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Omid@ardebilieng.com

ARDEBILI ENGINEERING
8100 E Indian School
STE 205, Scottsdale AZ

Colby Cataldi
Deputy Director
OC Public Works, Development Services/Planning
300 N. Flower Street
Santa Ana, CA 92703

Dear Mr. Cataldi;

The purpose of this letter is to provide the County of Orange with an analysis of the effects of requiring each residence in the Esperanza Hills subdivision to have solar photo voltaic (PV) panels on the roof pursuant to the formula set forth in the 2019 California Building Energy Efficiency Standards at Title 24, Part 1, Section 150.1(c)(14), (Exhibit 1) which will result in the solar PV systems supplying annual electric output equal to or greater than the dwelling's annual electric usage.

1. Qualifications

I am a registered electrical engineer in the State of California, license number 20186, as well as various other states, including Arizona, license number 53834. I am the principal owner of Ardebili Engineering, an engineering firm that specializes in providing mechanical, electrical and plumbing design for commercial, multi-family, retail, restaurant, hotel, medical, health fitness and residential projects throughout the United States. One of our specialties is Title 24 Energy Compliance Evaluation and Calculations and Solar System design. Ardebili Engineering has supplied engineering services to over 5000 projects throughout the United States since its inception in 2012. Our national accounts include Corepower Yoga, Verizon, Orange Theory Fitness, Cricket Wireless, Pure Barre, Grabbagreen, Thai Express, Popeyes, and Motion Stretch Studio. We have supplied services to grocery stores such as Albertsons and Safeway, hotels such as Holiday Inn and Holiday Inn, resorts such as Cibola Vista Resort, the US Army, many different office space users, shopping centers and individual retailers.

2. 2019 California Building Energy Efficiency Standards and Background

The 2019 California Building Energy Efficiency Standards adopted by the California Energy Commission were adopted in December 2018 and go into effect on January 1, 2020. According to the California Energy Commission, the standards for requiring solar photovoltaic panels on the rooftop were calculated to be "cost effective and bring value to the grid and the environment." (California Energy Commission – 2019 Energy Standards Overview, Exhibit 2.)

The requirement for solar PV on all new residences took into account two important policies – the Renewable Portfolio Standard ("RPS"), which requires utilities to have 50% of their electrical resources come from renewables by 2030 and net energy metering rules ("NEM"), which limits rooftop solar generation to produce no more electricity than the home is expected to consume on an annual basis. (Exhibit 2.)

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The California Energy Commission decided that "because the grid is cleaner and residential rooftop solar customer compensation for over-generation is very limited, it is critical that rooftop solar generation does not substantially exceed the home's electricity use." (Exhibit 2.) The Commission decided that: "When the rooftop solar generation is entirely used to offset on-site electricity consumption, then the home has virtually no impact on the grid, reducing the homes climate change emissions." (Exhibit 2.)

3. Calculations to Determine Solar PV System

The kilowatt size of the solar PV system for each residence is determined by using the formula set forth in Title 24, Part 1, which is Conditioned Floor Area multiplied by Adjustment Factor of .586 for Climate Zone 8/1000 plus (+) Number of Dwellings multiplied by the adjustment factor of 1.37 for dwelling units in climate zone 8. Esperanza Hills falls within the 92886-7 zip codes, which is climate zone 8. (Climate Zone by Zip Code, Exhibit 3.) The homes in Esperanza Hills are estimated to be between 4,500 and 6,500 square feet, with an average of 5,000 square feet of conditioned floor area. Using the adjustment factors from Table 150.1-C (Exhibit 4), the formula is:

(5000 sf X .586)/1000 + (1 dwelling unit X 1.37) = 4.3 KW

4. Calculations to Determine Output of Solar PV System & GHG Reductions

In order to determine the effect of requiring a solar PV system on reductions in Greenhouse Gas, two calculations need to be completed. First, total kilowatt output from a 4.3 kW system located in Yorba Linda needs to be determined. Once total output is determined in terms of kilowatts, Greenhouse Gas Emissions savings can be determined.

A. <u>Determination of Total Output for a 4.3 kW System</u>

The solar photovoltaic output of a 4.3 kW system was calculated by using software known as the PVWatts Calculator, which is available on the National Renewable Energy Laboratory's ("NREL") website. The NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy. Yorba Linda, California was inserted as the location, 4.3 kW was inserted as the system requirement, and the system was set as a standard system with a fixed open rack, with an industry standard tilt of 5 degrees and an azimuth of 90. System losses were estimated at 14.08%, which is the industry assumed standard. I estimated 90 degrees as the azimuth given the angle of the sun throughout the year in Yorba Linda. The net result is that the PV system will be required to generate 6,226 kWh/year. (Screenshots of Data Entry for PVWatts calculator, Exhibit 5.)

B. <u>Determination of Projected GHG Reductions</u>

The Greenhouse Gas Emissions savings for the solar PV system required under Title 24, Part 1, Section 150.1 was determined by using another program, the Greenhouse Gas Equivalences Calculator last updated in December, 2018 by the Environmental Protection Agency, which is located at the link

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https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator. The calculator showed a solar PV system producing 6,226 kilowatt-hours of electricity would save 4.403 metric tons of Carbon Dioxide or CO2 equivalent per year. This is equivalent to saving GHG emissions for 10,765 vehicle miles per year or 4,813 pounds of coal burned. (Screenshots of EPA Program for GHG Equivalencies, Exhibit 6.)

