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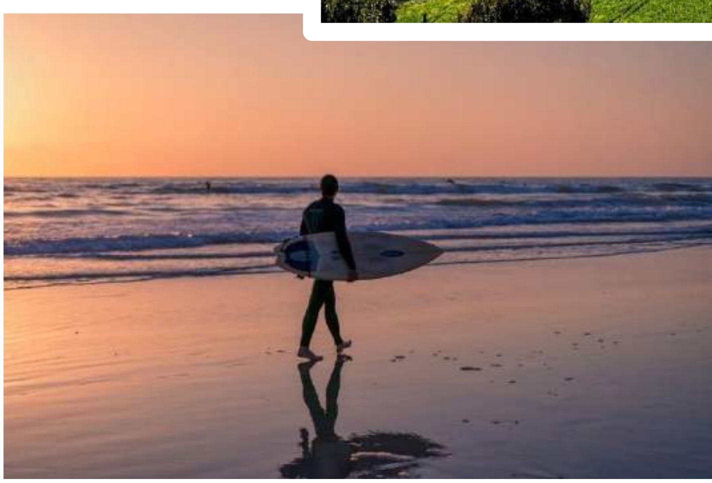
Sustainability Division
COUNTY OF SANTA BARBARA



Strategic Energy Plan for the County of Santa Barbara

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Executive Summary

ES.1 – Project Origin and Objectives

In an effort to stimulate renewable energy development within the County of Santa Barbara (County), help meet aggressive state and local emissions reduction goals, and to improve the resiliency of the local electric grid, the County's Board of Supervisors commissioned the development of a Strategic Energy Plan (SEP). In the wake of the 2017-2018 Thomas Fire and accompanying Montecito debris flows, and in preparation for imminent Public Safety Power Shutdown events, the need for reliability and resiliency of the local electric grid is imperative. Increasing the ability of the electricity grid to operate in emergency scenarios, and to recover quickly from them, will increase reliability for residents and businesses by reducing downtime during electrical outages. Likewise, increasing the availability and use of local renewables will provide the area with clean energy options that do not currently exist, and support the County's Energy and Climate Action Plan (ECAP) goals. To support these goals at the regional level, the Cities of Goleta and Carpinteria also chose to partner with the County on the development of the SEP, and the City of Santa Barbara is pursuing a similar energy planning process.

Due to Santa Barbara County's unique location at the border between Southern California Edison (SCE) and Pacific Gas & Electric (PG&E) electric service territories, the emergency scenarios that are targeted by the SEP extend far beyond natural disasters. The County's location at the end of each utility's electrical distribution system causes lower grid reliability because most of the utility generation is coming from only one direction for each utility, creating a "cul-de-sac" effect in both the northern county and the southern county. As a result, disruptions to the few key transmission wires carrying this electricity is more impactful than in other locations, increasing the likelihood of outages and increasing the downtime when outages do occur.

Furthermore, as a measure to proactively prevent wildfires and other natural disasters, the major Investor-Owned Utilities (IOUs), including SCE and PG&E, have been approved by the California Public Utilities Commission (CPUC) to implement a protocol called the Public Safety Power Shutdown (PSPS) during critical fire conditions with high winds. The PSPS allows and requires IOUs to turn off sections of the electric grid during high-risk periods to reduce the likelihood of a fire being started by the IOUs' equipment.[1] While potentially helpful in protecting people and property, these shutdowns are likely to result in higher frequencies of induced power outages, causing significant impacts on the communities reliant on those portions of the grid.

In the northern county, the shutdown of the nearby Diablo Canyon nuclear power plant in San Luis Obispo County, beginning in 2024, is forecasted to further reduce resiliency and jobs. In the southern county, SCE released a Request for Proposals (RFP) to procure local energy generation and demand response capacity (the reduction of energy usage during peak electricity demand periods) to ensure there were sufficient local energy resources available to meet demand and provide a more resilient grid in the face of shutdowns. However, while SCE stated a preference for renewable generation, the "Least Cost Best Fit" selection methodology used by SCE provided no quantified consideration for the renewable content of energy.[2] As such, none of the projects under final consideration include renewable energy components. The current list of final projects, as of June 2019, are all energy storage projects. While these projects help better position the local

[1] Southern California Edison, "SCE Proposes Grid Safety and Resiliency Program to Address the Growing Risk of Wildfires."

[2] California Public Utilities Commission, "Utility Scale Request for Offers (RFO)."

grid for future integration with renewable energy projects, they do not address existing sustainability concerns.

The objective of the SEP is to address these resiliency concerns and stimulate local renewable energy development in three ways:

1) Identifying total resource potential for various types of renewable energy, including solar, wind, hydro, biomass/biogas, and geothermal power, as well as specific hotspots for potential future development
2) Creating a list of priority sites for renewable energy development throughout the county
3) Developing a set of strategies tackling barriers to renewable energy in diverse program areas ranging from drafting regulatory frameworks to creating new financing mechanisms

ES.2 – Renewable Energy Resource Potential in Santa Barbara County

The table below summarizes the renewable energy potential in Santa Barbara County, ranked from greatest to least potential. Although solar potential dwarfs every other type of resource studied, there is sufficient potential, particularly in biomass/biogas and wind power, to justify further investigation in those areas.

Table ES.1: Renewable Energy Potential in Santa Barbara County

Renewable Resource	Generation Capacity (MW)	Annual Generation (GWh)	Households Powered (approximate)
Solar PV	1,251 – 1,857	1,700 – 2,925	595,000 – 1,023,000
Biomass	44 – 78	249 – 375	87,000 – 131,000
Wind	21 – 42	45 – 129	15,500 – 45,000
Biogas	3 – 7	13 – 20	4,500 – 7,000
Hydro	3 – 6	6 – 16	2,100 – 5,600
Geothermal	1 – 2	7 – 13	2,400 – 4,500

ES.3 – Barriers to Renewable Energy Development in Santa Barbara County

Table ES.2 summarizes the key barriers to renewable energy development that were identified in Santa Barbara County, with a focus on unincorporated areas. These barriers were determined through engaging both internal County stakeholders and members of the community in public workshops and private communications. Although some of these barriers are statewide or federal concerns, such as the anticipated decrease in federal tax credits, many are unique to or heightened in Santa Barbara County.

Table ES.2: Barriers to Renewable Energy Development in Santa Barbara County

Type of Barrier	Barrier(s)	Description
Regulatory	County Land Use and Development Code	Utility-scale solar photovoltaic projects are only allowed in Cuyama Valley.
	Williamson Act	Large areas of the county are under agricultural preservation and cannot be used for utility-scale renewable projects.
	Historic Landmarks Regulations	Several of the sites owned by the County are designated as historic and are not allowed to install renewable energy generation.
	Coastal Zoning Ordinance	Utility-scale renewable energy projects are prohibited in coastal areas.
	Solar and Solar + Storage Permitting	There is a lack of information on how to standardize solar + storage permitting.
Utility & Infrastructure	Transmission Grid	Many high-potential energy sites are far from the transmission grid, increasing project costs. The County is also served by two separate electric utilities that are not integrated.
	PG&E Integrated Capacity Analysis (ICA) Maps	PG&E's recent ICA maps intended to help developers do not work as intended.
County Institutional	Limited County-Owned Parcels	The County owns limited parcels for development.
	Energy Assurance Plan (EAP)	The County does not have a formal EAP to ensure reliability at critical facilities.
	On-Bill Financing (OBF) at County Facilities	There are uncertainties in the County's ability to use OBF at its own facilities.

Table ES.2: *Continued*

Type of Barrier	Barrier(s)	Description
Financial & Funding	Financing Mechanisms	Programs aimed at helping finance energy projects, such as emPower and Commercial PACE, have had low uptake.
	Altered Time-of-Use (ToU) Rate Schedules	Recent changes in electricity rates will lower the value of future solar production.
	Funding Sources	The County's funding is focused heavily on energy efficiency and lacks funding sources for distributed energy generation.
	Federal Investment Tax Credit (ITC)	The federal ITC is currently planned to phase out/down over time, which will reduce potential project viability.
Education & Public Awareness	Cost Awareness of Renewable Energy	Public awareness of the costs and benefits of renewable energy can be outdated due to recent and ongoing technology improvements.

ES.4 – Recommended Actions to Overcome Barriers

The strategies below were developed to directly target the barriers identified in Santa Barbara County. They span five major program areas: 1) regulatory actions; 2) actions aimed at shifting the utility landscape and changing the electricity supply in Santa Barbara County to more sustainable sources; 3) actions to spur renewable energy use at County facilities, particularly ones critical to public safety; 4) actions related to funding and financing renewable projects; and 5) actions related to education and public awareness both inside and outside the county.

Table ES.3: Recommended Actions to Overcome Renewable Energy Barriers in Santa Barbara County

Program Areas	Strategies	Description
Regulatory	Develop Utility-Scale Solar Ordinance	Update Land Use and Development Code and General Plan to allow utility-scale solar generation outside of the Cuyama Valley.
	Update Uniform Rules for Agricultural Preserves and Farmland Security Zones	Amend Uniform Rules to allow judicious utility-scale solar development on agricultural preserves by focusing on dual-use projects and non-prime or unproductive land.
	Update Coastal Zoning Ordinance	Amend Coastal Zoning Ordinance to reduce barriers for wind energy, in alignment with the Gaviota Coast Plan.
	Update Residential Solar and Storage Permitting Procedures	Create a team to develop and implement best practices for solar + storage permitting. Create a list of vetted installers with reduced permitting requirements.
Utility & Infrastructure	Consider Community Choice Aggregation (CCA)	Continue to explore feasibility of a countywide CCA and implement if desired.
	Community Solar Project	Develop a community solar project for those without access to on-site renewable energy.

Table ES.3: *Continued*

Program Areas	Strategies	Description
County Institutional	Energy Assurance Plan	Create and implement an energy assurance plan to ensure reliability at critical facilities.
Financial & Funding	Offer New Financing Mechanisms	Replicate loan-loss reserves used in past programs to create a low-interest funding source for the community.
	Financial Incentives	Provide financial incentives to fill gaps in economic viability.
	Diversify Funding Streams	Monitor and apply for regional, state, and federal grants.
Education & Public Awareness	One-Stop Shop	Set up a resource and education center to raise public awareness and act as a hub for advertising programs.

ES.5 – Successes and Challenges of the SEP Clustering Process

A key initial desired outcome of the SEP process was identification of geographic areas ideally suited for renewable energy development and the creation of potential clean energy clusters. As mentioned throughout this plan, the study process for clean energy siting looks for a set of clustered least-conflict zones by using a process of evaluating resources (wind, solar, geothermal, etc.) against impediments to development (critical species habitat, distance from electricity grid, land topography, etc.). The search for siting clean energy clusters within the Santa Barbara County geographical territory produced, as an interim product, a map and list of majority exclusion zones based on areas with the lowest level of conflicts to energy developments, including those mentioned above, as well as lands facing jurisdictional complexities such as Federal Parks, Coastal Commission, and prime agricultural lands.

As a result of the clean energy cluster mapping and community outreach processes, a number of ranch lands, dry farms, and smaller parcels were determined to be viable as cluster cores. The Ted Chamberlin Ranch identified itself as interested in working with the County to evaluate and develop a solar energy cluster around the Zaca Station Road electrical substation near the intersection of Highways 101 and 154, northwest of the community of Los Olivos. Proximity to a substation, gentle topography, and the non-prime, dry-farmed conditions are indicators that a viable cluster could be created around that location if cooperation from the County was made available.

However, broader efforts to engage landholders (and the clean energy development community) failed to galvanize a threshold level of commitment necessary in order to form multiple clean energy clusters within the County. The critical question is to ask why this level of commitment from landowners and clean energy developers failed to develop despite months of outreach, presentations, community dialogue, and offers of no-cost technical assistance. Stakeholder and community workshop feedback indicates a widespread perception among the clean energy development community that administrative and local policy barriers create an environment which is antithetical to new clean energy clusters. This is, on one level, a success of its own, in that it indicates that the SEP process will likely achieve greater success in accelerating clean energy clusters if the County is able to demonstrate goodwill and commitment to the landowners by addressing these local policy barriers. Therefore, a central goal of the Strategic Energy Plan was achieved in identifying these obstacles.

The planning process would achieve greater impacts if it could move forward in two phases: first to identify and address barriers; and second, to continue outreach and engagement to landholders once steps have been taken to reasonably address local policy barriers. It is likely that the desired clustering and sustainable development would follow policy revision that demonstrates commitment to clean energy clusters by the County. The key obstacles identified in the SEP process are noted throughout this plan and include agricultural preserve contracts, permitting, and land use requirements.

At the time of entering a second phase of revisited stakeholder outreach, the marketed message should make it clear that this streamlining process has been ongoing and seeks to continue the involvement of agricultural stakeholders, including the Agricultural Advisory Committee. In addition, beyond removing policy barriers, the message should include the County's work evaluating new energy off-taker arrangements such as Community Choice Aggregation (CCA, also called Community Choice Energy or CCE) as a pathway to price discovery and the setting of rates. During the second year, the SEP project should return to a list of potential cluster locations and begin to assess environmental impacts through California Environmental Quality Act (CEQA) compliant review of these clustered sites in order of priority.

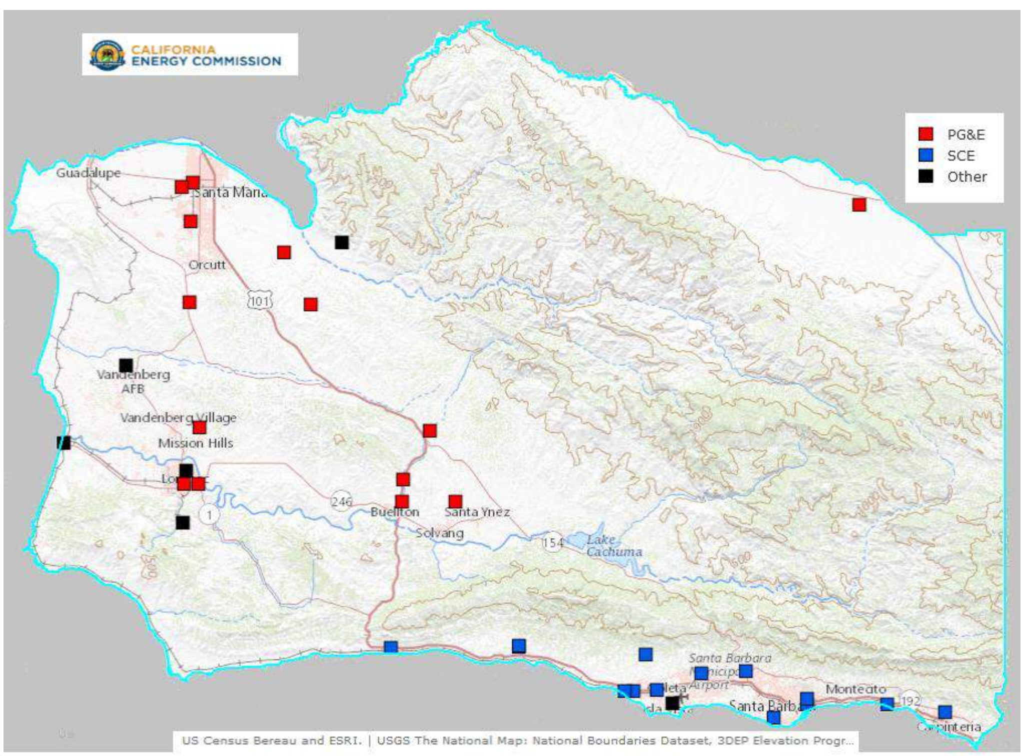

Figure ES.1: Santa Barbara County Substations on the Electricity Transmission Grid

As an indicator for early clustering of specific sites, locations near electrical substations at electrical grid transmission line voltages (e.g. 70, 115, and 220kV), as indicated in the figure above, are likely to be most financially viable for large-scale renewable energy development.

ES.6 – Call to Action

The County of Santa Barbara has ambitious, strong and varied energy goals stretching across many sectors including climate, emergency preparedness, and the diverse economy. Meeting these goals will require equally strong and varied actions by the County across many different program areas. Although meeting these goals will be difficult, success can be achieved with both strong financial and staffing commitment from County administrators and dedicated collaboration among the County, local cities, residents, and businesses.

Chapter 1 – Introduction

1.1 – Benefits of a Strategic Energy Plan (SEP)

1.1.1 – Renewable Energy and Climate Goals

In 2018, the County of Santa Barbara took the initiative to commission a county-wide Strategic Energy Plan (SEP). The goal of the SEP is to develop strategies to tackle community-wide barriers to local renewable development, as well as to identify high-priority sites for distributed and utility-scale renewable energy development, thereby improving electricity reliability and resiliency for residents and businesses of Santa Barbara County. The Cities of Goleta and Carpinteria chose to join this initiative to support these objectives while also addressing their own local goals.

A comprehensive SEP is consistent with the movement of local and state governments across the United States to take their renewable energy future into their own hands. Over 100 cities and at least 11 counties throughout the country have committed to powering themselves entirely through renewable electricity by 2050 or earlier. These include the Cities of Goleta and Santa Barbara, who have adopted 100% renewable electricity goals by 2030, as well as neighboring Ventura County.[3] A local SEP can also help the State meet its renewable electricity and greenhouse gas (GHG) emissions targets. California has goals to achieve 100% carbon-free electricity by 2045 and to reduce GHG emissions to 80% below 1990 levels by 2050.[4] At the local level, the County of Santa Barbara has established a goal to reduce GHG emissions from the unincorporated parts of the county to 50% below 1990 levels by 2030.[5]

1.1.2 – Reliability, Resiliency, and Economic Goals

Local siting of clean energy projects is a key feature of the SEP, both for distributed and utility-scale energy, to increase the reliability and resiliency of the electricity system by reducing reliance on the transmission grid carrying electricity to Santa Barbara County. The transmission grid in southern Santa Barbara County is especially vulnerable, as proven by the Thomas Fire, which hit southern Santa Barbara and northern Ventura Counties in December 2017 and January 2018. Transmission lines in Ventura County were damaged within minutes of the fire starting, cutting off the power to the south coast of Santa Barbara County, affecting 200,000 people for over six hours. For weeks, the power grid was unstable and threatened with further outages.

Furthermore, vegetation necessary for maintaining land stability was destroyed as a result of the fires, causing mud and debris flows to strike the unincorporated suburban area of Montecito during heavy rains shortly after the fire. These combined disasters destroyed hundreds of structures, caused hundreds of millions of dollars in property damages, and led to power outages for tens of thousands of residents. The debris flow destroyed a SoCal Gas high pressure natural gas line, resulting in an explosion destroying several homes and injuring two people.

Natural disasters are not the only threats to Santa Barbara's electricity system. In the wake of the Thomas Fire and other wildfires across California, the State's three investor-owned utilities (IOUs) announced Public Safety Power Shut-off (PSPS) protocols. These protocols are designed

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[3] Sierra Club, "100% Commitments in Cities, Counties, & States."

[4] California Senate, SB-100 California Renewables Portfolio Standard Program: emissions of greenhouse gases.

[5] County of Santa Barbara, "Energy and Climate Action Plan (ECAP)."

to pre-emptively reduce wildfire risk by shutting down sections of transmission lines in dangerous weather conditions,[6] which are likely to create power outages even in non-disaster situations.

Increasing the reliability and resiliency of the regional electricity system will also serve to bolster the economy in several ways. Power outages result in a loss of production and can be extremely costly, particularly to critical facilities such as hospitals, agricultural storage facilities, and water distribution systems. Stimulating renewable energy development will also create local jobs, a particularly pressing need as jobs in the traditional energy industry are expected to decrease with the shutdown of the Diablo Canyon nuclear plant in nearby San Luis Obispo. Additionally, greater economic growth generally requires greater electricity consumption to support more businesses and more operations. More renewable energy will reduce the extent to which this greater electricity consumption will be accompanied by an increase in greenhouse gas emissions (GHGs).

The County's goals can only be achieved through a combination of large renewable electricity installations that help utilities increase their renewable content AND distributed electricity resources installed by residents and businesses. Strong action by every local and regional government is needed over the next 25-30 years to achieve these ambitious targets and deliver the broad economic, environmental, and community benefits of renewable electricity.

1.2 – County Electrical Grid

One of the unique energy and resiliency challenges in Santa Barbara is caused by its location at the border of the PG&E and SCE electrical grids. As a result, the northern county is at the end of the PG&E grid and the southern county is at the end of the SCE grid, as shown in the transmission grid map of Figure 1.1. The transmission grid is designed to carry electricity over large distances, connecting large utility-scale power plants to load centers such as cities. The lines running at higher voltage, 115 kilovolts (kV) and 220 kV, can carry more electricity than the lower voltage 60/66 kV lines, and are thus particularly important. The distribution grid, which connects to the transmission grid and carries electricity at a lower voltage directly to buildings, is not shown.

Figure 1.1: Santa Barbara County Electricity Transmission Grid

[6] Southern California Edison, "SCE Proposes Grid Safety and Resiliency Program to Address the Growing Risk of Wildfires."

This split in electrical grids has several consequences. Firstly, resilience and backup capability are reduced due to being at the end of each utility's system of transmission lines. With that position, any major disruption to grid services, whether planned as a preventative measure or unplanned as a result of natural or human-caused disaster, is nearly certain to result in loss of electrical service to county residents. Additionally, since the only large generation in the county is in Cuyama, most of the electricity is coming into the county from only one direction in the north in PG&E territory (the Diablo Canyon nuclear generation plant) and from Ventura County in the south in SCE territory. As a result, a small number of extremely important transmission lines are essential to maintaining the power supply to the whole county.

The Ellwood backup natural-gas power electrical plant in the City of Goleta is a "peaker plant", designed to provide electricity to southern Santa Barbara County during disruption of transmission from Ventura County. However, during the extensive power outages caused by the Thomas Fire and Montecito Debris Flows damaging the transmission lines serving the county, the plant did not turn on for reasons that have not been made entirely clear, but likely had to with worker safety in repairing damages to those power lines connected to the plant.

The use and future of Ellwood has been the topic of frequent debate at the CPUC. In July 2018, the California Independent System Operator (CAISO) concluded that Ellwood was required for the reliable operation of the transmission system in 2019 and authorized the designation of Ellwood as a reliability must-run resource. In the future, the plant's usage may change, and clean energy or energy storage options could be explored at the facility at that time, in conjunction with the site owner/operator, SCE, and the CPUC.

To begin this process of investigating new opportunities for generation in the area served by Ellwood, SCE released a Request for Proposals (RFP) in early 2018 to attempt to solve this resiliency issue in the southern county through new on-demand energy generation development. However, their final selected portfolio only included battery storage resources and demand response capabilities, which meet local capacity requirements, but do not fully address resiliency or environmental issues. Similarly, the closure of PG&E's Diablo Canyon nuclear generation plant, scheduled for 2024-2025, will add reliability and resiliency concerns in the northern county, in addition to causing negative economic impact on workers and businesses in the northern county.

1.3 – Current County Actions Supporting Renewable Energy Development

1.3.1 – County Policies

As the County develops plans to implement its SEP, it is important to take stock of the past and present clean energy policies and programs that the County has already implemented to understand which initiatives have been most and least successful. This will allow the County to model its future actions towards the former and learn lessons from the latter to maximize the likelihood of their success, as well as understand the gaps that currently exist.

Recent major initiatives taken by the County to support renewable energy and climate goals include:

- a Zero Net Energy (ZNE) Facilities Resolution that sets a target for 50% of new County-owned facilities to be ZNE after 2020 and all new facilities or those undergoing major renovations to be ZNE after 2025;[7]
- the Energy and Climate Action Plan (ECAP) that sets a target to reduce GHG emissions from the unincorporated parts of the county to 15% below 2007 levels by 2020;[8] In 2018, the Board directed staff to update the ECAP post 2020 and set a new goal of 50% below 1990 levels by 2030; and
- an amendment to the Energy Element of the County's Long-Term Comprehensive Plan[9] that accepts and adopts the implementation of the ECAP.

Also in 2015, the Board of Supervisors authorized staff to explore the viability of a local Community Choice Aggregation (CCA) program, which would give more power to the County to procure electricity from cleaner and more local sources. The 2017 ECAP Progress Report revealed that, although the County has made progress towards implementing its recommended actions, it remains behind on meeting its targets,[10] indicating that further action is needed.

1.3.2 – County Departments

Many departments and divisions across the County organization are responsible for achieving the County's clean energy, GHG reduction, and other environmental sustainability goals. The Sustainability Division, part of the Community Services Department, plays a primary coordination and implementation role for community-facing sustainability initiatives. The Sustainability Division also facilitates a County Sustainability Committee that includes representation from all County departments/divisions with a role to play in implementing the ECAP. The General Services Department is responsible for meeting the County's sustainability goals for County facilities and fleet.

1.3.3 – County Programs

The County's primary community-facing objectives have been to facilitate energy actions by supporting training workshops, energy financing programs for homeowners and businesses, and regional collaborative efforts on energy and climate issues.

Most recently, this has included leading coordination on a Tri-County Regional Energy Network (3C-REN)[11] and on the County's ECAP, through the County Sustainability Committee.[12] Regional Energy Networks are collaborations between multiple local governments to access ratepayer funding directly from the CPUC to implement energy efficiency programs. 3C-REN was approved in 2018 with an 8-year budget. It will launch energy efficiency programming in mid-2019 that includes:

- Workforce education and training programs for building professionals and building departments

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7 Center for Sustainable Energy, "Case Study: Santa Barbara County's ZNE Facilities Resolution."

8 County of Santa Barbara, "Energy and Climate Action Plan (ECAP)."

9 County of Santa Barbara, "Long Range Planning Division."

10 County of Santa Barbara, "Energy and Climate Action Plan 2017 Progress Report."

11 County of Ventura, "Tri-County Regional Energy Network."

12 County of Santa Barbara, "County Sustainability Committee."

- Codes and standards compliance programs for building professionals and building departments
- Residential (including multi-family) direct-install energy efficiency program for customers considered hard-to-reach (e.g. renters, non-English speakers, etc.)

In 2018, the County approved a Property Assessed Clean Energy (PACE) financing program for commercial properties (C-PACE), which allows commercial building owners to take out loans for renewable energy and energy efficiency installations, among other measures, through property liens.[13] However, no C-PACE loans have been authorized to date in Santa Barbara County. The County has not authorized residential PACE (R-PACE) in the unincorporated parts of the county, though the Cities of Lompoc and Santa Barbara have both approved R-PACE programs. Participation in R-PACE has been limited thus far however, with only 17 R-PACE loans in Lompoc, and none in Santa Barbara City.

The County is also a participant in the Santa Barbara County Energy Watch Partnership, a collaboration between the County, the Cities of Buellton, Guadalupe, Santa Maria, and Solvang, and PG&E and Southern California Gas Company (SoCal Gas) to promote and support implementation of energy efficiency measures in northern Santa Barbara County. Since 2010, the Partnership has succeeded in reducing energy use by over 15 million kilowatt-hours (kWh) annually.[14] It is unclear how long the utilities will continue to fund this program.

Along with the Cities of Carpinteria, Goleta, and Santa Barbara, the County also participates in the South County Energy Efficiency Partnership (SCEEP), which is an energy efficiency program offered by SCE and SoCal Gas to encourage local governments to make energy efficiency improvements.[15] However, this partnership may end after 2019 due to utility funding cuts.

Until 2019, the County also ran the emPower Central Coast program, which partnered with local utilities and credit unions to provide wraparound ratepayer support services, such as energy education, free Energy Coach site visits and low-interest financing to help homeowners make energy efficiency upgrades. Due to many factors, including strict guidelines around the types of projects that could qualify for financing, and a heavy administrative burden to participating contractors, participation waned, and the program ended after seven years.[16]

1.4 – Currently Installed Renewable Energy Capacity

1.4.1 – Projects at County Facilities

The County has developed and is developing several large renewable energy projects on its own facilities that will allow the County to be more resilient in providing services during grid outages and demonstrate the County's leadership regarding renewable energy development.

Currently, there is an approximately 1100-kilowatt (kW) solar photovoltaic (PV) facility installed on the hillside behind the Calle Real Campus in southern Santa Barbara County, which is the largest energy user for the County. This solar facility has generated over 13,000,000 kWh over its

[13] PACENation, "PACENation: Building the Clean Energy Economy."

[14] Santa Maria Valley Chamber, "Energy Watch Partnership."

[15] South County Energy Efficiency Partnership, "South County Energy Efficiency Partnership."

[16] emPower SBC, "EmPower Central Coast."

lifetime to date. Operation of the PV system currently results in a reduction of approximately 300 metric tons of CO_2 emissions annually for the campus.

In 2021, the Tajiguas Resource Recovery Project (TRRP), a combined waste diversion and biogas generation facility, is set to come online. The TRRP is expected to reduce the waste buried in the landfill by 60%, as well as result in 1 megawatt (MW) of biogas electricity generation, enough to power roughly 1,000 homes. The project will accomplish several goals at once, by diverting waste from the landfill while also generating renewable energy in the southern county that can be used in emergency scenarios and transmission shut offs between Santa Barbara and the rest of SCE's electricity grid. The combined GHG reduction of the waste diversion and electricity generation is estimated to be over 117,000 tons, equivalent to removing 25,000 cars off the road.[17]

The County also has solar and building energy efficiency projects in various stages of the development process, from design to procurement, at its facilities in various campuses across the county. Energy efficiency upgrades will be made to over 125,000 square feet of buildings on the Betteravia campus in Santa Maria. This includes updates to outdated HVAC systems and controls, energy efficient lighting, and boilers. Following that, installation of an 800-kW solar energy system will begin in FY 2019-2020. This project will include covered parking with solar panels, installation of solar thermal for hot water heating, and an 800-kWh lithium battery storage system. This location will also pilot a small wind generation system.

The County is also in the process of completing an energy and retro-commissioning audit of over 50 buildings totalling 823,000 square feet in the south county. When complete, a strategy will be developed to address the numerous energy efficiency measures identified. Other potential future projects include energy efficiency and solar projects at the County's Foster Road campus in the north county, and a possible solar installation at the Cachuma Lake Recreation area.

1.4.2 –Distributed Renewable Energy Capacity Installed by the Community

Figures 1.1 and 1.2 below show the total installed distributed solar energy capacity by sector in the entire county, as well as in only the unincorporated areas. Distributed renewable energy refers to energy projects located at the site of electricity consumption, such as at homes and businesses, as opposed to utility-scale renewable energy, which is not co-located with electricity usage.[18] In urban areas, distributed renewable energy generally takes the form of solar energy systems installed on rooftops and carports.

Distributed solar installations can be divided into three rough categories: residential installations on single-family homes (<10 kW), commercial installations on multi-family housing and office and retail buildings (10 – 500 kW) and industrial installations on large industrial or agricultural campuses and yards (>500 kW).

The data used to inform the local installed solar capacity is taken from Net Energy Metering (NEM) Interconnection data released by California Distributed Generation Statistics.[19] Net Energy Metering is the program that allows customers with distributed solar installations to export energy to the grid or import from the grid as necessary, receiving credits for excess generation.

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[17] County of Santa Barbara - Waste Management and Resource Recovery Division, "Tajiguas Resource Recovery Project."

[18] Department of Energy, "Renewable Energy: Distributed Generation Policies and Programs."

[19] California Distributed Generation Statistics, "CaliforniaDGStats."

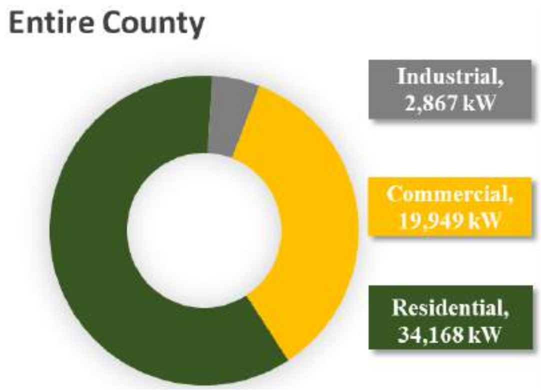

Figure 1.2: Distributed Solar Capacity Installed in Santa Barbara County

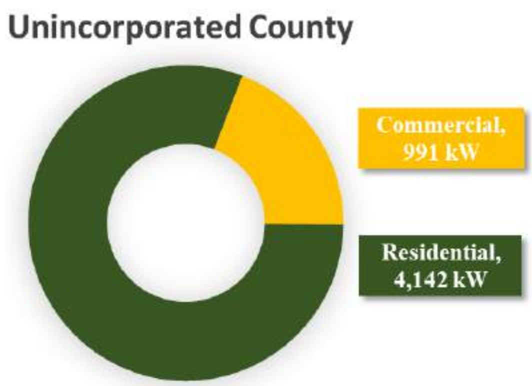

Figure 1.3: Distributed Solar Capacity Installed in Unincorporated Santa Barbara County

As illustrated, the total county has a much higher percentage of commercial and industrial solar projects than the unincorporated county areas only, with roughly 40% of county-wide potential being commercial & industrial for the entire county, compared to only 20% for the unincorporated county. This is to be expected due to incorporated cities having more commercial and industrial building spaces than unincorporated areas. Most of the relatively few commercial and multi-family residential buildings in the unincorporated county are in the Isla Vista community, due to its position adjacent to the University of California—Santa Barbara campus. The 57 MW of solar installed across the county results in roughly 14,000 metric tons of CO_2 being reduced annually, equivalent to approximately 3,000 cars being taken off the road. The total renewable energy potential of the county is discussed in more detail in Chapter 2.

Chapter 2 – Renewable Energy Resource Potential in Santa Barbara County

2.1 – Introduction

This chapter assesses the availability, within the County of Santa Barbara, of the five types of power generation that are eligible under California's Renewables Portfolio Standard (RPS): solar, wind, biomass/biogas, small hydroelectric, and geothermal.[20] Aligning the definition of renewable energy with California's definition enables a clearer comparison of the renewable energy capacity of various counties and regions in California. With the focus on RPS-eligible renewable energy resources, coal, natural gas, large hydro, and nuclear power were excluded from this study.

Within the RPS-eligible sources, the focus is primarily on solar photovoltaic, onshore wind, biogas digestion, biomass combustion, dam hydroelectric, and hot spring geothermal power. Solar thermal and concentrating solar power plants require larger amounts of land than are generally available in Santa Barbara County, and lag commercially installed solar photovoltaic power by an order of magnitude. Although offshore wind resource is generally better than onshore wind resource, the entire coast of Santa Barbara County is in a military restriction zone due to the Naval Base in Ventura County, making offshore wind development unlikely in the near term. Evaluating the potential of small-scale river hydro installations requires a level of field investigation and exploration that was outside of the scope of this study. Lastly, evaluating distributed geothermal power was not investigated as it is used primarily for offsetting natural gas for heating purposes, not electricity generation. This resource potential study includes both privately and publicly owned sites but excludes federally owned lands.

Specifically, the evaluation seeks to:

1. Estimate the quantity of renewable energy resources that can realistically be developed in the unincorporated county in the short-to-medium term;
2. Categorize the potential by energy type, customer segment, and utility territory to enable County staff to better target its policy and programmatic solutions;
3. Identify the geographical locations in the county with the greatest availability of resource; and
4. Document the technical and administrative barriers to meeting this potential.

The results of this analysis are summarized in Table 2.1 (capacity and generation ranges) and Figure 2.1 (generation averages) on the following pages, ranked in order of potential generation capacity, which is the maximum amount of power that can be provided by that energy resource at any given time. As can be seen in the table, solar capacity dwarfs every other type of energy resource that was studied.

However, intermittent energy sources, like solar, wind, and hydropower, cannot operate at full capacity at all times, as they depend on how much the sun is shining, how fast the wind is blowing, or how fast a river is flowing, which vary with both the time of day and the season, as well as other factors. In comparison, biomass and biogas plants, like coal and natural gas plants, depend on a fuel source that does not vary with time. Therefore, they have much higher capacity factors than solar, wind, and hydropower- meaning they can operate at full capacity for a greater percentage

[20] Crume and Green, "RPS Eligibility Guidebook, Ninth Edition."

of time.[21] As such, while the total electricity generated by 1 megawatt (MW) of solar power can power approximately 500 Santa Barbara County homes over the course of a year, the same amount of biomass power can power approximately 2000 homes over the course of a year. To account for the actual energy-generating capabilities across these varying capacity factors, the resources have also been compared in terms of how much total energy they can generate in a year in gigawatt-hours (GWh). 1 GWh is the energy consumed by approximately 350 homes over a year, based on average residential electricity consumption in southern Santa Barbara County.

Table 2.1: Total Countywide Renewable Energy Potential

Type		Generation Capacity (MW)	Annual Generation (GWh)
Solar	Rooftops	855 – 1,103	1,155 – 1,600
	Agricultural Land (Williamson Act)[22]	34 – 104	48 – 198
	Parking Lots	203 – 241	275 – 350
	Agricultural Land (Non-Williamson Act)	159 – 409	222 – 777
	Total Solar	1,251 – 1,857	1,700 – 2,925
Biomass	Forestry Waste	19 – 31	107 – 150
	Landfill Biosolids	19 – 31	106 – 149
	Agricultural Waste	6 – 16	36 – 76
	Total Biomass	44 – 78	249 – 375
Wind	Non-Williamson Act	14 – 28	30 – 86
	Williamson-Act	7 – 14	15 – 43
	Total Wind	21 – 42	45 – 129
Biogas	Landfills	2 – 5	8 – 13
	Wastewater Treatment	1 – 2	5 – 7
	Total Biogas	3 – 7	13 – 20
Hydro	Total Hydro	3 – 6	6 – 16
Geothermal	Total Geothermal	1 – 2	7 – 13
Grand Total		**1,323 – 1,992**	**2,020 – 3,478**

[21] US Energy Information Administration, "Electric Power Monthly with Data for December 2013."

[22] The Williamson Act is the state-wide legislation governing agricultural preserves. The challenges associated with solar development on agricultural preserve land are discussed in detail in Chapter 3.

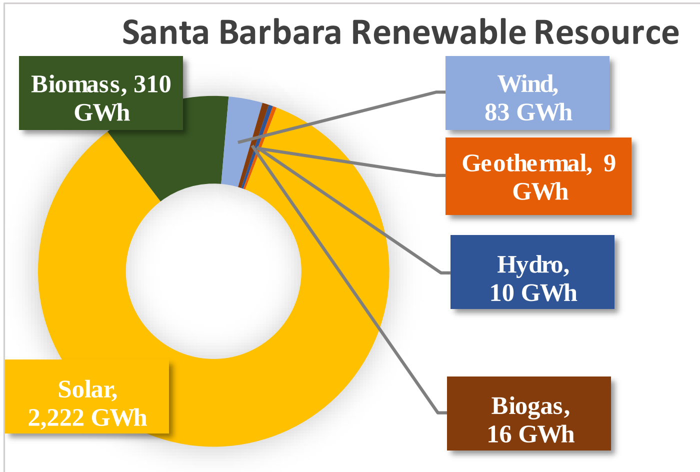

Figure 2.1: Total Countywide Renewable Energy Potential

2.2 – Total Potential of Solar Photovoltaic Resources

2.2.1 – Current Solar Projects in Santa Barbara

The Santa Barbara region has a strong history of urban rooftop installations but limited large utility-scale solar installations on agricultural land. Examining this history enables a comparison of different cities and areas in the county.

According to California DG Statistics, the reporting arm of the California Solar Initiative, approximately 57 MW of distributed, net-metered solar PV has been installed to date in Santa Barbara County, with nearly 52 MW within incorporated cities and over 5 MW in unincorporated areas of the county.[23] Over the past 5 years, roughly 8 MW of distributed capacity has been added on average each year across the county. Over two-thirds of total urban installations have been in the cities of Santa Maria or Santa Barbara.[24] Although these are the two largest cities, their total population is only approximately half of the population of the county, indicating that there may be more untapped potential in the smaller incorporated cities and unincorporated areas. Table 2.2 shows the installed capacity in each city or jurisdiction within Santa Barbara County.

Table 2.2: Distributed Solar Capacity by City or Jurisdiction

City or Jurisdiction	Total Installed Distributed Solar Capacity (MW)
Santa Maria	22
Santa Barbara	16
Unincorporated	5
Goleta	5
Lompoc	3
Solvang	2
Buellton	1
Carpinteria	1
Guadalupe	1

[23] California Distributed Generation Statistics, "CaliforniaDGStats."

[24] Due to data collection often being by zip code, solar generation just outside an incorporated city may be counted as within the boundaries. As such, Santa Maria generation may include some Orcutt generation, and Santa Barbara generation may include some Montecito generation.

Due to a variety of barriers that will be discussed in further detail in Chapter 3, such as the Williamson Act, there has been only one major utility-scale solar installation in Santa Barbara County--a 40-MW system near Lake Cuyama which began operation in 2017. For its first year of operation, the system provided electricity to Peninsula Clean Energy, a Community Choice Aggregation (CCA) in San Mateo County. Starting in 2019, the Cuyama Solar Array has provided energy to PG&E.[25] An aerial view of the Cuyama Solar Array can be seen in Figure 2.2.

Figure 2.2: Aerial View of 40 MW Cuyama Solar Array

Additionally, a smaller 3-MW project called the SEPV Cuyama Solar Project, which will be situated just beside the existing project, has been proposed. This development is currently undergoing the Board of Supervisors approval process.[26] Finally, although outside of the geographic scope of this study, a 28 MW array also exists in Vandenberg Air Force Base (VAFB). This array is the largest Air Force project intended directly for on-site use, and powers approximately 35% of total VAFB consumption.[27]

Figure 2.3 below shows the total distributed and utility-scale solar power installed in Santa Barbara County. The Cuyama array's generation is greater than almost every distributed array combined. However, since the transmission grid goes around Los Padres Forest, electricity generated in Cuyama tends to flow north and east and is highly unlikely to reach the rest of the county in an emergency scenario.

[25] County of Santa Barbara: Energy Division, "Cuyama Solar Array Project."

[26] County of Santa Barbara: Energy Division, "SEPV Cuyama Solar Project."

[27] Wear, "Vandenberg AFB Unveils Solar Array Project."

