillips 66 to be a world leader in renewable energy production while preserving family-wage jobs and helping to improve local air quality. This project preserves the livelihood of Phillips 66 employees as well as ours at ARB, Inc.

The future of Phillips 66's Rodeo Refinery directly links to the future of employees at companies like mine and numerous contractors, vendors and the surrounding community – Rodeo Renewed is our future, too.

Therefore, I strongly support Phillips 66 and the Draft EIR and ask that you approve the EIR and the Rodeo Renewed project as soon as possible.

Thank you.
Chris Anderson

Cc: Honorable Contra Costa County Supervisor Diane Burgis, Chair
Honorable Contra Costa County Supervisor Federal D. Glover, Vice Chair
Honorable Contra Costa County Supervisor John M. Gioia
Honorable Contra Costa County Supervisor Candace Andersen
Honorable Contra Costa County Supervisor Karen Mitchoff

Response to Comment

Comment noted.

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Comment Letter 42. PSC Primoris Industrial Group 12/14

COMMENT LETTER: 42

Gary Kupp

From: Gary Dennis <gdennis@prim.com>
Sent: Wednesday, December 15, 2021 1:02 PM
To: Gary Kupp
Subject: LETTER OF SUPPORT RODEO RENEWAL PROJECT
Attachments: Contractor_Letter of Support for BOS.pdf

Please see attached letter of support.

Thank you,

Gary Dennis
ARBinc.
General Superintendent/
Industrial Division
(925)852-8795
gdennis@prim.com
www.prim.com

PSC
Primoris
ARB Industrial

HEADQUARTERS

Lake Forest
26000 Commercentre Drive
Lake Forest, CA 92630
Phone: (949) 598-9242

Pittsburg
1875 Loveridge Road
Pittsburg, CA 94565
Phone: (925) 432-3563

"Primoris, building America's future, today."

1

COMMENT LETTER: 42

Primoris

Contra Costa County Dept. of Conservation &
Development Community: Development Division
Attention Gary Kupp, Senior Planner
30 Muir Road
Martinez, CA 94553

December 14, 2021

Dear Mr. Kupp:

I write to offer my strong support of the Rodeo Renewed project at Phillips 66 Refinery in Rodeo. In response to the Draft EIR, I am submitting this letter to be entered into the administrative record.

I am Gary Dennis, a contractor who has worked in Contra Costa County for 27 YEARS. ARB, Inc employs over 2,000 employees throughout the State of California performing construction services and we supports Phillips 66 and its Rodeo Renewed project to produce renewable fuels. We are proud to be part of this project that will create jobs, improve air quality, and help California advance its low-carbon goals. I fully support Rodeo Renewed and believe the Draft EIR accurately represents this positive and responsible project.

Rodeo Renewed serves the best interests of our employees, and the working men and women of Contra Costa County. The refinery's direct and indirect employment have an 1
economic multiplying effect that impacts the entire Bay Area and California as a whole.

Rodeo Renewed positions Phillips 66 to be a world leader in renewable energy production while preserving family-wage jobs and helping to improve local air quality. This project preserves the livelihood of Phillips 66 employees as well as ours at ARB, Inc.

The future of Phillips 66's Rodeo Refinery directly links to the future of employees at companies like mine and numerous contractors, vendors and the surrounding community – Rodeo Renewed is our future, too.

Therefore, I strongly support Phillips 66 and the Draft EIR and ask that you approve the EIR and the Rodeo Renewed project as soon as possible.

Thank you.

Cc: Honorable Contra Costa County Supervisor Diane Burgis, Chair
Honorable Contra Costa County Supervisor Federal D. Glover, Vice Chair
Honorable Contra Costa County Supervisor John M. Gioia
Honorable Contra Costa County Supervisor Candace Andersen
Honorable Contra Costa County Supervisor Karen Mitchoff

ARB, Inc. • 26000 Commercentre Drive • Lake Forest, California 92630 • Tel 949.598.9242 • Fax 949.454.7190 • www.prim.com

Response to Comment

Comment noted.

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Comment Letter 43. PTS Advance

COMMENT LETTER: 43

Gary Kupp

From:	Ella Marie Kallios <EllaMarie.Kallios@PTSadvance.com>
Sent:	Tuesday, November 30, 2021 12:38 PM
To:	Gary Kupp
Cc:	SupervisorMitchoff; District5; Supervisor Candace Andersen; Supervisor_Burgis; John Gioia
Subject:	Letter of support for the Phillis 66 Renewable Fuels Project
Attachments:	PTS Letter of Support for P66.docx

Dear Mr. Kupp,

Please see the attached letter of support for the Phillips 66 Renewable Fuels Project.

We appreciate your consideration of this project.

Kind regards,
Ella Marie Kallios

Ella Marie Kallios, PHR
Managing Director
925-363-8232
510-701-3885 Mobile
EllaMarie.Kallios@PTSadvance.com
PTSadvance.com

1

COMMENT LETTER: 43

Contra Costa County Dept. of Conservation &
Development Community: Development Division
Attention Gary Kupp, Senior Planner
30 Muir Road
Martinez, CA 94553

November 30, 2021

Dear Mr. Kupp:

I write to offer my strong support of the Rodeo Renewed project at Phillips 66 Refinery in Rodeo. In response to the Draft EIR, I am submitting this letter to be entered into the administrative record.

I am Ella Marie Kallios. a contractor who has worked in Contra Costa County for more than 40 years. I have worked with several of the Bay Area Refineries. I am currently employed with PTS Advance, and we provide contractor staff to the Phillips 66 Rodeo Refiner.

PTS Advance is proud to be a part of this innovative and exciting project. Renewable fuels are the next chapter in our industry, and we are excited to be a part of the story! This is a project that will better serve all of us, especially the local community. Phillips 66 places great value on the workforce and has a strong commitment to safety and caring for the environment - attributes we can all stand behind.

I fully support Rodeo Renewed and believe the Draft EIR accurately represents this positive and responsible project. 1

Rodeo Renewed serves the best interests of our employees, and the working men and women of Contra Costa County. The refinery's direct and indirect employment have an economic multiplying effect that impacts the entire Bay Area and California as a whole.

Rodeo Renewed positions Phillips 66 to be a world leader in renewable energy production while preserving family-wage jobs and helping to improve local air quality. This project preserves the livelihood of Phillips 66 employees as well as ours at PTS Advance.

The future of Phillips 66's Rodeo Refinery directly links to the future of employees at companies like mine and numerous contractors, vendors and the surrounding community – Rodeo Renewed is our future, too.

Therefore, I strongly support Phillips 66 and the Draft EIR and ask that you approve the EIR and the Rodeo Renewed project as soon as possible.

Kind regards,
Ella Marie Kallios

COMMENT LETTER: 43

Cc: Honorable Contra Costa County Supervisor Diane Burgis, Chair
Honorable Contra Costa County Supervisor Federal D. Glover, Vice Chair
Honorable Contra Costa County Supervisor John M. Gioia
Honorable Contra Costa County Supervisor Candace Andersen
Honorable Contra Costa County Supervisor Karen Mitchoff

Response to Comment

Comment noted.

Comment Letter 44. Redwood Painting Company, Inc.

COMMENT LETTER: 44

Gary Kupp

From: Tracy Glynn <tracy@redwoodptg.com>
Sent: Tuesday, November 30, 2021 3:18 PM
To: Gary Kupp; SupervisorMitchoff; District5; Supervisor Candace Andersen; supervisor; john.giola@bos.cccounty.us
Cc: Charles Del Monte
Subject: CCCD of Conservation Letter
Attachments: CCCD of Conservation Letter to Kupp.pdf

Please see attached

Tracy Glynn
Administrative Assistant
Redwood Painting Co., Inc.
Phone: (925) 432-4500
FAX: (925) 432-6129

tracy@redwoodptg.com

1

COMMENT LETTER: 44

Redwood Painting Co., Inc.

License No. 302617
Industrial Coatings • Sandblasting

620 West 10th Street
P.O. Box 1269
Pittsburg, CA 94565
(925) 432-4500 Ph.
(925) 432-6129 Fax

November 30, 2021

Contra Costa County Dept. of Conservation &
Development Community: Development Division
Attention Gary Kupp, Senior Planner
30 Muir Road
Martinez, CA 94553

Dear Mr. Kupp:

I write to offer my strong support of the Rodeo Renewed project at Phillips 66 Refinery in Rodeo. In response to the Draft EIR, I am submitting this letter to be entered in to the administrative record.

I am Charles Del Monte, a contractor who has a local and family owned business in Contra Costa County for 74 YEARS. Redwood Painting Co., Inc. is an Industrial Painting Company, employing over 90 people. I fully support Rodeo Renewed and believe the Draft EIR accurately represents this positive and responsible project.

Rodeo Renewed serves the best interests of our employees, and the working men and women of Contra Costa County. The refinery's direct and indirect employment have an economic multiplying effect that impacts the entire Bay Area and California as a whole. 1

Rodeo Renewed positions Phillips 66 to be a world leader in renewable energy production while preserving family-wage jobs and helping to improve local air quality. This project preserves the livelihood of Phillips 66 employees as well as ours at Redwood Painting Co., Inc.

The future of Phillips 66's Rodeo Refinery directly links to the future of employees at companies like mine and numerous contractors, vendors and the surrounding community- Rodeo Renewed is our future, too.

Therefore, I strongly support Phillips 66 and the Draft EIR and ask that you approve the EIR and the Rodeo Renewed project as soon as possible.

Thank you.
Redwood Painting Co., Inc.

Charles Del Monte
President

Response to Comment

Comment noted.

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Comment Letter 45. Southwest Airlines

COMMENT LETTER: 45

Gary Kupp

From: Stacy Malphurs <Stacy.Malphurs@wnco.com>
Sent: Thursday, December 16, 2021 10:16 AM
To: Gary Kupp
Cc: Michael Aubuchon; SupervisorMitchoff; District5; Supervisor Candace Andersen; Supervisor_Burgis; John Gioia
Subject: Southwest Airlines & Phillips 66's Rodeo Renewed Project
Attachments: 2021 12 16 - Southwest Airlines - Rodeo Renewed.pdf

Mr. Kupp:

Please see the attached letter regarding Phillips 66's Rodeo Renewed project.

Best regards,
Stacy Malphurs

Stacy Malphurs
Vice President Supply Chain Management &
Environmental Sustainability
(o) 214-792-7300

Southwest
50 years. One Heart.

1

COMMENT LETTER: 45

December 16, 2021

Gary Kupp
Senior Planner – Contra Costa County
30 Muir Road
Martinez, CA 94553
gary.kupp@dcd.cccounty.us

Dear Mr. Kupp:

On behalf of Southwest Airlines, I am submitting this letter in support of Phillips 66's efforts to get its Rodeo Renewed project permitted and approved by Contra Costa County officials. This approval is a critical step to delivering a more sustainable future for the County, the Bay Area, the State of California, and beyond.

The creation of a viable market for sustainable aviation fuel (or "SAF") is essential to Southwest's ability to meet our long-term goal of carbon neutrality by 2050 and our nearer-term goal to replace 10% of our fuel with SAF by 2030. SAF's commercialization is also crucial to meeting the U.S.'s and California's own emissions-reductions goals. On April 22, 2021, we announced our memorandum of understanding with Phillips 66, intended to facilitate the development and production of commercialized SAF in significant quantities and with the goal to drive the carbon intensities of 1
that SAF ever-lower. We view projects like Rodeo Renewed as critical to Southwest's ability to achieve our goals and advance these efforts. Contra Costa County is in a unique and exciting position to be a global leader in helping advance SAF, and the decisions you make today will help create a more sustainable future both within and beyond the County's borders.

At Southwest, we are committed to making a difference in the communities we serve, and we are dedicated to doing the right thing by our Planet. We greatly appreciate the role of Contra Costa County in this important journey too, including this important permitting/approval process for Rodeo Renewed. If you have questions, we stand ready to help the County understand how we intend to use SAF to improve our operations in the Bay Area, in California, and throughout the country.

Sincerely,

Stacy Malphurs
Vice President of Supply Chain Management & Environmental Sustainability
Southwest Airlines

Cc:
Contra Costa County Board of Supervisors

Response to Comment

Comment noted.

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Comment Letter 46. Sprinkler Fitters and Apprentices Local 483

COMMENT LETTER: 46

SPRINKLER FITTERS AND APPRENTICES
LOCAL 483
OF THE UNITED ASSOCIATION OF PLUMBERS, PIPEFITTERS AND SPRINKLER FITTERS OF THE UNITED STATES AND CANADA AFL-CIO

Stanley M. Smith
Business Manager

Jeffrey M. Dixon
Organizer

Dylan M. Boldt
John Medina
Dan Torres
Business Agents

Rik Drury
Market Development Representative

October 28, 2021

Department of Conservation and Development &
Community Development Division
Attn: Gary Kupp
30 Muir Road
Martinez, CA 94553

Dear Mr. Kupp:

On behalf of the 1200 members of the Sprinkler Fitters U.A. Local 483 we offer our strong support of Phillips 66's Rodeo Renewed project at the San Francisco Refinery in Rodeo. In response to the Draft EIR, we officially submit these public comments to be entered into the record.

Rodeo Renewed is among the first renewable transportation fuels projects in Contra Costa County and positions Phillips 66 to be a world leader in renewable energy production while preserving, family-wage jobs and helping to improve local air quality. **We fully support Rodeo Renewed and believe the Draft EIR is an accurate representation of this positive and responsible plan.**

Approval of this project will not only serve the best interests of the working men and women of Sprinkler Fitters Local 483, but Contra Costa County, the Bay Area and California as a whole. Rodeo Renewed will help achieve California's low-carbon goals while also creating renewable energy jobs. 1

Phillips 66's Rodeo Refinery is celebrating their 125th Anniversary this year, and we want to ensure its ability to contribute to the Contra Costa County economy for many years to come is retained. This includes its long legacy of providing family-wage jobs, not only for the men and women within the refinery, but also for the members of Sprinkler Fitters Local 483, numerous contractors, vendors, and the surrounding community.

Rodeo Renewed, will help support our local economy by creating more than 500 construction jobs, during the conversion, and supporting ~650 renewable energy jobs upon completion. As essential workers, the refinery is vital to keeping California moving. Projects like this also have multiplier effects, meaning for each job the refinery provides, many additional jobs are supported. The benefits extend well beyond the immediate employment within the refinery.

We appreciate the robust discussions surrounding the overall energy transition in California, and we want to be part of this great effort. But we must be thoughtful in our approach and utilize new

2525 Barrington Court • Hayward, California 94545
Telephone (510) 785-8483 • Fax (510) 785-8508
www.sprinklerfitters483.org

COMMENT LETTER: 46

technologies that support the transition while preserving local, family-wage jobs and supporting the local economy.

Therefore, the members of Sprinkler Fitters Local 483 stand in solidarity with Phillips 66 as it ushers in the next generation of renewable fuel production in California. We ask that Contra Costa County approve the Rodeo Renewed project.

1 cont'd

Thank you for your consideration,

SPRINKLER FITTERS & APPRENTICES

Rik D

RIK DRURY
Market Development Representative

COMMENT LETTER: 46

PLUMBERS • UNION • PIPEFITTERS • SERVICE TECHS • STEAMFITTERS • SPRINKLERFITTERS
Founded 1889

Local No. 483
Sprinkler Fitters & Apprentices
2525 Barrington Court
Hayward, CA 94545
Form 74

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Contra Costa County Dept. of Conservation &

Development Community: Development Division
Attention: Gary Kupp, Senior Planner
30 Muir Road
Martinez, CA 94553

94553-460130

Response to Comment

Comment noted.

Comment Letter 47. State Building and Construction Trades Council of California

COMMENT LETTER: 47

State Building and Construction Trades Council
of California

ROBBIE HUNTER
PRESIDENT

J. TOM BACA
SECRETARY-TREASURER

Established 1901
Chartered by
BUILDING AND CONSTRUCTION TRADES
DEPARTMENT
AFL - CIO

December 10, 2021

Mr. Gary Kupp, Senior Planner
Department of Conservation and Development &
Community Development Division
30 Muir Road
Martinez, CA 94553

RE: Phillips 66 Rodeo Renewed Project - SUPPORT

Dear Mr. Kupp:

The State Building and Construction Trades Council of California (SBCTC) is pleased to see the release of the Draft Environmental Impact Report (DEIR) for the Phillips 66 Rodeo Renewed project at the San Francisco Refinery in Rodeo, California. On behalf of the SBCTC, we officially submit our strong support of this project and offer our public comments for the record.

The Contra Costa County's DEIR accurately reflects the role and value of the project in meeting the State's energy needs and continuing to provide family-wage salaries to our blue-collar workforce in Contra Costa County. The SBCTC tradespeople are among the highest trained, skilled workers globally and are well-suited to meet the construction and maintenance for projects such as this.

Rodeo Renewed will continue to utilize the skilled Contra Costa Building and Construction Trades workforce. The project will create more than 500 construction jobs during the conversion and support ~650 renewable energy jobs upon completion. In addition, the ongoing maintenance will employ ~ 1,500 union workers during peak demand. 1

Rodeo Renewed sets an exemplary example of building a sustainable energy future while helping meet the State's low-carbon energy goals and protecting the local economy and family-wage jobs. Therefore, the members of the SBCTC stand in solidarity with Phillips 66 and are proud to support the Rodeo Renewed project. We ask that Contra Costa County approve the Rodeo Renewed project.

Thank you for your consideration,

Sincerely,

Robert Hunter

ROBBIE HUNTER
President

RH:bp
opeiu#29/afl-cio

1231 I Street, Suite 302 · Sacramento, CA 95814-2933 · (916) 443-3302 · FAX (916) 443-8204

COMMENT LETTER: 47

State Building and Construction Trades Council
of California
Established 1901
1231 I Street, Suite 302
Sacramento, CA 95814-2933

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Dept of Conservation & Development

Contra Costa County Dept. of Conservation
Development and Community Development
Division
Attention: Gary Kupp, Senior Planner
30 Muir Road
Martinez, CA 94553

94553-460130

Response to Comment

Comment noted.

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Comment Letter 48. The Climate Center

COMMENT LETTER: 48

Gary Kupp

From: Woody Hastings <woody@theclimatecenter.org>
Sent: Friday, December 17, 2021 3:07 PM
To: Gary Kupp
Cc: Ellie Cohen
Subject: Comments of The Climate Center on the Draft Environmental Impact Report for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040)
Attachments: TCC Comment-P66 File No. LP20–2040 12-17-21.pdf

Please see attached. Confirmation of receipt would be appreciated. Thank you.

Woody Hastings (he/him)
Program Manager, The Climate Center
707-829-3460 (Office) 310-968-2757 (Mobile)

the climate center

Facebook | Twitter | Donate
Our mission: Deliver speed and scale greenhouse gas reductions, starting in California.

1

COMMENT LETTER: 48

December 17, 2021

Gary Kupp, Senior Planner
Contra Costa County Department of Conservation and Development
30 Muir Rd, Martinez, CA 94553

Via Email: Gary.Kupp@dcd.cccounty.us

Subject: Comments of The Climate Center on the Draft Environmental Impact Report for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040)

Dear Mr. Kupp:

On behalf of The Climate Center and its thousands of supporters statewide, I'm writing to you concerning the Draft Environmental Impact Report (DEIR) for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040).

The DEIR is clearly inadequate. We request that the County address and correct the errors and deficiencies in the DEIR. Given the substantial additional information that needs to be included in an EIR to satisfy the requirements of CEQA, we request that the new information be included in a recirculated DEIR to ensure that members of the public have full opportunity to comment on it. We further request that a properly noticed public meeting be held to help bring this matter to the attention of the public. 1

The Climate Center has signed on to the Coalition technical letter (sent separately) regarding this project and we write to draw your attention to the section in that letter that addresses greenhouse gas emissions (Section VI. The DEIR Inadequately Discloses and Addresses Project Greenhouse Gas and Climate Impacts, beginning on page 45). Please see that letter for a full treatment on this issue. 2

The key point we want to emphasize is in regard to the assumed baseline. The DEIR assumes that if the permit isn't granted Phillips 66 will continue to refine petroleum at past levels, and that the conversion to biofuel refining will result in a reduction of pollution. But this benchmark is inappropriate given that Phillips 66 has made it clear that without this conversion, the refinery would need to close relatively soon. So the correct baseline should be no project with no emissions, and therefore, any emissions resulting from a conversion of the facility to biofuel refining will constitute local and climate pollution *increases*. 3

In the Summary of Environmental Impacts on page 2-5 two questions are posed and one declaration is made that incorrectly asserts that project 4

COMMENT LETTER: 48

operations would decrease GHG emissions.

1. Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?
2. Project operations would decrease emissions of GHGs that could contribute to global climate change.
3. Would the Project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

4 cont'd

The conclusions in the DEIR to the two questions (1 and 3) are generally that GHG impacts will be "less than significant" or will have "no impact." In both cases, we disagree. The latest climate science and conclusions from the Intergovernmental Panel on Climate Change are clear. In order to avoid the worst impacts of climate change, carbon emitting operations must rapidly be phased out. Replacing fossil fuels with bio-resources that have uncertain and potentially dramatically scaled-up feedstock sourcing operations is not necessarily an improvement over fossil fuel refining. The declaration (2 above) that "Project operations would decrease emissions of GHGs that could contribute to global climate change" is incorrect, as has already been explained.

The Climate Center does not categorically oppose bioenergy, but we do have significant concerns regarding appropriate *scale* for these kinds of projects. Small scale projects close to limited feedstocks may make sense. This project would create the largest biorefining facility of its kind in the U.S. The DEIR does not consider at all the impacts of a massive increase in use of food crops like soybean oil as a feedstock, which threatens to wreak havoc with land use and associated GHGs. Current indications are that the refinery could potentially use up to 40 percent of the nation's entire supply of soybean oil. More environmentally sustainable feedstocks like waste oil are not available in the quantities contemplated by the project. 5

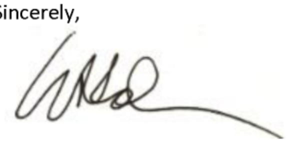
We are cognizant that a truly just transition to clean energy economy work is needed for the workforce at these refineries. The Climate Center's Climate Safe California campaign includes just transition and climate justice as key pillars in considerations for navigating to the sustainable clean energy economy of the future.

6

This project, if approved, will have potentially enormous impacts on the surrounding community for years to come. It is therefore critically important that the CEQA review be thorough and accurate, that corrections to the errors and deficiencies in the DEIR be made, and that the public be involved to the maximum extent possible. The Climate Center strongly urges you to arrange a public meeting on this project.

Thank you for your consideration.

Sincerely,



Ellie Cohen, CEO
The Climate Center

Response to Comment 1

The County has determined that recirculation of the EIR is unnecessary. Comments related to inadequacy of the Draft EIR are responded to throughout this document.

Response to Comment 2

Section 4.8 of the Draft EIR analyzes the Project's GHG emissions from Project construction and operation. The best information reasonably available was used to characterize and quantify baseline and operational emissions from stationary and mobile sources, including defining construction scenarios, modifying existing facilities, and assessing emission reductions from decommissioning other facilities. Refer to Revised Draft EIR Appendix B, Air Quality and Greenhouse Gas Emissions Technical Data.

Also see Master Response No. 5, Renewable Fuels Processing and Responses to Comments for Letter 36.

Response to Comment 3

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 4

The County disagrees. The Project's GHG emissions from Project construction and operation evaluated in Section 4.8 of the Draft EIR is based on the best documented information reasonably available. Expected reductions from equipment shutdowns contribute to the estimated GHG emission reductions from the Project. However, the combustion of renewable fuels has less carbon intensity than petroleum fuels.

Also refer to Master Response No. 6, Purpose of Project , Master Response No. 5, Renewable Fuels Processing and Master Response No. 4, Land Use and Feedstocks.

Response to Comment 5

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 6

Comment noted. The County has determined the EIR is thorough and accurate. As part of the CEQA process, the public will continue to be involved at hearings associated with approval or disapproval of the Project. These hearings will be publicly announced.

Comment Letter 49. United Association Local Union 159

COMMENT LETTER: 49

UNITED ASSOCIATION
LOCAL UNION 159

Comprised of
Plumbers, Steamfitters & Refrigeration
Journeymen & Apprentices

THOMAS LAWSON
Business Manager

JASON LESTER
President

NICK GOODWIN
Fin. Secretary-Treasurer

October 27, 2021

Department of Conservation and Development &
Community Development Division
Attn: Gary Kupp
30 Muir Road
Martinez, CA 94553

Dear Mr. Kupp:

On behalf of the members of Plumbers & Steamfitters, UA Local 159, we offer our strong support of Phillips 66's Rodeo Renewed project at the San Francisco Refinery in Rodeo. In response to the Draft EIR, we officially submit these public comments to be entered into the record.

Rodeo Renewed is among the first renewable transportation fuels projects in Contra Costa County and positions Phillips 66 to be a world leader in renewable energy production while preserving family-wage jobs and helping to improve local air quality. **We fully support Rodeo Renewed and believe the Draft EIR is an accurate representation of this positive and responsible plan.**

Approval of this project will serve the best interests of Contra Costa County, the Bay Area and California as a whole. Rodeo Renewed will help achieve California's low-carbon goals while also creating renewable energy jobs. 1

Phillips 66's Rodeo Refinery is celebrating their 125th Anniversary this year, and we want to ensure its ability to contribute to the Contra Costa County economy for many years to come is retained. This includes its long legacy of providing family-wage jobs, not only for the men and women within the refinery, but also for numerous members of the Contra Costa Building and Construction Trades Council, various contractors, vendors, and the surrounding community.

Rodeo Renewed, will help support our local economy by creating more than 500 construction jobs, during the conversion, and supporting ~650 renewable energy jobs upon completion. As essential workers, the refinery is vital to keeping California moving. Projects like this also have multiplier effects, meaning for each job the refinery provides, many additional jobs are supported. The benefits extend well beyond the immediate employment within the refinery.

1308 Roman Way • Martinez, California 94553 • Telephone (925) 229-0400 • FAX (925) 229-1101

COMMENT LETTER: 49

We appreciate the robust discussions surrounding the overall energy transition in California, and we want to be part of this great effort. But we must be thoughtful in our approach and utilize new technologies that support the transition while preserving local, family-wage jobs and supporting the local economy.

Therefore, the members of Plumbers & Steamfitters Local 159 stand in solidarity with Phillips 66 as it ushers in the next generation of renewable fuel production in California. We ask that Contra Costa County approve the Rodeo Renewed project.

1
cont'd

Thank you for your consideration,

Thomas Lawson

Thomas Lawson
Business Manager

Cc: Honorable Contra Costa County Supervisor Diane Burgis, Chair
Honorable Contra Costa County Supervisor Federal D. Glover, Vice Chair
Honorable Contra Costa County Supervisor John M. Gioia
Honorable Contra Costa County Supervisor Candace Andersen
Honorable Contra Costa County Supervisor Karen Mitchoff

COMMENT LETTER: 49

Local No. 159
Plumbers & Steamfitters
1308 Roman Way
Martinez, CA 94553

Founded 1889

Form 74

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Contra Costa County Dept. of Conservation &
Development Community: Development Division
Attn: Gary Kupp, Senior Planner
30 Muir Road
Martinez, CA 94553

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94553-460130

Response to Comment

Comment noted.

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Comment Letter 50. United Steel Workers

COMMENT LETTER: 50

Gary Kupp

From:	Bagley, Tyson A <Tyson.A.Bagley@p66.com>
Sent:	Monday, October 18, 2021 1:36 PM
To:	Gary Kupp
Cc:	Supervisor Candace Andersen; John Gioia; Supervisor_Burgis; SupervisorMitchoff; District5
Subject:	USW Local 326 Supports Rodeo Renewed Project
Attachments:	USW Local 326 response to Rodeo Renewed DEIR.pdf

Dear Mr. Kupp,

Please submit USW Local 326's public comment in response to the Phillips 66 Rodeo Renewed Draft Environmental Impact Report. Please do not hesitate to reach out to me personally with any additional questions that you may have.

In Solidarity,

Tyson A. Bagley
Local 326 President
Rodeo Refinery USW Health and Safety Represenative
Cell: 661-978-7625
Office Ext. 4501

"We must speak our minds openly, debate our disagreements honestly, but always pursue solidarity"

1

COMMENT LETTER: 50

UNITED STEELWORKERS

USW™

UNITY AND STRENGTH FOR WORKERS

Tyson Bagley
President
Local 326
P.O. 278
Rodeo, CA 94572
510.245.4501
661.978.7625

Contra Costa County Dept. of Conservation &
Development Community: Development Division
30 Muir Road
Martinez, CA 94553
Attention: Gary Kupp, Senior Planner

October 18, 2021

Dear Mr. Kupp,

On behalf of 289 members of United Steelworkers, Local 326, we offer our strong support of the Rodeo Renewed Project at the San Francisco Refinery in Rodeo, CA. Please submit this public comment in response to the Draft Environmental Impact Report.

In February of 2021, the San Francisco Refinery celebrated its 125th year as a facility in Rodeo. For the last 88 of those 125 years, Local 326 has been an integral member of both the refinery and the Rodeo/Crockett community. Local 326 is a proud community supporter and has a long and rich history of sponsoring and volunteering with numerous organizations within the surrounding communities of Crockett and Rodeo.

Further, our members have been given great career opportunities, often unattainable in other industries, and sectors. We pride ourselves on inclusion and diversity and employ Veterans, people of varying education levels, socioeconomic backgrounds and people who needed a second chance in life. 1

My brothers and sisters of Local 326 are proud to be among the first to work on one of the most significant Renewable Fuels Projects in Contra Costa County, California and the Nation. The Phillips 66 Rodeo Renewed Project positions us to be a world leader and a model for others to follow as we transition our workforce into the Renewable Energy Sector.

USW Local 326 is excited to partner with Phillips 66 as we convert the San Francisco Refinery away from Fossil Fuels and usher in a new future, while sustaining living wage careers and reducing air emissions for Contra Costa County.

Therefore, the members of USW Local 326 stand in solidarity with Phillips 66. We urge you to approve the Draft Environmental Impact Report and protect the very fabric that our livelihoods are built on today and for future generations of Steelworkers to come.

In Solidarity,

Tyson Bagley

Tyson Bagley
President, USW Local 326

Cc: Honorable Contra Costa County Supervisor Diane Burgis, Chair
Honorable Contra Costa County Supervisor Federal D. Glover, Vice Chair
Honorable Contra Costa County Supervisor John M. Gioia
Honorable Contra Costa County Supervisor Candace Andersen
Honorable Contra Costa County Supervisor Karen Mitchoff

Response to Comment

Comment noted.

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Comment Letter 51. Andrews, Floy

COMMENT LETTER: 51

Gary Kupp

From:	Floy Andrews <floyandrews@gmail.com>
Sent:	Friday, December 17, 2021 10:17 AM
To:	Gary Kupp
Subject:	Comment to DEIR (File No. LP20-2040)
Attachments:	DEIR Comment Letter Rodeo Refinery Conversation.pdf

Dear Mr. Kupp,
Please find attached my comments to the Draft EIR for the Proposed Conversion of the Phillips 66 Rodeo Oil Refinery to Biofuel Production (File No. LP20-2040).
Kind regards,
Floy Andrews
floyandrews@gmail.com
(323) 422-1147

1

COMMENT LETTER: 51

Floy Elizabeth Andrews
Attorney, SBN 187375
617 Golden Gate Avenue
Richmond, CA 94801

December 17, 2021

Via Email: Gary.Kupp@dcd.cccounty.us

Mr. Gary Kupp
Senior Planner
Department of Conservation & Development
Contra Costa County
1025 Escobar Street
Martinez, CA 94553

Re: Draft EIR for the Proposed Conversion of the Phillips 66 Rodeo Oil Refinery to Biofuel Production (File No. LP20-2040) ("DEIR")

Dear Mr. Kupp:

The proposed conversion of Phillips 66 refinery to biofuel production will have direct impact on local communities for decades. As such, a thorough analysis of environmental impacts, including a detailed, specific discussion of mitigation measures as required by the California Environmental Quality Act, is essential. Please address the following concerns and inadequacies of the DEIR submitted by the project proponents.

1. **ODOR:** Local communities are understandably concerned about possible foul or putrid odors associated with the new feedstock components. The DEIR's "standard of significance" for odors is much too high and fails to provide a workable, non-arbitrary standard for assessing such odors. The DEIR deems significant only those odors that "frequently and for a sustained duration" create "substantial objectionable odors affecting a substantial number of people." (*See* DEIR 4.3.5.1.) This standard is unreasonably high. Local populations in the area, who live, sleep, cook and eat, raise families, attend school, work, exercise, walk, garden, etc., nearby, should never be exposed to objectional odors from the project. Any foul odor impacting residents' daily lives is significant and must be mitigated. We cannot ask our fence-line communities to endure unmitigated impacts that undermine their quality of life, quite enjoyment of their homes, and property values. 1

   What's worse is the added requirement (hidden in a footnote) that any odor, no matter how sustained or pervasive, will not be deemed significant unless it is "verif[ied]" as such "by a District Inspector." (*See* DEIR 4.3.5.1 fn. 28.) What happens if this "District Inspector" is unavailable or applies an unreasonably high standard? What recourse or

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check is provided to residents if the "District Inspector" fails to provide an unbiased review or is simply derelict in their duties. Moreover, in the DEIR I found no definition of the term "District Inspector" or described process for contacting this person or method for updating residents when a change occurs. This clearly falls far short of offering an adequate mitigation process for a very real, negative impact on local communities.

1 cont'd

Project proponents must be required to provide a clear, workable plan for protecting local communities from any objectionable odors from the organic feedstocks and refining operations.

2. **BASELINE**: The DEIR assumes that if Phillips 66 does not convert its production to biofuels, it will continue to refine crude oil at historic levels. Recent market changes and crude oil availability, as well as the repeated comments of Phillips 66 representatives demonstrate otherwise. Phillips 66 has repeatedly stated that it plans to shut down its Santa Maria location, which makes sense since both its Santa Maria and Rodeo refineries rely on fast-dwindling crude supplies. Since Santa Maria and Rodeo are joined by one pipeline, it is clear that when Santa Maria discontinues its crude refining operation, Rodeo will quickly follow suit. Therefore, any project emissions from biofuel production will be an *increase* over emission from a *closed refinery*, as opposed to a decrease over its sunsetting crude refining. The DEIR must analyze the conversation in comparison to an idled refinery scenario. 2

3. **PUBLIC SAFETY:** I am worried about public safety from the biofuel refining process, which the DEIR fails to consider at all. You have data demonstrating that refining biofuels increases the incidence of flaring, but you did not consider it in the DEIR. 3

4. **LAND USE**: The DEIR does not consider the impact of a massive increase in use of food crops like soybean oil as a feedstock, which threatens to wreak havoc with agricultural land use. Current indications suggest the refinery could potentially use up to 40 percent of the nation's entire supply of soybean oil. Moreover, more environmentally sustainable feedstocks like waste oil are not available in the quantities contemplated by the project. 4

5. **PROJECT ALTERNATIVES:** The DEIR does not evaluate alternatives to the project in a way that makes sense. A green hydrogen alternative should have been considered for the project. 5

6. **OPERATING WITHOUT A PERMIT:** The Bay Area Air Quality Management District (BAAQMD) is currently investigating whether Phillips 66 violated the law in starting its conversion of the refinery *before* receiving a permit. The previously converted unit (Unit 250) should be evaluated as part of this project. No permit should be issued if Phillips 66 is currently acting in violation of the law. 6

7. **CUMULATIVE IMPACTS:** All of these potential impacts are from just one project. The DEIR did not make any meaningful effort at all to evaluate the cumulative impacts of the project considered collectively with the impacts of the very similar Marathon Martinez refinery project, which is being evaluated at almost the same time. 7

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I ask that this project not move forward until and unless these very serious potential impacts are fully analyzed and addressed. Additionally, given the enormous import of this project for the community, we believe a public hearing concerning the project and its environmental review would facilitate the purposes and goals of CEQA. We therefore request that you schedule such a hearing as soon as possible. 7 cont'd

Sincerely,

/s/ Floy Andrews

Floy Elizabeth Andrews

Response to Comment 1

Refer to responses to Comment Letter 1, specifically Response to Comment 1-3, which revises Mitigation Measure AQ-4.

Response to Comment 2

Refer to Master Response No. 1 CEQA Baseline.

Response to Comment 3

Since no routine flaring is anticipated, and CEQA does not require the analysis of unpredictable or unlikely events, it is appropriate to not include flaring in the HRA.

See Master Response No. 5, Renewable Fuels Processing.

Response to Comment 4

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 5

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 6

Phillips 66 operates Unit 250, which is permitted as Source 460 and Source 461 under the facility Permit to Operate issued by BAAQMD. Phillips 66 undertook a comprehensive permitting applicability review and determined that the facility Permit to Operate did not require modification to process renewable feedstocks in Unit 250. Phillips 66 previously had and still has the current capability to process either renewable feedstocks or petroleum-based feedstocks in Unit 250. The feedstock to be processed at any given time will be dictated by market, transportation, logistics, economic, supply, refinery, and other considerations. BAAQMD, via letter dated August 31, 2021, requested information from Phillips 66 regarding Unit 250 and the processing of renewable feedstocks. Phillips 66 provided the requested information on September 30, 2021, explaining that the facility Permit to Operate allows renewable feedstocks, such as a wide range of vegetable oils, to be processed at Unit 250, just as it allows and has always allowed a wide range of non-vegetable oils to be used as feedstocks for the unit.

See also Master Response No. 7, Project Description – Piecemealing.

Response to Comment 7

Refer to Master Response No. 3, Cumulative Impacts.

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Comment Letter 52. Bardet, Marilyn

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Gary Kupp

From: Marilyn Bardet <mjbardet@comcast.net>
Sent: Friday, December 17, 2021 11:39 AM
To: Gary Kupp
Subject: My comment letter on Phillips 66 Renewed Rodeo DEIR
Attachments: Bardet Comment Letter_P66 DEIR - Rodeo Renewed Project_12.17.21.pdf

Hello Mr. Kupp,

As a 34-year resident of Benicia, I'm honored to submit comments on the P66 Renewed Rodeo Project in deference to the people of Rodeo concerned to improve their community's quality of life as related to the refinery's constant presence in their lives.

Thank you for this opportunity to comment, and for your time and thoughts responding to my letter.

Best wishes for your health and safety through these holidays and in 2022.

Respectfully,

Marilyn Bardet
333 East K Street
Benicia CA 94510

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COMMENT LETTER: 52

Marilyn J Bardet
333 East K Street, Benicia CA 94510
707-745-9094 (h) mjbardet@comcast.net

Dec 17, 2021
delivered via email to
Gary Kupp, Senior Planner
Contra Costa County
Department of conservation and Development, Community Development Division
gary.kupp@dcd.cccounty.us

Subject:
Comments on Phillips66 Rodeo Renewed Project Draft Environmental Impact Report,
County File No. CDLP20-02040 State Clearinghouse No. 2020120330 October 2021

Dear Mr. Kupp,

As a 34-year resident of Benicia, I offer my comments, questions and requests regarding Phillips66 Refinery's Rodeo Renewed Project ["RRP"], and address particular adverse foreseeable effects and unintended consequences—local, regional and global—of the refinery's conversion from crude oil refining to biofuels production.

The conversion of the Phillips66 refinery in Rodeo to renewable fuels production is enthusiastically supported by the state as a climate-protective first step away from fossil fuel production for transportation fuels. A first requisite step of a "just transition" is the shutdown of crude oil refining for sake of the biosphere's health and survival of bio-diversity inclusive of human life. The first step of a model "just transition" would lead to an alternative energy future that would be most protective of communities' and the biosphere's health and safety. A just transition would ensure workforce retraining and employment in a growing alternative energy economy. Just transition models account for and assess the role and source of any near-term energy solution with regard to the enormous losses of biodiversity on a planet impacted by human activity at every level of bio-integration.

1. Questions re lifetime and timeframes of Phillips66 ["P66"] Rodeo Renewed Project:

The choice to convert the P66 refinery to biofuels processing apparently represents a near-term imperative for the refinery's operational and economic viability into the future. As the State of California currently envisions, P66 presumes a continuing demand for low carbon intensity liquid transportation fuels — a mix of conventional and renewable fuels— into an indeterminate future.

a) CEQA guidelines recommend that a DEIR Project Description estimate the lifetime of a project, (construction plus years of operation). The DEIR briefly accounts that RRP conversion will allow for continued limited gasoline production in addition to the processing of renewable feedstocks for liquid transportation fuels. What is the estimated "lifetime" of gasoline production at Rodeo as part of the Project's lifetime? What is the estimated timeframe or "lifetime" of biofuels production at the Rodeo Site? 1

b) What would be the basis for estimated projections for the whole lifetime of the RRP?

c) The DEIR explains that sources of biofuel feedstocks could/would include rendered fats (tallow), and other plant-based oils including used cooking oils, presumably from restaurants. In what timeframe of the Project (first year, 5 yrs., within decade or. . .?) would the respective inclusions of rendered fat and waste cooking oils for bio-feedstock "slates" likely occur? (Estimates of future emissions related to these oils should be accounted for.)

2. Comments and questions re feedstock sources:

Looking at the RRP through the lens of climate change and a rapidly changing global environment for human survival, I join with many others in the Bay Area and beyond concerned about the foreseeable 2

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loss of precious agricultural land for food production in the U.S. and around the world. As the DEIR makes clear, feedstocks for biofuels production are derived mainly from soybeans and corn, which suggests that agricultural lands producing soybeans or corn oil, whether for biofuels or plastics, would represent a net loss into the *indefinite future* of land for growing food crops and oils for human consumption. Industrial agricultural practices continue to degrade and lose topsoils concomitant with greater use of commercial fertilizers and herbicides that kill off beneficial insects and destroy loamy, fungal soil culture. Such destructive industrial practices that would potentially support biofuels production at other U.S. refineries in addition to the Bay Area's Phillips66 in Rodeo, and Marathon Refinery at Martinez, are unsustainable now and will be into the future. The potential dedication of greater acreage of prime Midwest ag land for growing crops for biofuel feedstocks represents an ominous growing trend. Acquiring plant-based liquid feedstocks from stripped rainforest lands (for example: in Brazil; Indonesia; Malaysia) burned and cleared for cash crops grown for biofuel production must not be allowed.

a) What would legally prevent P66 from purchasing plant oils (including palm oil) grown on rainforest lands?

b) What quantities (tonnages) of annual crops of soybean and corn, grown in theMidwest, does P66 assume will be available and adequate to produce feedstocks for their Rodeo refinery under the RRP? (Assuming competition from other U.S. refineries converting to biofuels production.) 2 cont'd

c) How many square miles of ag land would it take to grow soybeans and corn to supply the P66 Refinery at Rodeo for one year? For five years? For 10 years?

d) Where are the facilities located that press corn and/or soybeans into liquids for transport to Rodeo refinery by train or marine vessel? The DEIR must give estimates of VMT for all segments of transport supporting future biofuel production at Rodeo.

e) Are GHG emissions from processes that liquify soybeans and corn accounted for in the overall GHG emissions assessment for the RRP? The DEIR must give estimates of GHG for all segments of transport supporting future biofuel production at Rodeo.)

f) What are the locations and numbers of slaughterhouses that would be involved to supply "rendered fats" to the Rodeo refinery? The DEIR must give estimates of VMT for all segments of transport supporting future biofuels production at Rodeo).

g) What would be the estimated percentage of feedstock derived from waste oils that would feasibly be part a daily "slate" for biofuels production?