Because there are 340 homes in Esperanza Hills, the projected GHG emissions will be 4.403 metric tons X 340 homes for a total savings of 1,497.02 Metric Tons of CO2 or CO2 Equivalent (MTCO2EQ") per year. Appendix V of the Second Revised FEIR ("SRFEIR"), page 8, estimated that the total operational emissions for the Project were 6,037.30 MTCO2EQ per year prior to mitigation, and 5,558.6 MTCO2EQ per year after mitigation. (SRFEIR, Appendix V, Selected Pages, Exhibit 7.) With the savings projected by requiring solar PV panels under the formula set forth in Title 24, Part 1, Section 150.1(c), the operational emissions will be reduced to 4,540.28 MTCO2EQ per year before other mitigation, or 4,061.58 MTCO2EQ per year after all mitigation.

I did not attempt to calculate total GHG savings using the CalEEEMod software program since its last revision was in 2016 and included only the 2016 Title 24 Standards, not the 2019 Title 24 Energy Efficiency Requirements for installation of solar PV panels, which was not adopted until December 2018. I verified this on the website showing the latest update. (CalEEMod Fact Sheet, Exhibit 8.)

5. Environmental Effects of Installing Solar PV Panels

The solar PV panels on each individual residence can be installed while the interior of the house is being completed, so construction time should not be extended. Installation of solar PV will have no significant effect on geology, archeology, paleontology, grading or biology was it will not expand the footprint of each individual house, or otherwise increase the grading envelope for the Project. Solar PV panels on the roof should have no significant impact on air quality, and the construction noise associated with their installation is not significant as they can be installed in one day with standard tools used in the construction of the house. Solar PV panels are not hazardous and will not have a significant effect on fire hazards. Since they will supply power during the day, they should enable each home to have power even during a power outage during the day, which may prove useful in the event of an emergency.

To obtain 4.3 kilowatts of power, it will be necessary to install a 4.5 kW system which will require 15 standard 300 watt panels. Since each panel is 22 square feet, the roof area needed is 330 square feet. The roof area for a 5,000 square foot two story home will vary according to the design, but it should be at least 2,500 square feet, so the location of the panels should be able to be placed in an area that will accommodate productivity and minimize any aesthetic issues.

6. Summary

Compliance with the 2019 California Building Energy Efficiency Standards at Title 24, Part 1, Section 150.1(c)(14) requires that each house in Esperanza Hills install a 4.5 kW solar PV system. Each system will consist of 15 fixed 300-watt solar panels that will require 330 square feet of space. Based on

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the projected size of the houses in Esperanza Hills, there is adequate room on the rooftops to install the solar PV systems, and each system will supply the annual electric output equal to or greater than the dwelling's annual electric usage. Requiring the solar PV panels will save 6,226 total kW hours of electricity annually, which is equivalent to 10,765 miles driven by an average passenger vehicle, or 4,813 pounds of coal burned. This will reduce GHG emissions from the Project by 1,497.02 MTCO2EQ annually, which means that the Project's GHG emissions will be reduced to 4,540.28 MTCO2EQ per year before other mitigation, or 4,061.58 MTCO2EQ per year after all mitigation, which still exceeds the threshold established in the SRFEIR for the Project of 3000 MTCO2EQ annually.

IF ANY QUESTIONS OR CONCERNS SHOULD ARISE PLEASE FEEL FREE TO CONTACT ME AT 480.626.7072.

THANKS,

OMID ARDEBILI, P.E.
PRINCIPAL

11. **Roofing products.** All roofing products shall meet the requirements of Section 110.8 and the applicable requirements of Subsection A or B:

    A. Low-rise residential buildings with steep-sloped roofs, in Climate Zones 10 through 15 shall have a minimum aged solar reflectance of 0.20 and a minimum thermal emittance of 0.75, or a minimum SRI of 16.

    B. Low-rise residential buildings with low-sloped roofs; in Climate Zones 13 and 15 shall have a minimum aged solar reflectance of 0.63 and a minimum thermal emittance of 0.75 or a minimum SRI of 75.

    EXCEPTION 1 to Section 150.1(c)11: Building integrated photovoltaic panels and building integrated solar thermal panels are exempt from the minimum requirements for solar reflectance and thermal emittance or SRI.

    EXCEPTION 2 to Section 150.1(c)11: Roof constructions with a weight of at least 25 lb/ft² are exempt from the minimum requirements for solar reflectance and thermal emittance or SRI.

12. **Ventilation Cooling**. Single family homes shall comply with the Whole House Fan (WHF) requirements shown in TABLE 150.1-A. When a WHF is required, comply with Subsections A. through C. below:

    A. Have installed one or more WHFs whose total Air Flow CFM is equal to or greater than 1.5 CFM/ft^2 of conditioned floor area. Air Flow CFM for WHF's shall be determined based on the Air Flow listed in the Energy Commission's database of certified appliances, which is available at: www.energy.ca.gov/appliances/database; and

    B. Have at least 1 square foot of attic vent free area for each 750 CFM of rated whole house fan Air Flow CFM, or if the manufacturer has specified a greater free vent area, the manufacturers' free vent area specifications; and

    EXCEPTION to Section 150.1(c)12B: WHFs that are directly vented to the outside.

    C. Provide homeowners who have WHFs with a one page "How to operate your whole house fan" informational sheet.

13. **HVAC System Bypass Ducts.** Bypass ducts that deliver conditioned supply air directly to the space conditioning system return duct airflow shall not be used.