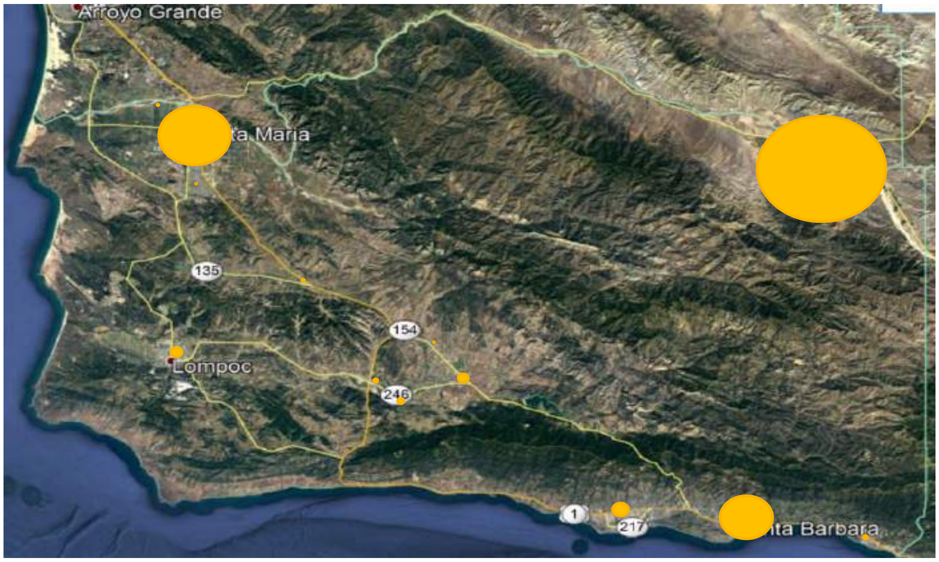

Figure 2.3: Currently Installed Solar Capacity in Santa Barbara County

2.2.2 – General Analysis Method

Solar photovoltaic potential was determined for four different types of land use: rooftops, including residential, commercial and municipal, parking lots, agriculturally zoned land protected by the Williamson Act, and agriculturally zoned land not protected by the Williamson Act. The first two land uses occur primarily in urban areas, while the latter two occur primarily in rural areas. Solar development also comes in two types: projects that sell electricity to the wholesale electricity market, also known as utility-scale solar, and distributed energy projects, where the electricity is used on-site to offset electricity bills.

Given the magnitude of the total acreage of the county, an in-depth analysis of the entirety of each of these land uses was not possible. As such, a statistical analysis was conducted for each of these land uses to determine the estimated solar generating potential. In each case, the total area was reduced based on relevant exclusions appropriate to the specific land type (discussed in further detail below) until only likely-viable space was remaining. Following that, rule-of-thumb solar siting principles were used to calculate the potential in representative samples of the available space. These principles, such as solar panel production efficiencies and rooftop fill factors, are discussed in further detail in Appendix A. The potential in these samples was then scaled up to determine the total potential. The exact concerns and constraints of solar development on each type of land use will be discussed below, as well as how these constraints informed the relevant exclusions and siting principles. It is important to note that the potential urban solar capacity (1059-1344MW) outweighs the potential agricultural solar capacity (193-513) by a relatively wide margin. Although total agricultural land space is far larger than rooftop space, there are many more uses for agricultural land than solar production, whereas there are relatively few other uses for rooftops. As such, urban spaces can be utilized far more fully than agricultural spaces.

2.2.3 – Urban Potential

Solar installations in urban areas occur primarily on rooftops and on parking lot canopies. Although undeveloped urban land can be used for solar power, doing so often conflicts with other uses such as recreation and housing. Therefore, undeveloped urban land was not considered for the statistical modeling.

Table 2.3 summarizes the key similarities, differences, and concerns for wholesale and on-site use projects.

Table 2.3: Comparison Between Urban Solar Arrays for Wholesale and On-Site Use

<table>
<tr><th>Consideration</th><th>Wholesale Projects</th><th>On-site Use Projects</th></tr>
<tr><td>Electricity Off-taker</td><td>Utility distribution grid</td><td>On-site use</td></tr>
<tr><td>Site-owner Revenue Stream</td><td>Rooftop lease to system owner</td><td>Electricity bill reductions</td></tr>
<tr><td>Electrical Concerns</td><td>Costly electrical upgrades may be necessary if utility distribution transformer or feeder is at full capacity</td><td>Costly electrical upgrades may be necessary if building switchgear is at full capacity</td></tr>
<tr><td>Load Concerns</td><td>California utilities do not allow wholesale generation on a feeder if it would exceed total feeder load</td><td>California utility Net Energy Metering rules do not allow on-site generation to exceed on-site consumption</td></tr>
<tr><td>Rooftop Availability</td><td colspan="2">Constrained by roof orientation and HVAC equipment</td></tr>
<tr><td>Shading Concerns</td><td colspan="2">Generation reduced by nearby trees and buildings</td></tr>
<tr><td>Structural Concerns</td><td colspan="2">Costly roof replacement may be necessary, based on rooftop age and material</td></tr>
<tr><td>Geotechnical Concerns</td><td colspan="2">Parking lot canopy may need added structural design if soil is unstable</td></tr>
</table>

Most of the considerations with urban solar development are similar regardless of whether the generated electricity is used on-site or sold to the utilities, CCAs, or other electricity providers through the electric grid. However, not all these considerations can be determined through visual imagery. The diagram in Figure 2.4 below shows how viable solar potential has been determined by narrowing down from the total urban area, applying each consideration individually:

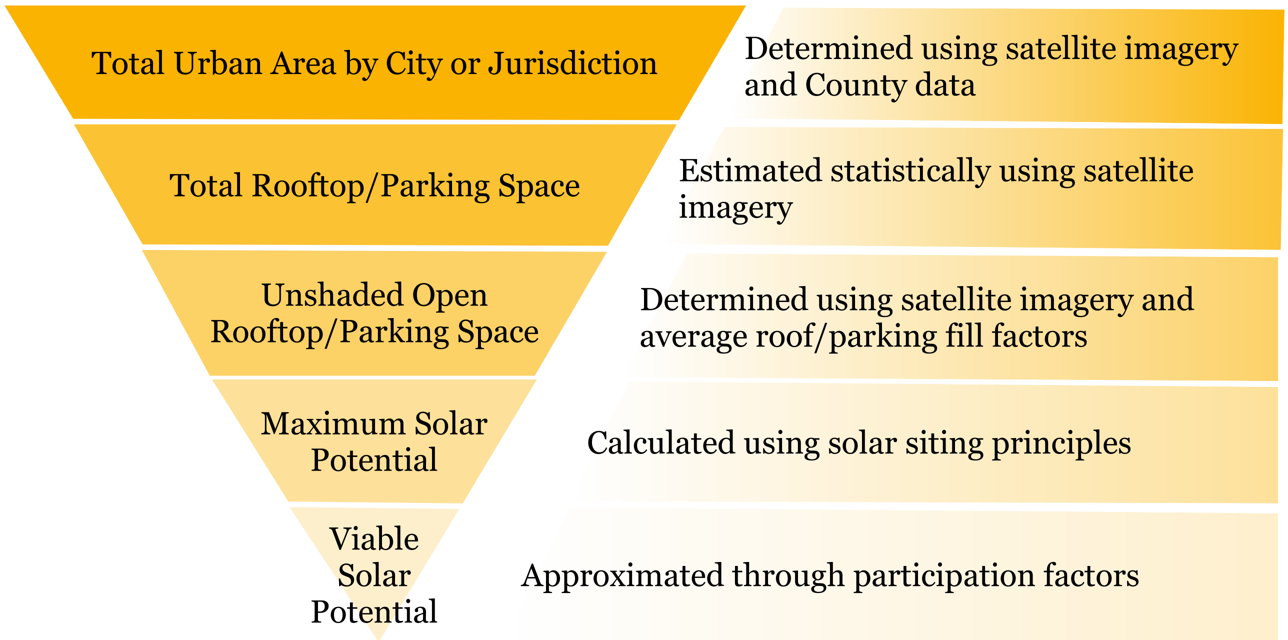

Figure 2.4: Process for Determining Urban Solar Potential

A separate, more-detailed analysis was conducted for the two cities participating in this study, Goleta and Carpinteria, as well as Santa Barbara City and the unincorporated areas of the county. Due to the size of the unincorporated area, it was split into three further urbanized study areas: Orcutt, Isla Vista, and the remaining higher-density population areas. The remaining urban potential for incorporated cities was estimated by comparing each city on a population and population density basis to one of the participating cities.

For each urban analysis, the city or unincorporated urban area was split further into “zones” that were similar in building density and use, such as residential, commercial, or mixed-use. The total rooftop and parking lot space, as well as development considerations that could be determined visually, such as shading, were incorporated by taking representative samples of each zone, and then scaling up to the size of the whole city. This available area was converted into maximum solar potential based on typical solar panel efficiencies of 15% – 20%. This was then narrowed further into a technically viable solar potential estimate through participation factors ranging from 30% to 60% that accounted for concerns that could not be determined visually. These included rooftop age, soil stability, available electrical capacity, and insufficient electrical load. Since residential buildings often have sloped roofs and low load compared to commercial buildings, much lower participation factors were used for the residential sector compared to the commercial and industrial sectors. An example of this analysis is shown in Figure 2.5 for the unincorporated urban area of Orcutt.

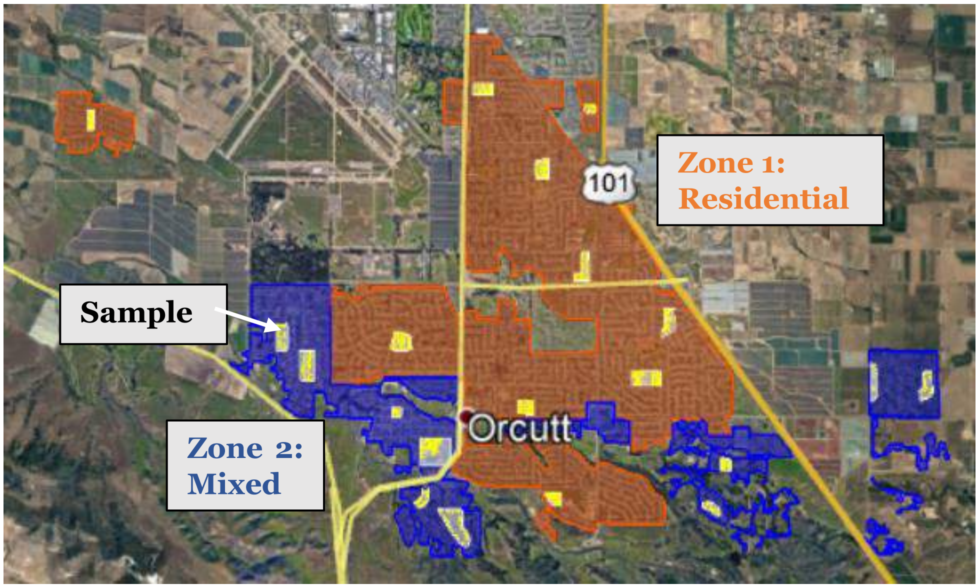

Figure 2.5: Statistical Solar Analysis for Orcutt

As a mostly suburban area, Orcutt was split into two zones: one residential and one mixed-use, with ten samples taken of each zone. The more agricultural parts of Orcutt are included in the agricultural potential in the next section.

The total urban potential capacity, by MW, is summarized in Table 2.4. Estimated urban solar energy generation, as measured in gigawatt-hours (GWh, equal to 1 million kWh), is shown in Table 2.5. Power capacity refers to the amount of electricity generated at a given moment in time, whereas energy refers to the amount of electricity generated over a period of time—typically measured by hour. The range of the solar power potential is caused by variance in the statistical estimation and uncertainty in the participation factor. The energy potential has a slightly larger range due to additional small variances in the duration and intensity of sunlight across the county.

Table 2.4: Summary of Potential Urban Solar Capacity (Power, in MW)

Area	City or Jurisdiction	Rooftop Generation Capacity (MW)	Parking Lot Generation Capacity (MW)	Total Urban Generation Capacity (MW)
Unincorporated County	Orcutt	88 – 113	1 – 3	89 – 116
	Isla Vista (non-UCSB)	9 – 11	1 – 3	10 – 14
	Other Unincorporated (Montecito, Santa Ynez, etc.)	120 – 154	11 – 15	131 – 169
Participating Cities	Goleta	79 – 107	22 – 26	101 – 133
	Carpinteria	31 – 39	7 – 8	38 – 47
Non-Participating Cities (Santa Barbara, Santa Maria, etc.)		528 – 679	161 – 186	689 – 835
Grand Total		**855 – 1,103**	**203 – 241**	**1,059 – 1,344**

Table 2.5: Summary of Potential Annual Urban Solar Generation (Energy, in GWh)

Area	City or Jurisdiction	Rooftop Annual Generation (GWh)	Parking Lot Annual Generation (GWh)	Total Urban Annual Generation (GWh)
Unincorporated County	Orcutt	119 – 164	1 – 4	120 – 168
	Isla Vista (non-UCSB)	12 – 16	1 – 4	13 – 20
	Other Unincorporated (Montecito, Santa Ynez, etc.)	162 – 223	14 – 22	176 – 245
Participating Cities	Goleta	107 – 155	30 – 38	137 – 193
	Carpinteria	42 – 57	9 – 12	51 – 69
Non-Participating Cities (Santa Barbara, Santa Maria, etc.)		713 – 985	220 – 270	931 – 1,255
Grand Total		**1,155 – 1,600**	**275 – 350**	**1,430 – 1,950**

2.2.4 – Agricultural Potential

As with urban solar installations, agricultural installations can also be designed for both wholesale and on-site use. Table 2.6 summarizes the key similarities, differences, and considerations for wholesale and on-site use projects on agricultural lands.

Table 2.6: Comparison Between Agricultural Solar Arrays for Wholesale and On-Site Use

Consideration	Wholesale Projects	On-site Use Projects
Electricity Off-taker	Utility distribution grid	On-site use
Site Owner Revenue Stream	Land lease to system owner	Electricity bill reductions
Topography Concerns	Due to tighter margins, land with >1% slope is generally unviable due to increased structural costs	Land with >20% slope is generally unviable due to increased structural costs
Electrical Concerns	Interconnection costs are prohibitive for projects too far from the nearest transmission line; projects will also not be allowed if there is no spare electrical capacity on transmission lines	Costly electrical upgrades may be necessary if building switchgear has no or limited electrical capacity
Load Concerns	California utilities do not allow wholesale generation on a feeder (section of the grid) if it would exceed total feeder load	California utility Net Energy Metering rules do not allow on-site generation to exceed on-site consumption
Regulatory Concerns	Land that is preserved for agricultural purposes under the Williamson Act is difficult to develop on and requires forfeiting tax deductions	Not applicable

Table 2.6: Continued

<table>
<tr><th>Consideration</th><th>Wholesale Projects</th><th>On-site Use Projects</th></tr>
<tr><td>Land Availability</td><td colspan="2">Constrained by other uses such as crops and livestock grazing</td></tr>
<tr><td>Shading Concerns</td><td colspan="2">Generation reduced by nearby trees</td></tr>
<tr><td>Environmental Concerns</td><td colspan="2">Projects are not allowed to disturb rare plant or animal habitats, such as those of the red-legged frog and condor</td></tr>
<tr><td>Geotechnical Concerns</td><td colspan="2">PV array structure may need added structural design if soil is unstable</td></tr>
<tr><td>Flooding Concerns</td><td colspan="2">Insurance costs are higher for panels in floodways or flood risk zones</td></tr>
</table>

However, compared to urban areas, the size difference between a project for on-site vs wholesale use is much larger. Individual farms generally have electrical loads sized similarly to a single medium-sized commercial building, although over a much greater area. In comparison, utility scale projects can be up to 1,000 times greater in size. Additionally, space for smaller projects is difficult to determine on a countywide scale due to the vast amount of space. As such, for agricultural areas, this report will focus on the potential of utility-scale energy due to its much greater possibilities for large-scale development.

Figure 2.6 shows how viable solar potential is determined by narrowing down from the total agricultural area, applying each concern individually.

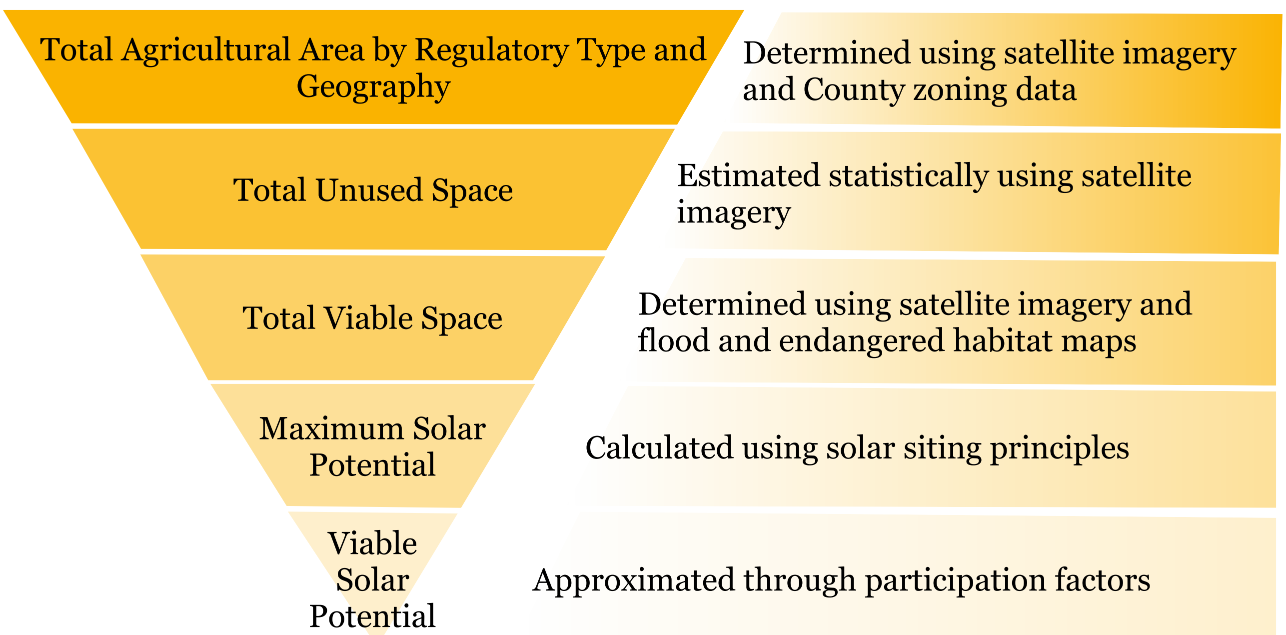

Figure 2.6: Process for Determining Agricultural Solar Potential

The total unused open space was determined by overlaying multiple GIS map layers that showed the land that was zoned non-agricultural (lavender-colored), the land close to endangered animal habitats (blue), and federal lands (dark pink). This land, which was excluded from the analysis, is shown in Figure 2.7.

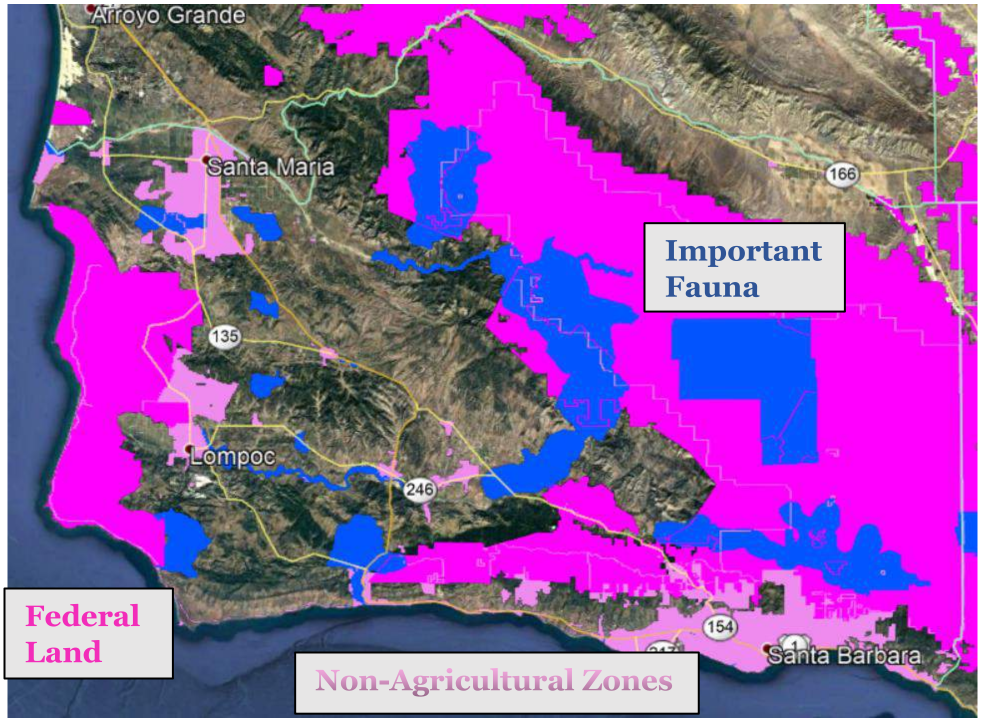

Figure 2.7: Agricultural Exclusions for Renewable Energy Generation

The remaining total agricultural space was split into five "zones" that were similar in regulatory type, geography, and topology. Lands in southern and northern county were placed in different zones due to the different electrical transmission grids, with southern county lands being served by SCE and northern county lands being served by PG&E. Additionally, land that was under the Williamson Act and not under the Williamson Act were also placed into different zones due to the very different regulatory requirements. The five agricultural zones are: (1) North – Williamson, (2) North-Flat – Non-Williamson, (3) North-Hilly – Non-Williamson, (4) South – Williamson, and (5) South – Non-Williamson (hilly and flat lands). Non-Williamson Act land was not split by topography in southern Santa Barbara County due to the much smaller availability of land.

The viable agricultural space, flood concerns, and exclusionary concerns that could be determined visually, such as topography, were established by taking representative samples of each zone, and then scaling up to the size of the whole zone. Additionally, sites within samples were only treated as viable if they were within three miles of the transmission grid, shown in Figure 2.8. Although it is possible for extremely large projects to be financially viable if sited more than three miles from a transmission line, the costs of connecting to the transmission grid would be prohibitive in most cases. Sites within either the green or purple zones were treated as viable, but ideal sites would be only in the green zones.

Figure 2.8: 1-Mile and 3-Mile Radius Distances from Transmission Lines

This available area was converted into maximum solar potential based on typical solar efficiencies of 15% – 20%, and then narrowed further into a technically-viable solar potential through participation factors that accounted for factors that could not be determined visually, such as geotechnical, electrical, and load concerns. These participation factors of 5% – 10% were much lower than the estimates used for the urban potential, reflecting the greater hurdles for agricultural installations. An example of this analysis is shown in Figure 2.9.

In addition to large sections of the hilly zone being deemed unviable due to topography, large sections of the other zones were also considered unviable as they were already being used for crops. Although solar panels can be installed above some specific shade-tolerant crops such as broccoli and celery, as well as smaller grazing livestock such as sheep, these dual-use opportunities need to be determined on a site-specific basis and were not considered for this statistical modeling. In comparison to the urban area, far fewer viable sites were found in the sample areas. However, due to the much larger size of the agricultural area and the viable sites being much larger, agricultural potential was still on the same scale as unincorporated urban potential.

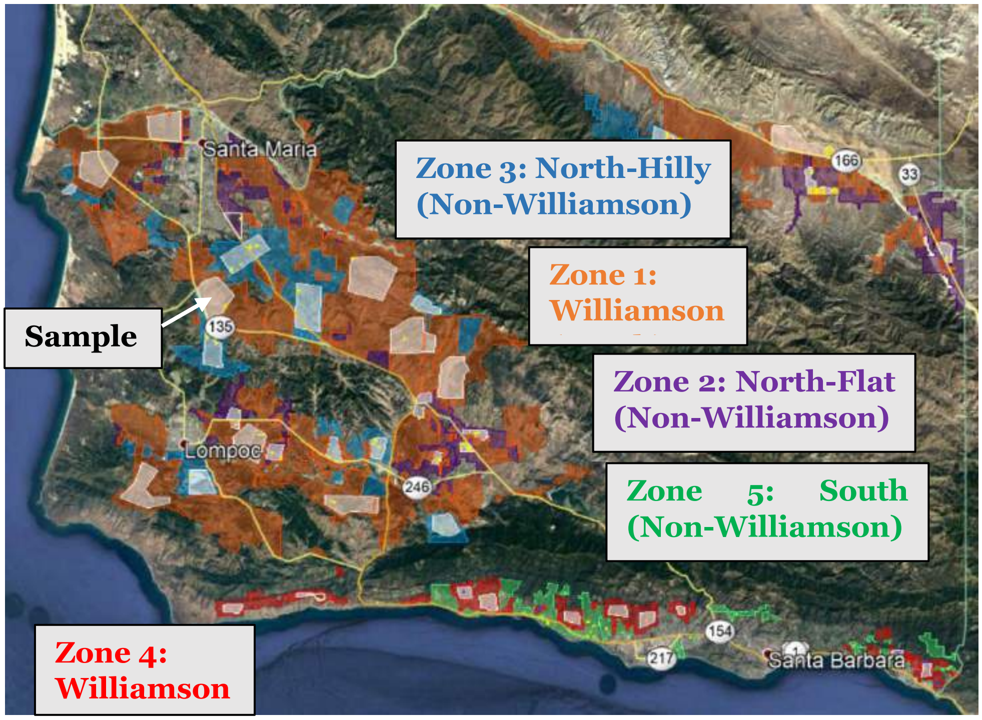

Figure 2.9: Statistical Solar Analysis for Agricultural Land

The total agricultural solar generating potential, both in MW of capacity and GWh of expected energy, is summarized in Table 2.7 below. The agricultural potential has a much larger range than the urban potential due to a larger number of variables and greater variances in topography. As there are fewer potential sites and a much larger land area, the statistical analysis has a much larger uncertainty. Lower participation factors result in a much greater participation variance. Finally, there is a much larger range in the energy yield of panels since solar trackers, if installed, can increase production by as much as 30%.

Table 2.7: Summary of Potential Agricultural Solar Capacity and Annual Generation

Area	Land Type	Generation Capacity (MW)	Annual Generation (GWh)
North County	(1) Williamson Act	34 – 102	48 – 194
	(2) Flat Land (Non-Williamson)	109 – 287	152 – 545
	(3) Hilly Land (Non-Williamson)	45 – 112	63 – 213
South County	(4) Williamson Act	0 – 2	0 – 4
	(5) Non-Williamson (flat and hilly)	5 – 10	7 – 19
Grand Total		**193 – 513**	**270 – 975**

2.3 – Total Potential of Wind Resources

2.3.1 – Current Wind Projects in Santa Barbara

Due to constraints discussed below, there are currently no utility-scale wind projects operating within Santa Barbara County. However, the Strauss Wind Energy Project, a proposed 100 MW project, is currently undergoing environmental review due to the large amount of development necessary to support it. If the project is approved and passes through all regulatory processes, the project will require the construction of 14 miles of new roads, a new communication system and meteorological towers, along with an 8.6-mile 115 kilovolt (kV) transmission line to connect it to PG&E's transmission system.[28]

2.3.2 – On-Shore Wind Potential

As with solar projects, wind turbines can be installed for both wholesale connection and for on-site use. However, small wind turbines generally operate below the heights for which wind maps are publicly available and have much less potential than large wind turbines due to lower wind speeds at lower heights. Additionally, wind turbines have a larger physical footprint than solar panels due to the distance required around each turbine- a small 10-kW turbine may require as much space as a 150-kW solar system, making small-scale turbines a poor choice for a space-constrained county like Santa Barbara. As such, they have been excluded from this study.

Other non-resource siting requirements for wind turbines are similar to utility-scale solar requirements, including land topography, environmental concerns, geotechnical concerns, and flooding concerns for supporting electric infrastructure, as well as electrical interconnection and transmission considerations.

Compared to the solar resource, the wind resource varies much more over Santa Barbara County, since wind is affected much more strongly by ground-level topography, such as forests, mountains, and cities, which prevent the wind from picking up enough speed to be viable for utility-scale wind turbines. This limitation can be seen in Figure 2.10 below, which shows a resource map of onshore wind speeds at a height of 80 meters in the county, from the National Renewable Energy Laboratory's (NREL) Wind Prospector.[29]

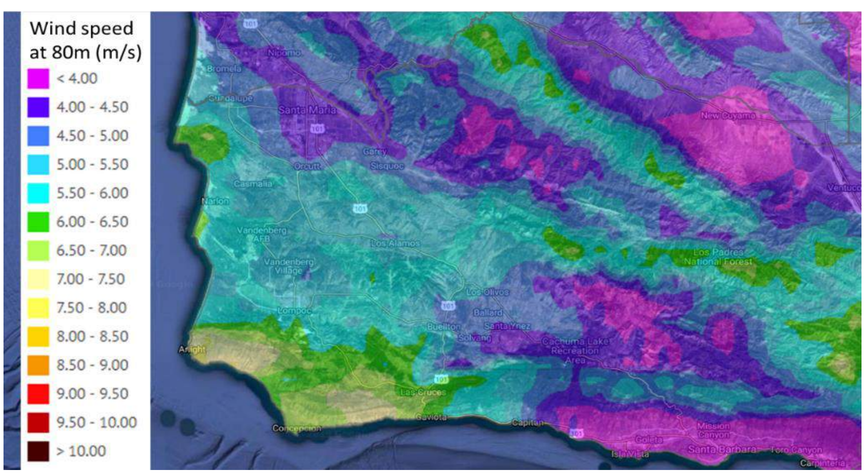

Figure 2.10: Average Annual Wind Speeds in Santa Barbara

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[28] County of Santa Barbara, "Strauss Wind Energy Project (SWEP)."

[29] National Renewable Energy Laboratory, "Wind Maps."

Utility wind projects generally require consistent wind speeds of at least 7 meters per second (m/s), constraining potential project development in the county to the area southwest of Lompoc. This region is difficult to develop due to the presence of Vandenberg Air Force Base and preserves such as the Jack and Laura Dangermond Preserve. This region is also partially in the Coastal Zone, where wind turbines are currently not permitted. Additionally, large parts of this region are between the areas covered by PG&E and SCE. Since their electric grids do not connect with each other, a project sited in this area would have high interconnection and transmission costs.

The exclusions applied to the agricultural solar potential, such as federal land ownership, flood risk, difficult topography, and protected animal habitats were also applied to the remaining wind area. As with the solar analysis, the land was split into Williamson and Non-Williamson land. After these exclusions were applied, potential locations for wind turbines were identified individually in the remaining space (shown as blue or red circles) based on general turbine spacing principles, as indicated in Figure 2.11.

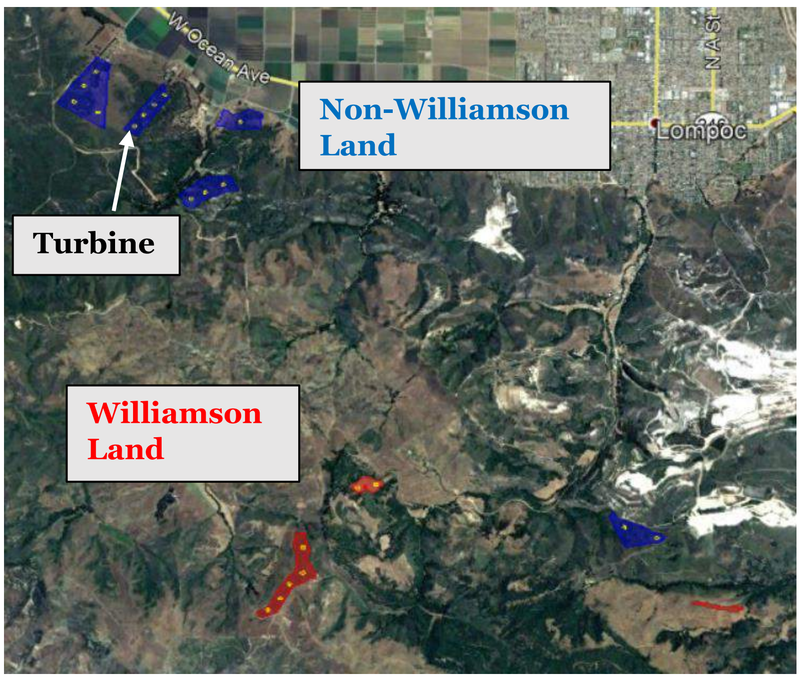

Figure 2.11: Wind Turbine Potential Siting

Based upon these exclusions and identified potential locations, the total wind potential is summarized in Table 2.8 below. The Strauss Wind Energy Project is in a hillier area than was considered viable in this study and requires the construction of an 8.6-mile transmission line for interconnection. Both concerns will result in higher costs, but the developers believe these costs can be overcome by the scale of the project. Since the project is currently undergoing development, it has not been included in this summary of future wind generation potential. If some of the strategies in this SEP are implemented, such as the Coastal Zoning Ordinance amendment, this wind energy potential could be increased.

Table 2.8: Summary of Potential Wind Capacity and Annual Generation

Land Type	Generation Capacity (MW)	Annual Generation (GWh)
Non-Williamson	14 - 28	30 – 86
Williamson Act	7 - 14	15 – 43
Grand Total	**21 – 42**	**45 – 129**

2.4 – Total Potential of Biomass/Biogas Resources

2.4.1 – Benefits of Biogas/Biomass and Current Projects

The key advantage of biogas and biomass power generation is that it makes use of waste that would otherwise contribute to greater greenhouse gas emissions. Biogas power generation makes use of methane, which is a greenhouse gas approximately 84 times more potent than carbon dioxide over the first two decades of release[30]. This methane would otherwise be flared into the air at wastewater treatment plants and landfills. Dairy operations can also be biogas sources, but do not currently exist in Santa Barbara County.

Biogas and biomass power are also dispatchable—the output of these plants can be increased or decreased as required by a grid operator, whereas solar and wind power must be utilized as each resource is available. As such, a biogas plant with the same peak power or capacity as a solar or wind plant can provide roughly two to three times more electricity annually. Additionally, biogas and biomass plants can be used to simultaneously generate heat in addition to electricity for other on-site purposes, a use known as cogeneration.

There are currently several biogas generators at wastewater treatment plants in the county, including in Santa Barbara City, the Tajiguas Landfill west of Santa Barbara City, and, until recently, the Laguna Sanitary District Plant. There is also a proposed expansion and technology upgrade of the Tajiguas Landfill project that would add solar to the project.

2.4.2 – Biogas Potential

The primary sources of biogas are manure and food processing waste (primarily from fruits, vegetables, and wineries) in landfills, as well as wastewater in treatment plants. The total recoverable biogas generated from these sources was estimated in raw tonnage using California Biomass Resource Assessments.[31] Biochemical conversion factors were used to convert raw biogas availability into potential peak power. Lastly, an average historical biogas utilization factor of roughly 70% was used to estimate the potential total annual generation.[32] This potential is summarized below. Variance in energy and power potential is due to the range in thermal to electrical conversion efficiencies and the range in capacity factors.

[30] Environmental Defense Fund, "Methane: The Other Important Greenhouse Gas."

[31] California Biomass Collaborative, "Renewable Energy Resource, Technology, and Economic Assessments."

[32] US Energy Information Administration, "Electric Power Monthly with Data for December 2013."

Table 2.9: Summary of Potential Biogas Capacity and Annual Generation

Biogas Source	Technically Available Waste (tons)	Generation Capacity (MW)	Annual Generation (GWh)
Landfills	~17,000	2 – 5	8 – 13
Wastewater	N/A	1 – 2	5 – 7
Grand Total		**3 – 7**	**13 – 20**

2.4.3 – Biomass Potential

Key sources of biomass are agricultural waste, forestry waste, and landfill biosolids such as cardboard and paper. The total recoverable biomass, again in raw tonnage, was estimated using California Biomass Resource Assessments[33] and converted to energy and power potentials using heating values for each type of waste and an average historical biomass capacity factor of approximately 60%.[34] It is important to recognize that biomass has competing uses, particularly for composting in agricultural settings, that may impact the availability of biomass as an energy source and reduce potential.

This potential is summarized in Table 2.10 below. As with the biogas potential, variance in energy and power potential is due to the range in thermal to electrical conversion efficiencies and the range in capacity factors.

Table 2.10: Summary of Potential Biomass Capacity and Annual Generation

Biomass Source	Technically Available Waste (tons)	Generation Capacity (MW)	Annual Generation (GWh)
Forestry Waste	~83,000	19 – 31	107 – 150
Agricultural Waste	~39,000	6 – 16	36 – 76
Landfill Biosolids	~102,000	19 – 31	106 – 149
Grand Total	**~224,000**	**44 – 78**	**249 – 375**

2.5 – Total Potential of Hydroelectric Power Resources

2.5.1 – Hydroelectric Power Requirements and Current Projects

Hydroelectric power (hydro) has its highest potential at large dams and reservoirs which have high flow rates and large changes in elevation, also known as head. This constraint limits large projects to a relatively small number of sites. Additionally, many of the large dams and reservoirs in Santa Barbara are far from the electrical transmission system, are on federal land, or have little on-site demand for electricity to use the generation. Furthermore, the recent drought in California has reduced the flow rates of rivers feeding reservoirs and dams, further lowering the viability of hydro power. As such, there is currently only one hydro power installation in Santa Barbara County—an 820-kW plant installed at Gibraltar Dam.

[33] California Biomass Collaborative, "Renewable Energy Resource, Technology, and Economic Assessments."

[34] US Energy Information Administration, "Electric Power Monthly with Data for December 2013."

2.5.2 – Dam/Reservoir Hydro Potential

Figure 2.12 shows the locations of the 11 dams in Santa Barbara County, and the location of the Gibraltar Dam plant.

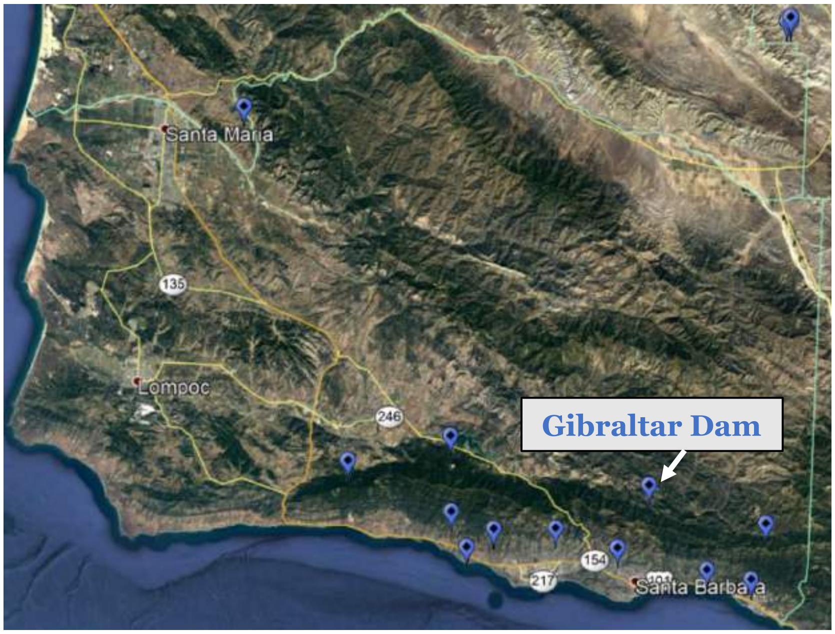

Figure 2.12: Locations of Dams in Santa Barbara

The available head at each dam was taken from the National Inventory of Dams.[35] Without access to water basin maps, total potential was estimated by scaling the known potential at Gibraltar Dam by available head and the amount of water stored there. Unlike with solar and wind power, federally owned sites are not excluded from this analysis. However, it should be noted that these installations may be harder to develop than those not on federal sites. The hydro generating potential is summarized in Table 2.11.

Table 2.11: Summary of Potential Hydro Capacity and Annual Generation

Hydro Source	Generation Capacity (MW)	Annual Generation (GWh)
Large Dams (>100 ft)	3 – 5	6 – 14
Small Dams (<100 ft)	0 – 1	0 – 2
Grand Total	**3 – 6**	**6 – 16**

2.6 – Total Potential of Geothermal Power Resources

2.6.1 – Requirements for Geothermal Electricity Generation

The term "geothermal" is often used to describe both electric power plants and heat pumps that use underground heat as the key source of energy. The latter use is more common and can draw heat from both the ground, known as ground-source, or water reservoirs, known as water-source.

[35] US Army Corps of Engineers, "National Inventory of Dams (NID)."

However, this use does not result in electricity being generated, and is therefore outside of the scope of this project.

In comparison, geothermal electric power requires an underground hot water reservoir or steam geysers. No steam geysers have been identified in Santa Barbara County. The map in Figure 2.13 shows several hot springs that have been identified in Santa Barbara County:

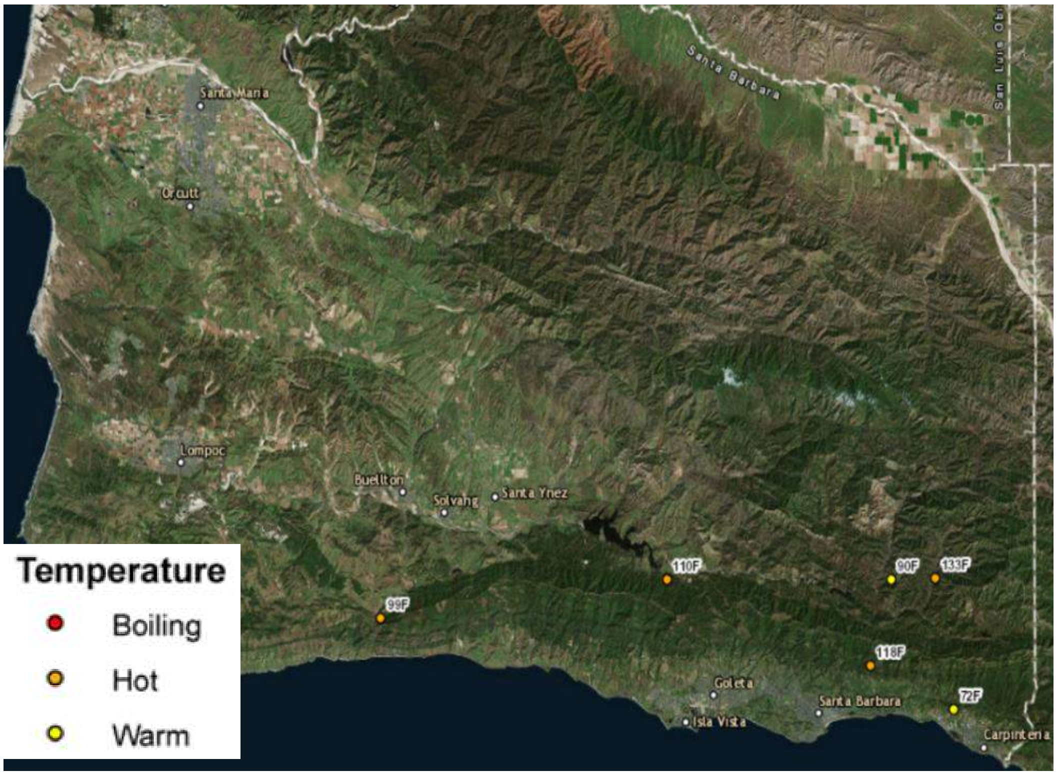

Figure 2.13: Hot Springs Locations in Santa Barbara County

All six hot springs are in southern Santa Barbara County. Higher temperature reservoirs have a greater electricity potential because more heat can be extracted from them. Ideal locations for hot springs development would be "boiling" (> 180F), but no such locations exist in Santa Barbara County. "Hot" locations (> 95F) are also technically viable, though harder to develop. "Warm" locations (< 95F) are likely not at a high enough temperature for a power plant. As with hydroelectric power, higher flow rates also lead to greater potential. Temperature and flow rate data from the California Geological Survey[36] were used to estimate geothermal electric potential.

