

Energy Impact Assessment

Vega SES Complex Solar Energy Storage Project

County of Imperial, California

Prepared For:

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Attachment A - Energy Consumption Modeling Output

LIST OF ACRONYMS AND ABBREVIATIONS

APNs	Assessor’s Parcel Numbers
CalEEMod	California Emissions Estimator Model
CAISO	California Independent System Operator
CARB	California Air Resources Board
CEC	California Energy Commission
EPS	Emissions Performance Standard
HSAT	Horizontal Single-Axis Tracker
IID	Imperial Irrigation District
kWh	Kilowatt-Hours
MW	Megawatt
mWh	Megawatt Hour
PV	Photovoltaic
Project	Vega SES Complex Solar Energy Storage Project
RPS	Renewables Portfolio Standard

1.0 INTRODUCTION

This report documents the results of an Energy Impact Assessment completed for the Vega SES Complex Solar Energy Storage Project (Project), which includes the construction of up to a nominal 240-megawatt (MW) alternating current solar photovoltaic (PV) energy generation system with an integrated 240 MW battery storage system (known as Vega 2), a nominal 60 MW alternating current PV energy generation system with an integrated 60 MW battery storage system (known as Vega 3), and a nominal 50 MW alternating current solar PV energy generation system with an integrated 50 MW battery storage system (known as Vega 5), all spanning approximately 1,962.76 acres of land in the County of Imperial, California. This report was prepared to analyze the potential direct and indirect environmental impacts associated with the Project energy consumption, including the depletion of nonrenewable resources (oil, natural gas, coal, etc.) 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 cluster of alternating current solar PV energy generation systems totaling 350 Megawatts (MWs) with accompanying battery storage. The Project consists of three individual site locations which make up the Vega SES Complex. Vega 2 is located on three non-contiguous parcels totaling 1,323 acres, Vega 3 is located on a 640-acre parcel but only comprising 230 acres, and Vague 5 is located on three parcels totaling 410 acres. It is proposed that Vega 2 & 3 will be constructed together beginning in early 2023 with Vega 5 being constructed in 2024.

All systems would be utilizing either thin film or crystalline solar PV technology modules mounted either on fixed frames or horizontal single-axis tracker (HSAT) systems. The fixed frame PV module arrays would be mounted on racks that would be supported by driven piles. The individual PV systems would be arranged in large arrays by placing them in columns spaced approximately ten feet apart to maximize operational performance and to allow access for panel cleaning and maintenance.

1.2 Project Location and Description

The total combined Project Site area spans approximately 1,963 acres and is located 5.67 miles southeast of the unincorporated community of Niland between the unincorporated communities of Iris and Slab City (see Figure 1. Project Vicinity). The Site is transected by the Coachella and East Highline Canals and the Union Pacific Railway in northcentral Imperial County, California.

1.3 Applicable Land Use Regulations

All Project parcels for Vega 2 & 3 parcels are designated as "Recreation/Open Space" in the Imperial County General Plan and are zoned S-2-RE (Open Space/Preservation with a Renewable Energy overlay). Pursuant to Section 91703.02 (*Conditional Use Permits*), Renewable Energy Projects must be located within the Renewable Energy Overlay Zone and may be permitted only through the issuance of a Conditional Use Permit (CUP) as approved by the Approving Authority unless otherwise allowed by applicable law. All Project parcels in Vega 5 are designated as "Recreation/Open Space" in the Imperial County General Plan.