14. **Photovoltaic Requirements.** All low-rise residential buildings shall have a photovoltaic (PV) system meeting the minimum qualification requirements as specified in Joint Appendix JA11, with annual electrical output equal to or greater than the dwelling's annual electrical usage as determined by Equation 150.1-C:

    EQUATION 150.1-C ANNUAL PHOTOVOLTAIC ELECTRICAL OUTPUT

    $$kW_{PV} = (CFA \times A)/1000 + (NDwell \times B)$$

    WHERE:

    kW_{PV} = kWdc size of the PV system

    CFA = Conditioned floor area

    NDwell = Number of dwelling units

    A = Adjustment factor from Table 150.1-C

    B = Dwelling adjustment factor from Table 150.1-C

    EXCEPTION 1 to Section 150.1(c)14: No PV is required if the effective annual solar access is restricted to less than 80 contiguous square feet by shading from existing permanent natural or manmade barriers

external to the dwelling, including but not limited to trees, hills, and adjacent structures. The effective annual solar access shall be 70 percent or greater of the output of an unshaded PV array on an annual basis.

EXCEPTION 2 to Section 150.1(c)14: In climate zone 15, the PV size shall be the smaller of a size that can be accommodated by the effective annual solar access or a PV size required by the Equation 150.1-C, but no less than 1.5 Watt DC per square foot of conditioned floor area.

EXCEPTION 3 to Section 150.1(c)14: In all climate zones, for dwelling units with two habitable stories, the PV size shall be the smaller of a size that can be accommodated by the effective annual solar access or a PV size required by the Equation 150.1-C, but no less than 1.0 Watt DC per square foot of conditioned floor area

EXCEPTION 4 to Section 150.1(c)14: In all climate zones, for low-rise residential dwellings with three habitable stories and single family dwellings with three or more habitable stories, the PV size shall be the smaller of a size that can be accommodated by the effective annual solar access or a PV size required by the Equation 150.1-C, but no less than 0.8 Watt DC per square foot of conditioned floor area.

EXCEPTION 5 to Section 150.1(c)14: For a dwelling unit plan that is approved by the planning department prior to January 1, 2020 with available solar ready zone between 80 and 200 square feet, the PV size is limited to the lesser of the size that can be accommodated by the effective annual solar access or a size that is required by the Equation 150.1-C.

EXCEPTION 6 to Section 150.1(c)14: PV sizes from Equation 150.1-C may be reduced by 25 percent if installed in conjunction with a battery storage system. The battery storage system shall meet the qualification requirements specified in Joint Appendix JA12 and have a minimum capacity of 7.5 kWh.

EXHIBIT 2

THE CALIFORNIA ENERGY COMMISSION | EFFICIENCY DIVISION

2019 Building Energy Efficiency Standards

The effective date of the 2019 Building Energy Efficiency Standards is January 1, 2020

What are Building Energy Efficiency Standards?

Building energy efficiency standards are designed to reduce wasteful, uneconomic, inefficient or unnecessary consumption of energy, and enhance outdoor and indoor environmental quality. The standards are adopted into the California Code of Regulations (Title 24, Part 6). They apply to newly constructed buildings and additions and alterations to existing buildings.

"The buildings that Californians buy and live in will operate very efficiently while generating their own clean energy. They will cost less to operate, have healthy indoor air and provide a platform for 'smart' technologies that will propel the state even further down the road to a low emissions future."

- Commissioner Andrew McAllister

Standards ensure that builders use the most energy efficient and energy conserving technologies and construction practices, while being cost effective for homeowners over the 30-year lifespan of a building.

The California Energy Commission is responsible for adopting, implementing and updating the standards every three years. Local city and county enforcement agencies have the authority to verify compliance with all applicable building codes including these standards.

How much energy will the 2019 standards save?

Single-family homes built with the 2019 standards will use about 7 percent less energy due to energy efficiency measures versus those built under the 2016 standards. Once rooftop solar electricity generation is factored in, homes built under the 2019 standards will use about 53 percent less energy than those under the 2016 standards. This will reduce greenhouse gas emissions by 700,000 metric tons over three years, equivalent to taking 115,000 fossil fuel cars off the road. Nonresidential buildings will use about 30 percent less energy due mainly to lighting upgrades.

How much will the 2019 standards add to the cost of a new home?

On average, the 2019 standards will increase the cost of constructing a new home by about $9,500 but will save $19,000 in energy and maintenance costs over 30 years. Based on a 30-year mortgage, the Energy Commission estimates that the standards will add about $40 per month for the average home, but save consumers $80 per month on heating, cooling and lighting bills.

What is new to the 2019 standards?

The standards require solar photovoltaic systems for new homes.

For the first time, the standards establish requirements for newly constructed healthcare facilities.

On the residential side, the standards also encourage demand responsive technologies including battery storage and heat pump water heaters and improve the building's thermal envelope through high performance attics, walls and windows to improve comfort and energy savings. In nonresidential buildings, the standards update indoor and outdoor lighting making maximum use of LED technology.

For residential and nonresidential buildings, the standards enable the use of highly efficient air filters to trap hazardous particulates from both outdoor air and cooking and improve kitchen ventilation systems.

Do the 2019 residential standards get us to zero net energy?

Homes built in 2020 and beyond will be highly efficient and include photovoltaic generation to meet the home's expected annual electric needs. Because smarter buildings perform better and affect the grid less, the standards also include voluntary options to install technology that can shift the energy use of the house from peak periods to off-peak periods.

In 2008, California set energy-use reduction goals targeting zero-net-energy use in all new homes by 2020 and commercial buildings by 2030. The goal meant that new buildings would use a combination of energy efficiency and distributed renewable energy generation to meet all annual energy needs.