Table 2.12: Summary of Potential Geothermal Electric Capacity and Annual Generation

Geothermal Source	Generation Capacity (MW)	Annual Generation (GWh)
Hot Springs	1 – 2	7 – 13
Grand Total	**1 – 2**	**7 – 13**

[36] California Geological Survey, "Geothermal Map of California."

A new method of geothermal extraction has also been identified recently, known as Enhanced Geothermal. An Enhanced Geothermal System (EGS) is a man-made reservoir created by injecting fluid into areas with hot rock and pre-existing fractures that do not otherwise have enough fluid to drive electricity-creating turbines. This technology has been realized at two demonstration sites in the US and on a pilot scale in Europe but is not yet commercially viable.[37]

2.7 – Conclusion

Due to the abundant solar resource, if land-use barriers are mitigated, utility-scale renewable generation will most likely be pursued and occur through photovoltaic projects. That fact notwithstanding, significant potential exists, in a limited number of locations, for the pursuit of other renewable energy development with wind, biomass, biogas, hydroelectric, and geothermal power within the county. By supporting the development of a diverse fleet of local energy generators, the County government can support a cleaner, more resilient future, locally and beyond.

[37] US Department of Energy, "Enhanced Geothermal System (EGS) Fact Sheet."

Chapter 3 – Obstacles and Opportunities for Distributed and Utility-Scale Energy Resources

This chapter will discuss the various obstacles for renewable energy development that are most important and/or unique to Santa Barbara County. Santa Barbara's combination of historical architecture, natural coastlines and mountains, and agricultural origins shape a culture that values natural aesthetics and social tradition. Although this culture contributes to what makes Santa Barbara special, it can be an impediment to renewable energy development.

One or more potential solutions or opportunities to address each obstacle will also be suggested. In Chapter 5, the most impactful possible solutions will be analyzed and explained in further detail to enable the County to identify and work rapidly towards implementation of programs and policies that can create an environment more conducive to mass renewable energy development. This list of barriers and solutions was developed by working closely with County officials, public agencies, community environmental advocacy groups, and residents and businesses.

3.1 – Regulatory Barriers and Solutions

3.1.1 – County Land Use & Development Code

Obstacle

The County Land Use & Development Code (LUDC) governs permitting for all inland areas of Santa Barbara County, including for renewable energy facilities such as wind turbines and solar photovoltaic facilities. Currently, the LUDC does not permit utility-scale solar photovoltaic facilities, defined in current code as those developed purely to sell electricity to the wholesale market, outside of the Cuyama Valley Rural Region. Furthermore, inside Cuyama Valley, they are limited to no more than 600 acres of AG-II zoned land. In comparison, wind turbines ARE permitted in agricultural and industrial zones with the Major Conditional Use Permits.[38]

The particular Cuyama solar allowance is in place because Cuyama Valley was the first region in the County that developers determined was suitable for utility-scale solar development, due to its high solar intensity and duration. However, with falling solar costs, more areas are financially viable for utility-scale solar development. Therefore, a new solar ordinance is necessary to open utility-scale development in the rest of Santa Barbara County.

For purposes of the solutions and recommended strategies in the SEP, the following definitions are used to refer to solar projects of various sizes selling electricity to the wholesale market:

- "Community-scale" is a subset of utility-scale solar and refers to systems between 1-10 MW
- "Utility-scale" solar refers to systems greater than 10 MW

Solutions

The main recommendations are:

1) Clarify the definition of utility-scale solar in the LUDC and the land-use element of the comprehensive plan to specify that solar facilities of any size that are constructed on built-environments, including rooftops, parking lots, and parking structures, are not considered

[38] County of Santa Barbara, "Santa Barbara County Land Use & Development Code, Chapters 58-59."

to be utility-scale solar facilities and therefore are exempted from the regulations governing utility-scale (and community scale) solar.

2) Allow community-scale solar projects under 3 MW in all industrial, AG-I and AG-II zones as permitted uses.

3) Allow community-scale solar projects under 3 MW in commercial zones (see Section 5.1.2 for specific suggestions) with a Minor Conditional Use Permit (MCUP).

4) Allow community-scale or utility-scale solar photovoltaic development greater than 3 MW in all industrial and AG-II zones in Santa Barbara County with a Conditional Use Permit (CUP).

5) Investigate the feasibility of allowing community-scale or utility-scale solar photovoltaic development greater than 3 MW in in AG-I zones with a CUP.

The first recommendation clarifies that solar projects developed on existing rooftops and parking lots should not be considered "utility-scale" for the purposes of regulation regardless of the specifics of the interconnection arrangement. For solar projects on open land, rather than amend the LUDC on a case-by-case basis as was done with Cuyama solar project, the County should amend the Code on a blanket basis, as is currently the case with wind energy. Permit applications can then be reviewed on a case-by-case basis, rather than updating the ordinance for each new region of interest. This would greatly reduce approval time for projects while still allowing the County to retain control over which projects can proceed. Changes to the LUDC may also require some General Plan updates to ensure alignment.

3.1.2– Williamson Act

Obstacle

The Williamson Act, officially known as the California Land Conservation Act, was established in 1965 to incentivize the preservation of farmland and open space land by providing property tax relief to land owners in exchange for 10-year contracts that require that the land not be developed or converted to another use for the duration of the contract. Longer 20-year contracts can be established for greater tax benefits on prime agricultural land, known as Farmland Security Zones.[39] In Santa Barbara County, the Williamson Act is enforced via the Uniform Rules for Agricultural Preserves and Farmland Security Zones.

Both Agricultural Preserve and Farmland Security Zone contracts are automatically renewed each year if a notice of non-renewal is not recorded. If a notice of non-renewal is recorded, starting January 1 of the following year, the contract will remain in effect for nine full years for a standard Agricultural Preserve contract, or 19 years for a Farmland Security Zone contract.[40] Figure 3.1 shows the land preserved under the Williamson Act within Santa Barbara County, as of June 2019. Although not all of it is viable for renewable energy generation, this land comprises a significant portion of the county.

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39 California Department of Conservation, "Williamson Act Program."

40 County of Santa Barbara, "Santa Barbara County Uniform Rules for Agricultural Preserves and Farmland Security Zones."

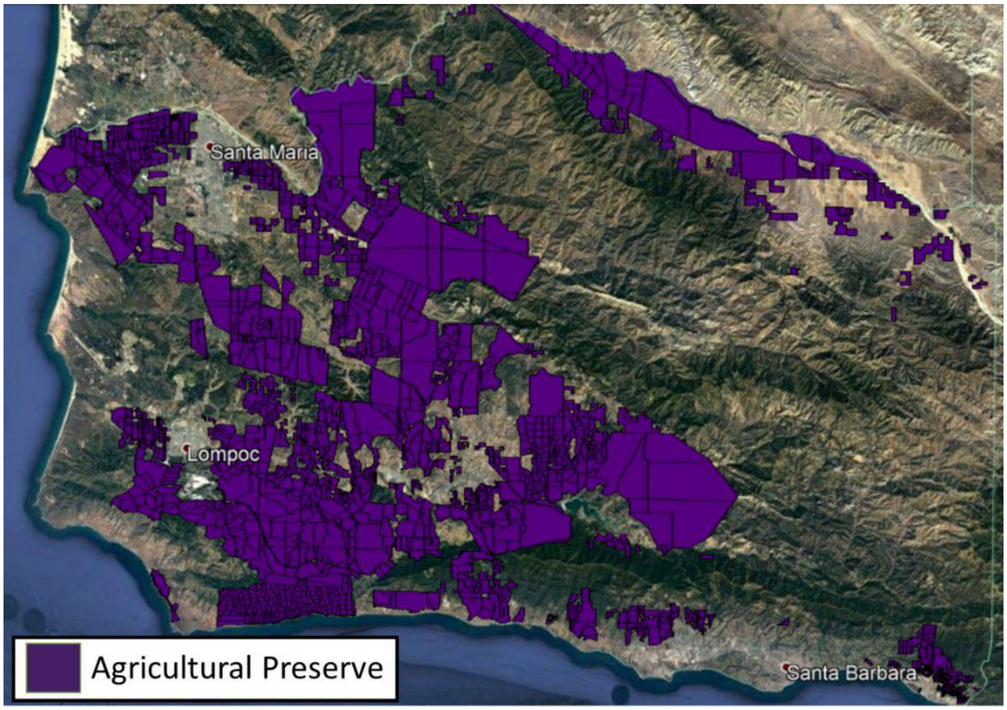

Figure 3.1: Williamson Act Land

Although cancellation of a contract is possible, it requires submitting documentation demonstrating the need for cancellation as well as payment of a cancellation fee equal to 25% of the land value and is therefore generally prohibitively expensive. To date, there have only been two cancellations of Williamson Act in the history of Santa Barbara County. Additionally, a 2012 UC Davis study of cattle ranchers across 33 counties in California reported that 71% of surveyed ranchers had an annual profit equal to or less than their Williamson Act savings,[41] indicating that Williamson Act savings are integral to maintaining operations, particularly on non-prime grazing land.

Owners or lessees of parcels preserved under the Williamson Act can install solar and wind energy systems to support on-site operations such as pumping water, as well as for frost protection. Furthermore, they are permitted to install other energy production structures subject to other zoning requirements and a review by the Agricultural Preserve Advisory Committee (APAC). However, the compatibility guidelines for this permit require that the long-term agricultural capability of the parcel is not harmed and that no current or foreseeable agricultural operations are impaired. The latter guideline allows development only on marginal land, but also allows APAC to make exemptions on non-prime land, generally ranch land.[42] The Uniform Rules also allow residences, residential accessory structures, and personal uses within a non-agricultural development envelope equal to two acres or three percent of the total contract size, whichever is less.

The APAC is responsible for monitoring and enforcement of the County's Agricultural Preserve Program and reviews land use permit applications to determine consistency with the County's

[41] Wetzel et al., "Analysis Reveals Potential Rangeland Impacts If Williamson Act Eliminated."

[42] County of Santa Barbara, "Santa Barbara County Uniform Rules for Agricultural Preserves and Farmland Security Zones."

Uniform Rules. The Uniform Rules do not generally allow utility-scale solar projects on Williamson Act land. For the Cuyama Valley utility-scale solar project, a partial contract cancellation was approved, which included the requirement to enroll equivalent agricultural land under a new preservation contract.

The Williamson Act therefore acts as a barrier to utility-scale solar development in two different ways:

1) Prevents the alternate use of preserved land for the contract duration
2) Provides a strong alternative revenue stream through tax relief that limits the value of solar lease payments to the landowner

Solutions

The following are the main recommendations for best practices for enabling judicious development of large-scale solar on Williamson Act land:

1) Amend the Uniform Rules to incorporate solar-use easement provisions consistent with Government Code sections 51190-51192.2, which allow owners with land that is no longer agriculturally productive to rescind their contracts with a fee equal to only 6.25% of the assessed value of the land.

2) Amend Uniform Rules to allow community-scale solar (projects 1-10 MW) as a compatible use, provided all the following conditions are met:
    - Facility is located on non-prime land
    - Does not exceed 30 acres
    - Confined to single lot
    - Sited to minimize land taken out of Agricultural Preserve
    - Consistent with Principles of Compatibility (Uniform Rules Section 2-1.1)
    - Board of Supervisors finding that the facility provides a substantial benefit to the agricultural community and the public.

3) Amend Uniform Rules to allow larger community-scale or utility-scale solar as a compatible use on non-prime land if it qualifies as a "dual-use" project which can co-exist with shade tolerant crops or smaller grazing animals. The following conditions need to be met to qualify as dual-use:
    - The land must be in continuous agricultural production over the period of the Agricultural Preserve or Farmland Security Zone contract
    - An agricultural study is conducted to ensure the crops or grazing animals on the land are compatible with reduced levels of sunlight
    - Does not exceed 50 acres
    - Confined to single lot
    - Consistent with Principles of Compatibility (Uniform Rules Section 2-1.1).

4) Explore the application of Recommendation 3 to prime land, as well, pending a further review of research indicating that dual-use solar development does not impact the long-term productivity of prime agricultural land.

The first recommendation is geared towards aligning the Uniform Rules with what state law already permits on Williamson Act land, particularly the solar use easement.[43] Meanwhile, the second and third recommendations are methods through which the County can amend its Uniform Rules to relax the restrictions surrounding solar development while maintaining the objective of the Williamson Act. The fourth recommendation would work towards a "co-habitation" of solar and agriculture to increase total land productivity, when and where possible.

These proposed changes do not require amending the Williamson Act itself, only the County's Uniform Rules. As such, they will be possible for the County to implement directly, as opposed to larger changes that would require lobbying on the topic statewide.

3.1.3 – Historic Landmarks Regulations

Obstacle

The State Historical Building Code, Santa Barbara County Code Chapter 18A, and County land use policies and development standards strictly regulate and limit alterations to designated historic structures. Therefore, historic designation of a structure or site presents a barrier to renewable energy by restricting alterations or new development.

The mission of the Historic Landmarks Advisory Commission (HLAC) is to promote the preservation of historic sites, buildings, and structures. The HLAC acts as the design review authority for any alteration outside normal maintenance and repair work that is made at 50 designated Historic Landmarks[44] and over 15 designated Places of Historic Merit[45] in the county.

Although these sites do not have potential to accommodate community-scale or utility-scale installations, in large part they are sites that the County or another public agency has direct control over.

Solutions

These are the main recommendations to expedite renewable energy development at historic landmarks:

1) Conduct a potential study at each historic site to determine total potential.
2) Create a list of pre-approved solar installation designs that are non-visible and sited away from historic features such as Mission-style roofs that can be replicated at different sites.

Recommendation 1 is intended to feed into Recommendation 2 by assessing the total potential and determining the types of solar designs that would be most viable at historic sites. Following that, a list of pre-approved designs would reduce approval time for HLAC while maintaining the aesthetic value of the Historic Landmarks. However, this would require there to be common features between different historical sites with regards to solar siting, which may not be the case.

3.1.4 – Coastal Zoning Ordinance

Obstacle

The California Coastal Commission is a key regulatory body in California. In partnership with coastal cities and counties, the Coastal Commission plans and regulates the use of land and water in the Coastal Zone, in accordance with the California Coastal Act. However, given that the County

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[43] California Senate, SB-618 Local government: solar-use easement.

[44] County of Santa Barbara, "County of Santa Barbara Historic Landmarks."

[45] County of Santa Barbara, "County of Santa Barbara Historic Places of Merit."

has a certified Local Coastal Program (LCP) as allowable under state law,[46] the County has primary permitting authority for development within the unincorporated portions of the Coastal Zone of Santa Barbara County. In Santa Barbara County, the Coastal Zone ranges from several hundred feet away from the shoreline in urbanized areas to several miles in more rural areas, as well as three miles offshore. In Figure 3.2 the Coastal Zone is indicated as the area west and south, or to the left of and below, the blue line.

The LCP includes the County's Coastal Land Use Plan and the Coastal Zoning Ordinance (CZO). The Coastal Zoning Ordinance and zoning district maps implement the policies in the Coastal Land Use Plan, as required by Public Resources Code Section 30500 of the California Coastal Act. Although they serve an important and necessary role in environmental and aesthetic protection of the coast, Coastal Act permitting requirements that are set forth in the LCP increase the difficulty of developing in the Coastal Zone. Development activities requiring the issuance of a Coastal Development Permit (CDP) are broadly defined by the Coastal Act to include (among others) construction of buildings, divisions of land, and activities that change the intensity of use of land or public access to coastal waters. Therefore, certain types of development that do require the issuance of a CDP in the Coastal Zone do not necessarily require the issuance of an entitlement if located outside of the Coastal Zone.

Figure 3.2: Coastal Zone Map

Under the Coastal Land Use Plan and the CZO of the LCP, most recently amended and republished in November 2018, the following type of renewable energy is exempt from the requirements to obtain a CDP:

- The addition of solar energy systems on the roofs of existing lawful structures[47]

46 A Local Coastal Program (LCP) is planning tool used by local governments to guide development in coastal areas. All LCPs are submitted to and certified by the Coastal Commission, after which permitting authority over most coastal development is transferred to the local government. The coastal commission maintains jurisdiction over development in public trust lands, tidelands and submerged lands.

47 As outlined in Section 35-51B.B.2.n of the CZO (Improvements to a structure, other than a public works facility)

Additionally, the following types of renewable energy are listed as unrestricted uses, meaning that they are allowed but may require a CDP, within agricultural buffers:[48]

- Solar systems that are an accessory to the principal use of lots, with an effort made to engage neighbors about potential concerns
- Pre-existing wind energy and cogeneration facilities that are operated in compliance with provisions for non-conforming structures

The following types of renewable energy systems are explicitly not permitted:

- New wind energy systems in all zones of the Gaviota Coast Plan Area[49]

All other types of systems are required to have a CDP, including freestanding (ground-mount) and carport solar systems that are accessory to the principal use of the lot and are sized to supply that lot. Additionally, the CDP process for other types of solar systems, such as utility-scale systems, also includes a public hearing requirement.[50]

Solutions

One possible method to expedite renewable energy development that is subject to the LCP is to allow certain wind energy systems which comply with the requirements of the Coastal Act, in certain Agricultural II zones. More specifically, the potential modifications that could be made to the current procedures are:

1) Amend the Coastal Land Use Plan & CZO to allow new small-scale, community-scale and utility-scale wind energy systems[51] to be developed on Agricultural II zones within the Gaviota Coast Plan Area, west of the Gaviota Pass Viewshed, with a major Conditional Use Permit (CUP) and a public hearing process.

The goal of this recommendation is to allow under certain circumstances—rather than prohibit, as currently is the case—wind energy systems that comply with Coastal Act requirements (e.g., requirements to protect public views of the coastline). This is consistent with Action TEI-7 recommended in the Gaviota Coastal Plan to create an ordinance enabling the development of small-scale wind energy systems and investigate the feasibility of an ordinance for community-scale and utility-scale wind energy systems if studies show that appropriate resources exist in the region. The permitting requirements for solar carport systems, both for on-site consumption and wholesale electricity production, can likely not be reduced due to the broad definitions of development under the Coastal Act.

3.1.5 – Solar and Solar + Storage Permitting

Obstacle

California Assembly Bill (AB) 2188, passed in 2014, required expedited and streamlined permitting for small residential solar systems, which are defined as <10 kW for solar PV and <30

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[48] County of Santa Barbara, "Santa Barbara County Article II Coastal Zoning Ordinance," Section 35-144O.E.1.e and –g.

[49] County of Santa Barbara, "Santa Barbara County Article II Coastal Zoning Ordinance," Section 35-430.E.1.

[50] County of Santa Barbara, "Santa Barbara County Article II Coastal Zoning Ordinance, Section 35-169.4."

[51] The Gaviota Coastal Plan defines small-scale, community scale and utility-scale wind energy systems only loosely. Small-scale is considered to be around 1-2 kW, community-scale systems to be up to 100 MW and utility-scale systems to be larger than 100 MW. See Gaviota Coastal Plan, Chapter 7, page 11.

kW for solar thermal.[52] Each jurisdiction was required to pass an ordinance and implement a permitting process that expedited permitting and allowed electronic submission, by 2015. The bill text does not specify the requirements for expedited permitting, but to assist local governments in implementing expedited permitting, the California Office of Planning and Research published the Solar Permitting Guidebook, which gathers best practices and recommendations for solar permitting.[53]

The County has implemented the majority of the recommendations in the Guidebook, including:

- A list of submittal requirements
- Forms and permit applications that need to be filled out
- Eligibility checklist for expedited permitting
- Standard electrical plans for systems with both microinverters and string inverters
- Structural criteria for residential systems
- Appointments for over-the-counter permit review of applications eligible for expedited permitting

In addition to the recommendations that are being followed, the County has worked to provide expedited plan-set review for projects that were not covered under the parameters of AB 2188, including projects requiring structural analysis and projects up to 15-kW in size, rather than the required 10-kW cap. The one recommendation in the Guidebook that the County has not implemented is a 1-3-day timeframe for electronic submissions. The County currently promises only a 10-day turnaround for electronic submissions. Additionally, appointments for over-the-counter review are limited due to a lack of staffing capacity, particularly in Santa Maria.

On top of AB 2188, California passed AB546 in 2017, which required County governments the size of Santa Barbara to also implement electronic permitting and consistent permit fees for combined solar + storage projects by September 2018.[54] However, there has been no equivalent of the Solar Permitting Guidebook for solar + storage projects to assist local governments with permitting, partially due to the lack of standardization in the electrical components. Although the County has established internal protocol for reviewing these applications, there are no publicly available packages available to developers for storage permitting. However, the County has taken proactive steps to ease permitting for solar + storage projects by extending digital submittals and expedited reviews for these types of systems.

Solutions

There are three main recommendations for resolving this issue:

1) Create an external team with representatives from neighboring Authorities Having Jurisdiction (AHJs) and the local solar + storage industry to compare Santa Barbara County protocol and technology standards and industry best practices to create a set of standardized permitting criteria for residential solar + storage systems.
2) Implement electronic submission for energy storage permitting based on the developed set of criteria.

[52] California Assembly, AB-2188 Solar energy: permits.

[53] Governor's Office of Planning and Research, "California Solar Permitting Guidebook."

[54] California Assembly, AB-546 Land use: local ordinances: energy systems.

3) Create a training program for installers, covering permitting, construction, and inspection requirements. Consider streamlining permitting requirements for trained, vetted installers.

Recommendation 1 is geared towards bridging the knowledge gap that exists with regards to storage permitting, so that the County permitting process for storage projects can be aligned with the goals of AB546. Meanwhile, Recommendations 2 and 3 are geared towards streamlining permitting and inspection beyond current best practices while also alleviating the burden on County plan checkers. Some of the reduced permitting and inspection requirements that might be available to a list of vetted installers, pursuant to Recommendation 3, include:

- Automatic permit approval for residential solar projects, subject to randomized inspection of one in every five to ten installations
- Expedited permitting for residential solar + storage projects
- A pilot virtual inspection program to reduce travel time for installation inspectors.

3.2 – Utility & Infrastructure Barriers

3.2.1 – Transmission Grid

Obstacle

As shown in Figure 2.8 in the Chapter 2.2.4, due to the location of Santa Barbara County at the border of the PG&E and SCE electricity grids, there are large parts of the county that are not close to transmission lines, including the west Gaviota coast and the land east of Santa Ynez. Furthermore, the disconnect in electrical systems requires separate projects in the northern and southern county despite there being far greater utility-scale potential in the northern county. Lastly, since the Cuyama Valley is disconnected even from the rest of the northern county PG&E grid due to Los Padres National Forest, installations in that region do not provide resiliency or local generation to the rest of the northern county. The locations of the current large power plants in the county are shown in Figure 3.3:

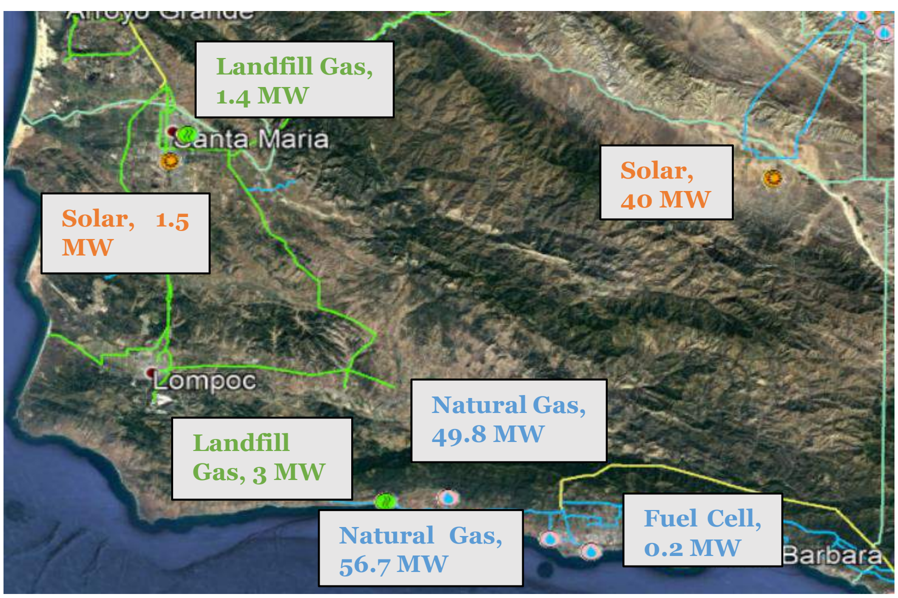

Figure 3.3: Current Community-Scale or Utility-Scale Energy Projects

Solutions

There are several distinct recommendations for overcoming the obstacle of minimal transmission grid infrastructure:

1) Continue progress made through the SEP process to evaluate specific substation locations and the potential for solar energy production on private and public land via a detailed formal mapping exercise.
2) Target and directly approach private landowners close to transmission lines to support renewable energy development on their land.
3) Work with PG&E and SCE (or a future CCA) on new community solar program opportunities with expedited distribution connection.
4) Work with SCE and PG&E to develop large renewable energy projects for local resiliency purposes that are tied to transmission line development.

Recommendation 1 continues efforts started during the SEP process to continue exploring information of feeder and distribution system capacity available in the ICA maps (see Figure 3.4 for example) in order to elucidate capacity on the high-voltage transmission lines. This feeds into Recommendation 2 by determining the hotspots for solar development and then finding parcels of land in those hotspots that are currently undeveloped. These recommendations are already underway, the results of which are presented in Chapter 2 and Chapter 4.

Recommendations 3 and 4 are advocacy solutions that are geared towards developing projects that provide local resiliency benefits that offset otherwise lower financial returns. Recommendation 3 is already possible through the currently available Enhanced Community Renewables (ECR) programs offered by both PG&E and SCE, whereas Recommendation 4 is an expansion of that principle for much larger projects.

The current ECR programs allow community solar projects to be developed, but the burden of administering the project and gathering participants is placed on the solar developer, who is often not equipped to do so. SCE recently filed an application to the CPUC for new Green Programs, which includes a new Community Solar program that involves SCE working together with a host public agency to administer the project and gather participants. This application was rejected by the California Public Utilities Commission (CPUC) on grounds that SCE was aiming to replace the current programs, which cannot be shut down until certain targets are made. However, it is likely that SCE will re-submit their application as programs to be run alongside current programs.

3.2.2 – PG&E Integration Capacity Analysis (ICA) Distribution Grid Maps

Obstacle

CPUC recently required all major IOUs to release ICA maps that show which areas of the distribution grid have available electrical capacity for wholesale connections and which areas do not, to simplify the interconnection process by enabling developers to target areas that are more likely to be approved. However, large parts of the PG&E maps are shown as not having any available capacity, as shown in the example of Figure 3.4 for the Orcutt area.

In the example in Figure 3.4, and in much of PG&E's ICA maps, the vast majority of the feeders are colored red, which indicates a lack of available capacity for new generation interconnection. Although PG&E has clarified that this simply means that interconnection applications on these red-colored lines "require further study", this vagueness defeats the purpose of the ICA maps, and is unique to PG&E—this is not an issue in SCE territory.

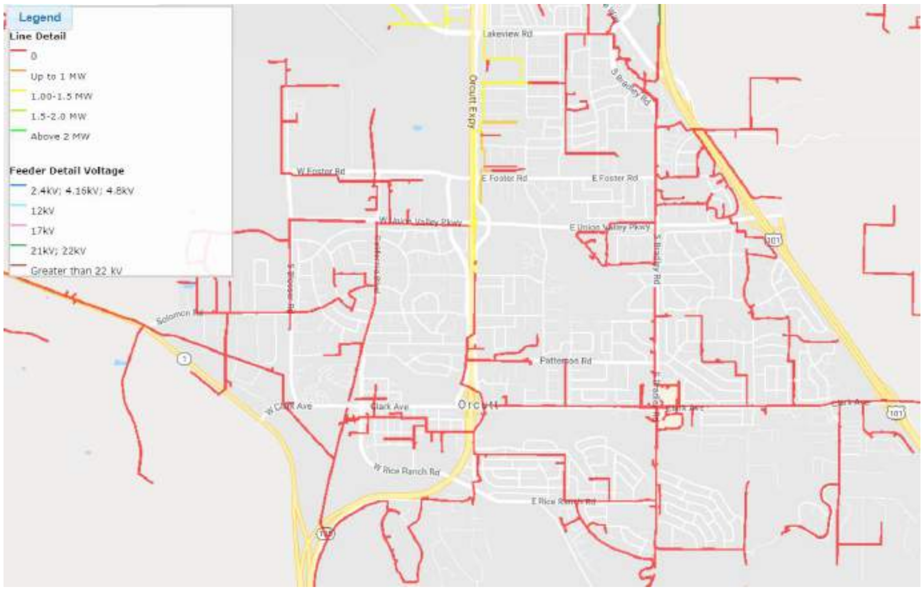

Figure 3.4: Sample PG&E Integration Capacity Analysis Map for Orcutt[55]

Solutions

The following is the main recommendation to help address this issue:

1) Support ICA advocates in asking for an examination and update of PG&E's ICA calculation methodology for available capacity, with corresponding updates to ICA maps.

This concern is already a strong area of advocacy for many ICA proponents. The County should add its voice to this group as part of its lobbying efforts to the state and utilities commission.

3.3 – County Institutional Barriers

3.3.1 – Limited County-owned Parcels

Obstacle

The County has only a limited ability to affect renewable generation on a county-wide scale because it owns a relatively small amount of land compared to the total size of the county. Additionally, many of the larger sites are open land spaces such as parks that are used for recreational purposes and/or have low electricity consumption, limiting their ability to take advantage of Net Energy Metering for on-site projects.

Solutions

The main recommendations to make full use of available County resources or reduce the need for these resources are:

1) Identify the County-owned buildings and facilities that are most critical from a resiliency perspective, such as key wastewater treatment facilities.
2) Identify major private parcels of land for partnering or supporting on renewable energy development applications.

[55] The information in this image is for purposes of example only. The information is routinely updated by the IOUs and should be reviewed when considering a specific project.

The County should not attempt to convert open spaces that are used by the public or have environmentally sensitive habitat converted into sites for renewable energy projects. Instead, Recommendation 1 focuses on developing those public sites whose operation is most key in sustaining critical services for residents and businesses, while Recommendation 2 sidesteps the lack of County resources by focusing on private sites instead. It attempts to meet the rest of the County's renewable energy goals through supporting development of open private sites, which do not have the same public obligations.

3.3.2 – Energy Assurance Plan (EAP)

Obstacle

The goal of energy assurance planning is to improve the robustness, security, and reliability of energy infrastructure by creating plans to protect key sites so that they continue to operate in the event of any disaster or electricity outage, and to ensure the ability to restore services as rapidly as possible. EAPs are therefore a key step in building a resilient local electricity grid.[56]

As more and more aspects of the transportation and building sectors are electrified by phasing out their reliance on fossil fuels, the importance of having a resilient electricity grid is magnified. For example, the Santa Barbara Metropolitan Transit District (MTD) recently announced a goal to fully electrify its bus fleet by 2030. In this scenario, an electricity outage could result in major disruption to mobility.[57]

Although the County has several emergency preparedness plans, including a partially developed multi-day power outage plan, the County does not currently have a formal EAP. The County's traditional methods of managing emergency power outages have included purchasing diesel generators for electricity backup at important facilities. Although diesel generators are inexpensive, they do not offer any benefit during non-emergency scenarios and emit carbon dioxide and other local pollutants.

Solutions

There are two main recommendations:

1) Undertake a formal EAP process to evaluate each critical site and its current level of emergency preparation, adding backup power capabilities where possible.
2) Evaluate opportunities to supplement diesel generators with battery storage.

The goal of Recommendation 2 is not to replace current diesel backup, but to supplement it where possible with solar and battery storage. The battery storage can offer the additional benefit of being used daily to achieve electricity bill reductions while also providing backup capacity for shorter outages and adding redundancy to existing critical backup.

3.3.3 – On-Bill Financing (OBF) at County Facilities

Obstacle

The County has taken significant steps to implement energy efficiency and renewable energy solutions at County-owned facilities, but such measures typically require capital improvement allocations from the General Fund, meaning that some facilities may need to wait for funds to become available before energy-saving measures can be implemented. One method for the County

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56 National Association of State Energy Officials, "Energy Assurance Planning."

57 Santa Barbara MTD, "Santa Barbara MTD Adopts Goal for 100% Zero-Emissions Fleet by 2030."

to use low- or no-interest funds to pursue energy efficiency projects, without using County funds needed by other Divisions, is to utilize current On-Bill Financing (OBF) options offered by the utilities. Such programs use utility-controlled funds to pay for energy efficiency improvements at no upfront cost to the County. The funds are then paid back to the utility through an added line-item on the normal utility bill. OBF works well when the monthly repayment amount is equal to or lower than the monthly cost savings incurred from the energy efficiency measure.

The utilities do not currently offer OBF for renewable energy projects, but this could change with political pressure through the state legislature or CPUC. Alternatively, if the County joins a Community Choice Aggregation (CCA), the County could push for some CCA revenues to be used for a revolving OBF investment fund through the CCA.

In addition to the barrier of limitations of what kinds of projects can use OBF funds, the County faces the internal hurdle of perceived legal ambiguity around the County utilizing such OBF programs at all. In order for County facilities staff to use OBF as a financing mechanism, the County legal team must achieve a comfort level with the legality of the process and the distribution and use of funds.

Solutions

There are two main recommendations, both of which are currently under various stages of review and implementation by the County:

1) Work with the utilities, peer government agencies, the CPUC, and the State of California to build understanding and acceptance of the use of OBF funds for County projects. Implement use policies and procedures to ensure that laws and guidelines are followed.
2) Press the utilities or a future CCA to make funds and a program available for OBF funding of renewable energy projects.

3.4 – Financial and Funding Barriers

3.4.1 – Financing Mechanisms

Obstacle

Businesses and commercial property owners do not always have the ability to take on additional loans beyond already existing business loans and mortgages, while residential homeowners do not always have access to low loan rates. However, as noted while analyzing the County's past energy efficiency financing programs in Section 1.3.3, past energy financing mechanisms for residents and businesses have seen low uptake. This is particularly the case for solar projects, which are not as well supported by utilities as energy efficiency projects. Additionally, many commercial and residential buildings are not owner occupied. This can lead to a dilemma known as a "split incentive", where building owners do not have an incentive to invest in energy retrofits because they do not pay the utility bills.

Solutions

There is one main recommendation for a potential new financing mechanism to help residents and businesses:

1) Create a source of funding for a Loan Loss Reserve (LLR) to back up loans taken by residents and businesses.

This involves creating funds to provide low-interest loans to residents and businesses by using an LLR to reduce risk for the lender. The County funds would be used as a backstop against loans offered to residents and businesses and would only be utilized in the cases of customer default.

3.4.2 – Altered Time-of-Use Rate Schedules

Obstacle

Traditionally, as a warm weather state, California has had electricity loads that peak during daytime in the summer, which aligned well with the timing of solar production. This was a key driver for payback, as solar panels produced during times with high utility rates, and therefore, high economic value. However, with the proliferation of solar PV throughout California, along with a culture that increasingly plugs in to digital devices at home in the evenings, electricity loads have shifted to peaking later in the day. Accordingly, both PG&E and SCE have announced new electricity rate schedules with peak time-of-use (ToU) rates in the late afternoon and evening, which have very little overlap with solar production. This mismatch is shown in Figure 3.5.

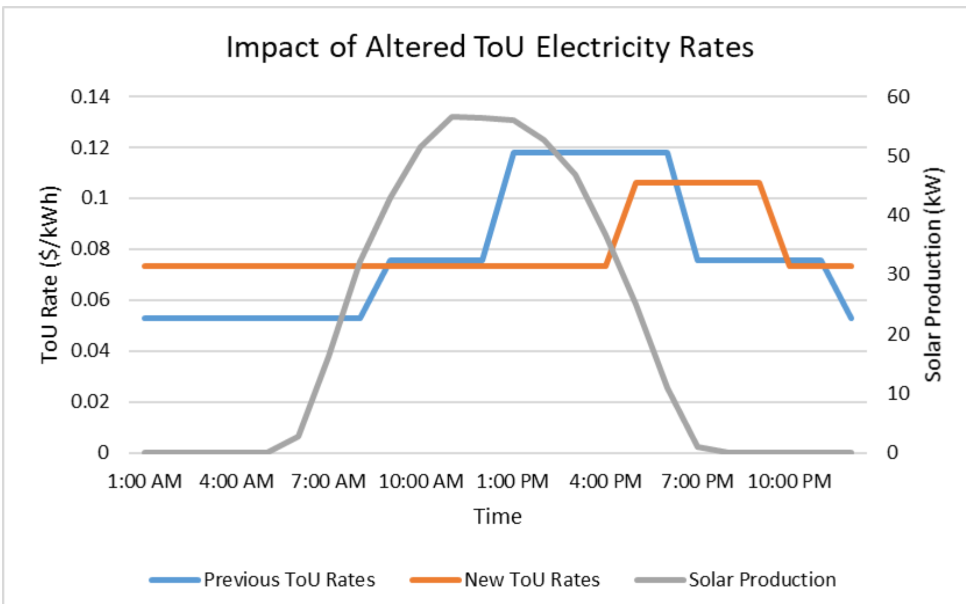

Figure 3.5: Impact of Proposed Time-of-Use Rate Changes on Solar Production Value

Solutions

To combat the reduced value of solar production under the new ToU periods, there are several ways for the County to improve the economics of solar projects:

1) Host collaborative procurements to bargain for better prices from solar vendors.
2) Institute a Performance-Based Incentive (PBI) that rewards combined solar + storage installations.

Recommendation 1 is aimed at lowering solar PV procurement costs through economies of scale. The County could directly host a collaborative procurement for public agencies across the county, such as school, fire protection, water, and sanitary districts, or support a community-led collaborative procurement such as the Community Environmental Council's Solarize program. Meanwhile, Recommendation 2 would involve a direct outlay of capital funds by the County to increase the electricity bill savings/revenues for local residential and commercial system owners.

3.4.3 – Funding Sources for Community Programs

Obstacle

A review of the County's various funding streams for energy-related policies and programs indicated that it was primarily dependent on three sources of funding; the County General Fund, State grants and Federal grants. The percentage breakdown of these sources is presented below.

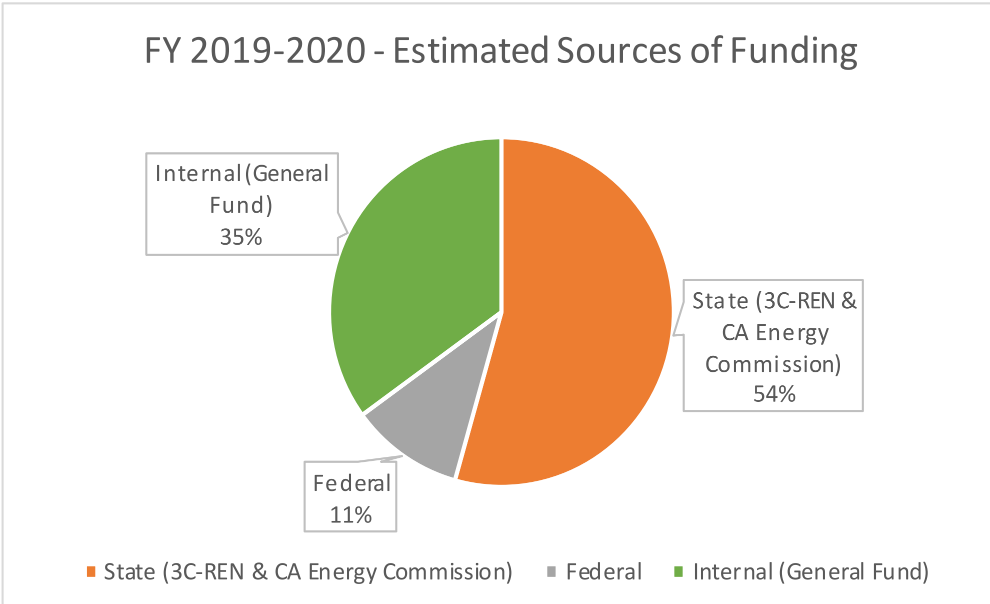

Figure 3.6: County Funding Sources

Implementation of the strategies recommended in the SEP will require an increase and diversification of these funding streams. Having a significant reliance on the General Fund indicates that the County prioritizes energy programs but increasing funding from the General Fund may be difficult given the competing priorities for General Fund dollars. Dependence on one type of funding can lead to an inconsistent funding stream.

Solutions

There are several ways for the County to increase and diversify its funding sources:

1) Aggressively pursue new federal, state, and private foundation funding sources.
2) Continue to work closely with the CPUC and existing IOUs to maximize the County's share of existing renewable program funding.
3) Partner with other nearby regional governments to create energy programs.
4) Continually monitor the costs and benefits of a potential CCA to determine viability.
5) Explore opportunities to raise additional revenue to fund energy programs.

Recommendations 1 and 2 are aimed at maximizing State funding, and Recommendation 3 is intended as expansion of the County's successful efforts to partner with neighboring counties in the formation of the 3C-REN. A CCA, if formed or joined, would be able to take some of the responsibility for running energy programs and would be able to directly gather funding from ratepayers, reducing the need for funding for the County. Finally, the County can explore methods of raising additional revenue to fund new energy programs (See Section 5.7).

3.4.4 – Federal Investment Tax Credit (ITC)

Obstacle

The federal ITC currently allows the owner of a renewable energy system to take 30% of the value of the system as a tax credit on the following year's income tax liability. The ITC is extremely critical to renewable energy development by essentially reducing the cost of systems by 30% if the owner has a large enough tax burden, and the ITC is responsible for pushing many projects to financial viability. This is a key driver for residential solar developers, in particular, as an important part of their business model involves improving financial return by being large enough to take on the tax credit for site owners that could otherwise not take advantage of it. However, the ITC is set to begin phasing down after the end of 2019 according to the schedule in Table 3.1.[58]

Table 3.1: Federal Investment Tax Credit Schedule

Year	Residential Systems	Commercial and Utility Systems
2019	30%	30%
2020	26%	26%
2021	22%	22%
2022 and beyond	0%	10%

While this staggered reduction will be generally detrimental to the development of commercial and utility systems, the complete elimination of the ITC will be particularly harmful for residential systems. Given the demographics of the unincorporated county, residential systems are particularly important.