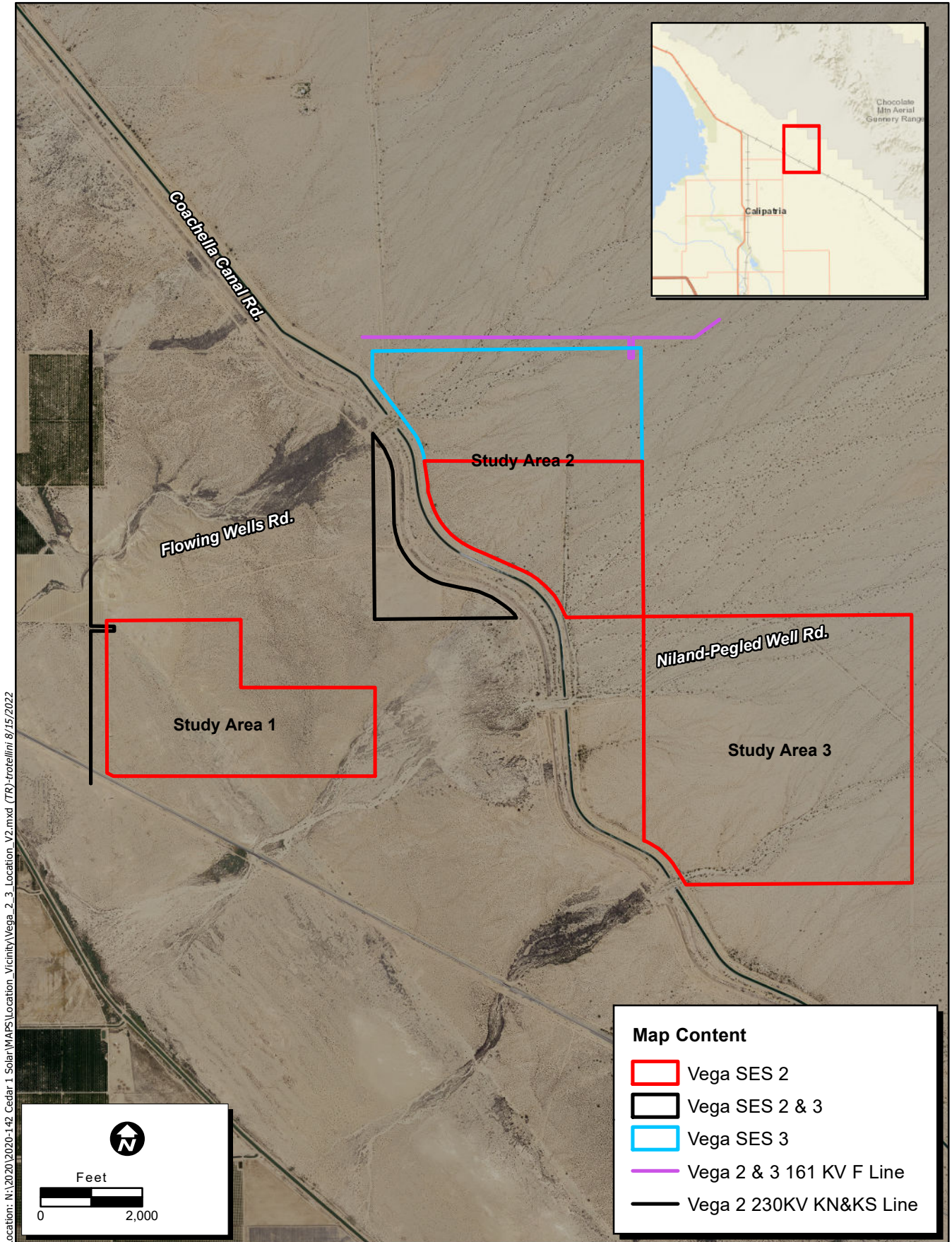
Two of the Vega 5 properties are zoned S-2-RE (areas with intent to preserve the cultural, biological, and open spaces that are rich and natural as well as cultural resources). The third Vega 5 property is zoned A-2-RE (areas that are suitable and intended primarily for agricultural uses [limited] and agricultural related compatible uses), A-3-RE (areas that are suitable for agricultural land uses; to prevent the encroachment of incompatible uses onto and within agricultural lands; and to prohibit the premature conversion of such lands to non-agricultural uses) and S-2-RE (see above). At present, all portions of the proposed Project (Vega 2 & 3, and 5) are located within the Renewable Energy Zone.