However, California's energy landscape has changed since then. Two important policies – the Renewables Portfolio Standard (RPS) and net energy metering rules (NEM) – affect the value of rooftop solar generation.

The RPS requires utilities to have 50 percent of their electrical resources come from renewables by 2030. As a result, electricity produced for the grid is already much cleaner than 10 years ago.

NEM rules limit residential rooftop solar generation to produce no more electricity than the home is expected to consume on an annual basis. If the home generates more, the surplus is compensated at much lower than the retail rate (which can be a difference of $.10 a kilowatt-hour or more).

The Energy Commission's standards must be cost effective and bring value to the grid and environment.

Because the grid is cleaner and residential rooftop solar customer compensation for over-generation is very limited, it is critical that rooftop solar generation does not substantially exceed the home's electricity use. It is ideal to generate the electricity and have it used onsite versus exporting it to the grid at a time it may not be needed. When the rooftop solar generation is entirely used to offset on-site electricity consumption, then the home has virtually no impact on the grid, reducing the home's climate change emissions.

Looking beyond the 2019 standards, the most important energy characteristic for a building will be that it produces and consumes energy at times that are appropriate and responds to the needs of the grid, which reduces the building's emissions.

EXHIBIT 3

Zip Code	Building CZ
90001	8
90002	8
90003	8
90004	9
90005	9
90006	9
90007	8
90008	8
90009	6
90010	9
90011	8
90012	9
90013	9
90014	9
90015	9
90016	8
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90041	9
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90044	8
90045	6
90046	9

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96130	16
96132	16
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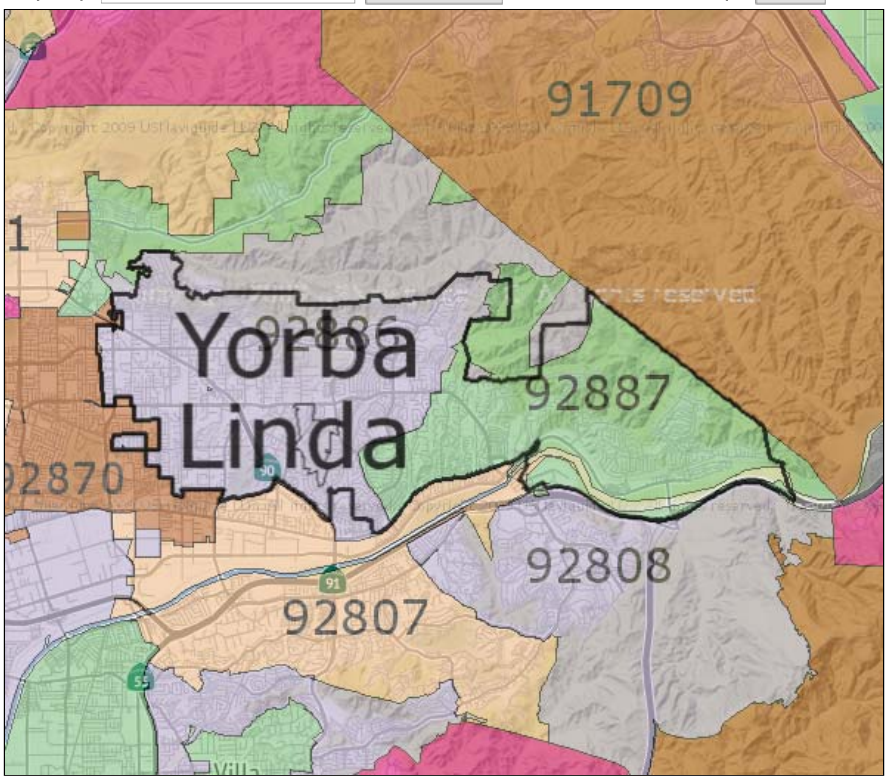
96135	16
96136	16
96137	16
96140	16
96141	16

Key Zip [ ] Find Zipcode or click on the map. Clear



This page shows a map with an overlay of Zip Codes for Yorba Linda, Orange County, California.
Users can easily view the boundaries of each Zip Code.
CONTACT US Instructions Privacy Policy RadarNow! (App)
Yorba Linda, Orange County, California Zip Code Polygon Map Version 4.1

Table 150.1-C – CFA and Dwelling adjustment Factors

Climate Zone	A - CFA	B - Dwelling Units
1	0.793	1.27
2	0.621	1.22
3	0.628	1.12
4	0.586	1.21
5	0.585	1.06
6	0.594	1.23
7	0.572	1.15
8	0.586	1.37
9	0.613	1.36
10	0.627	1.41
11	0.836	1.44
12	0.613	1.40
13	0.894	1.51
14	0.741	1.26
15	1.56	1.47
16	0.59	1.22

Caution: Photovoltaic system performance predictions calculated by PVWatts® include many inherent assumptions and uncertainties and do not reflect variations between PV technologies nor site-specific characteristics except as represented by PVWatts® inputs. For example, PV modules with better performance are not differentiated within PVWatts® from lesser performing modules. Both NREL and private companies provide more sophisticated PV modeling tools (such as the System Advisor Model at https://sam.nrel.gov) that allow for more precise and complex modeling of PV systems.

The expected range is based on 30 years of actual weather data at the given location and is intended to provide an indication of the variation you might see. For more information, please refer to this NREL report: The Error Report.

The energy output range is based on analysis of 30 years of historical weather data for nearby , and is intended to provide an indication of the possible interannual variability in generation for a Fixed (open rack) PV system at this location.