Solutions

These are the primary recommendations:

1) Support the renewable industry in advocating for a continuation of the current ITC beyond 2019.
2) Work with the State of California to develop a "Public Power Pool" to aggregate solar project procurement for public agencies.
3) Develop an outreach program informing residential property owners of the benefit of current tax credits.

All the recommendations are advocacy and outreach solutions, with Recommendation 1 attempting to extend the current ITC, Recommendation 2 attempting to take advantage of the current ITC while it lasts, if extension efforts are unsuccessful, and Recommendation 3 is geared towards outreach in the community as opposed to state-level advocacy. The Public Power Pool will be discussed in greater detail as part of the lobbying efforts in Strategy 5.5.1.

[58] Department of Energy, "Business Energy Investment Tax Credit (ITC)."

3.5 – Educational and Public Awareness Barriers

3.5.1 – Cost Awareness of Renewable Energy

As solar PV is still a relatively new technology, costs decrease every year with falling module and inverter prices, greater competition, and better efficiency in components and in markets. Figures 3.7 and 3.8 show recent historical trends in costs for residential and commercial solar projects, by cost component, with data taken from National Renewable Energy Laboratory (NREL) cost benchmarking studies.[59]

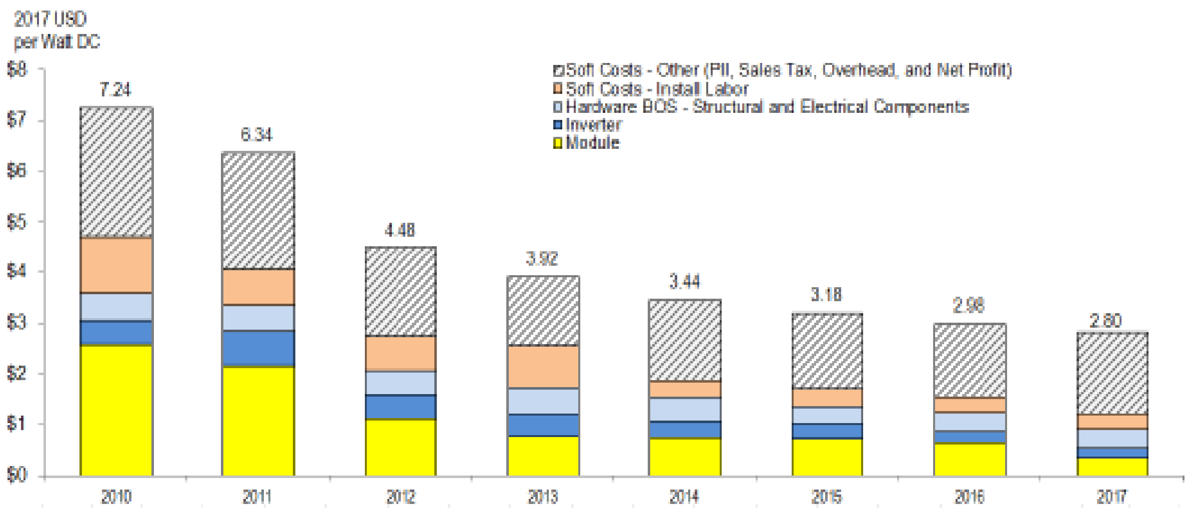

Figure 3.7: History of Residential Solar PV Cost

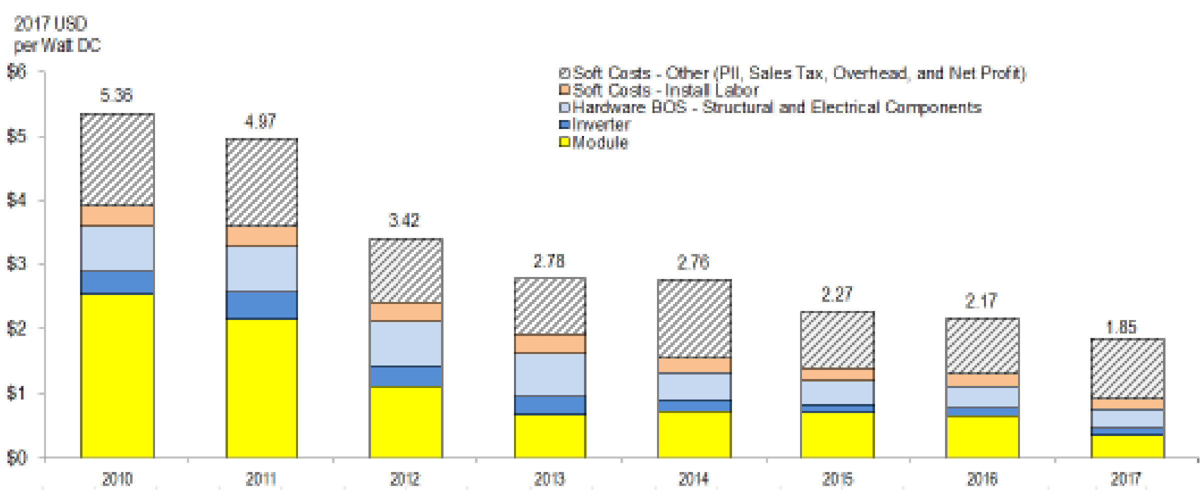

Figure 3.8: History of Commercial Solar PV Cost

59 Fu et al., "U . S . Solar Photovoltaic System Cost Benchmark : Q1 2017 U . S . Solar Photovoltaic System Cost Benchmark : Q1 2017."

Although costs are not decreasing as quickly as they did from 2010-2012, they are still falling 5-10% every year. However, potential customers rarely re-evaluate the economics of a project at their site on an annual basis, and, therefore, their knowledge of PV costs can lag actual costs. Furthermore, consumers may not be aware of changes in state and federal policies, such as the impending reduction in the ITC.

Solutions

The main recommendation is:

1) Create a formal One-Stop Shop to lead an educational campaign for community members to learn about the costs, benefits, and process of purchasing and installing energy efficiency and renewable energy and/or storage projects, as well as to provide resources and guidance as needed.

A One-Stop Shop can increase knowledge about the falling costs of solar and energy efficiency projects, as well as the value of having backup storage and resiliency. A One-Stop Shop could also serve as a hub to advertise other programs led by the County, such as 3C-REN programs, or could promulgate the benefits of a potential CCA. While the County Sustainability Division already performs this role to a large extent, formalizing this structure and program would increase the awareness of residents and businesses. Furthermore, working with and providing continued support to other cities and public agencies in the county would increase the positive impacts of the One-Stop Shop throughout the region.

Chapter 4 – Recommended Sites for Development

4.1 – Introduction

The purpose of this chapter is to provide a detailed technical assessment and financial analysis of potential solar photovoltaic (PV) project development opportunities at sites owned by the County. It is important to note that this analysis did not include many County-owned facilities, as County staff have been effectively assessing many County facilities for renewable energy development separate of the SEP.

A central focus of the County's SEP is identifying viable private sector renewable energy generation projects within the unincorporated county. A list of identified sites and their solar development potential has been included in Table 4.1. Due to privacy concerns, however, these sites have been anonymized while County staff works directly with site owners to determine the viability and likelihood of development, unless the site owner has provided permission for inclusion of their sites in the SEP. If the owner has provided permission for inclusion of their site(s) in this document, a more detailed site overview has been included in Section 4.4. Municipal sites and private sites, anonymized if necessary, that are located in the cities of Goleta and Carpinteria can be found in Chapter 6.

This chapter summarizes:

1. Site list and evaluation methodology
2. A comprehensive overview of types of solar projects, solar financing options, and incentives
3. The best sites for solar PV installations, from both technical and economic perspectives
4. Recommended solar PV system sizes and design characteristics
5. Next steps for pursuing the recommended options with a flowchart for implementation

Based on pre-screen assessments and in-person site visits, high-potential sites for solar PV deployment have been identified. Figure 4.1 summarizes the projects' total maximum potential economic and environmental impact over a 25-year analysis period, assuming a power purchase agreement (PPA) financing structure. PPAs are discussed further in Section 4.4.

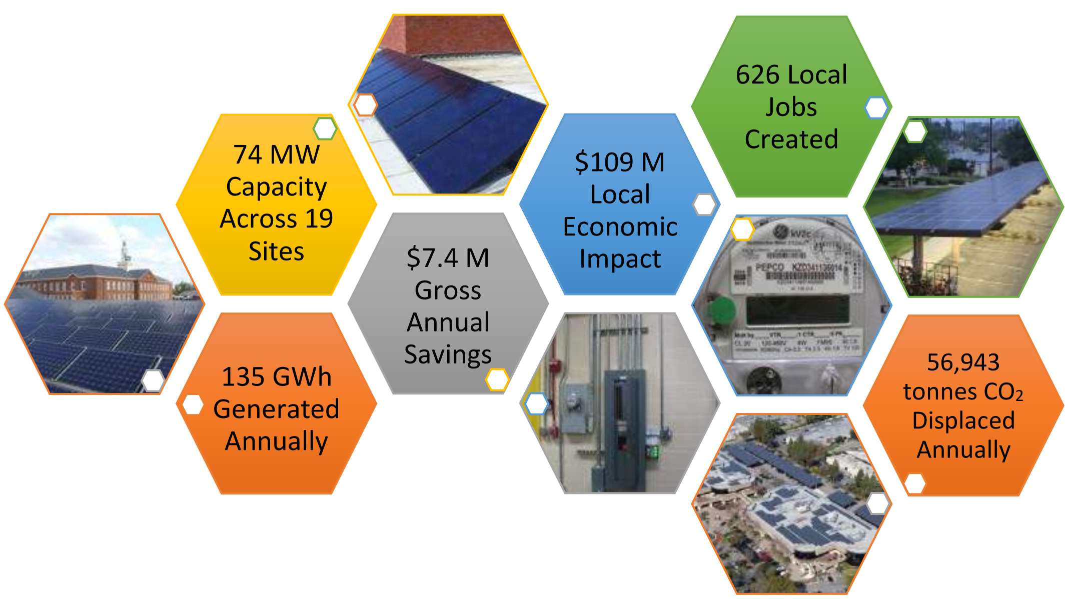

Figure 4.1: Economic and Climate Benefits of Proposed Sites

4.2 – Site Summary and Evaluation Methodology

Using information collected during pre-screening discussions and in-person site visits, viable sites on rooftops, parking lots, and open land have been selected and mapped out to provide system and project design flexibility. Based on the area available for solar at each site, the maximum possible solar PV system capacity at recommended sites has been estimated at 6,397 kilowatts (kW) to be installed across four County facilities. Installing the maximum solar PV capacity at those facilities would offset about 60% of current facility electricity use.

In addition to the County sites, multiple sites owned by private or non-County public entities were reviewed for solar installation potential, with over 67 MW of potential identified at 15 recommended sites. The table below summarizes each site and whether the systems are expected to be interconnected behind-the-meter and net-metered or interconnected as front-of-the-meter systems selling directly into the electricity grid.

Table 4.1: Site Summary

ID	Name	Priority Score	Site Type	Interconnect	System Size (kW-DC)	Energy Output (kWh/year)
Unincorporated County of Santa Barbara Public Sites						
1	Santa Maria Mental Health Building / SM Cares	A	Municipal Roof / Carport	Behind meter	161	258,000
2	North Branch Jail	A	Municipal Roof / Carport	Behind meter	1,120	1,813,400
3	North Branch Jail	B	Municipal Ground Mount	Front of meter	4,450	7,894,780
4	Fire Station 11	B	Municipal Roof	Behind meter	30	39,950
5	Goleta Pier / Beach Park	C	Municipal Carport	Front of meter	636	945,000
				Total Maximum – County Sites	**6,397**	**10,951,130**
				Total Recommended (A+B) – County Sites	**5,761**	**10,006,130**
Unincorporated County of Santa Barbara Private Sites						
6	Public -Commercial Site CoSB.1	A	Public Roof / Carport	Behind meter	125	207,600
7	Public – Industrial Site CoSB.1	A	Public Roof / Carport	Behind meter	92	151,000
8	Public -Commercial Site CoSB.2	A	Public Roof / Carport	Behind meter	449	779,000
9	Public -Commercial Site CoSB.4	A	Public Roof / Carport	Behind meter	603	1,040,000
10	Private – Agricultural Site CoSB.1	A	Private Ground	Behind meter	973	1,700,000
11	Ted Chamberlin Ranch – Parcel 1(a)	A	Private Ground	Front of meter	10600	19,340,000
12	Ted Chamberlin Ranch – Parcel 1(b)	A	Private Ground	Front of meter	14000	25,577,000
13	Ted Chamberlin Ranch – Parcel 2	A	Private Ground	Front of meter	14500	26,510,000
14	Ted Chamberlin Ranch – Parcel 3	A	Private Ground	Front of meter	9430	17,260,000

15	Ted Chamberlin Ranch – Parcel 4	A	Private Ground	Front of meter	14900	27,320,000
16	Public -Commercial Site CoSB.3	B	Public Roof	Behind meter	369	644,000
17	Public -Commercial Site CoSB.5	B	Public Roof / Ground	Behind meter	32	52,000
18	Private – MF Residential Site CoSB.1	B	Private Roof / Carport	Behind meter	180	260,000
19	Kim Jones Ranch – Parcel 2	B	Private Ground	Front of meter	1170	2,079,000
20	Kim Jones Ranch – Parcel 1	C	Private Ground	Front of meter	642	1,139,000
				Total Maximum – Private Sites	**68,065**	**124,058,600**
				Total Recommended (A+B) – Private Sites	**67,423**	**122,919,600**
				TOTAL MAXIMUM – ALL SITES	**74,462**	**135,009,730**
				TOTAL RECOMMENDED (A+B) – ALL SITES	**73,184**	**132,925,730**

In addition to confirming the physical space available for solar PV systems, planned energy and structural renovations and other site-specific issues were assessed. For rooftop sites, existing roof age, condition, and material were evaluated, as well as additional limitations such as the presence of HVAC equipment, parapets, surrounding vegetation, skylights, and conduits—all of which cannot be easily relocated. For parking lot or solar carport systems, the main site selection issues are the availability of space for construction, surrounding vegetation, and distance to the electrical interconnection point. For ground-mounted systems, geotechnical concerns and land-use constraints are evaluated as well as distance to the electrical interconnection point.

Table 4.2: Technical Feasibility Criteria

Criterion	Description
Shading	Survey the surroundings of the usable areas to identify obstructions, such as rooftop HVAC equipment, rooftop access penthouses, antennas, trees, lampposts, and neighboring buildings, that could potentially cast shadows on the solar modules and reduce output. Even minor shading can have a profound negative impact on system performance. In order to assess the amount of direct sunlight available at each usable area, the annual sun path is plotted at various points using industry standard tools and software.
Electrical	Inspect electrical rooms for main breaker and switchgear amperage and voltage ratings, as well as availability of space for additional electrical equipment, such as inverters. The location of the utility electrical meter(s) is important, as the distance between the solar modules and the point of connection must be minimized to reduce voltage drop, reduce costs, and increase system efficiency.
Structural	Evaluate the age, condition, and material of the roof; the structural integrity of the building; and building layout.
Geotechnical	Assess geotechnical issues, such as soil condition, water table levels, and presence of fault lines.
Environmental	Review environmental criteria related to environmental impact report requirements and other such considerations. In California this is primarily focused on site characteristics that will trigger review under the California Environmental Quality Act (CEQA).

The potential challenges were rated on a scale from *None* (no issues) to *High* (likely to require extensive review or remediation). Table 4.2 lists a description of each criterion. Table 4.3 summarizes this technical analysis for each site.

Table 4.3: Technical Feasibility Site Summary

ID	Name	Shading	Electrical	Structural	Geotech.	Enviro.	Comments
1	Santa Maria Mental Health Building / SM Cares	None	Low	Low	Low	None	Geotechnical and structural studies would need to be conducted for the carport and rooftops. No trees shading parking lot or rooftops. Electrical switchgear needs to be inspected for capacity.
2	Northern Branch Jail (BTM)	None	Low	Low	Low	Low	This site was built to be "solar-ready" so no major installation challenges are anticipated
3	North Branch Jail (IFOM)	None	Medium	Low	Low	Medium	The size of this system may require electrical upgrades to support interconnection. An environmental impact study would be required for a large ground-mount system, since the land at the site is not developed.
4	Fire Station 11	None	Low	Low	None	None	A structural study would need to be conducted for the rooftop. Trees are too small to shade the rooftop. Switchgear needs to be examined to confirm electrical capacity, but system is fairly small.
5	Goleta Pier / Beach Park	Low	Low	None	Medium	Medium	A geotechnical study would need to be conducted for the carports, but water table issues are likely. Many trees on-site, but mostly small, and only a few carports would be affected. ICA maps indicate enough electrical capacity nearby on the distribution grid. Installation would require a coastal development permit.

Based on this technical feasibility, each evaluated site was prioritized and scored with an "A" ranking, being most feasible and ready for immediate solar deployment, to a "C" ranking, which would require heavy modifications for solar deployment to be feasible. Table 4.4 provides a description of each score.

Table 4.4: Project Development Priority Ranking

Score	Description
A	Sites with an "A" score have excellent solar potential and current conditions support immediate deployment. Generally, these projects have roofs that are less than five years old and/or have minimal to no shading or other technical feasibility concerns.
B	Sites with a "B" score also have solar potential and could be developed immediately, but have minor site-specific challenges related to roof condition, shading, or other features. Generally, these projects have roof layers that are 5-10 years old, experience minimal shading and/or may have issues related to all other technical feasibility criteria, such as the potential need for minor electrical equipment upgrades. Sites with no technical feasibility concerns (and would otherwise be given an A priority ranking) but only allow for a small system size are placed in this category.
C	Sites with a "C" score have high-risk technical issues or are otherwise troublesome sites. While a PV system may still be feasible, it is unlikely that these systems will be able to provide economic savings to justify the cost of the systems at this time. In the event of any near-term procurement, these sites would not likely be included.

4.3 – Financial Structure Details

4.3.1 – Behind-the-Meter Projects

A cost/benefit analysis was conducted based on the review of the historical energy usage at each site, when available. This allows for a detailed projection of potential avoided energy and demand costs. Financial modeling has been performed for both primary ownership options: a direct purchase and a power purchase agreement. The results are presented within the detailed section for each site. The analysis includes only arrays with development priority scores of "A" or "B", which are recommended for immediate deployment.

Avoided costs from energy and demand charges provide the primary financial benefit of a behind-the-meter solar PV system. The key drivers to ensure maximum avoided costs are a proper system design, which affects system production and long-term operations, as well as the utility rate schedule, which determines the value for the energy produced. The financial analysis assumes the solar output reduces energy charges at the retail rate, which is the valuation structure under a net metering tariff in both SCE and PG&E territory. As for demand charges, it is possible for a solar PV system to reduce the maximum demand in a given month and/or year. However, the demand reduction percentage is difficult to reliably predict in any given month due to the variability of energy usage and solar output, and no guarantee that the solar output will occur at the same time as load. This financial analysis assumes a conservative estimate of 10% demand reduction from solar PV – that is, utility demand charges will be reduced by 10% of the PV system generation capacity.

Additional financial analysis and explanation of financing options and incentives is included in the next section.

Direct Purchase Option

The municipal agency or facility owner would use existing cash reserves to purchase the system outright (or finance the purchase through a loan). Under this scenario, the site owner is responsible for all ownership concerns, including operation and maintenance (O&M), regular system cleaning, insurance, and monitoring of system production. This requires a significant up-front capital expenditure and on-going operational costs.

Third-Party Ownership - Power Purchase Agreement

The facility owner (site host) would enter into a contract (typically 20-25 years) with a third-party to purchase all energy produced by a solar PV system installed on the property. This third-party would own the solar PV system and be fully responsible for all ownership costs, including financing, O&M, insurance, and system output.[60] This structure enables site owners to receive electricity from a solar PV system at no upfront costs and allows the tax incentives for solar installations to be monetized by the third-party. This is particularly important for economic viability when the site host is a public agency or non-profit that cannot take advantage of the tax benefits.

The site host pays a fixed rate for the electricity produced by the solar array. Ideally, this rate is lower than the current cost for electricity supply. PPAs typically have a yearly price escalator of between 0-3%. The value of this escalator relative to the rate at which utility prices increase (historically, approximately 3%) will affect the savings in future years. To lower this contracted PPA rate, the site host can also pre-pay a portion of the project at the beginning. This allows site hosts to use up-front capital while still allowing a third-party to take advantage of the ITC if the hosts cannot.

In general, the Direct Purchase option provides the greatest savings over the long-term for an entity with a tax appetite but requires a significant initial project investment and ongoing O&M for the systems. The third-party option typically provides the greatest savings for tax-exempt entities and is thus appealing for local governments. Monthly payments tend to be lower than current or projected utility bills starting on day one.

Tables 4.5 and 4.6 describe the applicable utility and state programs and incentives that can be used to improve financials for solar systems.

Table 4.5: Applicable Utility Solar Programs and Tariffs in Santa Barbara County

Type	Description
Net-metering[61]	*Overview:* California requires its utilities to offer a net-metering tariff that allows customers to receive the full retail value for solar generation that exceeds their facility's real-time demand. *Project Size-limit:* Projects are limited to the equivalent of 100% of the customer's annual load. *Net-Excess Generation:* If net-excess generation exists at the end of a billing cycle it is rolled over and credited to the next billing cycle at the retail rate. If net-excess generation exists at the end of a 12-month period, the customer can opt to roll over the credit indefinitely at the retail rate or receive a payment for that generation at a rate equivalent to the average wholesale spot market price of electricity (between 7am and 5pm) during the year that the excess electricity was generated. *Renewable energy credits (RECs):* The customer retains the RECs associated with their solar generation unless they choose to receive a payment for their net excess generation, in which case the utility gains the rights to the RECs.

[60] Solar Energy Industries Association, "Solar Power Purchase Agreements."

[61] More information: http://programs.dsireusa.org/system/program/detail/276, https://www.sce.com/residential/generating-your-own-power?from=/customergeneration/customer-generation.htm

Table 4.6: Applicable Solar Incentives and Financing Programs in Santa Barbara County

Type	Description
Federal	Investment Tax Credit (ITC): Allows site owner to take 30% of the project value as a credit on their federal taxes. Accelerated Depreciation: Allows the value of the entire system to be depreciated over the first year of operation.
State	Self-Generation Incentive Program (SGIP): Provides rebates for distributed energy systems, particularly with energy storage[62] Solar On Multifamily Affordable Housing (SOMAH): Provides a significant rebate to qualifying multi-family housing tenants or installers.[63] Energy Conservation Assistance Act (ECAA) Program Loans: Provides 0% and 1% loans for public agencies to undertake energy efficiency and renewable energy generation projects.
Local	Property-Assessed Clean Energy (PACE) Financing: Allows property owners to finance installations through a loan that is paid back on property taxes. It us currently available only for residents in Lompoc and Santa Barbara City, and for commercial properties in unincorporated Santa Barbara County.[64]

4.3.2 – Front-of-the-Meter Projects

A portion of the sites assessed, particularly those in the northern part of Santa Barbara County, have the characteristics to support a utility-scale renewable energy project. These projects, also called wholesale projects, are interconnected directly to the distribution or transmission grid and are built with the intention of selling power directly to the utility or another off-taker such as a CCA, or into the wholesale electricity market. In either case, the site host would lease their land (typically for a 20- or 30-year period) to a renewable energy developer to design and build the project.

In most cases, the developer is responsible for finding a project off-taker or determining if it is financially viable to sell the project output into the wholesale electricity market. In the case of the projects considered in this analysis, the opportunities and solutions discussed in the SEP document are designed, in part, to assist developers in overcoming the challenges of determining a financially viable project structure.

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62 California Public Utilities Commission, "Self-Generation Incentive Program."

63 California Public Utilities Commission, "SOMAH Solar On Multifamily Affordable Housing."

64 PACENation, "PACENation: Building the Clean Energy Economy."

4.4 – Site Evaluations

4.4.1 – Santa Maria Mental Health Building / SM Cares

Site Overview

Address:	212 Carmen Ln, Santa Maria, CA 93458 (SM Cares)

Utility Provider:	PG&E	Electricity Tariff:	A-10 S / A-6
Annual Energy Usage:	261,310 kWh (2 meters)	Monthly Demand Peak:	N/A

PV System Overview

System Size:	161 kW	Electricity Offset:	99%
Expected Year 1 Output:	258,000 kWh	Expected GHG Reduction:	41 mTCO2/yr

Financial Summary

Modeled PPA Rate:	$0.14 /kWh	Year 1 Savings	$11,976
		Simple Payback Period:	0 yrs

PV System Summary

A solar installation at these two buildings could be located on the roofs and on new solar carports in the parking lots. However, due to relatively low energy consumption, the installation was sited only on the rooftops and part of the parking lot. There are no visible shading or structural issues at this site, though tree removal would be necessary for carport construction. Combined with the higher electricity rates in PG&E territory compared to SCE territory, this is a strong candidate for solar development.

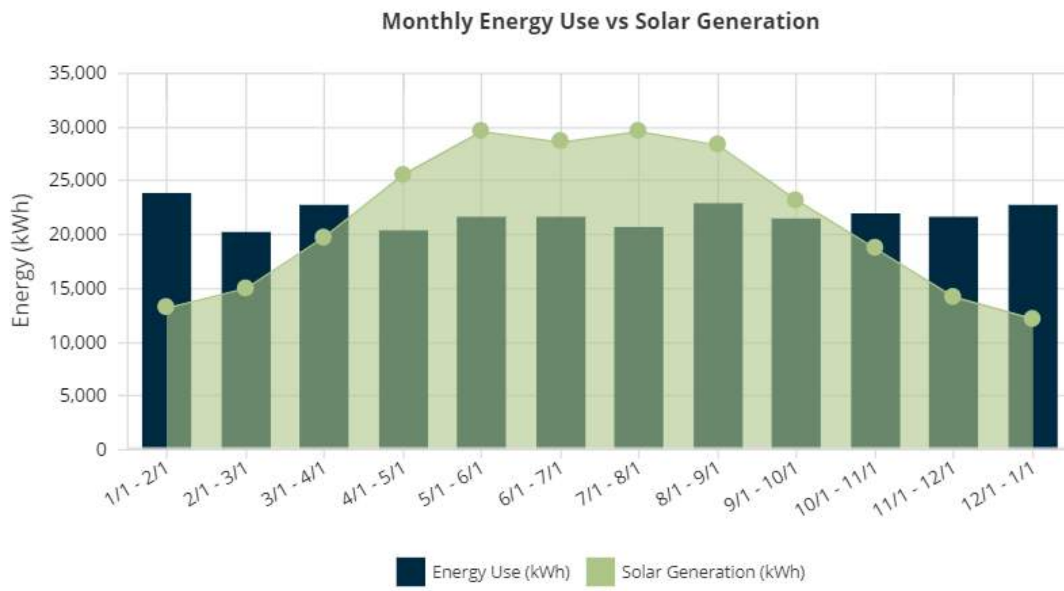
Due to the several different meters located on contiguous parcels, aggregation of these meters may be an option to allow as large a system as possible. Even then, site usage limits this system to less than 20% of its maximum potential. As such, it could also be used as a site for a potential Community Solar program, which would enable both greater development at the site and would be thematically fitting.

To take advantage of tax credits, the project is shown as financed through a zero-escalator PPA. This PPA will result in lower electricity costs from the first year. Furthermore, as time passes, rising utility rates will cause the savings from the solar panels to increase even further.

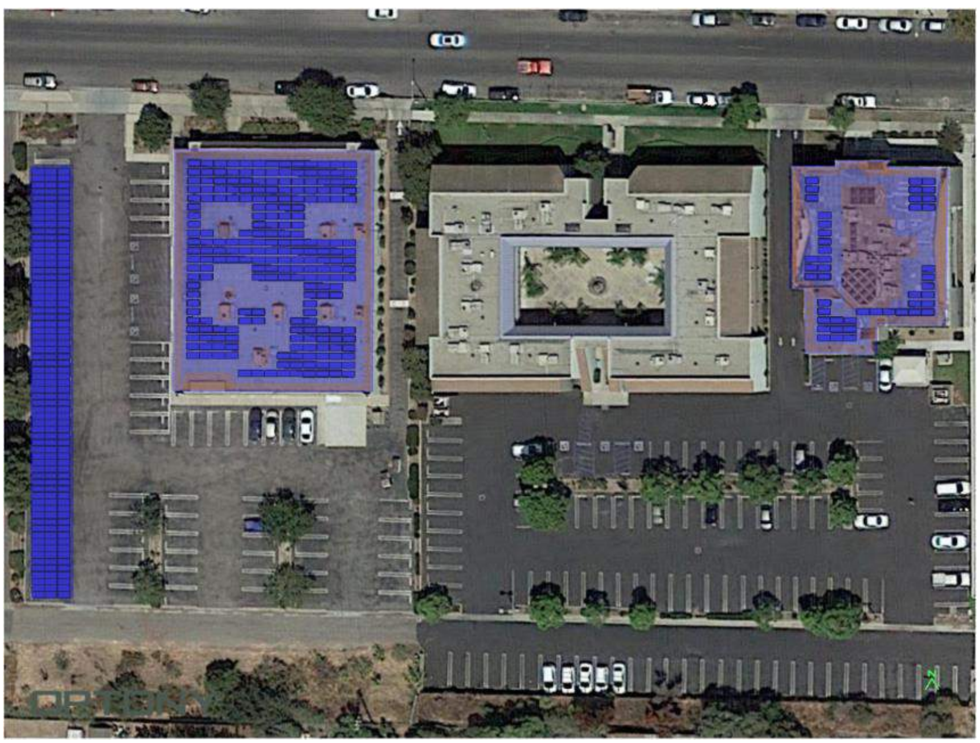
A potential battery system was modelled under a 3c/kWh adder to the PPA. However, given that the solar panels are projected to be so effective in reducing electricity bill costs, a battery will likely not be able to increase additional savings by enough to justify the greater costs. Additionally, this site may not necessarily be a target for resiliency hardening, so a battery would not be needed from that perspective either.

For carport installation, a geotechnical or soils study would be needed, unless such a study exists from previous construction on the site. As a previously developed location, carports and rooftop solar would be exempt from CEQA requirements.

Energy Use and Solar Generation Profile



Proposed Solar PV Design Layout



The layout above can accommodate approximately 68 kW on carports and 93 kW on rooftops. Additional parking lot area is available to enable placement of solar at the closest location to the preferred interconnection point. The energy yield for the proposed solar arrays is 1,606 kWh/kW per year.

4.4.2 Northern Branch Jail

The Northern Branch Jail is a 138,385 sq-ft facility recently constructed by the County of Santa Barbara. The facility is located at 2301 Black Road in the City of Santa Maria. Since the facility is newly completed, no historical electricity usage is available on which to base solar sizing and financial feasibility analysis. An annual electrical usage figure has been estimated based on the facility analysis completed as part of PG&E's Savings by Design Program. The estimated usage from the Savings by Design analysis was used to calculated a per square foot electricity intensity, which was then applied to the entire square footage of the facility. As such, the conclusions drawn on this analysis are intended to guide the County's approach to a future Request for Proposal (RFP) for solar at the facility and should not be considered final recommendations. As actual electrical usage data is accumulated, the recommendations in this analysis can be refined.

At the direction of County staff, the designs in this analysis have been split into two categories; Behind the Meter and In Front of Meter. Behind the Meter Designs are assumed to be interconnected to the electricity grid using the Net Energy Metering (NEM) program to offset onsite electricity usage, and In Front of Meter projects are assumed to be interconnected through the Renewable Energy Self-generation Bill Credit Transfer (RES-BCT) program to export electricity generated directly onto the electrical grid. Depending on future plans to expand the jail or otherwise use open roof and ground space, County staff can decide which type of project is the best fit for development.

Behind the Meter Designs

Design 1: Rooftop & Carport

Site Overview

Address: 2301 Black Road, Santa Maria, CA 93455

Utility Provider:	PG&E	Electricity Tariff:	E-19S -> E-19SR (projected)
Annual Energy Usage:	2,275,854 kWh (projected)	Monthly Demand Peak:	495 (projected)

PV System Overview

System Size:	1,120 kW	Electricity Offset:	80%
Expected Year 1 Output:	1,813,400 kWh	Expected GHG Reduction:	412 $mTCO_2$/yr

PV System Summary

A solar system on the newly constructed Northern Branch Jail facility could be located on the roof and parking lots, as depicted in "Proposed Solar PV Design Layout". The combined potential solar capacity from a full build-out of rooftops and carports is approximately 1120 kW. A system of this size would offset about 80% of the projected annual consumption at the facility.

A rooftop and carport system would be interconnected using PG&E's NEM tariff. This process is well-established with the utility and there are no expected challenges relating to the interconnection of this system.

Due to the recent construction of the site, there are no expected concerns with rooftop integrity or with the electrical capacity on the switchgear. Pursuant to Title 24, this facility was constructed with a future solar installation in mind. Feasibility and cost of developing a rooftop/carport system will likely be reduced by the existence of pre-installed conduit, as indicated by the electrical site plans reviewed for this analysis.

Financial Summary

Cash Purchase Price:	$2,380,00 – 2,940,000	Simple Payback Period:	14 - 17 yrs
Expected PPA Rate:	$0.106 – 0.131 /kWh	Estimated Annual Savings:	$169,315

Without accurate historical electrical usage data, analyzing financial feasibility for a net-metered site in a detailed manner is difficult. An expected cash purchase price and simple payback period, based on the size and type of the system and the value, under a NEM tariff, of the electricity produced, is provided. A range of expected Power Purchase Agreement (PPA) rates is also provided, based on the estimated total system cost and industry trends. These estimates are intended to provide a reasonable range for PPA prices that may be anticipated through any future Request for Proposal (RFP) solar procurement process.

During any future RFP process, the County should require pricing proposals to include both a cash purchase and a PPA rate. While a cash purchase may result in larger savings over the lifetime of the project, a PPA may result in a lower total cost because it enables the developer to take advantage of federal tax credits. Additionally, PPAs usually require no upfront payment by the County, which may increase the economic feasibility of development.

Battery Storage Considerations

New time-of-use periods established by PG&E, which moved the most expensive peak electricity rate period from 12-6pm to 4-9pm, create an opportunity for increased savings through battery storage. Due to recent regulatory changes, battery systems can now store excess solar production from the middle of the day to discharge to the grid during the new peak period in the evening, thereby increasing the value of that electricity and the credit the County can earn for it. Additionally, battery systems have the potential to earn additional value for the site host through demand charge reduction and the provision of grid services such as demand response or frequency regulation. Finally, the Integrated Distributed Energy Resources (IDER) proceeding at the state level is exploring mechanisms to enable site hosts to monetize additional, indirect services that a battery system can provide, such as deferred distribution and transmission upgrades. However, without detailed (15-min or 60-min interval) electricity usage and demand information, a meaningful battery valuation is difficult. As such, no battery valuation was performed in this site analysis. As detailed site usage data becomes available, the County should require the consideration of a battery system and analysis of associated savings in any RFP for solar PV at Northern Branch Jail.

Proposed Solar PV Design Layout

Design 2: Ground Mount

Site Overview

Address: 2301 Black Road, Santa Maria, CA 93455

Utility Provider:	PG&E	Electricity Tariff:	E-19S -> E-19SR (projected)
Annual Energy Usage:	2,275,854 kWh (projected)	Monthly Demand Peak:	495 kW (projected)

PV System Overview

System Size:	1,309 kW	Electricity Offset:	100%
Expected Year 1 Output:	2,275,854 kWh	Expected GHG Reduction:	518 $mTCO_2$/yr

PV System Summary

To take advantage of the surrounding land and achieve a 100% electricity offset, a solar system on the newly constructed Northern Branch Jail facility could also be developed as a ground mount installation. The system size is projected to be 1,309 MW.

A ground mount system could still be interconnected using PG&E's NEM tariff. The program changes known as NEM 2.0 removed the 1MW size limit on net-metered projects, enabling site hosts to develop systems sized large enough to generate up to a full 100% of the facility's electricity consumption. A 1,309-kW system is enough to meet 100% of site usage in this case. There is space for a larger array but the energy production of such an array would exceed the annual site usage.

Under NEM, however, a system larger than 1MW is required to pay all interconnection study costs, instead of the reduced costs applied to systems under 1MW. This may result in unexpected challenges and/or costs associated with interconnection of a larger system.

Additional ground mount designs, sized without site usage constraints, are explored in the In-Front of Meter section of this analysis.

Financial Summary

Cash Purchase Price:	$2,291,220 – 2,940,854	Simple Payback Period:	11 - 14 yrs
Expected PPA Rate:	$0.088 – 0.113 /kWh	Estimated Annual Savings:	$212,494

As is the case with Design 1, analyzing financial feasibility for a net-metered site in a detailed manner, without accurate electrical usage data, is difficult. An expected cash purchase price and simple payback period, based on the size and type of the system and the value, under a NEM tariff, of the electricity produced, is provided. A range of expected Power Purchase Agreement (PPA) rates is also provided, based on the estimated total system cost and industry trends. These estimates are intended to provide a reasonable range for PPA prices that may be anticipated through any future Request for Proposal (RFP) process.

During any future RFP process, the County should require pricing proposals to include both a cash purchase and a PPA rate. While a cash purchase may result in larger savings over the lifetime of the project, a PPA may result in a lower total cost because it enables the developer to take advantage of federal tax credits. Additionally, PPAs usually include no upfront payment by the County, which may increase the economic feasibility of development.

Battery Storage Considerations
All battery storage considerations discussed in Design 1 apply to Design 2. The larger solar system size, however, may enable a larger battery capable of providing additional services. One such potential service of note, enabled by a larger solar + storage system, is back-up power. Northern Branch Jail is equipped with a 1MW gas-fired generator to provide power in emergency situations. While this generator has already been purchased, the Design 2 has the potential to replace the need of this generator in a manner that aligns with the County's clean energy goals and can provide savings for the County during day to day operations.

If the County decides to pursue Design 2, it will be worth exploring the potential of a solar + storage system to provide back-up power during emergencies, instead of or in addition to the existing generator.

Proposed Solar PV Design Layout

In Front of Meter Designs (IFOM)

Utility Provider: PG&E **Proposed interconnection method:** RES-BCT

The amount of land surrounding the Northern Branch Jail provides the opportunity for the County to develop a utility-scale solar project. The analysis below includes five (5) design variations. The first design maximizes the entire ground-mount potential and the following four designs depict phased sections of which the County could develop any number. This phased approach was taken to account for possible jail expansions and the intention to reserve ~20 acres of land to provide a farming program for incarcerated people. The County can choose to pursue the solar design that best complements the other uses intended for the available land.

The Northern Branch Jail Site also provides a unique opportunity to align multiple Strategic Energy Plan priorities in one project. The SEP explored multiple mechanisms to expand the development of renewable energy on land designated for agriculture. One mechanism discussed, but in need of a pilot project to provide proof of concept and assuage stakeholder concerns, is the allowance of dual-use PV systems that generate electricity while agricultural uses are still active. Combining the Northern Branch Jail's farming program with a solar development would provide a valuable opportunity to test viability of dual-use PV in Santa Barbara County while providing economic savings for the County and important educational programs for incarcerated citizens.

Payback periods for the possible solar systems included in this section were calculated assuming participation in PG&E's RES-BCT program. RES-BCT is a program provided for local governments to develop renewable energy projects that provide electricity to the grid and receive bill credits on other accounts. The program has a system size cap of 5MW. Based on modeling of projected TOU rates and Power Charge Indifference Adjustment, a solar export value of $0.0898/kWh was used to model simple payback under the RES-BCT program. This value is based on only the generation portion of PG&E's electricity rates and excludes costs associated with transmission and distribution. The actual value of solar electricity under the RES-BCT program will be determined by the utility based on then-applicable rates and charges.

As an alternative to RES-BCT, the County could explore the possibility of developing utility-scale projects that have PPAs with PG&E or a community choice aggregator such as Clean Power Authority or Monterey Bay Clean Power. However, market research and discussions with relevant CCAs during the SEP development process have indicated that the value of solar production expected through a wholesale PPA will be much lower than through RES-BCT. This value is expected to be under 5 cents per kWh.