1.4 Project Site Access

The Project Area would be accessible from McDonald Road, a paved road off State Route 111. The Vega 5 Project Site is located at the eastern end of McDonald Road. Access to the Vega 2 and 3 Project Site would require an additional 1.65 miles of travel on Wiest Road and Flowing Wells Road. Both of which are unpaved.

1.5 Project Construction

Construction activities would involve demolition and grubbing, grading of the Project Site to establish access roads and pads for electrical equipment (inverters and step-up transformers), trenching for underground electrical collection lines, and the installation of solar equipment and security fencing. The construction of each Project component (Vega 2 & 3 and Vega 5) is estimated to take 12-18 months each and would begin in early 2023. A temporary, portable construction supply container would be located at the Project Site at the beginning of construction and removed at the end of construction. The number of on-site construction workers for Vega 2 and 3 solar facility is not expected to exceed 150 workers at any one time. The number of on-site construction workers for the Vega 2 and 3 battery storage facility and substations is not expected to exceed 100 workers at any one time. The number of on-site construction workers for the Vega 5 solar facility is not expected to exceed 75 workers at any one time. The number of on-site construction workers for the Vega 5 battery storage facility and substation is not expected to exceed 50 workers at any one time. Onsite parking would be provided for all construction workers.

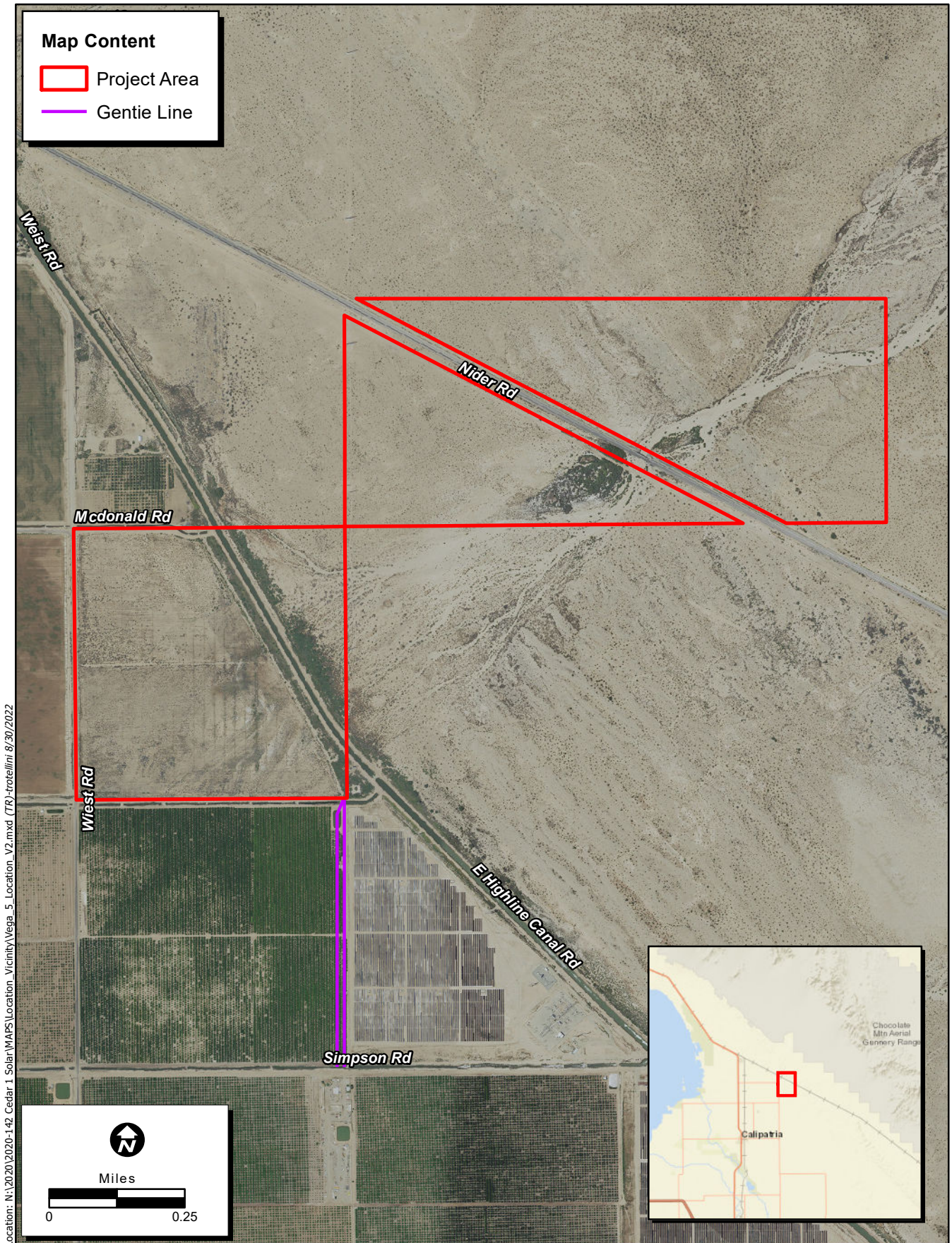


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Map Date: 8/15/2022
 Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Figure 1. Project Location

2020-144/2020-199/2020-209 Vega SES 2 and Vega SES 3



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Map Date: 8/30/2022
 Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community Photo Source: NADP

Figure 1. Project Location
 2020-144 Vega SES 5

2.0 ENERGY CONSUMPTION

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] 2020). 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 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 21.8 million consumers through 5.9 million meters in more than 500 communities. The Southern California Gas Company's service territory encompasses approximately 24,000 square miles throughout Central and Southern California, from Visalia to the Mexican border.

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 non-residential electricity consumption associated with all uses in Imperial County from 2017 to 2021 is shown in Table 2-1. As indicated, the demand has increased since 2017.