SOLAR RESOURCE DATA

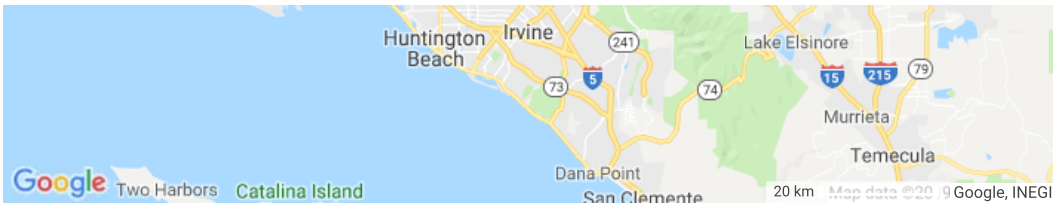
EXHIBIT 5

The latitude and longitude of the solar resource data site is shown below, along with the distance between your location and the center of the site grid cell. Use this data unless you have a reason to change it.

Solar resource data site	**Lat, Lon: 33.89, -117.82**	**0.3 mi**

Resource Data Map

The blue rectangle on the map indicates the NREL NSRDB grid cell for your location. If your location is outside the NSRDB area, the map shows a pin for the nearest avaliable NREL international data site instead of a rectangle. If you want to use data for a different NSRDB grid cell, double-click the map to move the rectangle. *Dragging the rectangle will not move it.* Use the Legacy Data Options check boxes to show pins for legacy data sites. Click a legacy data pin to use legacy data instead of the recommended NSRDB data. See **Help** for details.



NREL
NATIONAL RENEWABLE ENERGY LABORATORY

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The energy output range is based on analysis of 30 years of historical weather data for nearby , and is intended to provide an indication of the possible interannual variability in generation for a Fixed (open rack) PV system at this location.

SYSTEM INFO

RESTORE DEFAULTS

Modify the inputs below to run the simulation.

DC System Size (kW):	4.3
Module Type:	Standard
Array Type:	Fixed (open rack)
System Losses (%):	14.08
Tilt (deg):	5
Azimuth (deg):	90

Draw Your System

Click below to customize your system on a map. (optional)

Advanced Parameters

RETAIL ELECTRICITY RATE

To automatically download an average annual retail electricity rate for your location, choose a rate type (residential or commercial). You can change the rate to use a different value by typing a different number.

Rate Type:	Residential
Rate ($/kWh):	0.160

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Caution: Photovoltaic system performance predictions calculated by PVWatts® include many inherent assumptions and uncertainties and do not reflect variations between PV technologies nor site-specific characteristics except as represented by PVWatts® inputs. For example, PV modules with better performance are not differentiated within PVWatts® from lesser performing modules. Both NREL and private companies provide more sophisticated PV modeling tools (such as the System Advisor Model at https://sam.nrel.gov) that allow for more precise and complex modeling of PV systems.

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The energy output range is based on analysis of 30 years of historical weather data for nearby , and is intended to provide an indication of the possible interannual variability in generation for a Fixed (open rack) PV system at this location.

RESULTS

6,226 kWh/Year*

System output may range from 6,051 to 6,319 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)	Value ($)
January	3.14	313	50
February	3.85	354	57
March	5.31	536	86
April	6.22	601	96
May	6.95	695	111
June	7.32	687	110
July	7.58	735	117
August	7.30	693	111
September	5.93	553	88
October	4.57	451	72
November	3.39	326	52
December	2.79	283	45
Annual	5.36	6,227	$ 995

Location and Station Identification

Requested Location	yorba linda ca	
Weather Data Source	Lat, Lon: 33.89, -117.82	0.3 mi
Latitude	33.89° N	
Longitude	117.82° W	

PV System Specifications *(Residential)*

DC System Size	4.3 kW
Module Type	Standard
Array Type	Fixed (open rack)
Array Tilt	5°
Array Azimuth	90°
System Losses	14.08%
Inverter Efficiency	96%
DC to AC Size Ratio	1.2