Design 3: Ground Mount Total

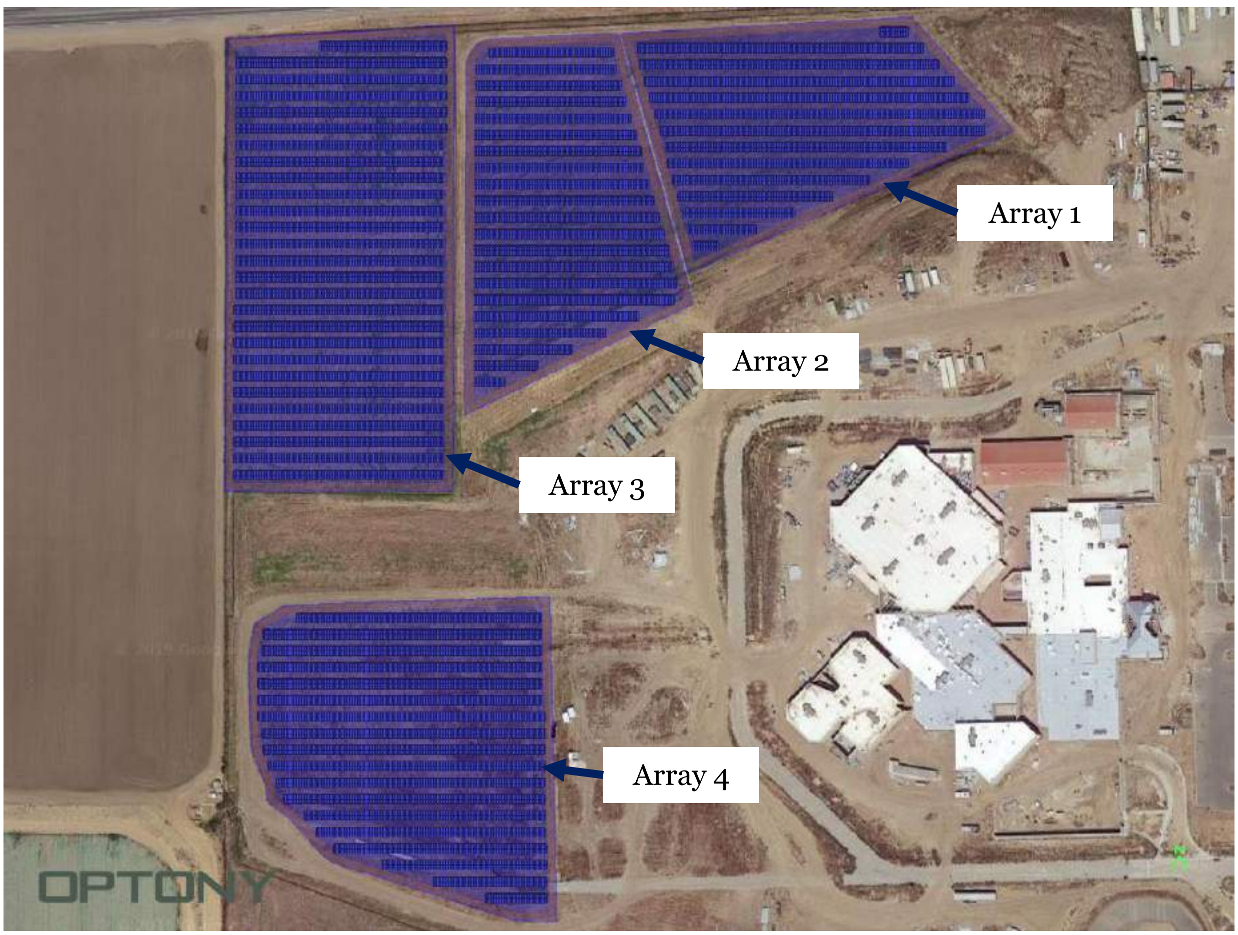
PV System Overview

System Size:	4,450 kW	Electricity Offset:	N/A
Expected Year 1 Output:	7,894,780 kWh	Expected GHG Reduction:	1,797 $mTCO_2$/yr

Financial Summary

Cash Purchase Price:	$7,787,500 – 10,012,500	Simple Payback Period:	11 - 14 yrs
Expected Solar Value:	$0.0898 /kWh	Estimated Annual Savings:	$708,697

Proposed Solar PV Design Layout



Design 4: Ground Mount Array 1

PV System Overview

System Size:	821 kW	Electricity Offset:	N/A
Expected Year 1 Output:	1,428,470 kWh	Expected GHG Reduction:	325 $mTCO_2$/yr

Financial Summary

Cash Purchase Price:	$1,438,150 – 1,849,050	Simple Payback Period:	11 - 14 yrs
Expected Solar Value:	$0.0898 /kWh	Estimated Annual Savings:	$128,231

Proposed Solar PV Design Layout

Design 5: Ground Mount Array 2

PV System Overview

System Size:	892 kW	Electricity Offset:	N/A
Expected Year 1 Output:	1,547,950 kWh	Expected GHG Reduction:	352 mTCO2/yr

Financial Summary

Cash Purchase Price:	$1,560,650 – 2,006,550	Simple Payback Period:	11 - 14 yrs
Expected Solar Value:	$0.0898 /kWh	Estimated Annual Savings:	$138,956

Proposed Solar PV Design Layout

Design 6: Ground Mount Array 3

PV System Overview

System Size:	1540 kW	Electricity Offset:	N/A
Expected Year 1 Output:	2,674,500 kWh	Expected GHG Reduction:	608 mTCO2/yr

Financial Summary

Cash Purchase Price:	$2,695,000 – 3,465,000	Simple Payback Period:	11 - 14 yrs
Expected Solar Value:	$0.0898 /kWh	Estimated Annual Savings:	$240,084

Proposed Solar PV Design Layout

Design 7: Ground Mount Array 4

PV System Overview

System Size:	1,200 kW	Electricity Offset:	N/A
Expected Year 1 Output:	2,275,854 kWh	Expected GHG Reduction:	472 $mTCO_2$/yr

Financial Summary

Cash Purchase Price:	$2,100,000 – 2,700,000	Simple Payback Period:	11 - 14 yrs
Expected PPA Rate:	$0.0898 /kWh	Estimated Annual Savings:	$186,436

Proposed Solar PV Design Layout

4.4.3 – Fire Station 11

Site Overview

Address:	6901 Frey Way, Goleta, CA 93117		

Utility Provider:	SCE	Electricity Tariff:	TOU GS1-D -> TOU GS-1 E
Annual Energy Usage:	44,385 kWh	Monthly Demand Peak:	12 kW

PV System Overview

System Size:	29.8 kW	Electricity Offset:	90%
Expected Year 1 Output:	39,950 kWh	Expected GHG Reduction:	4 mTCO2/yr

Financial Summary

Modeled PPA Rate:	$0.13 /kWh	Simple Payback Period:	16 yrs

PV System Summary

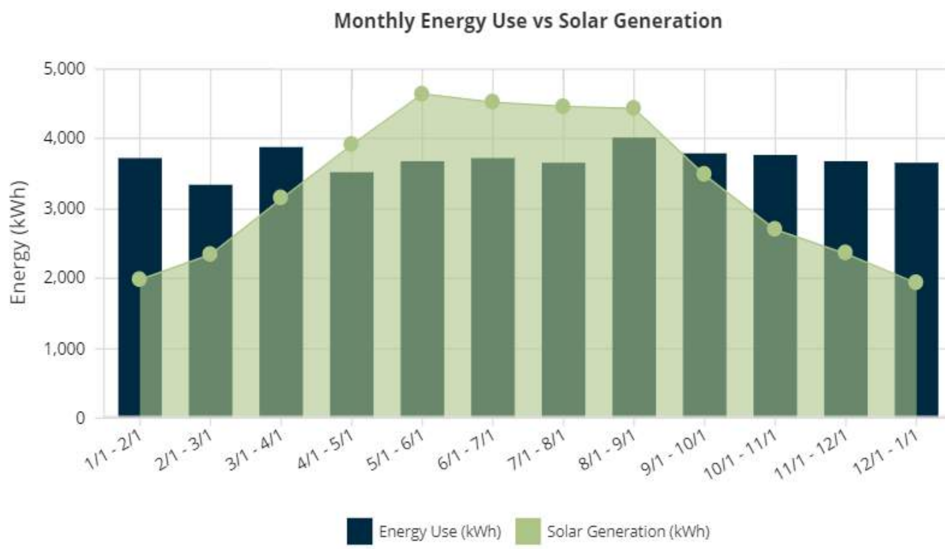
There are three potential locations at the fire station for solar siting: the west-facing roof on the western building, the east-facing on the eastern building, and the parking lot. Due to load constraints, the installation was sited only on the rooftops. Although a carport would likely be slightly more efficient than an east-facing roof installation, the efficiency benefits would likely not outweigh the additional structural costs of construction for a system of this size.

To take advantage of tax credits, the project is shown as financed through a zero-escalator PPA. Due to the recent change in time-of-use electricity rates, a 13 c/kWh PPA will initially be slightly more expensive than current electricity rates during solar production. However, as time passes, rising utility rates will surpass the flat PPA rate, leading to savings. The total savings will eclipse the initial increase in cost in Year 16, leading to 16-year payback period.

A battery storage system was modeled as well to test whether it could improve financial viability. However, there is not very much load during the peak evening periods, so there is relatively little benefit to doing so. However, a battery storage system would be important for resiliency purposes at a critical facility such as a fire station. It might be useful for the County to separately finance a battery system specifically as a resiliency and infrastructure investment that has the added co-benefit of slightly reducing electricity bills, though the system would be eligible for the Investment Tax Credit (ITC) if installed with the solar system.

Overall, the main concern at this building is the low electrical load. A 30-kW installation is too small to achieve a low payback with the new electricity rates and may not be worth the time required to undertake the procurement process as a single site. It may be worth including as part of a larger collaborative procurement with better economies of scale, but likely not by itself except for resiliency purposes.

Energy Use and Solar Generation Profile



Proposed Solar PV Design Layout

The layout above can accommodate approximately 29.8 kW on east- and west-facing shingle rooftops. Shading from trees to the east (to the right, in the photo above) is minimal. The energy yield for the proposed solar arrays is roughly 1,343 kWh/kW per year.

4.4.4 – Goleta Pier / Beach Park

Site Overview

Address: 5986 Sandspit Rd, Goleta, CA 93117

Utility Provider:	SCE	Electricity Tariff:	TOU GS-1 E
Annual Energy Usage:	38,033 kWh (4 meters)	Monthly Demand Peak:	N/A

PV System Overview

System Size:	636 kW	Electricity Offset:	N/A
Expected Year 1 Output:	945,000 kWh	Expected GHG Reduction:	148 mTCO2/yr

PV System Summary

There are large amounts of unshaded parking available for a solar installation at Goleta Beach Park. However, a low load would constrain a behind-the-meter project to less than 5% of its maximum output. As such, this project would be best suited for use in a Community Solar project or as the Generating Account under the RES-BCT program, which allows local governments to credit generation from a site with high solar potential to a site with low solar potential.

The other main difficulties at this site are related to its location very close to the ocean shoreline. Coastal permitting in this location would be difficult or unlikely, even with the loosened restrictions proposed in the Section 5.1.4 of the SEP. Additionally, underground construction of carport columns would likely encounter water table and soil stability issues so close to the beach, leading to higher costs to construct a stable carport. This location would almost certainly require the use of spread footings, which may also reduce parking availability, or, alternatively, would require much deeper foundations than are generally utilized.

Due to the unique nature of this site, financing options are not shown. However, if the constraints were able to be overcome, to take advantage of tax credits the project should be financed through a PPA, including for a Community Solar project. Again, due to the overwhelming constraints, a battery storage system was not analyzed for inclusion in this project.

Proposed Solar PV Design Layout

The layout above can accommodate approximately 636 kW on new solar carports. The energy yield for proposed solar arrays would be approximately 1,485 kWh/kW per year.

4.4.5 – Ted Chamberlin Ranch Parcel 1(a)

Site Overview

Address: Zaca Station Rd, Los Olivos, California

Utility Provider:	PG&E	Electricity Tariff:	N/A
Annual Energy Usage:	N/A	Monthly Demand Peak:	N/A

PV System Overview

System Size:	10.6 MW	Electricity Offset:	N/A
Expected Year 1 Output:	19,344 MWh	Expected GHG Reduction:	3,038 mTCO2/yr

PV System Summary

The Ted Chamberlin Ranch consists of multiple adjoining parcels of land that are either flat or gently sloping, with low hills and valleys separating the potential solar installation locations. Parcel 1 has been split into 2 halves, with 1(a) representing the southern half of the parcel, as shown here. Parcel 1(a) represents an area of about 25-30 acres.

Proposed Solar PV Design Layout

The topography of this section is the top of a low mesa—fairly flat, with several low undulations. A few small bushes and trees would need to be removed to enable the layout as shown, but the land is relatively clear. No electrical service is currently established on the site, but the southern tip of this parcel is approximately 1200 feet north of PG&E's Zaca Substation. With no electrical load, this site would need to utilize an alternative energy off-taker mechanism, such as a community solar arrangement or Feed-in Tariff, as applicable and available.

The primary constraints on development for this site are related to permitting. The site is currently engaged in a Williamson Act preservation contract, so that contract may need to run its course prior to development, or the site could be developed through the recommended revisions to the Uniform Rules related to agricultural land, as suggested in the SEP Section 5.1.3. The County could use this parcel and/or adjoining parcels as a test-case for proposed adjustments to the Uniform Rules.

4.4.6 – Ted Chamberlin Ranch Parcel 1(b)

Site Overview

Address: Zaca Station Rd, Los Olivos, California

Utility Provider:	PG&E	Electricity Tariff:	N/A
Annual Energy Usage:	N/A	Monthly Demand Peak:	N/A

PV System Overview

System Size:	14.0 MW	Electricity Offset:	N/A
Expected Year 1 Output:	21,413 MWh	Expected GHG Reduction:	4,017 mTCO2/yr

PV System Summary

The Ted Chamberlin Ranch consists of multiple adjoining parcels of land that are either flat or gently sloping, with low hills and valleys separating the potential solar installation locations. Parcel 1 has been split into 2 halves, with 1(b) representing the northern half of the parcel, as shown here. Parcel 1(b) represents an area of about 40-45 acres.

Proposed Solar PV Design Layout

This section is located on the top of a low mesa—fairly flat, but with a change in elevation on the northwest side. A minimal vegetation would need to be removed to enable the layout as shown, but the land is relatively clear. No electrical service is currently established on the site, but the southern tip of this parcel is approximately 1,200 feet north of PG&E's Zaca Substation. This site would need to utilize an alternative energy off-taker mechanism, such as a community solar arrangement or Feed-in Tariff, as applicable and available.

The primary constraints on development for this site are related to permitting. The site is currently engaged in a Williamson Act preservation contract, so that contract may need to run its course prior to development, or the site could be developed through the recommended revisions to the Uniform Rules related to agricultural land, as suggested in the SEP Section 5.1.3. The County could use this parcel and/or adjoining parcels as a test-case for proposed adjustments to the Uniform Rules.

4.4.7 – Ted Chamberlin Ranch Parcel 2

Site Overview

Address: Zaca Station Rd, Los Olivos, California

Utility Provider:	PG&E	Electricity Tariff:	N/A
Annual Energy Usage:	N/A	Monthly Demand Peak:	N/A

PV System Overview

System Size:	14.5 MW	Electricity Offset:	N/A
Expected Year 1 Output:	26,510 MWh	Expected GHG Reduction:	4,163 mTCO2/yr

PV System Summary

The Ted Chamberlin Ranch consists of multiple adjoining parcels of land that are either flat or gently sloping, with low hills and valleys separating the potential solar installation locations. Parcel 2 is non-prime land that is directly across Zaca Station Road from, and to the east of, Parcel 1. Parcel 2 features a road running through it, as shown below, with topography north of the road fairly flat, and land south of the road gently sloping southeast toward a low arroyo. The modeled area of Parcel 2 represents a section of slightly over 30 acres.

Proposed Solar PV Design Layout

A few small bushes and trees would need to be removed to enable the layout as shown, but the land is relatively clear. No electrical service is currently established on the site, but the southwestern tip of this parcel is approximately 1500 feet northeast of PG&E's Zaca Substation. With no electrical load, this site would need to utilize an alternative energy off-taker mechanism, such as a community solar arrangement or Feed-in Tariff, as applicable and available.

The primary constraints on development for this site are related to permitting. The site is currently engaged in a Williamson Act preservation contract, so that contract may need to run its course prior to development, or the site could be developed through the recommended revisions to the Uniform Rules related to agricultural land, as suggested in the SEP Section 5.1.3. The County could use this parcel and/or adjoining parcels as a test-case for proposed adjustments to the Uniform Rules.

4.4.8 – Ted Chamberlin Ranch Parcel 3

Site Overview

Address: Zaca Station Rd, Los Olivos, California

Utility Provider:	PG&E	Electricity Tariff:	N/A
Annual Energy Usage:	N/A	Monthly Demand Peak:	N/A

PV System Overview

System Size:	9.43 MW	Electricity Offset:	N/A
Expected Year 1 Output:	17,260 MWh	Expected GHG Reduction:	2,710 mTCO2/yr

PV System Summary

The Ted Chamberlin Ranch consists of multiple adjoining parcels of land that are either flat or gently sloping, with low hills and valleys separating the potential solar installation locations. Parcel 3 is located directly southeast of Parcel 2, on the southeast side of the boundary arroyo. As with Parcel 2, a few small bushes and trees would need to be removed and there may also be some topographical challenges depending on the specifics of the surface. The area represents approximately 20 acres, and this site could also be developed for its maximum potential under the recommendations for non-prime land.

Proposed Solar PV Design Layout

No electrical service is currently established on the site, but the southwestern tip of this parcel is approximately 1600 feet northeast of PG&E's Zaca Substation. With no electrical load, this site would need to utilize an alternative energy off-taker mechanism, such as a community solar arrangement or Feed-in Tariff, as applicable and available.

The primary constraints on development for this site are related to permitting. The site is currently engaged in a Williamson Act preservation contract, so that contract may need to run its course prior to development, or the site could be developed through the recommended revisions to the Uniform Rules related to agricultural land, as suggested in the SEP Section 5.1.3. The County could use this parcel and/or adjoining parcels as a test-case for proposed adjustments to the Uniform Rules.

4.4.9 – Ted Chamberlin Ranch Parcel 4

Site Overview

Address: Zaca Station Rd, Los Olivos, California

Utility Provider:	PG&E	Electricity Tariff:	N/A
Annual Energy Usage:	N/A	Monthly Demand Peak:	N/A

PV System Overview

System Size:	14.9 MW	Electricity Offset:	N/A
Expected Year 1 Output:	27,320 MWh	Expected GHG Reduction:	4291 mTCO2/yr

PV System Summary

The Ted Chamberlin Ranch consists of multiple adjoining parcels of land that are either flat or gently sloping, with low hills and valleys separating the potential solar installation locations. Parcel 4 is located south of Parcels 1, 2, and 3, east and south of Zaca Station Road. The area represents approximately 30-35 acres of dry farming land, and this site could also be developed for its maximum potential under the recommendations for non-prime land. This southern end of this site is directly east of the Zaca Substation, as is visible across the street in the photo below.

Proposed Solar PV Design Layout

The land is quite flat, with just a few small bushes and trees that would need to be removed for full utilization of the indicated space. No electrical service is currently established on the site, so this site would need to utilize an alternative energy off-taker mechanism, such as a community solar arrangement or Feed-in Tariff, as applicable and available.

The primary constraints on development for this site are related to permitting. The site is currently engaged in a Williamson Act preservation contract, so that contract may need to run its course prior to development, or the site could be developed through the recommended revisions to the Uniform Rules related to agricultural land, as suggested in the SEP Section 5.1.3. The County could use this parcel and/or adjoining parcels as a test-case for proposed adjustments to the Uniform Rules.

4.4.10 – Kim Jones Ranch Parcel 1

Site Overview

Address: South of 4502 Foothill Rd, Carpinteria, CA 93013

Utility Provider:	SCE	Electricity Tariff:	N/A
Annual Energy Usage:	N/A	Monthly Demand Peak:	N/A

PV System Overview

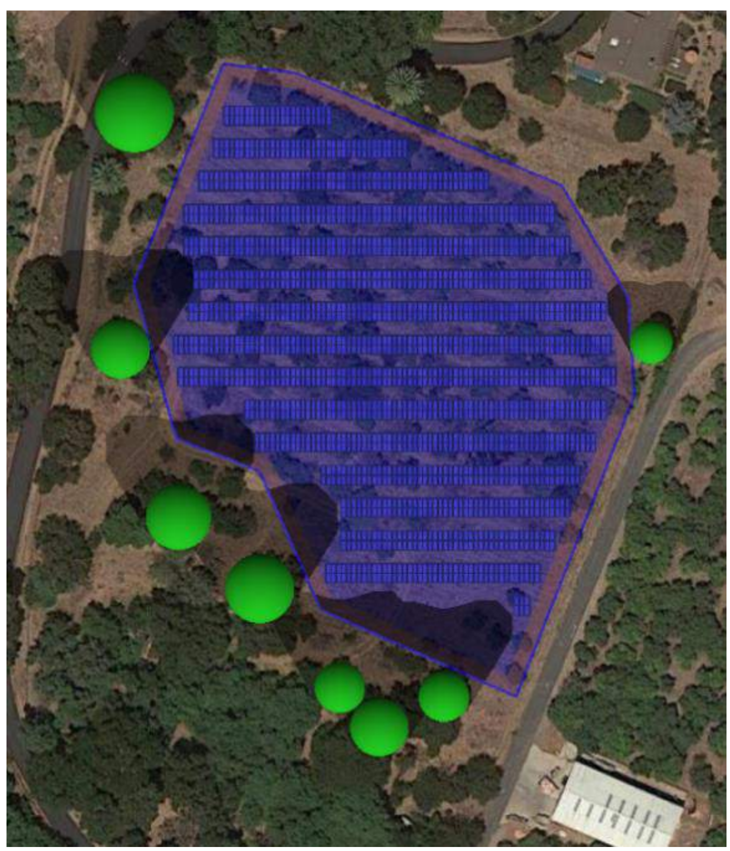
System Size:	642.3 kW	Electricity Offset:	N/A
Expected Year 1 Output:	1,139,000 kWh	Expected GHG Reduction:	179 mTCO2/yr

PV System Summary

The Kim Jones Ranch consists of two parcels on a hillside sloping gently down to the south or southwest. The land is currently used for avocado production, but the avocado trees are planned for future removal. Several trees on the southern and eastern perimeter would likely need to remain, creating some shading issues at this location, which reduce the potential at this site from approximately 700 kW to avoid the shading.

Proposed Solar PV Design Layout

The utility's integration capacity analysis (ICA) maps meant to show developers whether there is electrical capacity on the nearby grid show that there is no capacity near this site. However, this capacity is due to a lack of short circuit protection, rather than due to low wire amperage ratings or thermal constraints, which may be easier to overcome for a solar developer. On-site electrical usage is very low, so this site would need to utilize an alternative energy off-taker mechanism, such as a community solar arrangement or Feed-in Tariff, as applicable and available.



The primary constraints on development for this site are related to permitting. The site is currently engaged in a Williamson Act preservation contract, so that contract may need to run its course prior to development, or the site could be developed through the recommended revisions to the Uniform Rules related to agricultural land, as suggested in the SEP Section 5.1.3. The County could use this parcel and/or adjoining parcels as a test-case for proposed adjustments to the Uniform Rules.

4.4.11 – Kim Jones Ranch Parcel 2

Site Overview

Address: 4496 Foothill Rd, Carpinteria, CA 93013

Utility Provider:	SCE	Electricity Tariff:	N/A
Annual Energy Usage:	N/A	Monthly Demand Peak:	N/A

PV System Overview

System Size:	1170 kW	Electricity Offset:	N/A
Expected Year 1 Output:	2,079,000 kWh	Expected GHG Reduction:	327 mTCO2/yr

PV System Summary

The Kim Jones Ranch consists of two parcels on a hillside sloping gently down to the south or southwest. The land is currently used for minimal agricultural production. Several trees on the southern and eastern perimeter would likely need to remain, creating some shading issues at this location, which reduce the potential at this site from approximately 1330 kW to avoid the shading.

Solar is currently shown as being installed on the land between the two more-heavily forested areas on the parcel, to the north and south of the modeled area. As with the first parcel, the ICA maps show that there is no capacity due to a lack of short circuit protection, rather than due to wire rating or thermal constraints, which may be easier to overcome for a solar developer.

Proposed Solar PV Design Layout

On-site electrical usage is very low, so this site would need to utilize an alternative energy off-taker mechanism, such as a community solar arrangement or Feed-in Tariff, as applicable and available.

The primary constraints on development for this site are related to permitting. The site is currently engaged in a Williamson Act preservation contract, so that contract may need to run its course prior to development, or the site could be developed through the recommended revisions to the Uniform Rules related to agricultural land, as suggested in the SEP Section 5.1.3. The County could use this parcel and/or adjoining parcels as a test-case for proposed adjustments to the Uniform Rules.

4.5 – Next Steps

The SEP represents the final step in the solar feasibility assessment process and now requires internal review by County stakeholders. The next steps differ based on the ownership of assessed site. For sites owned by the County, the general project flowchart is as follows in Figure 4.2. On-site assessments and high-level feasibility reports have been conducted already. With those results, the County should decide upon a threshold of financial viability for projects, possibly with different thresholds for critical and non-critical facilities.

Figure 4.2: Public Agency PV Procurement Flowchart, Part 1

If the County decides to move forward with an RFP for selected County-owned sites, the following next steps have been identified in Figure 4.3 to move this project along quickly and achieve the desired impact on cost reduction and renewable energy production before available federal solar incentives decrease. The County could also lead a collaborative procurement for selected non-County sites at other public agencies such as school, water, fire, and sanitary districts. Collaborative procurements such as these can reduce soft costs by allowing steps in the RFP process, such as bid review and contract negotiation, to be shortened or spread out among multiple participants.

Figure 4.3: Public Agency PV Procurement Flowchart, Part 2

For the private sites assessed in this report, the next step is to continue the outreach process and engage site owners around the findings of this analysis. This outreach has been initiated by the County in order to raise awareness and gather necessary information to complete the SEP. The County can build on these relationships and continue to catalyze solar development. This general process is shown in Figure 4.4.

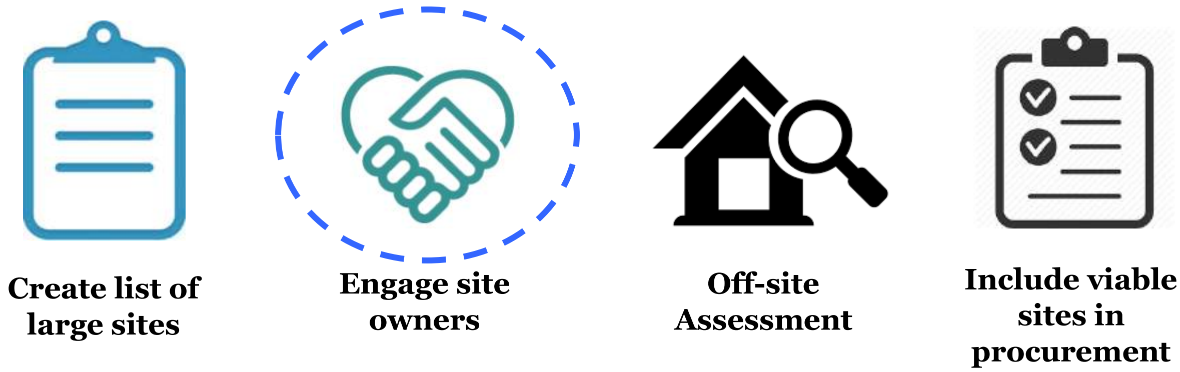


Figure 4.4: Private Property Owner Procurement Support Process

Chapter 5 – Specific Recommended Actions and Timeline

The recommendations listed in Chapter 3 were compiled and organized into five (5) key program areas matching the categories of barriers described in Chapter 3. The identified strategies are described in detail and an "implementation action plan" is provided for each strategy. Not every recommendation in Chapter 3 is addressed in further detail with a strategy, as some are already being undertaken as part of the SEP, and some are deemed to be relatively simple to address within pre-existing County precedents and roles, such as working with utilities and internal stakeholders to clarify the ability to use on-bill financing (OBF) programs for energy upgrades at County facilities. Additionally, several strategies are recommended in this chapter that do not track exactly with identified barriers but are advised for general pursuit of a development environment more conducive to promoting the deployment of sustainable energy.

This chapter also includes discussion of two overarching strategies that can be used by the County to support more specific efforts. These strategies are: (1) increased advocacy and outreach at the state and federal levels; and (2) revenue-raising methods to provide funding for SEP implementation efforts.

Table 5.1: Barriers Identified & Recommended Strategies to Address Each Barrier

Type of Barrier	Barrier	Strategy to Address
Regulatory	County Land Use and Development Code	Strategy 5.1.1: Develop Utility-Scale Solar Ordinance
	Williamson Act	Strategy 5.1.2: Update Uniform Rules for Agricultural Preserves
	Historic Landmarks Regulations	Addressed, as needed, via internal County efforts
	Coastal Zoning Ordinance	Strategy 5.1.3: Update Coastal Zoning Ordinance
	Solar and Solar + Storage Permitting	Strategy 5.1.4: Update Residential Solar and Storage Permitting Procedures
Utility & Infrastructure	Transmission Grid	Strategy 5.2.1: Evaluate the Benefits of a Community Choice Aggregation (CCA) and Consider Establishment
	PG&E Integrated Capacity Analysis (ICA) Maps	Addressed via increased advocacy described in Strategy 5.6.1

Table 5.1: Continued

Type of Barrier	Barrier	Strategy to Address
County Institutional	Limited County-Owned Parcels	Addressed via maximizing development on existing County parcels through site assessments completed for the SEP
	Energy Assurance Plan (EAP)	Strategy 5.3.1 Create an Energy Assurance Plan
	On-Bill Financing (OBF) at County Facilities	Addressed via ongoing internal County efforts
Financial & Funding	Financing Mechanisms	Strategy 5.4.1 Create New Financing Mechanisms for the Community
	Altered Time-of-Use (ToU) Rate Schedules	Strategy 5.4.2 Offer Financial Incentives to Increase Economic Payback
	Funding Sources	Strategy 5.4.3 Diversify County Funding Streams
	Federal Investment Tax Credit (ITC)	Addressed via increased advocacy described in Strategy 5.6.1
Education & Public Awareness	Cost Awareness of Renewable Energy	Strategy 5.5.1 Formalize a County-Wide One-Stop Shop to Lead Education Efforts Across the County

5.1 – Regulatory Program Area

5.1.1 – Develop Utility-Scale Solar Ordinance

Strategy Description

This strategy is aimed at reducing barriers for utility-scale (including community-scale projects under 3MW) solar PV projects by updating the County Land Use and Development Code (LUDC) to permit these projects outside of the Cuyama Valley Rural Region.

The following recommendations are made towards permitting for large-scale solar projects. As discussed in Section 3.1.1, "Community-scale" is a subset of "Utility-scale" solar and refers to systems between 1-10 MW and "Utility-scale" solar refers to systems greater than 10 MW.

1) Clarify the definition of utility-scale solar in the LUDC and the land-use element of the comprehensive plan to specify that solar facilities of any size that are constructed on built-environments, including rooftops, parking lots, and parking structures, are not considered

to be utility-scale solar facilities and therefore are exempted from the regulations governing utility-scale (and community scale) solar.

2) Allow community-scale solar projects under 3 MW to be installed in all AG-I and AG-II zones as permitted uses.

3) Allow community-scale solar projects under 3 MW to be installed in all MT-GOL, MT-TORO, RMZ, RES, C-1, C-2, C-3, C-S, CH, CN, CV, SC, PI, M-1, M-2, M-RP, M-CR, MU, PU, and REC zones with a Minor Conditional Use Permit (MCUP).

4) Allow community-scale or utility-scale solar projects greater than 3 MW to be installed in all AG-I, AG-II, M-1, M-2, M-RP, and M-CR zones with a Conditional Use Permit (CUP).

The permit requirements for each zone were selected based on the current permit requirements for wind turbines in the LUDC to increase the consistency with which wind and solar projects are treated. Although wind projects have some advantages over solar projects regarding site impact, namely the ability to co-locate other uses, solar projects have advantages regarding noise and visual impacts.

In addition, when compared to utility-scale wind projects, community-scale and utility-scale solar projects have a smaller total site footprint, but a larger utilization of that footprint. While a utility-scale wind farm would be spread out over a very large amount of space, it would be possible to grow crops or graze animals between each individual turbine. For example, an NREL survey indicated that the total site footprint of a wind farm is roughly 30-100 acres/MW, but the actual turbines and supporting electrical infrastructure permanently utilize less than 1 acre/MW, with up to 3.5 acres/MW being disturbed only temporarily during construction.[65] A solar farm would have a total site footprint of only roughly 3-5 acres/MW, but the land would be fully utilized unless specific measures are put in place to enable co-location of shade-tolerant crops or small cattle. Due to the large spacing of wind farms, they also more often require roads to be built to transport parts to the turbine locations, which is less often the case with solar farms. Due to the more modular nature of solar farms, land use scales very linearly with capacity, whereas wind turbines often need to be sited in unique configurations to maximize wind flows and circumvent existing features.

A community-scale or utility-scale power plant greater than 3 MW, whether wind or solar, generally also requires the construction of a dedicated substation to connect the generation to the transmission grid, unless a substation is already located nearby with available capacity. Placing the threshold for a CUP at 3 MW ensures that the construction of any substation, which would be a significant development, would require heavy scrutiny.

Additionally, a 3 MW cap aligns with past IOU- and CPUC-run programs for expedited interconnection of renewable projects. The availability of similar programs should be reviewed each year during SEP implementation.

From a visual perspective, large solar plants are generally ground-mounted, reaching a maximum height of less than 10-15 feet off the ground. It is common to use a hedge or some other type of greenery to hide the farm if desired. A utility-scale wind turbine is generally 250-330 feet in height and not possible to hide. From a noise perspective, although the impacts of wind turbines are generally overstated, they are undeniably louder than solar farms. Wind turbines produce noise

[65] Denholm et al., "Land Use Requirements of Modern Wind Power Plants in the United States."

up to 40dB (the level of a refrigerator) up to a quarter mile away. The main components that produce noise in solar farms are transformers for raising or lowering system voltage, but these are often located in just one corner of a project, limiting the audible impact. Furthermore, they primarily produce sound during the day and are mostly silent during the night when solar farms do not produce power, or they can be contained within a new building structure to further reduce noise impact.

This solar ordinance would govern solar development in many parts of the County but, where applicable, the permit allowances would be superseded by the Coastal Zoning Ordinance in the Coastal Zone and the Uniform Rules for Agricultural Preserves in Williamson Act land. Since the ordinance would need to follow the guidelines within these other County codes, those codes should be similarly updated as proposed in Sections 5.1.3 and 5.1.4.

Furthermore, the ordinance would include project development plan guidelines that would need to be met to obtain a CUP for projects that require one. These would include the creation of a site-specific Integrated Pest and Weed Management Plan and a fire prevention plan, attention to the protection of agricultural land and sensitive biological resources, the avoidance of geologic hazards and hazardous material, and the reduction of traffic hazards, noise levels, and waste.

Action Plan – Project

Year 1

1. Work with members of the Long-Range Planning division to review of best practices for County-wide community-scale and utility-scale solar permitting in California and other high-penetration states.
2. Identify potential places of overlap between permitting requirements for community-scale and utility-scale solar and other renewable energy facilities such as wind turbines to streamline writing of ordinance.
3. Compile development guidelines for community-scale and utility-scale solar construction.
4. Draft revised ordinance for community-scale and utility-scale solar permitting.
5. Circulate draft ordinance to all relevant County stakeholders for written feedback.
6. Prepare a programmatic environmental document pursuant to CEQA, which analyzes the environmental impacts of utility-scale solar development that would be allowed under the revised ordinance.
7. Present draft ordinance to appropriate County review committees and design boards.
8. Present draft ordinance to the County Planning Commission.
9. Obtain approval from Board of Supervisors.

Staffing Responsibility

1. Long Range Planning – Supervising Planner
2. Long Range Planning – Senior Planner
3. Long Range Planning – Planner I, II, and/or III
4. Sustainability Division Chief
5. Senior Sustainability Program Specialist

5.1.2 – Update Uniform Rules for Agricultural Preserves

Strategy Description

This strategy is aimed at reducing barriers for solar development on land designated as agricultural preserve under the Williamson Act, while maintaining agricultural productivity, particularly for prime land. Since most of the agricultural land in Santa Barbara County is currently designated as either an agricultural preserve or farmland security zone, enabling a greater amount of solar development within these areas is critical. While a larger lobbying effort could be undertaken to ease Williamson Act requirements on a state-wide level, this strategy focuses on changes the County can make to its Uniform Rules for enforcing Williamson Act contracts.

The following recommendations are directed towards amending the Uniform Rules. For the purposes of these recommendations, community-scale and utility-scale projects are those whose primary purpose is to sell electricity to the utility or wholesale electricity market rather than to offset on-site electricity consumption and that are delineated by the project capacity limits discussed in Section 3.1.1. Non-prime land generally refers to ranch land for grazing cattle, whereas prime land generally refers to crop land.

1) Amend the Uniform Rules to incorporate solar-use easement provisions consistent with Government Code sections 51190-51192.2, which allow owners with land that is no longer agriculturally productive to rescind their contracts with a fee equal to only 6.25% (rather than 25%) of the assessed value of the land.

2) Amend Uniform Rules to allow community-scale solar (projects 1-10 MW) as a compatible use, provided all the following conditions are met:
    - Facility is located on non-prime land
    - Does not exceed 30 acres
    - Confined to single lot
    - Sited to minimize land taken out of Agricultural Preserve
    - Consistent with Principles of Compatibility (Uniform Rules Section 2-1.1)
    - Board of Supervisors finding that the facility provides a substantial benefit to the agricultural community and the public.

3) Amend Uniform Rules to allow larger community-scale or utility-scale solar as a compatible use on non-prime land if it qualifies as a "dual-use" project which can co-exist with shade tolerant crops or smaller grazing animals. The following conditions need to be met to qualify as dual-use:

- The land must be in continuous agricultural production over the period of the Agricultural Preserve or Farmland Security Zone contract
- An agricultural study is conducted to ensure the crops or grazing animals on the land are compatible with reduced levels of sunlight
- Does not exceed 50 acres
- Confined to single lot
- Consistent with Principles of Compatibility (Uniform Rules Section 2-1.1).

4) Explore the application of Recommendation 3 to prime land, as well, pending a further review of research indicating that dual-use solar development does not impact the long-term productivity of prime agricultural land

Non-prime land is targeted for community-scale projects under a certain acreage impact level because a minor loss in agricultural productivity is much less harmful to the landowner, particularly if that loss is offset, or more than offset, by a new revenue stream through a solar project. Furthermore, since non-prime parcel sizes are generally larger, projects will take up a smaller portion of the parcel. The County should also specify best practices to ensure that the remainder of the parcel remains suitable for cattle grazing requirements. Given the importance of these land considerations, the suggested changes to the Uniform Rules utilize acreage caps as the primary factor limiting project size, compared to a MW cap used in the Solar Ordinance recommendations.

Dual-use projects that promote co-existence of solar PV and smaller grazing animals (e.g., goats and sheep) or shade tolerant crops such as broccoli and celery should also be permitted on non-prime land. Research indicates that for certain crops, the shading provided by solar panels set above them can actually increase total productivity of the land.[66] The County should also specify further development guidelines to maximize agricultural productivity, such as requiring such projects to be west-facing, allowing inter-row crops to receive more sunlight than they would receive between south-facing rows of solar modules. As comfort grows with allowing dual-use solar projects, the County should explore expansion of the dual-use allowances to prime land.

Lastly, the County should align their Uniform Rules with the solar-use easement specified by SB-618, which allows owners of non-productive agricultural land to rescind their contracts specifically for solar development. Although there is still a rescission fee in this process, it is 6.25% of the fair market value of the parcel, compared to 25% of the value for a traditional cancellation of the contract.[67] With the changing climate, it is expected that this method of enabling solar development will increase in importance.

All community-scale projects on agricultural preserves will also need to be compliant with the development guidelines outlined in the revised Utility Scale Solar Ordinance in Strategy 5.5.1.

Action Plan – Project

[66] Herbert, "Vegetables under Solar PV 2016-17."

[67] California Senate, SB-618 Local government: solar-use easement.

Year 1

1. Conduct review of best practices for solar permitting on agricultural preserves in California.
2. Compile additional development guidelines for dual-use solar projects based on best national practices.
3. Submit draft Uniform Rules amendment to the Department of Conservation for review and comment.
4. Work with members of the Long-Range Planning Division to draft revised Uniform Rules.
5. Prepare a programmatic environmental document pursuant to CEQA, which analyzes the environmental impacts of allowing community-scale projects on both prime and non-prime lands.
6. Conduct environmental review on proposed Uniform Rules amendment and circulate draft for public comment.
7. Circulate or present draft document to all relevant County stakeholders and review committees for feedback.
8. Obtain approval from Board of Supervisors.

Staffing Responsibility

1. Long Range Planning – Supervising Planner
2. Long Range Planning – Senior Planner
3. Long Range Planning – Planner I, II, and/or III
4. Sustainability Division Chief
5. Senior Sustainability Program Specialist

Case Study: Limiting the Agricultural Impact of Utility-Scale Projects

Several counties have Public Benefit Policies that allow utility-scale renewable energy development on farmland while limiting any negative impact they may have on the community through the removal of farmland. Butte County created a best-practices guide for utility-scale solar permitting, summarizing some of these policies.[68] The examples include:

- Riverside County, which implemented an annual fee of $150/acre on utility-scale projects, with at least 25% of collected fees going towards benefiting the local community
- Imperial County, which implemented a one-time payment of $5,000/acre for projects in prime farmland, and $2,000/acre for projects in Farmland of Statewide Importance, as well as an annual payment of $150/acre for the first ten years
- San Bernardino County, which implemented an annual fee of $157/acre
- Kern County, which created the RENEWBIZ program to use tax collections from utility-scale projects to fund community revitalization projects

68 Butte County, "Butte Utility-Scale Solar."

It is important that these fees be designed such that they do not prevent utility-scale development but do ensure that prime farmland is only converted for high-value projects. One potential way of ensuring that only high-value projects pass is to create the fee based on the GHG reduction impact of the farmland, to ensure that the net GHG reduction of the renewable energy is positive. An American Farmland Trust study has examined the potential value of this GHG reduction.[69]

When exploring programs for implementation in the County, the legal considerations of a fee versus a tax will need to be considered, as revenue collected via fee must be spent on a program closely related to the activity on which the fee is charged.

5.1.3 – Update Coastal Zoning Ordinance

Strategy Description

This strategy is aimed at reducing barriers for renewable energy projects by targeting the Coastal Zone, where development typically is subject to heightened permit requirements as compared to development within the inland portions of the unincorporated county. Although the Coastal Zone does not cover as large an amount of land as the Williamson Act, it does cover an area that is particularly important for wind energy development. Although the solar resource for large-scale development is low relative to other parts of the County, coastal permitting can also be an issue for solar projects aimed at reducing on-site consumption.

The Gaviota Coast Plan adopted in 2016 outlined several recommended policies and actions for allowing judicious renewable energy development in the Coastal Zone. These included:

- **Policy TEI-10:** *Renewable Energy Production Facility Impacts. (COASTAL)* "Ensure through siting, design, scale, and other measures that all renewable energy production facilities are constructed to avoid significant impacts on public health, safety and welfare, public views, community character, natural resources, agricultural resources, and wildlife, including threatened or endangered species, bat populations, and migratory birds. Where an applicable, more specific resource protection policy of the Gaviota Coast Plan requires more stringent protection of resources, renewable energy production facilities must comply with those policies as opposed to this more general policy."
- **Policy TEI-11:** *Renewable Energy Resource Priority.* "Utilize local renewable energy resources and shift imported energy to renewable resources where technically and financially feasible at a scale that is consistent with the sensitivity of coastal resources. Encourage opportunities for development of renewable energy resources where impacts to people, natural resources and views can be avoided or minimized. Support appropriate renewable energy technologies, including solar and wind conversion, wave and tidal energy, and biogas production through thoughtfully streamlined planning and processing, rules and other incentives. New development should be encouraged to use small scale renewable energy facilities to offset energy requirements."
- **Action TEI-6:** *Study Renewable Energy Resource Potential.* "Work with other agencies to study the potential for renewable energy generation in the Coastal Zone and Inland Areas of the Gaviota Coast and identify areas with adequate capacity for renewable resources such as wind and solar power. Within areas identified, specify sites suitable for locating renewable energy facilities with the least possible impact, and evaluate mechanisms for protecting such sites for appropriate renewable energy facilities."

[69] "State of the Art on Agricultural Preservation."

- **Action TEI -7:** *Enabling Ordinance for Small Scale, Community Scale, and Utility Scale Wind Energy Generation and Community Scale Solar Energy Generation*. "Create an enabling ordinance for small-scale wind energy into the Coastal Zone. If results from studies shows that there are appropriate resources in this area then create an enabling ordinance for community and utility-scale wind energy and extend the enabling ordinance for community-scale solar energy into the Coastal Zone, west of the Gaviota Pass viewshed."

