Strategic Energy Plan: City of Goleta

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June 25, 2019

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Executive Summary

ES.1 – 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.[1] 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).[2] 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 Offers (RFO) to fulfill local capacity requirements, but its "Least Cost Best Fit" selection methodology provided no additional consideration for the renewable content of energy.[3] 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:

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

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[1] 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].

[2] 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].

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

ES.2 – Renewable Energy Potential in Goleta

Table ES.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 ES.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

ES.3 – 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 ES.2: 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 RFO Process	SCE's RFO 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.

ES.4 – Recommended Actions to Overcome Barriers

The strategies in Table ES.3 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 ES.3: 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 RFO 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 regional energy programs.	0.1%

ES.5 – 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)[4] 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 ES.1.

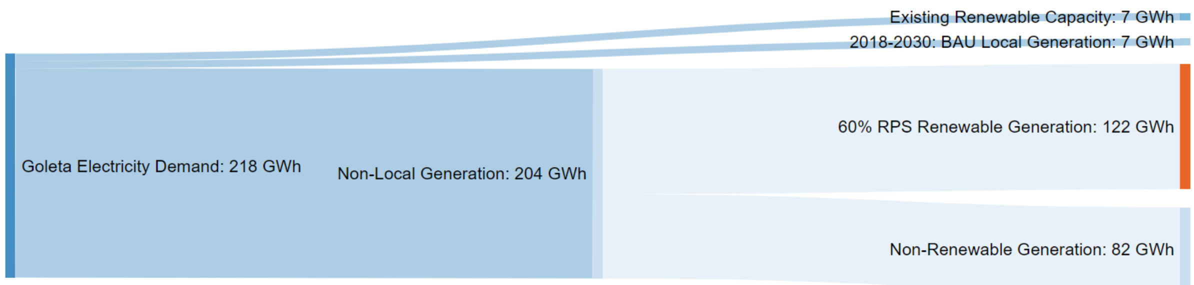
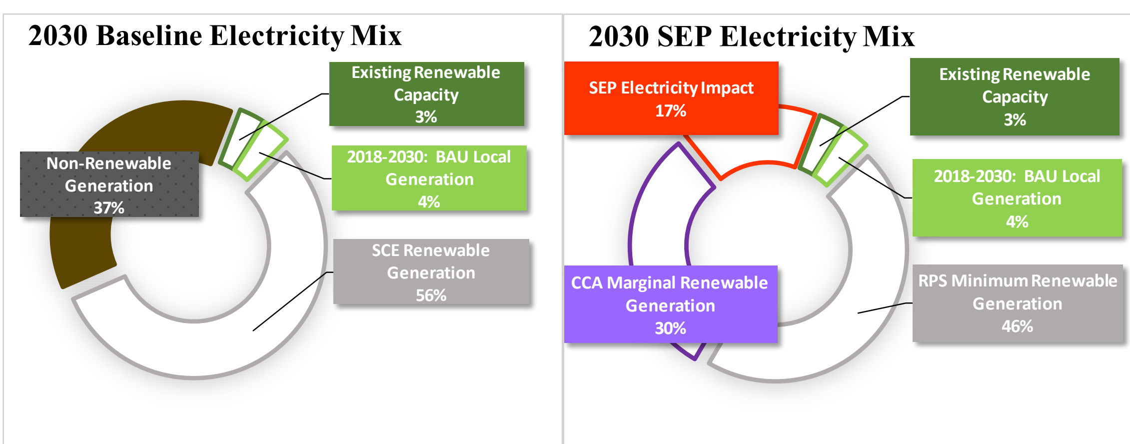


Figure ES.1: Goleta Electricity Demand Flow Chart – Business as Usual Scenario

Figure ES.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.



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

Figure ES.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.[5] 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.

ES.6 – Call to Action

The City of Goleta, both its government and its citizens, has taken a bold and ambitious step to commit to a 100% renewable electricity supply by 2030. Although Goleta has a challenging road ahead, strong and immediate action by both the City and the community can result in Goleta meeting its 100% renewable electricity goal by 2030. Strong financial commitment and collaboration internally and externally is necessary for Goleta to take control of its energy future and dictate its path towards meeting its energy, climate, and resiliency goals.

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

Chapter 1 – Introduction

1.1 – Benefits of a Strategic Energy Plan (SEP)

1.1.1 - 100% Renewable Electricity Goals

In December 2017, the City of Goleta passed a resolution to power the entire city with renewable electricity by 2030, as well as all the City's municipal facilities with renewable electricity by 2025.[6] In taking its renewable energy future into its own hands, the City of Goleta joined the Cities of Santa Barbara and Monterey to become the third city on the Central Coast of California, and one of 109 cities across the country, to pass this goal.[7] The main objective of the SEP is to help the City meet this 100% renewable electricity goal by identifying long-term trends in Goleta's electricity demand, renewable energy deployment, and energy efficiency implementation to determine the forecasted gap and to suggest a list of recommendations to assist the City in bridging this gap.

1.1.2 – Local Prioritization & Available Options

There are several ways in which the city can meet its 100% renewable electricity goal, though the different pathways to reach that goal produce different impacts on the local grid and community resilience. A focus of the SEP will be to prioritize policy measures and strategies that result in locally-sited renewable energy and energy efficiency deployment to achieve these goals.

The most common method for cities in California without municipal utilities to meet renewable energy goals is through a Community Choice Aggregation (CCA) energy supplier. Forming a CCA allows cities to procure their own energy supply while leaving operation of the distribution and transmission grid to the local investor-owned utility (IOU).[8] Although forming a CCA is the most straightforward method to achieving these goals, recent rules passed by the California Public Utilities Commission (CPUC) have potentially reduced the ability of CCAs to offer renewable electricity at a rate competitive with IOUs.[9] The County of Santa Barbara, in conjunction with the Cities of Goleta, Santa Barbara, and Carpinteria, has re-commissioned an update to its existing CCA feasibility study to account for these and other recent policy and market changes. The study results are expected in early summer 2019.

Should a CCA be determined unviable, new green energy programs offered by SCE may be another option for meeting Goleta's municipal facility goal. In August of 2018, SCE proposed five new green energy programs to the CPUC. The purpose of the proposed programs is to offer customers increased options and opportunities to use renewable energy resources to meet their electricity needs. As initially proposed, these programs would be implemented in 2021, but they would not be available to CCA customers. One of the programs includes a Green Tariff in which 100% of the enrolled customer's energy needs would be met with renewable energy sources through the payment of a premium adder to the energy bill. Another program, called Green Direct, involves SCE procuring renewable energy PPAs customized for the City's facilities. Various aspects of the proposed tariffs and cost recovery approach are intended to enable SCE to offer a rate that is expected to be more economically viable than SCE's current Green Tariff portion of the existing Green Tariff Shared Renewables (GTSR) programs. However, even though these programs will

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[6] Sierra Club, 'Goleta, California Commits To 100% Clean, Renewable Energy'.
[7] Sierra Club, '100% Commitments in Cities, Counties, & States', 2019 <https://www.sierraclub.org/ready-for-100/commitments> [accessed 10 April 2019].
[8] US EPA, 'Community Choice Aggregation', 2019 <https://www.epa.gov/greenpower/community-choice-aggregation> [accessed 10 April 2019].
[9] California Public Utilities Commission, *CPUC ENSURES CHANGING ELECTRIC MARKET IS EQUITABLE FOR CUSTOMERS* (San Francisco, 2018) <www.cpuc.ca.gov.> [accessed 10 April 2019].

be SCE programs, the rates will still include the Power Charge Indifference Adjustment (PCIA) applied to departing load, which is used to protect IOUs from increased or sunk electricity procurement costs that cannot otherwise be recovered through customer payments because of the departing load.[10] As such, how the costs of these programs compare to past programs and local siting is unknown. To add additional uncertainty, in April 2019 the CPUC issued a decision putting the approval of these programs on hold. At the time of writing, it is unclear when these programs will be approved. However, prior to submission to the CPUC, the City worked closely with SCE in an attempt to improve these offerings in a way that would work for the City and can continue these efforts as SCE refines the programs.

Some cities and utilities also purchase Renewable Energy Certificates (RECs), which represent the renewable attribute of renewable electricity without necessarily being bundled to the electricity itself.[11] Buying RECs will likely be the cheapest method for the City, but REC purchase is more likely to result in the reshuffling of renewable electricity from one section of the grid to another, as opposed to additional renewable electricity being installed. Furthermore, neither a CCA nor RECs are guaranteed to help Goleta meet its resiliency goals, since these strategies would likely procure renewable electricity from outside the region.

1.1.3 – Resiliency and Climate

Adopting and implementing a SEP focusing on local generation would have important resiliency benefits for Goleta. One of the unique energy and resiliency challenges in Goleta is caused by being close to the end of the SCE transmission grid. As a result, Goleta is heavily dependent on a few key transmission lines, as shown with the gold and blue lines in Figure 1.1 below:

Figure 1.1: Southern Santa Barbara County Electricity Transmission Grid

[10] Application No. 18-09-015 of SCE *U 38-E) for Approval of Green Energy Programs.
[11] US EPA, 'Renewable Energy Certificates (RECs)', 2018 <https://www.epa.gov/greenpower/renewable-energy-certificates-recs> [accessed 10 April 2019].

Increased local generation would help Goleta respond to power outages during natural disasters, such as those experienced during the Thomas Fire and resulting Montecito mud and debris flows. Local utility-scale generation would improve electricity reliability for residents and businesses in Goleta by reducing outage time caused by lost generation or transmission from outside of Goleta, whereas combined on-site solar generation and energy storage would also potentially allow owners to be self-sufficient.

Natural disasters are not the only disruptions that may impact Goleta'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.[12] These protocols are designed to pre-emptively reduce wildfire risk by shutting down sections of transmission lines in dangerous weather conditions, which could create power outages even in non-disaster situations. As Goleta and the southern Santa Barbara County region are served by only a few transmission lines, PSPS protocols could have significant impacts on the local residential and commercial energy users.

Goleta, along with the rest of southern Santa Barbara County, is dependent on the 220-kV (kilovolt) transmission line going through the mountains north and east of the city. Due to its location, this transmission line is at high risk from potential wildfires and landslides or a PSPS shutdown. If that line is shut off, the transmission capacity in the lower-capacity 66-kV lines coming into and through Carpinteria may not be enough to serve the remaining load in southern Santa Barbara County.

SCE recently released a Request for Offers (RFO) to attempt to solve the resiliency issue in southern Santa Barbara County, seeking proposals for new electricity resources in the Moorpark sub-area, which included resources that connect to circuits, loads, or lower-level substations served by the Goleta, Santa Clara, and Moorpark 220/66-kV substations. Any contracted resources will need to be online in 2021. However, only stand-alone battery applications were accepted by SCE through this RFO process. A key goal of the SEP will be to increase the viability of renewable generation applications in the southern Santa Barbara County for future energy procurement or development opportunities.

Increasing the reliability and resiliency of the electricity system will also serve to bolster the economy in several ways. Power outages result in a loss of productivity and can be extremely costly, particularly to critical facilities such as hospitals and water treatment and distribution systems. Furthermore, adding reliability by bolstering renewable energy development will create local jobs in a burgeoning industry. As an unfortunate but inevitable side effect, greater economic growth generally requires greater electricity consumption to support more businesses and more operations, potentially moving Goleta away from its clean energy goals. However, more renewable energy will reduce the extent to which this greater electricity consumption will be accompanied by an increase in greenhouse gas emissions (GHGs).

Lastly, a SEP will help to meet state renewable electricity and emissions targets. California has goals of 100% carbon-free electricity by 2045 and emissions of 80% below 1990 levels by 2050.[13] These goals can only be achieved if every city plays its part to increase its renewable content and supports distributed electricity development by residents and businesses. Strong action by every city is needed over the next

[12] 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]

[13] California Senate, *SB-100 California Renewables Portfolio Standard Program: Emissions of Greenhouse Gases.* (Senate, 2018) <https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB100> [accessed 10 April 2019].

25-30 years to achieve this goal and deliver the broad economic, environmental, and community benefits of renewable electricity.

1.2 – Current City Actions Supporting Energy Development

1.2.1 – City Policies

As the City develops its SEP, it is important to take stock of the past and present clean energy and climate policies and programs that the City has already implemented to understand which initiatives have been most and least successful. This will allow the City 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.

In 2014, the City adopted its Climate Action Plan (CAP), which identified measures to help Goleta meet its GHG reduction targets. The CAP established a 2007 baseline inventory and a planning horizon through to 2030 to reduce emissions by 11% below 2007 emissions by 2020, and 26% below 2020 levels by 2030. The voluntary measures identified in the CAP included the building energy efficiency and renewable energy sectors, but the measures were focused mostly at regulatory implementation of state-wide policies, such as an ordinance requiring construction of solar-ready buildings.[14]

Prior to that, the City implemented a Green Building Program in 2013 to increase access to green building resources and provide benefits to developers who voluntarily incorporated green building measures. The City also chose to lead by example by adopting a Green Building Policy requiring LEED Silver or higher certification from the US Green Building Council for all new City-owned facilities.[15]

In 2012, the City Council adopted an Energy Efficiency Action Plan (EEAP) for municipal facilities consistent with the requirements of the City's General Plan Conservation Element Implementation Action 5, *(CEIA-5) – Preparation of a GHG Reduction Plan (also known as the Climate Action Plan)*. The EEAP describes actions that the City could take to improve municipal building energy efficiency, including potential funding mechanisms and suggested protocols for tracking the energy efficiency actions and monitoring electricity usage. The EEAP documented that, through energy efficiency projects completed between 2007 and 2012 using both Energy Efficiency and Conservation Block Grant and other funds, the City reduced electrical consumption by 90,205 kWh (kilowatt-hours).