Table 2-1. Non-Residential Electricity Consumption in Imperial County 2017-2021	
Year	Electricity Consumption (kilowatt hours)
2021	841,302,847
2020	834,483,019
2019	839,095,659
2018	831,318,925
2017	817,450,656

Source: CEC 2022

The non-residential natural gas consumption associated with all uses in Imperial County from 2017 to 2021 is shown in Table 2-2. As indicated, the demand has remained relatively constant since 2017.

Table 2-2. Non-Residential Natural Gas Consumption in Imperial County 2017-2021	
Year	Natural Gas Consumption (therms)
2021	33,421,848
2020	33,813,700
2019	34,736,596
2018	31,159,562
2017	33,090,927

Source: CEC 2022

Automotive fuel consumption in Imperial County from 2017 to 2021 is shown in Table 2-3. Fuel consumption has decreased between 2017 and 2021.

Table 2-3. Automotive Fuel Consumption in Imperial County 2017-2021	
Year	Total Fuel Consumption (gallons)
2021	217,447,173
2020	195,778,823
2019	219,032,998
2018	219,075,991
2017	220,921,357

Source: California Air Resources Board (CARB) EMFAC 2021

2.2 Regulatory Framework

2.2.1 State

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.

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 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. Modeling was based on Project specific information such as construction timing and equipment as well as site operations. Energy consumption estimates were calculated using the California Emissions Estimator Model (CalEEMod), version 2020.4.0. 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.

2.3.3 Impact Analysis

Energy Consumption

The Project proposes to construct a cluster of alternating current solar PV energy generation systems totaling 350 MWs with accompanying battery storage on approximately 1,962.76 acres of 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, this impact analysis focuses on the two sources of energy that are most relevant to the Project: the equipment fuel necessary for construction and the automotive fuel necessary for ongoing maintenance activities. The amount of total construction-related fuel use was estimated using ratios provided in the Climate Registry's General Reporting Protocol for the Voluntary Reporting Program,

Version 2.1. The amount of operational fuel use was estimated using CARB’s EMFAC2021 computer program, which provides projections for typical daily fuel usage in Imperial County. 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. Project increases in automotive fuel consumption are compared with the countywide fuel consumption in 2021, the most recent full year of data.