Figure 5.1 shows the critical viewshed corridor within which renewable energy systems, particularly wind turbines due to their visual presence, should not be permitted.

Figure 5.1: Gaviota Coast Plan Critical Viewshed

The following recommendation is made towards amending the Coastal Zoning Ordinance (CZO). For the purposes of this recommendation, utility-scale projects are those whose primary purpose is to sell electricity to the utility or wholesale electricity market rather than to offset on-site electricity consumption.

1) Allow new small-scale and utility-scale wind energy systems to be developed on Agricultural II zones within the Gaviota Coast Plan Area, west of the Gaviota Pass Viewshed, with a major Conditional Use Permit (CUP) and a public hearing process

Permitting onshore wind turbines inside the Coastal Zone will likely be difficult to establish, given the public viewshed that is present in the eastern portion of the Gaviota area. However, the western Gaviota Coast which has limited public access and, consequently, is mostly not located within a public viewshed, is the most viable location for wind turbines in the southern county from a visual impact and wind availability perspective. As such, this recommendation provides the most potential for increased renewable energy development, after taking into consideration the visual resource protection goals of the Coastal Act.

Compared to inland zones, wind energy development in the Coastal Zone will require a CUP for small wind energy systems (<200 kW), as opposed to only a MCUP, and will require a public hearing. This level of scrutiny is appropriate to ensure the preservation of public viewsheds in the Coastal Zone.

Action Plan - Project

Year 1

1. Conduct review of best practices implemented in other Local Coastal Programs (LCPs) for renewable energy permitting.
2. Conduct outreach to external stakeholders such as the Coastal Commission and California Department of Conservation to ascertain viability of recommended changes and iterate upon them.
3. Identify critical viewshed areas to exclude from wind energy allowance.

Year 2

4. Work with members of the Long-Range Planning Division to draft amendments to the CZO.
5. Circulate draft ordinance to all relevant County stakeholders for written feedback and iterate upon it.
6. Present draft ordinance to appropriate County review committees and design boards.
7. Prepare a programmatic environmental document pursuant to CEQA, which analyzes the environmental impacts of the development that would be allowed under the revised ordinance.
8. Present draft ordinance to the County Planning Commission.
9. Obtain approval from Board of Supervisors.
10. Submit ordinance to Coastal Commission for certification.

Staffing Responsibility

1. Long Range Planning – Supervising Planner
2. Long Range Planning – Senior Planner
3. Long Range Planning – Planner I, II, and/or III
4. Sustainability Division Chief
5. Senior Sustainability Program Specialist

5.1.4 – Update Residential Solar and Solar + Storage Permitting Procedures

Strategy Description

The goal of this strategy is to turn the County into a desirable area for solar developers to operate by greatly reducing permit barriers. There are three key steps to updating residential permitting procedures for standalone solar systems and combined solar and storage systems, to compile best practices for permitting and go beyond requirements in AB2188 and AB546:

1) Create an external team with representatives from neighboring Authorities Having Jurisdiction (AHJs) and the local solar + storage industry to compare Santa Barbara County protocol and technology standards and industry best practices to create a set of standardized permitting criteria for residential solar + storage systems.
2) Implement electronic submission for energy storage permitting based on the developed set of criteria.
3) Create a training program for installers, covering permitting, construction, and inspection requirements. Consider streamlining permitting requirements for trained, vetted installers.

Some of the reduced permitting and inspection requirements that might be available to a list of vetted installers, pursuant to Recommendation 3, include:

- Automatic permit approval for residential solar projects, subject to randomized inspection of one in every five to ten installations
- Expedited permitting for residential solar + storage projects
- A pilot virtual inspection program to reduce travel time for installation inspectors

Action Plan – Project
Year 1 1. Reach out to local industry contacts and AHJs in California to determine interest and level of expertise in storage schematics and permitting. 2. Create team, led by Chief Building Official and other members of the Building and Safety Division, with appropriate representation of local vs non-local stakeholders and industry vs government stakeholders. 3. Host meeting(s) as necessary to discuss and compare different permitting protocol for most common types of storage configurations. 4. Develop guidelines for permitting and a set of standard designs for small-scale systems. 5. Circulate draft guidelines and designs to all relevant County stakeholders for written feedback. 6. Obtain approval from Board of Supervisors. 7. Publish permitting guidelines and standard designs both on the County's permitting website and as a publicly available report.

Year 2

8. Create training material for electrical and structural plans for solar and solar + storage systems based on existing and new permitting guidelines.
9. Determine most effective method of communicating training material and verifying understanding (e.g. in-person seminars, online tests, etc.)
10. Decide upon level of permitting benefits to grant to verified installers (e.g. expedited permitting, automatic permitting, etc.)
11. Begin implementation of chosen training method.

Staffing Responsibility

1. Sustainability Division Chief
2. Senior Sustainability Program Specialist
3. Building & Safety – Supervising Planner
4. Building & Safety – Planner II

Case Study: Streamlined Permitting through Virtual Inspections

Los Angeles County has recently launched a virtual inspection program for residential PV installations. This program is not mandatory and must be agreed to by the inspector. The process requires the applicant have an active valid permit for the work, a flashlight, and an approved application for a video call such as Skype or Facetime. As opposed to examining the system in person, the inspector instructs the applicant to show the important aspects of the system virtually. Then, the inspector sends a copy of a correction notice within 30 minutes and updates inspection records as necessary. The program is expected to achieve reductions in soft costs for both applicants and safety inspectors. The program is set to be evaluated in a few months to determine inspectors' comfort level towards virtual inspections, as well as their efficacy compared to in-person inspections.

5.2 – Utility & Infrastructure Program Area

5.2.1 – Evaluate the Benefits of a CCA and Consider Establishment

Note: Since the writing of the SEP, the County Board of Supervisors voted to join the pre-existing CCA Monterey Bay Community Power.

Strategy Description

Community Choice Aggregations (CCAs, also called Community Choice Energy or CCEs) are governmental organizations that provide local governments more authority and decision-making over local electricity rates and power content, particularly as it relates to renewable energy content and programs promoting renewable energy development. The methods through which a CCA can help the County meet its renewable energy goals include:

- Creating rates and programs such as a Performance-Based Incentive (described in Section 5.3.2) to boost the financial viability of renewable energy projects
- Developing programs for community solar and microgrid projects that provide renewable electricity to the community while focusing on resiliency
- Procuring additional renewable power as a default offering for customers through a combination of out-of-county contracts, feed-in tariffs, and unbundled REC procurement

However, a county-wide CCA poses unique challenges in Santa Barbara due to its dual-utility nature, which results in two different paradigms with different electricity rate structures. There are currently no CCAs that stretch over utility boundaries, although Pioneer Community Energy in Placer County may expand from single utility coverage (PG&E) to also include the Liberty Utilities service area, and other dual-utility counties such as Tulare and Fresno are also considering establishing CCAs.

The County of Santa Barbara and partner cities commissioned a study in 2018 to analyze the rates that a CCA could offer in the northern and southern county and how those would compare to PG&E's and SCE's current rates. However, in 2018, the California Public Utilities Commission (CPUC) modified the formula for how IOUs calculate the Power Charge Indifference Adjustment (PCIA) that is added onto CCA generation rates to minimize cost impacts to IOU customers. These PCIA changes, as well as other recent policy and market changes, have the potential to reduce the viability of new CCAs. The County has re-commissioned an update to its existing CCA feasibility study to account for the new PCIA rates, among other changes. The study results are expected in summer 2019. If the County chooses not to proceed with a CCA at this time, it should continue monitoring the costs and benefits of a CCA for possible future development.

Staffing impacts below are limited to the time taken by County staff to monitor CCA viability and support start-up if a CCA moves forward. It is expected that, if the County proceeds with a CCA, dedicated CCA staffing will be procured to lead the start-up process and manage operations.[70]

Action Plan - Project
Year 1 1. Review commissioned study on CCA viability and assess impact to viability of CCA formation for current participants (County and the Cities of Carpinteria, Goleta, and Santa Barbara) 2. Conduct outreach to North County cities to determine interest in participation based on revised study results **IF CCA MOVES FORWARD** 1. Secure remaining formation and early operational budget

[70] Pacific Energy Advisors, "Technical Feasibility Study on Community Choice Aggregation: CCA Start Up."

2. Create new County department (if only County participates) or joint powers authority (if County and at least one city participates)
3. Engage consultant(s) for technical, marketing, financial, and legal services
4. Develop and submit to the CPUC CCA Implementation Plan by January 1, 2020 (for 2021 launch)

Year 2

1. Execute service agreements with IOUs
2. Conduct start-up activities, such as hiring, securing office space, load forecasting, power procurement, rate-setting, branding, outreach, etc.
3. Provide customer notifications as required by statute
4. Establish back office and conduct billing and data exchange testing

Year 3

1. Launch CCA

Staffing Responsibility

1. Sustainability Division Chief
2. Senior Sustainability Program Specialist
3. Sustainability Program Specialist
4. Civic Spark Fellow

Case Study: Sonoma Clean Power

Sonoma Clean Power (SCP) can provide a model for a Santa Barbara County CCA. The Sonoma County Water Agency completed its initial feasibility study for a county-wide CCA in 2011. Over a 3-year period, SCP received buy-in from all cities in Sonoma County, signed power procurement contracts, and set electricity rates below PG&E's, with a higher renewable content. It officially began serving customers in 2014. In 2016, its success prompted Mendocino County to also join SCP.[71]

5.2.2 – Work with IOUs to Develop a Community Solar Project

Strategy Description

Community solar projects are solar projects sized similarly to large commercial installations, typically in the 1-3 MW capacity range. However, these projects can be subscribed to by residents and businesses that cannot install solar PV on their own facilities due to either technical

[71] Sonoma Clean Power, "History of SCP."

constraints or a lack of financial capability. These local projects can also provide other important benefits to the community, such as resiliency and jobs for the local solar industry and supporting businesses. Local siting also reduces reliance on transmission by adding a large project to the distribution grid. In the case of a PSPS or other transmission outage, a small portion of customers could be served by a community solar project, though it would not operate in the case of a distribution outage.

A community solar project could be developed in partnership with IOUs or through a CCA. Although a CCA would provide more control, an IOU-controlled project could be developed earlier. Both SCE and PG&E have a current pathway for community solar programs, known as Enhanced Community Renewables (ECR), but due to the high administrative burdens placed on the project developer, no community solar projects have been constructed to date, with only a handful in development stages. The only utility community solar program to have launched to date in California has been administered by Roseville Municipal Utility, due to the municipal entity's ability to reach customers directly in a way that solar developers are unequipped to do.

SCE recently asked for funding from the CPUC to develop an alternative community solar program to begin in 2020, known as Community Renewables. This application was denied, but it is expected that SCE will re-apply after ensuring compliance with regulations regarding the current programs. Due to the uncertainty of a CCA moving forward and the lack of historical precedent for community solar projects in PG&E territory, the action plan below is directed towards participating in the proposed SCE program.

The expected SCE program also requires an entity such as a County, or a group of entities, to act as "project anchors" to agree to purchase at least 80% of the system output, which greatly reduces the potential for this strategy to meet community goals. Therefore, a CCA would be the preferred implementation option for this strategy.

The proposed SCE program contains the following steps:

1. Jurisdiction partakes in SCE Request for Information (RFI) to assess community requirements such as resiliency and location and to find a suitable site host
2. Jurisdiction identifies co-anchors if necessary
3. SCE issues RFP for development of project and selects a winner
4. Jurisdiction collaborates with developer to ensure smooth project installation and program launch

Action Plan - Project

Year 1

1. Assign a County staff member and team to lead project development and review status of SCE Community Renewables program.
2. Conduct an analysis of large County-owned sites and approach other public agencies and large commercial property owners to potentially act as an anchor client and/or site owner for the solar project.

3. Conduct outreach to residents and businesses neighboring the project to educate them about the need for solar development in that area.
4. Offer assistance to SCE to help with outreach and enrollment in the project.
5. Respond to SCE RFI with site details and proceed through process as directed by SCE.

Year 2

6. Obtain approval for participation in SCE Community Renewables program from Board of Supervisors.
7. Return to Board as necessary for additional contract approvals.
8. Begin and monitor project construction.

Year 3

9. Complete construction and interconnection of project and launch program.

Staffing Responsibility

1. Sustainability Division Chief
2. Senior Sustainability Program Specialist
3. Sustainability Program Specialist
4. Civic Spark Fellow

5.3 – County Institutional Program Area

5.3.1 – Write and Implement a Formal Energy Assurance Plan (EAP)

Strategy Description

Energy assurance planning is an important step in improving the robustness, security, and reliability of energy infrastructure by creating plans to protect key municipal sites so that they continue to operate in the event of any disaster or electricity outage. This will increase the reliability of critical services such as fire protection and critical facilities such as Emergency Operations Centers. EAPs are therefore a key step in building a resilient local electricity grid. These are the key steps to developing a strong EAP:

1) Identify the County-owned buildings and facilities that are most critical from a resiliency perspective, such as fire protection facilities and sites used as emergency operation centers or community gathering spots.
2) Evaluate each critical site, including its current level of emergency preparation from an energy perspective and the renewable energy potential present.
3) Evaluate opportunities to supplement diesel generators with battery storage.

4) Evaluate impact of critical sites on other key resilience requirements such as transportation.

Following the Thomas Fire and debris flow, the Office of Emergency Management drafted a Multi-Day Power Outage Contingency Plan. An Energy Assurance Plan would build on that initial draft to provide a more comprehensive and robust plan for the entire county. Additionally, the EAP should also consider reviewing and potentially integrating recommendations from other regional resilience efforts, such as the Transportation Network Resiliency Study completed by SBCAG.

Action Plan - Project

Year 1

1. Assemble internal energy assurance team with representation from the Sheriff's Office, Fire Department, and Office of Emergency Management, Public Works, Public Health, and General Services.
2. Create mission and vision statements for the Energy Assurance Plan.
3. Conduct external outreach to Counties with existing EAPs to gather advice and guidance.
4. Research IOU, state, and federal funding opportunities available for energy assurance support.
5. Work with Long-Range Planning Division to identify existing County plans that could incorporate the EAP.
6. Identify key issues and critical facilities and sites to be covered in an EAP.

Year 2

7. Conduct outreach to external community stakeholders for feedback on resiliency issues and challenges faced by the community.
8. Create and release RFP to write the EAP.
9. Review proposals and negotiate contract with winning bid.
10. Obtain Board of Supervisors approval for contract.
11. Work with consulting team to write draft EAP, focusing on opportunities for renewable energy and battery storage at identified sites.
12. Coordinate with SBCAG to align EAP site suggestions with high priority transportation networks.
13. Circulate draft EAP for comments and feedback from internal and external stakeholders and iterate upon it.

Year 3

14. Implement EAP recommendations.

Staffing Responsibility

1. Sustainability Division Chief
2. Senior Sustainability Program Specialist
3. Sustainability Program Specialist
4. Civic Spark Fellow
5. Office of Emergency Management Director
6. Office of Emergency Management Emergency Manager

5.4 – Financial & Funding Program Area

5.4.1 – Create New Financing Mechanisms for the Community

Strategy Description

The goal of this strategy is to enable residents and businesses to undertake renewable energy actions without the available cash to buy solar projects up-front, by creating a low-interest financing source. The main potential pathway for the County to achieve this is:

1) Create a source of funding for a Loan Loss Reserve (LLR) to back up loans taken by residents and businesses.

A LLR is a fund that is set aside to write off bad loans or loans that are never paid, rather than being used to directly finance projects. By using its limited resources only to insure its partner against bad loans, rather than providing loans directly, the County can effectively help write many more loans than it would be able to otherwise with its limited funding. This would allow the County to reduce risk for a commercial lender who would otherwise not be able to provide low interest loans. The County has used LLRs in the past for the emPower program.

Action Plan - Project

Year 1

1. Assign staff lead for creation of LLR program.
2. Review lessons learned from use of LLR for emPower program.
3. Conduct outreach to local large commercial lenders.
4. Assess viability of various lenders as funding partners based on interest rate, program size, LLR requirements, etc.
5. Decide upon a funding partner.
6. Establish most important program components for the County's needs, such as technology eligibility (e.g. solar PV, solar thermal, etc.) and amount of focus on low-income customer segments.

Year 2

7. Conduct community outreach to gather feedback on program design and identify an area for a potential pilot.
8. Work with funding partner and program manager to design pilot parameters.
9. Launch short pilot program to assess program interest and participation.

Year 3

10. Adjust program based on pilot results.
11. Launch full program.

Staffing Responsibility

1. Sustainability Division Chief
2. Senior Sustainability Program Specialist
3. Sustainability Program Specialist
4. Civic Spark Fellow

5.4.2 – Offer Financial Incentives to Increase Economic Payback

Strategy Description

Financial incentives can directly fill the reduction in the economic value of solar production that will be experienced due to utility ToU rate changes. There are two types of financial incentives that have been used recently by the State's California Solar Initiative (CSI) program to stimulate solar project development: an Expected Performance Based Buydown (EPBB) and a Performance-Based Incentive (PBI).

An EPBB is an up-front credit that provides funds to the system owner based on the expected performance of the system or system capacity. It is relatively simple to administer because it requires only a lump sum provided to the system owner at the time of installation. In comparison, PBIs provide money over time only as energy is generated by the system, which prevents paying incentives to systems that underproduce or stop working entirely and promotes maintenance. As such, a PBI more efficiently directs capital to high-performing projects. Additionally, the PBI has more levers to adjust to achieve the desired level of penetration than an EPBB. PBIs are more difficult to administer than an up-front rebate due to the multiple (typically, monthly) payments that must be made, as well as the need to monitor system production on an ongoing basis.[72] However, the size of Santa Barbara County should enable it to spread out these greater soft costs over many projects. As such, this section will focus primarily on a PBI, though much of the recommendations and process would also be applicable to an EPBB incentive.

[72] Go Solar California, "California Solar Initiative (CSI) - STEP 3."

The two main PBI levers that the County can adjust are the amount of the incentive ($/kWh generated) and the duration of the incentive. The goal of this incentive should be to push marginal solar projects into economic viability. Therefore, the incentive amount and duration should be set such that the average cost of producing solar electricity for a target payback period is brought down just below retail electricity rates for each customer class. The duration of the incentive is also a key factor in determining administrative costs. A high incentive offered for a short period of time will have less administrative costs associated with it than a low incentive offered for a long period of time and will likely also be more attractive to participants. However, longer incentives are key to ensuring project performance and to spreading out capital outlays, so these levers need to be adjusted judiciously to strike the desired balance.

The County should also increase or decrease the value provided by the incentive once the program has been launched based on program success and progress made towards any specific targets. The incentive can also be offered at different rates to incentivize certain types of projects over others to meet resiliency and social equity goals. These priority projects could include storage projects, multi-unit dwelling projects, or projects aimed to support low-income residents.

Establishing a CCA would greatly increase the ease of administering a PBI. The CCA would already have a billing system to interface with customers and could directly provide the incentive in the form of utility bill credits, greatly reducing the administrative burden added by the PBI. A CCA would also be able to perform validation of energy production more readily than municipal staff unfamiliar with energy production modeling. In the absence of a CCA, however, the County could contract with a third party to manage payouts and track system production. While this would require an additional budget allotment, it would also increase the County's insight into local renewable electricity generation and allow the County to better track progress towards goals.

Due to capital cost requirements, the offering of a PBI is recommended as a later-stage strategy. This would provide the County with more time to develop a potential funding source, including, possibly, a future CCA that would remove the need for third party contracting for administration.

Action Plan - Project

Year 1

1. Create a program development team to lead the strategy.
2. Identify most important customer segments (e.g. residential, commercial, agricultural, etc.) and property types to target with the incentive.
3. Establish DER target for the incentive program.
4. Conduct outreach to local solar installers and other DER vendors to gather their opinions on important program requirements.

Year 2

5. Create program guidelines, including project eligibility, length of program, length of incentive, type of incentive, reporting requirements, and amount of incentive to be offered.

6. Assess potential risks and legal protections for the County.
7. Determine estimated capital needs.
8. Identify gaps in County expertise for implementation and program design, such as need for third party contracting.
9. Finalize program design based on consultant advice.
10. Present draft guidelines to vendor community for feedback.
11. Obtain Board of Supervisors approval for required funding.

Year 3

12. Publish guidelines and conduct outreach campaign to advertise PBI to residents and businesses
13. Launch program county-wide

Ongoing

1. Evaluate program results and monitor market costs of applicable DERs.
2. Adjust program parameters as necessary to achieve desired DER development.

Staffing Responsibility

1. Sustainability Division Chief
2. Senior Sustainability Program Specialist
3. Sustainability Program Specialist
4. Civic Spark Fellow

Case Study: Alameda Municipal Power Solar Rebate Program[73]

In 2008, Alameda Municipal Power (AMP) allocated over four million dollars to provide solar incentives to the community in the form of a PBI, which was more than the amount required by SB1 at the time. All incentives were reserved for payout by 2013 for residential projects and 2016 for commercial projects, well ahead of schedule, indicating the value and popularity of such a program. AMP was able to provide incentives for more projects than initially anticipated because installed system production was lower in many cases than the expected production. This proved the value of a PBI compared to an up-front rebate by ensuring that enough generation was incentivized to meet renewable energy targets despite under-performing systems.

5.4.3 – Diversify County Funding Streams

Strategy Description

In order for the County to achieve its goals, funds will need to be allocated for supporting the recommendations made in this SEP. Diversifying funding streams is extremely important to

[73] More information: https://www.alamedamp.com/for-your-home/index.php?option=com_content&view=article&id=1175:solar-rebate-levels&catid=142:solar-center&Itemid=866

ensuring the County has a stable funding stream that is not dependent on any one source. These are methods for the County to diversify its funding stream:

1) Aggressively pursue new federal, state, and private foundation funding sources
2) Continue to work closely with the CPUC (and existing IOUs as necessary) to maximize the County's share of existing renewable program funding
3) Partner with other nearby regional governments to create energy programs
4) Explore opportunities to raise additional revenue to fund energy programs (see Section 5.6 for additional discussion).

Continuing to work with the CPUC and other State entities committed to funding energy programs will allow the County to both maximize its intake of rate payer funding collected by the utilities, and to receive CPUC funding that would otherwise go to utilities to administer local programs.

Another method the County could use to directly receive this funding is to partner with the governments of nearby counties such as San Luis Obispo and Ventura. This is an initiative that the County is already beginning through its role in the Tri-County Regional Energy Network (3C-REN), which is currently planning on providing residential and multi-family energy efficiency programs, codes and standards compliance programs, and workforce education and training programs.[74] The scope of CPUC-defined RENs is limited purely towards energy efficiency, but they provide a case study for regional collaboration on energy programs, as well as for Counties to take a portion of the traditional utility role of administering such programs.

This role could be expanded to other types of programs such as Community Solar programs. As discussed in Strategy 5.5.2, SCE recently applied for $5M from the CPUC to manage these and other programs such as green tariffs. If approved, it may set a precedent for the County to ask for similar funding, given that the County has a more direct relationship with residents and businesses.

Action Plan - Project

Year 1

1. Review current sources of funding and reliance on funding from any specific sector for energy programs.

Ongoing

2. Monitor federal, state, utility, and foundation grants and funding programs for applicability to the County
3. Monitor approval progress of IOU requests for funding, particularly the Community Renewables Program
4. Identify best opportunities for the County to request funds from CPUC to replicate IOU role through 3C-REN

[74] County of Ventura, "Tri-County Regional Energy Network."

Staffing Responsibility

1. Sustainability Division Chief
2. Senior Sustainability Program Specialist
3. Sustainability Program Specialist
4. Civic Spark Fellow

5.5 – Education & Public Awareness Program Area

5.5.1 – Formalize a County-Wide One-Stop Shop to Lead Education Efforts Across the County

Strategy Description

A One-Stop Shop would be a web resource, likely headed by the Sustainability Division, acting as the main hub and point of contact for information for all new programs and policies implemented due to SEP recommendations and other County sustainability initiatives. A One-Stop Shop would also act as the main method for the County to promote the benefits of certain programs, such as a CCA, and advertise programs requiring community enrollment or participation, such as a Community Solar program or a Performance-Based Incentive program.

Such an information hub could also increase knowledge about clean energy technologies and the clean energy industry, such as alerting the public to the falling costs of solar and energy efficiency projects and the role that local utility-scale generation and distributed storage can play in increasing resiliency, and therefore reliability, of the electricity supply.

While the County already acts in an informational capacity with regards to energy programs, a One-Stop Shop would go a step beyond, to act as a mechanism for targeted outreach campaigns to maintain active engagement with key community segments and targets of certain energy programs. Public outreach conducted as part of the SEP process has identified the need for trusted advisors to support the renewables procurement process for both public agencies and large private entities, ranging from project analysis to providing information on current best market practices.

This One-Stop Shop should be a joint effort with other jurisdictions in Santa Barbara County to share resources and take advantage of similar information requirements.

Action Plan - Project

2019

1. Use SEP process to execute initial outreach and promotional campaign through a series of workshops targeted at different customer segments such as commercial property owners,

agricultural landowners, special districts and other public agencies, and opportunity zone investors.

2. Continue building relationships with partners across the county to extend reach of One-Stop Shop.
3. Assemble internal team and hire staff if necessary, to administer and lead promotional and educational programs.
4. Compile list of clean energy resources to be included in online resource pages.

2020

5. Create and release RFP for web design to create One-Stop Shop.
6. Publish online resource page.

Staffing Responsibility

1. Sustainability Division Chief
2. Senior Sustainability Program Specialist
3. Sustainability Program Specialist
4. Civic Spark Fellow

5.6 –Advocacy Strategies

5.6.1 – Advocate to Support County Goals at the State and Federal Level

Strategy Description

Due to the uncertain future facing PG&E because of its bankruptcy, as well as the potentially volatile federal policies surrounding climate change, strong and sustained advocacy by the County has a greater potential than normal to affect change on a scale that might not previously have been possible. Some advocacy goals are listed below:

1) Support ICA advocates asking for an examination of PG&E's ICA calculation methodology
2) Support renewable industry in advocating for a continuation of the current ITC beyond 2019
3) Work with the State of California to develop a "Public Power Pool" to aggregate solar projects
4) Advocate for less restrictive naval and military restrictions around offshore wind siting

A reformed ICA calculation methodology that is friendlier towards new solar installations would be an important step to reducing barriers for local developers. Furthermore, since both SCE and SDG&E have much more favorable results than PG&E, there is a strong case for an altered methodology.

The second objective involves supporting existing groups such as the California Solar and Storage Association (CALSSA) in extending the ITC. The phase-out of the ITC represents a gap in terms of financial viability that would need to otherwise be filled in by the County. It should be noted however that this level of federal advocacy is reliant on many national political trends.

The third objective involves advocacy for the creation of an aggregated power pool to buy off-site, but in-state, renewable projects. One of the green programs proposed by SCE is a Green Direct program, which would allow public agencies with energy goals to procure renewable energy directly through off-site PPAs. Enabling various governments and non-taxpaying special districts to bundle together their energy requirements would allow them to receive better PPA rates through economies of scale than would be possible on a case-by-case basis through this Green Direct program. Agencies would also be able to spread soft costs such as consultant analysis and contract review to spread out over many participants. In effect, this would be similar to a CCA, but only for public agencies rather than entire communities.

Texas currently enables aggregation on this smaller scale for electricity procurement, not limited solely to public entities. However, one aggregation in Texas is the Public Power Pool (P3), which purchases power for 98 political subdivisions and over 5,300 public accounts.[75] Although P3 does not focus on renewable electricity, the goal of a California Public Power Pool could be purely for renewable electricity. Although this would not be implemented in time to take advantage of a 30% ITC, it could be implemented prior to the ITC phasing down to 10% for commercial projects.

Lastly, as noted in Chapter 2, offshore wind potential is currently locked due to naval restrictions that bar the entirety of the Santa Barbara coast from offshore wind development due to the nearby presence of Naval Base Ventura County. The current naval restriction zones can be seen in Figure 5.2.

Figure 5.2: Naval Exclusion Zones for Off-Shore Wind

The entire coast of Santa Barbara County for up to roughly 50 miles offshore is under a wind exclusion. As the offshore wind resource is much greater than the onshore wind resource,

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75 Texas Conference of Urban Counties, "Public Power Pool."

lessening these restrictions could result in a great deal of wind power for Santa Barbara County, which would otherwise be heavily dependent on solar PV as a renewable energy source.

5.7 – Strategies to Raise Revenue

Given the strong levels of staffing and funding required to implement the actions recommended in the SEP, additional sources of revenue may be needed to supplement funding dedicated by the Board of Supervisors.

There are two broad categories of funding options: taxes and fees. Taxes require a vote to be conducted, but due to this high barrier for implementation, allow wide flexibility in terms of how the gathered revenue can be allocated and the link between the source of the tax and the programs and projects it funds. In comparison, fees can be established by the County without a vote, but in exchange for easier implementation, there must be a much stronger link between the source of the fee and its use. As such, due to the broad range of programs recommended as part of the SEP, a single revenue stream would likely need to be a tax rather than a fee.

5.7.1 – Utility Tax

Strategy Description

A utility tax can be placed on a utility bill, whether water, waste, natural gas, or electricity. Since the County does not provide its own utilities with bills, the County would need to partner with a range of public agencies or utilities covering Santa Barbara County to collect the revenues, or with a potential CCA if formed. The tax could be on a consumption basis—per kWh of electricity consumed or per therm of natural gas, for example, or on the whole utility bill, which is also known as a Utility Users Tax.

Although very similar, the key difference between these two taxes is that the entire utility bill often includes non-consumption charges, such as minimum monthly charges on electricity bills. Therefore, taxing directly on consumption gives customers the ability to respond strongly to the tax by adjusting their usage or undertaking projects such as installing solar panels. Although this may make the tax easier to pass, it may also result in decreasing revenues, particularly if the tax is on electricity consumption, since SEP strategies are aimed at lowering electricity use through the proliferation of DERs. In comparison, a Utility Users Tax would still give customers some ability to respond, while maintaining a base level of revenue.

The County does not currently have a uniform Utility Users Tax, but some locations have a tax. Isla Vista has a tax of 8% on all of water, electricity, waste, and natural gas, through which it raises roughly $650,000 annually. With a similar rate placed across the entire unincorporated County, this approach could raise approximately $6M annually, or $3M if placed only on electricity.

A consumption-based electricity tax, called the CAP tax, has existed in Boulder, Colorado, since 2007. As opposed to being an equal percentage of all bills, the CAP tax is set at a different rate for each customer segment, with residential customers paying $0.0049/kWh, commercial customers paying $0.0009/kWh, and industrial customers paying $0.0003/kWh. Translating these taxes to unincorporated Santa Barbara County electricity usage would equate to roughly 1% of electricity costs, or $540,000 - $600,000 annually. These rates could be raised to match the amounts that could be gathered through a Utility Users Tax.

5.7.2 – Sales Tax Increase

Strategy Description

A sales tax increase could be implemented in two different ways:

- A tax on gross retail sales of large corporations
- A special or general Sales and Use Tax increase

The former would target specifically corporations over a certain size. In Portland, Oregon, a 1% tax was passed in 2018 on corporations having over $500,000 of annual sales within City limits and $1 billion in total annual sales. This tax, called the Portland Clean Energy Initiative, is expected to raise $30 million annually to fund renewable energy programs and policies. If deemed a good fit, County staff should review business activity in Santa Barbara County to determine the appropriate local threshold, as well as if any exemptions could be necessary.

One of the main objectives of this type of tax is to focus on equity by redistributing revenues from large corporations. Portland mandates that a certain portion of the funds be spent in developing energy programs for disadvantaged communities most affected by climate change.

In comparison, a use tax could be placed on all purchases made within the unincorporated County, which would place a comparatively larger burden on lower-income communities. Sales tax increases are common among municipalities as a method to invest in key community needs such as infrastructure and public health and safety. The resilience and reliability benefits of SEP strategies could fall under a similar category and reason to implement a use tax increase.

Chapter 6 – SEPs for Carpinteria & Goleta

As the County was exploring the creation of an SEP, the Cities of Goleta and Carpinteria chose to partner with the County and create an SEP that had both a regional focus and local strategies specific to each entity. Through the SEP process, standalone SEPs were created for each City. A summary of those documents is included here to provide insight into the actions that are recommended to be taken at a local level in support of and in relation to the County's regional efforts.

6.1 – Summary of the Goleta Strategic Energy Plan

Project Origin and Objectives

In December 2017, the City of Goleta City Council unanimously adopted a goal of 100% renewable electricity supply for the community by 2030 with an interim goal of 50% renewable electricity for municipal facilities by 2025.[76] Following the adoption of this goal, the City of Goleta partnered with the County of Santa Barbara and the City of Carpinteria to commission the creation of a Strategic Energy Plan (SEP) to meet its 100% renewable electricity goals and improve the resiliency of the local electricity system by promoting local renewable energy development and energy efficiency deployment. Increasing the ability of the electricity grid to operate in emergency scenarios, like recent wildfires or the Montecito debris flows, where transmission of electricity to Goleta and the South Coast could be cut off, will improve reliability for residents and businesses.

Due to Goleta's unique location close to the end of the Southern California Edison (SCE) service area, the emergency scenarios that are addressed by the SEP extend far beyond natural disasters. There is lower resiliency at the end of the SCE grid because most of the utility generation is coming from only one southeasterly direction, placing higher emphasis on reducing electrical load and hardening a few key sections of the transmission grid. Furthermore, as a measure to proactively prevent wildfires and other natural disasters, SCE has implemented a protocol called the Public Safety Power Shutdown (PSPS; see this and other Key Terms and Definitions in Appendix B).[77] The PSPS allows and requires SCE to turn off sections of the transmission grid during high-risk periods, such as high-wind events, which could result in an induced power outage locally.

Additionally, in 2018, SCE released a Request for Proposals (RFP) to fulfill local capacity requirements, but its "Least Cost Best Fit" selection methodology provided no additional consideration for the renewable content of energy.[78] As such, none of the selected projects included renewable energy generation despite strong community interest in the development of local renewable resources.

The objective of the SEP is to help the City of Goleta meet its 100% renewable electricity goals and address these resiliency concerns by promoting renewable energy development in Goleta in five ways:

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[76] Sierra Club, 'Goleta, California Commits To 100% Clean, Renewable Energy', 2017 <https://www.sierraclub.org/press-releases/2017/12/goleta-california-commits-100-clean-renewable-energy> [accessed 10 April 2019].

[77] Southern California Edison, 'SCE Proposes Grid Safety and Resiliency Program to Address the Growing Risk of Wildfires', 2018 <https://newsroom.edison.com/releases/sce-proposes-grid-safety-and-resiliency-program-to-address-the-growing-risk-of-wildfires> [accessed 10 April 2019].

[78] California Public Utilities Commission, 'Utility Scale Request for Offers (RFO)', 2019 <http://cpuc.ca.gov/Utility_Scale_RFO/> [accessed 10 April 2019].

1) Identifying the gap in forecasted electricity demand and baseline growth in renewable energy and energy efficiency to determine the necessary scope of the City's actions
2) Identifying a set of policy measures and strategies in diverse program areas ranging from drafting regulatory frameworks to creating new financing mechanisms
3) Evaluating the ability of these policy measures and strategies towards closing this gap and meeting the City's 100% renewable electricity goals
4) Identifying total resource potential for distributed solar development in Goleta on rooftops and parking lots
5) Creating a list of priority sites for renewable energy development throughout Goleta

Renewable Energy Potential in Goleta

Table 6.1 summarizes the estimated maximum realistic distributed solar potential in Goleta. Although most of the potential is on rooftops, roughly 20% of the potential is in parking lots, where solar carport structures could provide shade for vehicles while simultaneously creating energy. Due to Goleta's constrained geography and generally urban/suburban make-up, alternative renewable energy sources, such as wind, biogas/biomass, hydroelectric, and geothermal hold minimal potential for local development, and solar photovoltaic (PV) energy is the primary target for local renewable electricity generation.

Table 6.1: Distributed Solar Potential in Goleta

Solar Resource	Potential Generation Capacity (MW)	Potential Annual Generation (GWh)	Households Powered
Rooftop	79 – 107	107 – 155	38,000 – 55,000
Parking Lots	22 – 26	30 – 38	10,000 – 14,000
Total	101 – 133	137 – 193	48,000 – 69,000

Recommended Sites for Development - Public & Private Site Analysis

This section provides a summary of the public and private sites in the City of Goleta identified, analyzed and recommended for solar development through the SEP process. A full analysis of the public sites can be found in the City of Goleta's SEP. As with the sites located in the unincorporated County, all private sites included below are anonymized to protect the privacy of the site owners as City/County staff work directly with them to explore development.

Table 6.2: Site Summary

ID	Name	Priority Score	Site Type	Interconnection	System Size (kW-DC)	Energy Output (kWh/year)
	Goleta Municipal Solar Site Potential					
1	Goleta Library	A	Roof / Carport	Behind meter	118	190,911
2	Goleta City Hall	A	Roof / Carport	Behind meter	145	226,867
3	Goleta Valley Community Center	B	Carport	Behind meter	61	116,011
	Total Maximum at Municipal Site(s)				**324**	**533,789**
	Total Recommended for Municipal Site(s) (A+B)				**324**	**533,789**
	Goleta Solar Site Potential					
4	Public – Commercial Site 1	B	Roof / Carport	Behind meter	300	492,000
5	Public – Commercial Site 2	A	Roof / Carport	Behind meter	630	1,050,000
6	Public – Commercial Site 3	A	Roof / Carport	Behind Meter	548	961,900
7	Public – Commercial Site 4	A	Roof / Carport	Behind Meter	402	657,700
8	Private – Commercial Site 1	A	Roof / Carport	Behind Meter	334	517,000
9	Private – Commercial Site 2	A	Roof	Behind Meter	1,040	1,560,000
10	Private – Commercial Site 3	A	Roof / Carport	Behind Meter	1,180	1,940,000
11	Private – Commercial Site 4	A	Roof / Carport	Behind Meter	400	621,000
12	Private – Commercial Site 5	C	Roof / Carport	Behind Meter	45	68,000
13	Private – Commercial Site 6	B	Roof	Behind Meter	185	286,000
14	Private – Commercial Site 7	B	Roof / Carport	Behind Meter	945	1,510,000
15	Private – Commercial Site 8	B	Roof / Carport	Behind Meter	562	930,000
16	Private – Commercial Site 9	B	Roof / Carport	Behind Meter	949	1,500,000
17	Private – Commercial Site 10	A	Roof / Carport	Behind Meter	1,270	2,072,000
18	Private – MF Residential Site 1	C	Roof	Behind Meter	330.8	496,000
19	Private – MF Residential Site 2	A	Roof	Behind Meter	110.6	168,800
20	Private – MF Residential Site 3	B	Roof	Behind Meter	471.5	700,900
21	Private – MF Residential Site 4	C	Roof	Behind Meter	81.6	119,500
	Total Maximum at Private Site(s)				**9,653.5**	**15,516,100**
	Total Recommended for Private Site(s) (A+B)				**9,195.9**	**14,832,600**

Barriers to Renewable Energy Development in Goleta

The table below summarizes the key barriers to renewable energy development identified in Goleta. These barriers were determined through engaging both City staff and members of the Goleta community, including regional renewable energy project developers, through public workshops, individual communications, and feedback opportunities on draft versions of the SEP. Although some of these barriers are state or federal concerns, such as the decrease in federal tax credits, many are unique to or heightened in Goleta.

Table 6.1: Barriers to Renewable Energy Development in Goleta

Type of Barrier	Barrier(s)	Description
Property Ownership	Split Incentive	Landlords do not have any incentive to undertake energy upgrades on behalf of tenants.
	Load Constraints and Rooftop Leasing Challenges	Many high-potential areas do not have the load to install a maximum-sized PV array and rooftop leases do not provide enough financial benefit to make up for the additional liability.
Financial / Funding	Financing Mechanisms	Several programs to finance energy projects have not achieved desired outcomes
	Altered Time-of-Use (ToU) Rate Schedules	Recent changes in electricity rates lower the value of solar production.
	Funding Sources	The City lacks diverse funding sources due to its size and having a limited number of facilities.
Institutional City	Energy Assurance Plan (EAP)	The City does not have a formal EAP to ensure electricity reliability at critical facilities.
	Regional Collaboration	There is limited regional framework for municipal collaboration on energy, climate, and resiliency issues in southern Santa Barbara County.
Educational / Public Awareness	Cost Awareness of Renewable Energy	Public awareness of the costs and benefits of renewable energy can be outdated due to technology improvements and ever-changing electricity rates and programs.

	Regulatory / Utility	SCE RFP Process	SCE's RFP process for increasing local electrical resiliency does not place additional value on renewable energy.
	Technical / Infrastructural	Distribution Grid	Parts of the distribution grid in western Goleta may not support additional renewable electricity due to low capacity
	State and Federal Policy	Federal Investment Tax Credit (ITC)	The federal ITC is currently planned to drop down and then phase out, which will reduce project viability.

Recommended Actions to Overcome Barriers

The strategies in Table 6.4 below and on the following page were developed to directly target the barriers identified in Goleta. These strategies span five major program areas: regulatory policy-driven actions to drive new local development, actions aimed at changing the electricity supply to Goleta, actions related to increasing options for financing renewable projects, actions to address electricity usage and supply at City facilities, and actions related to outreach and advocacy both inside and outside Goleta.

Table 6.2: Recommended Actions to Overcome Renewable Energy Barriers in Goleta

Program Areas	Strategies	Description	Contribution to 100% Goal
Regulatory	Streamline Solar and Storage Permitting	Update residential and small commercial permitting ordinances to expand existing regulations.	1.9%
	Commercial Building Energy Benchmarks	Institute energy benchmarks for large commercial buildings to encourage commercial building owners to undertake energy projects.	2.2%
Utility	Consider Community Choice Aggregation (CCA)	Continue to explore feasibility of a county-wide CCA and implement or consider joining an existing CCA.	30.7%
	Community Solar Project	Develop a community solar project for those without access to on-site renewable energy.	0.6%

	Pilot Back-up Inverter Program	Release an RFP to determine a shortlist of "back-up inverters" that provide resilience benefits in a residential application	0.4%
Financial and Funding	Financing Mechanisms	Create an improved Property-Assessed Clean Energy (PACE) or On-Bill Financing (OBF) program to finance projects.	1.4%
	Financial Incentives	Provide financial incentives to fill gaps in project viability.	10.4%
	Diversify Funding Streams	Monitor and apply for regional, state, federal, and foundation grants.	
City Facility	Energy Assurance Plan	Create and implement an energy assurance plan to ensure electrical reliability at critical facilities.	0.6%
Outreach and Advocacy	One-Stop Shop	Support a County-wide resource & education center to raise awareness and act as a hub for energy programs.	0.1%

Meeting the 100% Renewable Electricity Goal

Goleta electricity demand is forecasted to be 218 GWh (gigawatt-hours) in 2030. Under a business-as-usual (BAU) scenario, local renewable generation and SCE renewable generation are forecasted to comprise only 63% of Goleta's electricity mix in 2030. This is because the statewide Renewables Portfolio Standard (RPS)[79] of 60% utility renewable generation is only credited to the remaining electricity consumption after local renewable generation is accounted for. As such, as local renewable electricity generation increases, utility renewable generation, whether supplied by an investor-owned utility (IOU) or a CCA, decreases. This is shown in Figure 6.1.