On November 2, 2010, the City also adopted Ordinance No. 10-06 Local Energy Efficiency Standards – Goleta Reach Code, as allowed in California's Energy Efficiency Standards for Residential and Non-Residential Buildings (Title 24, Part 6 of California Code of Regulations). The code is updated every 3 years, ensuring that California buildings incorporate the latest technologies available in energy efficiency. The City's standards, known as a reach code, were more stringent than Title 24, exceeding its energy efficiency requirements by 15%. Since then, the state Title 24 energy code has become more stringent, exceeding those previously adopted standards, which have sunset.

1.2.2 – City Programs

Many of the City's previous and existing programs supporting energy development have focused on improving local infrastructure and community-scale sustainability.

[14] City of Goleta, *FINAL CLIMATE ACTION PLAN July 2014* (Goleta, 2014).
[15] City of Goleta, 'Green Building Program', 2019 <https://www.cityofgoleta.org/city-hall/planning-and-environmental-review/green-building-program> [accessed 10 April 2019].

One of the City's major projects is its acquisition of the streetlighting system serving Goleta. Beginning in 2012, the City Council authorized an annual set-aside in the Capital Improvement Program to fund the acquisition costs for 1,296 of 1,576 streetlight poles from SCE (those without wires or other utility equipment). Once the acquisition process is complete, the City will embark on a multi-phased project to convert the existing lights to high-efficiency light-emitting diode (LED) technology with the goals of improved lighting quality and decreased energy use for illuminating City streets, sidewalks, and crosswalks.[16] The City will also be working with SCE to transition utility-owned lights to LEDs. In addition to that, the City also worked with Santa Barbara County's Air Pollution Control District (APCD) to install a direct-current fast-charger (DCFC) electric vehicle charging station at the Camino Real Marketplace.[17]

The City also achieved a 3-STAR Rating from the STAR Community Rating system in 2017. The STAR system measures the work a City has done to achieve 45 sustainability objectives over seven goal areas: The Built Environment; Climate & Energy; Economy & Jobs; Education; Arts & Community; Equity & Empowerment; and Natural Systems. Goleta's rating was driven by its abundant parks, strong economy, and active and healthy lifestyle.[18] In November 2018, the U.S. Green Building Council (USGBC) announced that the STAR Community Rating System will be fully integrated into USGBC's Leadership in Energy and Environmental Design (LEED) for Cities and Communities programs. At the same time, the USGBC recognized the City of Goleta as a LEED City. LEED helps cities and communities benchmark current performance, track performance metrics, communicate continuous improvement, and educate residents, visitors and business owners to demonstrate commitment to sustainability, human health, and economic prosperity.

1.2.3 – City Collaborative Efforts

The City participates in many regional and statewide partnerships that are utilized to share and receive advice and best practices on meeting energy goals.

Green Cities California is a group of 14 cities and two counties, including the City of Goleta, the City of Santa Barbara, and County of Santa Barbara, that creates campaigns and policies centered around sustainability. Examples include creating a comprehensive guide on CCAs, banning the use of city funds for plastic water bottles, promoting sustainable foods and recycled paper, and commissioning assessments on the impacts of single-use bags and methods of consumption.[19] Green Cities California also convenes peer learning exchanges for member jurisdictions such as a recent event on single-use plastics, and hosts regular calls to share best practices between jurisdictions on topics such as land-use planning to reduce carbon emissions, and work to promote renewable energy through collective legislative proposals.

Similarly, the City is part of the Local Government Sustainable Energy Coalition (LGSEC), which grants its city, county, and local agency members a collective voice in lobbying for statewide policy changes. To date, the LGSEC has campaigned for greater local government involvement across broad areas such as climate change, resource management, and alternative-fueled vehicles.[20]

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[16] Paula Perotte and others, *2/5/2019 City Council Meeting Minutes*, 2019.
[17] Santa Barbara County Air Pollution Control District, *Electric Car Show for National Drive Electric Week*, 2016 <https://www.ourair.org/wp-content/uploads/090116rel-NDEW.pdf> [accessed 10 April 2019].
[18] City of Goleta, 'STAR Communities & LEED for Cities', 2019 <https://www.cityofgoleta.org/projects-programs/sustainability-climate-adaptation/star-communities> [accessed 10 April 2019].
[19] Green Cities California, 'GCC's Impact', 2019 <http://www.greencitiescalifornia.org/gccs-impact> [accessed 10 April 2019].
[20] The Local Government Sustainable Energy Coalition, 'Regulatory Filings', 2019 <http://www.lgsec.org/regulatory-filings/> [accessed 10 April 2019].

Until 2019, the City also collaborated with the County and Cities of Carpinteria and Santa Barbara to participate in the emPower SBC program, which partnered with local utilities and banks to provide low-interest energy efficiency loans to homeowners.[21] However, this program will be closed in 2019 due to low participation. Due to the various public and private partners administering the loans there were too many administrative hurdles for residents to clear and too many tie-ins to other programs with additional eligibility requirements, such as the Home Energy Upgrade Program. Additionally, due to utility participation, there were very strict guidelines on eligibility placed by the CPUC, and many businesses either could not participate or were dissuaded from even applying.

Finally, the City also partners with the County and the Cities of Carpinteria and Santa Barbara, as well as SCE and SoCal Gas, to participate in the South County Energy Efficiency Partnership (SCEEP). The SCEEP focuses on running smaller energy efficiency programs, certifications, and training seminars and workshops, but this partnership is also anticipated to end in 2019.[22]

1.3 – Currently-Installed Renewable Capacity

1.3.1 – Projects at City Facilities

The City of Goleta currently has no PV capacity installed at its facilities. However, in accordance with its Green Building Policy, it is developing two new facilities to act as a clean energy example among local governments, special districts and agencies, and commercial property owners.

The foremost amongst these is the new Fire Station 10, which is planned in Western Goleta. Fire Station 10 is being designed to a LEED Silver standard, which currently includes a conceptual design for a solar installation and a 150-kW capacity diesel generator. It is recommended that battery storage for electricity backup be included in the design considerations, in addition to the diesel generator. It has also been designed to a high standard of sustainability, with extensive thought given to aesthetics and environmental impact.[23]

The new train station that is projected to open in 2024 will have a sustainable design, is required to be certified LEED Silver, and provides an excellent opportunity to install a solar power producing facility. The new station will lead to lower GHG emissions by increasing train ridership, reducing local vehicle miles traveled (VMT). Greater use of the station and higher levels of train ridership will result from several factors, including expanded parking, improved bicycle and pedestrian access, and better connectivity between the train station and the neighboring University of California – Santa Barbara (UCSB).[24]

1.3.2 – Installed Community Renewable Energy Capacity

Figure 1.2 on the following page shows the total installed distributed renewable energy capacity by sector in Goleta, as per Net Energy Metering (NEM) Interconnection data released by the state through the California Distributed Generation Statistics website.[25] Net Energy Metering is the program that allows

[21] emPower SBC, 'EmPower Central Coast', 2019 <https://www.empowersbc.org/> [accessed 10 April 2019].
[22] South County Energy Efficiency Partnership, 'South County Energy Efficiency Partnership', 2018 <https://www.sceep.org/> [accessed 10 April 2019].
[23] City of Goleta, 'Fire Station 10 in Western Goleta', 2019 <https://www.cityofgoleta.org/projects-programs/building-development/fire-station-in-western-goleta> [accessed 10 April 2019].
[24] City of Goleta, 'Goleta Train Depot Project', 2019 <https://www.cityofgoleta.org/projects-programs/studies-and-other-projects/goleta-train-depot-project> [accessed 10 April 2019].
[25] California Distributed Generation Statistics, 'CaliforniaDGStats', 2019 <https://www.californiadgstats.ca.gov/downloads/> [accessed 21 March 2019].

customers with solar installations to export excess energy to the grid or import energy from the grid as necessary, receiving credits for excess generation.

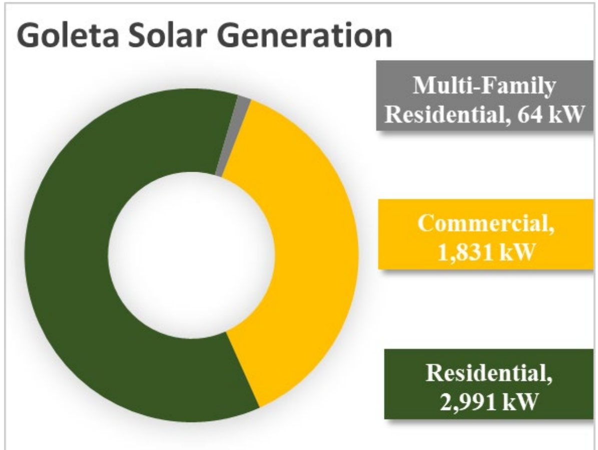

Figure 1.2: Distributed Energy Capacity in Goleta

Most of the solar development in Goleta has been in the single-family residential sector, with a sizable amount in the commercial sector as well. However, the large number of business parks in Goleta represent a significant opportunity or untapped resource that can bring much more commercial solar development in Goleta. The 4,886 kilowatts (kW), or nearly 4.9 megawatts (MW), of deployed solar across Goleta has resulted in a reduction of roughly 1,200 metric tons of CO_2, equivalent to over 250 cars being taken off the road. The energy production of this amount of local solar can fully offset the electrical needs of roughly 1,110 single-family homes. The total renewable energy potential available by sector will be discussed in more detail in Chapter 2, while the contribution of local solar to meeting the city's renewable electricity goal will be covered in Chapter 3.

Chapter 2 – Distributed Energy Resource Potential in Goleta

2.1 – Introduction

The purpose of this chapter is to assess the availability of renewable generation within the City of Goleta. There are five types of power generation eligible under California's Renewables Portfolio Standard (RPS): solar, wind, biomass/biogas, small hydroelectric, and geothermal.[26] This chapter primarily focuses on distributed solar photovoltaic (PV) potential because the remaining types of renewable generation are either not cost-effective or not possible within the City, since they require large amounts of space or access to natural resources such as rivers or high wind. Attention will also be devoted to energy efficiency and battery storage as methods of reducing the need for renewable generation and shifting it to needed times, respectively.

This chapter serves the following purposes:

1. Estimate the quantity of distributed solar energy resource that can realistically be developed in Goleta prior to its 2030 goal;
2. Categorize the potential by customer segment to enable City of Goleta (City) staff to better target policy and programmatic solutions;
3. Identify the geographical locations in Goleta with the greatest availability of resource;
4. Compare the estimated generation potential with the amount of renewable generation needed to meet the City's renewable energy goals; and
5. Document the technical and administrative barriers to meeting this potential.

The results discussed in this chapter are used to inform the possible impacts of the various policies, programs, and projects recommended as part of the SEP.

2.2 – Current Solar Projects in Goleta

Goleta has a strong history of rooftop solar installations, particularly on residential buildings. Examining this history enables a comparison of different cities and areas in the county.

Approximately 4.9 MW of distributed, net-metered solar PV has been installed to date in Goleta. Over the past three years, roughly 400 – 1,300 kW of distributed solar capacity has been added each year across Goleta. Among similar-sized cities and census-designated places in California, such as Orcutt, Goleta ranks slightly above the median for installed capacity per capita but lags slightly behind the mean average due to extremely high-penetration cities such as Los Gatos, Los Altos, and Spring Valley.[27]

Over half of the total urban installations to date have been in the residential sector, with nearly 3 MW on residential rooftops and the rest mostly on commercial rooftops. Although residential structures greatly outnumber commercial and industrial structures, these buildings are much smaller and therefore have much less rooftop space, as summarized in Table 2.1 on the following page. This data is estimated by the statistical solar distribution analysis performed for the city, which will be described in further detail in Section 2.3.

[26] Christina Crume and Lynette Green, *RPS Eligibility Guidebook, Ninth Edition*, 2017.
[27] California Distributed Generation Statistics.

Table 2.1: Estimated Goleta Building Data

Building Type	# of Estimated Structures	Amount of Estimated Rooftop Space (acres)
Residential	~4,500	~200
Commercial	~3,000	~275
Large Commercial / Industrial	~250	~150

Additionally, there is much less rooftop space on residential buildings suitable for solar installation than on commercial and industrial buildings due to a larger number of sloped roofs. As such, there is far more potential on commercial properties in Goleta, and therefore more of an opportunity for development.

2.3 – General Statistical Analysis Method

Given the magnitude of the total number of rooftops and parking lots in Goleta, it was not possible to individually measure the solar potential at each building. Instead, a statistical analysis was conducted for both rooftops and parking lots to determine the estimated solar generating potential. In each case, the total available area was reduced based on relevant exclusions 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. The potential in these samples was then scaled up to determine the total estimated solar installation potential by zone for the whole city. The exact challenges 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.

2.4 – Solar 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 in this SEP.

Table 2.2 below summarizes the key similarities, differences, and challenges for solar projects based on whether they are intended for sale of electricity to the utility (wholesale) or for on-site consumption of electricity by the building owner or occupant.