3. Estimates of RRP toxic air emissions including GHG relative to the DEIR's emissions' "baseline":
The DEIR assumes a baseline that would reflect a "No Project Alternative" situation whereby if a permit for RRP is not issued, then P66 at Rodeo will resume historic levels of crude oil production. By comparing emissions estimates for RRP to emission levels at maximum crude oil production, the estimated RRP emissions appear to be greatly reduced. 3

a) Please give several recent examples, if any, of other U.S. refineries' biofuel conversion projects and their operations and account for their respective annual levels of toxic air emissions.

b) What are estimates for future emissions of H_2S and PM2.5 from biofuels production?

4. Comments and questions regarding odor and hydrogen sulfide mitigation, monitoring and management: 4

Of great local and regional concern are the amounts of airborne toxic refinery emissions pouring into the air from refineries and other sources of pollution, including tailpipe emissions from freeways that

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divide and/or pass closely by our fenceline communities. The P66 refinery is located so close to neighborhoods that residents' mistrust of the behemoth in their midst goes without question, even when the refinery's shiny promises of no more crude oil processing and greatly reduced emissions from the refinery's RRP conversion do not inspire hope or psychic relief. Life-long Rodeo residents, confined within a small town adjacent to a major constant source of toxic air contaminants, know that the air they take into their lungs in every breathe delivers an assault that adds to their cumulative and chronic burdens of compromised health. Rodeo residents, and we their regional neighbors who share the experience of living in a "refinery town", as well as those living farther away who have the imagination to feel what it would be like to be living in close proximity to a Bay Area refinery — P66 (Rodeo), Chevron (Richmond), PBF Martinez Refinery (Martinez), Valero (Benicia) or Marathon (Martinez)—can share Rodeoans healthy skepticism and doubt about the claims of the DEIR for mostly "no significant impacts" of P66's conversion Project. The Marathon Refinery, located within unincorporated land east of the City of Martinez will be undergoing a similar conversion to processing biofuels. While there are only a few pockets of houses near that refinery, a 5,000 home residential development will be constructed "just around the corner" as the crow flies, on former lands of the Concord Naval Weapons Station.

Breathing air reeking of rotten egg smell—typical of decaying plants, marsh tidelands at low tide and landfills—is offensive and dangerous: the gross smell indicates the presence of hydrogen sulfide gas, a potentially lethal neurotoxin. Depending on the concentration and exposure length, the effects of H_2S on human health include eye irritation, headaches, dizziness, vomiting and, if exposure is inescapable, damage to the olfactory nerve, such that the "rotten smell" would no longer be perceivable as a warning; within minutes of such an acute exposure, a person risks becoming unconsciousness when the H_2S "dose" could kill. 4 cont'd

The human nose is capable of detecting very low levels of H_2S gas in a range of 25 ppb. California's Air Resources Board's Ambient Air Quality Standard for odor/H_2S control is .03ppm for a 1 hour average exposure. A "credible worst case exposure scenario" may seem unlikely. But if a person is trapped in a small space where the gas settles, a prolonged acute exposure can be deadly.

Under Phillips66 "Renewed Rodeo" conversion plan, the potential threat of exposures to off-site emissions and fugitive releases of odorous H_2S gas emanating from various liquid plant-based oils and "rendered fats" during transport, storage and processing of those feedstocks would constitute yet another major assault on Rodeo residents' air quality and quality of life.

Rotten egg odors coming from biofuel feedstocks would not occur if systems implemented to control odor perform flawlessly and are regularly maintained. However, if odors are poorly managed and odor suppression systems do not perform as planned or inspection protocols are not regularly conducted (recall NuStar tank farm fire and explosion) leakages will foreseeable occur during transport, transfer, storage and refining of feedstocks. Those odors, thus H_2S gas, can travel long distances at near ground level depending on fluctuations of the wind direction and seasonal meteorological conditions.

The DEIR's Mitigation Measure AQ-4, "Implement Odor Management Plan" defers development of the actual OMP until construction phases of the Project. The text of Mitigation Measure AQ-4 is vague, without description.

> "Mitigation Measure AQ-4: Implement Odor Management Plan
>
> During the 2-year construction phase of the Project, an Odor Management Plan (OMP) shall be developed and implemented upon commencement of the renewable fuels processes, which will become an integrated part of daily operations at the Rodeo Refinery. The purpose of the OMP is to prevent any offsite odors and effect diligent identification and remediation of any potential odors generated by the Project. The OMP shall outline equipment that is in place and procedures that facility personnel shall use to address odor issues, facility wide. The OMP would include evaluation of the overall system performance, identifying any trends to provide an opportunity for improvements to the plan, and updating the odor management and control strategies, as necessary. This plan would be retained at the facility for County or other government agency inspection upon request."

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The DEIR does not enumerate or describe potential and foreseeable causes of odors owing to the performance of units entailed in the storage, transport and processing of renewable feedstocks. The DEIR must specify such sources and causes.

a) The ambiguous statement of MMAQ-4 suggesting deferral of creation of the OMP to a later date uncertain suggests that such required plans will be submitted *after* adoption of a FEIR and *after* BAAQMD issues a permit for construction. Is this true?

c) *Environmental justice requires transparency.* The public has a right to know important information related to people's health and safety. Providing adequate information about methods for odor/H_2S emissions mitigation, management and monitoring at the level of a DEIR is necessary. The Marathon Martinez Refinery's DEIR for their Renewable Fuels Project states that the frequency of inspections for odor management is dependent on whether 3 to 5 or 10 individuals separately report odor complaints on the same day to the Air District. This is not a particularly reassuring method of assessing degree of rotten egg odors' dispersion through a community and beyond: not everyone smelling "rotten eggs" knows to call the Air District's hotline to report odor releases, nor just how important to the Air District are those individual citizens' odor reports! Will the public be informed, *before* adoption of a FEIR, of the actual OMP, as well as of protocols for citizen reporting of odor complaints?

d) Will a public hearing be held on the RRP prior to release of the Response to Comments document that will provide for discussion regarding the OMP as well as cumulative emissions from all regional sources: the Rodeo Site related to biofuel production, transport, storage + extended gasoline production in addition to emissions from other major regional polluters?

e) The DEIR does not account for all regional sources of H_2S emissions nor calculate the potential risks of exceeding safe thresholds for ambient air quality related to public health in a crisis situation when wild fires and smoke particulates (PM2.5) are added to the toxic mix. Further explanations of odor management issues outlined under the heading, Odor Management [DEIR p.3-30 Project Description], with use of diagrams and graphics to help the public visualize methods of suppressing odors, would be very helpful. **4** cont'd

e) It is crucially important that a fence line monitoring system that meets BAAQMD required detection limits for H_2S emissions be installed. Will Phillips66 comply with BAAQMD latest requirements under Reg 12-Rule 15 for 100% coverage of refinery perimeters with installation of proven state-of-the art UV open path monitors that meet required H2S detection limits of 25 ppb? If so, will such a system be in place *before* biofuel production is allowed to proceed?

f) How will data collected by open path monitoring systems for detecting H_2S be objectively verified as accurate? Without reliable, third-party data verification for accuracy, there can be no public trust of refinery-reported emission levels.

g) What are other gases and compounds that would be present in emissions that are particular to refining plant-derived oils and/or rendered animal fats? Are there fenceline monitors that can detect and differentiate gas signatures that are associated to biofuels production?

h) Please provide examples of proven successful odor management methods at existing biofuels production facilities and at slaughterhouses where animal fat is rendered.

i) Will liquid rendered animal fat and other plant-based oils be stored in storage tanks with floating lids? How often will storage tanks be inspected for fugitive leakage?

j) Who owns and operates the storage tanks used by Rodeo refinery's RRP? How close are storage tanks for feedstock oils and refined products to residential neighborhoods and schools?

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k) The DEIR describes H2S gas as highly flammable, but does not describe under what conditions it could ignite. Please describe those conditions.

l) When biofuel feedstocks are stored in great quantities at refinery storage tank farms, (in tanks on or off site) or in railroad tanker cars, pressures can build up inside. What is the potential for catastrophic fire and explosion of hydrogen sulfide gas under extreme hot weather conditions or grass fires such as ignited around the NuStar tank farm, located just east ofRodeo, and set off an explosion several years ago? An unintended consequence of that explosion and fire was the entrampment of Rodeo residents who could not exit town since traffic was at a standstill on I-80 because of the NuStar explosion in addition to a grass fire raging on the eastern side of the freeway near Crockett. There is no mention that I could find in the DEIR's Executive Summary, Project Description or Summary of Impacts of the potential for catastrophic accidents involving H_2S or other emissions emanating from biofuel feedstocks.

4 cont'd

5. <u>Comments and questions re public safety:</u>
The DEIR does not discuss flaring and accidental releases that impact public health and safety.

a) What can the public expect with regard incidents of flaring during the processing of biofuels?
b) Will procedures during pre-treatment of bio-feedstocks have particular or unusual safety risks?
c) Will hydrogen production be increased for refining biofuels? Why? What are public safety risks associated to hydrogen production and use during feedstock pre-treatment and refining?
d) What are the cleanup methods for odiferous feedstocks in the case of a spill on land?
e) What are the methods of cleanup for feedstocks spilled into the Bay, or marsh, Carquinez Strait or Sacramento River during transport of bio-feedstocks by marine vessels?

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6. <u>Comments and questions re Air Quality</u>:
The DEIR, [p4.3-36], states "The nearest monitoring station to the Rodeo Refinery that measures concentrations of all of the major pollutants of concern is in Vallejo. The Rodeo Refinery operates a fenceline monitoring system as required by BAAQMD Regulation and AB1647."

a) Imaginatively Imposing the wind rosette for P66 refinery [Figure 4.3-1, p.4.3-32] showing prevailing wind directions on the aerial map of the town of Rodeo as seen adjacent to the refinery [Figure 3-1: Rodeo Refinery and Vicinity], I can't help but ask: Why is there no community-based air monitoring station in Rodeo to date that would monitor ambient air quality and detect toxic emissions directly affecting Rodeo neighborhoods and school? <u>Creation and financing of such a community-based monitoring station should be a permitting condition of the Renewed Rodeo Project</u>.

d) Will train tank cars containing biofuel feedstocks to be delivered to the refinery be permitted to be parked on side tracks? If so, for how long can they remain parked off site?

e) What are the different methods by which biofuels will be unloaded from barges, trucks and train tank cars in regard to potential for fugitive releases of H_2S, odors and other toxic emissions?

f) What, if any, off-site air monitors will be installed under RFP, e.g., monitoring for fugitive releases that occur beyond the fenceline? (For example, monitoring at truck racks and wharves for detecting H_2S and other toxic emissions during transport and delivery operations involving biofuel feedstocks.)

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Thank you for this opportunity to comment on Phillips66's ambitious Renewed Rodeo Project, and for your time reviewing my basic comments, questions and requests, which are examples of my thoughts

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related to sustainability goals, climate protection, public health and safety. I hope what I have offered will be considered constructive and useful.

Respectfully,

Marilyn Bardet

Good Neighbor Steering Committee, Benicia
Valero Benicia Refinery Community Advisory Panel
Benicia Community Sustainability Commission
Benicia Community Air Monitoring Program 501(c)3, board member
Sustainable Solano 501(c)3, Board Chair

[Since 2000, I have been active as a founding member of the Good Neighbor Steering Committee [GNSC], a local voluntary group in Benicia focused on Valero Benicia refinery operations and upgrade projects. We commented on and challenged the Valero Improvement Project DEIR (2003), and were thus contributive to a permitting requirement to install a Flue Gas Scrubber that greatly reduced SOX emissions; subsequently, we challenged Valero's VIP Addendum (2007), which led to a $14 million Settlement Agreement in 2008 negotiated between the GNSC and Valero, with Settlement funds dedicated to city-wide benefits for energy and water-saving community projects that were vetted by the Benicia Community Sustainability Commission and City Council. Since those efforts, I have been engaged with BAAQMD rule-making (Reg-12, Rule 15 and Rule 16). I also helped organize and lead a citizens' local campaign to educate residents to the dangers of permitting Valero's proposed Crude By Rail Project, which was first introduced to the public in 2013, and which was finally unanimously rejected by the City Council in June 2016, on appeal of Planning Commissioners' unanimous rejection of the project. In 2020 - 2021, I helped establish with members of the GNSC and several others the 501 (c) 3 called Benicia Community Air Monitoring Program ["BCAMP"]

cc
Constance Beutel
Kathy Kerridge
Nancy Lund
Mary Frances Kelly Poh

Response to Comment 1

See Response to Comment Response to Comment 36-49 and Master Response No. 4, Land Use and Feedstocks.

Response to Comment 2

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 3

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 4

Refer Responses to Comments 1 through 3, and Master Response No. 5, Renewable Fuels Processing.

Response to Comment 5

Since no routine flaring is anticipated, and CEQA does not require the analysis of unpredictable or unlikely events, it is appropriate to not include flaring in the HRA.

Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 6

The Rodeo Refinery operates a fenceline monitoring system as required by BAAQMD Regulation and Assembly Bill (AB) 1647. The fenceline air monitoring sites are secure on Phillips 66 property. Locating monitoring sites elsewhere would require obtaining cooperation, permission, and access from public entities or private property owners, long-term leases, reliable electric power, and, in particular, site security arrangements that may be difficult or impossible to achieve in a practicable manner.

Comment Letter 53A. Brennan, Maureen

COMMENT LETTER: 53A

Gary Kupp

From: Maureen Brennan <harpmo@sbcglobal.net>
Sent: Saturday, December 4, 2021 10:51 AM
To: Gary Kupp; matt.kaufmann@cchealth.org; Charles Davidson
Subject: Re: Nustar Soybean Oil Project from CC County Planner and ISO 84-63 per the Rodeo Renewed Project

Dear Gary and Matt,
I support Charles' concerns about the Nustar pipeline connection to the P66 renewable diesel project. Other similar projects for renewable diesel need to heat their pipelines and their tanks, to keep the product moving and flowing. There is no longer the benzene/xylene components that served that function in the past. Typically for this new product, the pipes are heated, and the tanks as well. Is that the case for the P66-Nustar pipeline connection? That certainly seems like a change-in-risk situation. By the way, I was down at the parking lot near the old Tormey schoolhouse, taking photos of the new construction. I asked one of the engineers, "is your work here on this new pipeline part of the P66 Renewable Diesel project?" He said "yes." Just saying. 1
Maureen Brennan
Rodeo CA

On Friday, December 3, 2021, 10:55:56 AM PST, Charles Davidson <charlesdavidson@me.com> wrote:

Subject: Nustar Soybean Oil Project from CC County Planner and ISO 84-63 per the Rodeo Renewed Project

To: Gary Kupp, CC County DCD
Matt Kaufmann, Hazardous Materials Director

Hello Gary and Matt,

Greetings.

I am sending this letter to both of you, as you are both involved with the permitting of aspects of the the Phillips 66 renewable diesel project and also because Gary's response to me about the Nustar Soybean Oil Project referred to the County Industrial Safety Ordinance 84-63. My comments below are neither for or against the project, but about the County's permitting process as it has so far progressed, which I have contentions with and which are described below regarding both of your agencies.

Arguing for a ministerial approval, Gary, you stated in your email to me, that "the Nustar Soybean Oil Project, which is a stand-alone project [is] not related to the Rodeo Renewed refinery conversion currently under review". According to the August 9th 2021 Argus article: California refinery conversions face skepticism, the Phillips 66 refinery has "reached 8,000 b/d of renewable diesel output in July at its 120,000 b/d at its Rodeo refinery". As you state in your email, the project's new railroad loading dock is directly connected to the Phillips 66 tank by a new pipeline and that is then connected to hydrotreater Unit 250. This strongly arguing against your point that the Nustar Soybean Oil Project is not related to the Rodeo Renewed refinery conversion, but is clear evidence that it is a piecemealed project of the larger Rodeo renewed Project. Obviously, piecemealing of two or more related projects is not allowable under CEQA.

Gary, you also state that the project was reviewed by the Department of Conservation and Development and the county's Hazardous Materials Program staff for compliance with Ordinance Code, Chapter 84-63 entitled "Land Use Permits for Development Projects Involving Hazardous Waste or Hazardous Materials". The divisions' conclusion was that the project was not a "change-in-risk project, with a higher hazard category and which use will result in a hazard score higher than the hazard score of the previous use. (Ords. 98-48 § 5, 96-50, 96-20)".

However, soybean oil is a triglyceride which has six oxygen atoms, three of which bond glycerol to three fatty acids

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(which will become the three renewable diesel molecules after hydrodeoxygenation). Most importantly, petroleum oil does not contain any oxygen. The three other oxygen atoms are released from the fatty acids upon decarbonylation.These triglyceride oxygen removal processes would occur within the hydrocracker at between 350-450 degrees Centigrade (approximately 650-850 degrees Fahrenheit) and possibly up to 200 atmospheres, maximum (according to Catalysts for Hydrogenations, Dehydrogenations and Metathesis. Guido Busca, in Heterogeneous Catalytic Materials, 2014. 10.2.5 Hydrocracking catalyst)

My point in bringing up these details is that hydrocracking triglycerides occurs in an environment rich in oxygen (approximately 11% by weight of the triglyceride feedstock), which is not present within the hydrocracker when hydrocracking petroleum oil. Moreover, the glycerol portion of the triglyceride become hydrogenated and converted to propane gas, (becoming approximately 6% by weight of the triglyceride feedstock) which is also not present to any appreciable degree in petroleum hydrocracking.

Thus, triglyceride hydrocracking (of any fat, oil or grease) is a high-temperature and high-pressure hydrogen environment rich in both oxygen and propane and this confluence appears as a potential higher risk project compared to hydrocracking petroleum oils and possibly is in contrast to Hazardous Materials determination of decreased risk.

Specifically, catalytic hydrocracking is primarily a *hydrogen-driven exothermic reaction* (whether using either petroleum oils or triglycerides). In view of the over 100 petroleum-related flaring incidents which have occurred at both the Phillips 66 and the Marathon/Tesoro refineries since 2010, the risk of hydrogen-driven runaway reactions and flaring would seem to increase, not decrease during triglyceride hydrocracking. Moreover, the Phillips 66 project will require nearly twice the amount of hydrogen per gallon, due to a nearly one-third increase in hydrogen production from Air Liquide and Unit 110, combined with a one-third decrease in refinery throughput (Attachment A, Table 15 and Table 1, respectively). Thus, Air Liquide may also be more prone to major upsets, as have occurred in the past, while flaring and hydrocracker hydrogen quenching are two methods used to prevent yet more dangerous situations.

Finally, in the words of the Industrial Safety Ordinance and the meaning of the ISO 84-63 for a Change-of Risk Project, the feedstock substance cannot be separated from the processing of that substance, which states: "which use will result in a hazard score higher than the hazard score of the previous use.” (1)

As my concern regards a potential public safety issue for what would be the largest renewable diesel project in the world at Phillips 66, which would be novel in scale, I would therefore like to personally review the hydrocracker technical analysis of the Hazardous Materials program at the earliest possible date, for CEQA comment purposes (and for Marathon as well).

Sincerely,

Charles Davidson
Hercules CA

1) Per: 84-63.406 Change-in-risk project.
A “change-in-risk project” means a new use of an existing building, structure, or facility, not involving construction other than minor alterations, which use will involve a hazardous material or hazardous waste in a higher hazard category and which use will result in a hazard score higher than the hazard score of the previous use. (Ords. 98-48 § 5, 96-50, 96-20).

2

COMMENT LETTER: 53A

From: Gary Kupp <Gary.Kupp@dcd.cccounty.us>
Subject: FW: Phillips 66 Construction BRAND NEW Rodeo Renewed (Diesel) Loading rack on - AND With or without permit ??? - Note new or planned pipeline from Phillips 66
Date: December 2, 2020 at 9:32:58 AM PST
To: Charles Davidson <charlesdavidson@me.com>

Dear Mr. Davidson:
Thank you for reaching out. The project you are seeing is not associated with the proposed Phillips 66 Rodeo Renewed refinery conversion, which is currently under review with an EIR is still being prepared. Nor have any construction permits been issued for that project.

The project you are referring to appears to be the Nustar Soybean Oil Project, which is a stand-alone project not related to the Rodeo Renewed refinery conversion currently under review. The project will install an approximately 2300-foot pipeline from Nustar to Phillips 66 to carry pretreated soybean oil feedstock to existing tankage and the Unit 250 diesel hydrotreater at the Phillips 66 refinery, which can already produce diesel from both renewable and crude feedstocks (see attached site plan). The soybean feedstock will be unloaded at existing Nustar rail facilities which will be modified with 33 offload headers to accommodate the soybean oil.

The project was reviewed by the Department of Conservation and Development and the county's Hazardous Materials Program staff for compliance with Ordinance Code, Chapter 84-63 entitled "Land Use Permits for Development Projects Involving Hazardous Waste or Hazardous Materials". The ordinance requires a land use permit for projects that propose a "change in risk". A change-in-risk project is one that will involve the use of hazardous materials or hazardous waste of a higher hazard category than the existing use. The attached safety data sheet indicates that pretreated soybean oil is not classified as a hazardous material nor does it meet the criteria of a hazardous waste. As such, it was determined that the modifications proposed by Nustar would not require a land use permit. The appropriate building permits have been issued.

Please let me know if you have any questions.

--

From: Charles Davidson <charlesdavidson@me.com>
Sent: Monday, November 30, 2020 2:44 PM
To: Gary Kupp <Gary.Kupp@dcd.cccounty.us>
Cc: Charles Davidson <charlesdavidson@me.com>
Subject: Phillips 66 Construction BRAND NEW Rodeo Renewed (Diesel) Loading rack on - AND With or without permit ??? - Note new or planned pipeline from Phillips 66

From: Charles Davidson <charlesdavidson@me.com>
Subject: Phillips 66 Construction BRAND NEW Rodeo Renewed (Diesel) Loading rack on - AND With or without permit ??? - Note new or planned pipeline from Phillips 66

Gary, Greetings.

My name is Charles Davidson, I am an incoming director on the Rodeo-Hercules Fire Protection District board of directors.

Several constituents have asked me if the newly constructed railroad loading apparatus/dock adjacent to Selby Slag has a permit from the County, as the Rodeo Renewed Project has not yet actually been approved by CC County. If there is such a permit or agreement between Phillips 66 and the County, please let me know, as soon as possible.

Also, since either at or near that recent consruction are three adjacent corporate boundaries, ie, Phillips 66, Nustar

3

COMMENT LETTER: 53A

and the SL Corporation, a public-private corporation formed between the State Lands Commission and Phillips 66 (which is in charge of Selby Slag). So please let me know exactly who is the owner of that site and if another entity other than Phillips 66 has a permit for that newly constructed loading dock. For example, the only other agency which has construction jurisdiction over refinery activities is BAAQMD. I you do not know, also please let me know. Thank you very much.

Sincerely, Charles Davidson RHFPD-director elect (510) 837-8441

4

Response to Comment

Comment noted.

See Responses to Comments for Letters 59A and 59B and Master Response No. 7, Project Description–Piecemealing.

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Comment Letter 53B. Brennan, Maureen

COMMENT LETTER: 53B

Public Comment of draft EIR Phillips 66: 12/14/21
Dear Gary Kupp:
I am a citizen of the unincorporated town of Rodeo. I have many concerns about this upcoming project with Phillips 66. They call it "Rodeo Renewed," I call it Rodeo Screwed. It's a good money-maker for P66 as $3.32 subsidies from the state of CA, covers all production costs. Renewable diesel currently costs $3.79 including taxes, at the pump.

It is presented as an emissions reduction project in the EIR. Phillips currently emits 140 tons/yr PM, 50% of that is still, 70 tons/yr. This is still a dirty project. And as typical, the EIR does not address cumulative impacts of the other local 4 refineries. Shell/PBF emits 600+ tons/yr PM. We all breathe the same air, depending how the wind blows. I saw no studies of cumulative impacts. Other similar projects for renewed diesel in EU, also show increases in NO2, another GHG. 1

Next on my list is noise impacts. The EIR states that less than 60 decibels is acceptable. However, last summer I purchased a decibel meter from Amazon, because I was repeatedly awoken in the night with the loud noises from the refinery. They started their hydrotreater conversion back in April 2021, without permits, and I could hear it and smell it. After 20 years here in Rodeo, I am quite certain the loud "jet plane" sounds come from the hydrogen plant (2). I have recently registered 62-70 decibels, typically around 3am. Also, the hydrogen plant is running much longer hours, even in the daytime. And with the increase of train traffic, it spikes at 72 decibels throughout the night. Please rethink your numbers on this. 2

Oddly, the EIR does not address odor nuisance at all. This is often a feature of other EIRs I have experienced. I am on the Fenceline committee with P66 for 3 years now, as you know. When I asked one of the engineers at the table back in August 2019, he said "the facility will smell like a rendering plant." Nik Epstein has stated that a large portion of the feedstock will be beef tallows. This was confirmed at a meeting of the East Bay Leadership Council and the guest speaker was William Darling, whose international product is "re-purposed" animals. Currently there is no pre-treatment plant at the P66 facility. I see no requirements for this in the context of this EIR. Bad smells will certainly have an environmental impact. This is a grave omission. 3

The hydrogen plant. Were you at the Fenceline meeting just after a "unit upset" shutdown of Air Liquide last year? Don Bristol mentioned with clear frustration, that it happened in 2009, the first year of operation, then in 2010, 2011, 2012, . . . and sort of threw up his hands. With Rodeo Renewed production, the plant will be running 2 ½ times it's usual production. This is a severe hazard, the risk of explosion. Also, it will be burning massive amounts of methane to fuel the H+ plant. A GHG 80 times more potent than CO2. This should be addressed under Hazardous Materials and Green House Gases in the EIR. 4

Also, I noticed that the delayed-coker is not being de-commissioned. The continued use of this unit for slurry oil products, should be considered as a consequence of this Rodeo Renewed project. Slurry oils continue large amounts of heavy metals, and will certainly increase PM emissions. This would not occur but for this project. Another omission. 5

(MB)

COMMENT LETTER: 53B

I request that we put the brakes on this unsafe project. At the very least, please consider Environmental Justice issues to this community. I was here 9 years ago when the Fuels Expansion Project started in 2009. Previously, I cleaned my decks maybe once/yr. After 2009, my decks were dirty with soot after 3 weeks post-cleaning. This is an environmental impact that was never addressed.

We are weary. This EIR has too many omissions and unknowns, and should not move forward at this time. At the least, we should have a Public Meeting opportunity to review some of these concerns. Thanks.

Maureen Brennan
Rodeo CA

Maureen Brennan

COMMENT LETTER: 53B


Maureen Brennan
524 Suisun Ave
Rodeo, CA 94572

OAKLAND CA 945
15 DEC 2021 PM 5 L

Gary Kupp, Senior Planner
Contra Costa Co., DCD
30 Muir Rd.
Martinez, CA 94553

94553-460130

CONTRA COSTA
2021 DEC 17 PM 3:34
APPLICATION & PERMIT CENTER

Response to Comment 1

Refer to Master Response No. 3, Cumulative Impacts.

Response to Comment 2

Comment noted. However, the comment did not state whether the sound level meter that was used met American National Standards Institute (ANSI) performance specifications, was calibrated before and after the measurement was taken, or if other sources of ambient noise could have been detected that would affect the measurements.

Response to Comment 3

Refer to Response to Comment 1-3.

Response to Comment 4

As proposed, the Project would lower facility-wide GHG emissions by about 24,000 MT per year compared to baseline operations. Refer to Table 4.8-5 in the Draft EIR "Annual Project Operational GHG Emissions".

Refer to Master Response No. 5, Renewable Fuel Processing. The principal byproducts of combustion of methane (CH_4) with oxygen (O_2) are water vapor (H_2O) and carbon dioxide (CO_2). These gases are nontoxic and nonhazardous to human health. Methane is the principal constituent of natural gas. Methane combustion emits 29 percent less CO_2 than fuel oil, and 44 percent less CO_2 than coal (https://www.epa.gov/sites/default/files/2018-03/documents/emission-factors_mar_2018_0.pdf)

Also see Master Response No. 5, Renewable Fuel Processing.

Response to Comment 5

The Draft EIR explains the status of retained permits in the Notes to Table 3-3:

> The permits for Unit 267, the Carbon Plant, and Units 236/238 will be relinquished upon startup of the Project. The permits for Unit 244, Unit 200, MP-30, Unit 215 and Unit 228 are being maintained for the possibility of future use, depending on economic and regulatory conditions. Therefore, the potential use of these units has been included as a part of the environmental analysis, and no reductions in emissions have been taken to account for the non-operational status of the units. Any future use of the units would be evaluated in accordance with CEQA and all applicable laws and regulations.

Although Phillips 66 is retaining its permit to operate the Delayed Coker, any use of that equipment in the future is speculative and not part of this Project. Any potential use of that equipment in the future would be evaluated at that time and any permits or approvals necessary would be obtained.

Also refer to Refer to Master Response No. 5, Renewable Fuels Processing.

Comment Letter 54. Callaghan, Janet

COMMENT LETTER: 54

Gary Kupp

From: Janet Callaghan <janetandpaul@icloud.com>
Sent: Friday, December 17, 2021 12:14 AM
To: Gary Kupp
Cc: Janet Callaghan
Subject: DEIR Phillips 66 Rodeo oil refinery to biofuel production File No. LP20-2040.

Attn: Gary Kupp, Senior Planner. 12/17/2021
Contra Costa County
Department of Conservation & Development Via email. Re: Phillips 66 Rodeo Biofuels Project, file No. CDLP20-02040 gary.kupp@dcd.cccounty.us

As you know Gary, I have been on the P66 fenceline committee for many years. It was the public that insisted on fenceline monitoring even before P66.

1. PHILLIPS 66 is in violation of land use permit #05-2048 condition 46 paragraph 12 for the monitoring of H2S.

PHILLIPS 66 IS CURRENTLY IN VIOLATION OF THE "MEMORANDUM OF UNDERSTANDING FENCELINE MONITORING AT THE RODEO REFINERY" THAT WAS SIGNED ON APRIL 16, 2012. IN THIS AGREEMENT THE MOU STATES ON PAGE 5 THAT OPEN-PATH TUNABLE DIODE LASER SYSTEMS (TDLS) WILL BE INSTALLED ALONG THE NORTH AND SOUTH FENCE-LINES OF THE REFINERY AND THE SYSTEMS WILL HAVE DETECTION LIMITS FOR HYDROGEN SULFIDE GAS OF 25 PARTS-PER-BILLION (ppb). Yet THE AIR MONITORING PLAN SUBMITTED BY P66 TO THE BAY AREA AIR QUALITY MANAGEMENT DISTRICT AS REQUIRED BY REGULATION 12, RULE 15(BAAQMD 12-15) STATES THE SYSTEMS TDLS AIR MONITORING SYSTEMS CURRENTLY IN OPERATION AT THE FENCELINE HAVE DETECTION LIMITS OF 300(ppb). PLEASE ACKNOWLEDGE THIS DISCREPANCY. I RESPECTIVELY REQUEST THE DEIR PROVIDE A TIMELINE AS TO WHEN THE P66 FENCELINE WILL BE BROUGHT IN COMPLIANCE WITH MOU FOR THE DETECTION AND QUANTIFICATION OF H2S? PLEASE UNDERSTAND THAT THE BAAQMD HAS IDENTIFIED A VENDOR THAT CAN SUPPLY EQUIPMENT THAT CAN MEET THESE DETECTION LIMITS. 1

2. Phillips 66 is in violation of land use permit No. 05-2048
condition # Paragraph 12 for the monitoring of benzene, toluene, and xylene.

THE TECHNOLOGIES USED BY PHILLIPS 66 NO LONGER MEET THE REQUIRED DETECTION CAPABILITY STATED IN THE MOU BETWEEN THE REFINERY, LOCAL COMMUNITY GROUPS AND COUNTY. PHILLIPS 66 DETECTION LIMITS FOR BENZENE, TOLUENE & XYLENE LATEST REPORT FOR ALL 3 GASES DETECTION LIMIT IS 10 parts-per-billion(ppb). 2

THIS AGREEMENT SPECIFICALLY STATES THE FENCE-LINE AIR MONITORING EQUIPMENT TO BE OPERATED AT DETECTION LIMITS FOR 5 (ppb),

1

COMMENT LETTER: 54

I respectively request the DER provide a timeline as to when the Phillips 66 fenceline will be brought in compliance with the MOU for the detection and quantification of benzene, toluene and xylene at the detection limits stated in the MOU. 2 cont'd

3. Phillips 66 fenceline air monitoring equipment is obsolete.

In reviewing the BAAQMD 12-15 air monitoring plans by the five refineries in the Bay Area, Phillips 66 is the only refinery to propose and justify using antiquated air monitoring technology to protect the communities impacted by their emissions. As an example, the open-path fenceline systems used by Phillips 66 are over 10 years old and have much higher detection limits than other refineries. Many of the air monitors used by Phillips 66 are no longer sold by the vendors who supplied the equipment, effectively rendering them obsolete. I respectively request the DER provide a timeline as to when the Phillips 66 fenceline will be required to replace their obsolete air monitoring equipment with current technology. 3

4. PHILLIPS 66 IGNORES ITS ENVIRONMENTAL IMPACT ON THE COMMUNITY OF RODEO, CALIFORNIA

When Phillips 66 submitted its BAAQMD 12-15 Air Monitoring Plan, it employed arbitrary community impact analysis to exclude the community of Rodeo as part of its fenceline air monitoring system. For this reason, it excluded any type of technology upgrade associated with the BAAQMD 12-15 for the community of Rodeo. 4

I respectively request the DER provide the community of Rodeo with a written guarantee that all fenceline air monitoring equipment installed at the Phillips 66 San Francisco Rodeo refinery be made consistent with the land use permit and BAAQMD standards.

5. THE FENCELINE AIR MONITORING EQUIPMENT THAT IS CURRENTLY IN PLACE AT PHILLIPS 66 WILL NOT DETECT POLLUTANTS ASSOCIATED WITH RENEWABLE FUELS

THE POLLUTANTS ASSOCIATED WITH THE FEEDSTOCK, INTERMEDIARY AND PRODUCTS ASSOCIATED WITH BIOFUEL PRODUCTION ARE NOT DETECTABLE WITH THE FENCELINE TECHNOLOGY IN PLACE AT THE REFINERY. THESE POLLUTANTS INCLUDE AMINES, REDUCED SULFURS, ALDEHYDES AND KETONES GASES. NONE OF THESE GASES ARE CAPABLE OF BEING DETECTED BY THE CURRENT SYSTEMS AT LEELS THAT PROTECT THE PUBLIC IN A TIME SENSITIVE MANNER. I RESPECTIVELY REQUEST THE DER PROVIDE THE COMMUNITIES OF RODEO AND CROCKETT WITH A WRITTEN GUARANTEE THAT ALL FENCELINE AIR MONITORING EQUIPMENT INSTALLED AT 5

2

COMMENT LETTER: 54

THE PHILLIPS 66 SAN FRANCISCO RODEO REFINERY ADDRESS ALL HEALTH IMPACTS INCLUDING ODORS ASSOCIATED WITH ANY CHANGE IN REFINERY ACTIVITIES.

As a result of these identified inadequacies of the current fence line systems and the potential for yet unknown impacts to nearby residents due to the current antiquated systems and change in operation at Phillips 66 refinery, I REQUEST THAT AT A MINIMUM PHILLIPS 66 BE REQUIRED TO MEET CURRENT REQUIREMENTS OF BAAQMD 12-15 FOR OTHER REFINERIES AND DEMONSTRATE PROPER OPERATION OF ITS FENCE LINE SYSTEM IN A TRANSPARENT AND VERIFIABLE WAS, MAKING ALL DATA AVAILABLE TO THE PUBLIC ON ITS CURRENT WEBSITE, WITH AND INDEPENDENT THIRD-PARTY AUDIT OF THE SYSTEM ON AT LEAST AN ANNUAL BASIS, ALSO RELEASED TO THE PUBLIC.

5 cont'd

I also request that all refineries in Contra Costa County meet verifiable minimum detection limits added to their use permit that are achievable with current technologies and cover all potentially emitted compounds that may negatively impact the community. I request the County work with the BAAQMD to update the requirements of Regulation 12, Rule 15 to produce transparent, verifiable data, including audit results given to the public that covers the measurement of compounds produced not only by traditional refineries, but those producing biofuels and include all fence line systems in its BAAQMD 12-15 Air Monitoring Plan to cover the community of Rodeo.

I ASK THAT THIS PROJECT NOT MOVE FORWARD UNTIL AND UNLESS THESE VERY SERIOUS POTENTIAL IMPACTS ARE FULLY ANALYZED AND ADDRESSED.

ADDITIONALLY, GIVEN THE ENORMOUS IMPORT OF THIS PROJECT FOR THE COMMUNITY, I BELIEVE A PUBLIC HEARING CONCERNING THE PROJECT AND ITS ENVIRONMENTAL REVIEW WOULD FACILITATE THE PURPOSES AND GOALS OF CEQA. I THEREFORE REQUEST THAT YOU SCHEDULE SUCH A HEARING AS SOON AS POSSIBLE.

Janet Callaghan
510-502-5057

3

Response to Comment 1

The fenceline monitoring system satisfies the requirements of both the 2012 MOU and BAAQMD Regulation 12, Rule 15. The MOU from 2012 identified specific pieces of equipment to detect among other things, H2S, and that equipment has been used continuously since 2012. Regulation 12, Rule 15 has different reporting detection levels and these requirements were satisfied with a subset of the 2012 MOU fenceline monitoring system. Nonetheless, the entire fenceline monitoring system has been kept in place, using the same equipment (updated and maintained as appropriate) and is still operating. Phillips 66 will continue to work with the community to implement improved technology and the applicable requirements of the BAAQMD. Phillips 66 meets quarterly with the citizens around the Refinery to discuss the fenceline monitoring system performance and believes the system is in compliance with the 2012 MOU as well as BAAQMD Regulation 12, Rule 15 requirements.

Response to Comment 2

The table data provided does not reflect the minimum detection capability of the instruments. The fenceline monitoring system currently meets the MOU detection limits of 5 ppb for benzene, toluene, and xylene.

See also Response to Comment 1-3.

Response to Comment 3

The Rodeo Refinery operates a fenceline monitoring system as required by BAAQMD Regulation and Assembly Bill (AB) 1647. Air monitoring equipment at the end of its useful economic life is replaced with new up-to-date equipment by Phillips 66.

See Response to Comment 1.

Response to Comment 4

All monitoring required as part of mitigation or conditions in the permit will be monitored by the County and/or the BAAQMD to ensure compliance.

See Response to Comment 1.

Response to Comment 5

The Rodeo Refinery operates a fenceline monitoring system as required by BAAQMD Regulation and Assembly Bill (AB) 1647. Gases such as amines, reduced sulfurs, aldehydes, and ketones are not expected to be emitted in detectible concentrations, if at all, from the proposed renewable fuels processes. See also Response 62-2.

Refer to Response to Comment 1-3, which revises Mitigation Measure AQ-4.

Comment Letter 55. Carmichael, Cynthia

COMMENT LETTER: 55

Gary Kupp

From: CYNTHIA CARMICHAEL <cgcarmichael@comcast.net>
Sent: Friday, December 17, 2021 11:53 AM
To: Gary Kupp
Subject: HOLD YOUR HORSES PLEASE

I am writing with concern about the biofuel processing to be started at P66 and at Marathon.
I request further information about these endeavors as I am concerned about possible health effects on the community.
I believe the DEIR should describe the project so as to assess the impact on our community.
Please provide more information on the environmental and climate impacts of these projects These projects cannot be hurried along without assessing the climate and health effects.

Apparently there is information that refining biofuels may increase the incidence of flaring which would be detrimental to our community. 1

As a family physician I am especially concerned about our community health.

Please arrange a public event so that the community can be fully involved in

making decisions that may cause detrimental effects to humans.

Thank you,

Cynthia Carmichael, MD
cgcarmchael@comcast.net

1

Response to Comment

The Draft EIR provides an assessment of community impacts in Section 4.3, Air Quality, which addresses human health risk, and Section 4.8, Greenhouse Gas Emissions, which addresses the Project's effect on climate change. Both sections conclude that the Project would not result in significant impacts related to human health and climate change. In addition, 4.17, Environmental Justice specifically addresses potential impacts to the surrounding communities.

The Project does not propose any changes to existing flaring. See Master Response No. 5, Renewable Fuel Processing.

Regarding community involvement, public outreach and participation is an important component of CEQA. The public will be offered the opportunity to again provide comment on the Project at upcoming Planning Commission meetings. These meetings will be publicly announced.

Comment Letter 56. Clifford, Deborah

Deborah Clifford
6205 Panama Ave
Richmond, CA 94804-5727

12/13/21

COMMENT LETTER: 56

Dear Mr. Kupp:

I'm writing to you concerning the draft EIR for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040). ***I am very concerned that the analysis of the project's impacts in the draft EIR is inadequate.*** As a long-time Contra Costa homeowner and taxpayer, I'm alarmed that the draft ***does not consider*** 1 ***the impact on land use of massive importation of food crops as feedstocks, or the*** 2 ***public safety risks*** associated with the proposed biofuel refining.

Please schedule a public hearing to capture the community's significant concerns and incorporate them into your permitting decisions about this project.

Best wishes for a safe and healthy year ahead –

Debi Clifford

'Coralie'
Damask
Prior to 1848

TASCHEN

Deborah Clifford
6205 Panama Ave
Richmond, CA 94804-5727

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14 DEC 2021 PM 6 L

Gary Kupp
Senior Planner
Contra Costa County
Dept of Conservation
& Development
30 Muir Road
Martinez, CA 94553

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Dept of Conservation & Development

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Response to Comment 1

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 2

It is unclear what the comment is addressing. The Draft EIR address hazards and hazardous materials related to feedstock in Section 4.9, Hazards and Hazardous Materials, as well as human health risk in Section 4.3, Air Quality.

Refer to Master Response No. 5, Renewable Fuel Processing.

Comment Letter 57. Conhagen

COMMENT LETTER: 57

Gary Kupp

From:	Renee Baptiste <rBaptiste@conhagen.com>
Sent:	Friday, December 17, 2021 7:31 AM
To:	Gary Kupp
Subject:	Phillips 66 Rodeo Renewed Project
Attachments:	Conhagen - P66 Support Letter.docx

- -

Reneé Baptiste
Conhagen Inc of CA
3900 Oregon Street
Benicia CA 94510
Ph 707-746-4848

1

COMMENT LETTER: 57

ALFRED CONHAGEN, INC. OF CALIFORNIA
3900 Oregon Street
Benicia, California 94510

December 7th, 2021

Gary Kupp
Department of Conservation and Development &
Community Development Division
30 Muir Road
Martinez, CA 94553
Via email to: Gary.Kupp@dcd.cccounty.us

Re: Support of Phillips 66 Rodeo Renewed Project

Dear Mr. Kupp:

On behalf of the Alfred Conhagen Inc. of California, I am writing to confirm our strong support of the Phillips 66 Rodeo Renewed project. Phillips 66 has been an important member of our community for many years. Please add our public comment in support of the Rodeo Renewed project. The Draft EIR demonstrates this project will benefit our community by reducing criteria pollutants while maintaining family-wage jobs. 1

Throughout the years we have forged a partnership and we are proud to work alongside Phillips 66 towards the betterment of our shared community. With the approval of the Rodeo Renewed project we can continue this great work which benefits residents, businesses, and community groups. As one of the largest employers in our area, we implore you to do all that you can to ensure their continued success which, in turn, supports Alfred Conhagen Inc. of California.