Table 2-4. Proposed Project Energy and Fuel Consumption		
Energy Type	Annual Energy Consumption	Percentage Increase Countywide
Electricity Consumption ¹	0 kilowatt-hours	0.00000 percent
Natural Gas ¹	0 therms	0.00000 percent
<i>Automotive Fuel Consumption</i>		
Vega 2 and Vega 3		
Construction	94,680 gallons	0.0435 percent
Vega 5		
Construction	77,635 gallons	0.0357 percent
Vega Complex (2,3,5 combined)		
Construction	172,315 gallons	0.0792 percent
Project Operations ³	225.5 gallons	0.0001 percent

Source: ¹CalEEMod; ²Climate Registry 2016; ³EMFAC2021 (CARB 2021)

Notes: The Project increases in electricity and natural gas consumption are compared with all uses in Imperial County in 2021, 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 Vega 2 and Vega 3 construction period is estimated to be 94,680 gallons, which would increase the annual countywide gasoline fuel usage by 0.0435 percent. The gasoline fuel consumption in Project’s Vega 5 construction period is estimated to be 77,635 gallons, which would increase the annual countywide gasoline fuel usage by 0.0357 percent. Additionally, the construction during the Vega Complex, which adds Vega 2, 3, and 5 together, has an estimate gasoline usage of 172,315 gallons, which would increase the annual countywide gasoline fuel usage by 0.0792 percent. As such, all of the Project’s construction options 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 and site security as well as panel upkeep and cleaning. A conservative estimate of two vehicle trips per day 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 225.5 gallons of automotive fuel per year, which would increase the annual countywide automotive fuel consumption by 0.0001 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.

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.

3.0 REFERENCES

CARB. 2021. EMFAC2021 Web Database Emissions Inventory. <https://www.arb.ca.gov/emfac/2021/>.

CEC. 2022. California Energy Consumption Database. <http://www.ecdms.energy.ca.gov/>

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>

LIST OF ATTACHMENTS

Attachment A - Energy Consumption Modeling Output

ATTACHMENT A

Energy Consumption Modeling Output

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

Table 1. VEGA 2 and VEGA 3			
Action	Carbon Dioxide Equivalents (CO₂e) in Metric Tons¹	Conversion of Metric Tons to Kilograms²	Construction Equipment Emission Factor²
Project Construction	0,961	961,000	10.15
Total Gallons Consumed During Project Construction:			94,680

Table 2. VEGA 5			
Action	Carbon Dioxide Equivalents (CO₂e) in Metric Tons¹	Conversion of Metric Tons to Kilograms²	Construction Equipment Emission Factor²
Project Construction	0,788	788,000	10.15
Total Gallons Consumed During Project Construction:			77,635

Table 3. VEGA Complex (2,3,5 combined)			
Action	Carbon Dioxide Equivalents (CO₂e) in Metric Tons¹	Conversion of Metric Tons to Kilograms²	Construction Equipment Emission Factor²
Project Construction	1,749	1,749,000	10.15
Total Gallons Consumed During Project Construction:			172,315

Notes:
 Fuel used by all construction equipment, including vehicle hauling trucks, assumed to be diesel.
¹Per CalEEMod Output Files found in Air Quality and Greenhouse Gas Emissions Assessment Attachment C
²Per Climate Registry Equation 13e

Sources:
¹ECORP Consulting, 2022.
²Climate 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>

Table 4. Total Gallons During Project Operations ³

Area	Sub-Area	Cal. Year	Season	Veh_tech	EMFAC 2011 Category	Fuel_GAS Output	Daily Total	ANNUAL TOTAL
Sub-Areas	Imperial County	2025	Annual	All Vehicles	All Vehicles ⁴	0.000617813	0.617813	225.5

Sources:

³California Air Resource Board. 2017. EMFAC2017 Mobile Emissions Model.

Notes:

⁴Excluding Heavy-Duty Highway Trucks, T6 Agricultural Truck, T6 Instate Construction (heavy and small), T7 Agricultural Truck, T7 CAIRP Construction, T7 Single Construction, T7 Tractor Truck, and T7 Tractor Construction