Table 2.2: Comparison Between Urban 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	Rooftop lease to solar system owner	Electricity bill reductions
Electrical Concerns	Costly electrical upgrades may be necessary if utility distribution transformer or feeder is at full capacity	Costly electrical upgrades may be necessary if building switchgear is at full capacity
Load Concerns	California utilities do not allow wholesale generation on a feeder (a section of the electrical grid) if it would exceed total feeder load	SCE Net Energy Metering rules do not allow on-site generation to exceed on-site consumption
Rooftop Availability	Constrained by roof orientation and pitch and presence of Heating, Ventilation, and Air Conditioning (HVAC) equipment	
Shading Concerns	Generation reduced by nearby trees and buildings that would cause shading on installed solar systems	
Structural Concerns	Costly roof replacement may be necessary, based on rooftop age and material	
Geotechnical Concerns	Parking lot canopy may need added structural design if soil is unstable or difficult to drill into	

Many of the challenges with urban solar development are similar regardless of whether the generated electricity is used on-site or sold to the utilities or CCAs through the electric grid. However, not all these concerns can be determined through visual satellite imagery. The diagram below shows how viable solar potential is determined by narrowing down from the total urban area, applying each concern as an individual filter:

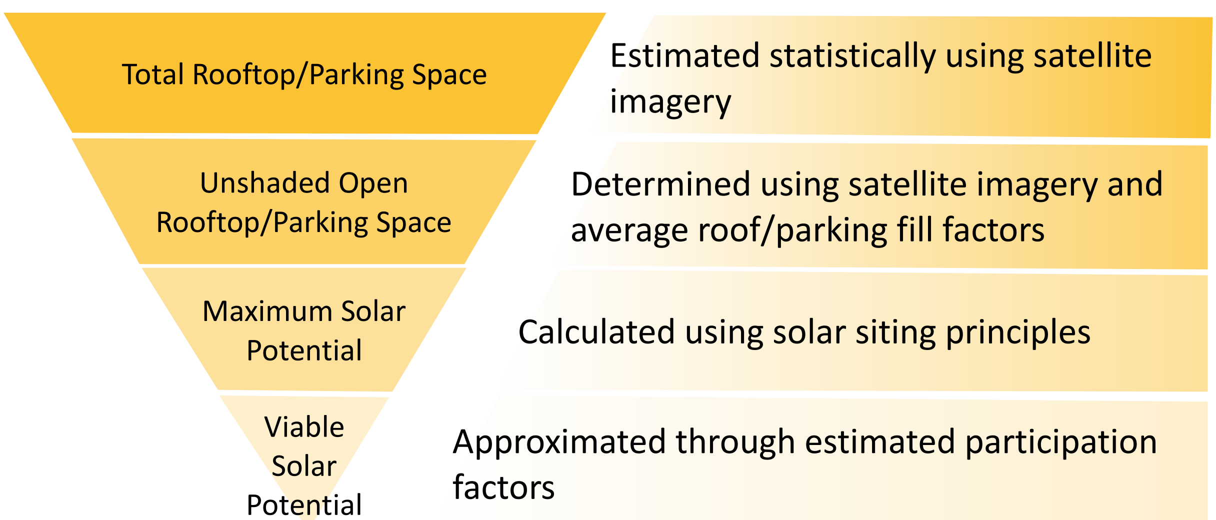

Figure 2.1: Process for Determining Goleta Solar Potential

To refine the analysis, the City of Goleta was split further into “zones” that were similar in building density, use, and geographical location, such as residential or commercial. The total rooftop and parking lot space, as well as concerns that could be identified visually, such as shading, were determined 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 efficiencies, and then narrowed further into a technically viable solar potential estimate through estimated participation factors that accounted for issues or items that could not be determined visually, such as structural, geotechnical, electrical, and load concerns. This analysis is shown in Figure 2.2 on the following page.

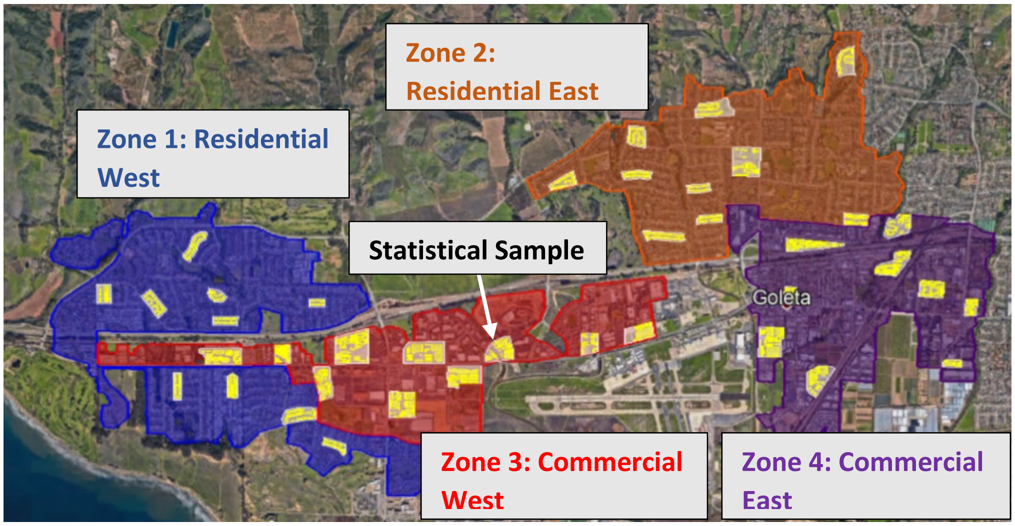

Figure 2.2: Statistical Solar Analysis for Goleta

Goleta was split into four zones: two residential and two commercial, with 10 samples taken of each zone, as indicated by the yellow polygons in Figure 2.2. These zones do not correspond exactly with the boundaries of Goleta, to exclude undeveloped urban land and any agriculture that may exist within City boundaries.

The total potential capacity, by MW, is summarized in Table 2.3 below. Estimated urban solar energy generation from this projected solar capacity, as measured in gigawatt-hours (GWh, equal to 1 million kWh) of electricity produced annually, is shown in Table 2.4 on the following page. As noted in Section ES.5, Goleta's total estimated annual electrical consumption by 2030 is expected to be roughly 218 GWh. The range of the solar power potential calculation is caused by the variance in the statistical estimation and the uncertainty in the participation factor. The energy potential has a slightly larger range due to the additional small variance in solar yield caused by the different orientations or angles at which solar can be installed.

In addition to orientation and tilt, shading also plays a large role in calculating solar potential. Due to the preference in Goleta towards small trees in parking lots, it was found that roughly 35% - 50% of available carport locations were shaded, compared to only 15% - 20% of rooftops, where the solar installation is higher up and can be placed strategically to avoid shading, particularly for commercial buildings. Additionally, it should be noted that, due to participation factors, this analysis represents a conservative estimate of solar potential, particularly for residential installations.

Table 2.3: Summary of Goleta Solar Capacity by MW

Building Sector	Rooftop Generation Capacity (MW)	Parking Lot Generation Capacity (MW)	Total Generation Capacity (MW)
Residential	6 – 8	0	6 – 8
Commercial	45 – 61	7 – 9	52 – 69
Large Commercial / Industrial	28 – 38	15 – 17	43 – 56
Grand Total	**79 – 107**	**22 – 26**	**101 – 133**

Table 2.4: Summary of Potential Annual Goleta Solar Generation by GWh

Building Sector	Rooftop Generation Capacity (GWh)	Parking Lot Generation Capacity (GWh)	Total Generation Capacity (GWh)
Residential	8 – 12	0	8 – 12
Commercial	61 – 88	10 – 13	71 – 101
Large Commercial / Industrial	38 – 55	20 – 25	58 – 80
Grand Total	**107 – 155**	**30 – 38**	**137 – 213**

2.5 – Energy Efficiency Potential

Energy efficiency is a valuable approach that will undoubtedly be used by the community to meet Goleta's 100% renewable electricity goals. By reducing the amount of total electricity consumed, the relative percentage of remaining electrical consumption that can be met by existing and future renewable energy generation is increased. The building number and size distribution estimated as part of the statistical analysis was used to determine the potential energy reduction due to widespread LED retrofits, as a bellwether for realistic community energy efficiency action. It was estimated that there is approximately 30,000 – 32,000 MWh in total projected energy reduction possible across all customer sectors, which corresponds to roughly 12% – 13% of 2019 electricity consumption.

However, it should be noted that, since net-metered solar generation is generally capped at annual electricity consumption, energy efficiency potential and solar generation potential are not mutually exclusive. Undertaking efficiency projects reduces the allowable installed solar capacity if implemented before solar or reduces the value of existing generation if developed after solar PV. Additionally, the load forecast for Goleta already estimates that a large portion of this energy efficiency will take place, since past energy efficiency actions are embedded into the forecast.

2.6 – Battery Storage Potential

Although battery storage cannot directly meet the City of Goleta's renewable energy goals through increased generation or decreased annual load, it can still play an important role by enabling greater penetration of solar generation by shifting the timing of solar export onto the grid to other times of day, when utility needs and credits are higher. Additionally, in some cases, energy storage can help meet the City's resiliency goals for its community by enabling solar power to generate during grid outages. While there have been concerns regarding the safety and reliability of battery energy storage, strong work has been done both on the state and federal level to address these concerns. These support resources include the U.S. Department of Energy's Energy Storage Safety Strategic Plan[28] and best practices for energy storage installation developed by Santa Clara County.[29]

Unlike solar potential, battery storage does not carry significant constraints due to available space and other site characteristics such as shading, though ventilation and spill management requirements may limit site locations for installations of batteries. In comparison to solar, battery storage requires a relatively smaller footprint and can be placed anywhere on-site that meets the requirements noted above.

However, battery storage constraints do exist, namely from the financial perspective. Although battery storage costs are reducing rapidly, financial feasibility is still variable and is heavily dependent on the range of services being performed by the battery. These services can range from utility bill reductions to performing utility services contracts. California utilities and regulators are still in the process of determining how, and whether, to value some potential grid services available through battery systems, so risk and volatility in these markets remain fairly high. As penetration of batteries onto the electrical grid, and into the public consciousness, increases, prices will continue to fall, and additional value streams will continue to be developed.

A final constraint on battery potential that is important to mention, but is decreasing in importance as policy is adjusted, is distribution grid capacity. While utilities are becoming more comfortable with the software controls that limit the export of energy from battery storage systems to the grid, solar + storage systems are still approached from a worst case scenario, as though both the solar and battery storage systems could discharge at full capacity at the same time, even though this scenario is unlikely to ever occur without equipment malfunction . By treating solar + storage systems as though both could and would export at full capacity at the same time, the utilities effectively restrict the size of and amount of solar + storage systems on their distribution grids.

2.7 – Conclusion

Goleta has had a strong history of residential solar installations: almost 50% of the estimated viable residential solar potential has already been reached. This does not mean that one in two residential buildings have installed solar. Due to the 30% participation factor used for estimating residential installation capacities, this indicates that roughly three in twenty, or 15% of residential buildings with substantive solar exposure have existing solar installations. However, in comparison, less than 2% of the viable commercial and industrial potential has been reached in Goleta. Tapping into this potential is a key opportunity for the City to meet a large portion of its 100% renewable electricity goal and support a cleaner, more resilient future.

[28] Conrad Eustis, Imre Gyuk, and US DOE, *Energy Storage Safety Strategic Plan*, 2014.
[29] County of Santa Clara, 'Interconnection of Batteries', 2015.

Chapter 3 – Meeting Goleta's 100% Renewable Energy Goal

There are two steps to meeting any goal: determining the current state and determining how to get from that baseline to the end goal. Accordingly, this chapter will discuss how Goleta can meet its 100% renewable energy goal following four steps:

1) Forecasting how Goleta's electricity requirements will evolve until 2030
2) Forecasting business-as-usual (BAU) growth in local renewable generation and utility generation to determine a baseline path towards meeting the 100% goal even if no further actions are taken
3) Calculating the impact of strategies recommended in the SEP
4) Discussing options for Goleta to bridge the remaining gap

3.1 – Business-as-Usual (BAU) Scenario

3.1.1 – Electricity Demand in Goleta

Figure 3.1 shows how Goleta's electricity consumption changed from 2010 to 2016. This data is taken from utility billing data,[30] which is calculated after deducting distributed solar generation.

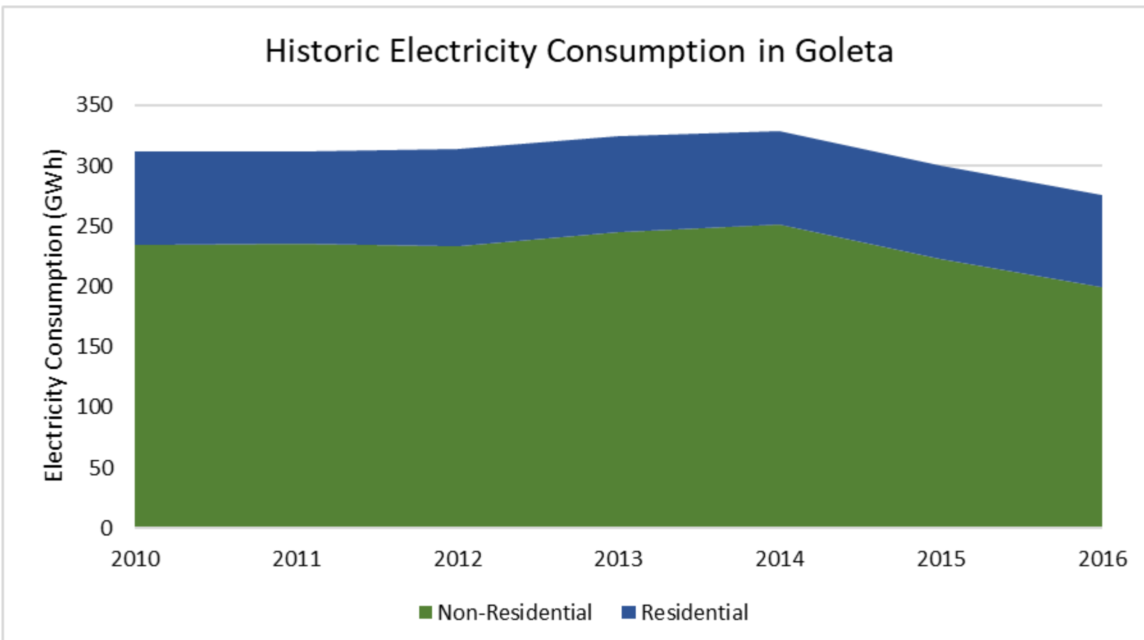

Figure 3.1: Electricity Consumption in Goleta from 2010-2016

Commercial electricity consumption has shown the biggest change; it increased slightly from 2012 to 2014 but decreased rapidly from 2014 to 2016 despite increases in population, potentially due to widespread adoption of energy efficiency measures such as LED lighting. As such, commercial electrical consumption is forecasted to keep decreasing at a lower rate to 2030. In comparison, residential electricity consumption stayed mostly constant, presumably because energy efficiency actions are less common in residential buildings.