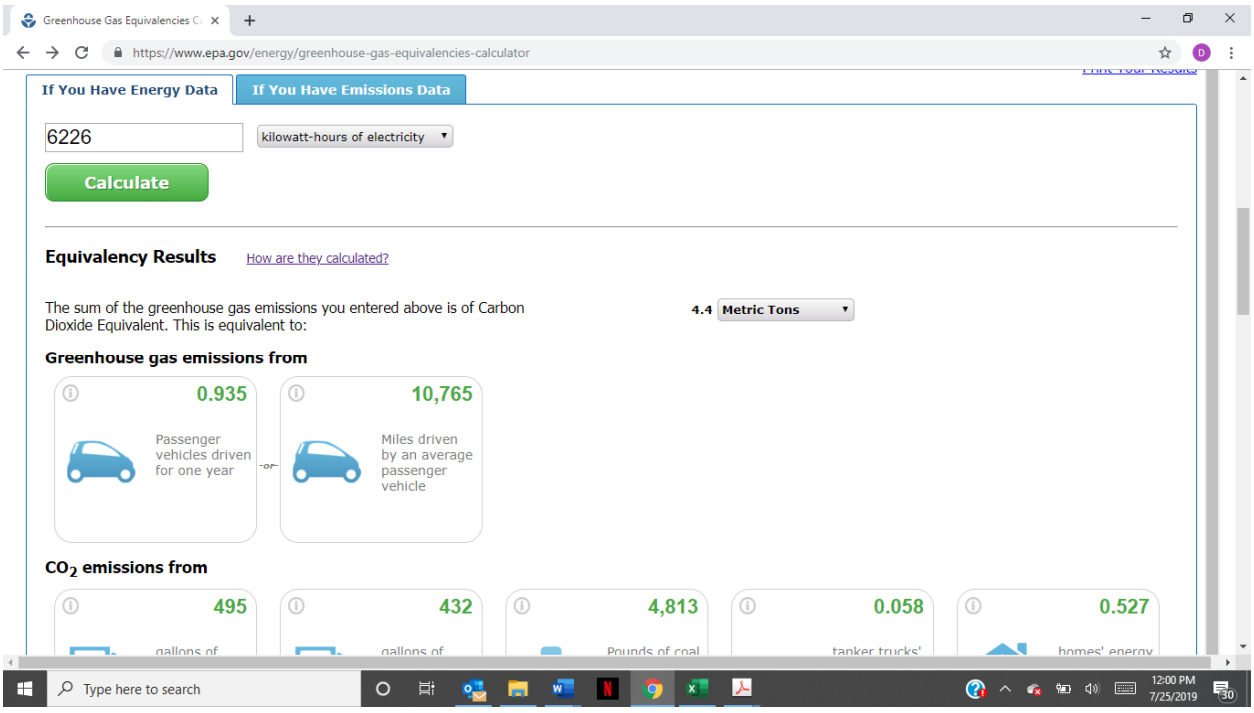
Economics

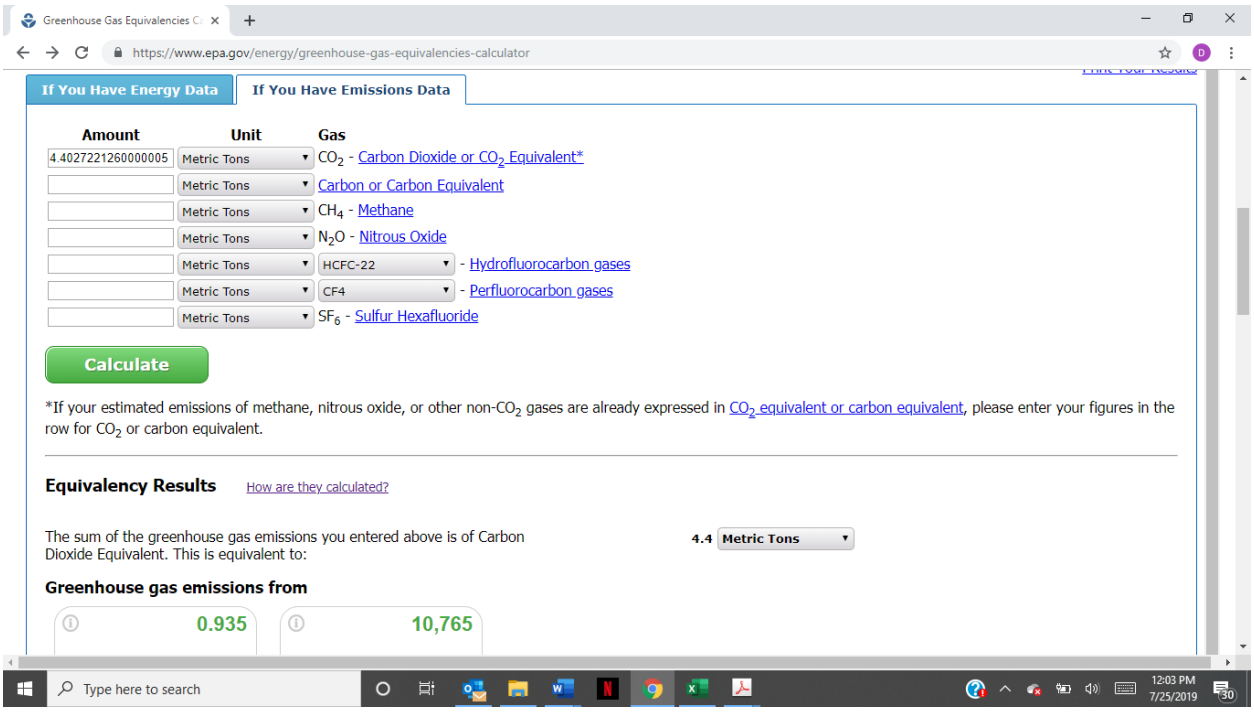
Average Retail Electricity Rate	0.160 $/kWh

Performance Metrics

Capacity Factor	16.5%

EXHIBIT 6


Greenhouse Gas Equivalencies C
https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator
If You Have Energy Data
If You Have Emissions Data
6226
kilowatt-hours of electricity
Calculate
Equivalency Results
How are they calculated?
The sum of the greenhouse gas emissions you entered above is of Carbon Dioxide Equivalent. This is equivalent to:
4.4 Metric Tons
Greenhouse gas emissions from
0.935
Passenger vehicles driven for one year
-or-
10,765
Miles driven by an average passenger vehicle
CO2 emissions from
495
gallons of
432
gallons of
4,813
Pounds of coal
0.058
tanker trucks'
0.527
homes' energy
Type here to search
12:00 PM
7/25/2019