The Rodeo Renewed Project is what the future *can* look like: industry, labor, local business and the community working together to help our State meet its renewable energy goals while maintaining solid economic growth. Phillips 66 has shown how innovative and well-designed technologies can reduce local criteria pollutants and produce lower carbon intensive fuels. What a great thing to celebrate here at home!

As shown in the Draft EIR, Rodeo Renewed plans to use existing facilities, repurposing the existing equipment currently in use today while also creating hundreds of construction jobs. These family-wage jobs not only benefit the worker, they also benefit the immediate community through the purchase of goods and services. Our local businesses count on this multiplier effect and we ask you to carefully consider these economic drivers and the impacts they have on our community.

Therefore, on behalf of Alfred Conhagen Inc. of California, we enthusiastically support and urge you to approve the Rodeo Renewed project

Sincerely,

Ben Pierce
General Manager / Mechanical Engineer

Response to Comment

Comment noted.

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Comment Letter 58. Datnow, Lilly

COMMENT LETTER: 58

Gary Kupp

From: Lilly Datnow <lillydatnow@gmail.com>
Sent: Friday, December 17, 2021 11:29 AM
To: Joseph Lawlor; Gary Kupp
Subject: REJECT Biofuels Refinery in Contra Costa County

Dear Mr. Kupp and Mr. Lawlor:
I am a resident of Contra Costa and I'm writing to urge you to reject the proposed refinery transition projects in Rodeo and Martinez, and decommission the county's outdated refinery infrastructure once and for all. If the County insists on moving forward with these proposals, it must fully disclose all of the harms to public health and the environment that would result from these ill-conceived projects. A full and honest evaluation of these harms will demonstrate clearly that these projects should be rejected.

As a young person in California concerned about the environment and public health, I urge you to prioritize the climate and your community over false climate solutions. My generation and frontline communities deserve a livable future, which starts with renewable energy, NOT biofuels.
While each project is distinct, the draft Environmental Impact Reports (EIR) for both projects (File No. LP20–2040 and File No. CDLP20-02046) are inadequate for similar reasons.

First, the assumption that the transition projects will reduce pollution is unsupported. Both EIRs improperly compare the pollution of a biofuel refinery to an oil refinery operating at historic levels. However, the Marathon refinery is currently shut down and there is no plausible way the Phillips 66 refinery can continue refining crude at its historic capacity, especially when it shuts down its Santa Maria refinery. The proper alternative to a biofuel refinery would be no refinery in the case of Martinez, and greatly reduced or no refining in the case of Rodeo. Under the proper comparison, it would be clear that transitioning to biofuels could only increase pollution from current or projected levels in both communities. 1

A full analysis would also demonstrate that continuing to approve such carbon-intensive projects is inconsistent with California's goals for reducing greenhouse gas emissions.
In addition, neither report adequately considers the harms of massively increasing use of food crops as biofuel feedstock. The Marathon and Phillips 66 refinery transitions combined could use up huge amounts of the nation's entire supply of soybean oil. The environmental impacts, like habitat destroyed to meet more soybean demand, have not been properly considered in either EIR. 2

Furthermore, neither EIR considers the consequences of biofuel refining on public safety, such as potential increased flaring, which will have harmful impacts on my health and my community's health. 3 And neither EIR meaningfully acknowledges the fact that these two very similar refinery transition projects are being proposed simultaneously in the County, in addition to the nearby oil refineries still in operation. These EIRs therefore fail to adequately assess the cumulative impacts both refinery transitions will have on the entire County. 4
For these reasons, both draft EIRs are inadequate and a more accurate and thorough assessment should be carried out. Moreover, an EIR that fully analyzed and addressed these grave potential harms would almost certainly conclude that the refineries will prolong both the Martinez and Rodeo communities' exposure to pollution, undermine the state's climate goals, and wreak havoc with major changes to land use and food crops. I urge you, therefore, to reject biofuels as a false climate solution and instead facilitate a just transition to an energy system that protects workers and does not cost the health and wellbeing of frontline communities in California and beyond. 5
Best regards,

Lilly Datnow
they/she (https://www.mypronouns.org/)
(415) 250-7132

1

Response to Comment 1

Refer to Master Response No. 1, CEQA Baseline and Master Response No. 2 CEQA Alternatives.

Response to Comment 2

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 6, Purpose of Project.

Response to Comment 3

Refer to Master Response No. 5, Renewable Fuel Processing.

Response to Comment 4

Refer to Master Response No. 3, Cumulative Impacts.

Response to Comment 5

The County disagrees with the comment. Refer to Master Response No. 4, Land Use and Feedstocks.

Comment Letter 59A. Davidson, Charles

COMMENT LETTER: 59A

Gary Kupp

From: Charles Davidson <charlesdavidson@me.com>
Sent: Friday, December 3, 2021 10:56 AM
To: Gary Kupp; matt.kaufmann@cchealth.org
Subject: Nustar Soybean Oil Project from CC County Planner and ISO 84-63 per the Rodeo Renewed Project

Subject: Nustar Soybean Oil Project from CC County Planner and ISO 84-63 per the Rodeo Renewed Project

To: Gary Kupp, CC County DCD
Matt Kaufmann, Hazardous Materials Director

Hello Gary and Matt,

Greetings.

I am sending this letter to both of you, as you are both involved with the permitting of aspects of the the Phillips 66 renewable diesel project and also because Gary's response to me about the Nustar Soybean Oil Project referred to the County Industrial Safety Ordinance 84-63. My comments below are neither for or against the project, but about the County's permitting process as it has so far progressed, which I have contentions with and which are described below regarding both of your agencies.

Arguing for a ministerial approval, Gary, you stated in your email to me, that "the Nustar Soybean Oil Project, which is a stand-alone project [is] not related to the Rodeo Renewed refinery conversion currently under review". According to the August 9th 2021 Argus article: California refinery conversions face skepticism, the Phillips 66 refinery has "reached 8,000 b/d of renewable diesel output in July at its 120,000 b/d at its Rodeo refinery". As you state in your email, the project's new railroad loading dock is directly connected to the Phillips 66 tank by a new pipeline and that is then connected to hydrotreater Unit 250. This strongly arguing against your point that the Nustar Soybean Oil Project is not related to the Rodeo Renewed refinery conversion, but is clear evidence that it is a piecemealed project of the larger Rodeo renewed Project. Obviously, piecemealing of two or more related projects is not allowable under CEQA. 1

Gary, you also state that the project was reviewed by the Department of Conservation and Development and the county's Hazardous Materials Program staff for compliance with Ordinance Code, Chapter 84-63 entitled "Land Use Permits for Development Projects Involving Hazardous Waste or Hazardous Materials". The divisions' conclusion was that the project was not a "change-in-risk project, with a higher hazard category and which use will result in a hazard score higher than the hazard score of the previous use. (Ords. 98-48 § 5, 96-50, 96-20)".

However, soybean oil is a triglyceride which has six oxygen atoms, three of which bond glycerol to three fatty acids (which will become the three renewable diesel molecules after hydrodeoxygenation). Most importantly, petroleum oil does not contain any oxygen. The three other oxygen atoms are released from the fatty acids upon decarbonylation.These triglyceride oxygen removal processes would occur within the hydrocracker at between 350-450 degrees Centigrade (approximately 650-850 degrees Fahrenheit) and possibly up to 200 atmospheres, maximum (according to Catalysts for Hydrogenations, Dehydrogenations and Metathesis. Guido Busca, in Heterogeneous Catalytic Materials, 2014. 10.2.5 Hydrocracking catalyst) 2

My point in bringing up these details is that hydrocracking triglycerides occurs in an environment rich in oxygen (approximately 11% by weight of the triglyceride feedstock), which is not present within the hydrocracker when hydrocracking petroleum oil. Moreover, the glycerol portion of the triglyceride become hydrogenated and converted to propane gas, (becoming approximately 6% by weight of the triglyceride feedstock) which is also not present to any appreciable degree in petroleum hydrocracking.

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Thus, triglyceride hydrocracking (of any fat, oil or grease) is a high-temperature and high-pressure hydrogen environment rich in both oxygen and propane and this confluence appears as a potential higher risk project compared to hydrocracking petroleum oils and possibly is in contrast to Hazardous Materials determination of decreased risk.

Specifically, catalytic hydrocracking is primarily a *hydrogen-driven exothermic reaction* (whether using either petroleum oils or triglycerides). In view of the over 100 petroleum-related flaring incidents which have occurred at both the Phillips 66 and the Marathon/Tesoro refineries since 2010, the risk of hydrogen-driven runaway reactions and flaring would seem to increase, not decrease during triglyceride hydrocracking. Moreover, the Phillips 66 project will require nearly twice the amount of hydrogen per gallon, due to a nearly one-third increase in hydrogen production from Air Liquide and Unit 110, combined with a one-third decrease in refinery throughput (Attachment A, Table 15 and Table 1, respectively). Thus, Air Liquide may also be more prone to major upsets, as have occurred in the past, while flaring and hydrocracker hydrogen quenching are two methods used to prevent yet more dangerous situations. 2 cont'd

Finally, in the words of the Industrial Safety Ordinance and the meaning of the ISO 84-63 for a Change-of Risk Project, the feedstock substance cannot be separated from the processing of that substance, which states: "which use will result in a hazard score higher than the hazard score of the previous use." (1)

As my concern regards a potential public safety issue for what would be the largest renewable diesel project in the world at Phillips 66, which would be novel in scale, I would therefore like to personally review the hydrocracker technical analysis of the Hazardous Materials program at the earliest possible date, for CEQA comment purposes (and for Marathon as well). 3

Sincerely,

Charles Davidson
Hercules CA

1) Per: 84-63.406 Change-in-risk project.
A "change-in-risk project" means a new use of an existing building, structure, or facility, not involving construction other than minor alterations, which use will involve a hazardous material or hazardous waste in a higher hazard category and which use will result in a hazard score higher than the hazard score of the previous use. (Ords. 98-48 § 5, 96-50, 96-20).

From: Gary Kupp <Gary.Kupp@dcd.cccounty.us>
Subject: FW: Phillips 66 Construction BRAND NEW Rodeo Renewed (Diesel) Loading rack on - AND With or without permit ???
- Note new or planned pipeline from Phillips 66
Date: December 2, 2020 at 9:32:58 AM PST
To: Charles Davidson <charlesdavidson@me.com>

Dear Mr. Davidson:
Thank you for reaching out. The project you are seeing is not associated with the proposed Phillips 66 Rodeo Renewed refinery conversion, which is currently under review with an EIR is still being prepared. Nor have any construction permits been issued for that project.

The project you are referring to appears to be the Nustar Soybean Oil Project, which is a stand-alone project not related to the Rodeo Renewed refinery conversion currently under review. The project will install an approximately 2300-foot pipeline from Nustar to Phillips 66 to carry pretreated soybean oil feedstock to existing tankage and the Unit 250 diesel hydrotreater at the Phillips 66 refinery, which can already produce diesel from both renewable and crude feedstocks (see attached site plan). The

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soybean feedstock will be unloaded at existing Nustar rail facilities which will be modified with 33 offload headers to accommodate the soybean oil.

The project was reviewed by the Department of Conservation and Development and the county's Hazardous Materials Program staff for compliance with Ordinance Code, Chapter 84-63 entitled "Land Use Permits for Development Projects Involving Hazardous Waste or Hazardous Materials". The ordinance requires a land use permit for projects that propose a "change in risk". A change-in-risk project is one that will involve the use of hazardous materials or hazardous waste of a higher hazard category than the existing use. The attached safety data sheet indicates that pretreated soybean oil is not classified as a hazardous material nor does it meet the criteria of a hazardous waste. As such, it was determined that the modifications proposed by Nustar would not require a land use permit. The appropriate building permits have been issued.

Please let me know if you have any questions.

--

From: Charles Davidson <charlesdavidson@me.com>
Sent: Monday, November 30, 2020 2:44 PM
To: Gary Kupp <Gary.Kupp@dcd.cccounty.us>
Cc: Charles Davidson <charlesdavidson@me.com>
Subject: Phillips 66 Construction BRAND NEW Rodeo Renewed (Diesel) Loading rack on - AND With or without permit ??? - Note new or planned pipeline from Phillips 66

From: Charles Davidson <charlesdavidson@me.com>
Subject: Phillips 66 Construction BRAND NEW Rodeo Renewed (Diesel) Loading rack on - AND With or without permit ??? - Note new or planned pipeline from Phillips 66

Gary, Greetings.

My name is Charles Davidson, I am an incoming director on the Rodeo-Hercules Fire Protection District board of directors.

Several constituents have asked me if the newly constructed railroad loading apparatus/dock adjacent to Selby Slag has a permit from the County, as the Rodeo Renewed Project has not yet actually been approved by CC County. If there is such a permit or agreement between Phillips 66 and the County, please let me know, as soon as possible.

Also, since either at or near that recent consruction are three adjacent corporate boundaries, ie, Phillips 66, Nustar and the SL Corporation, a public-private corporation formed between the State Lands Commission and Phillips 66 (which is in charge of Selby Slag). So please let me know exactly who is the owner of that site and if another entity other than Phillips 66 has a permit for that newly constructed loading dock. For example, the only other agency which has construction jurisdiction over refinery activities is BAAQMD. I you do not know, also please let me know. Thank you very much.

Sincerely, Charles Davidson RHFPD-director elect (510) 837-8441

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Response to Comment 1

Refer to Master Response No. 7, Project Description– Piecemealing.

Response to Comment 2

Refer to Master Response No. 5, Renewable Fuel Processing.

Response to Comment 3

The Draft EIR address hazards and hazardous materials related to feedstock in Section 4.9, Hazards and Hazardous Materials, as well as human health risk in Section 4.3, Air Quality. Regarding review of Phillips 66 Hazardous Materials program, any information available for public review can be found at the County Department of Conservation and Development.

Comment Letter 59B. Davidson, Charles

COMMENT LETTER: 59B

Gary Kupp

From:	Charles Davidson <charlesdavidson@me.com>
Sent:	Friday, December 17, 2021 4:01 PM
To:	Gary Kupp
Subject:	Re: Phillips 66 Rodeo Biofuels Project, File No. CDLP20-02040
Attachments:	Phillips 66 DEIR FINAL gary.kupp@dcd.cccounty.us Re- Phillips 66 Rodeo Biofuels Project, File No. CDLP20-02040 .docx

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Via electronic mail (gary.kupp@dcd.cccounty.us)

December 17, 2021

Via Email

Attn: Gary Kupp, Senior Planner
Contra Costa County
Department of Conservation and Development
Community Development Division
30 Muir Rd.
Martinez, CA 94553
gary.kupp@dcd.cccounty.us

Re: Phillips 66 Rodeo Biofuels Project, File No. CDLP20-02040

To the Department of Conservation and Development:

SUMMARY

A. In order for the Philips 66 San Francisco Refinery in Rodeo to produce each barrel of hydrogenated biodiesel, also known as "renewable diesel", the proposed Rodeo Renewed Project is actually a very high CO2 greenhouse gas generating project, not a low GHG Project as proposed.

Making biodiesel from hydrocracking triglyceride plant oils and animal fats using high-pressure hydrogen (at high temperatures) is approximately as high in carbon intensity as hydrocracking the heaviest crude oils, such as Canadian tar sands oil or Kern County crude oils, on a per barrel basis. 1

Currently, pre-project, the Phillips 66 is one of the heaviest crude capable refineries in the United States, with a Nelson Complexity Index of 13.3, which is very high for a larger, mid-size refinery. Heavy crude oil processing refineries produce the most CO2 greenhouse gasses and require large amounts of refinery-made hydrogen for cracking large molecules and removing sulfur. (1) The Rodeo Renewed Project's "Renewable Diesel is also referred to as hydro-processed esters and fatty acids (HEFA) and requires the use of a hydrocracker unit and a large supply of hydrogen gas to hydrocrack triglycerides, i.e., vegetable oils and animal fats.

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Importantly, although Phillips 66 will be processing two-thirds as much biodiesel feedstock as the amount of petroleum oil feedstock before their conversion (i.e., 80,000 vs 120,000 barrels a day), the refinery intends to operate their principle, large fossil fuel hydrogen plant (Air Liquide) at approximately one-third higher capacity utilization (93.26 mmscf/d versus 120 mmscf/d). (2) The combination of these two effects (decreased throughput and increased hydrogen production) will mean that the Rodeo Renewed Project will potentially result in the production of up to 50% higher CO2-greenhouse gas per gallon of "renewable diesel" produced, compared to their current petroleum refining. 1 cont'd

F. Fats, oils and grease molecules are more complex and far more strongly bonded together than petroleum and harder to crack into "renewable" biodiesel using hydrogen, when compared to petroleum diesel. Safety-wise, making biodiesel from fats, oils and grease (technically triglycerides of the same type that clog your arteries), using high-pressure hydrogen, is altogether different and potentially *less safe* than hydrocracking petroleum. This is because fats, oils and greases are strongly bonded together with oxygen, (composed of approximately 11% by weight for renewable diesel feedstock) which is *not* present during petroleum hydrocracking. Because hydrocracking is an exothermic reaction (producing more heat than put in), this will lead to more flaring and increase the risk of explosivity. Especially because of the massive scale of the Rodeo Renewed Project, consequences of this potential and novel threat by a refinery to public and worker safety needs to be considered in the DEIR. The Rodeo Renewed Projects use of the hydrocracker should be evaluated by the County's Hazardous Materials Program staff for compliance with Industrial Safety Ordinance Code, Chapter 84-63 entitled "Land Use Permits for Development Projects Involving Hazardous Waste or Hazardous Materials". (3) 2

H. As described in a recent technical report: Causal analysis reports for significant flaring show that hydrogen-related hazard incidents occurred at [the Phillips 66 Rodeo and Marathon Martinez] refineries a combined total of 100 times from January 2010 through December 2020 and sudden unplanned or emergency shutdowns of major hydro-conversion of hydrogen production plants occurred in 84 of these 100 reported safety hazard incidents. There was also the Jan. 21, 1997 Tosco Martinez (now Marathon) hydrocracker explosion which killed one worker and injured 24. (4,5)

Regarding risk, it should be considered that the Rodeo Renewed Project's exothermic hydrocracker operation will contain 11% oxygen by weight not present during petroleum hydrocracking. Therefore, because for this reason, biofuel hydrocracking will increase the likelihood of refinery flaring, potentially to a significant degree and also present a risk of explosivity, the Contra Costa County Industrial Safety Ordinance, section ISO 84-63 should declare the project a Change-in-Risk project, as opposed to the Nustar Soybean Oil Project having been granted a building permit, i.e., a land use Permit. 3

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In contrast for a conservative approach of permit denial and as justification of a ministerial permit without CEQA review, Contra Costa County planner Gary Kupp, and accounting for the county's Hazardous Materials Program staff's decision for compliance with Ordinance Code, Chapter 84-63):

The project was reviewed by the Department of Conservation and Development and the county's Hazardous Materials Program staff for compliance with Ordinance Code, Chapter 84-63 entitled "Land Use Permits for Development Projects Involving Hazardous Waste or Hazardous Materials". The ordinance requires a land use permit for projects that propose a "change in risk". A change-in-risk project is one that will involve the use of hazardous materials or hazardous waste of a higher hazard category than the existing use. The attached safety data sheet indicates that pretreated soybean oil is not classified as a hazardous material nor does it meet the criteria of a hazardous waste. As such, it was determined that the modifications proposed by Nustar would not require a land use permit. The appropriate building permits have been issued.

3 cont'd

The Industrial Safety Ordinance declares that for a Change-of Risk Project, the feedstock substance cannot be separated from the processing of that substance and does not merely consider the risk of the raw, unprocessed feedstock substance. Therefore, in contrast to the County's no hazard determination, it is sclearly tated in section ISO 84-63 that a substance will obtain a Change-of Risk score when its: "*use* will result in a hazard score higher than the hazard score of the previous use." Here the operative word is the particular potentially hazardous manner of the "use" of soybean oil delivered to the Nustar Railroad loading dock.

B. At only 57 gallons of soy oil produced per acre of soybeans planted, if the refinery were to operate *entirely* on 1.22 billion gallons of soybean oil per year (or 80,000 barrels of oil per day), then 33,442 square miles of farmland or forest lands will be required to be converted from food to fuels production. With nearby Marathon and other U.S. and global refiners now also entering the renewable diesel business, the animal fat market will become increasingly competitive and therefore much more constrained at the biorefinery level. Maximizing the U.S and global land-use of vegetable oil feedstock for refinery biofuel sourcing will, consequently, raise the cost of a diverse range of foodstuffs and likely promote tropical deforestation. The consequences of this massive food-to-fuel conversion needs to be considered in the DEIR. 4

C. The Phillips 66 Refinery's biofuels operational feasibility is entirely dependent on government credits and financial incentives, i.e., California Low Carbon Fuel Standards and Federal 5

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Renewable Investment and Blenders Tax Credits, which are essentially subsidies of up to $3.32 according to Stratas Advisers.(7)

Contradicting the refinery's claims of low carbon-intensity for Renewable Diesel, the vast scale of global planned refinery conversions to biofuels production (with the Phillips 66 Refinery being the world's largest producer) will significantly increase the carbon intensity of vegetable oil-derived biofuels well above previous assumptions based upon only small-scale operations. The eventual industry-wide increase the biofuel carbon intensity, on a well-to-tank basis, will be due to resource constraints related to land-use and supply limitations. The full range of economic consequences of this governmental subsidization needs to be considered in the DEIR.

5 cont'd

D. The Phillips 66 Rodeo Renewed Project's physical connection to the Nustar Soybean Oil Project did not undergo CEQA review, only a ministerial review, based upon Contra Costa County's assertion that the two projects are unrelated and entirely separate projects (communicated to me by email from the County planner Gary Kupp on Dec. 2nd 2020 and Dec. 3, 2021). However, clear facts about the Nustar Soybean Oil Project indicate that it is a piecemealed project of the Phillip 66 Rodeo Renewed Project, to which its railroad loading dock for biofuels feedstock is physically connected to by a project-critical 2,300 foot pipeline to Phillips 66's tank and the Unit 250 hydrotreater. Instead of the current positions by Contra Costa County, Nustar and the Phillips 66 refinery that the two projects are unrelated, the Nustar Project should not be considered as a separate, "stand-alone" project (as asserted by the County), but rather, should become an integral part of the Phillips 66 Rodeo Renewed Project Draft Environmental Impact Report Environmental Impact Report. The consequences of this omission needs to be considered in the DEIR.(8)

6

H. According to Contra Costa County planner Gary Kupp (in a Dec. 3, 2021 email to me), the Nustar Soybean Oil Project was reviewed by the Department of Conservation and Development and the county's Hazardous Materials Program staff for compliance with Ordinance Code, Chapter 84-63 entitled "Land Use Permits for Development Projects Involving Hazardous Waste or Hazardous Materials". The ordinance requires a land use permit for projects that propose a "change in risk". A change-in-risk project is one that will involve the use of hazardous materials or hazardous waste of a higher hazard category than the existing use. The attached safety data sheet indicates that pretreated soybean oil is not classified as a hazardous material nor does it meet the criteria of a hazardous waste. As such, it was determined that the modifications proposed by Nustar would not require a land use permit. The appropriate building permits have been issued.

However, in the words of the Industrial Safety Ordinance and in a more careful reading of the ISO 84-63 for a Change-of Risk Project, the feedstock substance cannot be separated from

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the processing of that substance, which states: "which *use* will result in a hazard score higher than the hazard score of the previous use." 6 cont'd

G. Although the refinery claims that they won't be refining petroleum crude oil, they now want to retain the capacity to process extremely dirty petroleum waste products, specifically Fluid Catalytic Cracker "slurry oil", within their Delayed Coker, for which they intend to retain the operating permit. They have stated exactly this in both their public forum on May 25th 2021 and in email, when asked about the reason for not decommissioning their Delayed Coker in their Rodeo Renewed Project (please see the image of the email attachment from Phillips 66 employee NW-L). The "FCC slurry oil", which would be obtained from other refineries, is a petroleum processing waste product, which is thicker than heavy petroleum crude and also contains much larger amounts of highly toxic heavy metals derived from spent catalyst. This contradiction with the public statement that the refinery would no longer be refining petroleum crude oil is intentionally misleading and therefore, needs to be considered in the DEIR. 7

E. The Phillips 66 Refinery's proposed large Marine Terminal capacity increase in petroleum delivery, up to 131,000 barrels of oil per day, until the 2024 completion of the (supposed low-carbon intensity) Rodeo Renewed Project should not be permitted as a "piggyback" project added onto the functionally-unrelated Rodeo Renewed Project, which is for refinery biofuels production (and the acquisition of California Low Carbon Fuel Standards (LCSF) credits and Federal renewable incentives and tax credits). The consequences of this Marine Terminal petroleum throughput increase needs to be considered within an entirely separate Environmental Impact Report. 8

I. The projected post-project Marine Terminal delivery increase from 80 tanker ships deliveries per year to 20 tankers ships 1 and 90 barges per year to 161 barges should be considered in a separate Environmental Impact Report.

Discussion – Part A: Refinery CO2 Greenhous Gasses

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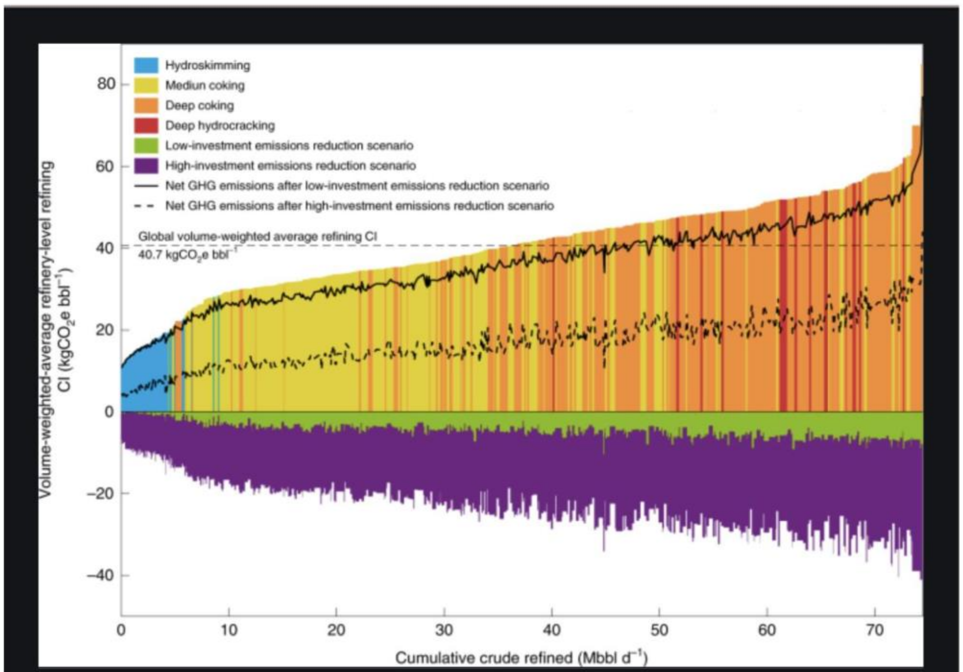
A. The Phillips 66 Refinery's 80,000 barrel per day biofuel feedstock capacity, translates to 29.2 million barrels per year biofuel feedstock capacity. And Total Annual Project Operational CO2e GHG Emissions, is projected to be 2,352,284 MT/Year (Appendix B, Table 4.8-5.).

B. Therefore, the Rodeo Renewed Projects projected kilograms of CO2e per barrel is equal to: 2.35 [10 (6) MT/Yr X 10 (3) KG/MT] / 2.92 [10(7)] barrels per yr = 0.805 X 10 (2) = ~ 0.8 X10 (2) = 80 KG/Barrel CO2e.

C. The global-weighted carbon intensity at crude level is 10.1 – 72.1 kg CO2e/bbl, with a weighted average of 40.7 kgCO2e/kg (Nature. Joule Bergerson) (11)



Nature

Carbon intensity of global crude oil refining and mitigation potential | Nature Climate Change

PATENTED HYDROCRACKER HYDROGEN USAGE FOR AGAEL BIOFUELS REFINING COMPARED TO SOY OIL

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For comparison of algael oil hydrorefining to soy oil and heavy petroleum hydrorefining, a patented algael biofuels protocol was described for hydrocracking, plus hydroisomerization and feedstock hydrotreating, of 80 barrels per day throughput using 245,000 scfd of hydrogen plant H2. The total hydrogen volume required for the described "Integrated Biofuels Refinery" for algael oil is 3,063 scf per barrel, which would place the algael fuel hydrocracker hydrogen consumption at the upper (heavy petroleum) end of the 1,000-3,000 scf per barrel range. Similar large- and small-size algael biofuels hydrorefinery configurations were described in the patent. [Pub.No.:US2010/0297749A1 ARAVANIS et al. METHODS AND SYSTEMS FOR BIOFUEL PRODUCTION. Pub.Date: Nov.25,2010] (12)

ENERGY STAR® Guide: ENERGY STAR is a U.S. Environmental Protection Agency Program for Energy and Plant Managers. February 2015
https://www.energystar.gov/sites/default/files/tools/ENERGY_STAR_Guide_Petroleum_Refineries_20150330.pdf
The principle reactions are similar to a FCC, although with hydrogenation. The reactions are carried out at a temperature of 500-750°F (290-400°C) and increased pressures of 8.3 to 13.8 Bar. The temperature and pressures used
Various designs have been developed and are marketed by a number of licensors in the United States and Western Europe. The hydrocracker consumes energy in the form of fuel, steam and electricity (for compressors and pumps). The hydrocracker also consumes energy indirectly in the form of hydrogen. The hydrogen consumption is between 150 and 300 scf/barrel of feed (27-54 Nm^3/bbl) for hydrotreating and 1000 and 3000 scf /barrel of feed (180-540 Nm^3/bbl) for the total plant (Gary et al., 2007). The hydrogen is produced as by-product of the catalytic reformer, and in dedicated steam reforming plants (see below).

REFERENCES:
1) **Phillips 66 San Francisco Refinery (By the Numbers).**
https://www.phillips66.com/refining/san-francisco-refinery

2) Ramboll - Phillips 66: Rodeo Renewed Project Technical Air Quality Report FINAL; Appendix B. **Stationary Source Table 15: Air Liquide Hydrogen Plant Emissions Summary Phillips 66 Company - San Francisco Refinery Rodeo, CA.**
https://www.contracosta.ca.gov/DocumentCenter/View/72908/Appendix-B--Air-Quality-and-GHG-Emissions-Technical-Data-PDF

3 ISO Chapter 84-63 LAND USE PERMITS FOR DEVELOPMENT PROJECTS INVOLVING HAZARDOUS WASTE OR HAZARDOUS MATERIAL
Article 84-63.2. General https://cchealth.org/hazmat/pdf/iso/land_use_ordinance.pdf

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4) [a. Starting date of the environmentally significant flaring incident, as defined by Bay Area Air Quality Management District Regulation § 12-12-406, which requires causal analysis by refiners: https://www.baaqmd.gov/about-air-quality/research-and-data/flare-data/flare-causal-reports.

5) Refinery Explosion Kills 1, Injures 24 / Fiery blast at Tosco jolts Martinez area. Henry K. Lee. SFGate. Jan. 22, 1997. https://www.sfgate.com/news/article/Refinery-Explosion-Kills-1-Injures-24-Fiery-2857476.php]

6) From: Gary Kupp <Gary.Kupp@dcd.cccounty.us>
Subject: FW: Phillips 66 Construction BRAND NEW Rodeo Renewed (Diesel) Loading rack on - AND With or without permitDate: December 2, 2020 at 9:32:58 AM PST
To: Charles Davidson <charlesdavidson@me.com>

7) From Nikolas Weinberg-Lin to Charles davidson <hcarlesdavidson@RHFD.org> on 7-23-2021

8 Kupp SEE ATTACHMENT BELOW

9 Nik Weinberg-Lin SEE ATTACHMENT BELOW

10 8) Phillips 66' move into biofuels likely to saturate future California demand for renewable diesel. August 14, 2020. https://stratasadvisors.com/insights/2020/08142020-california-rd-update

SANN FRAANCISCO

11) G, Liang, Hassan M. El-Houjeiri, Jean-Christophe Monfort, Adam R. Brandt, Mohammad S. Masnadi, Deborah Gordon, and Joule A. Bergerson. "Carbon intensity of global crude oil refining and mitigation potential." *Nature Climate Change* 10: (2020) 526–532.

12) 1.3 enhancements as per Appendix A in this document. Jessica P. Abella, Dr. Kavan Motazedi, John Guo, Krystin Cousart, Dr. Liang (Liam) Jing, Dr. Joule A. Bergerson. April 16, 2019.

13) Energy Efficiency Improvement and Cost Saving Opportunities for Petroleum Refineries.

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Email: From- Gary Kupp <Gary.Kupp@dcd.cccounty.us> Subject- FW- Phillips 66 Construction BRAND NEW Rodeo Renewed (Diesel) Loading rack on - AND With or without permitDate- December 2, 2020 at 9-32-58 AM PST To- Charles Davidson <charlesdavidson@me.com>

From: Gary Kupp <Gary.Kupp@dcd.cccounty.us>
Subject: FW: Phillips 66 Construction BRAND NEW Rodeo Renewed (Diesel) Loading rack on - AND With or without permit ??? - Note new or planned pipeline from Phillips 66
Date: December 2, 2020 at 9:32:58 AM PST
To: Charles Davidson <charlesdavidson@me.com>

Dear Mr. Davidson:
Thank you for reaching out. The project you are seeing is not associated with the proposed Phillips 66 Rodeo Renewed refinery conversion, which is currently under review with an EIR is still being prepared. Nor have any construction permits been issued for that project.

The project you are referring to appears to be the Nustar Soybean Oil Project, which is a stand-alone project not related to the Rodeo Renewed refinery conversion currently under review. The project will install an approximately 2300-foot pipeline from Nustar to Phillips 66 to carry pretreated soybean oil feedstock to existing tankage and the Unit 250 diesel hydrotreater at the Phillips 66 refinery, which can already produce diesel from both renewable and crude feedstocks (see attached site plan). The soybean feedstock will be unloaded at existing Nustar rail facilities which will be modified with 33 offload headers to accommodate the soybean oil.

The project was reviewed by the Department of Conservation and Development and the county's Hazardous Materials Program staff for compliance with Ordinance Code, Chapter 84-63 entitled "Land Use Permits for Development Projects Involving Hazardous Waste or Hazardous Materials". The ordinance requires a land use permit for projects that propose a "change in risk". A change-in-risk project is one that will involve the use of hazardous materials or hazardous waste of a higher hazard category than the existing use. The attached safety data sheet indicates that pretreated soybean oil is not classified as a hazardous material nor does it meet the criteria of a hazardous waste. As such, it was determined that the modifications proposed by Nustar would not require a land use permit. The appropriate building permits have been issued.

Please let me know if you have any questions.

From Nikolas Weinberg-Lin to Charles davidson <hcarlesdavidson@RHFD.org> on 7-23-2021

WN Weinberg-Lynn, Nikolas <Nik.Weinberg-Lynn@p66.com>
Fri 7/23/2021 3:31 PM
To: Charles Davidson
Cc: Ursino, Adrienne <Adrienne.Ursino@p66.com>; Henry, Aimee <Aimee.M.Henry@p66.com>

Mr. Davidson,
Thanks for your participation in the July 22nd RMAC meeting and questions about the Rodeo Renewed project related to the future use of the Coker. Phillips 66 is retaining the coker permit for a possible future evaluation of producing battery-grade coke at the Rodeo site. Battery-grade coke is a key component in the manufacture of electric vehicle batteries (see graphic below) and Phillips 66 is a major global supplier. Feedstock for the coker would be slurry oil, which would be sourced from a different refinery. Once the Rodeo Renewed project is fully implemented, the Rodeo facility will not be permitted to process crude oil. Emissions from a potentially operating Coker will be accounted for in the EIR.

I appreciate your interest in the project and look forward to further discussion,

Nik Weinberg-Lynn
Manager, Renewable Energy Projects

O: (+1) 510.245.4567 | M: (+1) 310.923.1436
RDO-RM 205 | 1380 San Pablo Avenue | Rodeo, CA 94572

Response to Comment 1

As proposed, the Project would lower facility-wide GHG emissions by about 24,000 MT per year compared to baseline operations. Refer to Table 4.8-5 in the Draft EIR "Annual Project Operational GHG Emissions".

Refer to Master Response No. 5, Renewable Fuel Processing.

Response to Comment 2

Refer to Master Response No. 5, Renewable Fuel Processing.

Response to Comment 3

Refer to Master Response No. 5, Renewable Fuel Processing.

Response to Comment 4

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 5

Refer to Master Response No. 4, Land Use and Feedstocks, and Master Response No. 6, Purpose of Project.

Response to Comment 6

Refer to Master Response No. 7, Project Description– Piecemealing.

Response to Comment 7

The Draft EIR explains the status of retained permits in the Notes to Table 3-3:

> The permits for Unit 267, the Carbon Plant, and Units 236/238 will be relinquished upon startup of the Project. The permits for Unit 244, Unit 200, MP-30, Unit 215 and Unit 228 are being maintained for the possibility of future use, depending on economic and regulatory conditions. Therefore, the potential use of these units has been included as a part of the environmental analysis, and no reductions in emissions have been taken to account for the non-operational status of the units. Any future use of the units would be evaluated in accordance with CEQA and all applicable laws and regulations.

Although Phillips 66 is retaining its permit to operate the Delayed Coker, any use of that equipment in the future is speculative and not part of this Project. Any potential use of that equipment in the future would be evaluated at that time and any permits or approvals necessary would be obtained.

Also refer to Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 8

The Marine Terminal petroleum throughput increase is part of the Project. Therefore, it would be improper to analyze impacts associated with this part of the Project in a different EIR. As described in the Draft EIR (Section 3.11), there is a Transitional Phase evaluated in the Draft EIR. The Draft EIR clearly states the crude and gas oil deliveries during this Transitional Phase would peak at up to 85,000 bpd (12-month rolling average), not "131,000 barrels of oil per day" as described in the comment. The consequences of the Transitional Phase are included in the Draft EIR and a separate EIR would be unnecessary.

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Comment Letter 60. De Martini, Catherine

COMMENT LETTER: 60

December 9, 2021

Gary Kupp Senior Planner Contra Costa County
Department of Conservation and Development
30 Muir Road
Martinez, CA 94553

Dear Mr. Kupp,

I have been a resident of Rodeo for almost twelve years and previously owned small rentals for over forty years at one time. I do have concerns about what will be happening at Phillips 66 if this very large biofuel plant will proceed as planned. 1

What levels of noise will be allowed for community? I've heard that the new project will SMELL like a "rendering plant" I am especially concern about all our residents with particular worry about those many folks who live in the Bayo Vista area. I've heard that Rodeo is near the top with asthma affecting its residents compared to other California towns.

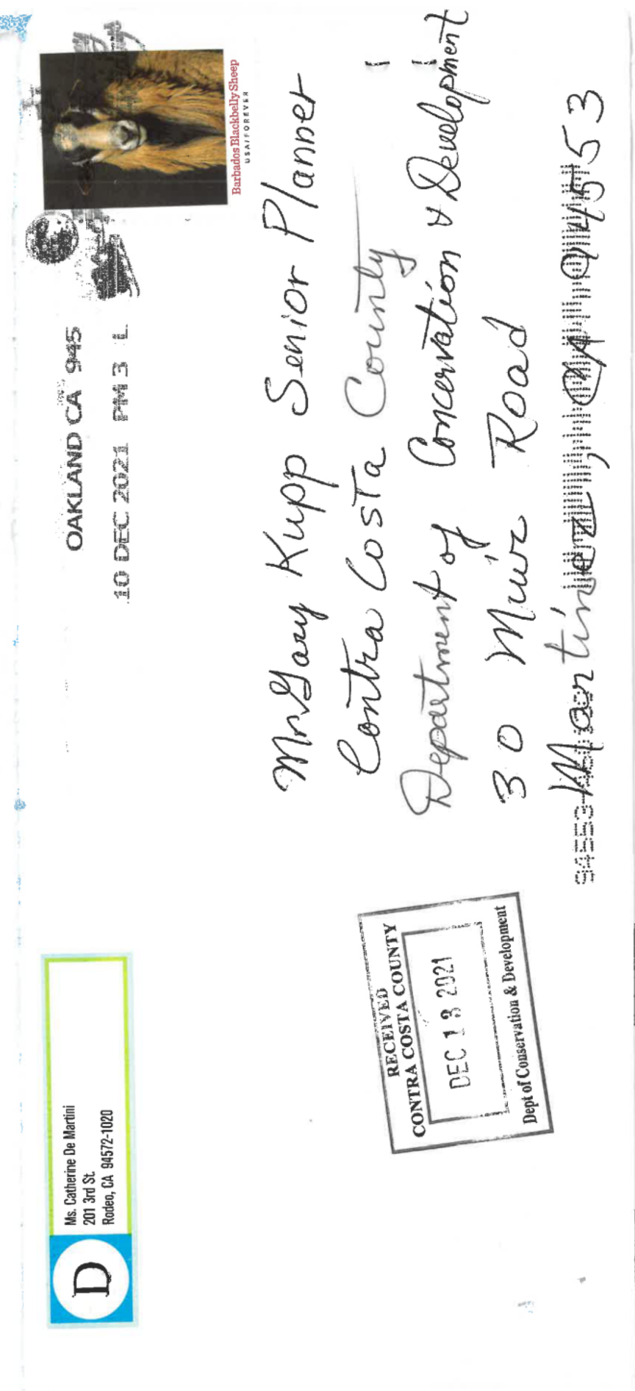
Is it true an impact plan has not been developed yet because this hasn't been done before?. I would hope only a twenty percent usage should be allowed for the first year so we can determine if this is a feasible project to get a go-ahead. The literature suggest using soy products is going to be detrimental to our environment. 2

I would hope a public meeting will address these issues.

Sincerely,

Catherine De Martini
Catherine De Martini
201 Third St.
Rodeo, CA. 94572

COMMENT LETTER: 60



Response to Comment 1

Refer to Table 4.12-3 in the Draft EIR “Land Use Compatibility for Community Noise Environments, dBA”.

Response to Comment 2

See Response to Comment 1-3 and Master Response No. 4, Land Use and Feedstocks.

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Comment Letter 61. Dietzman, John

COMMENT LETTER: 61

Gary Kupp

From: John Dietzman <John.Dietzman.364704628@p2a.co>
Sent: Thursday, December 16, 2021 7:16 PM
To: Gary Kupp
Subject: I Support Rodeo Renewed

Dear Mr. Kupp

I believe the EIR and the permit for the Phillips 66 Rodeo Renewed Project at the Rodeo Refinery should be approved. As a member of the Spokane Regional Clean Air Agency Advisory Committee in the State of Washington, I have been following the EIR process for this project closely. California is leading the way with it's Low Carbon Fuel Standard, and this EIR and permit will be a model for future similar conversions elsewhere in the country. 1

There is interest in renewable fuels in Washington state, and once incentives similar to California's are in place here that make renewable fuels economically attractive to the consumer, the demand will evolve. This demand will catalyze additional production in Washington, and some of the production from the Rodeo project can possibly supply some of that demand.