[30] California Energy Commission, 'Electricity Consumption by County', 2018 <https://ecdms.energy.ca.gov/elecbycounty.aspx> [accessed 10 April 2019].

However, this residential trend will most likely change as electric vehicle (EV) penetration increases. Since electric vehicles are charged primarily at home,[31] growth in the deployment of EVs will primarily lead to increased residential electrical load. The impact of EV penetration on community-wide electricity load has been aggregated across the City and treated separately from specific charging locations. Stress on the grid caused by demand spikes from high EV charging loads in targeted locations (likely related to commercial fleet operations) is an important concern but was beyond the scope of this planning effort. Figure 3.2 depicts how electricity demand, prior to an increase in distributed generation installations, is forecasted to change. Residential load is expected to comprise almost half of Goleta's load by 2030.

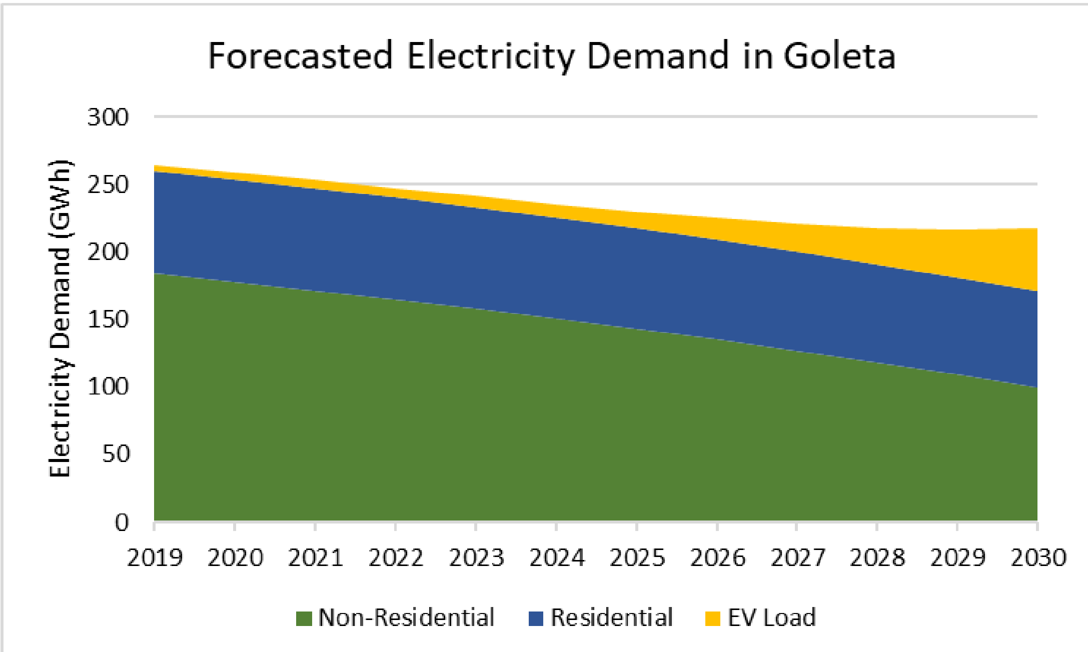

Figure 3.2: Goleta Electricity Demand Forecast to 2030

3.1.2 – Goleta Renewable Electricity

Renewable electricity comes from two sources: residents and businesses installing it to reduce their electricity needs or participating in an SCE program for additional renewable electricity that gets applied to the customer's bill, and SCE providing it through the grid as part of the state-mandated Renewables Portfolio Standard (RPS). For this first source (local installations), Figure 3.3 on the following page shows how the amount of local renewable generation that has been installed in Goleta has grown over the preceding eight years.

[31] Idaho National Laboratory, "Plugged in: How Americans Charge Their Electric Vehicles" 2015. https://avt.inl.gov/sites/default/files/pdf/arra/PluggedInSummaryReport.pdf

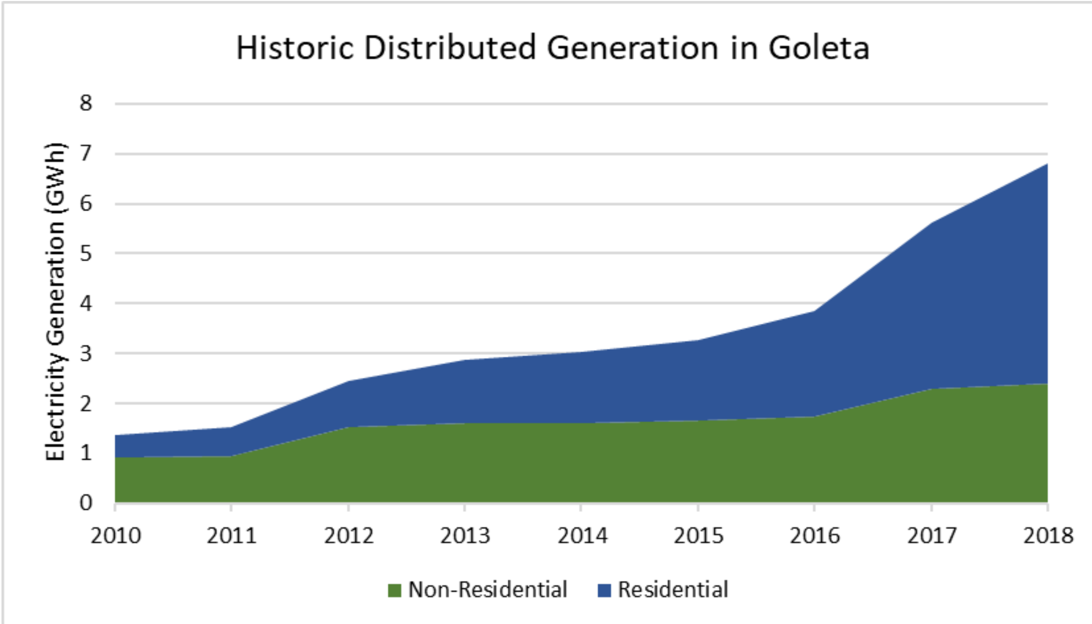

Figure 3.3: Goleta Distributed Solar Installations from 2010-2018

Even though over 70% of the electricity load in Goleta is non-residential, most of the local electricity generation to date has been residential. Although this is also a trend occurring in other nearby cities, such as Santa Barbara, given the larger proportion of commercial buildings in Goleta, this mismatch of local generation and consumption indicates a further need for solutions targeting increased commercial solar generation. The baseline scenario assumes that both residential and commercial generation will continue to increase, but still only result in minor contributions towards the 100% renewable electricity goal.

SCE's renewable mix is also forecasted to increase, largely due to increases in mandated RPS procurement requirements for utilities. However, it should be noted that SCE is currently ahead of RPS requirements, and will likely remain so in the short-term, due to the increasing cost-competitiveness of utility-scale renewable generation. As a conservative estimate, however, it is forecasted that in 2030, SCE will have only the 60% renewable generation required to be compliant with the RPS.

3.1.3 – Business-as-Usual (BAU) Gap in Renewable Electricity

Figure 3.4 on the following page shows the current forecast towards meeting the 100% goal with no further City actions. The forecasted electrical demand is shown with the dotted line, while renewable generation from local sources and from SCE are shown in green and gray, respectively.

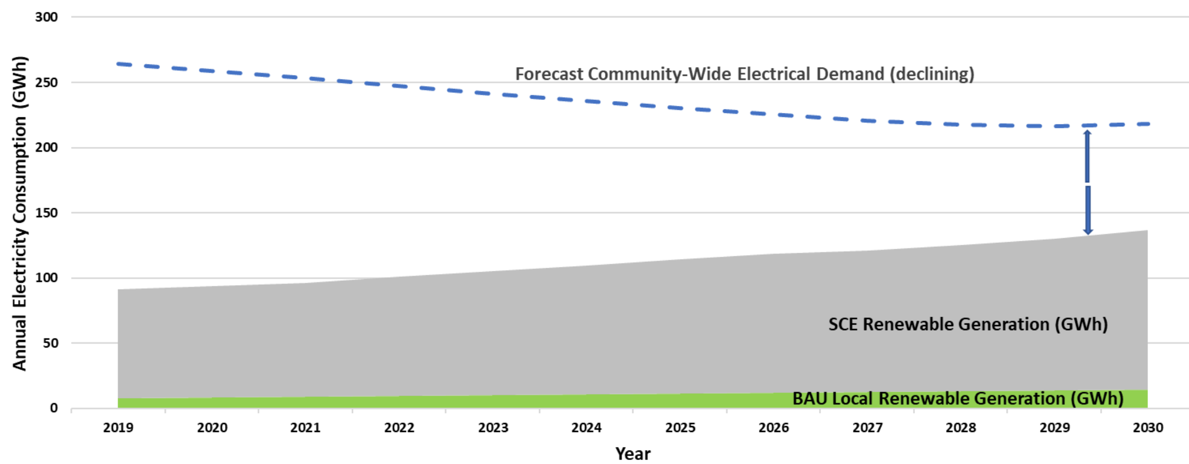

Figure 3.4: Goleta BAU Renewable Electricity Forecast to 2030

In this scenario, roughly 63% of Goleta's electricity will be renewable, only slightly ahead of the RPS mandate of 60% for SCE. Although local renewable electricity comprises 7% of Goleta's consumption, the 60% renewable electricity from SCE applies only to the remaining 93% consumption, not the whole 100% consumption. As such, each 1% of local renewable electricity is also accompanied by a reduction of 0.5% utility renewable electricity.

3.2 – SEP Impact

The estimated impact of the SEP strategies towards narrowing this gap between consumption needs and renewable supply, which are discussed in further detail in Chapter 6, is shown in Figure 3.5 below.

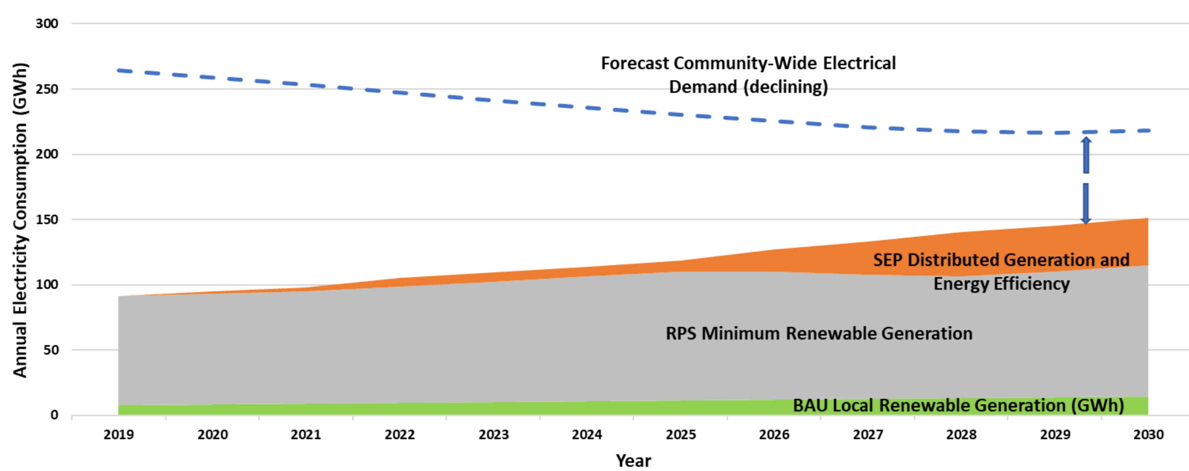

Figure 3.5: Goleta Renewable Electricity Forecast to 2030 with SEP

Implementation of the recommended SEP strategies takes Goleta to roughly 70% of the 100% Renewable Electricity goal. While the strategies contribute to 17% of Goleta's electricity supply in 2030, as local electricity contributes more of Goleta's electricity supply, less of it is supplied by the utility. Therefore, increasing local renewable generation has diminishing returns: Goleta can only meet its goal if local renewable generation supplies the entirety of Goleta's needs, or if the incoming utility electricity supply is completely renewable.

3.3 – Options for Bridging the Remaining Gap

Short of Goleta supplying all of its own renewable energy needs, the City can bridge the remaining gap either by purchasing Renewable Energy Certificates (RECs) or by forming a Community Choice Aggregation (CCA). As discussed in Section 1.1.2, "Local Prioritization & Available Options", RECs represent the renewable attribute of electricity generation from a renewable source. They are usually purchased from renewable energy projects that have already been constructed, and therefore generally do not result in additional renewable electricity being generated. Through the purchase of RECs, the renewable attribute of the RECs, and thus the credit for that renewable electricity, is merely reshuffled. However, as discussed in Section 1.1.2, depending on action by the CPUC, proposed SCE programs may offer the opportunity for the purchase of RECs through new dedicated utility-scale solar developments in the region. For a short-term or long-term method of reaching the city's 100% renewable energy goal, these SCE programs may be considered as the 2030 deadline approaches.

Alternatively, CCAs procure electricity supply instead of a utility, while leaving the utility to manage the electricity grid and wires. As a quasi-governmental Joint Powers Authority, a CCA is governed by member jurisdictions, giving members significant control over the energy procurement approach, including the purchase or development of utility-scale renewable projects, either inside or outside the County. The County of Santa Barbara, in conjunction with the Cities of Goleta, Carpinteria, and Santa Barbara, commissioned a study testing the viability of a CCA spanning the unincorporated County and the three southern Santa Barbara County cities. The feasibility study assessed a potential CCA under three different renewable procurement scenarios:

1) The CCA procures only the RPS-mandated minimum amount of renewable electricity
2) The CCA's default electricity offering is 50% renewable, staying so until the RPS mandates an increase
3) The CCA's default electricity offering is 75% renewable, staying so until 2030

Due to regulatory changes on the charge that a CCA must pay the utility for taking over a portion of the utility's electric demand (the Power Charge Indifference Adjustment, or PCIA, as discussed in greater detail in Section 6.2), this study is being re-commissioned, and will be completed in the first half of 2019.

