

# **Energy Consumption Assessment for the North Star 2 Project**

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**County of Imperial, California**

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**LIST OF ACRONYMS AND ABBREVIATIONS**

<b>Term</b>	<b>Definition</b>
BESS	Battery Electric Storage System
CalEEMod	California Emissions Estimator Model
CAISO	California Independent System Operator
CARB	California Air Resources Board
CEC	California Energy Commission
CPUC	California Public Utilities Commission
EO	Executive Order
EPS	Emissions Performance Standard

<b>Term</b>	<b>Definition</b>
HSAT	Horizontal Single-Axis Tracker
IID	Imperial Irrigation District
kWh	Kilowatt-Hours
MW	Megawatt
MWh	Megawatt Hour
PV	Photovoltaic
Project	North Star 2 Project
RPS	Renewable Portfolio Standard
SB	Senate Bill

## **1.0 INTRODUCTION**

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This report documents the results of an Energy Impact Assessment completed for the North Star 2 Solar Energy Project (Project), which includes the construction of a 130-megawatt (MW) alternating current solar field and a 175 MW Battery Electric Storage System (BESS) on approximately 614 acres of vacant land on two parcels in Imperial County, California (APN 039-140-013, 460 acres, and APN 039-140-014, 154 acres). This report was prepared to analyze the potential direct and indirect environmental impacts associated with Project energy consumption, including the depletion of nonrenewable resources (e.g., oil, natural gas, coal) during the construction and operational phases. The impact analysis focuses on the four sources of energy that are relevant to the Proposed Project: electricity, natural gas, the equipment-fuel necessary for Project construction, and the automotive fuel necessary for Project operations.

### **1.1 Project Overview**

The Project proposes to construct a 130-MW alternating current solar field, consisting of 289,800 tracker modules in 9,660 strings and associated collector and inverter facilities, and a 175 MW battery energy storage system (BESS), on approximately 614 acres of vacant land. The Project would connect to the grid offsite through an approximately 1.25-mile gen-tie line to the 230 kilovolt (kV) KN transmission line near the East Highland Canal. Operational water supply for the Project would be trucked in from offsite over the life of the Project. Neither parcel is within the County's Renewable Energy and Transmission (RE) Element. An amendment to the County's General Plan will be needed to include and classify the Project Site within the RE Overlay Zone. Additionally, a conditional use permit (CUP) to allow construction and operation of the solar energy generation facility with battery storage within the RE Overlay Zone will be required to implement the Project.

### **1.2 Project Location**

The total combined Project Site, consisting of two separate parcels of 154 acres and 460 acres in size, spans approximately 614 acres on land between the East Highline Canal and Coachella Canal, abutting State Route 78 on the Site's southern boundary and approximately 13 miles east of Brawley. The Site is currently vacant, undeveloped land, and is surrounded by Open Space on all sides. The California Department of Conservation's Imperial County Important Farmland Map (2018) categorizes the parcels as "Other Land," indicating that they are not considered important farmland under any category Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance).

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## **2.0 ENERGY CONSUMPTION**

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### **2.1 Energy Types and Sources**

California relies on a regional power system comprised of a diverse mix of natural gas, renewable, hydroelectric, and nuclear generation resources. Natural gas provides California with a majority of its electricity followed by renewables, large hydroelectric and nuclear (California Energy Commission [CEC] 2021a). Imperial Irrigation District (IID), the sixth largest electrical utility in California serving more than 150,000 customers in the Imperial Valley and parts of Riverside and San Diego counties, provides electrical services to the Project Area. IID controls more than 1,100 megawatts of energy derived from a diverse resource portfolio that includes its own generation, and long- and short-term power purchases. Located in a region with abundant sunshine, enviable geothermal capacity, wind and other renewable potential, IID has met or exceeded all Renewable Portfolio Standard (RPS) requirements to date, procuring renewable energy from diverse sources, including biomass, biowaste, geothermal, hydroelectric, solar and wind.