Although there are questions about how much nationwide production capacity the available volume of renewable feedstock will support, I believe the Rodeo project is one of the facilities that will be among the survivors in the distant future. This is because of the well thought out conversion of the refinery to renewable fuels. This includes a robust pretreatment facility that can handle any available feedstock, a flexible transportation system that can receive it by truck, rail, barge, and tanker from anywhere in the country and the world, a processing system that can reliably convert that feedstock into the highest quality products, a significant reduction in current emissions, and operations without odors or other new environmental impacts.

There are hopes that the rapid electrification of passenger vehicles, light and medium duty trucks, and local mass transit will soon reduce the use of all carbon based fuels, and this raises doubts about the need for construction of significant renewable fuels production capacity, or that by allowing it, the electrification effort might somehow be negatively impacted. Never the less, it is unlikely that it will be practical in the foreseeable future for airplanes, heavy duty long range freight trucks, and freight train locomotives to be totally electrified. So the need for renewable jet fuel and diesel will continue.

In summary, I believe the Rodeo project is well designed to meet the challenges of feedstock procurement and variable feedstock quality and processing requirements. I believe it will be one of the most long term successful conversions to renewable fuels in the country.

I recommend that the EIR and the permit be approved.

Sincerely,
John Dietzman
6607 W Kitsap Dr
Spokane, WA 99208

1

Response to Comment

Comment noted.

Comment Letter 62. Domagalski, Michael

COMMENT LETTER: 62

Gary Kupp

From: Michael Domagalski <michaelryand@gmail.com>
Sent: Sunday, December 12, 2021 1:23 PM
To: Gary Kupp
Subject: Phillips 66 Rodeo oil refinery conversion to biofuel production
Attachments: Phillips Rodeo Letter from M Domagalski.docx

See attached letter from a Port Costa resident.

1

COMMENT LETTER: 62

December 12, 2021

Via email to: Gary.kupp@dcd.cccounty.us

Dear Mr. Kupp,

I'm writing to you concerning the draft EIR for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040). This project will have a potentially enormous impact on our community for years to come. It is therefore critically important that the CEQA review be thorough and accurate, and that the public be involved to the maximum extent possible. I have the following specific concerns about the draft EIR for the project that I would like you to address:

1. BASELINE: The draft EIR basically assumes that if the permit isn't granted Phillips 66 will continue to refine crude oil at historic levels, so that biofuel refining will reduce pollution. But that is not accurate. Phillips 66 has repeatedly said elsewhere that it is planning to shut down its Santa Maria refinery regardless, and that is clearly the case since both its Santa Maria and Rodeo Refineries uniquely rely on landlocked and fast-dwindling crude supplies. (Santa Maria and Rodeo are the two halves of the San Francisco refinery, joined by a pipeline.) So any project emissions are actually a pollution increase. 1

2. LAND USE: The draft EIR does not consider at all impact of a massive increase in use of food crops like soybean oil as a feedstock, which threatens to wreak havoc with land use. Current indications are that the refinery could potentially use up to 40 percent of the nation's entire supply of soybean oil. More environmentally sustainable feedstocks like waste oil are not available in the quantities contemplated by the project. 2

3. PUBLIC SAFETY: I am worried about our safety from the biofuel refining process, and the draft EIR doesn't consider that at all. You have information about the risk that refining biofuels increases the incidence of flaring, but you did not consider it in the draft EIR. I am very concerned by the potential impact of a spike in flaring on my health and that of my neighbors. 3

4. PROJECT ALTERNATIVES: The draft EIR does not evaluate alternatives to the project in a way that makes sense. Most significantly, the County was wrong to reject a green hydrogen alternative for the project when considering that same alternative for the similar Marathon project. 4 5. OPERATING WITHOUT A PERMIT: The Bay Area Air Quality Management District (BAAQMD) is currently investigating whether Phillips 66 violated the law in starting its conversion project before it received a permit. The County should consider whether the previously converted unit (Unit 250) should have been evaluated as part of this project. And it should not issue any permit at all if it is determined that Phillips 66 is acting in violation of the law. 5

6. CUMULATIVE IMPACTS: All of these potential impacts are from just one project. The draft EIR did not make any meaningful effort at all the evaluate the cumulative impacts of the project considered collectively with the impacts of the very similar Marathon Martinez refinery project, being evaluated nearly simultaneously. I ask that this project not move forward until and unless these very serious potential impacts are fully analyzed and addressed. Additionally, given 6

COMMENT LETTER: 62

the enormous import of this project for the community, we believe a public hearing concerning the project and its environmental review would facilitate the purposes and goals of CEQA. We therefore request that you schedule such a hearing as soon as possible. 6 cont'd

Michael Domagalski
135 Prospect Avenue
PO Box 44
Port Costa, CA 94569

Response to Comment 1

Comment noted. Refer to responses to Comment Letter 1 and Master Response No. 1, CEQA Baseline.

Response to Comment 2

Refer to Master Response No. 1, CEQA Baseline and Master Response No. 4, Land Use and Feedstocks.

Response to Comment 3

The Project does not require additional flaring.

Refer to Master Response No. 5. Renewable Fuel Processing.

Response to Comment 4

Refer to Master Response No. 2. CEQA Alternatives.

Response to Comment 5

Refer to Master Response No. 7, Project Description – Piecemealing.

Response to Comment 6

Refer to Master Response No. 3, Cumulative Impacts.

Comment Letter 63. Granett, Ariella

COMMENT LETTER: 63

Gary Kupp

From: Ariella Granett <granett.ariella@gmail.com>
Sent: Friday, December 17, 2021 1:40 PM
To: Gary Kupp
Subject: (File No. LP20–2040) draft EIR Phillips 66 Rodeo oil refinery to biofuel production

Dear Mr. Kupp:

The Phillips 66 Rodeo oil refinery to biofuel production project (File No. LP20–2040) would have a huge impact on neighboring residents and the community at large. The dire climate emergency requires us to drastically cut greenhouse gas emissions. It is not clear that biofuel refining from soybean food crop at Phillips 66 Rodeo would in fact reduce greenhouse gas emissions given the significant impacts of **mono crop farming land use**, **transportation emissions** of the raw stock, the **fossil fuels burned** in the refining process, and the **fossil fuels blended** 50/50 with biofuel at end use. I am concerned that not enough public outreach has been done and request a public hearing be scheduled.

I have the following specific concerns about the draft EIR for the project that I would like you to address:

1. BASELINE: The draft EIR basically assumes that if the permit isn't granted Phillips 66 will continue to refine crude oil at historic levels, so that biofuel refining will reduce pollution. But that is not accurate. Phillips 66 has repeatedly said elsewhere that it is planning to shut down its Santa Maria refinery regardless, and that is clearly the case since both its Santa Maria and Rodeo Refineries uniquely rely on landlocked and fast-dwindling crude supplies. (Santa Maria and Rodeo are the two halves of the San Francisco refinery, joined by a pipeline.) So any project emissions are actually a pollution increase. 1

2. LAND USE: The draft EIR does not consider at all the impact of a massive increase in use of food crops like soybean oil as a feedstock, which threatens to wreak havoc with land use. Current indications are that the refinery could potentially use up to 40 percent of the nation's entire supply of soybean oil. More environmentally sustainable feedstocks like waste oil are not available in the quantities contemplated by the project. 2

3. PUBLIC SAFETY: I am worried about our safety from the biofuel refining process, and the draft EIR doesn't consider that at all. You have information about the risk that refining biofuels increases the incidence of flaring, but you did not consider it in the draft EIR. I am very concerned by the potential impact of a spike in flaring on my health and that of my neighbors. 3

4. PROJECT ALTERNATIVES: The draft EIR does not evaluate alternatives to the project in a way that makes sense. Most significantly, the County was wrong to reject a green hydrogen alternative for the project when considering that same alternative for the similar Marathon project. 4

5. OPERATING WITHOUT A PERMIT: The Bay Area Air Quality Management District (BAAQMD) is currently investigating whether Phillips 66 violated the law in starting its conversion project before it received a permit. The County should consider whether the previously converted unit (Unit 250) should have been evaluated as part of this project. And it should not issue any permit at all if it is determined that Phillips 66 is acting in violation of the law. 5

6. CUMULATIVE IMPACTS: All of these potential impacts are from just one project. The draft EIR did not make any meaningful effort to evaluate the cumulative impacts of the project considered collectively with the impacts of the very similar Marathon Martinez refinery project, being evaluated nearly simultaneously. I ask that this project not move forward until and unless these very serious potential impacts are fully analyzed and addressed. Additionally, given the enormous import of this project for the community, we believe a public hearing concerning the project and its environmental review would facilitate the purposes and goals of CEQA. We therefore request that you schedule such a hearing as soon as possible. 6

1

COMMENT LETTER: 63

Sincerely,

Ariella Granett

Response to Comment 1

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 2

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 3

The Project does not require additional flaring. Refer to Master Response No. 5, Renewable Fuel Processing.

Response to Comment 4

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 5

Refer to Master Response No. 7, Project Description – Piecemealing.

Response to Comment 6

Refer to Master Response No. 3, Cumulative Impacts.

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Comment Letter 64. Pygeorge, Janet

COMMENT LETTER: 64

Gary Kupp

From: Will Nelson
Sent: Friday, November 5, 2021 9:27 AM
To: Gary Kupp
Cc: Lashun Cross
Subject: FW: Envision

I think this is for you, Gary.

-Will

-----Original Message-----
From: JANET PYGEORGE <pypy@sbcglobal.net>
Sent: Friday, November 5, 2021 9:17 AM
To: Will Nelson <Will.Nelson@dcd.cccounty.us>
Subject: Envision

We are so busy with our fight against P66. It's sad, but chemicals will continue. The smell of tallow (dead meat) in P66 recipe.
All Refinerys join together. Chevron sending greasy oil here, Well digging by homes. Nu star blending, haven't a permit for anything. Another pipeline for shell and Chevron. Hydrogen running full blast. Something has to give.!! On top of that Nu star on3 earthquake faults,and p66 sitting on another. 1
Many organization meeting on the 14th. People have the right to know, and comment their fears. Lots of chemical out in the air here. The Refinerys are nuts, snd supervisors think renewable is ok!! God help us!!!
Handing out literature Saturday in Pinole .
Janet Pygeorge Vice President Rodeo Citizens Association

Sent from my iPhone

1

COMMENT LETTER: 64

Gary Kupp

From: JANET PYGEORGE <pypy@sbcglobal.net>
Sent: Friday, November 19, 2021 7:08 PM
To: Gary Kupp
Subject: Re: Nustar Soybean Oil Project from CC County Planner

Thank you Gary. It is life in Contra Costa County unincorporated communities living next to 4 Refinerys. These people have spoke many times at BAAQMD meetings. Let us not forget our friends in Vallejo and Benicia, near Valero refinery.
Janet Pygeorge

Sent from my iPhone

On Nov 19, 2021, at 1:15 PM, Gary Kupp <Gary.Kupp@dcd.cccounty.us> wrote:

Thanks Janet, I will add your comment to the record.

Thanks,
Gary

From: JANET PYGEORGE <pypy@sbcglobal.net>
Sent: Friday, November 19, 2021 11:52 AM
To: Gary Kupp <Gary.Kupp@dcd.cccounty.us>
Subject: Re: Nustar Soybean Oil Project from CC County Planner

Dear Gary
You do not live in Rodeo. You should read statistic the state has listed as health issues in our community, the death rate is high, we are losing a generation born from late50 and 60. These children played outside, and were poisoned by pollution.
I have not checked with other unincorporated community about their illness. But I can imagine it is not good. It seems that we small communities are given the shaft, we are disadvantage, and those who fight for our needs are few. State government has said in print, that we suffer from neglect by county. You and your team are also county, I pray every night that god keeps contra costa citizens safe from pollution. I pray pollution disappears. Citizens in Rodeo have lost love ones. Death caused from living on the fence line of Refineries. Doctors in Walnut Creek are questioning this. Doctors in CCC cities are treating diseases that are not usual. 2

They are on our side. Rodeo citizens do go out of area for Doctors. Physicians ask questions, they know there is a problem with pollution. if any of your staff need a new home, come to Rodeo, we have room. Can't guarantee no pollution, you have to change it. Statistics from state are in the high 80% and 98% cancer, heart disease asthma low birth rate, hospital visit, ground water threats. There is more, this is relative to the state.
The disadvandage citizens in Rodeo Housing are in Harms Way, They are frighten to death. They are disadvantaged people, I am tired of excuses, we have 9 communities without a hospital and no escape route. A earthquake fault under P66, and 3 faults under Nu Star. All these issues scare the hell out Of Rodeo citizens. If you remember, it took contra costa, and the state 22 days before they closed Unocal in 1994. That is criminal, and it is criminal that people are poisoned daily. I have photographs of 3

1

COMMENT LETTER: 64

upsets at P66, and the flames spitting from stacks at refinery and Air liquid, Air L. Should have been fired long ago. Thirty Two years back, after the quake in
San Francisco, CCC came to Rodeo, told us 30 years a possible quake will come to Rodeo, worst than in SF. It has been 32 years, earthquake 3 in San Ramon, one a 3.2. every day they get closer. I recall a planner CCC said," many years he had lived here, and no earthquake ever." There's always a first time!!!!!!
My photos will go with me to the State Government in Sacramento. I suggest your board take the side of no more pollution. If you believe refinery, think again, remember, just in Rodeo, we have lost a generation, and more will die from Refinery pollution. The statistics are published.
At this moment all Refineies are leaking methane, and another chemical daily. This must stop now!!!!!!!!
If a Refinery could make a fuel and, not harm the air, citizens would stamp approval.
JANET PYGEORGE
CITIZENS OF RODEO 74 YEARS

3 cont'd

2

COMMENT LETTER: 64

On Nov 18, 2021, at 5:02 PM, 'Charles Davidson' via refinery-transitions-workgroup <refinery-transitions-workgroup@stand.earth> wrote:

> From: Gary Kupp <Gary.Kupp@dcd.cccounty.us>
> Subject: FW: Phillips 66 Construction BRAND NEW Rodeo Renewed (Diesel) Loading rack on - AND With or without permit ??? - Note new or planned pipeline from Phillips 66
> Date: December 2, 2020 at 9:32:58 AM PST

3

COMMENT LETTER: 64

To: Charles Davidson <charlesdavidson@me.com>

Dear Mr. Davidson:

Thank you for reaching out. The project you are seeing is not associated with the proposed Phillips 66 Rodeo Renewed refinery conversion, which is currently under review with an EIR is still being prepared. Nor have any construction permits been issued for that project.

The project you are referring to appears to be the Nustar Soybean Oil Project, which is a stand-alone project not related to the Rodeo Renewed refinery conversion currently under review. The project will install an approximately 2300-foot pipeline from Nustar to Phillips 66 to carry pretreated soybean oil feedstock to existing tankage and the Unit 250 diesel hydrotreater at the Phillips 66 refinery, which can already produce diesel from both renewable and crude feedstocks (see attached site plan). The soybean feedstock will be unloaded at existing Nustar rail facilities which will be modified with 33 offload headers to accommodate the soybean oil.

The project was reviewed by the Department of Conservation and Development and the county's Hazardous Materials Program staff for compliance with Ordinance Code, Chapter 84-63 entitled "Land Use Permits for Development Projects Involving Hazardous Waste or Hazardous Materials". The ordinance requires a land use permit for projects that propose a "change in risk". A change-in-risk project is one that will involve the use of hazardous materials or hazardous waste of a higher hazard category than the existing use. The attached safety data sheet indicates that pretreated soybean oil is not classified as a hazardous material nor does it meet the criteria of a hazardous waste. As such, it was determined that the modifications proposed by Nustar would not require a land use permit. The appropriate building permits have been issued.

Please let me know if you have any questions.

4

COMMENT LETTER: 64

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To unsubscribe from this group and stop receiving emails from it, send an email to refinery-transitions-workgroup+unsubscribe@stand.earth.
To view this discussion on the web visit https://groups.google.com/a/stand.earth/d/msgid/refinery-transitions-workgroup/113FE521-642D-412F-932C-A64FCD521CC4%40me.com.
For more options, visit https://groups.google.com/a/stand.earth/d/optout.
<image004.png>

From: Charles Davidson <charlesdavidson@me.com>
Sent: Monday, November 30, 2020 2:44 PM
To: Gary Kupp <Gary.Kupp@dcd.cccounty.us>
Cc: Charles Davidson <charlesdavidson@me.com>
Subject: Phillips 66 Construction BRAND NEW Rodeo Renewed (Diesel) Loading rack on - AND With or without permit ??? - Note new or planned pipeline from Phillips 66

From: Charles Davidson <charlesdavidson@me.com>
Subject: Phillips 66 Construction BRAND NEW Rodeo Renewed (Diesel) Loading rack on - AND With or without permit ??? - Note new or planned pipeline from Phillips 66

Gary, Greetings.

My name is Charles Davidson, I am an incoming director on the Rodeo-Hercules Fire Protection District board of directors.

Several constituents have asked me if the newly constructed railroad loading apparatus/dock adjacent to Selby Slag has a permit from the County, as the Rodeo Renewed Project has not yet actually been approved by CC County. If there is such a permit or agreement between Phillips 66 and the County, please let me know, as soon as possible.

Also, since either at or near that recent consruction are

5

COMMENT LETTER: 64

three adjacent corporate boundaries, ie, Phillips 66, Nustar and the SL Corporation, a public-private corporation formed between the State Lands Commission and Phillips 66 (which is in charge of Selby Slag). So please let me know exactly who is the owner of that site and if another entity other than Phillips 66 has a permit for that newly constructed loading dock. For example, the only other agency which has construction jurisdiction over refinery activities is BAAQMD. I you do not know, also please let me know. Thank you very much.

Sincerely, Charles Davidson RHFPD-director elect (510) 837-8441

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<image007.jpeg>

Note Old, but relatively recent Google map satellite image does not show new loading racks upland from the UP RR tracks.

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For more options, visit https://groups.google.com/a/stand.earth/d/optout.
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COMMENT LETTER: 64

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For more options, visit https://groups.google.com/a/stand.earth/d/optout.
<Site Plan.pdf>

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For more options, visit https://groups.google.com/a/stand.earth/d/optout.
<Soy Safety Data Sheet.pdf>

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To view this discussion on the web visit https://groups.google.com/a/stand.earth/d/msgid/refinery-transitions-

7

COMMENT LETTER: 64

workgroup/113FE521-642D-412F-932C-A64FCD521CC4%40me.com.
For more options, visit https://groups.google.com/a/stand.earth/d/optout.

8

Response to Comment 1

Comment noted.

Response to Comment 2

Refer to Draft EIR Section 4.3.7.3 “Health Risk Analysis” and Impact 4.3-4 “Would the Project expose sensitive receptors to substantial pollutant concentrations?”

Response to Comment 3

Comment noted. The Draft EIR addresses inadequate emergency access during construction. Refer to Impact 4.13-1, page 4.13-412 of the Draft EIR. Also refer to the responses to Comment Letters 59A and 59B.

Comment Letter 65. Gray, Richard

COMMENT LETTER: 65

Gary Kupp

From: Richard Gray <richardgraysart@gmail.com>
Sent: Monday, December 13, 2021 5:20 PM
To: Gary Kupp
Subject: Phillips 66 EIR - File No. LP20–2040
Attachments: P-66 EIR Comments.docx

Dear Mr. Kupp,

I have the attached comments on the Draft EIR for Phillips 66.

Richard Gray

1

COMMENT LETTER: 65

Gary Kupp, Contra Costa County Department of Conservation and Development

Dear Mr. Kupp Re: File No. LP20–2040

I have the following comments on the draft EIR for the Phillips 66 conversion to refining biofuels in Rodeo. Not only do I see potential health and life impacts to this overburdened fence line community, but also to California's response to our changing climate and wider impacts on food security worldwide. To fulfil CEQA the following questions must be responded to in the final EIR for this project.

It appears that before the CEQA process has been completed, and lacking a permit from BAAQMD to make changes to its equipment, Phillips 66 has gone ahead, made changes and already begun switching to biofuel feedstock in its operations. It has all too often happened that refineries edge their way into approval for major projects by "piecemealing" or breaking projects into parts, claiming that they don't require permits for minor changes. Contra Costa County had no business approving Unit 250 lacking a permit to operate from the Air District or an approved EIR from the county. This breach of the law by Phillips 66 should be grounds for rejecting the proposal as a whole. 1

Phillips 66 has already made plans to shut down the second half of its refining operation in Santa Maria, CA whether their "Rodeo Renewed" project is approved or not. Since previous operations only cover half of the refining process, the current proposal should be considered as a new project in detailing CEQA environmental impacts. 2

The draft EIR does not include data on the California, national and worldwide impacts of consuming huge quantities of soy or corn oil as feedstock. How can evaluation of impacts possibly be properly analyzed when the refinery claims that data about their feedstock inputs and hydrogen consumption is "CBI" Confidential Business Information? This information must be disclosed to allow proper analysis of environmental impacts. 3

While Phillips 66 claims to be sourcing waste animal fats for its input, this is highly unlikely to amount to a substantial amount because sparse rendered fat commitments have already been gobbled up by other buyers. At full operating capacity Phillips 66 is estimated to consume 40% of all the soy produced in the country at this one refinery, adding enormous pressure to food costs that are bound to create hardship for low income communities worldwide. 4

COMMENT LETTER: 65

Moreover, this pressure on the world market would likely intensify deforestation to make space for growing soybeans and corn, resulting in loss of sequestered carbon to the atmosphere from those forests, plowed and denuded soils, resulting in wholesale severe climate impacts. All these secondary impacts of the project must be detailed and evaluated in the EIR. 4 cont'd

It is inaccurate and disingenuous to claim that pollution resulting from this new project actually reduces impacts on the neighboring community. All emissions should properly be described as an increase in pollution. The full life cycle of carbon released from farming, processing and transportation of soy or corn oils and the carbon released from hydrogen production must be included in evaluation of environmental impacts. The EIR should detail what the likely toxic elements and compounds are that can be expected to be released into the Rodeo community during production, occasional flaring or other incidents. 5

It is my understanding that biofuel refining and hydrogen production for the difficult cracking process may well include adding a portion of crude petroleum or waste from the cracking process at other refineries to the biofuels to facilitate processing. This mixture would contain heavy metals that are dangerous to health, especially for children, in this already overburdened community. Also, although the refinery denies it, there is evidence that the incidence of flaring may be higher resulting from refining biofuels than from refining petroleum crude. This would potentially poison our local communities beyond what they have experienced. An evaluation of this increased threat to health must be included in the EIR. 6

EIRs generally evaluate impacts from not only the subject property but also the cumulative impacts from similar projects existing, planned or likely. In this case Marathon is also proposing to switch to biofuels and Chevron is also discussing doing so for a portion of their operations.

It is my hope that the county will schedule a community meeting specifically on the EIR before bringing it to the board.

Thank you for the opportunity to comment.

Richard Gray

Response to Comment 1

See Response to Comment 49-7 and Master Response No. 7, Project Description- Piecemealing. Also, several Contra Costa County building permits were required and Phillips 66 submitted applications for those permits to the Conservation and Development Department of Contra Costa County. As part of that process the County evaluated the scope of the project and specific construction activities and determined that the application decisions were ministerial and issued the building permits after completing its regulatory and engineering review.

Response to Comment 2

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 3

Refer to Master Response No. 4, Land Use and Feedstocks and Master Response No. 5, Renewable Fuel Processing.

Response to Comment 4

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 5

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 6

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Comment Letter 66. Gunkelman, Jay

COMMENT LETTER: 66

Gary Kupp

From: Jay Gunkelman <qeegjay@sbcglobal.net>
Sent: Thursday, December 16, 2021 6:20 PM
To: Gary Kupp; Contra Costa County Supervisor Federal Glover
Cc: SF BAY SHORELINE CCC
Subject: P66 DEIR comments by Jay Gunkelman
Attachments: DEIR Comments Jay Gunkelman.docx

Mr. Kupp and Supervisor Glover,

Please see the attached word document containing my DEIR comments regarding the P66 DEIR.

I would note that P66 refinery's current ***violation of their land use permit*** is detailed in the comments. The land use violation needs to be addressed promptly, and independently of the DEIR, as well as being addressed within the DEIR response.

Jay Gunkelman
510-688-8298

1

COMMENT LETTER: 66

(Gary.Kupp@dcd.cccounty.us)

Dear Mr. Kupp: 12-16-2021

I'm writing this regarding the DEIR for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040).

This project will have a long-term impact on our community for years to come, thus it is critically important that the CEQA review be thorough and accurate, and that the public be involved to the maximum extent possible. Of particular concern is the impact of air quality on individuals within Contra Costa County for the following reasons:

1. ***PHILLIPS 66 IS IN VIOLOATION OF LAND USE PERMIT NO. 05-2048 CONDITION 46 PARAGRAPH 12 FOR THE MONITORING OF H2S***

   Phillips 66 is currently in violation of the "Memorandum of Understanding Fenceline Monitoring at the Rodeo Refinery" that was signed on April 16, 2012. In this agreement the MOU states on page 5 that Open-path Tunable Diode Laser Systems (TDLS) will be installed along the North and South Fencelines of refinery and the systems will have detection limits for Hydrogen Sulfide gas of 25 parts-per-billion (ppb). Yet, the Air Monitoring Plan submitted by Phillips 66 to the Bay Area Air Quality Management District as required by Regulation 12, Rule 15 (BAAQMD 12-15) states the systems TDLS air monitoring systems currently in operation at the fenceline have detection limits of 300 (ppb). Please acknowledge this discrepancy. I respectively request the DER provide a timeline as to when the Philips 66 fenceline will be brought in compliance with the MOU for the detection and quantification of H2S? Please note that the BAAQMD has identified a vendor that can supply equipment that can meet these detection limits. 1

2. ***PHILLIPS 66 IS IN VIOLOATION OF LAND USE PERMIT NO. 05-2048 CONDITION 46 PARAGRAPH 12 FOR THE MONITORING OF BENZENE, TOLUENE, AND XYLENES***

   The table below shows the detection limits for various gases monitored by the refineries under the BAAQMD Fenceline Rule 12-15. As this data is the latest reported operational capabilities for the fenceline systems, it should be noted that ***<u>the technologies used by Phillips 66 no longer meet the required detection capability stated in the MOU between the refinery, local community groups, and county</u>***. This agreement specifically states the fence-line air monitoring equipment to be operated at detection limits for 5 parts-per-billion (ppb). 2

Table Summarizing Detection Limits (ppb) for Fence-line Air Monitoring Equipment

Gas	Chevron	Valero	Marathon	PBF	Phillips 66

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	Det Lim (ppb)	Det Lim (ppb)	Det Lim (ppb)	Det Lim (ppb)	Det Lim (ppb)
Benzene	0.6	0.2	0.6	0.9	10
Toluene	1.4	2	1.7	1.8	10
Xylene	6.5	12	7.8	1	10

2 cont'd

I respectively request the DER provide a timeline as to when the Philips 66 fenceline will be brought in compliance with the MOU for the detection and quantification of benzene, toluene and xylene at detection limits stated in the MOU.

3. PHILLIPS 66 FENCELINE AIR MONITORING EQUIPMENT IS OBSOLETE

In reviewing the BAAQMD 12-15 air monitoring plans by the five refineries in the Bay Area, Phillips 66 the only refinery to propose and justify using antiquated air monitoring technology to protect the communities impacted by their emissions. As an example, the open-path fenceline systems used by Phillips 66 are over 10 years old and have much higher detection limits than other refineries. Many of the air monitors used by Phillips 66 are no longer sold by the vendors who supplied the equipment, effectively rendering them obsolete. I respectively request the DER provide a timeline as to when the Philips 66 fenceline will be required to replace their obsolete air monitoring equipment with current technology. 3

4. PHILLIPS 66 IGNORES ITS ENVIRONMENTAL IMPACT ON THE COMMUNITY OF RODEO, CALIFORNIA

When Phillips 66 submitted its BAAQMD 12-15 Air Monitoring Plan, it employed arbitrary community impact analysis to exclude the community of Rodeo as part of its fenceline air monitoring system. For this reason, it excluded any type of technology upgrade associated with the BAAQMD 12-15 for the community of Rodeo. 4

I respectively request the DER provide the community of Rodeo with a written guarantee that all fenceline air monitoring equipment installed at the Phillips 66 Rodeo refinery be made consistent with the land use permit and BAAQMD standards.

5. THE FENCELINE AIR MONITORING EQUIPMENT THAT IS CURRENTLY IN PLACE AT PHILLIPS 66 WILL NOT DETECT POLLUTANTS ASSOCIATED WITH RENEWABLE FUELS

The pollutants associated with the feedstock, intermediary and products associated with biofuel production are not detectable with the fenceline technology in place at the refinery. These pollutants include amines, reduced sulfurs, aldehydes and ketones gases. None of these gases are capable of being detected by the current systems at levels that protect the public in a time sensitive manner. I respectively request the DER provide the communities of Rodeo, and Crockett with a written guarantee that all fenceline air 5

COMMENT LETTER: 66

monitoring equipment installed at the Phillips 66 Rodeo refinery address all health impacts including odors associated with any change in refinery activities.

As a result of these identified inadequacies of the current fence line systems and the potential for yet unknown impacts to nearby residents due to the current antiquated systems and change in operation at the Phillips 66 refinery, *I request that at a minimum Phillips 66 be required to meet current requirements of BAAQMD12-15 for other refineries and demonstrate proper operation of its fence line system in a transparent and verifiable way, making all data available to the public on its current website, with an independent third-party audit of the system on at least an annual basis, also released to the public*. 5 cont'd

I also request that all refineries in Contra Costa County meet verifiable minimum detection limits added to their use permit that are achievable with current technologies and cover all potentially emitted compounds that may negatively impact the community. I request the County work with the Bay Area Air Quality Management District to update the requirements of Regulation 12, Rule 15 to produce transparent, verifiable data, including audit results given to the public that covers the measurement of compounds produced not only by traditional refineries, but those producing biofuels and include all fence line systems in its BAAQMD 12-15 Air Monitoring Plan to cover the community of Rodeo. 6

I ask that this project not move forward until and unless these very serious potential impacts are fully analyzed and addressed. Additionally, given the enormous import of this project for the community, I believe a public hearing concerning the project and its environmental review would facilitate the purposes and goals of CEQA. I therefore request that you schedule such a hearing as soon as possible.

Jay Gunkelman

510-688-8298

Response to Comment 1

The fenceline monitoring system satisfies the requirements of both the 2012 MOU and BAAQMD Regulation 12, Rule 15. The MOU from 2012 identified specific pieces of equipment to detect among other things, H2S, and that equipment has been used continuously since 2012. Regulation 12, Rule 15 has different reporting detection levels and these requirements were satisfied with a subset of the 2012 MOU fenceline monitoring system. Nonetheless, the entire fenceline monitoring system has been kept in place, using the same equipment (updated and maintained as appropriate) and is still operating. Phillips 66 will continue to work with the community to implement improved technology and the applicable requirements of the BAAQMD. Phillips 66 meets quarterly with the citizens around the Refinery to discuss the fenceline monitoring system performance and believes the system is in compliance with the 2012 MOU as well as BAAQMD Regulation 12, Rule 15 requirements.

Response to Comment 2

The table data provided does not reflect the minimum detection capability of the instruments. Phillips 66 currently meets the MOU detection limits of 5 ppb for benzene, toluene, and xylene.

Response to Comment 3

Refer to Response to Comment 1 and Response to Comment 1-3.

Response to Comment 4

All monitoring required as part of mitigation or conditions in the permit will be monitored by the County and/or the BAAQMD to ensure compliance.

Refer to Response to Comment 1.

Response to Comment 5

Since no routine flaring is anticipated, and CEQA does not require the analysis of unpredictable or unlikely events, it is appropriate to not include flaring in the HRA. See also Response to Comment 1 and Response to Comment 1-3.

Response to Comment 6

Since no routine flaring is anticipated, and CEQA does not require the analysis of unpredictable or unlikely events, it is appropriate to not include flaring in the HRA.

The comment appears to suggest that the BAAQMD should consider changes to Regulation 12, Rule 15 that regulates fenceline monitoring equipment at all regional refineries, which is not within the scope of the Project. The existing fenceline system while a part of the Rodeo facility, will not be affected by the Project. The facility fenceline monitoring system has been evaluated and approved by the BAAQMD in accordance with Regulation 12, Rule 15 and the associated BAAQMD guidance.

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Comment Letter 67. Hallisy, E.E.

COMMENT LETTER: 67

Gary Kupp

From: EE Hallisy <eehallisy@gmail.com>
Sent: Sunday, December 12, 2021 7:20 PM
To: Gary Kupp
Subject: EIR Comments, Phillips66 Refinery

Gary.Kupp@dcd.cccounty.us

Dear Mr. Kupp:

I'm writing to you concerning the draft EIR for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040).
This project will have a potentially enormous impact on our community for years to come. It is therefore critically important that the CEQA review be thorough and accurate, and that the public be involved to the maximum extent possible.

I have the following specific concerns about the draft EIR for the project that I would like you to address:

1. The draft EIR basically assumes that if the permit isn't granted Phillips 66 will continue to refine crude oil at historic levels, so that biofuel refining will reduce pollution. But that is not accurate. Phillips 66 has repeatedly said elsewhere that it is planning to shut down its Santa Maria refinery regardless, and that is clearly the case since both its Santa Maria and rodeo Refineries uniquely rely on landlocked and fast-dwindling crude supplies. So any project emissions are actually a pollution increase. 1
2. The draft EIR does not consider at all impact of a massive increase in use of food crops like soybean oil as a feedstock, which threatens to wreak havoc with land use. Current indications are that the refinery could potentially use a major fraction of the nation's entire supply of soybean oil. More environmentally sustainable feedstocks like waste oil are not available in the quantities contemplated by the project. 2
3. I am worried about our safety from the biofuel refining process, and the draft EIR doesn't consider that at all. You have information about the risk that refining biofuels increases the incidence of flaring, but you did not consider it in the draft EIR. I am very concerned by the potential impact of a spike in flaring on my health and that of my neighbors. 3
4. The draft EIR does not evaluate alternatives to the project in a way that makes sense. Most significantly, the County was wrong to reject a green hydrogen alternative for the project when considering that same alternative for the similar Marathon project. 4
5. BAAQMD is currently investigating whether Phillips 66 violated the law in starting its conversion project before it received a permit. The County should consider whether the previously converted unit (Unit 250) should have been evaluated as part of this project. And should not issue any permit at all if it is determined that Phillips 66 is acting in violation of the law. 5
6. All of these potential impacts are from just one project. The draft EIR did not make any meaningful effort at all to evaluate the cumulative impacts of the project considered collectively with the impacts of the very similar Marathon Martinez refinery project, being evaluated nearly simultaneously. 6

I ask that this project not move forward until and unless these very serious potential impacts are fully analyzed and addressed. Additionally, given the enormous import of this project for the community, we believe a public hearing concerning the project and its environmental review would facilitate the purposes and goals of CEQA. We therefore request that you schedule such a hearing as soon as possible.

Sincerely,
EE Hallisy

1

Response to Comment 1

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 2

Master Response No. 4, Land Use and Feedstocks.

Response to Comment 3

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 4

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 5

Refer to Master Response No. 7, Project Description – Piecemealing.

Response to Comment 6

Refer to Master Response No. 3, Cumulative Impacts.

Comment Letter 68. Kerridge, Kathy

COMMENT LETTER: 68

Gary Kupp

From: Kathy Kerridge <kathykerridge@gmail.com>
Sent: Friday, December 17, 2021 11:43 AM
To: Gary Kupp
Subject: my comments

Dear Mr. Kupp,
I just submitted comments on the Rodeo Renewed DEIR. My address is 771 West I Street, Benicia, in case you need that. I did not include it in my comment.

Kathy Kerridge

1

COMMENT LETTER: 68

Gary Kupp

From: Kathy Kerridge <kathykerridge@gmail.com>
Sent: Friday, December 17, 2021 11:41 AM
To: Gary Kupp
Subject: Rodeo rewed comments

Comment on Rodeo Renewed Project DEIR, County File No. CDLP20-02040

Dear Mr. Kupp:

I'm writing to you concerning the draft EIR for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040).

This project will have a potentially enormous impact on the bay area and on the worldwide vegetable oil market for years to come. It is therefore critically important that the CEQA review be thorough and accurate, and that the public be as involved as possible.

I have the following specific concerns about the draft EIR for the project that I would like you to address:

1. BASELINE: The draft EIR basically assumes that if the permit isn't granted Phillips 66 will continue to refine crude oil at historic levels, so that biofuel refining will reduce pollution. But that is not accurate. Phillips 66 has repeatedly said elsewhere that it is planning to shut down its Santa Maria refinery regardless, and that is clearly the case since both its Santa Maria and Rodeo Refineries uniquely rely on landlocked and fast-dwindling crude supplies. (Santa Maria and Rodeo are the two halves of the San Francisco refinery, joined by a pipeline.) So, any project emissions are actually a pollution increase. Why is the baseline not zero? 1

2. LAND USE, GREENHOUSE GAS EMISSIONS

The draft EIR does not consider at all the impact of a massive increase in use of food crops like soybean oil as a feedstock, which threatens to wreak havoc with land use. Current indications are that the refinery could potentially use up to 40 percent of the nation's entire supply of soybean oil. More environmentally sustainable feedstocks like waste oil are not available in the quantities contemplated by the project. Why doesn't the DEIR present several different scenarios using different feedstocks in different proportions?

The overall GHG emissions of various feedstocks need to be considered. The GHG emissions of used cooking oil, which has already been processed for a different purpose, will be drastically different that the GHG emissions of oil produced specifically because of this new market. If biodiesel products start using 40% of soy oil the other users of that product will go elsewhere, and it is most likely that they will turn to palm oil. If additional deforestation is caused by increased palm oil production and if peat bogs are burned to provide more land for palm oil production that is a climate bomb. Peat is a valuable carbon sink as are forests and the last thing in the world we want is a massive release of GHGs because of this project and the Marathon project. There is no analysis whatsoever of this possibility. What would the GHG emissions be like if peat bogs, or rainforests were destroyed to produce the oil used for this plant? Is this considered in the CI? It should be. We need to consider all the impacts if the plant ends up using mostly soy oil. 2

3. MITIGATION MEASURE AQ4 3

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COMMENT LETTER: 68

The DEIR states that Phillips will come up with an odor plan. That is not adequate. How can we even comment on a nonexistent plan? What will the plan be, how will it be implemented and how will it be monitored? There should be complete fence line monitors around the entire facility to monitor for emissions that could produce odor. There needs to be a plan to make sure materials are handled in such a way that they do not become rancid. Hydrogen Sulfide emissions would also increase if there is odor. This has detrimental health impacts. Odor could make the surrounding area unlivable. 3 cont'd

4. PUBLIC SAFETY: I am worried about our safety from the biofuel refining process, and the draft EIR doesn't consider that at all. You have information about the risk that refining biofuels increases the incidence of flaring, but you did not consider it in the draft EIR. 4

5. PROJECT ALTERNATIVES: The draft EIR does not evaluate alternatives to the project in a way that makes sense. Most significantly, the County was wrong to reject a green hydrogen alternative for the project when considering that same alternative for the similar Marathon project. There is enough land around the refinery to have enough solar panels to provide renewable power to produce hydrogen. Hydrogen fuel could be used in much of the same way that biodiesel is. The citation for the area used for wind power is over 10 years old. This is a field that is changing rapidly and that should be the most current research. 5

6. OPERATING WITHOUT A PERMIT: The Bay Area Air Quality Management District (BAAQMD) is currently investigating whether Phillips 66 violated the law in starting its conversion project before it received a permit. The County should consider whether the previously converted unit (Unit 250) should have been evaluated as part of this project. And it should not issue any permit at all if it is determined that Phillips 66 is acting in violation of the law. 6

7. CUMULATIVE IMPACTS: All of these potential impacts are from just one project. The draft EIR did not make any meaningful effort at all the evaluate the cumulative impacts of the project considered collectively with the impacts of the very similar Marathon Martinez refinery project, being evaluated nearly simultaneously. 7

I ask that this project not move forward until and unless these very serious potential impacts are fully analyzed and addressed. Additionally, given the enormous import of this project for the community, we believe a public hearing concerning the project and its environmental review would facilitate the purposes and goals of CEQA. We therefore request that you schedule such a hearing as soon as possible.

Kathy Kerridge

2

Response to Comment 1

Refer to Master Response No. 1, CEQA Baseline and Master Response No. 5, Renewable Fuel Processing.

Response to Comment 2

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 3

Refer to Response to Comment 1-3.

Response to Comment 4

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 5

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 6

Refer to Master Response No. 7, Project Description – Piecemealing.

Response to Comment 7

Refer to Master Response No. 3, Cumulative Impacts.

Comment Letter 69. Kirschling, Karen

COMMENT LETTER: 69

Gary Kupp

From: karen kirschling <kumasong@icloud.com>
Sent: Monday, December 13, 2021 7:32 PM
To: Gary Kupp
Subject: Re: Draft EIR for Phillips 66 Refinery oil-to-biofuel conversion

Dear Mr. Kupp:

I am writing to you concerning the draft EIR for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040).

This project will have a potentially enormous impact on our community for years to come. It is therefore critically important that the CEQA review be thorough and accurate, and that the public be involved to the maximum extent possible.

I have the following specific concerns about the draft EIR for the project that I would like you to address:

1. **BASELINE**: The draft EIR basically assumes that if the permit isn't granted Phillips 66 will continue to refine crude oil at historic levels, so that biofuel refining will reduce pollution. But that is not accurate. Phillips 66 has repeatedly said elsewhere that it is planning to shut down its Santa Maria refinery regardless, and that is clearly the case since both its Santa Maria and Rodeo Refineries uniquely rely on landlocked and fast-dwindling crude supplies. (Santa Maria and Rodeo are the two halves of the San Francisco refinery, joined by a pipeline.) So any project emissions are actually a pollution increase. 1
2. **LAND USE**: The draft EIR does not consider at all impact of a massive increase in use of food crops like soybean oil as a feedstock, which threatens to wreak havoc with land use. Current indications are that the refinery could potentially use up to 40 percent of the nation's entire supply of soybean oil. More environmentally sustainable feedstocks like waste oil are not available in the quantities contemplated by the project. 2
3. **PUBLIC SAFETY:** I am worried about our safety from the biofuel refining process, and the draft EIR doesn't consider that at all. You have information about the risk that refining biofuels increases the incidence of flaring, but you did not consider it in the draft EIR. I am very concerned by the potential impact of a spike in flaring on my health and that of my neighbors 3 **PROJECT ALTERNATIVES:** The draft EIR does not evaluate alternatives to the project in a way that makes sense. Most significantly, the County was wrong to reject a green hydrogen alternative for the project when considering that same alternative for the similar Marathon project. 4

4. **OPERATING WITHOUT A PERMIT:** The Bay Area Air Quality Management District (BAAQMD) is currently investigating whether Phillips 66 violated the law in starting its conversion project before it received a permit. The County should consider whether the previously converted unit (Unit 250) should have been evaluated as part of this project. And it should not issue any permit at all if it is determined that Phillips 66 is acting in violation of the law. 5
5. **CUMULATIVE IMPACTS:** All of these potential impacts are from just one project. The draft EIR did not make any meaningful effort at all the evaluate the cumulative impacts of the project considered collectively with the impacts of the very similar Marathon Martinez refinery project, being evaluated nearly simultaneously. 6

I ask that this project not move forward until and unless these very serious potential impacts are fully analyzed and addressed. Additionally, given the enormous import of this project for the community, a public hearing

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concerning the project and its environmental review would facilitate the purposes and goals of CEQA, and I therefore request that you schedule such a hearing as soon as possible.