Greenhouse Gas Equivalencies C
https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator
If You Have Energy Data
If You Have Emissions Data
Amount
Unit
Gas
4.4027221260000005
Metric Tons
CO2 - Carbon Dioxide or CO2 Equivalent*
Metric Tons
Carbon or Carbon Equivalent
Metric Tons
CH4 - Methane
Metric Tons
N2O - Nitrous Oxide
Metric Tons
HCFC-22
- Hydrofluorocarbon gases
Metric Tons
CF4
- Perfluorocarbon gases
Metric Tons
SF6 - Sulfur Hexafluoride
Calculate
*If your estimated emissions of methane, nitrous oxide, or other non-CO2 gases are already expressed in CO2 equivalent or carbon equivalent, please enter your figures in the row for CO2 or carbon equivalent.
Equivalency Results
How are they calculated?
The sum of the greenhouse gas emissions you entered above is of Carbon Dioxide Equivalent. This is equivalent to:
4.4
Metric Tons
Greenhouse gas emissions from
0.935
10,765
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Appendix V –
Greenhouse Gas Mitigation Assessment

Greenhouse Gas Mitigation Assessment for Esperanza Hills, County of Orange

Report #16-020C
September 14, 2016

Prepared For:

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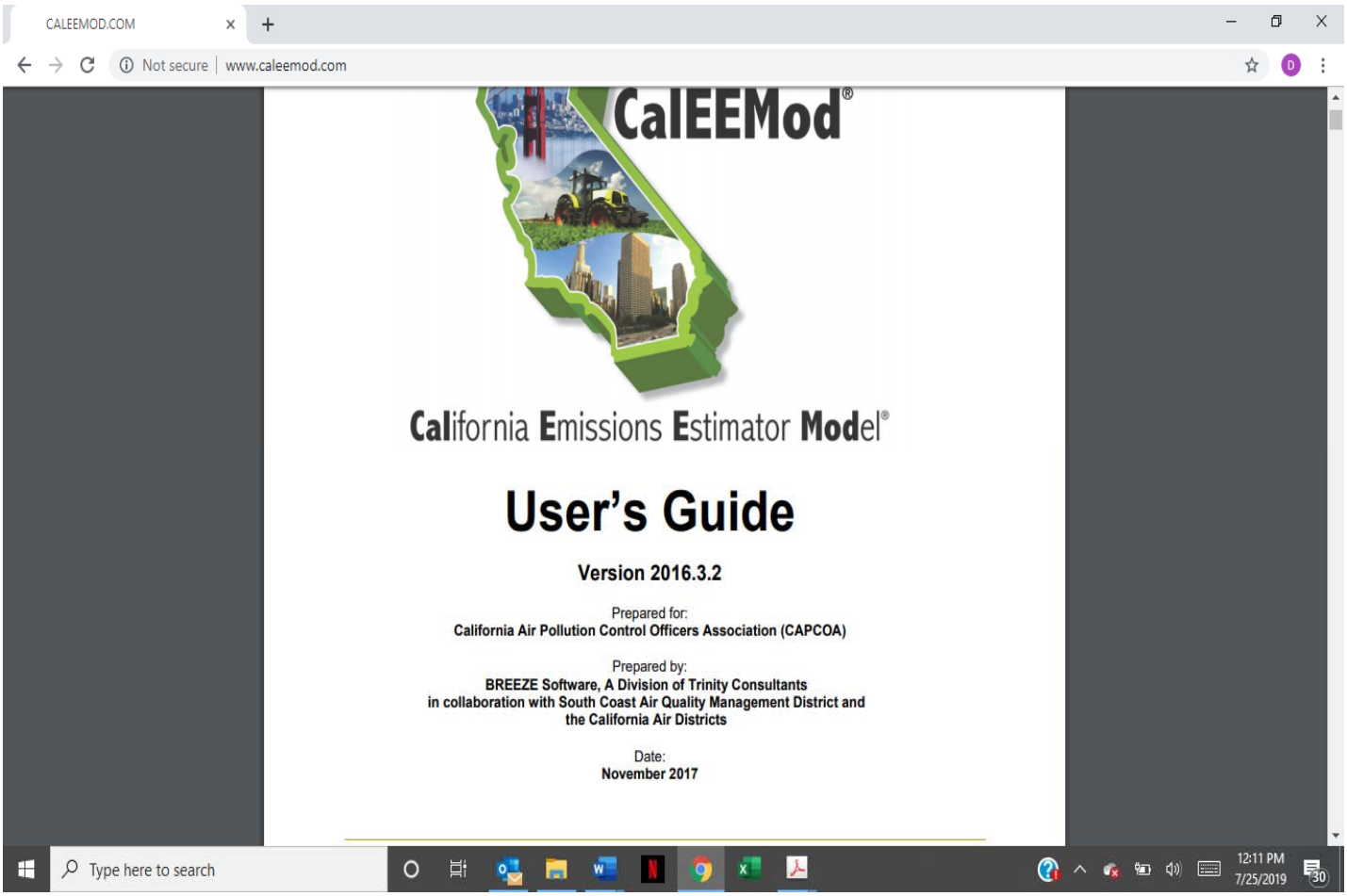
With all measures combined a 8.08% reduction is projected, resulting in operational GHG emissions of 5,444.6 MTCO2EQ/YR. This is a reduction 478.7 MTCO2EQ/YR over the base case.

Amortized construction emissions are commonly included in the total emission count. Giroux and Associates, in an updated analysis for the Response to Comments (April 14, 2016) projected that construction emissions amortized over a 30 year period would result in 114.0 MTCO2EQ/YR. This value was added to the operational emissions presented in Table 1 to give the total GHG emissions for the base case and mitigated case emissions presented in Table 2.