The Southern California Gas Company provides natural gas services to Imperial County. As the nation's largest natural gas distribution utility, the Southern California Gas Company delivers natural gas energy to 21.6 million consumers through 5.9 million meters in more than 500 communities. The Southern California Gas Company's service territory encompasses approximately 20,000 square miles throughout Central and Southern California, from Visalia to the Mexican border.

Imperial County, which encompasses the Project Site, contains 54 power plants generating electricity, of which 23 are solar-powered, 18 are geothermal, eight are hydro-powered, three are natural gas-fired, one is biomass-fired, and one is wind-powered (CEC 2021b).

#### **2.1.1 Energy Consumption**

Electricity use is measured in kilowatt-hours (kWh) and natural gas use is measured in therms. Vehicle fuel use is typically measured in gallons (e.g. of gasoline or diesel fuel), although energy use for electric vehicles is measured in kWh.

The electricity consumption associated with all nonresidential uses (such as the Proposed Project) in Imperial County from 2016 to 2020 is shown in Table 2-1. As indicated, the demand has decreased since 2016.

<b>Table 2-1. Non-Residential Electricity Consumption in Imperial County 2016 - 2020</b>	
<b>Year</b>	<b>Electricity Consumption (kilowatt hours)</b>
2020	834,483,019
2019	839,095,659
2018	831,318,925
2017	817,450,656
2016	895,952,526

Source: CEC 2021c

The natural gas consumption associated with all nonresidential uses in Imperial County from 2016 to 2020 is shown in Table 2-2. As indicated, the demand has increased since 2016.

<b>Table 2-2. Non-Residential Natural Gas Consumption in Imperial County 2016-2020</b>	
<b>Year</b>	<b>Natural Gas Consumption (therms)</b>
2020	33,813,768
2019	34,736,596
2018	31,159,562
2017	33,090,927
2016	28,708,371

Source: CEC 2020c

Automotive fuel consumption in Imperial County from 2016 to 2021 is shown in Table 2-3. Fuel consumption has remained relatively constant between 2016 and 2021.

<b>Table 2-3. Automotive Fuel Consumption in Imperial County 2016-2021</b>	
<b>Year</b>	<b>Total On-Road Fuel Consumption</b>
2021	216,105,185
2020	194,711,440
2019	217,988,585
2018	218,114,145
2017	220,106,315
2016	215,751,500

Source: California Air Resources Board (CARB) 2021

## **2.2 Regulatory Framework**

### **2.2.1 State**

#### **2.2.1.1 Executive Order B-55-18**

In September 2018 Governor Jerry Brown Signed Executive Order (EO) B-55-18, which establishing a new statewide goal “to achieve carbon neutrality as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter.” Carbon neutrality refers to achieving a net zero carbon dioxide emissions. This can be achieved by reducing or eliminating carbon emissions, balancing carbon emissions with carbon removal, or a combination of the two. This goal is in addition to existing statewide targets for GHG emission reduction. EO B-55-18 requires the California Air Resource Board (CARB) to “work with relevant state agencies to ensure future Scoping Plans identify and recommend measures to achieve the carbon neutrality goal.

#### **2.2.1.2 Senate Bill 1368**

On September 29, 2006, Governor Arnold Schwarzenegger signed into law Senate Bill (SB) 1368 (Perata, Chapter 598, Statutes of 2006). The law limits long-term investments in baseload generation by the state's utilities to those power plants that meet an emissions performance standard jointly established by the CEC and the California Public Utilities Commission (CPUC).

The CEC has designed regulations that:

- Establish a standard for baseload generation owned by, or under long-term contract to, publicly owned utilities, of 1,100 pounds carbon dioxide per megawatt hour (MWh). This would encourage the development of power plants that meet California's growing energy needs while minimizing their emissions of greenhouse gas.
- Require posting of notices of public deliberations by publicly owned utilities on long-term investments on the CEC website. This would facilitate public awareness of utility efforts to meet customer needs for energy over the long term while meeting the State's standards for environmental impact.
- Establish a public process for determining the compliance of proposed investments with the emissions performance standard (EPS) (Perata, Chapter 598, Statutes of 2006).