Sincerely,

Karen Kirschling

San Francisco, CA

2

Response to Comment 1

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 2

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 3

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 4

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 5

Refer to Master Response No. 7, Project Description – Piecemealing.

Response to Comment 6

Refer to Master Response No. 3, Cumulative Impacts.

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Comment Letter 70. Lawrence, Jocelyn

COMMENT LETTER: 70

Gary Kupp

From: Jocelyn Lawrence <jocelynv16@gmail.com>
Sent: Wednesday, December 1, 2021 12:08 PM
To: Gary Kupp
Subject: Phillips 66 Rodeo Renewed Project

Dear Mr. Kupp,

As a resident of Rodeo, it concerns me that Contra Costa County would allow Phillips 66 to invest in new infrastructure that would allow them to refine biofuels at their Rodeo refinery. While less destructive to our environment than refinement of crude oils, the refinement of biofuels will still release unacceptable levels of harmful chemicals upon the residents of Rodeo.

I am currently pregnant, about to give birth next February, and our family was hoping that the cost preventative trends in crude oil refinement would mean that the Rodeo plant would no longer find it affordable to continue operation here, as has occurred at adjacent local refineries. The economic pressures of this region mean that it no longer makes sense to invest in heavy industrial, polluting industries close to where people already make their homes. With very limited affordable housing stock, families like ours are forced to make hard decisions about where they live, and Contra Costa County should do its utmost to alleviate the current housing crisis by protecting human health in all areas where residential neighborhoods exist. 1

Allowing the Phillips 66 refinery in Rodeo to convert to biofuel refinement gives them a financially feasible path to continue to pollute the environment our child will grow up in. We strongly oppose any such project.

thank you for your consideration,

Jocelyn Lawrence Barish
539 Vallejo Ave.
Rodeo, CA 94572

1

Response to Comment

Comment noted.

Refer to Master Response No. 6, Purpose of Project.

Comment Letter 71. Leclaire, Elaine

COMMENT LETTER: 71

Gary Kupp

From: kirk leclaire <kirkleclaire@gmail.com>
Sent: Wednesday, December 8, 2021 6:16 PM
To: Gary Kupp
Subject: Draft EIR comments..

Dear Mr. Kupp:
I'm writing to you about my concerns over the draft EIR for the proposed conversion of Phillips66 Rodeo Oil Refinery to biofuels.
I would like these concerns addressed in the CEQA review with facts and truths. The many people living next to this industry live's depend on this process. A public hearing would be the best way for people to ask questions and receive information.

The first issue I want addressed is odor from this biofuels process. Compost stinks and this is like an enormous belching compost pile on top of us. The air quality will be hugely impacted,so what will Plillips66 do to mitigate this .Bad air can make people very sick. If there are animal supply sources then there can be bacteria airborne we will breath in and be sickened. I want the refinery project to address how they will keep this from happening in a literal and factual way. 1

I would also like addressed why a conversion at all if it has not been done before. If a biofuels refinery is Phillips66 idea of future energy solutions , why not have a real biofuels plant ,not one that is converted with this or that piece of equipment from the existing oil refining equipment . If this has not been done before why do the surrounding communities have to be guinea pigs for this business that seems to care so little for the people who live next to them. Potential explosions from extremely hot units and fires so close to our towns would be deadly. and need to be addressed . Other biofuels companies find and buy similar assets,not conversions of oil refining to biofuel refining. These plants seem to be in the middle of fields too, not highly populated areas. and since not all the fuels are not compatible it would seem that building a new plant with more infrastructure and more buffer space around it somewhere else would be a better option.

Please do not approve this project unless these serious potential impacts are analyzed and answered.

Thank you,
Elaine Wander Leclaire

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Response to Comment

Refer to Response to Comment 1-3 and Master Response No. 6, Purpose of Project.

Comment Letter 72. Mann, Jackie

COMMENT LETTER: 72

Gary Kupp

From: jackie mann <jackiemann@att.net>
Sent: Wednesday, December 15, 2021 3:50 PM
To: Gary Kupp
Subject: Comments Phillips 66 DEIR

Dear Mr. Kupp:
I am submitting comments on the draft EIR for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040).
There should be an immediate public hearing on this project as approval will lock in decades of impacts to the community and environment. Consider these impacts BURNED Deception, Deforestation and America's Biodiesel Policy

Please address the following concerns.
Inaccurate baseline: Decreasing crude production in California may lead to the end of refining at this location. Economic factors may close the refinery. The baseline should consider a no project alternative. This is the preferred alternative for human and environmental health and safety. The project increases pollution over this baseline. 1
Indirect Land Use Change (ILUC) is a significant impact not addressed in the DEIR. The soy feedstock demand cannot be met by used oils or domestic agriculture. Importing soybean oil may contribute to higher food prices, deforestation, and other social and environmental burdens to countries which try to supply soy for fuel. https://theicct.org/blog/staff/us-biofuels-policy-RFS-oct21 2
Health and Safety: There is no published medical information on the health impacts of emissions from refining biofuels. Share medical and scientific data to demonstrate that this is safe. In the past, we were told that petroleum refining was safe for nearby communities. The scientific medical data shows this is false. Demonstrate that there is no risk from high heat refining, flaring, explosions, storage and transportation. **Lack of harmful evidence for a new project is not equivalent a demonstration of safety**. 3
PROJECT ALTERNATIVES: The draft EIR does not evaluate alternatives to the project in a way that makes sense. Most significantly, the County was wrong to reject a **green hydrogen alternative** for the project when considering that same alternative for the similar Marathon project. 4
Violation of the law: OPERATING WITHOUT A PERMIT: The Bay Area Air Quality Management District (BAAQMD) is currently investigating whether Phillips 66 violated the law in starting its conversion project before it received a permit. The County should consider whether the previously converted unit (Unit 250) should have been evaluated as part of this project. And it should not issue any permit at all if it is determined that Phillips 66 is acting in violation of the law. 5
CUMULATIVE IMPACTS: All of these potential impacts are from just one project. The draft EIR did not make any meaningful effort at all the evaluate the cumulative impacts of the project considered collectively with the impacts of the very similar Marathon Martinez refinery project, being evaluated nearly simultaneously. Likewise, Chevron in Richmond may switch to biofuels. I ask that this project not move forward until and unless these very serious potential impacts are fully analyzed and addressed. Additionally, given the enormous import of this project for the 6

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COMMENT LETTER: 72

community, we believe a public hearing concerning the project and its environmental review would facilitate the purposes and goals of CEQA. We therefore request that you schedule such a hearing as soon as possible. 6 cont'd

Elizabeth Jacqueline Garcia
Contra Costa Resident

2

Response to Comment 1

Refer to Master Response No. 1, CEQA Baseline.

Response to Comment 2

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 3

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 4

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 5

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 6

Refer to Master Response No. 3, Cumulative Impacts.

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Comment Letter 73. Masci, Alexandra

COMMENT LETTER: 73

Gary Kupp

From: Alex Masci <alexmasci22@gmail.com>
Sent: Thursday, December 16, 2021 7:01 PM
To: Joseph Lawlor; Gary Kupp
Subject: REJECT Biofuels in Contra Costa County

Dear Mr. Kupp and Mr. Lawlor:

I am a resident of Ventura County and the Bay Area and I'm writing to urge you to reject the proposed refinery transition projects in Rodeo and Martinez, and decommission the county's outdated refinery infrastructure once and for all. If the County insists on moving forward with these proposals, it must fully disclose all of the harms to public health and the environment that would result from these ill-conceived projects. A full and honest evaluation of these harms will demonstrate clearly that these projects should be rejected.

As a young person in California concerned about the environment and public health, I urge you to prioritize the climate and your community over false climate solutions. My generation and frontline communities deserve a livable future, which starts with renewable energy, NOT biofuels.

1

While each project is distinct, the draft Environmental Impact Reports (EIR) for both projects (File No. LP20–2040 and File No. CDLP20-02046) are inadequate for similar reasons.

First, the assumption that the transition projects will reduce pollution is unsupported. Both EIRs improperly compare the pollution of a biofuel refinery to an oil refinery operating at historic levels. However, the Marathon refinery is currently shut down and there is no plausible way the Phillips 66 refinery can continue refining crude at its historic capacity, especially when it shuts down its Santa Maria refinery. The proper alternative to a biofuel refinery would be no refinery in the case of Martinez, and greatly reduced or no refining in the case of Rodeo. Under the proper comparison, it would be clear that transitioning to biofuels could only increase pollution from current or projected levels in both communities.

A full analysis would also demonstrate that continuing to approve such carbon-intensive projects is inconsistent with California's goals for reducing greenhouse gas emissions. 2

In addition, neither report adequately considers the harms of massively increasing use of food crops as biofuel feedstock. The Marathon and Phillips 66 refinery transitions combined could use up huge amounts of the nation's entire supply of soybean oil. The environmental impacts, like habitat destroyed to meet more soybean demand, have not been properly considered in either EIR. 3

1

COMMENT LETTER: 73

Furthermore, neither EIR considers the consequences of biofuel refining on public safety, such as potential increased flaring, which will have harmful impacts on my health and my community's health. And neither EIR meaningfully acknowledges the fact that these two very similar refinery transition projects are being proposed simultaneously in the County, in addition to the nearby oil refineries still in operation. These EIRs therefore fail to adequately assess the cumulative impacts both refinery transitions will have on the entire County. 4 5

For these reasons, both draft EIRs are inadequate and a more accurate and thorough assessment should be carried out. Moreover, an EIR that fully analyzed and addressed these grave potential harms would almost certainly conclude that the refineries will prolong both the Martinez and Rodeo communities' exposure to pollution, undermine the state's climate goals, and wreak havoc with major changes to land use and food crops. I urge you, therefore, to reject biofuels as a false climate solution and instead facilitate a just transition to an energy system that protects workers and does not cost the health and wellbeing of frontline communities in California and beyond.

Best regards,

Alexandra Masci

--
Alex Masci
(she/her/hers)
alexmasci22@gmail.com
805.886.0559

Response to Comment 1

Refer to Master Response No. 1, CEQA Baseline and Master Response No. 2, CEQA Alternatives.

Response to Comment 2

As proposed, the Project would lower facility-wide GHG emissions by about 24,000 MT per year compared to baseline operations. Refer to Table 4.8-5 in the Draft EIR "Annual Project Operational GHG Emissions".

Refer to Master Response No. 5, Renewable Fuel Processing and Master Response No. 6, Purpose of Project.

Response to Comment 3

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 4

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 5

Refer to Master Response No. 3, Cumulative Impacts.

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Comment Letter 74. McElhanon, Lilah

COMMENT LETTER: 74

Gary Kupp

From: Lilah Mcelhanon <lilahchantal28@icloud.com>
Sent: Thursday, December 16, 2021 8:25 PM
To: Gary Kupp
Subject: REJECT Biofuels Refinery in Contra Costa County

I am a resident of Ventura and I'm writing to urge you to reject the proposed refinery transition projects in Rodeo and Martinez, and decommission the county's outdated refinery infrastructure once and for all. If the County insists on moving forward with these proposals, it must fully disclose all of the harms to public health and the environment that would result from these ill-conceived projects. A full and honest evaluation of these harms will demonstrate clearly that these projects should be rejected.

As a young person in California concerned about the environment and public health, I urge you to prioritize the climate and your community over false climate solutions. My generation and frontline communities deserve a livable future, which starts with renewable energy, NOT biofuels. 1

While each project is distinct, the draft Environmental Impact Reports (EIR) for both projects (File No. LP20–2040 and File No. CDLP20-02046) are inadequate for similar reasons.

First, the assumption that the transition projects will reduce pollution is unsupported. Both EIRs improperly compare the pollution of a biofuel refinery to an oil refinery operating at historic levels. However, the Marathon refinery is currently shut down and there is no plausible way the Phillips 66 refinery can continue refining crude at its historic capacity, especially when it shuts down its Santa Maria refinery. The proper alternative to a biofuel refinery would be no refinery in the case of Martinez, and greatly reduced or no refining in the case of Rodeo. Under the proper comparison, it would be clear that transitioning to biofuels could only increase pollution from current or projected levels in both communities.

A full analysis would also demonstrate that continuing to approve such carbon-intensive projects is inconsistent with California's goals for reducing greenhouse gas emissions. 2

In addition, neither report adequately considers the harms of massively increasing use of food crops as biofuel feedstock. The Marathon and Phillips 66 refinery transitions combined could use up huge amounts of the nation's entire supply of soybean oil. The environmental impacts, like habitat destroyed to meet more soybean demand, have not been properly considered in either EIR. 3

1

COMMENT LETTER: 74

Furthermore, neither EIR considers the consequences of biofuel refining on public safety, such as potential increased flaring, which will have harmful impacts on my health and my community's health. 4 And neither EIR meaningfully acknowledges the fact that these two very similar refinery transition projects are being proposed simultaneously in the County, in addition to the nearby oil refineries still in operation. These EIRs therefore fail to adequately assess the cumulative impacts both refinery transitions will have on the entire County. 5

For these reasons, both draft EIRs are inadequate and a more accurate and thorough assessment should be carried out. Moreover, an EIR that fully analyzed and addressed these grave potential harms would almost certainly conclude that the refineries will prolong both the Martinez and Rodeo communities' exposure to pollution, undermine the state's climate goals, and wreak havoc with major changes to land use and food crops. I urge you, therefore, to reject biofuels as a false climate solution and instead facilitate a just transition to an energy system that protects workers and does not cost the health and wellbeing of frontline communities in California and beyond.

Best regards,

Lilah McElhanon

2

Response to Comment 1

Refer to Master Response No. 1, CEQA Baseline and Master Response No. 2, CEQA Alternatives.

Response to Comment 2

As proposed, the Project would lower facility-wide GHG emissions by about 24,000 MT per year compared to baseline operations. Refer to Table 4.8-5 in the Draft EIR "Annual Project Operational GHG Emissions".

Refer to Master Response No. 5, Renewable Fuel Processing and Master Response No. 6, Purpose of Project.

Response to Comment 3

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 4

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 5

Refer to Master Response No. 3. Cumulative Impacts.

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Comment Letter 75. Peyrucain, Nadine

COMMENT LETTER: 75

Gary Kupp

From: Nadine Peyrucain <ngp125@icloud.com>
Sent: Friday, December 17, 2021 2:17 PM
To: Gary Kupp
Subject: Concerns regarding proposed conversion of the Phillips 66 oil refinery to biofuel production

Nadine Peyrucain
105 Silva Ct.
Martinez, CA94553
ngp125@mac.com
925 229-4514

December 17, 2021

Mr. Kupp
gary.Kupp@dcd.cccount.us

Regarding: Phillips 66 Rodeo Oil Refinery in Particular

Dear Mr. Kupp

I'm writing to you concerning the draft EIR for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040).

This project will have a potentially enormous impact on our community for years to come. It is therefore critically important that the CEQA review be thorough and accurate, and that the public be involved to the maximum extent possible.

Concerns:

The draft EIR basically assumes that if the permit isn't granted Phillips 66 will continue to refine crude oil at historic levels, so that biofuel refining will reduce pollution. Is that accurate? I don't believe so. Phillips 66 has said that it was planning to shut down its Santa Maria refinery. Both the Santa Maria and Rodeo Refineries rely on landlocked and fast-dwindling crude supplies. Santa Maria and Rodeo are the two halves of the San Francisco refinery; joined by a pipeline, so this project's emissions would actually be a pollution/ing increase. 1

Neither does the draft EIR consider all impacts of a massive increase in use of food crops like soybean oil as a feedstock since this source threatens to wreak havoc with land use. Look at what is going on in the Amazon; clear cutting to plant soy beans . This must end and current indications are that the refinery could potentially use up to 40 percent of the nation's entire supply of soybean oil. More environmentally sustainable feedstocks like waste oil are not available in the quantities contemplated by the project. So where does that leave us? Is the plan to use animal wastes?I am concerned about the health of the citizens of Rodeo. I have seen a chart that showed elevated illness and disease in Rodeo as compared with surrounding communities. 2

I am concerned about flaring that indicates problems at the refinery and which Phillips 66 has a history of. I also saw a proposal where the Bay Vista neighborhood would be torn down and made part of a safety zone. This isvery troubling-with the housing shortage and the knowledge that many of flats in Bay Vista are empty needing renovation . Many in the community were hoping that with federal funds coming to cities and counties that money would be available for restoration of this neighborhood and be part of he affordable housing that is so needed. If it is torn down for safety reasons where do these people currently living there go? I will end with two things that concern people in Martinez and elsewhere: the smells of the proposed plant depending on which way the wind blows will decrease property value in all areas, including Martinez (besides being potential health risk).This not only hurts individual property owners but also city and county coffers. 3

Lastly: We the people, elect leaders to make decisions that are wise and good for the community and We are all connected along the Carquinez Strait. Please consider the community; we are going into a new era of sustainability and this project, though it appears on the surface to be a healthy fuel production alternative is not. Please don't sell us out.

1

COMMENT LETTER: 75

Sincerely

Nadine Peyrucain

Life-time resident of the Delta Shoreline

2

Response to Comment 1

Refer to Master Response No. 1, CEQA Baseline and Master Response No. 2, CEQA Alternatives.

Response to Comment 2

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 3

The Project does not contain any proposal to tear down the Bayo Vista neighborhood, nor would any such action be required by or related to the Project.

Refer to Master Response No. 5, Renewable Fuel Processing.

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Comment Letter 76. Rieser, Nancy

COMMENT LETTER: 76

Gary Kupp

From: Nancy Rieser <gofindnancy@yahoo.com>
Sent: Friday, December 17, 2021 3:03 PM
To: Gary Kupp
Subject: Public comment P66 Rodeo Renewed Draft EIR (File No. LP20–2040)

Dear Mr. Kupp:

This letter of concern regarding the Draft EIR for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040).

This project will have a potentially enormous impact on the communities of Rodeo and Crockett for years to come. It is vitally important that the CEQA review of this project be as thorough and accurate, and that the public be involved to the maximum extent possible.

I have many concerns about this project.

(1) <u>Contra Costa County must look past the "greenwashing" presentation of this project and recognize that there are huge financial incentives in the form of "Low Carbon Fuel Credits" (LCFs) for a refinery to convert to biofuels that will NOT reduce dangerous emissions.</u> 1

In the case of P66's "Rodeo Renewed" project, these LCF credits:

- Will help monetize P66's oft-stated plans to shut down its sister refinery in Santa Maria.

- **Will not prohibit the use of fossil fuels** during the production of biofuels. P66 will continue to use the slurry waste oil shipped from Chevron's delayed coker units. According to the EIR, those amounts will dramatically increase. Those "spent" waste oils are laden with heavy metals and exist in higher amounts than the levels found in raw crude.

(2) <u>P66 began to use soybean oil 8 months ago (in April 2021)</u>. 2

P66 started processing soybean oil with an *unpermitted* refinery modification.

(3) <u>This project will present health and safety risks that will threaten the communities of Rodeo and Crockett.</u> 3

- The EIR does not acknowledge that there will be a 33% increase in the use of hydrogen during the biofuel refining process. Further, it fails to address that the increased amount of hydrogen – when heated – will be extremely explosive and will endanger the surrounding community.

- The excessive amounts of heavy metals in the slurry (aka "blended" petroleum) are neurotoxins. The heavy metals will negatively affect the neurological development of children who live in Rodeo and the Western edge of Crockett.

- It should be noted: There are several hundred families who live in the Bayo Vista Housing development along the refinery's Southern fence line. In ordinary times, kitchen and bedroom windows of those homes offer front row seats to routine flaring at night;

1

COMMENT LETTER: 76

(4) <u>Contra Costa County has no odor ordinance to prevent Rodeo and the Western portion of Crockett from smelling like a rendering plant.</u> 4

The proposed processing of tallow and animal waste will create profound odors. The smell of rendering animal waste products will be inescapable. When the air that the community breathes takes on the characteristic odor of an animal rendering plant, property values will crash.

The economic security of homeownership in Rodeo and portions of Crockett will be a thing of the past should this biofuel project go forward.

(5) <u>Creating a new, vast soybean "monoculture" at the expense of Mother Nature to create biofuels will be devasting for our planet.</u>

Rainforest ecosystems are some of the most diverse on the planet.

It should be noted that prior to the recent biofuels industry, the American and European food industry, burned vast jungles in Indonesia and elsewhere on the planet and replaced them with Palm Oil plantations. Sadly, it is now predicted that 98% of Indonesia's rainforests will be replaced by Palm Oil plantations by 2050. 5

Experts have also predicted that the P66 Rodeo Renewed biofuel project will most likely sacrifice a portion of the Amazonian rainforest equivalent to the size of the state of Indiana to make way for soybeans crops.

When that happens, the world will, once again, lose a critical carbon regulation system that will leave us with dangerous levels of heat-trapping gases. Our atmosphere will warm even further.

Add to that disaster: Plant and animal species extinction will reduce our access to potential medical breakthroughs, as pharmaceuticals and other medicinal remedies are inspired by the genetics of plants and animals found in rainforests.

(6) <u>The draft EIR does not evaluate alternatives to the project in a way that makes sense.</u> 6

The County needs to revisit the green hydrogen alternative for this project.

(7) <u>Cumulative impacts: All of these potential impacts above are from just one project and ignore a similar project up for review a few miles away</u>.

The draft EIR did not make any meaningful effort at all the evaluate the cumulative impacts of the project considered collectively with the impacts of the very similar Marathon Martinez refinery project, being evaluated nearly simultaneously. 7

This project must not move forward until these very serious potential impacts are fully analyzed and addressed.

In conclusion:

Given the enormous import of this project for the community, we believe a public hearing concerning the project and its environmental review would facilitate the purposes and goals of CEQA.

Respectfully,

Nancy Rieser

444 Alhambra Street

2

COMMENT LETTER: 76

Crockett, CA 945245

510-787-6779

Response to Comment 1

The Project does not propose to use slurry waste oil shipped from Chevron's delayed coker units.

Refer to Master Response No. 5, Renewable Fuel Processing and Master Response No. 6, Purpose of Project.

Response to Comment 2

Refer to Master Response No. 7, Project Description – Piecemealing.

Response to Comment 3

Comment noted. The Draft EIR identifies that health and safety risks are less than significant (refer to Section 4.3, Air Quality, and Section 4.9, Hazards and Hazardous Materials) with the exception of a vessel spill and railcar emissions outside the San Francisco Air Basin.

Refer to Response to Comment 1 above.

See Master Response No. 5, Renewable Fuel Processing.

Response to Comment 4

BAAQMD Regulation 7, Odorous Substances, establishes general limitations on odorous substances and specific emission limitations on certain odorous compounds. This rule applies in Contra Costa County.

Refer to Response to Comment 1-3.

Response to Comment 5

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 6

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 7

Refer to Master Response No. 3, Cumulative Impacts.

Comment Letter 77. Ripee, Kevin (Schultz)

COMMENT LETTER: 77

SCHULTZ
an AEGION company

Schultz Industrial Services, Inc.
175 Industrial Way
Benicia, CA 94510
Tel: 925-316-2901
www.schultzindustrial.com

December 6, 2021

RECEIVED
CONTRA COSTA COUNTY
DEC 9 2021
Dept of Conservation & Development

Contra Costa County Dept. of Conservation &
Development Community: Development Division
30 Muir Road
Martinez, CA 94553

Attention: **Gary Kupp**
Senior Planner

Subject: **Phillips 66 Rodeo Renewed Project**

Dear Gary,

I write to offer my strong support of the Rodeo Renewed project at Phillips 66 Refinery in Rodeo. In response to the Draft EIR, I am submitting this letter to be entered into the administrative record. 1

I am the Senior Vice President of Schultz Industrial Services, a contractor who has worked in Contra Costa County for the past 20 years. Schultz employs 100 - 200 employees in the bay area depending on the time of year and level of activity. Schultz fully embraces the move toward the reuse of renewable sources of energy and supports Phillips 66 Rodeo Refinery plans to convert to the production of renewable fuels. Schultz sees this as a strategic investment in Rodeo while contributing to the social, economic, and environmental well-being of California.

Rodeo Renewed serves the best interests of our employees, and the working men and women of Contra Costa County. The refinery's direct and indirect employment have an economic multiplying effect that impacts the entire Bay Area and California as a whole.

Rodeo Renewed positions Phillips 66 to be a world leader in renewable energy production while preserving family-wage jobs and helping to improve local air quality. This project preserves the livelihood of Phillips 66 employees as well as ours at Schultz.

The future of Phillips 66's Rodeo Refinery directly links to the future of employees at companies like mine and numerous contractors, vendors and the surrounding community – Rodeo Renewed is our future, too.

Therefore, I strongly support Phillips 66 and the Draft EIR and ask that you approve the EIR and the Rodeo Renewed project as soon as possible.

[Publish Date] Confidential

COMMENT LETTER: 77

If there are any questions or if you require any additional information, please contact me at 707.249.4285, or email krippee@aegion.com.

Sincerely,

Kevin Rippee
Sr. Vice President, Operations
Aegion Energy Services

Cc: Honorable Contra Costa County Supervisor Diane Burgis, Chair
Honorable Contra Costa County Supervisor Federal D. Glover, Vice Chair
Honorable Contra Costa County Supervisor John M. Gioia
Honorable Contra Costa County Supervisor Candace Andersen
Honorable Contra Costa County Supervisor Karen Mitchoff

Response to Comment 1

Comment noted.

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Comment Letter 78. Roach, Marti

COMMENT LETTER: 78

Gary Kupp

From: Marti Roach <martiroach@gmail.com>
Sent: Wednesday, December 15, 2021 11:32 AM
To: Gary Kupp
Cc: martiroach@gmail.com
Subject: Phillips 66 Rodeo Renewed Project (File No. LP20–2040) – comments

Gary Kupp

Senior Planner, Contra Costa County

Department of Conservation and Development

Re: Phillips 66 Rodeo Renewed Project (File No. LP20–2040) – comments concerning draft environmental impact report

Dear Mr. Kupp:

As a resident of Contra Costa County, I take strong interest in this project which will establish a huge biofuel refining complex near local Contra Costa communities. The current CEQA does not appear to be thorough. Further, as you know, this is a complex project and a complex process for a significant project in the County and deserves maximum attention to public engagement.

PUBLIC EDUCATION AND INVOLVEMENT. While it may not be legally, technically required, given the scope of this project, this CEQA process should prioritize more public opportunities for comment. At a minimum, there should be one or more publicized town halls or public hearing events in each of the nearby communities of Rodeo, Bayo Vista and Hercules.

More specific to the draft EIR:

BASELINE: The draft EIR, by using 2019 as the baseline year, assumes that if the permit isn't granted, Phillips 66 will continue to refine crude oil at 2019 levels, so that biofuel refining will reduce pollution. Phillips 66 has stated publicly that it intends to shut down the Santa Maria plant regardless of any new biofuel activity, so that should be taken out of the baseline. The draft EIR is basing this baseline on a false assumption of the known future. You cannot claim emissions reductions when it is known that the comparative emissions standard will be lower. This project, it appears, will actually increase emissions, working against California's climate goals. 1

PUBLIC SAFETY: I am worried about our safety from the biofuel refining process, and the draft EIR doesn't consider that at all. You have information about the risk that refining biofuels increases the incidence of flaring, but you did not consider it in the draft EIR related to air pollution, for example. I am very concerned by the potential impact of a spike in flaring on my health and that of my neighbors 2

AIR QUALITY. What most concerns me as a Contra Costan is the draft EIRs inattention to issues of public safety and health. In regard to air quality, it is likely and certainly not ruled out, that there will be an increase in flaring at the Rodeo facility. This type of event not only demonstrates increased risks for public safety, but it also means the release of dangerous pollutants into the air, exposing nearby residents to health risks that were not fully vetted and revealed in the draft EIR. Air monitoring stations alone do not reflect the impact that flaring will have on air quality in communities. 3

1

COMMENT LETTER: 78

Furthermore, the draft EIR shows that shipping the fuel will increase substantially and there is an air pollution health cost with this shipping that was not adequately accounted for. 3 cont'd

This EIR process needs to address these concerns more fully before moving forward. And, as I mentioned above, this process needs to provide more time to hear from the public and engage residents more so that they can learn and weigh in on this significant proposal that will affect their lives for many years to come if it is executed. Please plan for more public hearings or town halls.

Thank you,

Marti Roach
56 Amberwood Court
Moraga, CA 94556

925-376-3853

Response to Comment 1

Refer to Master Response No. 1, CEQA Baseline and Master Response No. 2 CEQA Alternatives.

Response to Comment 2

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 3

CEQA does not require the analysis of unpredictable or unlikely events. Because no routine flaring is anticipated once the Project becomes operational,, it is appropriate to not include flaring in the analysis.

Refer to Master Response No. 5, Renewable Fuel Processing.

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Comment Letter 79. Rosenblum, Stephen

COMMENT LETTER: 79

Gary Kupp

From: pol1@rosenblums.us
Sent: Friday, December 17, 2021 9:09 AM
To: Gary Kupp
Subject: Comments on the draft EIR for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20-2040).

Dear Mr. Kupp:

I'm writing to you concerning the draft EIR for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040).

This project will have a potentially enormous impact on the Bay Area for years to come. It is therefore critically important that the CEQA review be thorough and accurate, and that the public be involved to the maximum extent possible.

I have the following specific concerns about the draft EIR for the project that I would like you to address:

1. The draft EIR basically assumes that if the permit isn't granted Phillips 66 will continue to refine crude oil at historic levels, so that biofuel refining will reduce pollution. But that is not accurate. Phillips 66 has repeatedly said elsewhere that it is planning to shut down its Santa Maria refinery regardless, and that is clearly the case since both its Santa Maria and Rodeo Refineries uniquely rely on landlocked and fast-dwindling crude supplies. So, any project emissions are actually a pollution increase. In this case it would be prudent to recommend a no project alternative that would leave the refinery shut down. 1
2. The draft EIR does not consider at all the impact of a massive increase in use of food crops like soybean oil as a feedstock, which threatens to wreak havoc with land use. Current indications are that the refinery could potentially use up to 40 percent of the nation's entire supply of soybean oil. More environmentally sustainable feedstocks like waste oil and grease are not available in the quantities contemplated by the project. 2
3. I am worried about our safety from the biofuel refining process, and the draft EIR doesn't consider that at all. You have information about the risk that refining biofuels increases the incidence of flaring, but you did not consider it in the draft EIR. I am very concerned by the potential impact of a spike in flaring on my health and that of my neighbors in the Bay Area. This is particularly dangerous as the refinery has not even run pilot scale refining with the new feedstock. This is extremely risky from an engineering and public safety point of view. 3
4. The draft EIR does not evaluate alternatives to the project in a way that makes sense. Most significantly, the County was wrong to reject a green hydrogen alternative for the project when considering that same alternative for the similar Marathon project. The processing of bio-based oils also requires a much larger hydrocracking facility than the crude refined previously because of the need to remove oxygen and replace it with hydrogen. Previously P66 refined 80,000 bbl/day using fossil crude feedstock and proposes reducing output to 48,000 bbl/day using bio-based feedstock while increasing the amount of hydrogen used by 30%. The methane steam reformer will produce more CO_2 per gallon than was the case with fossil petroleum. 4
5. Carbon dioxide and other global warming gasses are agnostic in their effect on climate change. The earth does not care whether or not the gas in the atmosphere comes from a source that has been buried for millennia or has been stored for less than a year. Its residence time in the 5

1

COMMENT LETTER: 79

atmosphere and its effect on radiative forcing is the same. The EIR needs to address the total contribution to global warming from all sources of the project including scopes 1, 2, and 3 emissions. This would need to include, for example, all the carbon emissions associated with growing and transporting soy oil from farm to refinery including tractor fuel, pesticides and herbicides, truck, rail, and ship transport, etc.
Climate change is also a direct health risk to all Californians. Increased flooding and drought, increased wildfire and smoke, are all direct health risks of human caused climate change. The EIR must account for all carbon emissions from this project regardless of the source in order to mitigate these risks. 5 cont'd

6. All of these potential impacts are from just one project. The draft EIR did not make any meaningful effort at all to evaluate the cumulative impacts of the project considered collectively with the impacts of the very similar Marathon Martinez refinery project, being evaluated nearly simultaneously. 6
7. Under California Air Resources Board Advanced Clean Trucks program *"Manufacturers who certify Class 2b-8 chassis or complete vehicles with combustion engines would be required to sell zero-emission trucks as an increasing percentage of their annual California sales from 2024 to 2035. By 2035, zero-emission truck/chassis sales would need to be 55% of Class 2b – 3 truck sales, 75% of Class 4 – 8 straight truck sales, and 40% of truck tractor sales".* Trucks using biodiesel would not be zero emission trucks as they would emit the came amount of CO_2 per mile as a fossil diesel fueled truck. If we are to meet this guideline it makes no sense to allow continued investment in a polluting facility which will likely be shut down in less than a decade. 7

I ask that this project not move forward until and unless these very serious potential impacts are fully analyzed and addressed. Additionally, given the enormous import of this project for the community, I believe a public hearing concerning the project and its environmental review would facilitate the purposes and goals of CEQA. I therefore request that you schedule such a hearing as soon as possible.

Dr., Stephen S., Rosenblum, Ph.D. Chemistry

Palo Alto, Ca

2

Response to Comment 1

Refer to Master Response No. 1, CEQA Baseline and Master Response No. 2, CEQA Alternatives.

Response to Comment 2

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 3

Since no routine flaring is anticipated, and CEQA does not require the analysis of unpredictable or unlikely events, it is appropriate to not include flaring in the analysis.

Refer to Master Response No. 5, Renewable Fuel Processing.

Response to Comment 4

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 5

Master Response No. 4, Land Use and Feedstocks, and Master Response No. 5, Renewable Fuels Processing.

Response to Comment 6

Refer to Master Response No. 3, Cumulative Impacts.

Response to Comment 7

Comment noted.

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Comment Letter 80. Ryan, Victoria

COMMENT LETTER: 80

Gary Kupp

From: Victoria Ryan <victoria4lita@gmail.com>
Sent: Sunday, December 12, 2021 1:03 PM
To: Gary Kupp
Subject: Public Comment regarding EIR for PHillips 66 biofuelproduction

Victoria Ryan

PO Box 0044

Port Costa, CA 94569-0044

December 11, 2021

Via email to : Gary.kupp@dcd.ccccounty.us

Dear Mr. Kupp,

I'm writing to you concerning the draft EIR for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040). This project will have a potentially enormous impact on our community for years to come. It is therefore critically important that the CEQA review be thorough and accurate, and that the public be involved to the maximum extent possible. I have the following specific concerns about the draft EIR for the project that I would like you to address:

1. BASELINE: The draft EIR basically assumes that if the permit isn't granted Phillips 66 will continue to refine crude oil at historic levels, so that biofuel refining will reduce pollution. But that is not accurate. Phillips 66 has repeatedly said elsewhere that it is planning to shut down its Santa Maria refinery regardless, and that is clearly the case since both its Santa Maria and Rodeo Refineries uniquely rely on landlocked and fast-dwindling crude supplies. (Santa Maria and Rodeo are the two halves of the San Francisco refinery, joined by a pipeline.) So any project emissions are actually a pollution increase. 1

2. LAND USE: The draft EIR does not consider at all impact of a massive increase in use of food crops like soybean oil as a feedstock, which threatens to wreak havoc with land use. Current indications are that the refinery could potentially use up to 40 percent of the nation's entire supply of soybean oil. More environmentally sustainable feedstocks like waste oil are not available in the quantities contemplated by the project. 2

3. PUBLIC SAFETY: I am worried about our safety from the biofuel refining process, and the draft EIR doesn't consider that at all. You have information about the risk that refining biofuels increases the incidence of flaring, but you did not consider it in the draft EIR. I am very concerned by the potential impact of a spike in flaring on my health and that of my neighbors. 3

4. PROJECT ALTERNATIVES: The draft EIR does not evaluate alternatives to the project in a way that makes sense. Most significantly, the County was wrong to reject a green hydrogen alternative for the project when considering that same alternative for the similar Marathon project. 4 5. OPERATING WITHOUT A PERMIT: The Bay Area Air Quality Management District (BAAQMD) is currently investigating whether Phillips 66 violated the law in starting its conversion project before it received a permit. The County should consider whether the previously converted unit (Unit 250) should have been evaluated as part of this project. And it should not issue any permit at all if it is determined that Phillips 66 is acting in violation of the law. 5

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6. CUMULATIVE IMPACTS: All of these potential impacts are from just one project. The draft EIR did not make any meaningful effort at all the evaluate the cumulative impacts of the project considered collectively with the impacts of the very similar Marathon Martinez refinery project, being evaluated nearly simultaneously. I ask that this project not move forward until and unless these very serious potential impacts are fully analyzed and addressed. Additionally, given the enormous import of this project for the community, we believe a public hearing concerning the project and its environmental review would facilitate the purposes and goals of CEQA. We therefore request that you schedule such a hearing as soon as possible. 6

Victoria Ryan

135 Prospect Avenue

PO Box 0044

Port Costa, CA 94569

2

COMMENT LETTER: 80

Gary Kupp

From:	Victoria Ryan <victoria4lita@gmail.com>
Sent:	Sunday, December 12, 2021 1:24 PM
To:	Gary Kupp
Subject:	Concern re EIR for proposed conversion of P66 oil refinery to biofuel

December 12, 2021

Via email to: Gary.kupp@dcd.cccounty.us

Dear Mr. Kupp,

I'm writing to you concerning the draft EIR for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040). This project will have a potentially enormous impact on our community for years to come. It is therefore critically important that the CEQA review be thorough and accurate, and that the public be involved to the maximum extent possible. I have the following specific concerns about the draft EIR for the project that I would like you to address:

1. BASELINE: The draft EIR basically assumes that if the permit isn't granted Phillips 66 will continue to refine crude oil at historic levels, so that biofuel refining will reduce pollution. But that is not accurate. Phillips 66 has repeatedly said elsewhere that it is planning to shut down its Santa Maria refinery regardless, and that is clearly the case since both its Santa Maria and Rodeo Refineries uniquely rely on landlocked and fast-dwindling crude supplies. (Santa Maria and Rodeo are the two halves of the San Francisco refinery, joined by a pipeline.) So any project emissions are actually a pollution increase.

2. LAND USE: The draft EIR does not consider at all impact of a massive increase in use of food crops like soybean oil as a feedstock, which threatens to wreak havoc with land use. Current indications are that the refinery could potentially use up to 40 percent of the nation's entire supply of soybean oil. More environmentally sustainable feedstocks like waste oil are not available in the quantities contemplated by the project.

3. PUBLIC SAFETY: I am worried about our safety from the biofuel refining process, and the draft EIR doesn't consider that at all. You have information about the risk that refining biofuels increases the incidence of flaring, but you did not consider it in the draft EIR. I am very concerned by the potential impact of a spike in flaring on my health and that of my neighbors.

4. PROJECT ALTERNATIVES: The draft EIR does not evaluate alternatives to the project in a way that makes sense. Most significantly, the County was wrong to reject a green hydrogen alternative for the project when considering that same alternative for the similar Marathon project. 5. OPERATING WITHOUT A PERMIT: The Bay Area Air Quality Management District (BAAQMD) is currently investigating whether Phillips 66 violated the law in starting its conversion project before it received a permit. The County should consider whether the previously converted unit (Unit 250) should have been evaluated as part of this project. And it should not issue any permit at all if it is determined that Phillips 66 is acting in violation of the law.

6. CUMULATIVE IMPACTS: All of these potential impacts are from just one project. The draft EIR did not make any meaningful effort at all the evaluate the cumulative impacts of the project considered collectively with the impacts of the very similar Marathon Martinez refinery project, being evaluated nearly simultaneously. I ask that this project not move forward until and unless these very serious potential impacts are fully analyzed and addressed. Additionally, given the enormous import of this project for the community, we believe a public hearing concerning the project and its

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environmental review would facilitate the purposes and goals of CEQA. We therefore request that you schedule such a hearing as soon as possible.

Signed: Victoria Ryan

135 Prospect Avenue

Port Costa, CA 94569-0044

2

Response to Comment 1

Refer to Master Response No. 1, CEQA Baseline and Master Response No. 2, CEQA Alternatives.

Response to Comment 2

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 3

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 4

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 5

Refer to Master Response No. 7, Project Description – Piecemealing.

Response to Comment 6

Refer to Master Response No. 3, Cumulative Impacts.

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Comment Letter 81. Saxe, Madeleine

COMMENT LETTER: 81

Gary Kupp

From: Madeleine Saxe <maddiesaxe13@gmail.com>
Sent: Thursday, December 16, 2021 9:10 PM
To: Joseph Lawlor; Gary Kupp
Subject: REJECT Biofuels Refinery in Contra Costa County

Dear Mr. Kupp and Mr. Lawlor:

I am a resident of Alameda County and I'm writing to urge you to reject the proposed refinery transition projects in Rodeo and Martinez, and decommission the county's outdated refinery infrastructure once and for all. If the County insists on moving forward with these proposals, it must fully disclose all of the harms to public health and the environment that would result from these ill-conceived projects. A full and honest evaluation of these harms will demonstrate clearly that these projects should be rejected.

As a young person in California concerned about the environment and public health, I urge you to prioritize the climate and your community over false climate solutions. My generation and frontline communities deserve a livable future, which starts with renewable energy, NOT biofuels.

While each project is distinct, the draft Environmental Impact Reports (EIR) for both projects (File No. LP20–2040 and File No. CDLP20-02046) are inadequate for similar reasons. 1

First, the assumption that the transition projects will reduce pollution is unsupported. Both EIRs improperly compare the pollution of a biofuel refinery to an oil refinery operating at historic levels. However, the Marathon refinery is currently shut down and there is no plausible way the Phillips 66 refinery can continue refining crude at its historic capacity, especially when it shuts down its Santa Maria refinery. The proper alternative to a biofuel refinery would be no refinery in the case of Martinez, and greatly reduced or no refining in the case of Rodeo. Under the proper comparison, it would be clear that transitioning to biofuels could only increase pollution from current or projected levels in both communities.