Figure 3.6 on the following page shows how a CCA that goes beyond the scenarios listed above to help Goleta meet its goal:

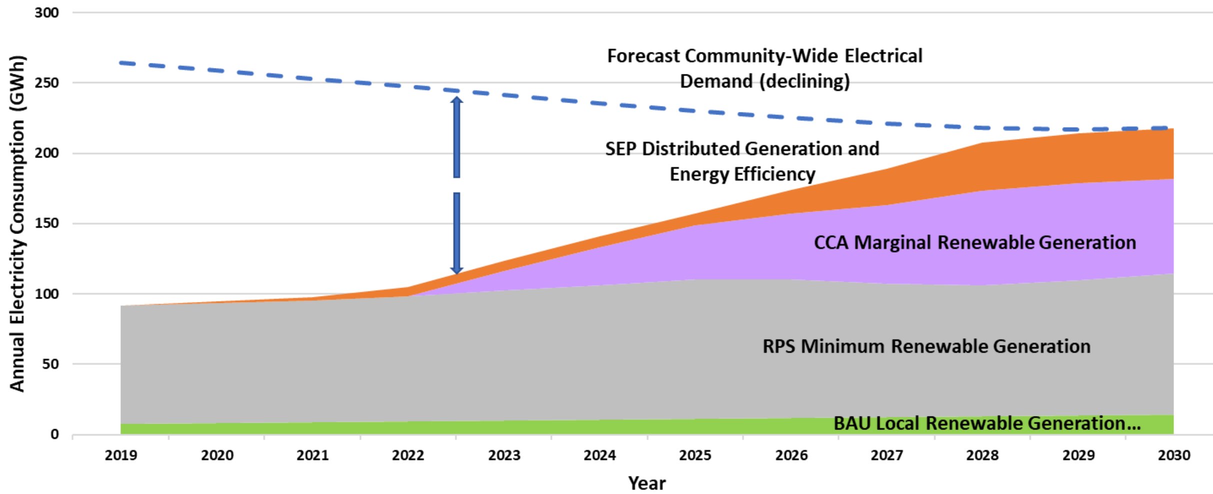

Figure 3.6: Goleta Renewable Electricity Forecast to 2030 with SEP and CCA

This hypothetical CCA begins at 75% renewable, and slowly ramps up to 100% renewable by 2030. To improve viability, it rolls out to the various customer classes one by one. The benefits of this delayed rollout are discussed in further detail in Section 6.2.1.

A CCA would likely not procure all its electricity locally and would therefore not immediately resolve local resiliency issues. The exact percentage of renewable electricity procured by a CCA that would be local has not been considered in the SEP and would depend upon CCA procurement programs and approach that have yet to be determined. However, compared to an IOU, a local CCA may be more mission-driven to focus on local solar siting, and could work more directly with local stakeholders to develop local renewable electricity programs.

Chapter 4 – Obstacles and Opportunities for Distributed and Utility-Scale Energy Resources

This chapter will discuss the various obstacles for renewable energy and energy efficiency development that are most important and unique to Goleta. One or more potential solutions or opportunities to address each obstacle will also be suggested and analyzed. This list of barriers and solutions was developed by working closely with City officials, public agencies, community environmental advocacy groups, residents, and businesses through a series of public workshops and individual meetings.

4.1 – Property Ownership, Structural, and Locational Barriers

4.1.1 – Split Incentive

Obstacle

One of the key obstacles to solar development, particularly in commercial and multi-family residential buildings, is that the site owner is often different from the site user. In rental situations, while the landlord often has final say over capital improvements such as solar or energy efficiency projects, the tenant is often responsible for paying utility bills. Therefore, while the tenant has the incentive to lower their electricity consumption and their bills through energy projects, the landlord does not. Even if the tenant pays for the project, the landlord may have to take on the associated structural risks for no additional benefit. This creates a situation where the landlord does not take any energy-saving actions even when a project would be financially viable for the tenant.

Solutions

There are three main ways through which the City can try to resolve this issue:

1) Facilitate green leases, where the tenant pays a higher rent per square foot to account for lower utility bill costs due to actions taken and paid for by the landlord
2) Institute energy benchmarking requirements for commercial building owners
3) Institute feed-in tariffs (FIT) either through a CCA or by lobbying SCE

The first solution is geared towards bridging the split incentive by having tenants and landlords share the benefits of energy projects, while the second solution aims to side-step the issue entirely by requiring action be taken by building owners independent of tenants. These solutions do not have to be exclusive—green leases can be a method through which landlords can benefit from the actions required of them by the energy benchmarks.

The third solution would enable property owners to sell solar generation to the local utility at a rate higher than the wholesale rate. However, this generation would be distributed across the entire load served by the utility. Therefore, if the utility is SCE, this new generation would have only a small impact on Goleta's renewable electricity goal. Additionally, SCE has not indicated interest in establishing a new feed-in tariff so it is unlikely that a new program will be established in the near-term. However, if a CCA is present, there would be little preventing the establishment of a new FIT and this renewable electricity would be credited only to customers in Goleta, or elsewhere in the county for a larger CCA.

4.1.2 – Load Insufficiency

Obstacle

Most distributed solar installations are currently under a net-metering arrangement, where system owners can sell excess generation to the utility at the same retail rate paid by the utility customer and apply the revenues as a credit to energy provided by the utility at other times in the day, when the solar system is not covering all of the building's needs. However, SCE net-metering requirements do not allow residents and businesses to install solar systems for on-site consumption if the expected annual generation of the solar system is greater than the annual load at the site. As a result, many sites with large rooftops and/or large parking lots, but relatively low load, cannot install an equally large system. This results in both lower benefits for the site owner and a lower utilization of available rooftop or land space.

Although rooftop leases are a preferred way for solar developers to use these sites when an appropriate energy off-taker program is available, leases are not popular among site owners because the payment amount of the rooftop lease is often not high enough for the property owner to want to take on the associated risk of structural damage.

Solutions

One possible solution is:

1) Create a program where the City partially or fully insures rooftop replacements for commercial property owners with solar rooftop leases.

This solution would enable the City to lower the risk of rooftop leases for property owners. However, it could also result in a large cost outlay in a worst-case scenario, so the City would need to judiciously determine the correct amount of insurance liability to take on. It should also be noted that as with the feed-in tariff discussed in Section 4.1.1, this would not help the City meet its 100% renewable electricity goal without a CCA, because excess generation sold directly to SCE would count toward the utility's RPS mandate rather than offsetting the city's consumption.

4.2 – Financial and Funding Barriers

4.2.1 – Financing Mechanisms

Obstacle

As noted above, there is a large gap in solar development for commercial buildings between what has been installed and what could be installed. Initial outreach to commercial property owners to determine the cause of this gap has indicated a lack of viable financing mechanisms, as many commercial buildings are built or purchased through a mortgage loan, and lenders are often not willing to allow mortgaged buildings to take on a second loan. Meanwhile, residential homeowners do not always have access to low loan rates. This lack of financing options is particularly the case for solar projects, which are not as well supported by utilities as energy efficiency projects.

Solutions

There are two main recommendations for potential new financing mechanisms to help residents and businesses:

1) Work with private foundations to create a low-interest source of funding for residential and commercial Property Assessed Clean Energy (PACE)

2) Work with private foundations and local water or sanitation utilities to create a low-interest source of funding and repayment mechanism for a community solar on-bill financing (OBF) program

Both scenarios involve partnering with a local private foundation, trust or other source of no- or low-interest funds to create a low-interest source of funding for residents and businesses. A PACE program would enable customers to finance loans through increased property tax payments,[32] whereas an OBF program would enable customers to finance loans by offsetting higher water or sanitation bills with a lower electricity bill until the loan is paid off and the water or sanitation bill loses the embedded energy loan repayment.[33] Traditional OBF programs offered by utilities use electricity bills as the mechanism of loan repayment and the loan payments are structured such that they are equal to the bill savings associated with the energy efficiency upgrade being financed. This "bill neutrality" mechanism cannot be utilized under the proposed solutions because they hinge on using a local utility bill (water or sanitation), in place of a utility-controlled electrical bill, to create a local program targeted toward renewable development in Goleta. However, loan repayments could still be calculated with respect to expected electricity savings, so residents and businesses experience no net increase in their overall utility costs, even if the breakdown of those costs shifted.

4.2.2 – 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 with air conditioning usage, which were well-aligned with solar production. This was a key driver for payback analysis, as solar panels produced during times with high economic value. However, with the proliferation of solar PV and personal electronic devices throughout California, electricity loads have shifted to peaking later in the day. Accordingly, as of March 1st, 2019, SCE released new electricity rate schedule time periods with peak time-of-use (ToU) rates in the late afternoon and evening, which have very little overlap with solar production. This shift causes a drop in value of solar production, thus negatively affecting the payback analysis of solar investments. This shift of ToU periods and the reduced overlap with solar production times is shown in Figure 4.1:

[32] PACENation, 'PACENation: Building the Clean Energy Economy', 2019 <https://pacenation.us/> [accessed 10 April 2019].
[33] Office of Energy Efficiency and Renewable Energy, 'On-Bill Financing and Repayment Programs', 2019 <https://www.energy.gov/eere/slsc/bill-financing-and-repayment-programs> [accessed 10 April 2019].

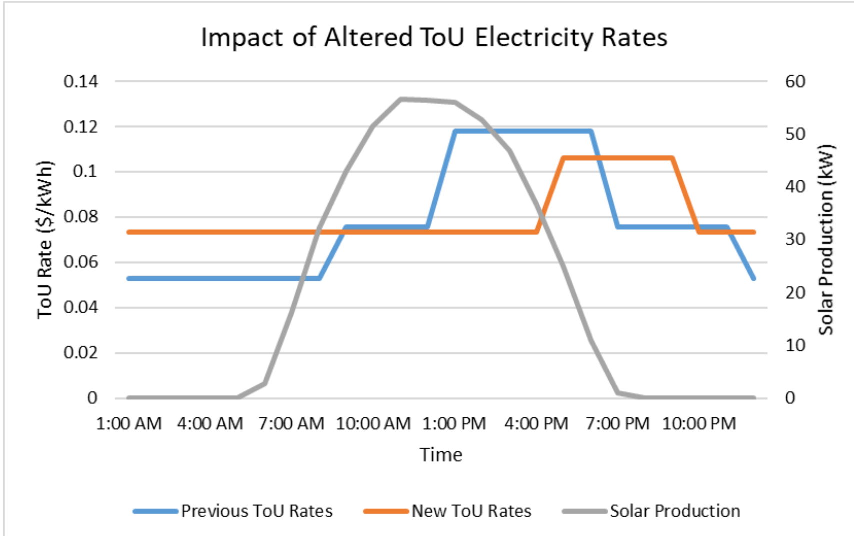

Figure 4.1: Impact of Time-of-Use Rate Changes on Solar Production Value

Solutions

There are several ways for the City to improve the economics of solar projects:

1) Host collaborative procurements to bargain for better prices from solar vendors
2) Streamline permitting requirements to increase the speed of developing projects
3) Institute a Performance-Based Incentive (PBI) that rewards combined solar + storage installations

Recommendations 1 and 2 are aimed at lowering solar PV costs for the system owner, while Recommendation 3 is aimed at increasing revenues for the owner.

Current permitting requirements for solar installations under Assembly Bills (AB) AB2188 and AB546 require residential (<10 kW) solar and solar + storage projects respectively to receive over-the-counter responses to in-person permit applications, with a 3-day turnaround for online permit applications.[34, 35] However, there are no specific requirements for larger systems.

Although the City is up to date with AB2188 regulations, its battery storage permitting processes need to be reviewed to ensure they are up to date with the relatively new AB546 regulations. Potential methods of streamlining this process will be discussed further in Section 6.1.1.

Using a Performance-Based Incentive to spur solar + storage projects helps to mitigate the devaluation caused by the ToU period shift by enabling solar production generated during the new off-peak periods to be stored in the batteries until the energy is more urgently needed by—and therefore more valuable to—the utility. By timing export of the solar energy to coincide with peak periods, solar value can be increased. The structure of a proposed PBI is discussed in further detail in Section 6.3.2.

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[34] California Assembly, *AB-2188 Solar Energy: Permits.* (Assembly, 2014) <https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB2188> [accessed 10 April 2019].
[35] California Assembly, *AB-546 Land Use: Local Ordinances: Energy Systems.* (Assembly, 2017) <https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180AB546> [accessed 10 April 2019].

4.2.3 – Funding Sources

Obstacle

A review of the City's various funding streams for energy-related policies and programs indicated that it is mostly dependent on IOU funds for any energy efficiency upgrades and incentives. The City currently receives no federal or private funding.

Dependence on one type of funding can lead to an inconsistent funding stream. For example, PG&E recently filed for Chapter 11 bankruptcy protection as part of the ongoing lawsuits against it related to wildfire damages. Although already approved programs are unlikely to have their funding revoked, there may be a downturn in future programs as PG&E tries to regain solvency. While SCE does not currently have this issue, similar fire- or disaster-related lawsuits or judgments are possible in the future. A reduction in the funds the City receives could reduce the City's ability to implement and administer programs and policies.