### **2.2.2 Renewable Energy Sources (Renewable Portfolio Standards)**

Established in 2002 under SB 1078, and accelerated by SB 107 (2006) and SB 2 (2011), California's Renewables Portfolio Standard (RPS) obligates investor-owned utilities, energy service providers, and community choice aggregators to procure 33 percent of their electricity from renewable energy sources by 2020. Eligible renewable resources are defined in the 2013 RPS to include biodiesel; biomass; hydroelectric and small hydro (30 megawatts or less); Los Angeles Aqueduct hydro power plants; digester gas; fuel cells; geothermal; landfill gas; municipal solid waste; ocean thermal, ocean wave, and tidal current technologies; renewable derived biogas; multi-fuel facilities using renewable fuels; solar photovoltaic;

solar thermal electric; wind; and other renewables that may be defined later. Governor Jerry Brown signed SB 350 on October 7, 2015, which expands the RPS by establishing a goal of 60 percent of the total electricity sold to retail customers in California per year by December 31, 2030. In addition, SB 350 includes the goal to double the energy efficiency savings in electricity and natural gas final end uses (such as heating, cooling, lighting, or class of energy uses upon which an energy efficiency program is focused) of retail customers through energy conservation and efficiency. The bill also requires the CPUC, in consultation with the CEC, establish efficiency targets for electrical and gas corporations consistent with this goal. SB 350 also provides for the transformation of the California Independent System Operator (CAISO) into a regional organization to promote the development of regional electricity transmission markets in the western states and to improve the access of consumers served by the CAISO to those markets, pursuant to a specified process. In 2018, SB 100 was signed by Governor Brown, codifying a goal of 60 percent renewable procurement by 2030 and 100 percent by 2045 Renewables Portfolio Standard.

## **2.3 Energy Consumption Impact Assessment**

### **2.3.1 Thresholds of Significance**

The impact analysis provided below is based on the following CEQA Guidelines Appendix G thresholds of significance. The Project would result in a significant impact to energy if it would do any of the following:

- 1) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.
- 2) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

The impact analysis focuses on the four sources of energy that are relevant to the Proposed Project: electricity, natural gas, the equipment fuel necessary for Project construction, and the automotive fuel necessary for Project operations. Addressing energy impacts requires an agency to make a determination as to what constitutes a significant impact. There are no established thresholds of significance, statewide or locally, for what constitutes a wasteful, inefficient, and unnecessary consumption of energy for a proposed land use. For the purposes of this analysis, the amount of electricity and natural gas estimated to be consumed by the Project are quantified and compared to that consumed by all non-residential land uses in Imperial County. Similarly, the amount of fuel necessary for Project construction and operations is calculated and compared to that consumed in Imperial County.

### **2.3.2 Methodology**

Levels of construction and operational related energy consumption estimated to be consumed by the Project include the number of kWh of electricity, therms of natural gas and gallons of gasoline. The amount of total construction-related fuel used was estimated using ratios provided in the Climate Registry's General Reporting Protocol for the Voluntary Reporting Program, Version 2.1. Electricity and natural gas consumption estimates were calculated using the California Emissions Estimator Model (CalEEMod), version 2020.4.0 (see Air Quality and Greenhouse Gas Emissions Assessment: North Star 2 Project [ECORP 2022]). CalEEMod is a statewide land use computer model designed to quantify resources associated with both construction and operations from a variety of land use projects. Operational

automotive fuel consumption has been calculated with EMFAC 2021. EMFAC 2021 is a mathematical model that was developed to calculate emission rates and rates of gasoline consumption from motor vehicles that operate on highways, freeways, and local roads in California.

**2.3.3 Impact Analysis**

**2.3.3.1 Project Energy Consumption**

The Project includes the construction of a 130 MW alternating current solar field, consisting of 289,800 tracker modules in 9,660 strings and associated collector and inverter facilities, and a 175 MW BESS, on approximately 614 acres of vacant land. Operations of the Proposed Project would not result in the consumption of electricity or natural gas and thus, would not contribute to the County wide usage. Instead, the Project would directly support the RPS goal of increasing the percentage of electricity procured from renewable sources.