A full analysis would also demonstrate that continuing to approve such carbon-intensive projects is inconsistent with California's goals for reducing greenhouse gas emissions. 2

In addition, neither report adequately considers the harms of massively increasing use of food crops as biofuel feedstock. The Marathon and Phillips 66 refinery transitions combined could use up huge amounts of the nation's entire supply of soybean oil. The environmental impacts, like habitat destroyed to meet more soybean demand, have not been properly considered in either EIR. 3

Furthermore, neither EIR considers the consequences of biofuel refining on public safety, such as potential increased flaring, which will have harmful impacts on my health and my community's health. And neither EIR 4

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meaningfully acknowledges the fact that these two very similar refinery transition projects are being proposed simultaneously in the County, in addition to the nearby oil refineries still in operation. These EIRs therefore fail to adequately assess the cumulative impacts both refinery transitions will have on the entire County. 5

For these reasons, both draft EIRs are inadequate and a more accurate and thorough assessment should be carried out. Moreover, an EIR that fully analyzed and addressed these grave potential harms would almost certainly conclude that the refineries will prolong both the Martinez and Rodeo communities' exposure to pollution, undermine the state's climate goals, and wreak havoc with major changes to land use and food crops. I urge you, therefore, to reject biofuels as a false climate solution and instead facilitate a just transition to an energy system that protects workers and does not cost the health and wellbeing of frontline communities in California and beyond.

Best regards,

Madeleine Saxe

2

Response to Comment 1

Refer to Master Response No. 1, CEQA Baseline and Master Response No. 2, CEQA Alternatives.

Response to Comment 2

As proposed, the Project would lower facility-wide GHG emissions by about 24,000 MT per year compared to baseline operations. Refer to Table 4.8-5 in the Draft EIR "Annual Project Operational GHG Emissions".

Refer to Master Response No. 5, Renewable Fuel Processing and Master Response No. 6, Purpose of Project.

Response to Comment 3

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 4

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 5

Refer to Master Response No. 3, Cumulative Impacts.

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Comment Letter 82. Shaia, Tehallisy

COMMENT LETTER: 82

Gary Kupp

From: tehallisy@aol.com
Sent: Sunday, December 12, 2021 7:21 PM
To: Gary Kupp
Subject: EIR ccomments,P66

Dear Mr. Kupp:
I'm writing to you concerning the draft EIR for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040).

This project will have a potentially enormous impact on our community for years to come. It is therefore critically important that the CEQA review be thorough and accurate, and that the public be involved to the maximum extent possible.

I have the following specific concerns about the draft EIR for the project that I would like you to address:

1. The draft EIR basically assumes that if the permit isn't granted Phillips 66 will continue to refine crude oil at historic levels, so that biofuel refining will reduce pollution. But that is not accurate. Phillips 66 has repeatedly said elsewhere that it is planning to shut down its Santa Maria refinery regardless, and that is clearly the case since both its Santa Maria and rodeo Refineries uniquely rely on landlocked and fast-dwindling crude supplies. So any project emissions are actually a pollution increase. 1
2. The draft EIR does not consider at all impact of a massive increase in use of food crops like soybean oil as a feedstock, which threatens to wreak havoc with land use. Current indications are that the refinery could potentially use a major fraction of the nation's entire supply of soybean oil. More environmentally sustainable feedstocks like waste oil are not available in the quantities contemplated by the project. 2
3. I am worried about our safety from the biofuel refining process, and the draft EIR doesn't consider that at all. You have information about the risk that refining biofuels increases the incidence of flaring, but you did not consider it in the draft EIR. I am very concerned by the potential impact of a spike in flaring on my health and that of my neighbors. 3
4. The draft EIR does not evaluate alternatives to the project in a way that makes sense. Most significantly, the County was wrong to reject a green hydrogen alternative for the project when considering that same alternative for the similar Marathon project. 4
5. BAAQMD is currently investigating whether Phillips 66 violated the law in starting its conversion project before it received a permit. The County should consider whether the previously converted unit (Unit 250) should have been evaluated as part of this project. And should not issue any permit at all if it is determined that Phillips 66 is acting in violation of the law. 5
6. All of these potential impacts are from just one project. The draft EIR did not make any meaningful effort at all to evaluate the cumulative impacts of the project considered collectively with the impacts of the very similar Marathon Martinez refinery project, being evaluated nearly simultaneously. 6

I ask that this project not move forward until and unless these very serious potential impacts are fully analyzed and addressed. Additionally, given the enormous import of this project for the community, we believe

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a public hearing concerning the project and its environmental review would facilitate the purposes and goals of CEQA. We therefore request that you schedule such a hearing as soon as possible.

Sincerely,

T. Shaia

2

Response to Comment 1

Refer to Master Response No. 1, CEQA Baseline and Master Response No. 2, CEQA Alternatives.

Response to Comment 2

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 3

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 4

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 5

Refer to Master Response No. 7, Project Description – Piecemealing.

Response to Comment 6

Refer to Master Response No. 3, Cumulative Impacts.

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Comment Letter 83. Tepperman, Jean

COMMENT LETTER: 83

Gary Kupp

From: Jean Tepperman <jeantepper@gmail.com>
Sent: Tuesday, December 14, 2021 7:31 PM
To: Gary Kupp
Subject: DEIR for Phillips 66 proposed conversion to biofuels

Dear Mr. Kupp:
I am concerned about a number of issues that aren't addressed adequately in the draft EIR for the proposed conversion of the Phillips 66 Rodeo oil refinery to biofuel production (File No. LP20–2040).

I am really hoping the county will do a more thorough CEQA review including a public hearing and other opportunities to involve the community in this critical decision.
Here are some of the questions I think a full EIR should address:

1. **BASELINE**: As the "no project alternative," the draft EIR assumes the refinery would continue to refine crude oil as much as in the past. But Phillips 66 has already said they can't do that. They're shutting down their Santa Maria refinery and have said they can't get enough crude oil. So the "no project alternative" is really a much reduced or closed refinery. The EIR should use that as the baseline. 1
2. **FEEDSTOCKS/ LAND USE EFFECTS**: The idea that biofuels are environmentally beneficial ignores the impact on the global climate and food systems. The draft EIR does not consider the impact of a massive increase in use of food crops like soybean oil as a feedstock. Phillips 66 does not commit to using a particular feedstock. It mentions used cooking oil and tallow, but a lot of research shows that there's nowhere near enough of that. In reality, a lot of biofuel feedstock comes from industrial soybean production, so it competes with food uses and/or results in clearcutting forest to get more land for this environmentally destructive form of agriculture. An environmental impact review that does not examine this major impact is not complete. 2
3. **PUBLIC SAFETY:** I understand that the proposed process will require more hydrogen production and more heat than the current process because the molecules in the feedstock are more tightly bonded than in petroleum, and that more oxygen will be released. All of this seems like it would lead to a greater danger of flaring and explosions. There are people living right next to this refinery! It is essential that the EIR thoroughly investigate this danger! 3
4. **PROJECT ALTERNATIVES:** Production of hydrogen by the proposed methods creates serious environmental impacts. There is an alternative. Producing hydrogen by the electrolysis of water, powered by solar panels, is totally non-toxic and no-risk. I am upset that the draft EIR doesn't consider this very important alternative. 4
5. **OPERATING WITHOUT A PERMIT:** It is reported that Phillips 66 has already started this project without waiting for a permit. The Bay Area Air Quality Management District (BAAQMD) is investigating that – it would be illegal. So how can the county reward this behavior by issuing a permit after the fact? 5
6. **CUMULATIVE IMPACTS:** Since the nearby Martinez Marathon refinery is proposing a similar project, these should be evaluated together, to honor the principle that cumulative impacts should be considered. 6

Before moving forward with this project I request that these issue be thoroughly investigated. Because of the importance of this issue, there should first be a public hearing to air these issues and get community input.
Thank you,
Jean Tepperman
,

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Response to Comment 1

Refer to Master Response No. 1, CEQA Baseline and Master Response No. 2, CEQA Alternatives.

Response to Comment 2

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 3

Increased flaring is not part of the Project. Refer to Master Response No. 5, Renewable Fuels Processing.

Response to Comment 4

Refer to Master Response No. 2, CEQA Alternatives.

Response to Comment 5

Refer to Master Response No. 7, Project Description – Piecemealing.

Response to Comment 6

Refer to Master Response No. 3, Cumulative Impacts.

Comment Letter 84. Walker, Pat

COMMENT LETTER: 84

Gary Kupp

From: Pat Walker <plwalker@pacbell.net>
Sent: Friday, December 17, 2021 4:35 PM
To: Gary Kupp
Subject: FW: Comment on the Phillips 66 Rodeo Renewed Project Draft EIR

Dear Mr. Kupp:

I sent the message below to you at the address in the Notice but it bounced back. Hopefully, this message will arrive in time.

Thank you.

Pat Walker

From: Pat Walker [mailto:plwalker@pacbell.net]
Sent: Friday, December 17, 2021 2:59 PM
To: 'gary.kupp@ded.cccounty.US'
Subject: Comment on the Phillips 66 Rodeo Renewed Project Draft EIR

Upon reading about this proposal to convert an old oil refinery facility to one that produces "renewable diesel", what I detect is the lack of urgency to reduce greenhouse gases and address climate change.

Scientists worldwide and current weather-related disasters have made it clear that the world is in an emergency climate-change situation after decades of inaction when there should have been action. California's extreme drought and epic wildfires are not the only climate change disasters in the U.S., as seen by the recent destructive tornadoes, winds, and floods.

Prolonging the sales and lifespan of non-electric cars is not in our interest. Our interest is in 1
increasing the number of electric cars, the technology for which already exists and is improving. We no longer have time for a leisurely transition to renewable resources.

Public tax money would be much better spent on subsidizing the cost of electric cars for the non-wealthy than on propping up the petroleum industry by giving them public funds to convert old facilities to "renewable diesel" facilities. The petroleum industry has been an incredibly profitable industry for its shareholders and CEOs, and it has not had to pay for the external costs of the pollution it has caused over the decades, nor for the illnesses inflicted on our communities. If the petroleum industry wants to convert the refineries, it should be on its own dime.

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Response to Comment 1

As proposed, the Project would lower facility-wide GHG emissions by about 24,000 MT per year compared to baseline operations. Refer to Table 4.8-5 in the Draft EIR "Annual Project Operational GHG Emissions".

Refer to Master Response No. 5, Renewable Fuel Processing and Master Response No. 6, Purpose of Project.

Comment Letter 85. Warren, Jan

COMMENT LETTER: 85

Gary Kupp

From: Jan Warren <jtxwarren@gmail.com>
Sent: Friday, December 17, 2021 3:18 PM
To: Gary Kupp
Subject: Phillips 66 Rodeo Renewal Project (File No. LOLP20-2040)

Gary Kupp
Senior Planner
Contra Costa County
Department of Conservation and Development
30 Muir Road
Martinez, CA 94553

Dear Mr. Kupp,

The scope of the Phillips 66 Rodeo Renewed Project (file No. LOLP20-2040) is huge and unprecedented in California.
There is too much vagueness in the feedstock being used to go through the pre-treatment process.

Listing a group of feedstocks is not the same as stating the exact feedstocks to be used. There isn't enough available feedstock and the industry is rushing this project through without clear confirmation of the feedstock. 1

Significantly transferring to a bio-diesel project at such a large scale has dangerous implications. This is an old refinery with different ages of pieces of metal equipment in various stages of deterioration. It's not like building a biodiesel facility from scratch. 2

The community needs more confidence in this new technology. I strongly feel a much smaller pilot project should be considered at this site to work

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out unforeseen issues and gradually increase the number of gallons when proven successful. 2 cont'd

Most of the emerging biodiesel production facilities in the United States are producing a much smaller amount of biodiesel and many of them are not in such close proximity to a residential neighborhood.

When considering soybean feedstock the real determinant is how much land currently being used to raise soybeans for food will be diverted to make biodiesel.and at what cost to the consumer and health of the planet. Inflation was 6% in 2021. It's not a fair comparison to just say we'll cut down more trees, which sequester carbon, and plant more acreage of soybeans. There are real consequences to Indigenous people and local health for these actions.

You have to also answer the question of :
1. How much energy is used to grow the feedstock?
2. How much energy is used to extract and refine oil?
3. How much energy is used for soy oil extraction? 3
4. How much will food derived from soybeans cost once the land is diverted to create biodiesel.

This series of questions has to be answered with each feedstock used to produce biodiesel.

You also have to look at the impact on the neighborhood community closest to the refinery. Just because a feedstock isn't labeled toxic in and by itself, doesn't mean there won't continue to be cumulative impacts from the entire process. What plans are in place to handle accidents in the Carquiez Strait? What plans are in place to make sure there isn't excessive flaring from increased use of hydrogen. What odors will the 4

2

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community endure when other feedstocks are substituted? It's past time for Contra Costa County to institute an Odor Ordinance. 4 cont'd

Initially Phillips 66 will continue to refine crude oil in addition to plant feedstock oil. Why was Phillips 66 allowed to begin production early without a permit? It is extremely disingenuous for them to be allowed to piecemeal this project. If the NuStar facility was needed to store and transfer plant based oil that they will use in the same way as after the project is approved, you can't say it's not related. Phillips has been allowed to make changes on site without a permit in which they will use what they changed. CEQA is supposed to look at collective impacts. 5

There are a lot of holes in this DEIR and although I'm not a scientist or a lawyer, I've been following the continued rubber stamp this refinery has received for the past 6 years. I ask for transparency and public accountability for a refinery who too often has hidden behind the banner of jobs instead of the banner of health for the workers and community. I ask you to redraft this document and tighten the loopholes and come back with DEIR that answers the questions the public has asked.

Jan Warren
3202 Primrose Lane
Walnut Creek, CA 94598
925-818-6530

3

Response to Comment 1

Refer to Master Response No. 4, Land Use and Feedstocks.

Response to Comment 2

The Project will reuse and modify existing equipment as described in the Draft EIR. The Feed Pre-treatment Unit (PTU) will be new and will handle feedstocks that are not already pre-treated. See Master Response No. 5, Renewable Fuels Processing regarding the use of existing equipment and its similarities to the petroleum refining process. In addition, while the Rodeo Refinery has been operating for a long time, its equipment has been replaced, modified and updated on a regular basis to comply with new regulations, to integrate new and advanced technology, and to maintain operating standards for a productive facility. Thus, Rodeo Refinery's equipment is not in "various stages of deterioration" and the facility's transformation to process renewable fuels facility involves the use of existing equipment that is modern and current. The smaller project suggested by the comment was analyzed in the Alternatives section of the Draft EIR and the preference for that project is noted.

Response to Comment 3

Refer to Master Response No. 4, Land Use and Feedstocks and Response to Comment 1-3.

Response to Comment 4

Refer to Response to Comment 1-3. Also, see Master Response No. 5, Renewable Fuels Processing and Chapter 4.9 of the EIR for information regarding potential accidents associated with Project vessel traffic

Response to Comment 5

Refer to Master Response No. 7, Project Description – Piecemealing.

FORM LETTERS—For and Against Project

Over 1,600 form letters were received that provided an opinion as to whether the Project should be approved or not. These comments will be considered during the decision-making process. Refer to Master Response No. 8, Non-CEQA Topics and Project Merits for additional explanation.

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4 County-Initiated Updates and Errata to the Draft EIR

4.1 Introduction

In accordance with CEQA Guidelines Section 15132(a), this chapter of the Final EIR provides changes to the Draft EIR that have been made to update, refine, or clarify Project information and mitigation measures presented in the Draft EIR. The edits are made either in response to a comment received on the Draft EIR, or initiated by County staff.

4.2 Text Changes to the Draft EIR

New text is indicated in double underline and text to be deleted is reflected by a ~~strike through~~. Text changes are presented in the page order in which they appear in the Draft EIR. As indicated in Chapter 1, Introduction, the entirety of the EIR consists of the Draft EIR, together with this Response to Comments / Final EIR document, including all appendices. Therefore, the Draft EIR changes presented in this chapter are incorporated in and supersede corresponding original text in the Draft EIR.

4.3 Implication of Changes to the Draft EIR

Pursuant to CEQA Guidelines Section 15088.5(a), recirculation of a Draft EIR is required only if:

1. a new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented;
2. a substantial increase in the severity of an environmental impact would result unless mitigation measures are adopted that reduce the impact to a level of insignificance;
3. a feasible project alternative or mitigation measure considerably different from others previously analyzed would clearly lessen the environmental impacts of the project, but the project's proponents decline to adopt it; or
4. the draft EIR was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded.

None of the changes to the Draft EIR identified in this document meet any of the above conditions. Therefore, recirculation of any part of the Draft EIR is not required. The information presented in the Draft EIR and this document support this determination by the County.

Changes to Executive Summary

Executive Summary, Table ES-1 is revised as follows:

Table ES-1. Rodeo Refinery Pre- and Post-Project Operational Activity

	Baseline	Post-Project
~~Product~~ Material **Received**		
Marine Terminal Crude and Gas Oil Received (1,000 bpd 12-month average)	35	0
Pipeline Crude Received (1,000 bpd 12-month average)	70	0
Renewable Feedstocks Received (1,000 bpd 12-month average)[a]	0	80
Gasoline and Blendstocks Received (1,000 bpd 12-month average)	10	38
Product Shipped		
Petroleum Products Shipped (1,000 bpd 12-month average)	121	40
Renewable Fuels Shipped (1,000 bpd 12-month average)	0	67
Treated Renewable Feedstock Shipped (1,000 bpd 12-month average)	0	25
Mode of Transportation		
Tanker Vessels (calls/year)	80	201
Barges (calls/year)	90	161
Carbon Plant Site Rail (average railcars per week)	6.96	0
Refinery Railcar Loading/Unloading Rack (average railcars per day)	4.7	16
Santa Maria Site Rail (railcars per year)	409	0
Refinery and Carbon Plant Truck Trips (roundtrips per year)	40,213	16,026
Santa Maria Site Truck Trips (roundtrips per year)	13,008	0
Rodeo Refinery Approximate Number of Employees and Contractors	650	650

Executive Summary, page xxii is revised as follows:

> Pre- and post-Project operational activities are shown in Table ES-1. Once the Project is operational, no crude oil would be processed at the Rodeo Refinery. As shown in Table 3-2, the Rodeo Refinery would no longer receive crude oil and gas oil at its Marine Terminal (35,000 barrels per day [bpd]) on a 12-month rolling average) or from pipelines connecting the Rodeo Refinery to Central California crude supplies and the Santa Maria Refinery (70,000 bpd).

The references in the Draft EIR are not contained in Chapter 8. All references follow each chapter and section. The Executive Summary, page xxv is revised as follows:

- Chapter 7, Report Preparation.
- ~~Chapter 8, References.~~
- Appendix A, Notice of Preparation and Public Comments

The Executive Summary, Table ES-2 is revised as follows:

Table ES-2. Summary of Alternatives

	Project	No Project[a]	Reduced Project	Terminal Only[c]	No Temporary Increase in Crude Oil[b]
~~Product~~ Material Received/ Processed (bpd)					
Crude and Gas Oil Received	0	105,000[e]	0	0	0
Renewable Feedstock Received/Processed	80,000[c]	0	55,000	~~0~~	80,000[c]
Gasoline Blendstocks Received/Processed	38,000	~~115,000~~10,000	38,000	~~0~~	38,000
Existing Renewable Fuels Processed	13,000	13,000[d,h]	13,000	~~0~~75,000[f]	13,000
Product Produced (bpd)					
Renewable Fuels Produced/Shipped	55,000[c]	0	50,000	75,000[f]	55,000[c]
Existing Renewable Fuels Produced	12,000	12,000[d,h]	12,000		12,000
~~Conventional Fuels~~Petroleum Products Produced/Shipped	40,000	~~100~~109,000	40,000		40,000
Treated Renewable Feedstock Shipped	25,000	0	0	0	
Mode of Transportation[g]					
Ships (annual visits)	201	80	165	70	201
Barges (annual visits)	161	90	161	40	161
Truck Trips (roundtrips/year)	16,026	53,221	11,230	0	16,026
Railcars (per day)	16	5	16	8	16
Employees	650	650	630	75	650

Notes:

a. No Project and Terminal Only Alternatives would transport blend stock and product by pipeline, marine vessel, and rail.

b. The No Temporary Increase in Crude Oil Alternative at full buildout is identical to the Project; it differs only in the temporary change in throughput of crude oil during the construction period, and associated vessel calls, which is not reflected in this table. This difference, however, is described in the following discussion.

c. Up to 25,000 bpd excess capacity of pre-treated feedstocks could be sold elsewhere.

d. As explained in the Project Description, Section 3.7, *Project Operation*, the facility currently has the capacity to produce approximately 12,000 bpd of renewable fuels from pretreated feedstocks using Unit 250, which was previously used to process petroleum-based feedstocks. Unit 250 is not included in the Project as the Project does not propose any changes for Unit 250 and it would continue to produce 12,000 bpd of renewable fuels. Given that Unit 250 is not part of the Project, Unit 250 feedstock and production numbers are not included in this chart under the No Project Alternative.

e. 70,000 bpd out of 105,000 bpd would arrive by pipeline, the rest would arrive through the Marine Terminal.

f. Blendstocks and product into the facility would arrive through the Marine Terminal and by rail, and products leaving the facility would be transported by pipeline and rail.

g Reflects operations (not construction) of the Project and Alternatives.

h The amount of existing renewable fuels produced (12,000 bpd) is less than the existing renewable feeds processed (13,000 gpd) due to losses that occur during the production process.

The Executive Summary, Table ES-3 is revised as follows:

Mitigation Measure AQ-1: Implement BAAQMD Basic Control Measures

Construction contractors shall implement the following applicable BAAQMD basic control measures as BMPs:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material offsite shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least 2 times per day, not less than 4 hours apart, on San Pablo Avenue, between the refinery and I-80, and on the access roads between the Carbon Plant and Highway 4. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 mph.
- All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 2 minutes as recommended by the BAAQMD, and not to exceed 5 minutes as required by the California airborne toxics control measure CCR Title 13, Section 2485. Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications.
- All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

Construction contractors shall implement the following Advanced Construction Mitigation Measures:

- All exposed surfaces shall be watered at a frequency adequate to maintain minimum soil moisture of 12 percent. Moisture content can be verified by lab samples or moisture probe.
- All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph.
- Wind breaks (e.g., trees, fences) shall be installed on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity.
- Vegetative ground cover (e.g., fast-germinating native grass seed) shall be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established.

- The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time shall be limited. Activities shall be phased to reduce the amount of disturbed surfaces at any one time.
- All trucks and equipment, including their tires, shall be washed off prior to leaving the site.
- Site accesses to a distance of 100 feet from the paved road shall be treated with a 6 to 12 inch compacted layer of wood chips, mulch, or gravel.
- Sandbags or other erosion control measures shall be installed to prevent silt runoff to public roadways from sites with a slope greater than one percent.

Executive Summary, Table ES-3 is revised as follows:

Recommended Onsite Emission Reduction Measures:

i. Onsite equipment and vehicle idling and/or daily operating hour curtailments;

ii. Construction “clean fleet” using Tier 4 construction equipment to the maximum extent practicable;

iii. Reductions in Vessel and/or Rail Traffic;

iv. Other onsite NOx reduction measures (e.g., add-on NOx emission controls); or

v. Avoid the use of Suezmax vessels to the maximum extent practicable.

Contra Costa County Department of Conservation and Development in its consideration of the NM Plan shall have the option to require daily NOx reductions at the Carbon Plant necessary to achieve the NOx daily emissions significance threshold. Daily idling of one kiln would provide sufficient NOx reductions to offset the Project’s incremental NOx emissions to below the NOx daily emissions threshold of significance on individual days that construction emissions are estimated to potentially be above the daily NOx significance threshold.

Executive Summary, Table ES-3 is revised as follows:

Mitigation Measure BIO-3: Update and Review Facility Response Plan and Spill Prevention, Control, and Countermeasure Plan with OSPR

- The Facility Response Plan and Spill Prevention, Control, and Countermeasure (SPCC) Plan shall be updated to address the Project operational changes, including changes in proposed feedstocks and types of vessels and trips ~~change in proposed feedstocks.~~ The SPCC shall address the operational changes of the Transitional Phase and post-Project. Phillips 66 will consult with OSPR during update of the SPCC Plan, especially adequacy of booms at the Marine Terminal to quickly contain a spill of renewable feedstocks.

Executive Summary, Table ES-3 is revised as follows:

Mitigation Measure HAZ-1: Implement Release, Monitoring and Avoidance Systems

The following actions shall be completed by Phillips 66 prior to Project operations, including the transitional phase, and shall include routine inspection, testing and maintenance of all equipment and systems conducted in accordance with manufacturers’ recommendations and industry guidance for effective maintenance of critical equipment at the Marine Terminal.

Feedstocks handled at the Marine Terminal are not regulated under the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act (LKS Act) (e.g. renewable feedstocks such as soybean oil and tallow) and therefore not subject to OSPR oversight, and are also not subject to the CSLC oversight efforts (MOTEMS, Article 5, Article 5.3 and Article 5.5, depending on the materials handled). Yet materials may be detrimental to the environment if spilled.

Regulated products (i.e. "Oil" and "Renewable Fuels" defined in Pub. Resources Code sec. 8750) will continue to be transferred at the Marine Terminal, which do require MOTEMS-compliant Terminal Operating Limits for those products that reside within the jurisdiction of the CSLC. To ensure that Project operation continues to meet those standards, the following measures are required.

Applicability of MOTEMS, Article 5, 5.3, 5.5 and Spill Prevention Requirements

As some materials transferred at the terminal may be feedstocks or other non-regulated materials/feedstocks/products, Phillips 66 shall comply with the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act (LKS Act) for all vessels calling at the Marine Terminal regardless of feedstock/material type. In addition, MOTEMs operational regulations, as codified in Article 5. Marine Terminals Inspection and Monitoring (2CCR §2300 et seq), Article 5.3 Marine Terminals Personnel Training and Certification (2CCR §2540 et seq), and Article 5.5 Marine Terminals Oil Pipelines (2CCR §2560 et seq), including items such as static liquid pressure testing of pipelines, shall be implemented for all operations at the Marine Terminal regardless of feedstock/material type and LKS Act regulatory status.

Upon request, Phillips 66 shall provide evidence to relevant regulatory agencies that these facilities, operational response plans, and other applicable measures have been inspected and approved by CSLC and OSPR and determined to be in compliance.

If terminal operations do not allow for regular compliance and inspection of LKS and MOTEMS requirements by the CSLC and OSPR, Philips 66 shall employ a CSLC-approved third-party to provide oversight as needed to ensure the same level of compliance as a petroleum-handling facility, and to ensure maximum protection of the environment from potential spills and resulting impacts. Phillips 66 shall provide evidence of compliance upon request of relevant regulatory agencies.

Remote Release Systems

The Marine Terminal has a remote release system that can be activated from a single control panel or at each quick-release mooring hook set. The central control system can be switched on in case of an emergency necessitating a single release of all mooring lines. However, to further minimize the potential for accident releases the following is required:

- Provide and maintain mooring line quick release devices that shall have the ability to be activated within 60 seconds.
- These devices shall be capable of being engaged by electric/push button release mechanism and by integrated remotely-operated release system.
- Document procedures and training for systems use and communications between Marine Terminal and vessel operator(s).
- Routine inspection, testing and maintenance of all equipment and systems in accordance with manufacturers' recommendations and necessity, as well as guidance provided by SIGTTO/OCIMF 2008 "Jetty Maintenance and Inspection Guide" Section 2.3.1.1, 2.3.1.2 and 2.3.1.4, are required to ensure safety and reliability. The inspections, testing, and maintenance will be performed by Phillips 66 or its designated representatives.
- In consultation with the CSLC and prior to Project operation, Phillips 66 shall provide a written evaluation of their existing equipment and provide recommendations for upgrading equipment to meet up-to-date best achievable technology standards and best industry

practices, including but not limited to consideration of equipment updates and operational effectiveness (e.g. visual and audible alarm options, data display location and functionality, optional system features). Phillips 66 shall follow guidance provided by SIGTTO/OCIMF 2008 "Jetty Maintenance and Inspection Guide" Section 2.3.1.1, 2.3.1.2 and 2.3.1.4.

Best achievable technology shall address:

- Functionality – Controlled release of the mooring lines (i.e. a single control system where each line can be remotely released individually in a controlled order and succession) vs. release all (i.e. a single control system where all lines are released simultaneously via a single push button). See SIGTTO/OCIMF 2008 "Jetty Maintenance and Inspection Guide" Section 2.3.1.2.1.
- Layout – The location(s) of the single control panel and/or central control system to validate that it is operationally manned such that the remote release systems can actually be activated within 60 seconds.

This measure would allow a vessel to leave the Marine Terminal as quickly as possible in the event of an emergency (fire, explosion, accident, or tsunami that could lead to a spill). In the event of a fire, tsunami, explosion, or other emergency, quick release of the mooring lines within 60 seconds would allow the vessel to quickly leave the Marine Terminal, which could help prevent damage to the Marine Terminal and vessel and avoid and/or minimize spills. This may also help isolate an emergency situation, such as a fire or explosion, from spreading between the Marine Terminal and vessel, thereby reducing spill potential. The above would only be performed in a situation where transfer connections were already removed and immediate release would not further endanger terminal, vessel and personnel.

Tension Monitoring Systems

- Provide and maintain Tension Monitoring Systems to effectively monitor all mooring line and environmental loads, and avoid excessive tension or slack line conditions that could result in damage to the Marine Terminal structure and/or equipment and/or vessel mooring line failures.
- Line tensions and environmental data shall be integrated into systems that record and relay all critical data in real time to the control room, Marine Terminal operator(s) and vessel operator(s).
- All systems data shall be required to be recorded and readily accessible to enable tasks such as: (1) verification that systems are routinely operated in compliance with the MM (e.g. vessels are berthing within the MOTEMS compliant speed and angle requirements), and (2) post-event investigation and root-cause analysis (e.g. vessel allision during berthing).
- System shall include, but not be limited to, quick release hooks only (with load cells), site-specific current meter(s), site-specific anemometer(s), and visual and audible alarms that can support effective preset limits and shall be able to record and store monitoring data.
- Document procedures and training for systems use and communications between Marine Terminal and vessel operator(s).
- Routine inspection, testing and maintenance of all equipment and systems in accordance with manufacturers' recommendations and necessity, as well as guidance provided by SIGTTO/OCIMF 2008 "Jetty Maintenance and Inspection Guide" Section 2.3.1.1, 2.3.1.2 and 2.3.1.4, are required to ensure safety and reliability. The

inspections, testing, and maintenance will be performed by Phillips 66 or its designated representatives.

- Install alternate technology that provides an equivalent level of protection.
- All systems data shall be required to be recorded and readily accessible to enable tasks such as: (1) verification that systems are routinely operated in compliance with the MM, and (2) post-event investigation and root-cause analysis.

The Marine Terminal is located in a high-velocity current area and currently has only limited devices to monitor mooring line strain and integrated environmental conditions. Updated MOTEMS Terminal Operating Limits (TOLs), including breasting and mooring, provide mooring requirements and operability limits that account for the conditions at the terminal. The upgrade to devices with monitoring capabilities can warn operators of the development of dangerous mooring situations, allowing time to take corrective action and minimize the potential for the parting of mooring lines, which can quickly escalate to the breaking of hose connections, the breakaway of a vessel, and/or other unsafe mooring conditions that could ultimately lead to a petroleum product spill. Backed up by an alarm system, real-time data monitoring and control room information would provide the Terminal Person-In-Charge with immediate knowledge of whether safe operating limits of the moorings are being exceeded. Mooring adjustments can be then made to reduce the risk of damage and accidental conditions.

Allision Avoidance Systems

- Provide and maintain Allision Avoidance Systems (AASs) at the Marine Terminal to prevent damage to the pier/wharf and/or vessel during docking and berthing operations. Integrate AASs with Tension Monitoring Systems such that all data collected are available in the Control Room and to Marine Terminal operator(s) at all times and vessel operator(s) during berthing operations. The AASs shall also be able to record and store monitoring data.
- All systems data shall be required to be recorded and readily accessible to enable tasks such as: (1) verification that systems are routinely operated in compliance with the MM, and (2) post-event investigation and root-cause analysis (e.g. vessel allision during berthing).
- Document procedures and training for systems use and communications between Marine Terminal and vessel operator(s).
- Routine inspection, testing and maintenance of all equipment and systems in accordance with manufacturers' recommendations and necessity, as well as guidance provided by SIGTTO/OCIMF 2008 "Jetty Maintenance and Inspection Guide", are required to ensure safety and reliability. The inspections, testing, and maintenance will be performed by Phillips 66 or its designated representatives.
- Velocity monitoring equipment is required to monitor reduced berthing velocities until permanent MOTEMS-compliant corrective actions are implemented.
- The systems shall also be utilized to monitor for vessel motion (i.e. surge and sway) during breasting/mooring operations to ensure excessive surge and sway are not incurred.

The Marine Terminal has a continuously manned marine interface operation monitoring all aspects of the marine interface. The Automatic Identification System is monitored through TerminalSmart and provides a record of vessel movements. Pursuant to the CSLC January 26, 2022 letter entitled Phillips 66 (P66) Rodeo Marine Terminal – Review of New September 2021

Mooring & Berthing Analyses and Terminal Operating Limits (TOLS), the single cone fenders shall not be used as the first point of contact during berthing operations. Therefore, all berthing operations shall utilize the double cone fenders. P66 shall incorporate TOL diagrams with landing point statements in the Terminal Information Booklet. For all vessels, a Phillips 66 Marine Advisor is in attendance and is in radio contact with the vessel master and pilot prior to berthing, reviewing initial contact point and then monitoring.

Excessive surge or sway of vessels (motion parallel or perpendicular to the wharf, respectively), and/or passing vessel forces may result in sudden shifts/redistribution of mooring forces through the mooring lines. This can quickly escalate to the failure of mooring lines, breaking of loading arm connections, the breakaway of a vessel, and/or other unsafe mooring conditions that could ultimately lead to a spill. Monitoring these factors will ensure that all vessels can safely berth at the Marine Terminal and comply with the standards required in the MOTEMS.

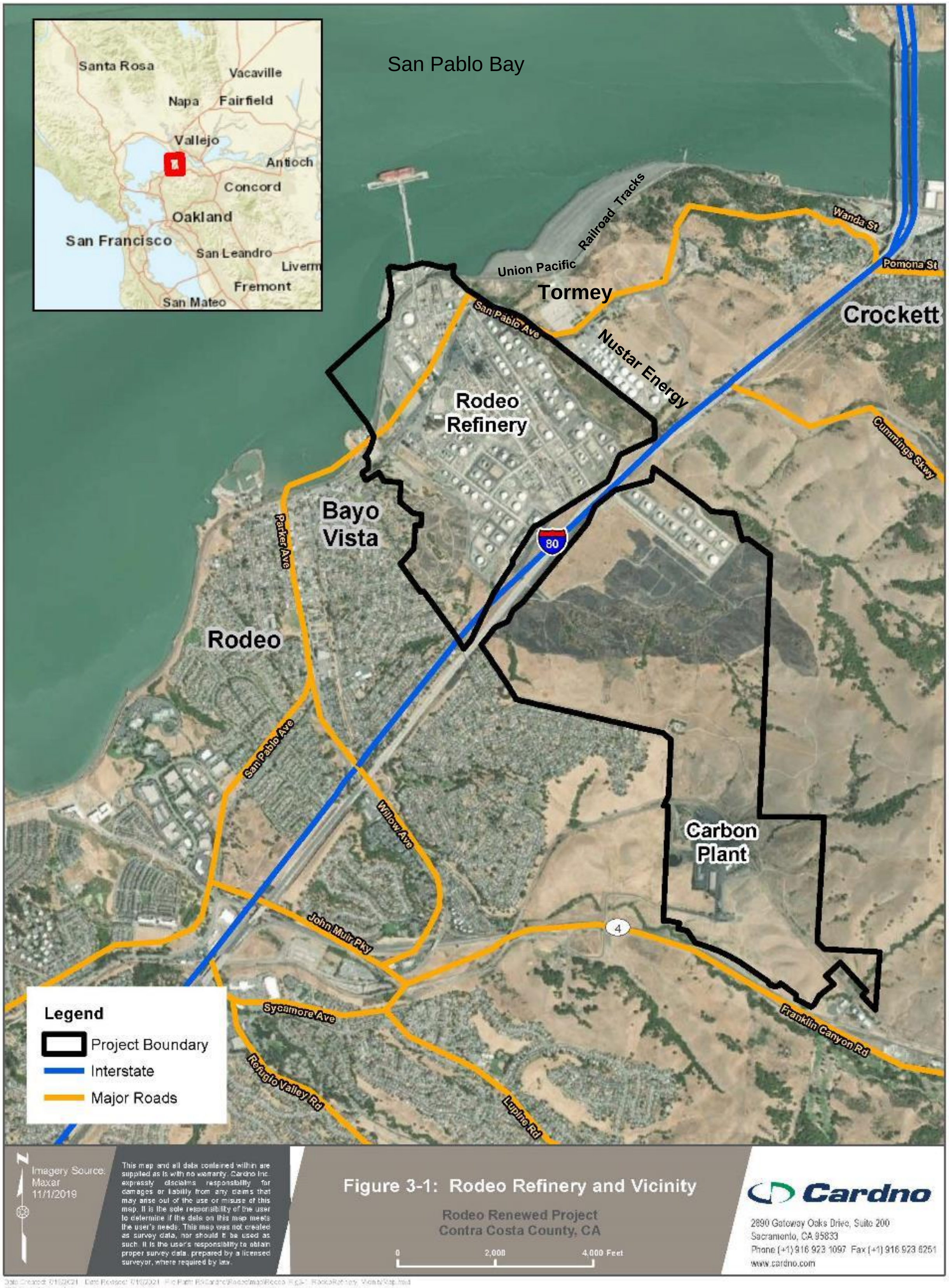
Changes to Chapter 1, Introduction

The references in the Draft EIR are not contained in Chapter 8. All references follow each chapter and section. Chapter 1, Introduction, page 1-7 is revised as follows:

- Chapter 7, Report Preparation.
- Chapter 8, References.
- Appendices.

Changes to Chapter 3, Project Description

Figures 3-1 and 3-2 are revised as follows:


San Pablo Bay
Santa Rosa
Vacaville
Napa
Fairfield
Vallejo
Antioch
Concord
Oakland
San Francisco
San Leandro
Fremont
San Mateo
Union Pacific Railroad Tracks
Tormey
Crockett
Wanda St
Pomona St
San Pablo Ave
Nustar Energy
Rodeo Refinery
Cummings Skwy
Bayo Vista
Parker Ave
80
Rodeo
Carbon Plant
Willow Ave
John Muir Pky
4
Sycamore Ave
Franklin Canyon Rd
Refugio Valley Rd
Lupine Rd
Legend
Project Boundary
Interstate
Major Roads
Imagery Source: Maxar 11/1/2019
Figure 3-1: Rodeo Refinery and Vicinity
Rodeo Renewed Project
Contra Costa County, CA
0
2,000
4,000 Feet
Cardno
2890 Gateway Oaks Drive, Suite 200
Sacramento, CA 95833
Phone (+1) 916 923 1097 Fax (+1) 916 923 6251
www.cardno.com

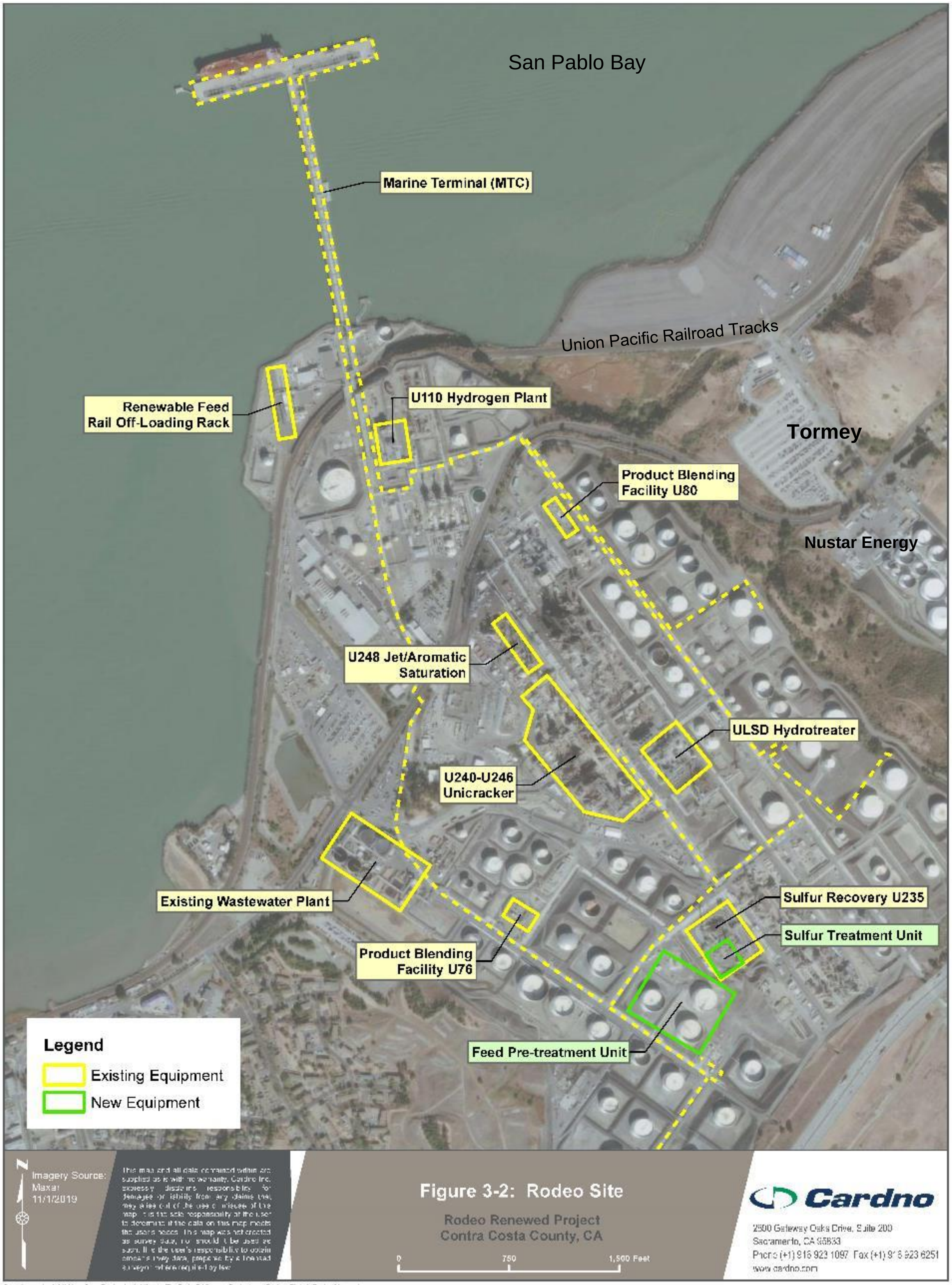


Figure 3-2: Rodeo Site

Section 3.4.4 of the Draft EIR is revised as follows:

3.4.4 Existing Pipeline Sites

The Project includes the Pipeline Sites—four regional pipelines serving the Santa Maria Site and the Rodeo Refinery. The Santa Maria Site is connected to the Rodeo Refinery by approximately 200 miles of subterranean pipeline (Figure 3-5), designated Line 400 and Line 200. Line 400 runs north and east from the Santa Maria Site through the Coastal Range of central California in San Luis Obispo and Kern Counties, a region of dry grassland, pasture, and open live oak woodland, to connect with Line 200 north of McKittrick. Line 200 runs northwest up the west side of the San Joaquin Valley, through a mixture of Coastal Range grasslands and pasture and San Joaquin Valley agricultural land, and then west to the Rodeo Refinery. Line 200 runs through Kern, Kings, Fresno, Merced, Stanislaus, San Joaquin, Alameda, and Contra Costa Counties. ~~Two other pipelines—Line 100 and Line 300—connect the Santa Maria Site to crude oil collection facilities elsewhere in California (Figure 3-5).~~ ~~Line 100 runs underneath San Joaquin Valley agricultural land and Coastal Range grasslands and pasture lands in Kern County, and Line 300 runs beneath agricultural land and grasslands in the Santa Maria Valley area in San Luis Obispo and Santa Barbara Counties.~~ Line 100 is used to transport crude oil from several collection facilities in Central California to Line 200 at the Junction Pump Station. Line 100 runs underneath San Joaquin Valley agricultural land and Coastal Range grasslands and pasture lands in Kern County (Figure 3-5). Line 300 connects crude oil collection facilities elsewhere in California to the Santa Maria Site and runs beneath agricultural land and grasslands in the Santa Maria Valley area in San Luis Obispo and Santa Barbara counties (Figure 3-5).