Solutions

There are several ways for the City to diversify its funding sources:

1) Aggressively pursue new federal, state, and private foundation funding sources, as well as explore new mechanisms of raising municipal revenue
2) Continue to work closely with the CPUC and existing IOUs to maximize the City's share of existing and future renewable program funding
3) Partner with other nearby local and regional governments to create energy programs
4) Continue to monitor the costs and benefits of a potential CCA to determine viability
5) Earmark a portion of the recently passed cannabis tax towards supporting local renewable energy programs
6) Use savings from the tariff switch related to the streetlight acquisition to fund projects at City facilities, as well as energy savings once LEDs are installed

Various programs and funding opportunities that are currently available for the City to pursue under Recommendation 1 have been delivered to City staff separate from the SEP. Strategies to raise additional municipal revenue are discussed in Section 6.7. Recommendations 2 and 3 are aimed at maximizing IOU funding, either directly or by-passing IOUs altogether. Under Recommendation 4, a CCA would enable the City to create a separate entity to lead energy programs with less need for outside funding, as programs that support CCA-member goals could be funded through customer payments. Lastly, Recommendations 5 and 6 involve using new parts of the City general fund that may not yet have been allocated or that may be able to be re-allocated to financially support the City's clean energy efforts.

4.3 – Institutional City Barriers

4.3.1 – 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, ensuring the ability to restore services as rapidly as possible. EAPs are therefore a key step in building a resilient local electricity grid.

As more and more aspects of the transportation and building sectors are electrified, with fossil fuel reliance being reduced or eliminated, 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 fleet by 2030. In this scenario, an electricity outage in southern Santa Barbara County could result in major disruption to regional mobility.

Although the City has several emergency preparedness plans and has recently hired an Emergency Services Coordinator, the City does not currently have a formal EAP. Traditional methods utilized to address resiliency 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 existing and under-construction 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, where the battery storage can be used daily to achieve electricity bill reductions while also providing backup capacity for shorter outages. Battery storage can achieve these savings in two ways: by shifting solar generation to more valuable time periods (also known as energy arbitrage) or reducing charges related to the maximum electricity demand.

4.3.2 – Regional Collaboration

Obstacle

While City and Santa Barbara County staff have frequent communication on energy and climate issues, the patchwork nature of the many special districts and public agencies has resulted in a lack of formal regional collaboration on climate and resiliency projects. To date, formal collaborations around energy issues have included the South County Energy Efficiency Partnership (SCEEP), the CCA feasibility study, and the SEP process.

Recently, the County has begun efforts to form a Regional Climate Collaborative to coordinate climate mitigation and adaptation (or action) efforts across several sectors, including transportation and waste. It will also focus on electric reliability and resiliency.

Solutions

The main recommendation to increase regional collaboration is:

1) Continue collaboration with the County and other Cities around the County's efforts to create a regional energy and resiliency working group.

The City has been a part of the County's efforts to create this collaborative and should continue to do so.

4.4 – Educational and Public Awareness Barriers

4.4.1 – Cost Awareness of Renewable Energy

As solar PV is still a relatively new technology, the costs of purchasing equipment and installation decrease every year with falling module and inverter costs and greater competition. Figures 4.3 and 4.4 show historical trends in costs for residential and commercial projects, with data taken from National Renewable Energy Laboratory (NREL) cost benchmarking studies.[36]

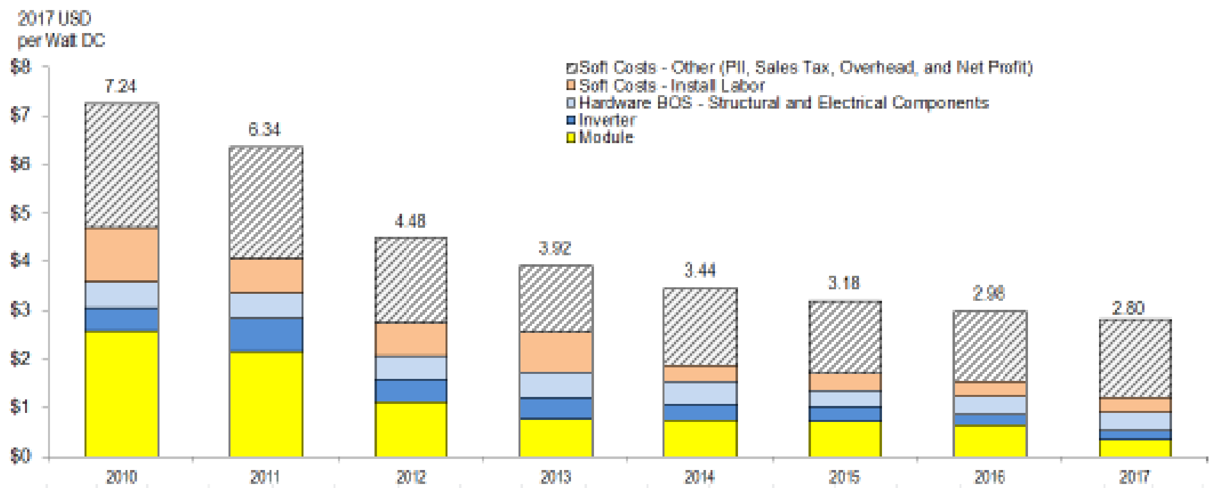


Figure 4.2: History of Residential Solar PV Cost

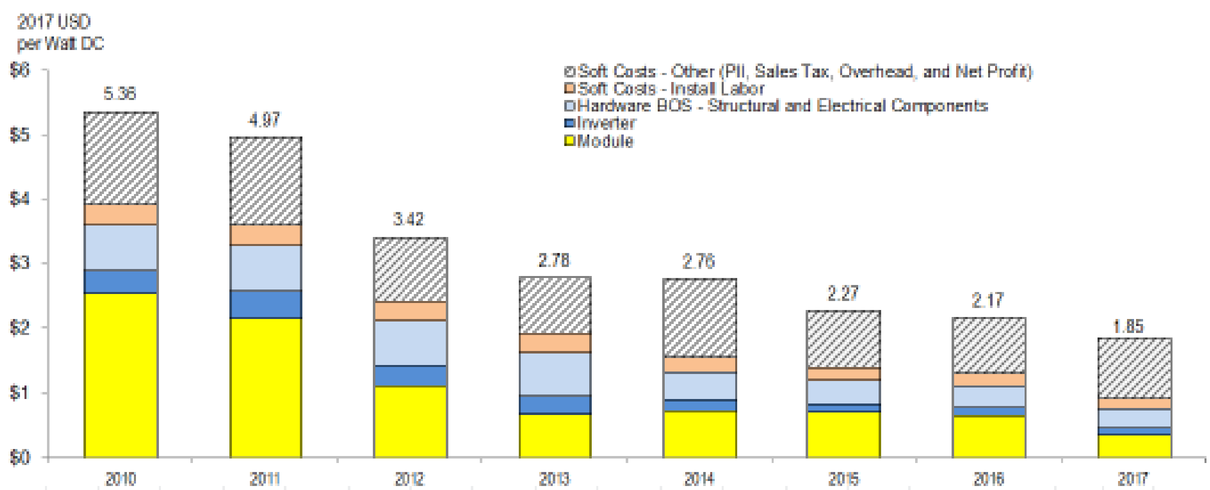


Figure 4.3: History of Commercial Solar PV Cost

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, they may not be aware

[36] Ran Fu and others, *U . S . Solar Photovoltaic System Cost Benchmark : Q1 2017 U . S . Solar Photovoltaic System Cost Benchmark : Q1 2017*, 2017.

of changes in state and federal policies such as the reduction in the Investment Tax Credit (ITC), which provides 30% of the system value back to the owner through an income tax credit, but which is scheduled to step down to 26%, 22%, and then 10% or 0% over the coming years (See Section 4.7.1 for more details related to the ITC).

Solutions

The main recommendation to increase community awareness is:

1) Support a County-wide One-Stop Shop to lead an educational campaign, provide resources to the public, and act as a trusted advisor to citizens and businesses looking to undertake energy actions.

A One-Stop Shop can increase knowledge about the falling costs of solar and energy efficiency projects, as well as informing on 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 City, such as financing programs and financial incentives, or promulgate the benefits of a potential CCA. Lastly, a One-Stop Shop can provide neutral and trusted advice for customers negotiating with energy developers.

4.5 – Regulatory Barriers and Solutions

4.5.1 – SCE Resiliency Procurement Process

Obstacle

In 2018, SCE released a Request for Offers (RFO) to procure additional backup power and resiliency in the Goleta-Moorpark transmission area, which represents southern Santa Barbara County. The “Least-Cost Best-Fit” (LCBF) methodology used by SCE to rank projects does not give higher scoring to renewable generation projects unless the procurement is specifically seeking renewable generation, which was not the case in 2018. The LCBF methodology provides benefit to projects that can generate power at on-peak periods.[37] However, due to the abundance of solar generation and the resulting SCE policy changes, solar generation no longer aligns with SCE’s defined on-peak periods.

Solutions

There are two recommendations:

1) Work with SCE, the County, and the CPUC to design a longer procurement process with an explicit carve-out for renewables;
2) Lobby for the institution of a feed-in tariff (FIT) or other form of standard offer for renewable development through SCE.

It is important to note, before discussing the two recommendation in further detail, that these recommendations are not mutually exclusive and address different aspects of the renewable development and interconnection processes. A longer procurement process with an explicit carve out for renewables would increase the likelihood of viable proposals for front-of-meter renewable projects in Goleta. A standard offer for renewable development through SCE would increase the viability of front-of-meter *and* distributed renewable projects in Goleta. However, broad changes to investor-owned utility policies, as discussed here, are often best achieved at the state-level. This does not mean that the City should stop engagement efforts with SCE, but it does lend credence to continued exploration of

[37] California Public Utilities Commission, ‘Utility Scale Request for Offers (RFO)’.

community choice energy and add importance to the advocacy strategies discussed in the SEP (Section 6.5.2).

Given increasingly high RPS requirements for renewable generation, procuring additional amounts of non-renewable generation purely for outage scenarios is short-sighted. Although fossil fuel generation sometimes has lower cost than renewable generation, since renewable generation can be run year-round and will eventually need to be procured under the RPS, the value of renewable content should be properly accounted for in an RFO.

Alternatively, Recommendation 2 would allow utilities to consistently procure renewable power through methods other than an RFO. While standard offers such as FITs do not ensure minimum pricing, they are quicker and less administratively burdensome for both utilities and developers. For smaller projects, where administrative costs are a larger portion of overall project costs, the uncertainty of the RFO process can dissuade developers who may not be able to shoulder the administrative costs of a failed bid.

Additionally, it is important to note that SCE has historically not indicated interest in establishing a new FIT, but, rather, seeks to enable more large-scale renewable energy projects through proposed Green Tariff programs. Continued engagement with SCE will be necessary to push these programs toward a structure that supports the City's goals.

4.6 – Technical/Infrastructural Barriers

4.6.1 – Distribution Grid

Obstacle

SCE recently released Integration Capacity Analysis (ICA) maps that show which areas of the distribution grid have additional electrical capacity for high-amperage wholesale connections and which do not. Figure 4.5 shows an example of such an ICA map for the Goleta area. The intent of the ICA maps is to simplify the interconnection process by enabling developers to target areas that are more likely to be approved. Projects that are smaller than the available capacity can be interconnected with no additional study by the utility. These maps show that there are potential constraints in some parts of Goleta, particularly western Goleta.

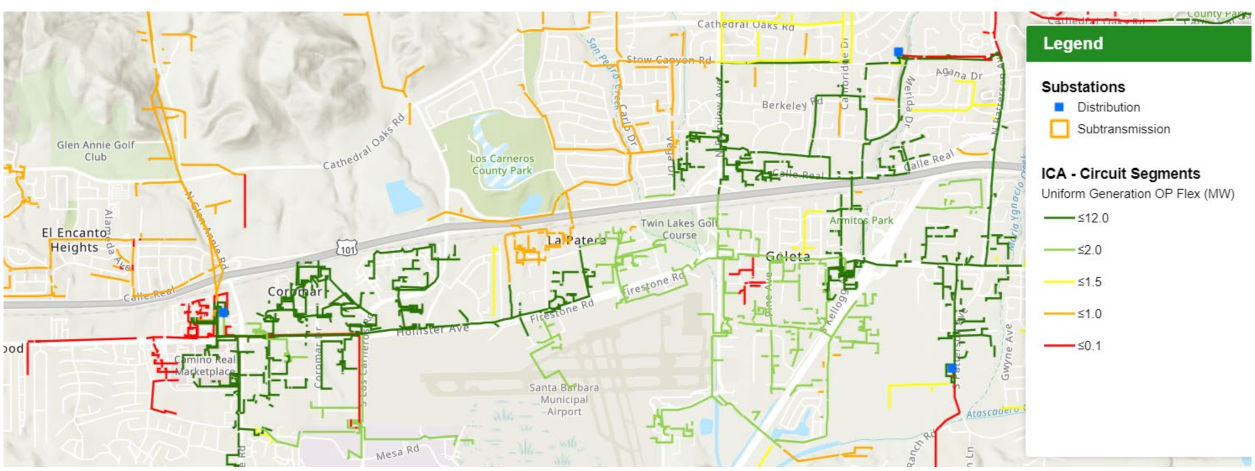


Figure 4.4: SCE ICA Map for Goleta

Solutions

There are several potential solutions to resolve this issue:

1) Focus energy efficiency initiatives in distribution-constrained areas
2) Provide larger energy efficiency incentives to residents and businesses who have been denied solar interconnection applications due to distribution-level limits
3) Approach SCE to upgrade or add additional feeders in the area to increase renewable energy potential

Recommendations 1 and 2 are geared towards energy projects that do not have to proceed through utility electrical interconnection processes, while Recommendation 3 would increase capacity and reduce constraints related to wire and transformer sizing. Recommendations 1 and 2 would be much cheaper and easier than Recommendation 3 but given that low on-site load is often the limiting constraint on renewable generation in ICA maps, failure to address Recommendation 3 would further limit the amount of available distributed generation capacity.

4.6.2 – Solar Automatic Shut-Off

Obstacle

Most solar installations use low-cost inverters that are tied to the grid and depend upon the grid to provide a reference voltage to operate. Therefore, these grid-tied inverters shut off during power outages, preventing the solar panels from providing power to the building during critical times. As a result, although many solar PV owners believe they can be self-sufficient during outages, their system is unavailable.[38]

Solutions

There are several methods for solar owners to power themselves during outages:

1) Supplement solar PV with battery storage backup;
2) Install secure power backup inverters for critical circuits; and
3) Supplement solar PV with a diesel or propane backup generator.