Therefore, the consumption of electricity and natural gas is not a factor in this analysis. The two sources of energy associated with the Project includes the equipment fuel necessary for construction and the automotive fuel necessary for ongoing maintenance activities. For the purpose of this analysis, Project increases in construction and automotive fuel consumption are compared with the countywide fuel consumption in 2021, the most recent full year of data. This analysis conservatively assumes that all of the automobile trips projected to arrive at the Project during operations would be new to Imperial County.

Energy consumption associated with the Proposed Project is summarized in Table 2-4.

<b>Table 2-4. Proposed Project Energy and Fuel Consumption</b>		
<b>Energy Type</b>	<b>Annual Energy Consumption</b>	<b>Percentage Increase Countywide</b>
Facility Electrical and Natural Gas Consumption		
Electricity Consumption <sup>1</sup>	0 kilowatt-hours	0.000
Natural Gas <sup>1</sup>	0 therms	0.000
Automotive Fuel Consumption (Gallons)		
Year One of Construction <sup>2</sup>	16,453	0.007
Year Two of Construction <sup>2</sup>	107,094	0.049
Year Three of Construction <sup>2</sup>	7,488	0.003
Project Operations <sup>3</sup>	1,336 gallons	0.000

Source: 1CalEEMod; 2Climate Registry 2016; 3EMFAC2021 (CARB 2020)

Notes: The Project increases in electricity and natural gas consumption are compared with all uses in Imperial County in 2020, the latest data available. The Project increases in automotive fuel consumption are compared with the countywide fuel consumption in 2021, the most recent full year of data.

Fuel necessary for Project construction would be required for the operation and maintenance of construction equipment and the transportation of materials to the Project Site. The fuel expenditure

necessary to construct the solar facility and infrastructure would be temporary, lasting only as long as Project construction. As indicated in Table 2-4, the Project's gasoline fuel consumption during the one-time construction period is estimated to be 16,453 gallons during the first year of construction, 107,094 gallons during the second year of construction, and 7,488 gallons during the third year of construction. This would increase the annual countywide gasoline fuel use associated with offroad equipment in the County by 0.007 percent, 0.049 percent, and 0.003 percent, respectively. As such, Project construction would have a nominal effect on local and regional energy supplies. No unusual Project characteristics would necessitate the use of construction equipment that would be less energy efficient than at comparable construction sites in the region or the state. Construction contractors would purchase their own gasoline and diesel fuel from local suppliers and would judiciously use fuel supplies to minimize costs due to waste and subsequently maximize profits. Additionally, construction equipment fleet turnover and increasingly stringent state and federal regulations on engine efficiency combined with state regulations limiting engine idling times and requiring recycling of construction debris, would further reduce the amount of transportation fuel demand during Project construction. For these reasons, it is expected that construction fuel consumption associated with the Project would not be any more inefficient, wasteful, or unnecessary than other similar development projects of this nature.

Once construction is completed the Project would be remotely controlled. No employees would be based at the Project sites. The only operational emissions associated with the Project would be associated with motor vehicle use for routine maintenance work, water import, and site security as well as panel upkeep and cleaning. Four heavy-duty truck vehicle trips per day for routine maintenance work, site security, and trucking in water was assumed. This is a conservative estimate as most days would require no operational related vehicle trips. As indicated in Table 2-4, this would estimate to a consumption of approximately 1,336 gallons of automotive fuel per year, which would increase the annual countywide automotive fuel consumption by 0.0006 percent. Fuel consumption associated with both the construction equipment needed to construct the Project and the vehicle trips generated by the Project during ongoing maintenance activities would not be considered inefficient, wasteful, or unnecessary in comparison to other similar developments in the region.