Section 3.4.2.5, page 3-20, paragraph 2 of the Draft EIR is revised as follows:

3.4.2.5 Marine Oil Terminal Engineering and Maintenance

The California State Lands Commission (CSLC) developed Marine Oil Terminal Engineering and Maintenance Standards (MOTEMS) to establish standards for the design, construction, operation, and maintenance of marine oil terminals. ~~berthing and cargo loading/unloading facilities.~~ MOTEMS are comprehensive and contain requirements for assessment of the structural, mechanical, and electrical systems, including, but not limited to routine audits and inspections, geotechnical assessments, structural evaluations, seismic analyses, berthing and mooring analyses, fire protection, pipelines, mechanical and electrical equipment, and electrical systems. MOTEMS is intended to minimize the possibility of accidents at marine oil terminals during potentially damage causing events such as seismic activity, extreme weather events, tsunamis, vessel impacts, fires, and explosions ~~extreme weather events and seismic activity~~ that would lead to releases of petroleum substances to the environment. Compliance with MOTEMS is ongoing, as facilities are required to have routine audits and inspections to identify any deficiencies. Existing facilities are required to retrofit or rebuild as necessary to meet MOTEMS. ~~which has been completed at t~~The Rodeo Refinery's Marine Terminal~~,~~ and Phillips 66 will continue to work with the CSLC Marine Environmental Protection Division (MEPD) to take any necessary corrective actions to comply with MOTEMS requirements. The CSLC has regulatory authority over MOTEMS.

Chapter 3 Table 3-2 is revised as follows:

Table 3-2. Rodeo Refinery Pre- and Post-Project Operational Activity

	Baseline	**Post-Project**
~~Product~~ Material **Received**		
Marine Terminal Crude and Gas Oil Received (1,000 bpd 12-month average)	35	0
Pipeline Crude Received (1,000 bpd 12-month average)	70	0
Renewable Feedstocks Received (1,000 bpd 12-month average)[a]	0	80
Gasoline and Blendstocks Received (1,000 bpd 12-month average)	10	38
Product Shipped		
Petroleum Products Shipped (1,000 bpd 12-month average)	121	40
Renewable Fuels Shipped (1,000 bpd 12-month average)	0	67
Treated Renewable Feedstock Shipped (1,000 bpd 12-month average)	0	25
Mode of Transportation		
Tanker Vessels (calls/year)	80	201
Barges (calls/year)	90	161
Carbon Plant Site Rail (average railcars per week)	6.96	0
Refinery Railcar Loading/Unloading Rack (average railcars per day)	4.7	16
Santa Maria Site Rail (railcars per year)	409	0
Refinery and Carbon Plant Truck Trips (roundtrips per year)	40,213	16,026
Santa Maria Site Truck Trips (roundtrips per year)	13,008	0
Rodeo Refinery Approximate Number of Employees and Contractors	650	650

The title for Figure 3-7 is not accurate. Figure 3-7 is revised as follows:

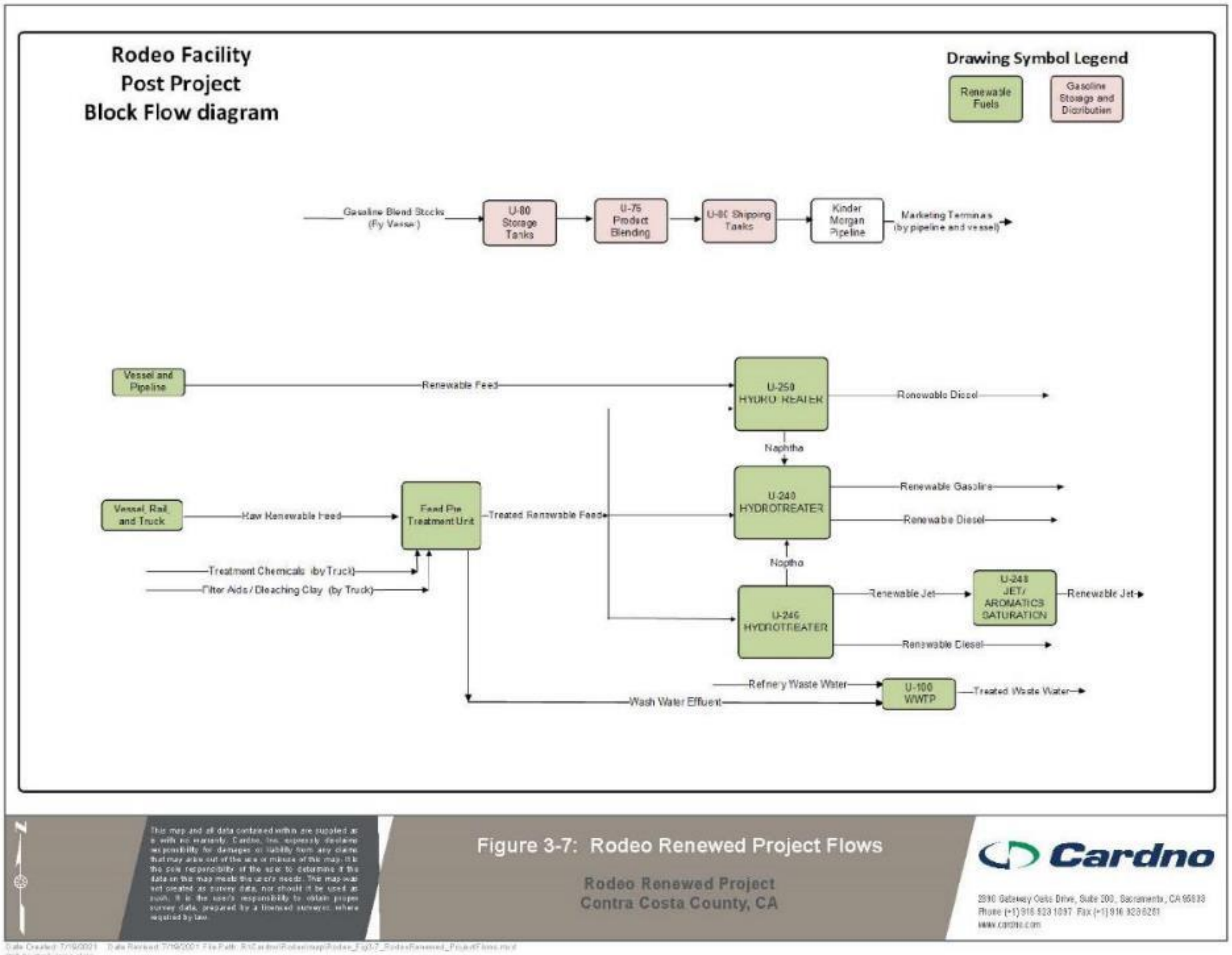


Figure 3-7. ~~**Rodeo Renewed Project Flows**~~ **<u>Post Project Flows</u>**

Section 3.7.1 of the Project Description is revised as follows:

3.7.1 Product Received

Once the Project is operational, no crude oil would be processed at the Rodeo Refinery. As shown in Table 3-2, the Rodeo Refinery would no longer receive crude oil and gas oil at its Marine Terminal (35,000 bpd on a 12-month rolling average10) or from pipelines connecting the Rodeo Refinery to <u>Central California crude supplies</u> and the Santa Maria Refinery (70,000 bpd). The Rodeo Refinery would receive 38,000 bpd gasoline and gasoline blendstocks, which is an increase over baseline of 28,000 bpd.

Section 3.8.3.5 is revised as follows:

3.8.3.5 Project Feedstock Flexibility

~~To address these and other inherent risk factors in the market, Phillips 66 secures contracts in excess of the crude oil feedstocks supply needed to process more than 2 million barrels of crude oil per day. Phillips 66's position in the market is then adjusted as needed over time, depending on the market conditions for that year or month (or appropriate time interval).~~

Phillips 66 could secure market positions in oilseeds, vegetable oils, and waste oils, and by having an excess of the amounts needed for processing, Phillips 66 has the flexibility to adapt to market conditions and process the optimal mix of renewable feedstocks to achieve its business objectives. Thus, it is difficult to predict which specific types or sources of renewable feedstocks would be used in any one particular year, much less over several years…

Changes to Section 4.3, Air Quality

Section 4.3.4.2 of the Draft EIR are revised as follows:

4.3.4.2 CEQA Baseline Emissions

Vessel emissions of criteria pollutants include hoteling at the wharf or at anchor, and vessel maneuvering and transit between the wharf or anchorage area out to the Pilot Buoy located ~~approximately 9 nautical miles (7.8 statute miles)~~ 11 nautical miles west of the Golden Gate.

Air Quality, Mitigation Measure AQ-1 is revised as follows:

Mitigation Measure AQ-1: Implement BAAQMD Basic Control Measures

Construction contractors shall implement the following applicable BAAQMD basic control measures as BMPs:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material offsite shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least 2 times per day, not less than 4 hours apart, on San Pablo Avenue, between the refinery and I-80, and on the access roads between the Carbon Plant and Highway 4. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 mph.
- All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 2 minutes as recommended by the BAAQMD, and not to exceed 5 minutes as required by the California airborne toxics control measure CCR Title 13, Section 2485. Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications.
- All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

Construction contractors shall implement the following Advanced Construction Mitigation Measures:

- All exposed surfaces shall be watered at a frequency adequate to maintain minimum soil moisture of 12 percent. Moisture content can be verified by lab samples or moisture probe.
- All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph.
- Wind breaks (e.g., trees, fences) shall be installed on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity.
- Vegetative ground cover (e.g., fast-germinating native grass seed) shall be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established.
- The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time shall be limited. Activities shall be phased to reduce the amount of disturbed surfaces at any one time.
- All trucks and equipment, including their tires, shall be washed off prior to leaving the site.
- Site accesses to a distance of 100 feet from the paved road shall be treated with a 6 to 12 inch compacted layer of wood chips, mulch, or gravel.
- Sandbags or other erosion control measures shall be installed to prevent silt runoff to public roadways from sites with a slope greater than one percent.

Air Quality Mitigation Measure AQ-2: Implement a NOx Mitigation Plan, is revised as follows:

Recommended Onsite Emission Reduction Measures:

i. Onsite equipment and vehicle idling and/or daily operating hour curtailments;

ii. Construction “clean fleet” using Tier 4 construction equipment to the maximum extent practicable;

iii. Reductions in Vessel and/or Rail Traffic;

iv. Other onsite NOx reduction measures (e.g., add-on NOx emission controls); or

v. Avoid the use of Suezmax vessels to the maximum extent practicable.

Contra Costa County Department of Conservation and Development in its consideration of the NM Plan shall have the option to require daily NOx reductions at the Carbon Plant necessary to achieve the NOx daily emissions significance threshold. Daily idling of one kiln would provide sufficient NOx reductions to offset the Project’s incremental NOx emissions to below the NOx daily emissions threshold of significance on individual days that construction emissions are estimated to potentially be above the daily NOx significance threshold.

Section 4.3, Air Quality Mitigation Measure AQ-4 is revised as follows:

Mitigation Measure AQ-4: Implement Odor Management Plan

~~During the 2-year construction phase of the Project, an Odor Management Plan (OMP) shall be developed and implemented upon commencement of the renewable fuels processes, which will become an integrated part of daily operations at the Rodeo Refinery. The purpose of the OMP is to prevent any offsite odors and effect diligent identification and remediation of any potential odors generated by the Project. The OMP shall outline equipment that is in place and procedures~~

~~that facility personnel shall use to address odor issues, facility wide. The OMP would include evaluation of the overall system performance, identifying any trends to provide an opportunity for improvements to the plan, and updating the odor management and control strategies, as necessary. This plan would be retained at the facility for County or other government agency inspection upon request.~~

Phillips 66 shall develop and implement an Odor Management Plan (OMP). The OMP shall be an integrated part of daily operations at the Rodeo Site, to effect diligent identification and remediation of any potential odors generated by the Facility.

- The OMP shall be developed and reviewed by the County and the BAAQMD prior to operation of the Project, and implemented upon commencement of the renewable fuels processes.
- The OMP shall be an “evergreen” document that provides continuous evaluation of the overall system performance, identifying any trends to provide an opportunity for improvements to the plan, and updating the odor management and control strategies as necessary.
- The OMP shall include guidance for the proactive identification and documentation of odors through routine employee observations, routine operational inspections, and odor compliant investigations.
- All odor complaints received by the facility shall be investigated as soon as is practical within the confines of proper safety protocols and site logistics. The goal of the investigation will be to determine if an odor originates from the facility and, if so, to determine the specific source and cause of the odor, and then to remediate the odor.
- The OMP shall be retained at the facility for Contra Costa County, the BAAQMD, or other government agency inspection upon request.

Changes to Section 4.4, Biological Resources

Section 4.4.3.2, page 4.4-109 is revised as follows:

Coastal Ecosystems Protection Act of 2006, California State Lands Act

The Coastal Ecosystems Protection Act of 2006 directed the CSLC to adopt performance standards for discharging ballast water by January 1, 2008, and prepare a report assessing the availability of treatment technologies to meet those standards (Falkner et al. 2009). The CSLC completed the rulemaking process and adopted the standards in October 2007 as part of its Marine Invasive Species Program (MISP), as described below ~~(a multi-agency programs that includes CDFW’s OSPR, the SWRCB, and the Department of Tax and Fee Administration)~~. The technology assessment report was completed in December 2007. In response to the report’s recommendations, the California Legislature passed Senate Bill 1781 (Chapter 696, Statutes of 2008), which delayed initial implementation of the performance standards from January 1, 2009, to January 1, 2010, and required an update of the technology assessment report by January 1, 2009. The CSLC continues to support research into evolving ballast water management practices, treatment technologies, compliance monitoring techniques and equipment, and environmental effects of ballast water treatment. According to CSLC (2021), in 2018–2019, less than 1 percent of reported ballast water discharged in California did not meet the state’s ballast water management requirements.

The CSLC is also mandated to adopt regulations governing the management of vessel fouling by January 1, 2012, specifically, introduction of nonindigenous invasive species via vectors other than ballast water. Two studies are currently underway to guide the development of these regulations. In January 2008, Hull Husbandry Reporting Forms were used to gather data on fouling-related husbandry practices of the commercial vessel fleet visiting California waters. In addition, ongoing fouling-related research conducted by the CSLC’s ~~Marine Invasive Species Program~~ MISP will better define how hull husbandry practices and voyage characteristics affect the quantity and quality of fouling biota associated with vessels separating in California (CSLC 2021).

Section 4.4.3.2, page 4.4-109, following paragraph titled "California Marine Invasive Species Act" is revised as follows:

Marine Invasive Species Program

MISP was reauthorized and expanded in 2003 with the passage of the Marine Invasive Species Act (MISA; AB 433, Chapter 491, Statutes of 2003) which, among other provisions, directed the Commission to adopt ballast water management regulations for vessels moving coastally between ports on the west coast of the U.S. Since 2003, the MISA has been amended numerous times, most notably to establish California's ballast water discharge performance standards (SB 497, Chapter 292, Statutes of 2006) and to authorize the Commission to adopt and implement biofouling management regulations (AB 740, Chapter 370, Statutes of 2007).

The Commission adopts and amends regulations to implement the MISA (Public Resources Code section 71201.7). The ballast water management regulations for coastal vessels were adopted in 2006 (California Code of Regulations, title 2, section 2280 et seq.); ballast water discharge performance standards were codified in 2007 (California Code of Regulations, title 2, section 2291 et seq.); and the biofouling management regulations (see section 7.1) were adopted and implemented in 2017 (California Code of Regulations, title 2, section 2298.1 et seq.). These regulations were strengthened through the adoption of enforcement regulations in 2017 (California Code Regulations, title 2, section 2299.01 et seq.).

In 2019, the Commission sponsored AB 912 (Chapter 433, Statutes of 2019) which authorizes the Commission to:

- Adopt and enforce the federal ballast water discharge performance standards set forth in section 151.2030(a) of Title 33 of the Code of Federal Regulations; and
- Delay implementation of the interim and final California ballast water discharge performance standards to 2030 and 2040, respectively, due to a lack of available ballast water treatment technologies to enable vessels to meet the California standards.

In 2021, the Commission amended existing regulations (California Code of Regulations, title 2, section 2291 et seq.) to implement the requirements of AB 912.

Section 4.4.3.3, page 4.4-111, after paragraph 1 is revised as follows:

The following policies are relevant to the Project:

Fish, Other Aquatic Organisms and Wildlife

Policy 4: Consult with the California Department of Fish and Wildlife, and the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, whenever a proposed project may adversely affect an endangered or threatened plant, fish, other aquatic organism or wildlife species;

Not authorize projects that would result in the "taking" of any plant, fish, other aquatic organism or wildlife species listed as endangered or threatened pursuant to the state or federal Endangered Species Acts, or the federal Marine Mammal Protection Act, or species that are candidates for listing under these acts, unless the project applicant has obtained the appropriate "take" authorization from the U.S. Fish and Wildlife Service, National Marine Fisheries Service or the California Department of Fish and Wildlife; and

Give appropriate consideration to the recommendations of the California Department of Fish and Wildlife, the National Marine Fisheries Service or the U.S. Fish and Wildlife Service in order to avoid possible adverse effects of a proposed project on fish, other aquatic organisms and wildlife habitat.

Section 4.4.9 Impact 4.4-4, page 4.4-140 is revised as follows:

Mitigation Measure BIO-3: Update and Review Facility Response Plan and Spill Prevention, Control, and Countermeasure Plan with OSPR

- The Facility Response Plan and Spill Prevention, Control, and Countermeasure (SPCC) Plan shall be updated to address the Project operational changes, including changes in proposed feedstocks and types of vessels and trips. ~~change in proposed feedstocks.~~ The SPCC shall address the operational changes of the Transitional Phase and post-Project. Phillips 66 will consult with OSPR during update of the SPCC Plan, especially adequacy of booms at the Marine Terminal to quickly contain a spill of renewable feedstocks.

Impact 4.4-6 page 4.4-143 is revised as follows:

- As discussed under Impact 4.4-3 ~~4.4-5~~, deep-draft vessel propeller-induced water velocities, and resulting shear velocities, would be expected to scour sediment and resuspend sediments, causing turbidity plumes. Turbidity would be expected to be more pronounced during docking maneuvers and departures.

Changes to Section 4.5, Cultural Resources

Section 4.5.2.3, page 4.5-186 – 187 of the Draft EIR is revised as follows:

California Public Resources Code

In addition to the definition of “unique archaeological resources” in PRC Section 21083.2, the sections of the California Public Resource Code applicable to the Project follow:

- PRC Title 14, Section 5097.5: any unauthorized removal or destruction of archaeological, paleontological resources on sites located on public lands is a misdemeanor.
- PRC Title 14, Section 5097.99: prohibits obtaining or possessing Native American artifacts or human remains taken from a grave or cairn; sets penalties.
- PRC Section 6313: the title to all abandoned shipwrecks and all archaeological sites and historic resources on or in the tide and submerged lands of California is vested in the state and subject to the control of the commission.

Section 4.5.7, page 4.5-191 of the Draft EIR is revised as follows:

Mitigation Measure CUL-1: Inadvertent Discovery of Archaeological Resources

Pursuant to CEQA Guidelines Section 15064.5(f), “provisions for historical or unique archaeological resources accidentally discovered during construction” shall be instituted. In the event that any cultural resources are discovered during ground-disturbing activities, all work within 100 feet of the find shall be halted and Phillips 66 shall consult with the County and a qualified archaeologist (as approved by the County) to assess the significance of the find pursuant to CEQA Guidelines Section 15064.5. If cultural resources are recovered on State lands, submerged or tidal lands, all work within 100 feet of the find shall be halted and Phillips 66 shall consult with the California State Lands Commission. If any find is determined to be significant, representatives of the County and the qualified archaeologist would meet to determine the appropriate course of action.

Changes to Section 4.7, Geology and Soils

Section 4.7.2.7 page 4.7-227 is revised as follows:

The earthquake design requirements take into account the occupancy category of the structure, site class, soil classifications, and various seismic coefficients, CBC Chapter 16, Section 1613, provides earthquake loading specifications for every structure, and portion thereof, including nonstructural components that are permanently attached to structures and their supports and attachments, which shall be designed and constructed to resist the effects of earthquake motions in accordance with ~~ASCE 7-05~~ ASCE/SEI 7-22.

Section 4.7.2.7 page 4.7-228

CBC Chapter 31F, administered by the Marine Environmental Protection Division on behalf of the CSLC contains requirements and specifications pertaining to Marine Terminal Structures; existing, new and modified. Nonstructural and nonbuilding components of marine terminals are included as well and required to comply with all regulations. Chapter 31F provides earthquake loading and geotechnical specifications.

Changes to Section 4.8, Greenhouse Gas Emissions

Section 4.8.2.3 is revised as follows:

4.8.2.3 Project Setting

Vessel emissions include hoteling at the wharf or at anchor, and vessel maneuvering and transit between the wharf or anchorage area out to the Pilot Buoy located ~~approximately 9~~ 11 nautical miles ~~(10.4 statute miles)~~ west of the Golden Gate.

Changes to Section 4.9, Hazards and Hazardous Materials

Section 4.9.2.4, page 4-9.300 is revised as follows:

Design

As industrial facilities that handle hazardous chemicals, the Rodeo and Santa Maria Refineries must be constructed and operated in accordance with certain codes and standards that are enforced via administrative mechanisms such as internal audits, design reviews, and building inspections. Some of the main design standards include the American Petroleum Institute's (API's) Recommended Practice 750, Codes of Management Practices of the Chemical Manufacturers, the American National Standards Institute's B31.1: Power Piping and B13.3: Petroleum Refinery Piping, National Fire Prevention Association 30, and the International Building Code. ~~Uniform Building Codes~~.

Section 4.9.2.7, page 4.9-301, is revised as follows:

4.9.2.7 Marine Oil Terminal Engineering and Maintenance Standards

The Marine Terminal ~~operates as a MOTEMS-compliant facility,~~ is required to and has ongoing compliance with MOTEMS, meaning that its construction, materials, equipment, maintenance, and operating procedures meet the standards for marine terminals established by CSLC. The Marine Terminal undergoes routine audits and inspections to identify any deficiencies and comply with MOTEMS. The operating procedures are set forth in the Phillips 66 Rodeo Marine Terminal Handbook, which was revised and updated in 2016.

Section 4.9.2.11, page 4.9-313, paragraph 5 is revised as follows:

As per California Building Code Chapter 31F – Marine Oil Terminals, Section 3101F.2, the purpose of the code is to establish minimum engineering, inspection and maintenance criteria for Marine Oil Terminals in order to prevent oil spills and to protect public health, safety and the environment. The code defines "oil" as any kind of petroleum, liquid hydrocarbons, or petroleum products or any fraction or residues thereof, including but not limited to, crude oil, bunker fuel, gasoline, diesel fuel, aviation fuel, oil sludge, oil refuse, oil mixed with waste, and liquid distillates from unprocessed natural gas.

The discussion under Impact 4.9-2, page 4.9.329, paragraph 2 is revised as follows:

During the transitional phase, additional vessel traffic arriving at the Marine Terminal would increase from 80 tankers and 90 barges annually as part of the baseline, or about 3.3 vessels calls per week, to an estimated 96 tankers and 92 barges over the 7-month transitional period, or about 6.7 calls per week, with a total number of vessel calls over the transitional period producing an increase of ~~approximately 10 percent~~ 11 percent over the baseline entire-year vessel calls. This would produce a spill frequency of an in-transit spill of once every 1,076 years and a spill at the Marine Terminal of about once every year (note this is on an annualized basis utilizing the rate of vessel calls over the 7-month period).

The discussion under Impact 4.9-2, page 4.9-330 is revised as follows:

…Appendix C-2, ~~CEQA PM2.5 Modeling Analysis~~ Rodeo Renewed Spill Modeling Report.

Mitigation Measure HAZ-1, beginning page 4.9-334, is revised as follows:

The following measures are consistent with requirements applied to other marine terminals in the San Francisco Bay (CSLC 2014, 2015) subject to discretionary permitting as a result of modified operations.

Mitigation Measure HAZ-1: Implement Release, Monitoring and Avoidance Systems

The following actions shall be completed by Phillips 66 prior to Project operations, including the transitional phase, and shall include routine inspection, testing and maintenance of all equipment and systems conducted in accordance with manufacturers' recommendations and industry guidance for effective maintenance of critical equipment at the Marine Terminal.

Feedstocks handled at the Marine Terminal are not regulated under the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act (LKS Act) (e.g. renewable feedstocks such as soybean oil and tallow) and therefore not subject to OSPR oversight, and are also not subject to the CSLC oversight efforts (MOTEMS, Article 5, Article 5.3 and Article 5.5, depending on the materials handled). Yet materials may be detrimental to the environment if spilled.

Regulated products (i.e. "Oil" and "Renewable Fuels" defined in Pub. Resources Code sec. 8750) will continue to be transferred at the Marine Terminal, which do require MOTEMS-compliant Terminal Operating Limits for those products that reside within the jurisdiction of the CSLC. To ensure that Project operation continues to meet those standards, the following measures are required.

Applicability of MOTEMS, Article 5, 5.3, 5.5 and Spill Prevention Requirements

As some materials transferred at the terminal may be feedstocks or other non-regulated materials/feedstocks/products, Phillips 66 shall comply with the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act (LKS Act) for all vessels calling at the Marine Terminal regardless of feedstock/material type. In addition, MOTEMs operational regulations, as codified in Article 5. Marine Terminals Inspection and Monitoring (2CCR §2300 et seq), Article 5.3 Marine Terminals Personnel Training and Certification (2CCR §2540 et seq), and Article 5.5 Marine Terminals Oil Pipelines (2CCR §2560 et seq), including items such as static liquid pressure testing of pipelines, shall be implemented for all operations at the Marine Terminal regardless of feedstock/material type and LKS Act regulatory status.

Upon request, Phillips 66 shall provide evidence to relevant regulatory agencies that these facilities, operational response plans, and other applicable measures have been inspected and approved by CSLC and OSPR and determined to be in compliance.

If terminal operations do not allow for regular compliance and inspection of LKS and MOTEMS requirements by the CSLC and OSPR, Philips 66 shall employ a CSLC-approved third-party to provide oversight as needed to ensure the same level of compliance as a petroleum-handling facility, and to ensure maximum protection of the environment from potential spills and resulting impacts. Phillips 66 shall provide evidence of compliance upon request of relevant regulatory agencies.

Remote Release Systems

The Marine Terminal has a remote release system that can be activated from a single control panel or at each quick-release mooring hook set. The central control system can be switched on in case of an emergency necessitating a single release of all mooring lines. However, to further minimize the potential for accident releases the following is required:

- Provide and maintain mooring line quick release devices that shall have the ability to be activated within 60 seconds.
- These devices shall be capable of being engaged by electric/push button release mechanism and by integrated remotely-operated release system.
- Document procedures and training for systems use and communications between Marine Terminal and vessel operator(s).
- Routine inspection, testing and maintenance of all equipment and systems in accordance with manufacturers' recommendations and necessity, as well as guidance provided by SIGTTO/OCIMF 2008 "Jetty Maintenance and Inspection Guide" Section 2.3.1.1, 2.3.1.2 and 2.3.1.4, are required to ensure safety and reliability. The inspections, testing, and maintenance will be performed by Phillips 66 or its designated representatives.
- In consultation with the CSLC and prior to Project operation, Phillips 66 shall provide a written evaluation of their existing equipment and provide recommendations for upgrading equipment to meet up-to-date best achievable technology standards and best industry practices, including but not limited to consideration of equipment updates and operational effectiveness (e.g. visual and audible alarm options, data display location and functionality, optional system features). Phillips 66 shall follow guidance provided by SIGTTO/OCIMF 2008 "Jetty Maintenance and Inspection Guide" Section 2.3.1.1, 2.3.1.2 and 2.3.1.4.

  Best achievable technology shall address:

  - Functionality – Controlled release of the mooring lines (i.e. a single control system where each line can be remotely released individually in a controlled order and succession) vs. release all (i.e. a single control system where all lines are released simultaneously via a single push button). See SIGTTO/OCIMF 2008 "Jetty Maintenance and Inspection Guide" Section 2.3.1.2.1.
  - Layout – The location(s) of the single control panel and/or central control system to validate that it is operationally manned such that the remote release systems can actually be activated within 60 seconds.

This measure would allow a vessel to leave the Marine Terminal as quickly as possible in the event of an emergency (fire, explosion, accident, or tsunami that could lead to a spill). In the event of a fire, tsunami, explosion, or other emergency, quick release of the mooring lines within 60 seconds would allow the vessel to quickly leave the Marine Terminal, which could help prevent damage to the Marine Terminal and vessel and avoid and/or minimize spills. This may also help isolate an emergency situation, such as a fire or explosion, from spreading between the Marine Terminal and vessel, thereby reducing spill potential. The above would only be performed in a situation where transfer connections were already removed and immediate release would not further endanger terminal, vessel and personnel.

Tension Monitoring Systems

- Provide and maintain Tension Monitoring Systems to effectively monitor all mooring line and environmental loads, and avoid excessive tension or slack line conditions that could result in damage to the Marine Terminal structure and/or equipment and/or vessel mooring line failures.
- Line tensions and environmental data shall be integrated into systems that record and relay all critical data in real time to the control room, Marine Terminal operator(s) and vessel operator(s).
- All systems data shall be required to be recorded and readily accessible to enable tasks such as: (1) verification that systems are routinely operated in compliance with the MM (e.g. vessels are berthing within the MOTEMS compliant speed and angle requirements), and (2) post-event investigation and root-cause analysis (e.g. vessel allision during berthing).
- System shall include, but not be limited to, quick release hooks only (with load cells), site-specific current meter(s), site-specific anemometer(s), and visual and audible alarms that can support effective preset limits and shall be able to record and store monitoring data.
- Document procedures and training for systems use and communications between Marine Terminal and vessel operator(s).
- Routine inspection, testing and maintenance of all equipment and systems in accordance with manufacturers' recommendations and necessity, as well as guidance provided by SIGTTO/OCIMF 2008 "Jetty Maintenance and Inspection Guide" Section 2.3.1.1, 2.3.1.2 and 2.3.1.4, are required to ensure safety and reliability. The inspections, testing, and maintenance will be performed by Phillips 66 or its designated representatives.
- Install alternate technology that provides an equivalent level of protection.
- All systems data shall be required to be recorded and readily accessible to enable tasks such as: (1) verification that systems are routinely operated in compliance with the MM, and (2) post-event investigation and root-cause analysis.

The Marine Terminal is located in a high-velocity current area and currently has only limited devices to monitor mooring line strain and integrated environmental conditions. Updated MOTEMS Terminal Operating Limits (TOLs), including breasting and mooring, provide mooring requirements and operability limits that account for the conditions at the terminal. The upgrade to devices with monitoring capabilities can warn operators of the development of dangerous mooring situations, allowing time to take corrective action and minimize the potential for the parting of mooring lines, which can quickly escalate to the breaking of hose connections, the breakaway of a vessel, and/or other unsafe mooring conditions that could ultimately lead to a petroleum product spill. Backed up by an alarm system, real-time data monitoring and control room information would provide the Terminal Person-In-Charge with immediate knowledge of whether safe operating limits of the moorings are being exceeded. Mooring adjustments can be then made to reduce the risk of damage and accidental conditions.

Allision Avoidance Systems

- Provide and maintain Allision Avoidance Systems (AASs) at the Marine Terminal to prevent damage to the pier/wharf and/or vessel during docking and berthing operations. Integrate AASs with Tension Monitoring Systems such that all data collected are available in the Control Room and to Marine Terminal operator(s) at all times and vessel operator(s) during berthing operations. The AASs shall also be able to record and store monitoring data.
- All systems data shall be required to be recorded and readily accessible to enable tasks such as: (1) verification that systems are routinely operated in compliance with the MM, and (2) post-event investigation and root-cause analysis (e.g. vessel allision during berthing).
- Document procedures and training for systems use and communications between Marine Terminal and vessel operator(s).
- Routine inspection, testing and maintenance of all equipment and systems in accordance with manufacturers' recommendations and necessity, as well as guidance provided by SIGTTO/OCIMF 2008 "Jetty Maintenance and Inspection Guide", are required to ensure safety and reliability. The inspections, testing, and maintenance will be performed by Phillips 66 or its designated representatives.
- Velocity monitoring equipment is required to monitor reduced berthing velocities until permanent MOTEMS-compliant corrective actions are implemented.
- The systems shall also be utilized to monitor for vessel motion (i.e. surge and sway) during breasting/mooring operations to ensure excessive surge and sway are not incurred.

The Marine Terminal has a continuously manned marine interface operation monitoring all aspects of the marine interface. The Automatic Identification System is monitored through TerminalSmart and provides a record of vessel movements. Pursuant to the CSLC January 26, 2022 letter entitled Phillips 66 (P66) Rodeo Marine Terminal – Review of New September 2021 Mooring & Berthing Analyses and Terminal Operating Limits (TOLS), the single cone fenders shall not be used as the first point of contact during berthing operations. Therefore, all berthing operations shall utilize the double cone fenders. P66 shall incorporate TOL diagrams with landing point statements in the Terminal Information Booklet. For all vessels, a Phillips 66 Marine Advisor is in attendance and is in radio contact with the vessel master and pilot prior to berthing, reviewing initial contact point and then monitoring.

Excessive surge or sway of vessels (motion parallel or perpendicular to the wharf, respectively), and/or passing vessel forces may result in sudden shifts/redistribution of mooring forces through the mooring lines. This can quickly escalate to the failure of mooring lines, breaking of loading arm connections, the breakaway of a vessel, and/or other unsafe mooring conditions that could ultimately lead to a spill. Monitoring these factors will ensure that all vessels can safely berth at the Marine Terminal and comply with the standards required in the MOTEMS.

Changes to Section 4.10, Hydrology and Water Quality

Section 4.10.2.11, page 4.10-354, paragraph 6 of the Draft EIR is revised as follows:

> In addition, marine terminals located on lands under CSLC jurisdiction are subject to comply with the CSLC's Marine Facilities Division–developed MOTEMS. ~~For the existing Marine Terminal, these regulations establish standards for the maintenance of marine oil terminal berthing and cargo loading/unloading facilities. MOTEMS are intended to minimize the possibility of accidents at marine~~

~~oil terminals during extreme weather events and seismic activity that would lead to releases of petroleum and oil-based substances to the environment. Existing facilities are required to retrofit or rebuild as necessary to meet MOTEMS, which the Rodeo Refinery's Marine Terminal has, and Phillips 66 would continue to comply.~~

Impact 4.10-1, page 4.10- 363 is revised as follows:

Rodeo Refinery—Marine Terminal (spills)

During the 7-month transitional phase that would be concurrent with Rodeo Refinery construction, vessel traffic arriving at the Marine Terminal would increase from 80 tankers and 90 barges to an estimated 96 tankers and 92 barges, which is an increase of ~~approximately 10 percent~~ 11 percent over baseline conditions. Marine vessels would bring renewable feedstocks and gasoline-blending components. In the event of an accidental spill hazardous materials would discharge into waters of the San Pablo and San Francisco Bays.

Changes to Section 4.14, Tribal Cultural Resources

Section 4.14.2.3, page 4.14-425, is revised as follows:

California Public Resources Code

In addition to the definition of "unique archaeological resources" in PRC Section 21083.2, the sections of the California Public Resource Code applicable to the Project follow:

- PRC Title 14, Section 5097.5: any unauthorized removal or destruction of archaeological, paleontological resources on sites located on public lands is a misdemeanor.
- PRC Title 14, Section 5097.99: prohibits obtaining or possessing Native American artifacts or human remains taken from a grave or cairn; sets penalties.
- PRC Section 6313: the title to all abandoned shipwrecks and all archaeological sites and historic resources on or in the tide and submerged lands of California is vested in the state and subject to the control of the commission.

Mitigation Measure TCR-3, page 4.14-430 is revised as follows:

Mitigation Measure TCR-3: Inadvertent Discoveries

- Phillips 66 shall develop a standard operating procedure, or ensure any existing procedure, to include points of contact, timeline and schedule for the project so all possible damages can be avoided or alternatives and cumulative impacts properly accessed.
- If potential tribal cultural resources, archaeological resources, other cultural resources, articulated, or disarticulated human remains are discovered by Native American Representatives or Monitors from interested Native American Tribes, qualified cultural resources specialists or other Project personnel during construction activities, work will cease in the immediate vicinity of the find (based on the apparent distribution of cultural resources), whether or not a Native American Monitor from an interested Native American Tribe is present. A qualified cultural resources specialist and Native American Representatives and Monitors from culturally affiliated Native American Tribes will assess the significance of the find and make recommendations for further evaluation and treatment as necessary. These recommendations will be documented in the project record. For any recommendations made by interested Native American Tribes which are not implemented, a justification for why the recommendation was not followed will be provided in the project record.
- If cultural resources are recovered on State lands, submerged or tidal lands, all work within 100 feet of the find shall be halted and Phillips 66 shall consult with the California State Lands Commission.

Changes to Chapter 5, Alternatives Analysis

Chapter 5 Alternatives Analysis, Table 5-1 is revised as follows:

Table 5-1. Summary of Alternatives

	Project	**No Project**[a]	**Reduced Project**	**Terminal Only**[c]	**No Temporary Increase in Crude Oil**[b]
~~Product~~ Material Received/ Processed (bpd)					
Crude and Gas Oil Received	0	105,000[e]	0	0	0
Renewable Feedstock Received/Processed	80,000[c]	0	55,000	~~0~~ ~~0~~ ~~0~~75,000[f]	80,000[c]
Gasoline Blendstocks Received/Processed	38,000	~~115,000~~10,000	38,000		38,000
Existing Renewable Fuels Processed	13,000	13,000[d,h]	13,000		13,000
Product Produced (bpd)					
Renewable Fuels Produced/Shipped	55,000[c]	0	50,000	75,000[f]	55,000[c]
Existing Renewable Fuels Produced	12,000	12,000[d,h]	12,000		12,000
~~Conventional Fuels~~Petroleum Products Produced/Shipped	40,000	~~100~~109,000	40,000		40,000
Treated Renewable Feedstock Shipped	25,000	0	0	0	
Mode of Transportation[g]					
Ships (annual visits)	201	80	165	70	201
Barges (annual visits)	161	90	161	40	161
Truck Trips (roundtrips/year)	16,026	53,221	11,230	0	16,026
Railcars (per day)	16	5	16	8	16
Employees	650	650	630	75	650

Notes:

a. No Project and Terminal Only Alternatives would transport blend stock and product by pipeline, marine vessel, and rail.

b. The No Temporary Increase in Crude Oil Alternative at full buildout is identical to the Project; it differs only in the temporary change in throughput of crude oil during the construction period, and associated vessel calls, which is not reflected in this table. This difference, however, is described in the following discussion.

c. Up to 25,000 bpd excess capacity of pre-treated feedstocks could be sold elsewhere.

d. As explained in the Project Description, Section 3.7, *Project Operation*, the facility currently has the capacity to produce approximately 12,000 bpd of renewable fuels from pretreated feedstocks using Unit 250, which was previously used to process petroleum-based feedstocks. Unit 250 is not included in the Project as the Project does not propose any changes for Unit 250 and it would continue to produce 12,000 bpd of renewable fuels. Given that Unit 250 is not part of the Project, Unit 250 feedstock and production numbers are not included in this chart under the No Project Alternative.

e. 70,000 bpd out of 105,000 bpd would arrive by pipeline, the rest would arrive through the Marine Terminal.

f. Blendstocks and product into the facility would arrive through the Marine Terminal and by rail, and products leaving the facility would be transported by pipeline and rail.

g Reflects operations (not construction) of the Project and Alternatives.

h The amount of existing renewable fuels produced (12,000 bpd) is less than the existing renewable feeds processed (13,000 gpd) due to losses that occur during the production process.

Changes to Section 6.4, Cumulative Impacts

Section 6.4.1, Projects Considered in the Cumulative Analysis, page 6-3 is revised to read as follows:

6.4.1.1 Contra Costa County

Selby Slag Remedial Action is a 66-acre site remediation project located within unincorporated Contra Costa County adjacent to the southern shoreline of the San Pablo Bay and Carquinez Strait. The site is the location of a former smelting facility. The Remedial Action Plan identifies what actions need to take place to remediate the site.

- Application Status: The Remedial Action Plan and EIR is in draft form and under review by the DTSC. No remediation activities have been conducted.

Addition of the Selby Slag project to the cumulative list of projects does not alter the conclusions of the cumulative impact analysis in the Draft EIR.

The following text is added to the existing description of the Martinez Refinery Renewable Fuels Project in Chapter 6, CEQA Statutory Sections, Section 6.4.4.1, Contra Costa County, page 6-4:

Martinez Refinery Renewable Fuels Project (File No. CDLP20-02046) is an application for an LUP to implement the Martinez Refinery Renewable Fuels Project located at 150 Solano Way, Martinez. The project would allow the conversion of Marathon's Martinez Refinery facility from the processing of crude oil to the processing of treated and untreated renewable feedstocks. Approximately 48,000 bpd of ~~The~~ renewable feedstocks are expected to include biological based oils (i.e., soybean oil and corn oil), rendered fats, and other miscellaneous renewable feedstocks including used cooking oils or other vegetable oils. The feedstocks would be processed into renewable diesel, naphtha, propane and treated fuel gas. The conversion would include modifications to existing processing units, the installation of new units, and removal of obsolete units. New facilities include a renewable feedstock pretreatment unit, wastewater treatment equipment, and an advanced 3-stage low-NOx thermal oxidizer. All construction, demolition, and addition of new equipment would be within the existing boundaries of the refinery.

Initially, product from the Refinery would be distributed by truck to the Bay Area as well as Central and Northern California. Product would also be transported to destinations outside of the Bay Area by ship via the Avon MOT and Amorco MOT, located approximately 0.5 mile north of the Refinery and approximately 2.5 miles west of the Refinery, respectively. Both terminals would undergo modifications to facilitate receipt of renewable feedstocks and distribution of renewable fuels associated with the proposed Project. Annual vessel traffic would increase from 143 vessels to 400 vessels.