[79] The Renewables Portfolio Standard is the state-wide legislation that defines what constitutes as renewable energy and outlines mandates on utility renewable procurement.

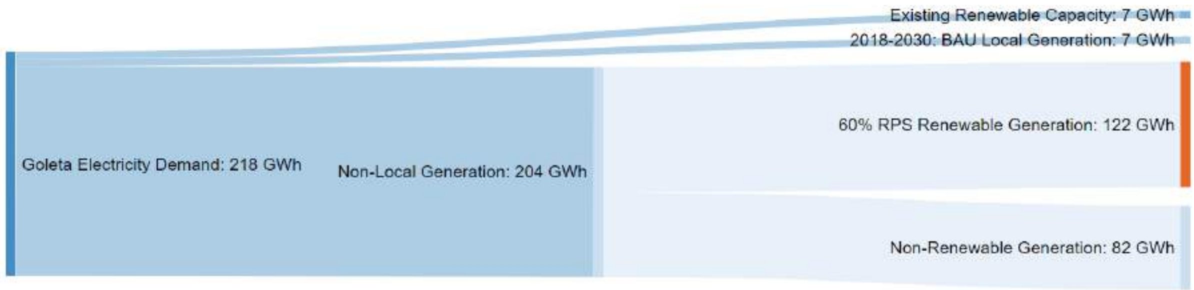

Figure 6.1: Goleta Electricity Demand Flow Chart – Business as Usual Scenario

Figure 6.2 shows a potential pathway for Goleta to fill the remaining gap in its 100% renewable electricity goal through a mix of local distributed electricity development spurred by the SEP and non-local renewable electricity procured by a CCA. In this scenario, increased local generation leads to reduced utility electrical purchases.

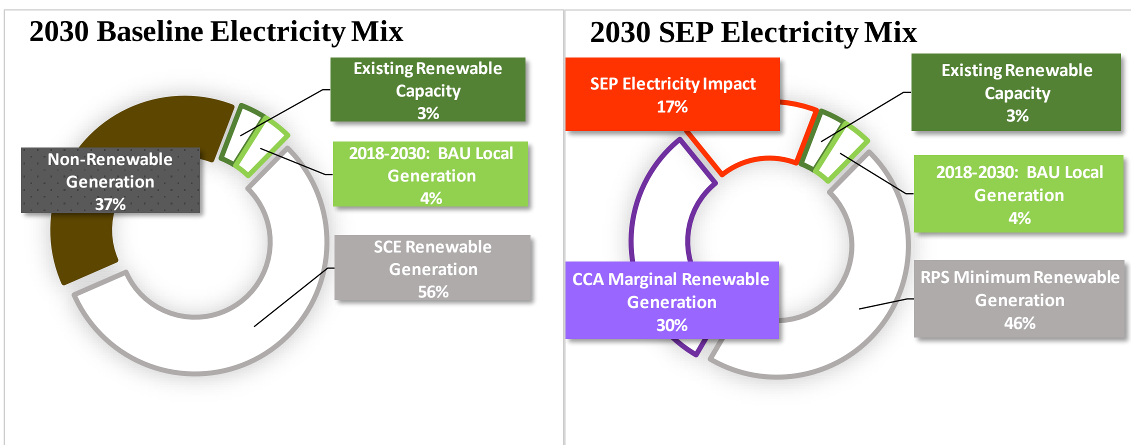

Figure 6.2: Projected 2030 Electricity Mix – Business as Usual vs SEP Scenario

Goleta is helped by two existing factors:

1) Due to strong state-wide action on energy efficiency, particularly on new construction, electricity demand is forecasted to decrease over the next 5-10 years, until electric vehicle load begins increasing and the decline in demand flattens.
2) Steadily increasing state-wide Renewables Portfolio Standard (RPS) requirements will increase the renewable electricity supply from SCE, even as demand decreases.

In addition, implementing the actions outlined in the SEP and establishing a CCA will bridge the remaining gap. This pathway assumes that a CCA would begin by offering 75% renewable electricity as a default rate, and slowly ramp up to 100% by 2030. To maximize financial viability, it would also slowly increase community enrollment by opening to different customer classes one by one.

If establishing a CCA is not viable in Goleta, one method of meeting its community goal locally would be for the City to increase its funding towards strategies, such as the Performance-Based Incentives, to increase their impact. However, this would likely be extremely expensive for the City. Alternatively, the City could purchase Renewable Electricity Certificates (RECs) from SCE or other sources on behalf of the community. RECs are tradable market-based commodities that represent the intangible renewable attribute of renewable electricity without the electricity itself.[80] While RECs would offset the non-renewable portion of the electricity supply to Goleta but would not necessarily result in additional renewable generation being installed, in Goleta or elsewhere. This solution also sacrifices all local economic and resilience benefits associated with new renewable generation developed in Goleta.

There are additional options for meeting Goleta's goal for its municipal facilities, due to the smaller number of sites and the control that the City has over them. These options include several new green programs proposed by SCE, such as the Green Tariff and the Green Direct program. However, the cost of these programs is uncertain, and both costs and benefits must be calculated on a case-by-case basis.

[80] US EPA, 'Renewable Energy Certificates (RECs)', 2018 <https://www.epa.gov/greenpower/renewable-energy-certificates-recs> [accessed 10 April 2019].

6.2 – Summary of the Carpinteria Strategic Energy Plan

Project Origin and Objectives

In an effort to address state and local emissions reduction goals, and in the wake of the 2017-2018 Thomas Fire and Montecito debris flows, the City of Carpinteria (City) partnered with the County of Santa Barbara and the City of Goleta to create the Strategic Energy Plan (SEP) in order to prepare for emergencies by improving the resiliency of the local electric distribution system. Increasing resiliency by promoting local renewable energy, energy efficiency, and energy storage projects will allow the residents and businesses in Carpinteria to reduce their dependence on the local electric distribution system and increase electricity reliability during power outages.

Due to Carpinteria's unique location close to the end of the Southern California Edison (SCE) electric service area, the emergency scenarios that are targeted by the SEP extend far beyond natural disasters. There is less resiliency at the end of the SCE power grid because most of the electric generation is coming from only one southeasterly direction, which places higher emphasis on reducing electrical load and hardening a few key sections of the power grid. Furthermore, the major Investor-Owned Utilities (IOUs), such as SCE, recently implemented a new protocol called the Public Safety Power Shutdown (PSPS)[81] as a measure to proactively prevent wildfires and other natural disasters. The PSPS would allow and require IOUs to turn off some of these key sections of the power grid upstream of Carpinteria during high-risk scenarios such as high-wind events, which could result in utility-induced power outages.

Additionally, in 2018, SCE released a Request for Proposals (RFP) for local generation to fulfill local capacity requirements around Carpinteria, but its "Least Cost Best Fit" selection methodology provided minimal consideration for the renewable content of energy.[82] As such, none of the selected projects included local renewable energy generation despite strong community interest in the development of local renewable resources.

Therefore, the objective of this SEP is to address these resiliency concerns by promoting local renewable energy development in three ways:

1) Identifying total resource potential for distributed solar development in Carpinteria on rooftops and parking lots;
2) Creating a list of priority sites for renewable energy development throughout Carpinteria; and
3) Developing a set of strategies to remove barriers to renewable energy development in diverse program areas ranging from drafting regulatory frameworks to creating new financing mechanisms.

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[81] Southern California Edison, 'SCE Proposes Grid Safety and Resiliency Program to Address the Growing Risk of Wildfires', 2018 <https://newsroom.edison.com/releases/sce-proposes-grid-safety-and-resiliency-program-to-address-the-growing-risk-of-wildfires> [accessed 10 April 2019].
[82] California Public Utilities Commission, 'Utility Scale Request for Offers (RFO)', 2019 <http://cpuc.ca.gov/Utility_Scale_RFO/> [accessed 10 April 2019].

Renewable Energy Potential in Carpinteria

Table 6.5 summarizes the estimated maximum solar potential in Carpinteria. Although most of the potential is on rooftops, roughly 17% of the potential is in parking lots, where solar carport structures could provide shade for vehicles while simultaneously creating energy. Due to Carpinteria's constrained geography and urban/suburban make-up, alternative renewable energy sources, such as wind, biogas/biomass, hydroelectric, and geothermal hold minimal potential for local development, and solar photovoltaic (PV) energy is the primary target for local renewable electricity generation.

Table 6.5: Distributed Solar Potential in Carpinteria

Solar Resource	Potential Generation Capacity (MW)	Potential Annual Generation (GWh)	Households Powered
Rooftop	**31 – 39**	**42 – 57**	**15,000 – 20,000**
Parking Lots	**7 – 8**	**9 – 12**	**3,000 – 4,000**
Total	**38 – 47**	**51 – 69**	**18,000 – 24,000**

Recommended Sites for Development - Public & Private Site Analysis

This section provides a summary of the public and private sites in the City of Goleta identified, analyzed and recommended for solar development through the SEP process. A full analysis of the public sites can be found in the City of Goleta's SEP. As with the sites located in the unincorporated County, all private sites included below are anonymized to protect the privacy of the site owners as City/County staff work directly with them to explore development.

Table 6.6: Site Summary

ID	Name	Priority Score	Site Type	Interconnection	System Size (kW-DC)	Energy Output (kWh/year)
Carpinteria Municipal Potential Solar Site(s)						
1	Carpinteria City Hall	A	Municipal Roof / Carport	Behind meter	137.2	221,664
Total Maximum PV Production at Municipal Site(s)					**137.2**	**221,664**
Total Recommended PV Production for Municipal Site(s) (A+B)					**137.2**	**221,664**
Carpinteria Community Potential Solar Sites						
2	Public – Commercial 1	A	Rooftop	Behind Meter	105.7	163,000
3	Public – Commercial 2	A	Rooftop	Behind Meter	165.2	252,000
4	Public – Commercial 3	A	Rooftop / Carport	Behind Meter	1,090.0	1,720,000
5	Public – Commercial 4	A	Rooftop	Behind Meter	403.9	651,000

6	Public – Commercial 5	B	Rooftop / Carport	Behind Meter	173.6	270,000
7	Public – Commercial 6	C	Rooftop / Ground-Mount	Behind Meter	32.2	52,000
8	Private – Commercial 1	A	Rooftop	Behind Meter	632.5	948,000
9	Private – Commercial 2	B	Rooftop	Front of Meter	776.7	1,160,000
10	Private – Commercial 3	A	Rooftop / Carport	Behind Meter	426.0	653,200
11	Private – MF Residential 1	A	Rooftop / Carport	Behind Meter	175.0	294,000
	Total Maximum PV Production at Community Sites				**3,980.8**	**6,163,200**
	Total Recommended PV Production for ALL Sites (A+B)				**4,085.8**	**6,332,864**

Barriers to Renewable Energy Development in Carpinteria

Table 6.7, on the following page, summarizes the key barriers to renewable energy development that were identified in Carpinteria. These barriers were determined through engaging both City staff and members of the Carpinteria community, including regional renewable energy project developers, through public workshops, individual communications, and feedback opportunities on draft versions of the SEP. Although some of these barriers are state or federal concerns, such as the decrease in federal tax credits, many are unique to, or heightened in, Carpinteria.

Table 6.7: Barriers to Renewable Energy Development in Carpinteria

Type of Barrier	Barrier(s)	Description
Property Ownership	Split Incentive	Landlords do not have any incentive to make energy improvements on behalf of tenants.
	Load Constraints and Rooftop Leasing Challenges	Many high-potential areas do not have the load to install a maximum-sized array & rooftop leases do not provide enough financial benefit to make up for the additional liability.
Financial / Funding	Financing Mechanisms	Several programs to help finance energy projects have not achieved desired objectives
	Altered Time-of-Use (ToU) Rate Schedules	Changes in electricity rates are will lower the value of solar generation.
	Funding Sources	The City is over-reliant on funding from utilities.
Institutional / City	Energy Assurance Plan (EAP)	The City does not have a formal EAP to ensure electricity reliability at critical facilities.
	Regional Collaboration	There is limited regional framework for municipal collaboration on energy, climate, and resiliency issues in Santa Barbara County.

	Public Awareness	Cost Awareness of Renewable Energy	Public awareness of the costs & benefits of renewable energy can be outdated due to technology improvements and changing electricity rates and programs.
	Regulatory / Utility	SCE RFP Process	SCE's RFP process for increasing local electrical resiliency does not place additional value on renewable energy.
	Technical / Infrastructural	Distribution Grid	Parts of the distribution grid in downtown Carpinteria may not be able to interconnect additional renewable electricity due to low-capacity infrastructure.
		Solar Automatic Shut-Off	Solar panels without backup inverters or battery storage must be shut off for safety reasons and not provide power during outages.
	State and Federal Policy	Federal Investment Tax Credits (ITC)	The federal ITC is currently planned to drop down and then phase out, which will reduce project viability.

Recommended Actions to Overcome Barriers

The strategies in Table 6.8 were developed to directly target the specific barriers identified in Carpinteria. These strategies span five major program areas: (1) regulatory policy-driven actions to drive new local development, (2) actions aimed at changing the electricity supply to Carpinteria, (3) actions related to increasing options for financing renewable projects, (4) actions to address electricity usage and supply at City facilities, and (5) actions related to outreach and advocacy both inside and outside Carpinteria.

Table 6.8: Recommended Actions to Overcome Renewable Energy Barriers in Carpinteria

Program Areas	Strategies	Description
Regulatory	Create Solar and Storage Permitting Procedures	Update residential and small commercial solar ordinances to go beyond AB2188 and AB546 regulations.
	Commercial Building Energy Benchmarks	Institute energy benchmarks for large commercial buildings to encourage commercial building owners to undertake energy projects.
Utility	Backup Inverter Program	Supply backup inverters for critical circuit operation during power outages.
	Community Solar Project	Develop a community solar project for those without access to on-site renewable energy.
Financial and Funding	Financing Mechanisms	Create an improved Property-Assessed Clean Energy (PACE) or On-Bill Financing (OBF) program for residents to finance projects.
	Financial Incentives	Provide financial incentives to fill gaps in project viability.
	Diversify Funding Streams	Monitor and apply for regional, state, federal and foundation grants.
City Facility	Energy Assurance Plan	Create and implement an energy assurance plan to ensure electrical reliability at critical facilities.
Outreach and Advocacy	One-Stop Shop	Support a county-wide resource and education center to raise awareness and act as a hub for advertising energy programs.

Appendix A: Detailed Urban Statistical Solar Analysis Description

A ground-up statistical analysis of rooftop and parking lot solar potential was conducted to estimate distributed solar energy potential in Santa Barbara County. This appendix will discuss the methodology for determining the potential in the unincorporated county specifically. Incorporated cities were analyzed separately, and then the unincorporated county was split into three areas:

- Area 1: Orcutt
- Area 2: Isla Vista, excluding portions under the jurisdiction of the University of California Santa Barbara (UCSB)
- Area 3: All remaining unincorporated urban land, including but not limited to Montecito and Summerland

Unincorporated agricultural land was not considered for this distributed solar potential study. Solar potential on agricultural land will be discussed in Appendix B. This split was decided based on building density and type. Isla Vista, while very small, is extremely dense, as it has a high proportion of multi-family housing and commercial properties. In comparison, Area 3 was the largest, but was also the least dense and comprised largely of single-family residential units. The methodology for Area 1, Orcutt, will be examined in deeper detail.

It should be noted that as part of the SEP process, individual analyses were also conducted for Goleta and Carpinteria. Those analyses are described in detail in their respective SEPs.

Area 1: Orcutt

A total of 484 representative rooftops and 241 representative carport locations were measured, and the resulting solar potential scaled to the full unincorporated community. To conduct this analysis, the township was divided into 2 zones based on geography, zoning types, and building stock, shown in Figure AA.1.

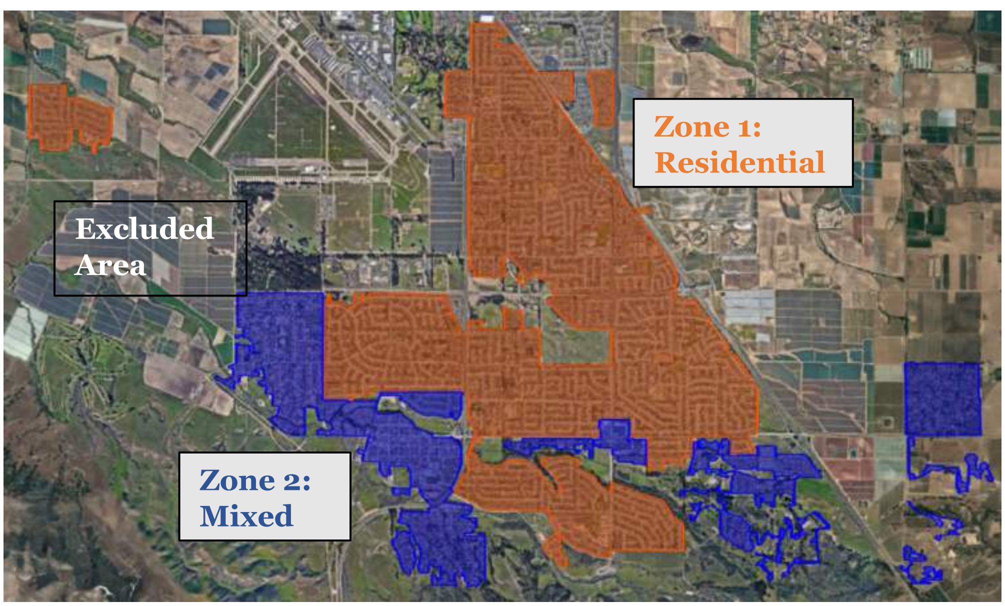

Figure AA.1: Statistical Solar Zones in Orcutt

These zones were defined using the County zoning maps and aerial imaging to visibly confirm boundaries of building type and density. The two zones included one residential zone and one mixed zone. The two zones differed from each other in their building and parking lot density and roof structure.

Importantly, the boundaries of these sample zones did not exactly follow traditional Orcutt limits, to exclude areas containing large spaces unusable for solar PV installations. Since this methodology scaled PV potential based on the physical size of the zones, including these areas would have overestimated solar potential. For example, large areas in the west part of Orcutt were excluded, since they were primarily being used for agricultural purposes. However, where possible to determine, areas that were undeveloped but set to become developed were included. As such, the analysis accounts for future development within the current Orcutt area.

Within each zone, a representative sample of 10 blocks was selected. These blocks were chosen to best reflect both building density and solar access within the entire zone. This is shown in more detail in Figure AA.2.

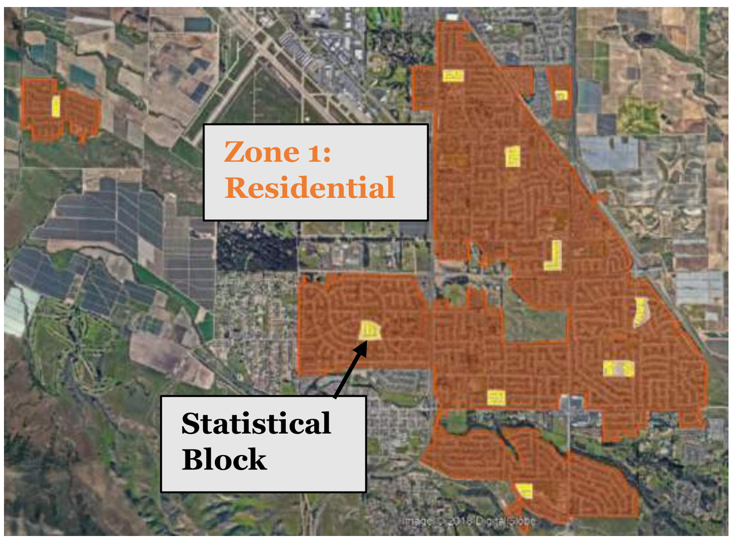

Figure AA.2: Residential Solar Zone with Statistical Blocks

The blocks varied in both area and the number of buildings. The residential zone was larger in area compared to the mixed zone, but with lower building density and higher shading, as well as much less carport potential. The average block had roughly 19 structures and 6 potential carport locations, whereas the densest block had 48 structures and 28 potential carport locations. Within each block, the number of shaded and unshaded buildings and carport locations were measured, as per Figure AA.3.

Figure AA.3: Statistical Samples in a Block

The Table AA.1 below provides a summary of the estimated area of each zone and the number of structures:

Table AA.1: Statistical Structural Estimates in Orcutt

Zone	Area (sq. miles)	Measured Structures	Total Structures (est.)	Measured Carports	Total Carports (est.)
Zone 1: Residential	4.80	284	~9750	6	~200
Zone 2: Mixed	1.82	200	~1950	8	~100
TOTAL	6.62	484	~11700	14	~300

Figure AA.4 shows the structural distribution by size on a community-wide scale. Small and medium structures dominate, with almost no large structure. Gaps occur in the measured structure data for medium sized buildings due to smaller sample sizes at this square footage. This does not necessarily mean that there are no structures of those sizes; most likely, there would be a re-distribution of the surrounding medium-sized buildings to fill in those gaps. This low sample size increases the potential variance in solar potential for buildings of those sizes.

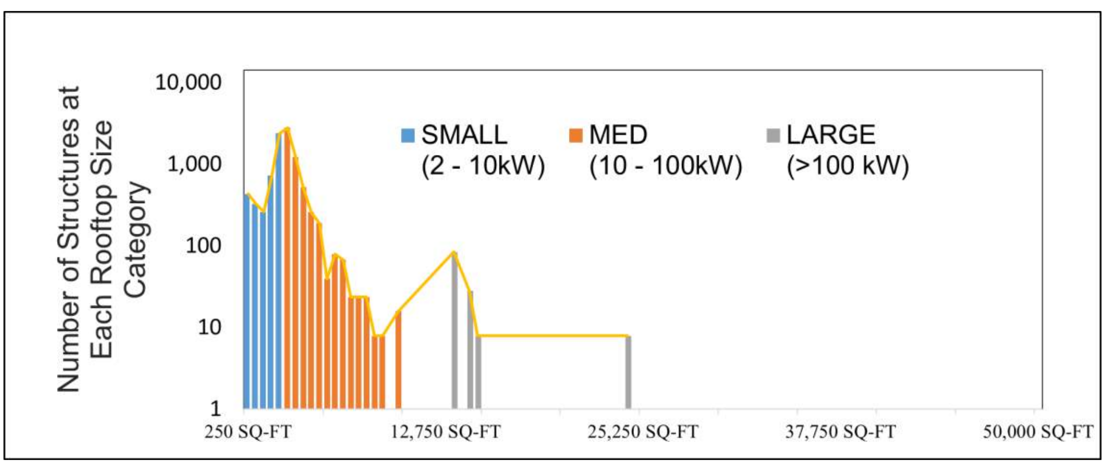

Figure AA.4: Estimated Distribution of Structures by Rooftop Size in Orcutt

The roof/parking lot area of each structure and the number of them ill-suited for solar PV systems due to shading or poor roof orientation were catalogued and categorized. After discounting for these losses, the total usable rooftop area of each block was calculated. The usable area from each block was summed, and then scaled up to define the total usable area of the whole zone.

Once the total area was known, the solar potential could be calculated. Fill factors were applied to the roof area to account for the fact that solar cannot cover the entire roof. The fill factors used were based on Optony generalized experience at each rooftop size: 10% - 30% for small roofs (defined as roofs <2500 ft^2), since residential roofs are typically pitched and have only one face available, 54% - 66% for medium roofs (<11000 ft^2), 66% - 70% for large roofs (>11000 ft^2), and 80% for carports. These fill factors yield a total solar coverage area, and from there, standard efficiency solar modules (15% - 20%) were assumed in calculating the total solar potential. Within the statistical model, the results were categorized by building area, providing a picture of system size distribution throughout the city, shown in Figure AA.5. As with building size, gaps would likely be filled by redistributing the surrounding potential over that space. While there are fewer buildings at larger sizes, there is also greater potential per building. Therefore, in comparison with building size, solar potential stays mostly flat at higher building sizes.

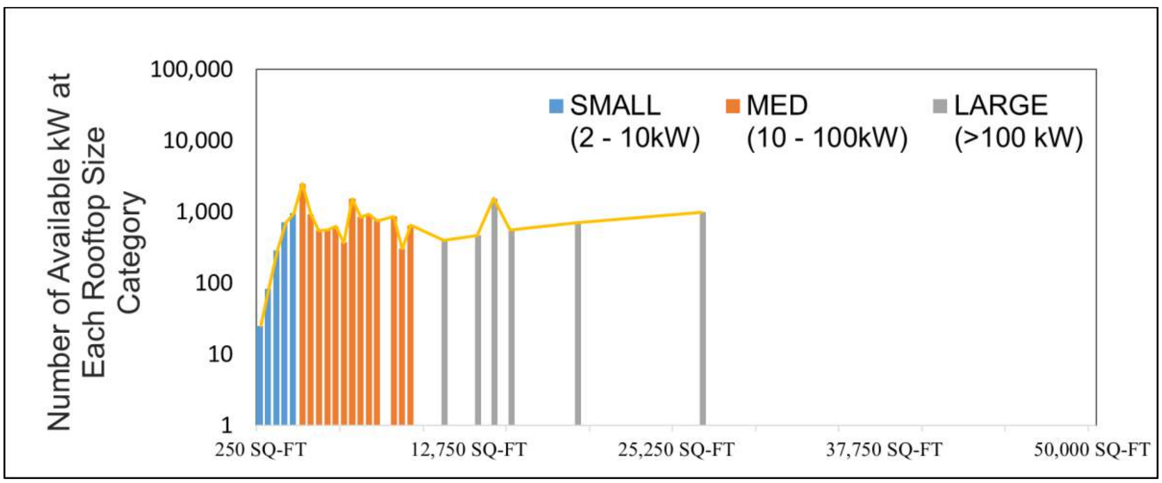

Figure AA.5: Estimated Distribution of Solar Potential by Rooftop Size in Orcutt

Total community-wide rooftop solar potential, assuming every single viable rooftop and parking lot installed solar PV, was calculated through this method to be roughly 183 MW, equating to generation potential of 256,200 MWh. The breakdown of potential by sector is summarized below. It is important to note, however, that achieving 100% participation is unrealistic. Even among viable rooftops and parking lots, many sites will not be able to install solar due to load, electrical, or structural constraints that cannot be determined through aerial imagery. As such, participation factors have been added that attempt to account for these. Residential systems use much lower participation since they are generally less able to bear electrical or structural upgrade costs. The final estimated realistic potential is summarized in Table AA.2.

Table AA.2: Orcutt Solar Summary

Project Type	Maximum Potential (MW)	Participation	Final Potential (MW)
Residential	20 – 20	25 – 35%	5 – 7
Small - Medium Commercial	151 – 164	55 – 65%	83 – 107
Carports	3 – 4	55 – 65%	2 – 2
TOTAL	174 – 288	52 – 62%	90 – 116

Area 2: Isla Vista (non-UCSB)

The analysis for Isla Vista followed a very similar pattern to that used for Orcutt. Rather than repeating the methodology description, key data and figures are presented below summarizing the zones, structural data, and solar potential. Figure AA.6 shows the two zones in Isla Vista, which include one residential zone and one commercial zone. The commercial zone includes multi-unit residential buildings which are common in communities with high levels of student housing.

Figure AA.6: Statistical Solar Zones in Isla Vista

Table AA.3 summarizes the estimated area of each zone and the number of measured and estimated structures and carports in each zone. One of the key results of the high density of Isla Vista is that the total number of carports were estimated to be on the same scale as Orcutt, despite the community being less than 10% the physical size of Orcutt.

Table AA.3: Statistical Structural Estimates in Isla Vista

Zone	Area (sq. miles)	Measured Structures	Total Structures (est.)	Measured Carports	Total Carports (est.)
Zone 1: Residential	0.14	166	~550	3	~10
Zone 2: Commercial	0.28	111	~550	35	~200
TOTAL	0.42	277	~1100	38	~210

Table AA.4 summarizes the total solar potential in Isla Vista. Due to the size of the city, the overall potential is small, but very high from a density perspective. Isla Vista has a solar density of approximately 26 MW/square mile (mi²), compared to roughly 15 MW/mi² in Orcutt.

Table AA.4: Isla Vista Solar Summary

Project Type	Maximum Potential (MW)	Participation	Final Potential (MW)
Residential	2 – 2	25 – 35%	1 – 1
Commercial	15 – 17	55 – 65%	8 – 11
Carports	2 – 2	55 – 65%	1 – 1
TOTAL	19 – 20	52 – 62%	10 – 12

Area 3: Other Unincorporated Urban Land (incl. Montecito, Summerland, etc.)

The analysis for Area 3 also followed a very similar pattern to that used for Orcutt and Isla Vista. Rather than repeating the methodology description, key data and figures are presented below summarizing the zones, structural data, and solar potential. Figure AA.7 shows the two zones in Area 3, which are both residential. One zone (red) features more dense housing, whereas the second zone (blue) features more suburban, less dense housing.

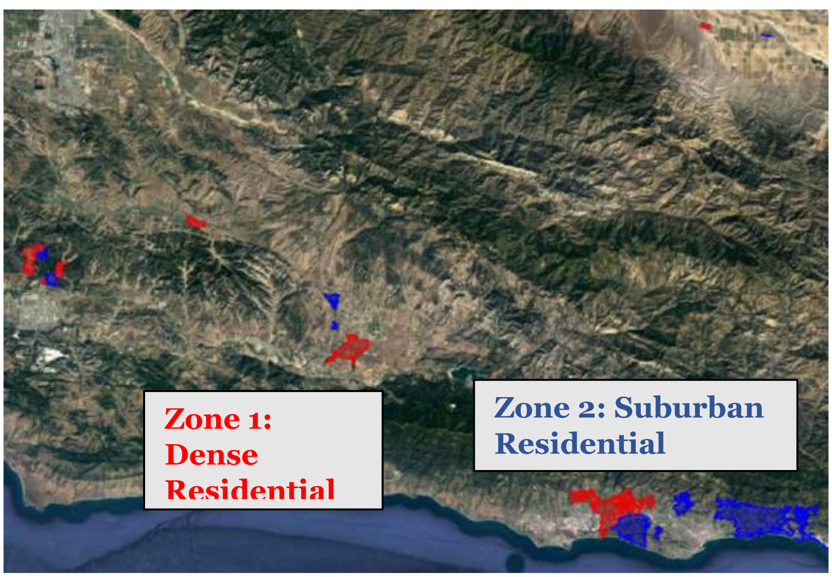

Figure AA.7: Statistical Solar Zones in Isla Vista

Table AA.5 summarizes the estimated area of each zone and the number of measured and estimated structures and carports in each zone. One of the key results is the extremely low density of this Area overall, even in Zone 1.

Table AA.5: Statistical Structural Estimates in Other Unincorporated Urban Areas

	Area (sq. miles)	Measured Structures	Total Structures (est.)	Measured Carports	Total Carports (est.)
Zone 1: Dense Residential	9.03	280	~16,150	17	~1,000
Zone 2: Suburban Residential	13.86	285	~12,250	1	~50
TOTAL	22.89	565	~28,400	18	~1,050

Table AA.6 summarizes the total solar potential in Area 3. One key difference in this analysis is the lower commercial participation factor. Because commercial structures were weighted heavily to the smaller side, small to medium commercial used a participation factor ranging from only 40% - 50%, rather than 55% - 65% (note that the commercial participation factor shown below is a blended average of small and large commercial installations). Area 3 has a solar density of only roughly 7 MW/mi².

Table AA.6: Other Unincorporated Urban Area Solar Summary

Project Type	Maximum Potential (MW)	Participation	Final Potential (MW)
Residential	38 – 38	25 – 35%	9 – 13
Commercial	257 – 266	43 – 53%	111 – 141
Carports	20 – 23	55 – 65%	11 – 13
TOTAL	318 – 327	42 – 52%	133 – 167

Costs

Levelized costs of energy can also be estimated but depend heavily on capital cost assumptions. Levelized costs indicate the average cost of procuring that energy system, spread out over its lifetime generation. Different sources report very different installation costs. Based on NREL data,[83] avoided utility energy costs, or levelized benefits, exceed levelized solar costs at every size, whereas based on LBNL data,[84] utility energy costs are lower than levelized solar costs even for large systems. In contrast, Optony historical data from past consulting experience indicates costs between LBNL and NREL data for medium and large systems, but higher costs for small systems. This comparison is shown in Figure AA.8. PG&E electricity rates and solar pricing is not shown

[83] Fu et al., "U . S . Solar Photovoltaic System Cost Benchmark : Q1 2017 U . S . Solar Photovoltaic System Cost Benchmark : Q1 2017."
[84] Lawrence Berkeley National Laboratory, "Tracking the Sun."

here, but Optony data indicates that solar pricing is higher than in SCE service territory, possibly due to higher PG&E retail electricity rates allowing for higher solar developer margins.

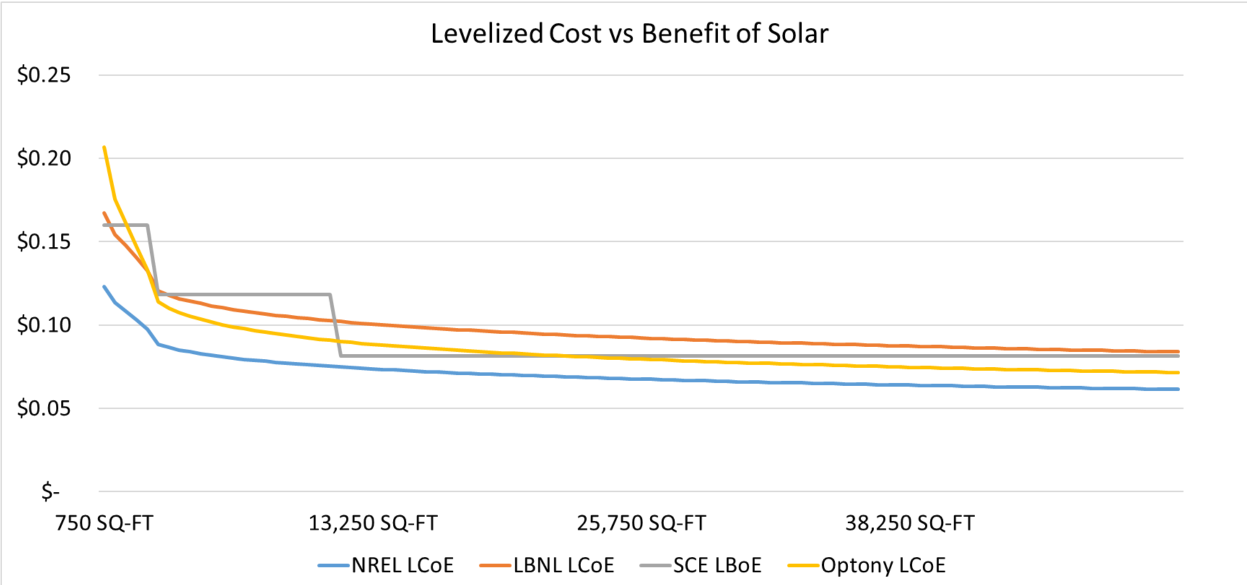

Figure AA.8: Cost vs Benefit of Solar Installations

Distribution Grid Constraints

Lastly, Figure AA.9 shows how local SCE distribution-level feeder constraints on wholesale renewable energy map onto the various solar zones in the unincorporated southern county. Identified constraints on these feeders would not necessarily prevent the interconnection of solar projects aimed at reducing on-site consumption, but could hinder development of electricity generated for the purpose of selling to the utility or the wholesale electricity market.

Red feeders have immediate constraints, orange feeders may face constraints in the short-medium term, and green feeders are not expected to face constraints in the short-medium term. There are no constraints in the short term on any feeders in the unincorporated southern Santa Barbara County.

Figure AA.9: Southern Santa Barbara County Distribution System Renewable Capacity

Similar maps are not yet available in a helpful manner for the northern Santa Barbara County in PG&E utility territory. The lack of usefulness of the PG&E integration connection analysis (ICA) maps is discussed in the SEP as a barrier for wholesale renewable energy development in those areas.

Some final notes and assumptions associated with the numbers in this report:

- Estimates include only shade-free and "correctly" oriented roofs (shaded and north-oriented roofs are counted as unviable in these results).
- This analysis does not account for systems that may need to be downsized for budgetary reasons.
- The solar fill factor on each roof accounts for good design principles. Only south-facing residential roofs are considered, and for larger flat roofs, space is left open for existing equipment and obstructions. A setback from the roof edge is maintained on all structures.
- Does not discount totals for existing solar installations, so this number represents the total realistic rooftop capacity (not incremental additional capacity), including the already existing solar capacity within the limits of each studied community.

Appendix B: Detailed Agricultural Statistical Solar Analysis Description

High-Level Zoning Filter

A ground-up statistical analysis of agricultural parcels was conducted to estimate utility-scale solar potential on agricultural land in Santa Barbara County. To conduct this analysis, a series of filters were first applied to screen out the major types of land that would not be suitable for agricultural solar development. These included rare animal habitats (blue), urban land (lavender), and federal land (dark pink), which is comprised of Vandenberg Air Force Base and Los Padres National Forest. These filters are shown in Figure AB.1.

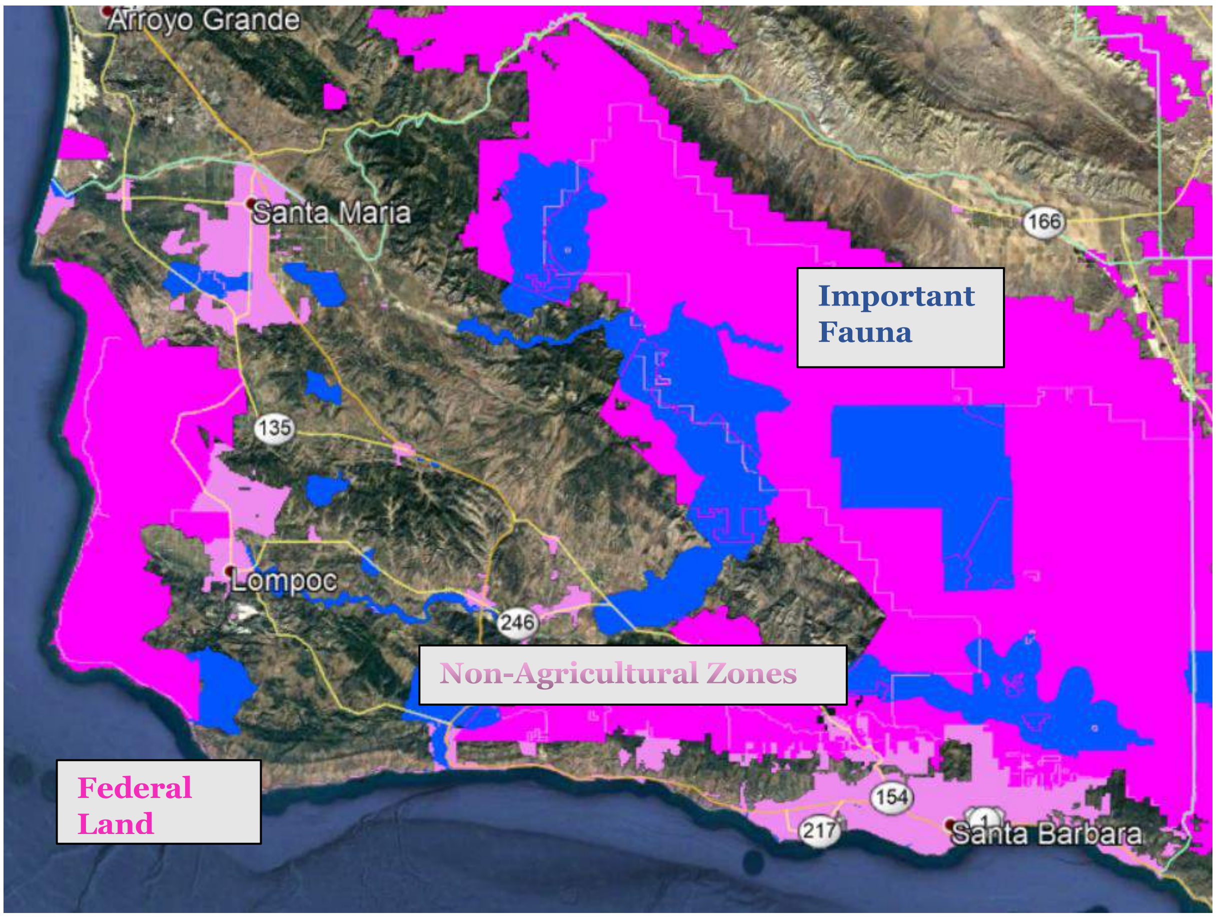

Figure AB.1: Agricultural Exclusions for Renewable Energy Generation

All remaining agricultural areas of the County were divided into 5 zones based on geography, terrain, and regulatory context, shown in Figure AB.2. These five zones were: (1) North – Williamson (shown in orange), (2) North-Flat – Non-Williamson (purple), (3) North-Hilly – Non-Williamson (blue), (4) South – Williamson (red), and (5) South – Non-Williamson (hilly and flat lands, shown in green). Ten representative sample blocks were taken from each zone (shown as white squares). These sample blocks were used to determine the average solar potential per block, which was then scaled to the entire size of the zone.