#### **2.3.4 State and Local Plans for Renewable Energy/Energy Efficiency**

The purpose of the Proposed Project is the construction of a renewable energy and storage facility in Imperial County. Once in operation, it will decrease the need for energy from fossil fuel-based power plants in the state. The result would be a net increase in electricity resources available to the regional grid, generated from a renewable source. Therefore, the Project would directly support the RPS goal of increasing the percentage of electricity procured from renewable sources. Additionally, the Project would also be consistent with the County's General Plan Conservation and Open Space Element, Objective 9.2 which encourages renewable energy developments. Therefore, the Project would directly support state and local plans for renewable energy development.

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### **3.0 REFERENCES**

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Energy Consumption Modeling Output

**Proposed Project  
Total Construction-Related  
Gasoline Usage**

**Construction**

<b>Table 1. Construction Year One</b>			
<b>Action</b>	<b>Carbon Dioxide Equivalents (CO<sub>2</sub>e) in Metric Tons<sup>1</sup></b>	<b>Conversion of Metric Tons to Kilograms<sup>2</sup></b>	<b>Construction Equipment Emission Factor<sup>2</sup></b>
Project Construction	167	167,000	10.15
<b>Total Gallons Consumed During Construction Year One:</b>			<b>16,453</b>

<b>Table 2. Construction Year Two</b>			
<b>Action</b>	<b>Carbon Dioxide Equivalents (CO<sub>2</sub>e) in Metric Tons<sup>1</sup></b>	<b>Conversion of Metric Tons to Kilograms<sup>2</sup></b>	<b>Construction Equipment Emission Factor<sup>2</sup></b>
Project Construction	1087	1,087,000	10.15
<b>Total Gallons Consumed During Construction Year Two:</b>			<b>107,094</b>

<b>Table 3. Construction Year Three</b>			
<b>Action</b>	<b>Carbon Dioxide Equivalents (CO<sub>2</sub>e) in Metric Tons<sup>1</sup></b>	<b>Conversion of Metric Tons to Kilograms<sup>2</sup></b>	<b>Construction Equipment Emission Factor<sup>2</sup></b>
Project Construction	76	76,000	10.15
<b>Total Gallons Consumed During Construction Year Three:</b>			<b>7,488</b>

**Sources:**  
<sup>1</sup>ECORP Consulting. 2022. Air Quality and Greenhouse Gas Emissions Assessment: North Star #2 Project <sup>2</sup>Climate Registry. 2016. *General Reporting Protocol for the Voluntary Reporting Program version 2.1*. January 2016. <http://www.theclimateregistry.org/wp-content/uploads/2014/11/General-Reporting-Protocol-Version-2.1.pdf>

**Proposed Project  
Total Construction-Related and Operational  
Gasoline Usage**

***Operations***

<b>Table 5. Average Miles per Gallon in Imperial County in 2021<sup>3</sup></b>								
Area	Sub-Area	Cal. Year	Season	Veh_tech	EMFAC 2021 Category	Total Onroad Vehicle Gallons Consumed in Imperial County in 2021	Total Onroad Vehicle Miles Traveled in Imperial County in 2021	Total Passenger Vehicle Miles per Gallon in Imperial County in 2021
Sub-Areas	Imperial County	2021	Annual	All Vehicles	All Vehicles	216,105,185	3,873,811,795	17.93
<b>Sources:</b> <sup>3</sup> California Air Resource Board. 2021. EMFAC2021 Mobile Emissions Model.								

<b>Table 6. Total Gallons During Project Operations</b>				
Project Onroad Vehicle Daily Trips <sup>3</sup>	Estimated Miles per Trip <sup>4</sup>	Project Onroad Vehicle Daily Miles Traveled	Project Onroad Vehicle Daily Fuel Consumption	Project Onroad Vehicle Annual Fuel Consumption
4	16.4	65.60	3.66	<b>1,336</b>
<b>Sources:</b> <sup>3</sup> Operational emissions account for four heavy-duty truck vehicle trip per day for routine maintenance work, site security, and trucking in water; <sup>4</sup> CalEEMod 2020.4.0				