Section 6.4.1.1, under the description of the Chevron Pipe Line Company, page 6-5 is revised as follows:

- The TransMontaigne Partners Pipeline is an existing bi-directional pipeline located immediately adjacent to the western boundary of the Avon Terminal. Presently, neither the Bay Area Products Line nor the facilities at the Avon Terminal connect to the TransMontaigne Partners Pipeline.
- Application Status: Initial Study in process.

The project applicant proposes to add a second connection from the existing Bay Area Products Line to flow refined liquid product to the Chevron Avon Terminal at 611 Solano Way, Martinez, CA 94553. This second connection associated with the Avon Connectivity Project would, if completed, enable Chevron to directly transport refined liquid products from the Avon Terminal to the Kinder Morgan Concord Terminal located in unincorporated Contra Costa County near the City of Concord and would also allow Chevron to directly transport such products from the Avon Terminal to TransMontaigne Partners' Martinez Oil Terminal located in the City of Martinez.

Section 6.4, Cumulative Impacts, Table 6-1 is added to page 6-3.

Table 6-1 Geographic Context of Cumulative Impacts

Resource Topic	Geographic Area
Aesthetics	Local – area surrounding Project sites that encompass public viewpoints
Air Quality	Regional - for pollutant emissions that have regional effects, combined air basins within the following air districts were used: BAAQMD; SJVAPCD; San Luis Obispo County Air Pollution Control District; and Santa Barbara County Air Pollution Control District Local/Immediate Vicinity – a refined area was used to evaluate areas with highly localized air emissions, such as NOx and PM
Biological Resources	Regional - within 3-mile radius for more localized effects
Cultural Resources	Local/Immediate Vicinity – area of potential effect (APE)
Energy Conservation	Regional – energy grids serving Project Sites
Geology and Soils	Local/Immediate Vicinity
Greenhouse Gas Emissions	Statewide and Global
Hazards and Hazardous Materials	Regional and Local
Hydrology and Water Quality	Regional and Local
Land Use and Planning	County
Noise and Vibration	Local/Immediate Vicinity
Tribal Cultural Resources	Local/Immediate Vicinity
Wildfire	Local/Immediate Vicinity
Solid Waste	Local – service areas
Environmental Justice	Local/Immediate Vicinity

Changes to Appendices

Draft EIR Appendix B, Air Quality and Greenhouse Gas Emissions Technical Data has been replaced with Revised Appendix B, Air Quality and Greenhouse Gas Emissions Technical Data provided in the Final EIR (as a CD attachment). The revised appendix addresses minor model modifications, which resulted in revised model output sheets. The revised appendix also includes a minor text modification as follows.

Appendix B Section 3.4.1.1

~~Project transiting was modeled as far as approximately 10 nautical miles from the Marine Terminal.~~ Vessel emissions include hoteling at the wharf or at anchor, and vessel maneuvering and transit between the wharf or anchorage area out to the Pilot Buoy located 11 nautical miles west of the Golden Gate. Figure 3-3 shows the modeled transiting route ~~within this 10 nautical mile boundary for all Project sources.~~

Rodeo Renewed Project
Final Environmental
Impact Report

APPENDIX

A

MITIGATION MONITORING AND REPORTING PROGRAM

MITIGATION MONITORING AND REPORTING PROGRAM

Phillips 66 Rodeo Renewed Project

Introduction

The California Environmental Quality Act (CEQA) requires a Mitigation Monitoring and Reporting Program (MMRP) for projects where mitigation measures are a condition of project approval and development. The Contra Costa County Conservation and Development Department prepared an Environmental Impact Report in response to Phillips 66 application for a land use permit to modify the existing Rodeo Refinery into a repurposed facility that would process renewable feedstocks into renewable diesel fuel, renewable components for blending with other transportation fuels, and renewable fuel gas.

Project Overview

Repurposing of the Rodeo Refinery would assist California in meeting its stated goals of reducing greenhouse gas emissions and ultimately transitioning to carbon neutrality. It would also provide a mechanism for compliance with California’s Low-Carbon Fuel Standard and Cap and Trade programs and the federal Renewable Fuels Standard, while continuing to meet regional market demand for transportation fuels.

The Project would produce up to 55,000 bbrl/d of a variety of renewable transportation fuels from renewable feedstocks. The Rodeo Refinery as a whole post-Project would produce up to 67,000 bbrl/d. To maintain current facility capacity to supply regional market demand for transportation fuels, including renewable and conventional fuels, the post-Project facility configuration could receive, blend, and ship up to 40,000 bbrl/d of gasoline and gasoline blendstocks.

Because the Project would discontinue processing crude oil at the Rodeo Refinery, other sites owned and operated by Phillips 66 located throughout the state would be affected. Therefore, the Project consists of activities at the following four sites:

- Rodeo Site—is within the Rodeo Refinery where the proposed modifications would occur.
- Carbon Plant—is within the Rodeo Refinery in nearby Franklin Canyon and would no longer be necessary. It would be demolished.
- Santa Maria Refinery—is located in San Luis Obispo County and would no longer be necessary to provide semi-refined feedstock to the Rodeo Refinery. It would be demolished.
- Pipeline Sites—these collect crude oil for the Santa Maria Refinery and deliver semi-refined feedstock to the Rodeo Refinery and, therefore, would not be necessary. The pipelines would be cleaned and taken out of service, or sold.

Purpose of the MMRP

This MMRP has been prepared in conformance with CEQA (Public Resources Code section 21081.6) and CEQA Guidelines section 15097. The MMRP is based on the information and mitigation measures contained in the EIR for the Project. Pursuant to Public Resources Code section 21081.6(b), each of the mitigation measures identified in the MMRP will be included as enforceable permit terms in any permit issued by Contra Costa County. The purpose of this MMRP is to:

- Verify compliance with the mitigation measures identified in the EIR;
- Provide a framework to document implementation of the mitigation measures included in the EIR;
- Provide a record of mitigation requirements;

- Identify monitoring and enforcement agencies;
- Establish and clarify administrative procedures for the clearance of mitigation measures;
- Establish the frequency and duration of monitoring; and
- Utilize the existing agency review processes wherever feasible.

Phillips 66 as the Permittee shall be responsible for implementing each mitigation measure and shall be obligated to provide verification to the appropriate monitoring and enforcement agencies that each mitigation measure has been implemented. The Permittee shall maintain records demonstrating compliance with each mitigation measure. Such records shall be made available to the Contra Costa County Conservation and Development Department upon request.

All documents and other information that constitute the public record for this project shall be maintained by the Contra Costa County Conservation and Development Department and shall be available for public review at the following address:

Contra Costa County
Conservation and Development Department
30 Muir Road, Martinez CA 94553

Organization

As shown in the following table, each mitigation measure for the Project is listed and categorized by impact area, with identification of:

- Implementation Schedule – The phase of the Project during which the mitigation measure shall be monitored; relevant phases include pre-construction, construction, and operation and maintenance.
- Responsible Party – The party responsible for implementing each mitigation measure and providing verification of implementation.
- Monitoring/Enforcement – The agency, or agencies, responsible for monitoring the compliance and implementation, and enforcement of the mitigation measure.

MMRP Modification

Minor changes and modifications to the MMRP are permitted, subject to Contra Costa County Conservation and Development Department approval. Contra Costa County Conservation and Development Department, in conjunction with appropriate agencies, will determine the adequacy of any proposed change or modification, and whether the change or modification requires additional environmental review. This flexibility is sometimes necessary to protect the environment with a workable program. No changes will be permitted unless the MMRP continues to satisfy the requirements of CEQA, as determined by the Contra Costa County Conservation and Development Department.

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
Air Quality				
Mitigation Measure AQ-1: Implement BAAQMD Basic Control Measures Construction contractors shall implement the following applicable BAAQMD basic control measures as best management practices (BMPs): • All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day. • All haul trucks transporting soil, sand, or other loose material offsite shall be covered. • All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least 2 times per day, not less than 4 hours apart, on San Pablo Avenue, between the refinery and Interstate 80, and on the access roads between the Carbon Plant and Highway 4. The use of dry power sweeping is prohibited. • All vehicle speeds on unpaved roads shall be limited to 15 miles per hour. • All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used. • Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 2 minutes as recommended by the BAAQMD, and not to exceed 5 minutes as required by the California airborne toxics control measure Title 13, Section 2485 of the California Code of Regulations (CCR). Clear signage shall be provided for construction workers at all access points. • All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. • All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.	During construction and demolition	Construction Contractor	Contra Costa County Conservation and Development; BAAQMD	

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
• Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations. Construction contractors shall implement the following Advanced Construction Mitigation Measures: • All exposed surfaces shall be watered at a frequency adequate to maintain minimum soil moisture of 12 percent. Moisture content can be verified by lab samples or moisture probe. • All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph. • Wind breaks (e.g., trees, fences) shall be installed on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity. • Vegetative ground cover (e.g., fast-germinating native grass seed) shall be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established. • The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time shall be limited. Activities shall be phased to reduce the amount of disturbed surfaces at any one time. • All trucks and equipment, including their tires, shall be washed off prior to leaving the site. • Site accesses to a distance of 100 feet from the paved road shall be treated with a 6 to 12 inch compacted layer of wood chips, mulch, or gravel. • Sandbags or other erosion control measures shall be installed to prevent silt runoff to public roadways from sites with a slope greater than one percent.				
Mitigation Measure AQ-2: Implement a NOx Mitigation Plan Phillips 66 shall prepare a NOx Mitigation Plan (NM Plan) prior to the issuance of construction-related permits for site preparation. The purpose of the NM Plan is to document expected construction and transitional phase NOx emissions in detail; and, if necessary, to identify feasible and	Prior to BAAQMD permit issuance	Phillips 66	Contra Costa County Conservation and Development; BAAQMD	

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
practicable contemporaneous measures to reduce aggregated construction and transition NOx emissions to below the BAAQMD's 54 pounds per day threshold of significance. The NOx emissions estimate for the Project shall include consideration of readily available NOx construction and transition emission reduction measures, and/or other emission reduction actions that shall be implemented during construction and transitional phase of the Project. The NM Plan shall describe the approximate amount of NOx emissions reductions that will be associated with each action and reduction measure on a best estimate basis. The NM Plan shall be submitted to the Contra Costa County Department of Conservation and Development and the BAAQMD for review and approval, or conditional approval based on a determination of whether the NM Plan meets the conditions described below. The NM Plan shall include those recommended measures listed below needed to reduce the Project's construction and transition NOx emissions to less than the BAAQMD's threshold of significance. The NM Plan shall include a detailed description of the NOx emissions for all construction and transition activities based on BMPs and use data at the time of Project approval and current estimation protocols and methods. The plan shall, at a minimum, include the following elements: 1. **Project Construction and Transition NOx Emissions** The Project's construction and transition NOx emission estimates presented in the NM Plan will be based on the emission factors for off-road and on-road mobile sources used during construction and transition, over and above baseline, along with the incorporation of vehicle fleet emission standards. Project construction and transition NOx emission estimates will be based upon the final Project design, Project-specific traffic generation estimates, equipment to be used onsite and during transition, and other emission factors appropriate for the Project prior to construction. The methodology will generally follow the approach used in this Draft EIR and in Appendix B. 2. **NOx Emission Reduction Measures** The NM Plan shall include feasible and practicable NOx emission reduction measures that reduce or contemporaneously offset the Project's incremental NOx emissions below the threshold of significance. Planned emission reduction measures shall be verifiable and quantifiable during Project construction and transitional phase. The				

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
NM Plan shall be consistent with current applicable regulatory requirements. Measures shall be implemented as needed to achieve the significance threshold and considered in the following order: (a) onsite measures, and (b) offsite measures within the San Francisco Bay Area Air Basin. Feasible[1] onsite and offsite measures must be implemented before banked emissions offsets (emission reduction credits) are considered in the NM Plan. **a. Recommended Onsite Emission Reduction Measures:** i. Onsite equipment and vehicle idling and/or daily operating hour curtailments; ii. Construction "clean fleet" using Tier 4 construction equipment to the maximum extent practicable; iii. Reductions in Vessel and/or Rail Traffic; iv. Other onsite NOx reduction measures (e.g., add-on NOx emission controls); or v. Avoid the use of Suezmax vessels to the maximum extent practicable. Contra Costa County Department of Conservation and Development in its consideration of the NM Plan shall have the option to require daily NOx reductions at the Carbon Plant necessary to achieve the NOx daily emissions significance threshold. Daily idling of one kiln would provide sufficient NOx reductions to offset the Project's incremental NOx emissions to below the NOx daily emissions threshold of significance on individual days that construction emissions are estimated to potentially be above the daily NOx significance threshold. Additional measures and technology to reduce NOx emissions may become available during the Project construction and operation period. Such measures may include new energy systems (such as battery storage) to replace natural gas use, new transportation systems (such as electric vehicles or equipment) to reduce fossil-fueled vehicles, or other technology (such as alternatively-fueled emergency generators or renewable backup energy supply) that is				

[1] For the purposes of this mitigation measure, "feasible" shall mean as defined under CEQA "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors."

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
not currently available at the project-level. As provided in the NM Plan, should such measures and technology become available and be necessary to further reduce emissions to below significance thresholds, Phillips 66 shall demonstrate to the Contra Costa County Department of Conservation and Development and BAAQMD satisfaction that such measures are as, or more, effective as the existing measures described above. **b. Recommended Offsite Emission Reduction Measures:** Phillips 66, with the oversight of the Contra Costa County Department of Conservation and Development and BAAQMD, shall reduce emissions of NOx by directly funding or implementing a NOx control project (program) within the San Francisco Bay Area Air Basin to achieve an annual reduction equivalent to the total estimated construction NOx emission reductions needed to lower the Project's NOx impact below the 54 pound per day significance threshold. The offsite measures will be based on the NOx reductions necessary after consideration of onsite measures. To qualify under this mitigation measure, the NOx control project must result in emission reductions within the San Francisco Bay Area Air Basin that would not otherwise be achieved through compliance with existing regulatory requirements or other program participation. Phillips 66 shall notify Contra Costa County within six months of completion of the NOx control project for verification. **3. Annual Verification Reports** Phillips 66 shall prepare an Annual NM Verification Report in the first quarter of each year following construction or transitional phase activities, while Project construction activities at the site are ongoing. The reporting period will extend through the last year of construction. The purpose of the Report is to verify and document that the total Project construction and transitional phase NOx emissions for the previous year, based on appropriate emissions factors for that year and the effectiveness of emission reduction measures, were implemented. The Report shall also show whether additional onsite and offsite emission reduction measures, or additional NOx controls, would be needed to bring the Project below the threshold of significance for the current year. The Report shall be prepared by Phillips 66 and submitted to the Contra Costa County Department of Conservation and				

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
Development and the BAAQMD for review and verification. NOx offsets for the previous year, if required, shall be in place by the end of the subsequent reporting year. If Contra Costa County and the BAAQMD determine the report is reasonably accurate, they can approve the report; otherwise, Contra Costa County and/or the BAAQMD shall identify deficiencies and direct Phillips 66 to correct and re-submit the report for approval.				
Mitigation Measure AQ-4: Odor Management Plan Phillips 66 shall develop and implement an Odor Management Plan (OMP). The OMP shall be an integrated part of daily operations at the Rodeo Site, to effect diligent identification and remediation of any potential odors generated by the Facility. • The OMP shall be developed and reviewed by the County and the BAAQMD prior to operation of the Project, and implemented upon commencement of the renewable fuels processes. • The OMP shall be an "evergreen" document that provides continuous evaluation of the overall system performance, identifying any trends to provide an opportunity for improvements to the plan, and updating the odor management and control strategies as necessary. • The OMP shall include guidance for the proactive identification and documentation of odors through routine employee observations, routine operational inspections, and odor compliant investigations. • All odor complaints received by the facility shall be investigated as soon as is practical within the confines of proper safety protocols and site logistics. The goal of the investigation will be to determine if an odor originates from the facility and, if so, to determine the specific source and cause of the odor, and then to remediate the odor. • The OMP shall be retained at the facility for Contra Costa County, the BAAQMD, or other government agency inspection upon request.	Obtain approval of OMP prior to Project operation; ongoing	Phillips 66	Contra Costa County Conservation and Development; BAAQMD	

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
Biological Resources				
Mitigation Measure BIO-1a: Update Pre-Arrival Documents Phillips 66 shall update pre-arrival document materials and instructions sent to tank vessels agents/operators scheduled to arrive at the Marine Terminal with the following information and requests: • Available outreach materials regarding the Blue Whales and Blue Skies incentive program; • Whale strike outreach materials and collision reporting from NMFS; • Request extra vigilance by ship crews upon entering the Traffic Separation Scheme shipping lanes approaching San Francisco Bay and departing San Francisco Bay to aid in detection and avoidance of ship strike collisions with whales; • Request compliance to the maximum extent feasible (based on vessel safety) with the 10 knot voluntary speed reduction zone. • Encourage participation in the Blue Whales and Blue Skies incentive program.	Prior to the commencement of transitional phase; ongoing	Phillips 66	Contra Costa County Conservation and Development	
Mitigation Measure BIO-1b: California Department of Fish and Wildlife (CDFW) and Research Sturgeon Support Phillips 66 will conduct and support the following activities to further the understanding of vessel strike vulnerability of sturgeon in San Francisco and San Pablo Bay. Coordinate with CDFW and Research Sturgeon to ensure appropriate messaging on information flyers suitable for display at bait and tackle shops, boat rentals, fuel docks, fishing piers, ferry stations, dockside businesses, etc. to briefly introduce interesting facts about the sturgeon and research being conducted to learn more about its requirements and how the public's observations can inform strategies being developed to improve fisheries habitat within the estuary.	Prior to the commencement of transitional phase; ongoing	Phillips 66	Contra Costa County Conservation and Development	

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
Mitigation Measure BIO-3: Update and Review Facility Response Plan and Spill Prevention, Control, and Countermeasure Plan with OSPR • The Facility Response Plan and Spill Prevention, Control, and Countermeasure (SPCC) Plan shall be updated to address the Project operational changes, including changes in proposed feedstocks and types of vessels and trips. The SPCC shall address the operational changes of the Transitional Phase and post-Project. Phillips 66 will consult with OSPR during update of the SPCC Plan, especially adequacy of booms at the Marine Terminal to quickly contain a spill of renewable feedstocks • In accordance with CCR Title 14, Chapter 3, Subchapter 3, several types of drills are required at specified intervals. Due to the potential for rapid dispersion of biofuels and oils under high energy conditions, Phillips 66 shall increase the frequency of the following drills to increase preparedness for quick response and site-specific deployment of equipment under different environmental conditions. – Semi-annual equipment deployment drills to test the deployment of facility-owned equipment, which shall include immediate containment strategies, are required on a semiannual pass/fail basis – if there is fail during first six months, then another drill is required. Phillips 66 will require that both semi-annual drills are conducted and schedule them under different tide conditions. – An OSRO field equipment deployment drill for on-water recovery is required at least once every three years. Phillips will increase the frequency of this drill to annual. – CDFW-OSPR shall be provided an opportunity to help design, attend and evaluate all equipment deployment drills and tabletop exercises. To ensure this, Phillips 66 shall schedule annual drills during the first quarter of each year to ensure a spot on OSPR's calendar.	Prior to the commencement of transitional phase; ongoing	Phillips 66	Contra Costa County Conservation and Development	
Mitigation Measure BIO-4a: Prohibit Ballast Water Exchange Phillips 66 shall prohibit vessels from ballast water exchange at the Marine Terminal.	During operation and maintenance; ongoing	Phillips 66	Contra Costa County Conservation and Development	

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
Mitigation Measure BIO-4b: Update Pre-Arrival Documentation Phillips 66 shall update pre-arrival document materials and instructions sent to tank vessels agents/operators to ensure they are advised prior to vessel departure of California's Marine Invasive Species Act and implementing regulations pertinent to (1) ballast water management, and (2) biofouling management. Additionally, Phillips 66 will request that vessel operations provide documentation of compliance with regulatory requirements (e.g., copy of ballast water management forms and logs of hull husbandry cleaning/inspections).	Prior to the commencement of transitional phase; ongoing	Phillips 66	Contra Costa County Conservation and Development	
Cultural Resources				
Mitigation Measure CUL-1: Inadvertent Discovery of Archaeological Resources • Pursuant to CEQA Guidelines Section 15064.5(f), "provisions for historical or unique archaeological resources accidentally discovered during construction" shall be instituted. In the event that any cultural resources are discovered during ground-disturbing activities, all work within 100 feet of the find shall be halted and Phillips 66 shall consult with the County and a qualified archaeologist (as approved by the County) to assess the significance of the find pursuant to CEQA Guidelines Section 15064.5. If cultural resources are recovered on State lands, submerged or tidal lands, all work within 100 feet of the find shall be halted and Phillips 66 shall consult with the California State Lands Commission. If any find is determined to be significant, representatives of the County and the qualified archaeologist would meet to determine the appropriate course of action. • Avoidance is always the preferred course of action for archaeological sites. In considering any suggestion proposed by the consulting archaeologist to reduce impacts to archaeological resources, the County would determine whether avoidance is feasible in light of factors such as the nature of the find, project design, costs, and other considerations. If avoidance is infeasible, other appropriate measures (e.g., data recovery, interpretation of finds in a public venue) would be instituted. Work may proceed on other parts of the Project site while mitigation for archaeological resources is carried out. All significant cultural materials recovered shall be, at the discretion of the consulting archaeologist, subject to	During construction and demolition	Phillips 66	Contra Costa County Conservation and Development	

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
scientific analysis, professional museum curation, and documented according to current professional standards.				
Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains • The treatment of human remains and associated or unassociated funerary objects discovered during any ground-disturbing activity shall comply with applicable state law. Project personnel shall be alerted to the possibility of encountering human remains during Project implementation, and apprised of the proper procedures to follow in the event they are found. State law requires immediate notification of the County coroner, in the event of the coroner's determination that the human remains are Native American, notification of the California Native American Heritage Commission (NAHC), which would appoint a Most Likely Descendent (MLD) (PRC Section 5097.98). The MLD would make all reasonable efforts to develop an agreement for the treatment, with appropriate dignity, of human remains and associated or unassociated funerary objects (CEQA Guidelines Section 15064.5[d]). • The agreement shall take into consideration the appropriate excavation, removal, recordation, analysis, custodianship, curation, and final disposition of the human remains and associated or unassociated funerary objects. The PRC allows 48 hours to reach agreement on these matters. If the MLD and the other parties do not agree on the treatment and disposition of the remains and funerary objects, Phillips 66 shall follow PRC Section 5097.98(b), which states that "the landowner or his or her authorized representative shall reinter the human remains and items associated with Native American burials with appropriate dignity on the property in a location not subject to further subsurface disturbance."	During construction and demolition	Phillips 66	Contra Costa County Conservation and Development	

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
Geology and Soils				
Mitigation Measure GEO-1: Comply with Geotechnical Report Phillips 66 shall comply with and implement all of the following measures designed to reduce potential substantial adverse effects resulting from strong seismic ground shaking: • A California licensed geotechnical engineer or engineering geologist shall perform a comprehensive geotechnical investigation of all Project facilities based on adequate subsurface exploration, laboratory testing of selected samples, and engineering/geologic analysis of the data gathered. The information shall be compiled and presented as a geotechnical report that provides an evaluation of potential seismic and geologic hazards, including secondary seismic ground failures, and other geologic hazards, such as landslides, expansive and corrosive soils, and provides current California Building Code seismic design parameters, along with providing specific standards and criteria for site grading, drainage, berm, and foundation design. • For construction requiring excavations, such as foundations, appropriate support and protection measures shall be implemented to maintain the stability of excavations and to protect construction worker safety. Where excavations are adjacent to existing structures, utilities, or other features that may be adversely affected by potential ground movements, bracing, underpinning, or other methods of support for the affected facilities shall be implemented. • Recommendations in the approved geotechnical report shall be incorporated into the design and construction specifications and shall be implemented during build-out of the Project. • The Project geotechnical engineer shall provide observation and testing services during grading and foundation-related work, and shall submit a grading completion report to the County prior to requesting the final inspection. This report shall provide full documentation of the geotechnical monitoring services provided during construction, including the testing results of the American Society for Testing and Materials. The Final Grading Report shall	Prior to Contra Costa County Building Permit Issuance	Construction Contractor	Contra Costa County Conservation and Development	

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
also certify compliance of the as-built Project with the recommendations in the approved geotechnical report.				
Hazards Materials and Water Quality				
Mitigation Measure HAZ-1: Implement Release, Monitoring and Avoidance Systems The following actions shall be completed by Phillips 66 prior to Project operations, including the transitional phase, and shall include routine inspection, testing and maintenance of all equipment and systems conducted in accordance with manufacturers' recommendations and industry guidance for effective maintenance of critical equipment at the Marine Terminal. Feedstocks handled at the Marine Terminal are not regulated under the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act (LKS Act) (e.g. renewable feedstocks such as soybean oil and tallow) and therefore not subject to OSPR oversight, and are also not subject to the CSLC oversight efforts (MOTEMS, Article 5, Article 5.3 and Article 5.5, depending on the materials handled). Yet materials may be detrimental to the environment if spilled. Regulated products (i.e. "Oil" and "Renewable Fuels" defined in Pub. Resources Code sec. 8750) will continue to be transferred at the Marine Terminal, which do require MOTEMS-compliant Terminal Operating Limits for those products that reside within the jurisdiction of the CSLC. To ensure that Project operation continues to meet those standards, the following measures are required. **Applicability of MOTEMS, Article 5, 5.3, 5.5 and Spill Prevention Requirements** As some materials transferred at the terminal may be feedstocks or other non-regulated materials/feedstocks/products, Phillips 66 shall comply with the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act (LKS Act) for all vessels calling at the Marine Terminal regardless of feedstock/material type. In addition, MOTEMs operational regulations, as codified in Article 5. Marine Terminals Inspection and Monitoring (2CCR §2300 et seq), Article 5.3 Marine Terminals Personnel Training and Certification (2CCR §2540 et seq), and Article 5.5 Marine Terminals Oil Pipelines (2CCR §2560 et seq), including items such as static liquid pressure testing of pipelines, shall be implemented for all operations at the Marine Terminal regardless of feedstock/material type and LKS Act regulatory status.	Prior to the commencement of transitional phase; ongoing	Phillips 66	California State Lands Commission	

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
Upon request, Phillips 66 shall provide evidence to relevant regulatory agencies that these facilities, operational response plans, and other applicable measures have been inspected and approved by CSLC and OSPR and determined to be in compliance. If terminal operations do not allow for regular compliance and inspection of LKS and MOTEMS requirements by the CSLC and OSPR, Philips 66 shall employ a CSLC-approved third-party to provide oversight as needed to ensure the same level of compliance as a petroleum-handling facility, and to ensure maximum protection of the environment from potential spills and resulting impacts. Phillips 66 shall provide evidence of compliance upon request of relevant regulatory agencies. **Remote Release Systems** The Marine Terminal has a remote release system that can be activated from a single control panel or at each quick-release mooring hook set. The central control system can be switched on in case of an emergency necessitating a single release of all mooring lines. However, to further minimize the potential for accident releases the following is required: • Provide and maintain mooring line quick release devices that shall have the ability to be activated within 60 seconds. • These devices shall be capable of being engaged by electric/push button release mechanism and by integrated remotely-operated release system. • Document procedures and training for systems use and communications between Marine Terminal and vessel operator(s). • Routine inspection, testing and maintenance of all equipment and systems in accordance with manufacturers' recommendations and necessity, as well as guidance provided by SIGTTO/OCIMF 2008 "Jetty Maintenance and Inspection Guide" Section 2.3.1.1, 2.3.1.2 and 2.3.1.4, are required to ensure safety and reliability. The inspections, testing, and maintenance will be performed by Phillips 66 or its designated representatives. • In consultation with the CSLC and prior to Project operation, Phillips 66 shall provide a written evaluation of their existing equipment and provide recommendations for upgrading equipment to meet up-to-date best achievable technology standards and best industry practices, including but not limited to consideration of equipment updates and operational effectiveness (e.g. visual and				

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
audible alarm options, data display location and functionality, optional system features). Phillips 66 shall follow guidance provided by SIGTTO/OCIMF 2008 "Jetty Maintenance and Inspection Guide" Section 2.3.1.1, 2.3.1.2 and 2.3.1.4. • Best achievable technology shall address: – Functionality – Controlled release of the mooring lines (i.e. a single control system where each line can be remotely released individually in a controlled order and succession) vs. release all (i.e. a single control system where all lines are released simultaneously via a single push button). See SIGTTO/OCIMF 2008 "Jetty Maintenance and Inspection Guide" Section 2.3.1.2.1. – Layout – The location(s) of the single control panel and/or central control system to validate that it is operationally manned such that the remote release systems can actually be activated within 60 seconds. This measure would allow a vessel to leave the Marine Terminal as quickly as possible in the event of an emergency (fire, explosion, accident, or tsunami that could lead to a spill). In the event of a fire, tsunami, explosion, or other emergency, quick release of the mooring lines within 60 seconds would allow the vessel to quickly leave the Marine Terminal, which could help prevent damage to the Marine Terminal and vessel and avoid and/or minimize spills. This may also help isolate an emergency situation, such as a fire or explosion, from spreading between the Marine Terminal and vessel, thereby reducing spill potential. The above would only be performed in a situation where transfer connections were already removed and immediate release would not further endanger terminal, vessel and personnel. **Tension Monitoring Systems** • Provide and maintain Tension Monitoring Systems to effectively monitor all mooring line and environmental loads, and avoid excessive tension or slack line conditions that could result in damage to the Marine Terminal structure and/or equipment and/or vessel mooring line failures. • Line tensions and environmental data shall be integrated into systems that record and relay all critical data in real time to the control room, Marine Terminal operator(s) and vessel operator(s).				

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
• All systems data shall be required to be recorded and readily accessible to enable tasks such as: (1) verification that systems are routinely operated in compliance with the MM (e.g. vessels are berthing within the MOTEMS compliant speed and angle requirements), and (2) post-event investigation and root-cause analysis (e.g. vessel allision during berthing). • System shall include, but not be limited to, quick release hooks only (with load cells), site-specific current meter(s), site-specific anemometer(s), and visual and audible alarms that can support effective preset limits and shall be able to record and store monitoring data. • Document procedures and training for systems use and communications between Marine Terminal and vessel operator(s). • Routine inspection, testing and maintenance of all equipment and systems in accordance with manufacturers' recommendations and necessity, as well as guidance provided by SIGTTO/OCIMF 2008 "Jetty Maintenance and Inspection Guide" Section 2.3.1.1, 2.3.1.2 and 2.3.1.4, are required to ensure safety and reliability. The inspections, testing, and maintenance will be performed by Phillips 66 or its designated representatives. • Install alternate technology that provides an equivalent level of protection. • All systems data shall be required to be recorded and readily accessible to enable tasks such as: (1) verification that systems are routinely operated in compliance with the MM, and (2) post-event investigation and root-cause analysis. The Marine Terminal is located in a high-velocity current area and currently has only limited devices to monitor mooring line strain and integrated environmental conditions. Updated MOTEMS Terminal Operating Limits (TOLs), including breasting and mooring, provide mooring requirements and operability limits that account for the conditions at the terminal. The upgrade to devices with monitoring capabilities can warn operators of the development of dangerous mooring situations, allowing time to take corrective action and minimize the potential for the parting of mooring lines, which can quickly escalate to the breaking of hose connections, the breakaway of a vessel, and/or other unsafe mooring conditions that could ultimately lead to a petroleum product spill. Backed up by an alarm system,				

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
real-time data monitoring and control room information would provide the Terminal Person-In-Charge with immediate knowledge of whether safe operating limits of the moorings are being exceeded. Mooring adjustments can be then made to reduce the risk of damage and accidental conditions. **Allision Avoidance Systems** • Provide and maintain Allision Avoidance Systems (AASs) at the Marine Terminal to prevent damage to the pier/wharf and/or vessel during docking and berthing operations. Integrate AASs with Tension Monitoring Systems such that all data collected are available in the Control Room and to Marine Terminal operator(s) at all times and vessel operator(s) during berthing operations. The AASs shall also be able to record and store monitoring data. • All systems data shall be required to be recorded and readily accessible to enable tasks such as: (1) verification that systems are routinely operated in compliance with the MM, and (2) post-event investigation and root-cause analysis (e.g. vessel allision during berthing). • Document procedures and training for systems use and communications between Marine Terminal and vessel operator(s). • Routine inspection, testing and maintenance of all equipment and systems in accordance with manufacturers' recommendations and necessity, as well as guidance provided by SIGTTO/OCIMF 2008 "Jetty Maintenance and Inspection Guide", are required to ensure safety and reliability. The inspections, testing, and maintenance will be performed by Phillips 66 or its designated representatives. • Velocity monitoring equipment is required to monitor reduced berthing velocities until permanent MOTEMS-compliant corrective actions are implemented. • The systems shall also be utilized to monitor for vessel motion (i.e. surge and sway) during breasting/mooring operations to ensure excessive surge and sway are not incurred. The Marine Terminal has a continuously manned marine interface operation monitoring all aspects of the marine interface. The Automatic Identification System is monitored through TerminalSmart and provides a record of vessel movements. Pursuant to the CSLC January 26, 2022 letter entitled Phillips 66 (P66) Rodeo Marine Terminal – Review of New September 2021				

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
Mooring & Berthing Analyses and Terminal Operating Limits (TOLS), the single cone fenders shall not be used as the first point of contact during berthing operations. Therefore, all berthing operations shall utilize the double cone fenders. P66 shall incorporate TOL diagrams with landing point statements in the Terminal Information Booklet. For all vessels, a Phillips 66 Marine Advisor is in attendance and is in radio contact with the vessel master and pilot prior to berthing, reviewing initial contact point and then monitoring. Excessive surge or sway of vessels (motion parallel or perpendicular to the wharf, respectively), and/or passing vessel forces may result in sudden shifts/redistribution of mooring forces through the mooring lines. This can quickly escalate to the failure of mooring lines, breaking of loading arm connections, the breakaway of a vessel, and/or other unsafe mooring conditions that could ultimately lead to a spill. Monitoring these factors will ensure that all vessels can safely berth at the Marine Terminal and comply with the standards required in the MOTEMS.				
Transportation and Traffic				
Mitigation Measure TRA-1: Implement a Traffic Management Plan. Prior to issuance of grading and building permits, Phillips 66 shall submit a Traffic Management Plan for review and approval by the Contra Costa County Public Works Department. At a minimum the following shall be included: • The Traffic Management Plan shall be prepared in accordance with the most current California Manual on Uniform Traffic Control Devices, and will be subject to periodic review by the Contra Costa County Public Works Department throughout the life of all construction and demolition phases. • Truck drivers shall be notified of and required to use the most direct route between the site and the freeway; • All site ingress and egress shall occur only at the main driveways to the Project site; • Construction vehicles shall be monitored and controlled by flaggers; • If during periodic review the Contra Costa County Public Works Department, or the Department of Conservation and Development, determines the Traffic Management Plan requires modification, Phillips 66 shall revise the Traffic Management Plan to meet the	Prior to Contra Costa County Building Permit Issuance	Construction Contractor	Contra Costa County Conservation and Development	

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
specifications of Contra Costa County to address any identified issues. This may include such actions as traffic signal modifications, staggered work hours, or other measures deemed appropriate by the Public Works Department. • If required, Phillips 66 shall obtain the appropriate permits from Caltrans for the movement of oversized or excessive load vehicles on state-administered highways				
Tribal Cultural Resources				
Mitigation Measure TCR-1: Awareness Training • A consultant and construction worker tribal cultural resources awareness brochure and training program for all personnel involved in project implementation shall be developed by Phillips 66 in coordination with interested Native American Tribes (i.e. Wilton Rancheria). The brochure will be distributed and the training will be conducted in coordination with qualified cultural resources specialists and Native American Representatives and Monitors from culturally affiliated Native American Tribes before any stages of project implementation and construction activities begin on the Project site. The program will include relevant information regarding sensitive tribal cultural resources, including applicable regulations, protocols for avoidance, and consequences of violating state laws and regulations. The worker cultural resources awareness program will also describe appropriate avoidance and minimization measures for resources that have the potential to be located on the Project site and will outline what to do and whom to contact if any potential archaeological resources or artifacts are encountered. The program will also underscore the requirement for confidentiality and culturally-appropriate treatment of any find of significance to Native Americans and behaviors, consistent with Native American Tribal values.				
Mitigation Measure TCR -2: Monitoring To minimize the potential for destruction of or damage to existing or previously undiscovered burials, archaeological and tribal cultural resources and to identify any such resources at the earliest possible time during project-related earthmoving activities, Phillips 66 and its construction contractor(s) will implement the following measures:				

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
• Paid Native American monitors from culturally affiliated Native American Tribes will be invited to monitor the vegetation grubbing, stripping, grading or other ground-disturbing activities in the project area to determine the presence or absence of any cultural resources. Native American representatives from cultural affiliated Native American Tribes act as a representative of their Tribal government and shall be consulted before any cultural studies or ground-disturbing activities begin. • Native American representatives and Native American monitors have the authority to identify sites or objects of significance to Native Americans and to request that work be stopped, diverted or slowed if such sites or objects are identified within the direct impact area. Only a Native American representative can recommend appropriate treatment of such sites or objects. • If buried cultural resources, such as chipped or ground stone, historic debris, building foundations, or bone, are discovered during ground-disturbing activities, work will stop in that area and within 100 feet of the find until an archaeologist who meets the Secretary of the Interior's qualification standards can assess the significance of the find and, if necessary, develop appropriate treatment measures in consultation with the California Department of Transportation, the State Historic Preservation Office, and other appropriate agencies. Appropriate treatment measures may include development of avoidance or protection methods, archaeological excavations to recover important information about the resource, research, or other actions determined during consultation. • In accordance with the California Health and Safety Code, if human remains are uncovered during ground disturbing activities, the construction contractor or the County, or both, shall immediately halt potentially damaging excavation in the area of the burial and notify the County coroner and a qualified professional archaeologist to determine the nature of the remains. The coroner shall examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands, in accordance with Section 7050(b) of the Health and Safety Code. If the coroner determines that the remains are those of a Native American, they shall contact the NAHC by phone within 24 hours of making that determination				

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
(Health and Safety Code Section 7050[c]). After the coroner's findings are presented, the County, the archaeologist, and the NAHC-designated MLD shall determine the ultimate treatment and disposition of the remains and take appropriate steps to ensure that additional human interments are not disturbed.				
Mitigation Measure TCR -3: Inadvertent Discoveries • Phillips 66 shall develop a standard operating procedure, or ensure any existing procedure, to include points of contact, timeline and schedule for the project so all possible damages can be avoided or alternatives and cumulative impacts properly accessed. • If potential tribal cultural resources, archaeological resources, other cultural resources, articulated, or disarticulated human remains are discovered by Native American Representatives or Monitors from interested Native American Tribes, qualified cultural resources specialists or other Project personnel during construction activities, work will cease in the immediate vicinity of the find (based on the apparent distribution of cultural resources), whether or not a Native American Monitor from an interested Native American Tribe is present. A qualified cultural resources specialist and Native American Representatives and Monitors from culturally affiliated Native American Tribes will assess the significance of the find and make recommendations for further evaluation and treatment as necessary. These recommendations will be documented in the project record. For any recommendations made by interested Native American Tribes which are not implemented, a justification for why the recommendation was not followed will be provided in the project record. • If adverse impacts to tribal cultural resources, unique archeology, or other cultural resources occurs, then consultation with Wilton Rancheria regarding mitigation contained in the Public Resources Code sections 21084.3(a) and (b) and CEQA Guidelines section 15370 should occur, in order to coordinate for compensation for the impact by replacing or providing substitute resources or environments.	During construction and demolition	Phillips 66	Contra Costa County Conservation and Development	

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
• If cultural resources are recovered on State lands, submerged or tidal lands, all work within 100 feet of the find shall be halted and Phillips 66 shall consult with the California State Lands Commission.				
Mitigation Measure TCR-4: Avoidance and Preservation Avoidance and preservation in place is the preferred manner of mitigating impacts to tribal cultural resources and shall be accomplished by several means, including: • Planning construction to avoid tribal cultural resources, archaeological sites and/ or other resources; incorporating sites within parks, green-space or other open space; covering archaeological sites; deeding a site to a permanent conservation easement; or other preservation and protection methods agreeable to consulting parties and regulatory authorities with jurisdiction over the activity. Recommendations for avoidance of cultural resources will be reviewed by the CEQA lead agency representative, interested Native American Tribes and the appropriate agencies, in light of factors such as costs, logistics, feasibility, design, technology and social, cultural and environmental considerations, and the extent to which avoidance is consistent with project objectives. Avoidance and design alternatives may include realignment within the project area to avoid cultural resources, modification of the design to eliminate or reduce impacts to cultural resources or modification or realignment to avoid highly significant features within a cultural resource. Native American Representatives from interested Native American Tribes will be allowed to review and comment on these analyses and shall have the opportunity to meet with the CEQA lead agency representative and its representatives who have technical expertise to identify and recommend feasible avoidance and design alternatives, so that appropriate and feasible avoidance and design alternatives can be identified. • If the resource can be avoided, the construction contractor(s), with paid Native American monitors from culturally affiliated Native American Tribes present, will install protective fencing outside the site boundary, including a buffer area, before construction restarts. The construction contractor(s) will maintain the protective fencing throughout construction to avoid the site during all remaining	During construction and demolition	Phillips 66	Contra Costa County Conservation and Development	

Mitigation Measure	Implementation Timing	Implementation Responsibility	Verification Responsibility	Compliance Verification Date
phases of construction. The area will be demarcated as an “Environmentally Sensitive Area.” Native American representatives from interested Native American Tribes and the CEQA lead agency representative will also consult to develop measures for long term management of the resource and routine operation and maintenance within culturally sensitive areas that retain resource integrity, including tribal cultural integrity, and including archaeological material, Traditional Cultural Properties and cultural landscapes, in accordance with state and federal guidance including National Register Bulletin 30 (Guidelines for Evaluating and Documenting Rural Historic Landscapes), Bulletin 36 (Guidelines for Evaluating and Registering Archaeological Properties), and Bulletin 38 (Guidelines for Evaluating and Documenting Traditional Cultural Properties); National Park Service Preservation Brief 36 (Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes) and using the Advisory Council on Historic Preservation’s Native American Traditional Cultural Landscapes Action Plan for further guidance. Use of temporary and permanent forms of protective fencing will be determined in consultation with Native American representatives from interested Native American Tribes.				

Rodeo Renewed Project
Final Environmental
Impact Report

APPENDIX B

REVISED DEIR APPENDIX B,
AIR QUALITY AND GHG
TECHNICAL DATA

The Technical Air Quality Report
is provided under separate cover that can be found at:

Contra Costa County
Department of Conservation and Development
30 Muir Road, Martinez, CA 94553 USA
www.contracosta.ca.gov

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About Cardno

Cardno is an ASX-200 professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage, and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

Cardno Zero Harm

Cardno ZERO HARM EVERY JOB. EVERY DAY.

At Cardno, our primary concern is to develop and maintain safe and healthy conditions for anyone involved at our project worksites. We require full compliance with our Health and Safety Policy Manual and established work procedures and expect the same protocol from our subcontractors. We are committed to achieving our Zero Harm goal by continually improving our safety systems, education, and vigilance at the workplace and in the field. Safety is a Cardno core value and through strong leadership and active employee participation, we seek to implement and reinforce these leading actions on every job, every day.