Inverters used for installations with battery storage are more expensive and allow the power from solar panels to alternate between supplying the grid, the battery, and the building. The battery inverters also come equipped with surge current capability, allowing the battery to power equipment that briefly needs a high start-up power, such as refrigerators. Additionally, battery storage provides savings even in non-emergency scenarios by allowing owners to shift consumption from peak periods to off-peak periods.

In comparison, secure backup inverters do not allow complete operation of a building, and do not have surge current capabilities. However, they can provide a critical outlet for operation of one or two loads, such as internet, and are cheaper than battery storage. Finally, although renewable generation is the goal of this SEP, small backup fossil fuel generators are also much cheaper than batteries and would also allow full operation. However, they can lead to poor air quality if used for prolonged periods of time, and they are a disturbance for neighbors.

[38] Energy Sage, 'Solar Power Systems: What Are Your Options in 2019?', 2019 <https://news.energysage.com/solar-power-systems-options/> [accessed 12 April 2019].

4.7 – State and Federal Policy Barriers

4.7.1 – 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 income taxes. 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.[39] This is a key driver for solar developers, 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 would otherwise be unable to do so, including the residential and public agency or non-profit sectors. However, the ITC is set to begin phasing down after the end of 2019 according to the following schedule in Table 4.1 on the following page:

Table 4.1: Federal Investment Tax Credit Schedule

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

Although this will be detrimental to commercial and utility systems, the complete elimination of the ITC will be particularly harmful for residential systems. While safe harbors are available to reserve a previous year's ITC level if construction or procurement begins prior to the end of each year, the additional pressing deadline with major financial implications will reduce the number of potential solar projects that prove to be financially viable.

Solutions

These are the main 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 projects

Both Recommendations are advocacy solutions, with Recommendation 1 attempting to extend the current ITC, and Recommendation 2 attempting to take advantage of the current ITC while it lasts if those efforts are unsuccessful, by enabling multiple public agencies to proceed with procurement before the planned ITC step-down.

[39] Solar Energy Industries Association, 'Solar Investment Tax Credit (ITC)', 2019 <https://www.seia.org/initiatives/solar-investment-tax-credit-itc> [accessed 10 April 2019].

Chapter 5 – Recommended Sites for Development

5.1 – Introduction

The purpose of this chapter is to provide a detailed technical assessment, financial analysis, and discussion of the next steps toward development of potential solar photovoltaic (PV) project development opportunities at sites owned by the City of Goleta. These sites will contribute to Goleta's 100% renewable electricity goal, as well as reliability and resiliency at critical sites.

Additionally, a focus of Goleta's SEP is identifying viable private-sector renewable energy generation projects within city boundaries. These opportunities were analyzed outside of this report in discussions with private site owners and City staff. A table of identified sites and their potential has been included at the end of the table covering City-owned sites. Due to privacy concerns, these sites have been anonymized while City staff works with site owners to determine the viability and likelihood of development.

This chapter summarizes:

1. Site 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 timeline for implementation

Based on information collected during pre-screen assessments and in-person site visits, high-potential sites for solar PV deployment have been identified. Figure 5.1 summarizes the projects' total potential economic and climate impact over a 25-year analysis period, assuming a power purchase agreement (PPA) financing structure. PPAs will be discussed further in Section 5.4.

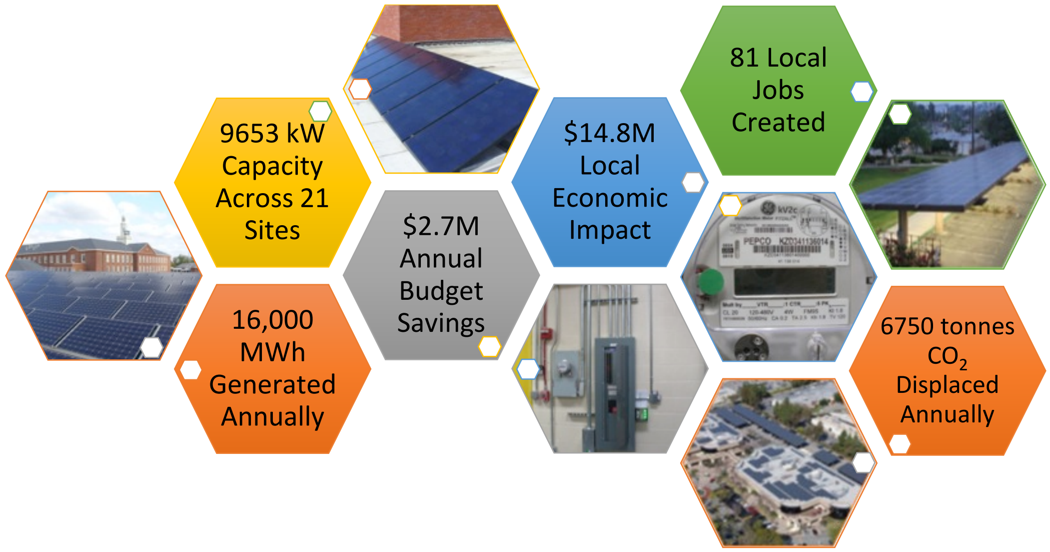


Figure 5.1: Projected Economic and Climate Benefit of Proposed Sites[40]

5.2 – 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 using a modular approach to provide system and project design flexibility. Based on the area available for solar at each site, the maximum possible solar PV system capacity has been estimated at 290 kilowatts (kW) to be installed across City facilities. Installing the maximum solar PV capacity at City facilities would offset 36% of current facility electricity use. 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.

[40] Economic and climate impacts estimated using the Jobs & Economic Development Impact (JEDI) tool from NREL and based on development of every site at the capacity listed in Table 5.1.

Table 5.1: 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**

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 parking structure solar carport systems, the main site selection issues are the availability of space for construction, geotechnical concerns relating to soil, surrounding vegetation, and distance to the electrical interconnection point. The potential challenges were rated on a scale from *None* (no issues) to *High* (likely to require extensive review or remediation). This siting methodology applied these challenges to municipal sites, but these challenges can, and should, be applied to any site where a solar installation is being considered. Below is a description of each criterion.

Table 5.2: Technical Feasibility Criteria

Criterion	Description
Shading	Survey the surroundings of the usable areas to identify obstructions that could potentially cast shadows on the solar modules and reduce output, such as rooftop HVAC equipment, rooftop access penthouses, antennas, trees, lampposts, and neighboring buildings. 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	Potential challenges such as roof and structural integrity are evaluated, including the age, condition, and material of the roof as well as the building and building layout. Potential shading sources include tall trees, rooftop mechanical equipment, and surrounding buildings.
Geotechnical	Geotechnical issues pertain to the surrounding area of the overall site such as soil condition, water table levels, and presence of fault lines. Structural capacities for soils vary greatly from site to site but, generally, projects seeking underground work of significant depth (i.e. solar carports with piers 8-12 feet below ground) encounter issues around water tables or in areas where soft soils can settle.
Environmental	Environmental criteria relate 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 table below summarizes this technical analysis for each site:

Table 5.3: Technical Feasibility Site Summary

ID	Name	Shading	Electrical	Structural	Geotech.	Enviro.	Comments
1	Goleta Library	Low	Medium	Low	Low	None	A geotechnical study would need to be conducted for the carport.

							The line of trees at the bottom of the parking lot should be far enough that shading impact is low. The electrical capacity on the switchgear will need to be confirmed, but likely won't limit project development. No apparent structural issues from site visit.
2	Goleta City Hall	Low	Low	Low	Low	None	A geotechnical study would need to be conducted for the carport. Many trees on-site, but mostly small. There is enough electrical capacity on the switchgear. No apparent structural issues from site visit.
3	Goleta Valley Community Center	None	Medium	None	Medium	None	Possible water table issues due to nearby creek, would need to conduct a geotechnical study to confirm. No trees shading parking lot. Electrical switchgear is very old and may need to be updated.

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. Below is a description of each category.

Table 5.4: 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. 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 will not be included.

5.3 – Financial Structure Details

5.3.1 – Behind-the-Meter Projects

A cost/benefit analysis was conducted based on the review of the historical energy usage at Goleta's municipal facilities, when available. This analysis allows for a detailed projection of potential avoided energy and peak 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" 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 kWh energy charges at the retail rate, which is the valuation structure under a net metering tariff in SCE 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 they will be coincident, among other factors. 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 nameplate size.

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

Direct Purchase Option

With this 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 operations 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

With this option, the municipal agency or facility owner (site host) would enter into a contract (typically 20 years) with a third-party to purchase all energy produced by a solar PV system installed on the property in question. 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.[41] 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. PPA's typically have a yearly price escalator of between 0-3%. The value of this escalator relative to the rate at which utility prices increase (assumed as 3% in this analysis)

[41] Solar Energy Industries Association, 'Solar Power Purchase Agreements', 2019 <https://www.seia.org/research-resources/solar-power-purchase-agreements> [accessed 10 April 2019].

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 allowing a third-party to take advantage of the ITC if they 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 budget certainty and 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.

Hybrid Purchase Options

Hybrid purchase options also exist to allow local governments, in particular, to take the best of the cash purchase and PPA options. Site hosts that have a small amount of up-front capital, but not enough to purchase the whole system, can buy down a portion of the system to lower the PPA rate for the duration of the contract. This enables the third-party developer to still take advantage of the tax credits, while reducing annual costs.

Alternatively, site hosts with no up-front capital but a desire to own the system for greater flexibility and control can sign PPA contracts with buy-out clauses. Buy-out clauses allow the site host to buy the system at a specific later point in time, typically six to eight years after development. This allows the site host to take ownership of the system after the full tax benefits have been exercised.

Table 5.5: Applicable Utility Solar Programs and Tariffs in Goleta

Type	Description
Net-metering[42]	*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 customers 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.

Table 5.6: Applicable Solar Incentives in Goleta

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 entire system to be depreciated over the first year.

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

State	Self-Generation Incentive Program (SGIP): Provides rebates for distributed energy systems, particularly with energy storage.[43] Multifamily Affordable Solar Housing (MASH): Provides a rebate to qualifying multi-family housing tenants (currently a waitlist for new applicants).[44]
Local	Property-Assessed Clean Energy (PACE) Financing for residential/commercial: Allows owners to finance installations through a loan that is paid back on property taxes.[45] On-bill financing (OBF): Allows owners to finance energy projects through loans that are paid back on utility bills; currently only available for energy efficiency projects.[46]

5.3.2 – Wholesale Projects

The available generation at some of the sites, particularly at commercial buildings, may be much greater than the load. These projects, also called wholesale projects, are interconnected directly to the distribution 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 whether it is financially viable to bid the project's capacity 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.

[43] California Public Utilities Commission, 'Self-Generation Incentive Program', 2019 <http://www.cpuc.ca.gov/sgip/> [accessed 10 April 2019].
[44] California Public Utilities Commission, 'CSI Multifamily Affordable Solar Housing (MASH) Program', 2019 <http://www.cpuc.ca.gov/general.aspx?id=3752> [accessed 10 April 2019].
[45] PACENation.
[46] Office of Energy Efficiency and Renewable Energy.

5.4 – Site Evaluations

5.4.1 - Goleta Library

Site Overview

Address: 500 N Fairview Ave, Goleta, CA 93117

Utility Provider:	SCE	Electricity Tariff:	TOU GS-1 D -> TOU GS-1 E
Annual Energy Usage:	193,398 kWh	Monthly Demand Peak:	80 kW

PV System Overview

System Size:	118 kW	Electricity Offset:	99%
Expected Year 1 Output:	190,911 kWh	Expected GHG Reduction:	30 tons/yr

Financial Summary

PPA Rate:	14 c/kWh	Simple Payback Period:	8.2 yrs

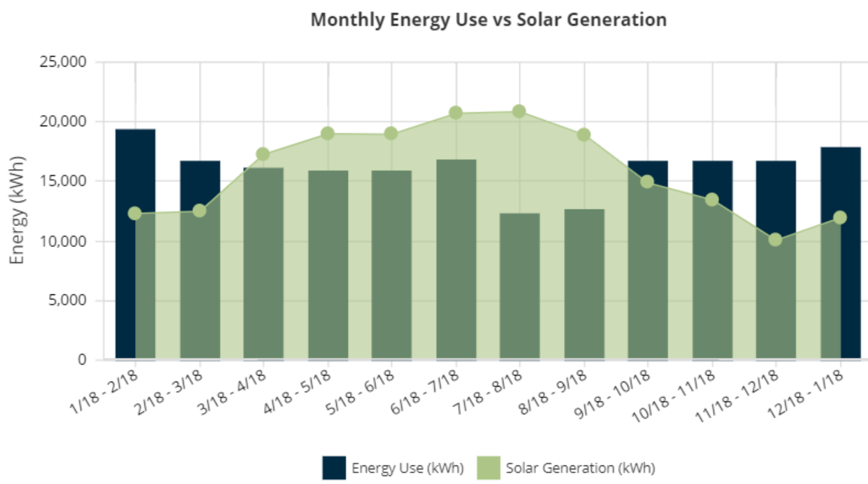
PV System Summary

There are three potential locations at the library for solar siting: the upper roof, the lower roof, and the parking lot. Due to load constraints, the installation was sited on only the upper roof and the parking lot. There are no expected issues with rooftop integrity, but electrical capacity on the switchgear needs to be confirmed and may be an issue, particularly with a battery storage system.