Table 2 Total GHG Emission Reductions

Measure	GHG Emissions (MTCO2EQ/YR)	Percent Reduction
Base Case (No Mitigation)	**6,037.3**	**---**
All Mitigation Measures Combined	**5,558.6**	**7.93%**

EXHIBIT 8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CalEEMod®
California Emissions Estimator Model®
User's Guide
Version 2016.3.2
Prepared for:
California Air Pollution Control Officers Association (CAPCOA)
Prepared by:
BREEZE Software, A Division of Trinity Consultants
in collaboration with South Coast Air Quality Management District and
the California Air Districts
Date:
November 2017
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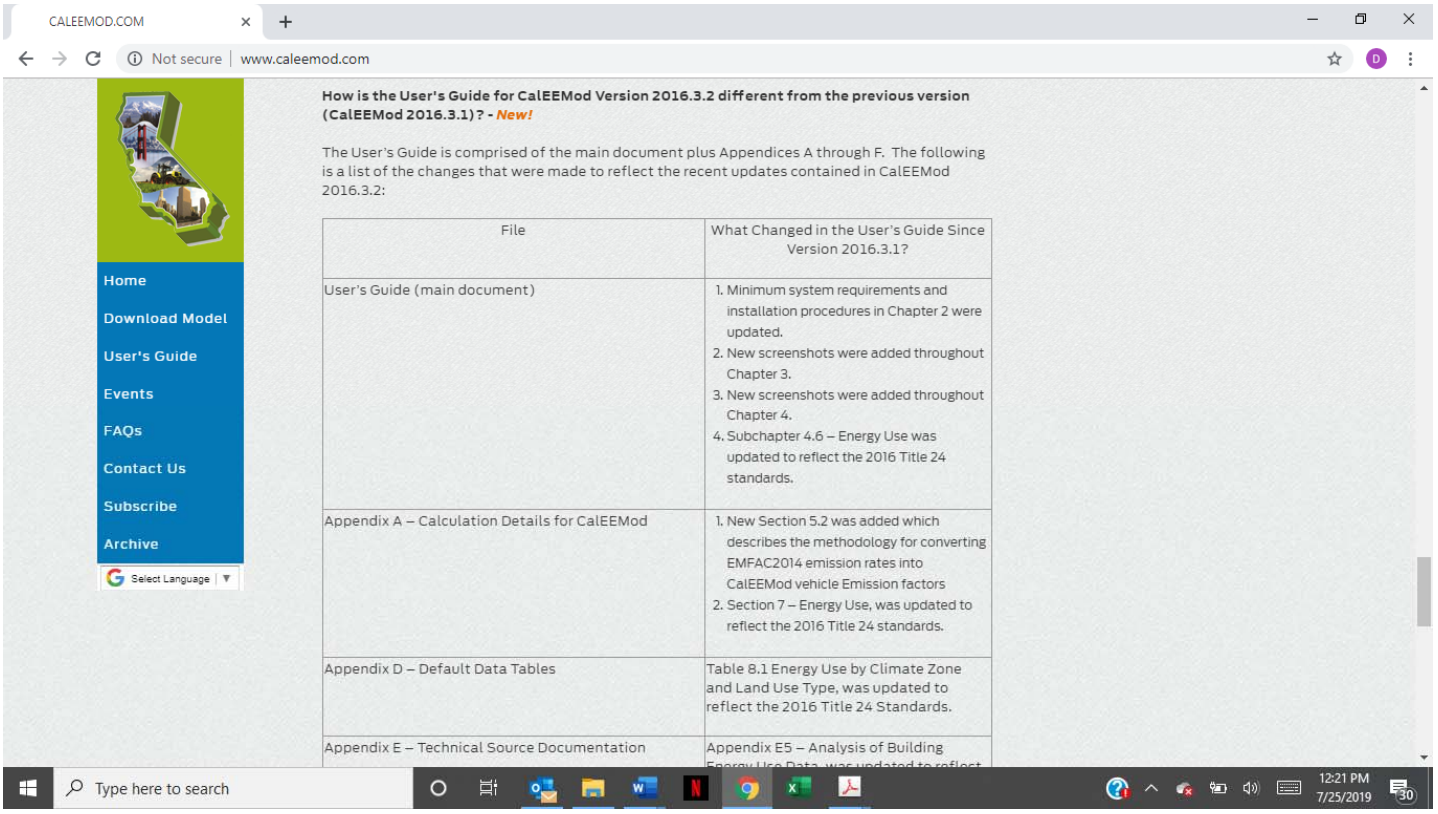
7/25/2019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How is the User's Guide for CalEEMod Version 2016.3.2 different from the previous version (CalEEMod 2016.3.1)? - New!
The User's Guide is comprised of the main document plus Appendices A through F. The following is a list of the changes that were made to reflect the recent updates contained in CalEEMod 2016.3.2:
File
What Changed in the User's Guide Since Version 2016.3.1?
User's Guide (main document)
1. Minimum system requirements and installation procedures in Chapter 2 were updated.
2. New screenshots were added throughout Chapter 3.
3. New screenshots were added throughout Chapter 4.
4. Subchapter 4.6 – Energy Use was updated to reflect the 2016 Title 24 standards.
Appendix A – Calculation Details for CalEEMod
1. New Section 5.2 was added which describes the methodology for converting EMFAC2014 emission rates into CalEEMod vehicle Emission factors
2. Section 7 – Energy Use, was updated to reflect the 2016 Title 24 standards.
Appendix D – Default Data Tables
Table 8.1 Energy Use by Climate Zone and Land Use Type, was updated to reflect the 2016 Title 24 Standards.
Appendix E – Technical Source Documentation
Appendix E5 – Analysis of Building
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