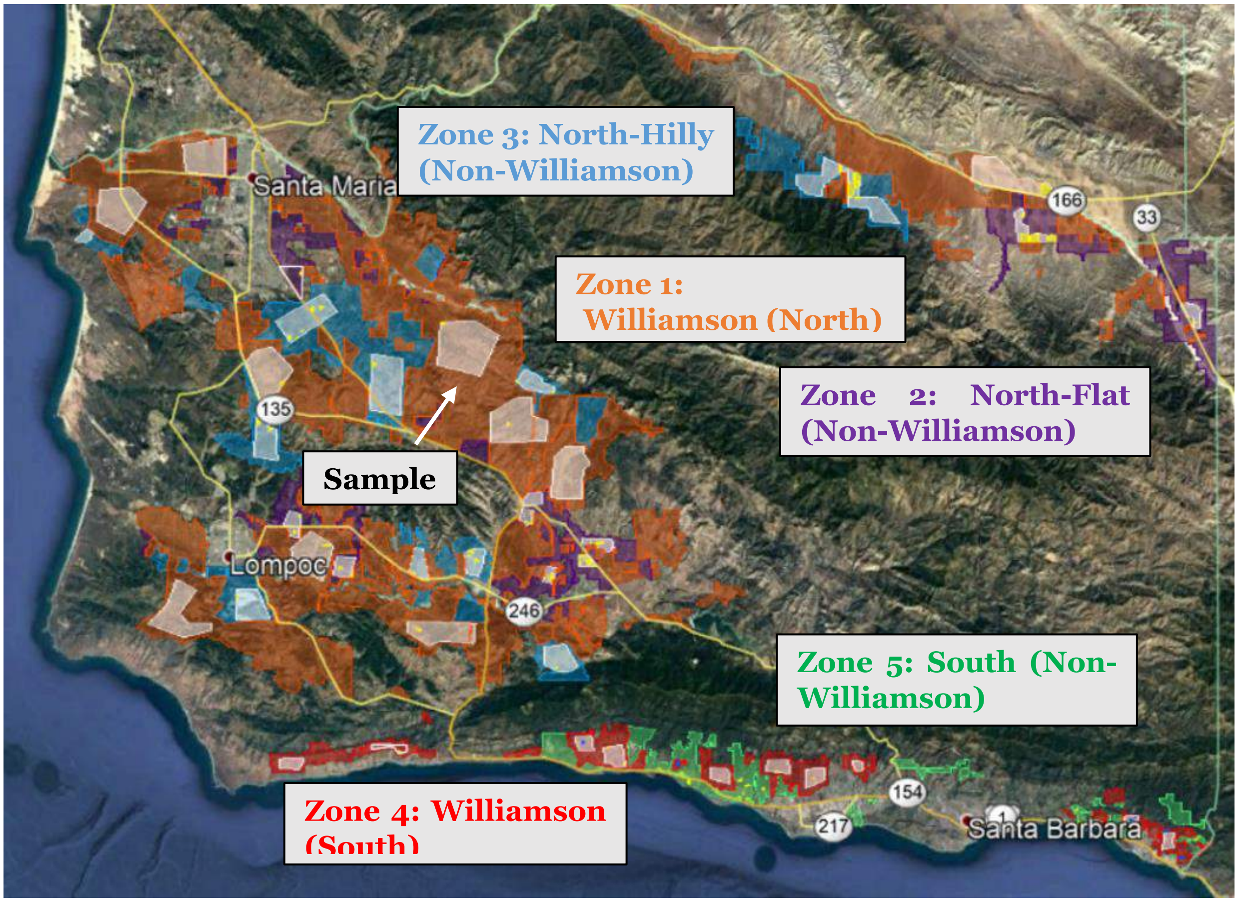

Figure AB.2: Statistical Agricultural Solar Zones

Splitting land by North vs South was critical due to the different utilities serving the two areas. Separating out land under the Williamson Act was also critical due to the current permit barriers placed around developing utility-scale solar on this type of land. Lastly, land was split by topography in northern Santa Barbara County. While flat land is much more suited for solar development, it is also much more suited for agricultural production, so a much greater portion of these lands are already cultivated. Therefore, a similar scale of potential is available in both hilly and flat land. Non-Williamson Act land was not split by topography in southern Santa Barbara County due to the much smaller availability of land suitable for renewable energy development. These zones were defined using aerial imaging and Williamson Act zoning maps to determine topography and terrain.

Sample Block Solar Potential

Following the filtering of lands described above, a further series of screens was conducted to eliminate area in each sample block in each zone. Figure AB.3 shows a sample block in the Williamson North zone prior to any determination of viable solar siting.

Figure AB.3: Basic Sample Block in the Williamson North Zone

Transmission Filter

Transmission interconnection is an important step in utility-scale solar project development. Sites that are within a mile of the transmission grid are ideal, sites that are within three miles of the transmission grid are possible, and sites greater than three miles away are generally rejected. However, good design principles and a weighing of additional costs play a factor here. A site that is outside this radius could still be accepted if the site is large enough to make up for the additional transmission cost. In comparison, a project would face much larger obstacles from a rare animal habitat in the form of public opposition and mitigation requirements for a permit. For this reason, the transmission filter was not included in the high-level filtering. Figure AB.4 shows the same sample block from Figure AB.3, with a map of transmission distance overlaid onto it.

Figure AB.4: Sample Block with Transmission Overlay

An inspection of the block indicates that the upper-right (northeast) portion of the block is too far from the transmission grid, with the land immediately outside the three-mile radius largely unviable due to terrain. Therefore, no solar capacity was estimated in that portion of the block.

Flood Risk Filter

Minimizing risk of flooding damage is less important than minimizing transmission interconnection costs, but still key to reducing insurance costs for the system. As with transmission, these higher insurance costs may be worth paying for a large project. The Cuyama Solar Array, for example, is located in a region of medium flood risk. The National Flood Hazard Layer (NFHL) from FEMA was used to inspect flooding potential in each block. This layer had to be applied on a block-by-block basis due to the extreme granularity of the GIS layer- it was not visible on a County-wide scale. Figure AB.5 shows the previous sample block with the NFHL applied.

Figure AB.5: Sample Block with NFHL Overlay

This block was entirely in a low to moderate risk flooding area, so flood risk did not reduce siting in this case. However, there were some regions of high flood risk both north and south of this block.

Agricultural Productivity and Terrain Filter

Lastly, the remaining portions of each block were inspected to rule out hilly areas and land with existing crops. This could only be determined at a very granular scale. Figure AB.6 shows the sample block marked to denote these areas, as well as the remaining siting potential. After these areas were excluded, only two small parcels remained with no identified issues, roughly 5 – 10 acres in size each. At approximately 0.2 – 0.4 MW/acre, the two parcels, combined, could generate somewhere between 2 – 4 MW of solar.

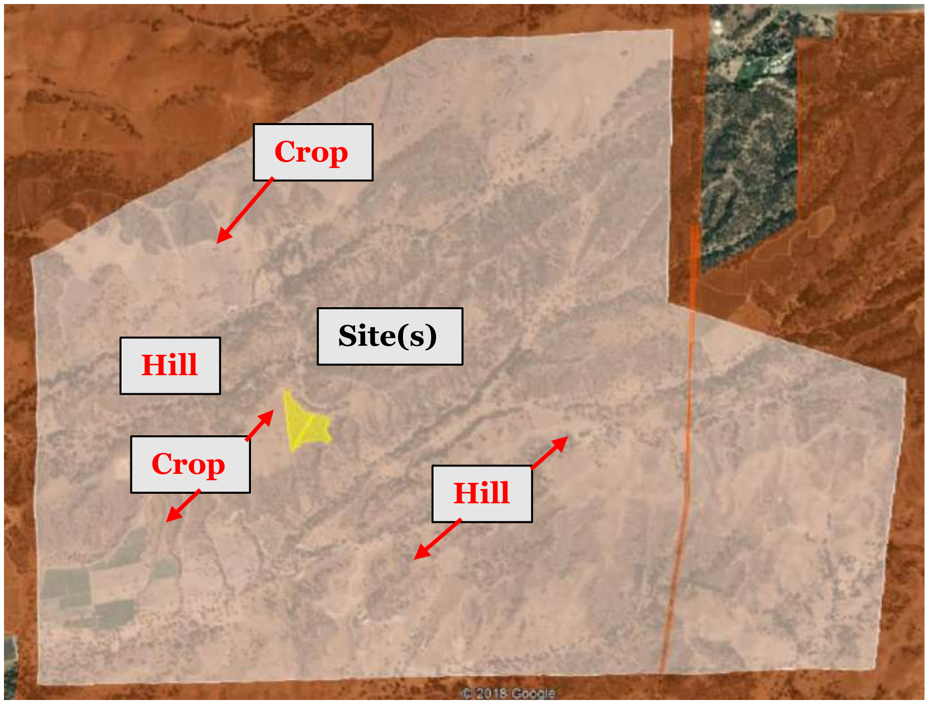

Figure AB.6: Sample Block with Agricultural and Terrain Exclusions and Siting

A similarly rigorous process was conducted for each sample block, with many blocks having no solar siting potential at all. Due to the very large amount of space that was being extrapolated onto, and the very small number of sites across the samples, there was a high variance in the average solar potential per block, and therefore a high variance in the total solar potential across all zones.

Agricultural Solar Summary

Table AB.1 summarizes the results of this statistical analysis.

Table AB.1: Agricultural Solar Summary

Area	Land Type	Maximum Generation Capacity (MW)	Final Generation Capacity (MW)	Annual Generation (GWh)
North County	(1) Williamson Act	340 – 510	34 – 102	48 – 194
	(2) Flat Land (Non-Williamson)	1,090 – 1,435	109 – 287	152 – 545
	(3) Hilly Land (Non-Williamson)	450 – 560	45 – 112	63 – 213
South County	(4) Williamson Act	0 – 10	0 – 2	0 – 4
	(5) Non-Williamson (flat and hilly)	~50	5 – 10	7 – 19
Grand Total		**1,930 – 2,565**	**193 – 513**	**270 – 975**

Participation factors were much lower compared to the urban statistical analysis due to the much greater difficulty of developing utility-scale projects, particularly very large ones. Sites under 15 acres, or 3 MW, used participation factors of 25% - 35%, while sites over 15 acres used participation factors of 5% - 15%. This resulted in a blended participation factor of approximately 10% - 20%. Furthermore, utility-scale systems can be either fixed-tilt or installed with trackers. Fixed tilt systems remain stationary, and therefore see a traditional parabolic solar curve that peaks at solar noon. Systems with trackers can rotate to follow the sun angle throughout the day, thereby maintaining a close-to-peak power output for much of the day. As such, utility-scale systems have a much higher variation in solar yield per panel than smaller systems, ranging from an annual generation of 1,400 MWh/MW to 1,900 MWh/MW in Santa Barbara County.

As expected, due to topography, generation potential in northern Santa Barbara County greatly outstrips potential in southern Santa Barbara County. Due to the parameters of this analysis excluding dual-use projects and with the inability to identify land that is no longer agriculturally productive, Williamson Act land potential is estimated to be only one-fifth of the overall potential in the County.

Appendix C: Detailed Wind Turbine Siting Description

High-Level Filtering

The first step in wind project siting is finding a location with high wind speeds. Generally, an average annual wind speed of at least 7 m/s is required to site a utility-scale wind turbine for commercial viability. Figure AC.1 shows a map of average wind speeds across Santa Barbara County, from NREL's Wind Prospector.[85]

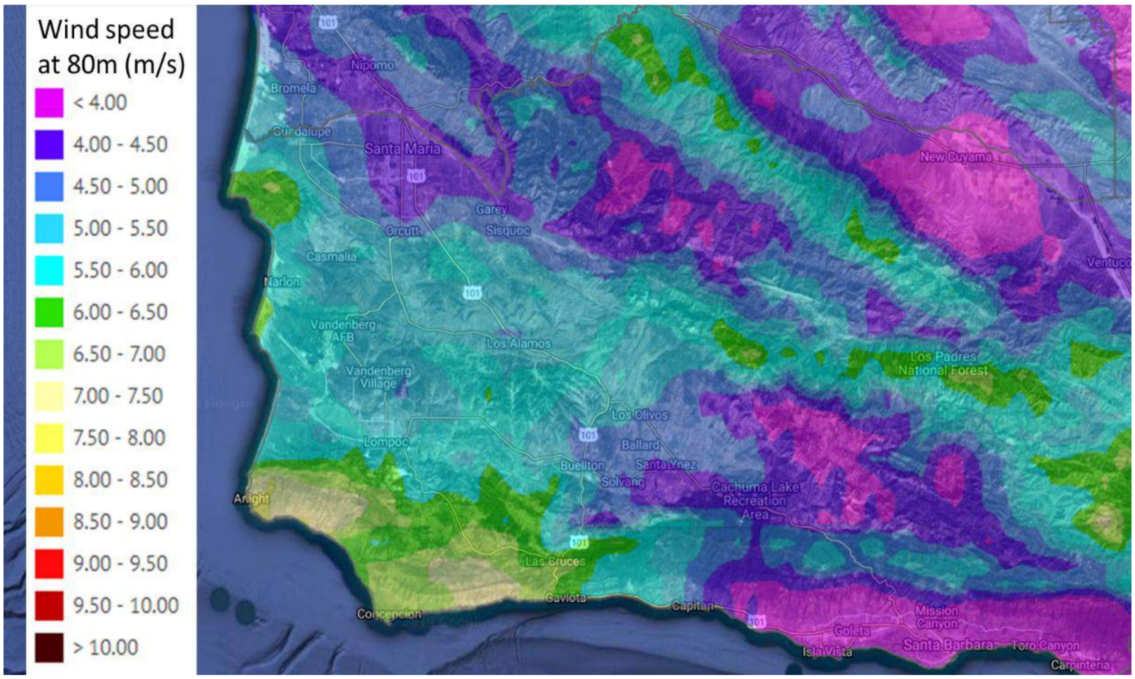

Figure AC.1: Average Annual Wind Speeds in Santa Barbara County

It is evident that only the portion in the southwest corner of Santa Barbara County is viable for wind energy development. However, these areas also overlap heavily with Vandenberg Air Force Base, the restricted Gaviota Coast, the Jack and Laura Dangermond Preserve, and protected animal habitats, as identified in Figure AB.1. Once these exclusions were applied and hilly terrain was excluded, only a very small amount of land southwest of Lompoc was left for wind turbine siting in the entire county. As with utility-scale solar siting, this land was split into two zones based on regulatory requirements: Non-Williamson (blue) and Williamson Act (red) land. These two zones are shown in Figure AC.2.

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[85] National Renewable Energy Laboratory, "Wind Maps."

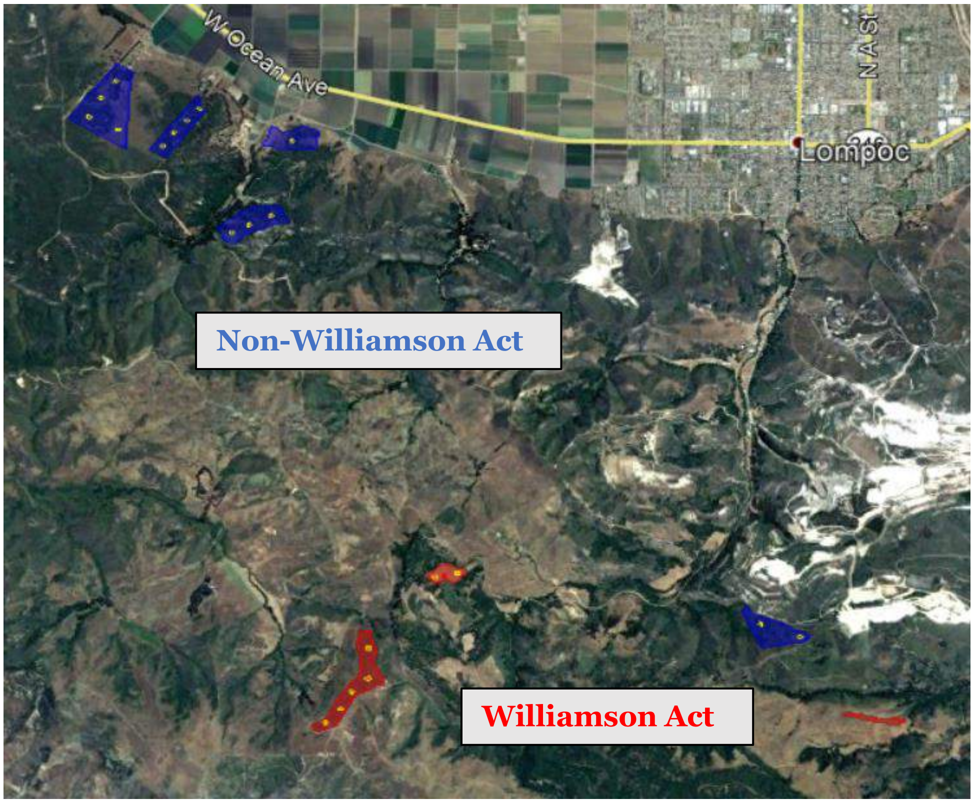

Figure AC.2: Wind-Eligible Areas in Santa Barbara County

Wind Turbine Siting Principles

Due to the small amount of land remaining, each land area was inspected individually for wind turbine siting rather than conducting a statistical analysis as was done for solar potential. The following design principles were used:

- 2 MW turbines with a rotor diameter (D) of 290 ft were used. These turbines are on the low range of commercially available utility-scale turbines, due to space constraints in Santa Barbara County.
- Turbines located perpendicular to the prevailing wind direction were spaced four rotor diameter lengths apart (4D).
- Turbines located parallel to the prevailing wind direction[86] were spaced six rotor diameter lengths apart (6D).
- A setback of two rotor diameter lengths (2D) from the closest turbine was used.

Figure AC.3 shows a sample wind turbine siting.

[86] National Oceanic and Atmospheric Administration, "Wind Map."

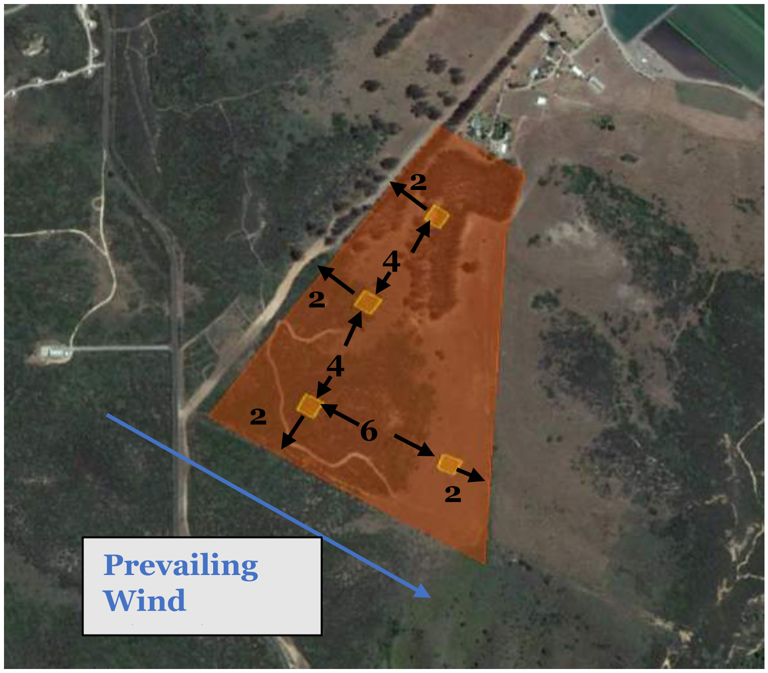

Figure AC.3: Sample Wind Turbine Siting

Wind Turbine Potential Summary

Similar to solar potential estimation, however, participation factors are necessary to account for factors that cannot be estimated visually. For wind turbines, a particularly important concern due to their size and visibility is public backlash. The wind turbines in the sample above are fairly close to residents and farms, for example, and could easily face a backlash that would shut down the project. The site above would also likely need tree cutting to clear space. However, due to the small number of sites, achieving high penetration would also be easier than for solar. As such, a participation factor range of 50% - 100% was used. To translate peak capacity into annual energy generation, it was assumed that the turbines would be able to operate at their peak capacity between 25% - 35% of the time, based on historic capacity factor data. Table AC.1 summarizes the total estimated realistic wind energy potential.

Table AC.1: Santa Barbara County Wind Potential Summary

Land Type	Maximum Number of Turbines	Maximum Generation Capacity (MW)	Final Generation Capacity (MW)	Annual Generation (GWh)
Non-Williamson Act	14	28	14 – 28	30 – 86
Williamson Act	7	14	7 – 14	15 – 43
Grand Total	**21**	**42**	**193 – 513**	**46 – 129**

Appendix D: Detailed Biogas/Biomass Potential Analysis

The purpose of this appendix is to describe in detail the methods used to estimate biogas and biomass electricity generation potential in Santa Barbara County.

Two main sources of biogas potential were identified:

- Landfill biogas, primarily from the decomposition of manure and food processing waste such as from fruits, vegetables, and wineries
- Wastewater biogas, created as a by-product at wastewater treatment facilities

Similarly, three main sources of biomass waste potential were identified:

- Waste from forestry operations, such as forest thinning, forest slash, shrub, and mill residue
- Waste from agricultural production in Santa Barbara County, including strawberries, broccoli, wine grapes, cauliflower, head lettuce, celery, raspberries, leaf lettuce, and avocado
- Landfill biosolids such as paper, cardboard, lumber, leaves, branches, and food waste

Biogas and biomass potential are treated together due to sharing a common major data source-the 2017 California Biomass Resource Assessments. These assessments, conducted for the California Energy Commission by the California Biomass Collaborative at UC Davis, estimated the total available biomass and biogas resource in each county in California for many of these sources, as well as the technically recoverable amount and the energy that could be generated from it. The technically recoverable resource was used for the purposes of the SEP, as well as data on heating values and thermal to electric conversion.[87]

Landfill Biogas

Tables AD.1 and AD.2 summarize the calculation for available annual electricity generation of manure biogas and food waste biogas. The mass of the resource is given in bone dry tons (BDT). This measure is often used in bioenergy calculations because the resource often carries a great deal of variable water weight. Dealing in BDTs enables a fair comparison.

Table AD.1: Manure Biogas Annual Electricity Generation

Source	Technical Biomass (BDT/yr)	Chemical Energy Content (kWh/ton)	Available Annual Biogas Energy (GWh)	Biochemical to Electric Efficiency	Annual Electricity Generation Potential (GWh)
Beef Cow Manure	8,300	4,347	36	10% - 13%	4 – 5
Other Cattle Manure	6,100	4,198	26	10% - 13%	2 – 3
Grand Total	**14,400**	**4,284**	**193 – 513**	**10% - 13%**	**6 – 8**

[87] California Biomass Collaborative, "Renewable Energy Resource, Technology, and Economic Assessments."

Table AD.2: Food Waste Biogas Annual Electricity Generation Potential

Source	Technical Biomass (BDT/yr)	Thermal Energy Content (kWh/ton)	Available Annual Thermal Energy (GWh)	Thermal to Electric Efficiency	Annual Electricity Generation Potential (GWh)
Fruits and Vegetables	50	3,780	0.2	25% - 35%	~0
Wineries	2,560	3,861	10	25% - 35%	3 – 4
Grand Total	**21**	**42**	**193 – 513**	**25% - 35%**	**3 – 4**

Once the total available annual electricity generation was determined, historical capacity factors for the amount of time biogas generation produced over a year were used to calculate an equivalent power capacity. Unlike other renewable generation such as solar and wind, biogas power output is uniform. This calculation is presented in Table AD.3.

Table AD.3: Manure and Food Waste Biogas Uniform Power Potential

Source	Annual Electricity Generation Potential (GWh)	Capacity Factor	Uniform Electric Power (MW)
Beef Cow Manure	4 – 5	55% - 65%	1 – 1
Other Cattle Manure	2 – 3	55% - 65%	0 – 1
Fruits and Vegetables	~0	55% - 65%	~0
Wineries	3 – 4	55% - 65%	0 – 1
Grand Total	**9 – 12**	**42**	**1 – 3**

Wastewater Biogas

Wastewater (WW) biogas potential information was limited in the Resource Assessments. A final potential was provided of less than 1 MW. To roughly verify this, wastewater potential power was estimated by scaling up the wastewater biogas potential at the Laguna wastewater plant serving Orcutt to the population of the entire Santa Barbara County. This calculation is shown in Table AD.4.

Table AD.4: Wastewater Biogas Annual Electricity Generation and Power Potential

Source	Orcutt WW Electric Capacity (kW)	Santa Barbara County – Orcutt Population Ratio	Uniform Electric Power (MW)	Capacity Factor	Annual Electricity Generation Potential (GWh)
Wastewater	90	~13	~1	55% - 65%	6 – 7
Grand Total	**90**	**~13**	**~1**	**55% - 65%**	**6 – 7**

Wood Waste Biomass

The Resource Assessments provided data on BDT of technically available biomass per year. Tables AD.5 and AD.6 summarize the calculations converting that to annual electricity generation and then uniform power.

Table AD.5: Wood Waste Biomass Annual Electricity Generation Potential

Source	Technical Biomass (BDT/yr)	Thermal Energy Content (kWh/ton)	Available Annual Thermal Energy (GWh)	Thermal to Electric Efficiency	Annual Electricity Generation Potential (GWh)
Forest Thinnings	2,100	5,292	11	25% - 35%	3 – 4
Forest Slash	39,200	5,292	207	25% - 35%	52 – 73
Shrub	37,600	5,040	190	25% - 35%	47 – 66
Mill Residue	4,000	5,040	20	25% - 35%	5 – 7
Grand Total	**82,900**	**5,165**	**428**	**25% - 35%**	**107 – 150**

Table AD.6: Wood Waste Biomass Uniform Power Potential

Source	Annual Electricity Generation Potential (GWh)	Capacity Factor	Uniform Electric Power (MW)
Forest Thinnings	3 – 4	55% - 65%	0 – 1
Forest Slash	52 – 73	55% - 65%	9 – 15
Shrub	47 – 66	55% - 65%	8 – 14
Mill Residue	5 – 7	55% - 65%	1 – 1
Grand Total	**107 – 150**	**55% - 65%**	**19 – 31**

Agricultural Waste Biomass

This potential was calculated slightly differently, using the Santa Barbara Crop Report instead to determine the total amount of crop of each type growth every year. From there, estimates were taken for the amount of shrink, or associated waste, for each crop. The calculation uses a 6% - 8% shrink assumption (so, 6% - 8% of total agricultural production is lost when producing a crop) and a 70% - 80% utilization of this shrink. This shrink was then converted to thermal energy using an energy content of 4,536 kWh/ton, and then electrical energy. Tables AD.7 and AD.8 summarize the calculations converting that waste material to uniform power output.

Table AD.7: Agricultural Waste Biomass Annual Electricity Generation Potential

Source	Harvested Crops (BDT/yr)	Estimated Available Shrink (BDT/yr)	Available Annual Thermal Energy (GWh)	Thermal to Electric Efficiency	Annual Electricity Generation Potential (GWh)
Strawberries	6,810	304	1,380	25% - 35%	0 – 1
Broccoli	147,126	6,574	29,818	25% - 35%	7 – 16

Wine Grapes	72,690	3,248	14,732	25% - 35%	4 – 8
Cauliflower	91,060	4,069	18,455	25% - 35%	5 – 10
Head Lettuce	177,903	7,949	36,055	25% - 35%	9 – 20
Celery	131,405	5,871	26,632	25% - 35%	7 – 15
Raspberries	6,737	301	1,365	25% - 35%	0 – 1
Leaf Lettuce	53,782	2,403	10,900	25% - 35%	3 – 6
Avocado	10,494	469	2,127	25% - 35%	1 – 1
Grand Total	**698007**	**31,188**	**141,464**	**25% - 35%**	**36 - 77**

Table AD.8: Agricultural Waste Biomass Uniform Power Potential

Source	Annual Electricity Generation Potential (GWh)	Capacity Factor	Uniform Electric Power (MW)
Strawberries	0 – 1	55% - 65%	~0
Broccoli	7 – 16	55% - 65%	1 – 3
Wine Grapes	4 – 8	55% - 65%	1 – 2
Cauliflower	5 – 10	55% - 65%	1 – 2
Head Lettuce	9 – 20	55% - 65%	2 – 4
Celery	7 – 15	55% - 65%	~1 – 3
Raspberries	0 – 1	55% - 65%	~0
Leaf Lettuce	3 – 6	55% - 65%	0 – 1
Avocado	1 – 1	55% - 65%	~0
Grand Total	**36 - 77**	**55% - 65%**	**6 – 16**

Landfill Biomass

The Resource Assessments provided data on BDT of technically available biomass from wood waste per year. Tables AD.9 and AD.10 summarize the calculations converting that to annual electricity generation and then uniform power.

Table AD.9: Wood Waste Biomass Annual Electricity Generation Potential

Source	Technical Biomass (BDT/yr)	Thermal Energy Content (kWh/ton)	Available Annual Thermal Energy (GWh)	Thermal to Electric Efficiency	Annual Electricity Generation Potential (GWh)
Paper/Cardboard	37,788	4,486	170	25% - 35%	42 – 59
C&D Lumber	30,954	4,864	151	25% - 35%	38 – 53
Leaves, Grass	3,692	3,780	14	25% - 35%	3 – 5
Prunings & Trimmings	7,042	3,780	27	25% - 35%	7 – 9

Branches & Stumps	871	3,780	3	25% - 35%	1 – 1
Other	10,050	2,243	23	25% - 35%	6 – 8
Food Waste	11,256	3,528	40	25% - 35%	10 – 14
Grand Total	**101,653**	**4,192**	**426**	**25% - 35%**	**107 – 150**

Table AD.10: Wood Waste Biomass Uniform Power Potential

Source	Annual Electricity Generation Potential (GWh)	Capacity Factor	Uniform Electric Power (MW)
Paper/Cardboard	42 – 59	55% - 65%	7 – 12
C&D Lumber	38 – 53	55% - 65%	7 – 11
Leaves, Grass	3 – 5	55% - 65%	1 – 1
Prunings & Trimmings	7 – 9	55% - 65%	1 – 2
Branches & Stumps	1 – 1	55% - 65%	~0
Other	6 – 8	55% - 65%	1 – 2
Food Waste	10 – 14	55% - 65%	2 – 3
Grand Total	**107 – 150**	**55% - 65%**	**19 – 31**

Appendix E: Detailed Hydro Potential Analysis

The purpose of this appendix is to describe the methodology to determine the potential hydroelectric power in Santa Barbara County. Hydroelectric power (hydro) has its highest potential at large dams and reservoirs which have high flow rates and large changes in elevation, also known as head. This constraint limits large projects to a relatively small number of sites. As such, an individual potential analysis was done for each dam and reservoir in the county. The National Inventory of Dams was used as the primary source of data for this analysis.[88]

Dam/Reservoir Site Analysis

Without access to water basin maps to determine the flow into each site, total potential was estimated by comparing the head at each site to the head at the only installed hydroelectric project in Santa Barbara County, the 820-kW project at Gibraltar Dam. To account for differing flows, a "flow variation factor" was defined to estimate the ratio of the flow at each dam to the flow at Gibraltar. Factors were split based on their location: dams that were on the Santa Ynez River like Gibraltar Dam had higher factors, and dams that were on other rivers such as the Alisal Creek had lower factors. Each dam also used a capacity factor of 25% - 35% based on historical averages.[89] Table AE.1 summarizes the results of this analysis:

Table AE.1: Hydroelectric Power Potential

Dam	River	Dam Height (ft)	Flow Variation Factor	Power / head (kW/ft)	Electric Power (kW)	Annual Electricity Generation (MWh)
Gibraltar	Santa Ynez River	169	100%	4.85	820	1,874
Juncal	Santa Ynez River	160	75% - 125%	3.64 – 6.07	582 – 970	1,020 – 2,550
Rancho del Ciervo	San Jose Creek	65	25% - 35%	1.21 – 1.70	32 – 158	55 – 414
Dos Pueblos	Dos Pueblos Creek	78	25% - 35%	1.21 – 1.70	38 – 189	66 – 497
Alisal Creek	Alisal Creek	93	25% - 35%	1.21 – 1.70	45 – 226	79 – 593
Santa Monica Debris Basin	Santa Monica Creek	102	25% - 35%	1.21 – 1.70	49 – 247	87 – 650
Edwards Reservoir	Gato Creek	120	25% - 35%	1.21 – 1.70	58 – 291	102 – 765
Bradbury	Santa Ynez River	279	75% - 125%	3.64 – 6.07	1,015 – 1,692	1,779 – 4,447
Glen Annie	Glen Annie Canyon Creek	135	25% - 35%	1.21 – 1.70	66 – 328	115 – 861
Lauro	Diablo Creek	137	25% - 35%	1.21 – 1.70	66 – 332	116 – 873
Ortega	Santa Ynez River	131	75% - 125%	3.64 – 6.07	477 – 795	835 – 2,088
Grand Total		**4,192**	**46% - 85%**	**2.21 – 4.12**	**3,248 – 6,048**	**6,129 – 15,613**

88 US Army Corps of Engineers, "National Inventory of Dams (NID)."

89 US Energy Information Administration, "Electric Power Monthly with Data for December 2013."

Appendix F: Detailed Geothermal Potential Analysis

The purpose of this appendix is to describe the methodology used to determine the potential geothermal electric power in Santa Barbara County. Geothermal power requires an underground hot water reservoir or steam geysers. No steam geysers have been identified in Santa Barbara County, so this study focuses solely on power capacity at hot springs.

Higher temperature reservoirs have a greater electricity potential because more heat can be extracted from them. Since geothermal power involves extracting heat from a fluid being circulated through the reservoir. As such, the temperature of the reservoir needs to be at least as high as the temperature of the source fluid. Additionally, more heat can also be extracted from reservoirs with higher flow rates.

A thermal analysis was conducted to calculate the maximum amount of heat that could be extracted from each hot spring if a source fluid of 35 C was used. Carnot, or theoretical maximum, efficiencies of 80% - 90% were used to account for realistic equipment efficiencies to calculate a technically viable amount of extractable heat. Following that, thermal to electric conversion efficiencies of 25% - 35% were used to convert to an electrical power capacity. Lastly, historic average capacity factors of 70% - 80% were used to convert to an annual electricity generation. Only hot springs with a temperature greater than that source fluid were evaluated. The results are summarized in Table AF.1.

Table AF.1: Hot Springs in Santa Barbara County

Hot Springs	Temp. (C)	Flow Rate (L/s)	Maximum Thermal Work (kW)	Viable Thermal Work (kW)	Electric Power Potential (kW)	Annual Electricity Generation (MWh)
Las Cruces	36	58	8	7 – 8	2 – 3	10
San Marcos	43	303	456	365 – 410	91 – 144	559
Montecito	48	300	856	685 – 770	171 – 270	1,050
Agua Caliente	56	760	4,283	3,427 – 3,855	857 – 1,349	5,253
Grand Total		**4,192**	**5,603**	**4,482 – 5,043**	**1,121 – 1,765**	**6,872 – 12,369**

Appendix G: Solar Site Feasibility Methodology and Assumptions

Technical Assessment Methodology

- A proprietary approach to performing a solar site technical analysis was used, which involves dynamic scenario creation and evaluation processes along with publicly and privately developed software and tools to determine all the relevant variables and trade-offs between options. These tools may include Helioscope, PVsyst, Measure Map Pro, Google Earth, AutoCAD, and others.
- Solar access is defined as the availability of direct sunlight that reaches the photovoltaic panels. A higher solar access percentage reflects fewer shading obstructions. Shading obstructions may include surrounding buildings, mechanical and other equipment on rooftops, architectural features of the building, tall trees, and other surrounding vegetation. To calculate available space at each site, the site is visited, where possible, with available areas compared to aerial views from Google Earth.
- Optony uses industry standard tools as well as proprietary financial modeling software with local utility rate schedules and typical meteorological year (TMY) 3 data, and neutral to conservative inflation, renewable energy certificate/credit, and Investment Tax Credit assumptions in all financial modeling. This approach allows Optony to present the client with realistic forecasting that reduces risks and estimates realistic project returns.
- Project timing is very important in the overall economics of a solar system installation due to the time-sensitive nature of the various federal, state, utility, and local incentives. Projects have been analyzed based on construction completing in 2020.
- Emissions reductions are based on metric tons of CO_2 equivalent, which includes the impact of other greenhouse gases such as methane that are also released. Reductions were estimated based on the difference between emissions factors for solar projects and emissions factors for the relevant IOU. SCE reported an emissions factor of 0.249 $mtCO_2e$/MWh for 2017. PG&E reported an emissions factor of 0.133 $mtCO_2e$/MWh in 2016. An emissions factor of 0.048 $mtCO_2e$/MWh was used for solar generation, which accounts for the life cycle costs of producing the solar panels, even though no emissions are generated at point-of-use.

Financial Assumptions

The assumptions and price points used in the financial modeling are based on current local market conditions in Santa Barbara as of June 2019, for a mid-range scenario. While conservative and aggressive scenarios have also been analyzed, the results are not included in this report.

- **Utility Supply and Delivery Rates:** Obtained from customer's electricity bills and/or utility tariff.
- **Utility Escalation Rate:** 3% per year. While difficult to predict on a year-to-year basis, 3% is the approximate long-term (40+ year) historical average.
- **O&M Cost:** $3/kW/yr.
- **O&M Escalation Rate:** 0%.
- **Panel Degradation Rate:** 0.5% per year. This is the industry average for well-maintained systems.
- **Discount Rate:** A discount rate of 6.5% was used to account for the time-value of money.

Appendix H: Key Terms and Definitions

Building Electrification: The conversion of natural gas loads in buildings to electricity loads. It is most commonly achieved by converting furnaces, boilers, and other equipment used for space and hot water heating to electric heat pumps and is a key strategy to reduce emissions. While solar thermal projects also reduce natural gas use, they are generally not included under the umbrella of building electrification as they do not result in a significant electricity load.

California Energy Commission (CEC): Formally the State Energy Resources Conservation and Development Commission, headquartered in Sacramento, this agency was created in 1974 to address energy challenges facing the state. The Commission provides technical guidance, performs stakeholder outreach and coordination, and administers grant funding.

California Public Utilities Commission (CPUC): The state regulatory agency that sets rules and performs oversight on privately-owned public utilities and some aspects of CCA, including approval of formation.

California Solar Rights Act: The California Solar Rights Act was originally passed in 1978 and is a combination of California Civil Code Sections 714 and 714.1, California Civil Code Section 801, California Civil Code Section 801.5, California Government Code Section 65850.5, California Health and Safety Code Section 17959.1, California Government Code Section 66475.3, and California Government Code Section 66473.1. The Act codifies a citizen's right to solar access and right to install a solar system by limiting installation restrictions placed on solar systems.

Community Solar: A large, or community-scale (defined as 1-10 MW in capacity in the SEP), solar installation or set of installations that residents and businesses can subscribe to for the purposes of receiving local solar electricity or credits, particularly if their own sites are unsuitable for solar development. It can also provide other community benefits, such as resiliency, if connected at the appropriate point in the distribution system and if other features such as battery storage are present.

Community Choice Aggregation (CCA): Also called Community Choice Energy, or CCE, a form of electric power procurement, enabled in 2002 under Assembly Bill 117, in which a city or county (or joint powers agency) serves residents, businesses and municipal facilities within its jurisdiction by taking over the responsibility of aggregating electricity supply from the existing Investor Owned Utility.

Design Integrated Permitting: This is a form of permitting where solar designs that adhere to a set of pre-approved design parameters and conditions are automatically eligible receive a municipal permit, thereby reducing permitting time and costs. These designs can potentially also be integrated into commercially available solar design software, which would ensure permit approval by preventing vendors from creating project designs that do not adhere to the guidelines.

Distributed Energy Resources (DERs): Small renewable energy and energy efficiency devices that are interconnected to the grid in a decentralized manner and provide more local energy control and reduce reliance on the utility. The category of DERs can also include services such as Demand Response (DR), when many electrical loads are aggregated and reduced in response to a grid signal.

Energy Benchmarking: A policy or program for comparing energy use of buildings or appliances with the goal of achieving reductions in usage. On a building scale, it is typically defined as energy intensity on a square foot basis to acknowledge that larger buildings use more energy.

Energy Storage: A technology that can store energy to be used at a later point in time. For the context of the SEP, storage is particularly relevant when paired with renewable energy sources, since many renewable energy sources are intermittent.

Full-Time Equivalent (FTE): Staffing by the number of hours a full-time employee would work over the course of a year. This is taken to be approximately 2,000 hours.

Grid Assistive Design: Grid assistive design refers to the ability of properly controlled DERs to provide services in support of the electricity grid, both during normal operation and emergency situations. Usually, DERs, such as rooftop solar, are load-following and automatically power themselves down when the grid is deenergized. Resources designed to island will automatically disconnect from a deenergized electricity grid and continue operating. Grid assistive design allows DERs to function in either of these modes and to be dispatched or automatically provide responsive support and services to the grid during either normal operation or a period of emergency.

Home Energy Score: Developed by the US Department of Energy, the Home Energy Score is a measure that provides homeowners, renters, and prospective buyers with a score that credibly indicates the energy use of a home. The calculation of this score is standardized to enable direct comparison between various homes, similar to fuel efficiency ratings for cars.

Interconnection: The process through which an energy resource is connected to the grid according to applications, permissions, approvals, inspections etc. as required by utility procedures.

kV: A unit of voltage that describes the electric potential at a given point. A traditional wall outlet provides 120 V. 1000 volts (V) equals 1 kilovolt (kV). When multiplied by the electricity current, it provides power.

kW/MW: A unit of power that describes the amount of energy being used at any given moment in time. A traditional incandescent lightbulb uses approximately 60-100 W. 1000 watts (W) equals 1 kilowatt (kW), and 1000 kW equals 1 megawatt (MW).

kWh/MWh: Units that describe the energy used by load or produced by a generator over a given period of time. For example, 1 kilowatt-hour (kWh) is the energy consumed by a 1 kW load over 1 hour. 1000 kWh equals 1 megawatt-hour (MWh), and 1000 MWh equals 1 gigawatt-hour (GWh).

Microgrid: A miniature electric grid consisting of DERs that can connect or disconnect to and from the utility grid as necessary. This enables buildings and loads served by the microgrid to operate independently of the utility grid in power outage events if there are sufficient energy resources on the microgrid.

Public Safety Power Shutoff: A new utility protocol enabling and requiring utilities to proactively turn off electricity movement on transmission lines in advance of dangerous weather, such as high winds, to protect against forest fires and other natural disasters. This policy could result in blackouts for customers served by these transmission lines.

Reliability: In the context of electricity, the consistency in providing high-quality energy at all times, in terms of both voltage and frequency, as required by applicable regulatory standards.

Regional Energy Network (REN): Partnerships of county and local governments who deliver or coordinate energy efficiency programs, often for hard-to-reach populations. RENs are approved, regulated, and largely funded by the CPUC.

Resilience: In the context of electricity, the ability of an electricity system–whether on a local or utility scale–to maintain reliable service for the purposes of public safety by withstanding disruptions, responding to faults, and recovering rapidly from failures.

Utility-scale solar: Solar projects that are developed specifically to provide electricity to the transmission grid. They are generally at least 10 MW in size.

Water-energy nexus: The connection between the resources and equipment that deliver water and those that deliver electricity. For example, water is used to create electricity through hydroelectric power; and electricity is used to treat, convey, and create potable water. The resiliency, reliability, and cost of electric resources affect sites in the water distribution system which require substantial amounts of electricity to operate; thus, the price and availability of one resource is inseparably linked to the price and availability of the other resource.

Zero-net-energy (ZNE): Used to describe a building that generates as much or more energy as it uses. Achieving ZNE is primarily focused on reducing energy use and self-generating the remaining need through on-site renewable energy.

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