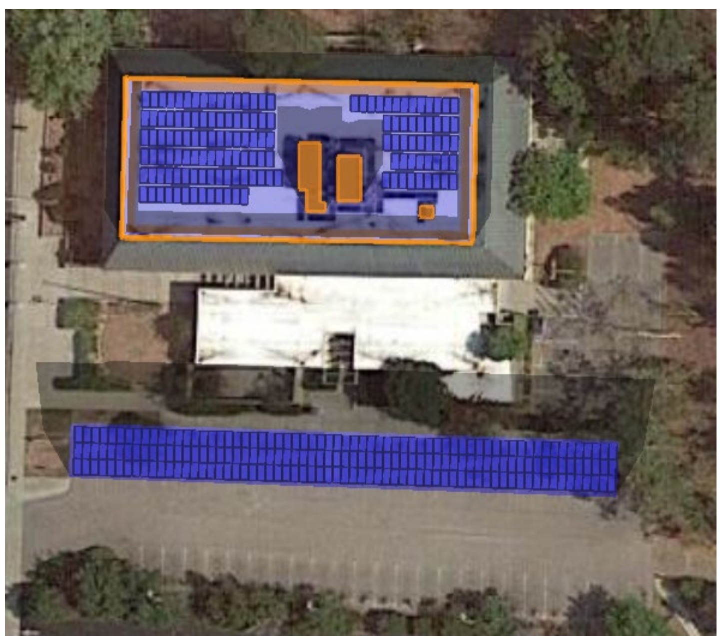
To take advantage of tax credits, the project is shown as financed through a zero-escalator PPA. Due to the recent change in time-of-use electricity rates, a 14 c/kWh PPA will initially be slightly more expensive than current electricity rates during solar production. However, as time passes, rising utility rates will surpass the flat PPA rate, leading to savings. The 8.2-year payback could potentially be improved by reducing the size of the system so that less generation is exported to the grid. However, a fully-sized system was chosen to help the City comply with its renewable energy goal for municipal facilities.

Battery storage systems were analyzed for inclusion in this project but were not found to be feasible at a 3 c/kWh adder to the PPA. The load profile for the library is similar to a traditional office building, with most of the load occurring between regular 9AM-5PM working hours. As such, there is little financial benefit to shifting solar production to the new evening peak period. However, the City may still want to include a battery for resiliency purposes, since the library is an important community gathering site during emergency scenarios.

Energy Use and Solar Generation Profile



Proposed Solar PV Design Layout



5.4.2 - Goleta City Hall

Site Overview

Address: 130 Cremona Dr # B, Goleta, CA 93117

Utility Provider:	SCE	Electricity Tariff:	TOU GS-2 D -> TOU GS-2 E
Annual Energy Usage:	225,772 kWh *(projected)*	Monthly Demand Peak:	73 kW *(projected)*

PV System Overview

System Size:	145 kW	Electricity Offset:	100%
Expected Year 1 Output:	226,867 kWh	Expected GHG Reduction:	36 tons/yr

BESS System Overview

System Size:	57 kW	System Duration	4 hrs

Financial Summary

PPA Rate:	17 c/kWh	Simple Payback Period:	14.7 yrs

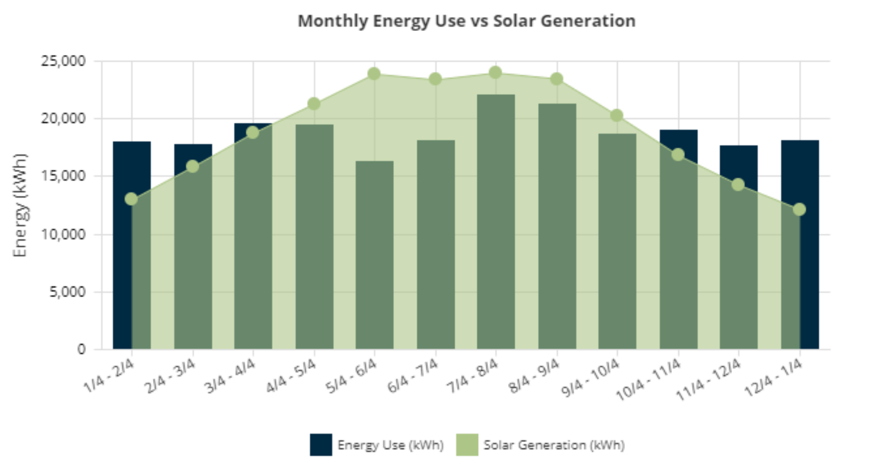
PV System Summary

A solar installation at City Hall can be installed on the roof as well as on part of the parking lot to the east of City Hall that is assigned to it. Due to load constraints, the installation was sited on the roof and a portion of the parking lot. In order to plan for the approved purchase by the City of the entire City Hall building, the design used in this analysis is sized to a *projected* electrical load. This projected load is based on the current electrical load scaled by an increase in square footage to reflect the planned purchase of the entire City Hall building. There are no expected issues with rooftop integrity or with the electrical capacity on the switchgear.

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 17 c/kWh PPA (including a 3 c/kWh for storage) will be more expensive than current electricity rates during solar production in the short term. However, as time passes, rising utility rates will surpass the flat PPA rate, leading to annual savings after the 8-year point, and a positive cumulative cash flow after 14 years. The payback could potentially be improved by reducing the size of the system so that less generation is exported to the grid. However, a fully sized system was chosen to help the City comply with its renewable energy goal for municipal facilities.

Preliminary modeling of a battery storage system at a 3 c/kWh adder to the PPA resulted in a payback period of 14.7 years, compared to 15.9 years in a solar-only case. The load profile for City Hall is similar to a traditional office building, with the majority of the load occurring between regular 9AM-5PM working hours. Thus, while there is some financial benefit of using a storage system to shift solar production to the new evening peak period, the benefits are not huge. However, since the modeling did indicate small financial benefits and those, coupled with the important resilience benefits at the facility since City Hall is the Emergency Operations Center for the City, indicate that the City should further explore inclusion of a battery system on site.

Energy Use and Solar Generation Profile



Proposed Solar PV Design Layout

5.4.3 - Goleta Valley Community Center

Site Overview

Address: 5679 Hollister Avenue, Goleta, CA 93117

Utility Provider:	SCE	Electricity Tariff:	TOU GS-1 D + TOU GS-1 E + TOU GS-2 E -> TOU GS-2 E
Annual Energy Usage:	116,011 kWh	Monthly Demand Peak:	49 kW

PV System Overview

System Size:	61 kW	Electricity Offset:	88%
Expected Year 1 Output:	102,296 kWh	Expected GHG Reduction:	18 tons/yr

BESS System Overview

System Size:	33 kW	System Duration:	4 hrs

Financial Summary

PPA Rate:	17 c/kWh	Simple Payback Period:	6.4 yrs

PV + BESS System Summary

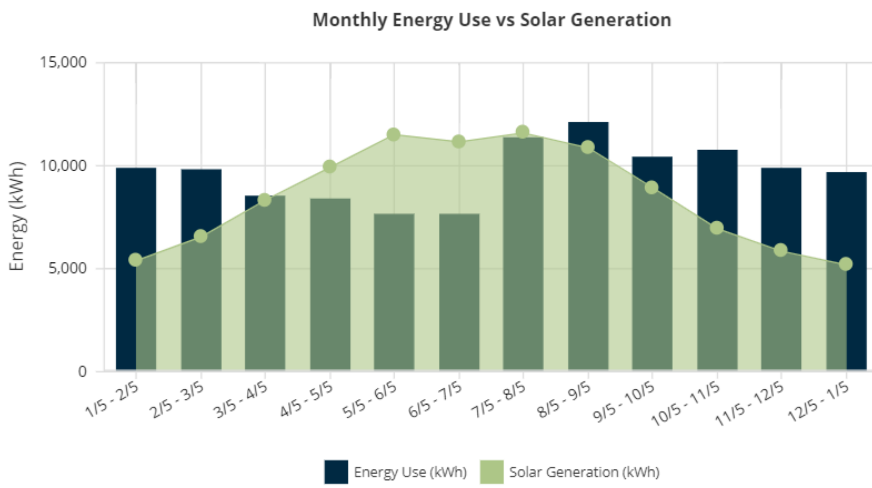
A solar installation at the Community Center could be located on the roofs, the main parking lot, or the parking lot in the back. However, due to load constraints, the installation was sited only in a portion of the back-parking lot, which is south-facing and unshaded. There may be water table issues leading to higher geotechnical costs for increased support of the carport. In that case, a flush-mount installation on the south-facing rooftops would likely be the next best option. The electrical system has capacity for an installation but is very old and may still require an upgrade.

Due to the several different meters located at the site, aggregation of these meters is recommended to allow as large a system as possible. Even then, relatively low load constrains 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.

A relatively small battery system accounted for 3c/kWh out of the 17c/kWh PPA. The load at the Community Center has noticeable demand spikes, so a battery system was found to be very strong at reducing demand charges. Additionally, the battery would help for resiliency purposes, since the Community Center is an important gathering spot in emergency scenarios. The battery will likely only be able to sustain full use of the Community Center for a few hours, so a load shedding plan should be designed to operate only critical loads during this time.

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 17 c/kWh PPA will be more expensive than current electricity rates during solar production in the short term. However, as time passes, rising utility rates will surpass the flat PPA rate, leading to savings after the 4-year point, and a positive cumulative cash flow after 7 years. The payback could potentially be improved by reducing the size of the system so that less generation is exported to the grid. However, a fully-sized system was chosen to help the City comply with its renewable energy goal for municipal facilities.

Energy Use and Solar Generation Profile



Proposed Solar PV Design Layout

5.5 – Next Steps

The SEP represents the final step in the solar feasibility assessment process and now requires internal review by City stakeholders. The next steps differ based on the ownership of the assessed site. For sites owned by the City, the project timeline is as follows:

Figure 5.2: Next Steps in Site Development

If the City decides to move forward with an RFP for selected City-owned sites, the following next steps have been identified to move this project along quickly and achieve the desired impact on cost reduction and renewable energy production before available federal solar incentives decrease.

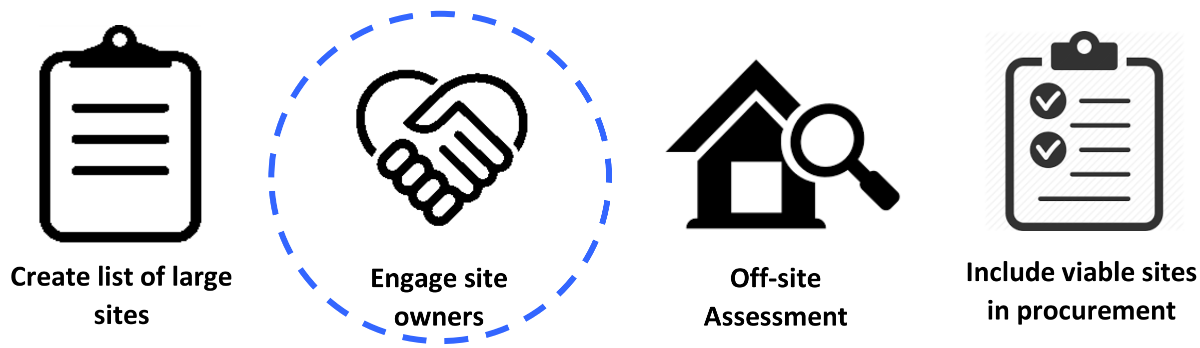


Figure 5.3: RFP issuance and execution

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 project team in order to raise awareness and gather necessary information to complete this report and the City can build on these relationships and continue to catalyze development.

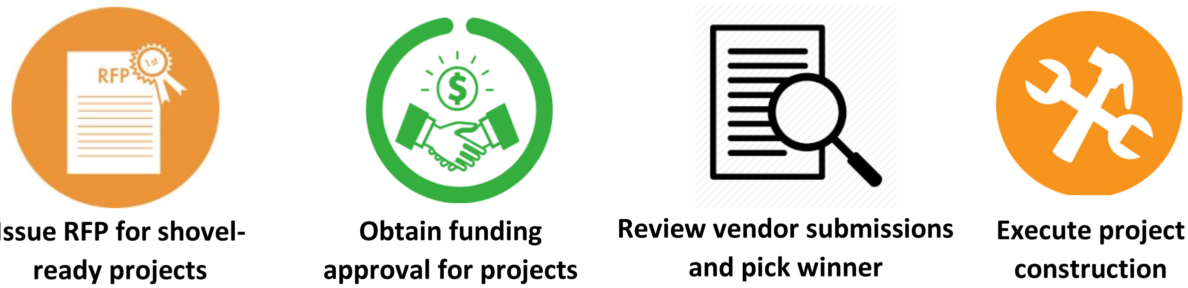


Figure 5.4: Private Site Outreach

5.6 – Methodology

Technical Assessment Methodology Used in this Report:

- 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. Shading analysis is performed using Solmetric SunEye.
- 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, particularly the ITC, which is set to reduce after the end of 2019. Projects have been analyzed based on construction completing in 2019.

Financial Assumptions Used in this Report:

The assumptions and price points used in the financial modeling are based on current local market conditions in southern Santa Barbara County as of January 2019.

- **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 long term (50+ 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.

Chapter 6 – Specific Recommended Actions and Timeline

The recommendations listed in Chapter 4 were compiled and organized into a small number of strategies, divided into 5 key program areas. Not every recommendation is described in further detail, such as those already being undertaken as part of the SEP, and those which were deemed to be relatively simple with pre-existing City precedents, such as continuing to support regional collaboration. This chapter addresses remaining recommendations with more details and suggestions for future implementation planning.

6.1 – Regulatory Program Area

6.1.1 – Update Residential and Commercial Solar and Solar + Storage Ordinances

Strategy Description

The goal of this strategy is to turn the City into a desirable area for solar developers to operate by greatly reducing permit barriers. There are two key steps to updating residential and commercial ordinances for stand-alone solar systems and combined solar and storage systems, to take the City beyond what is purely required by state regulations:

1) Implement electronic submission for energy storage permitting
2) Create a new solar ordinance that also streamlines permitting for larger sized systems, up to anywhere between large residential (<20 kW) to small commercial systems (<100 kW), with a checklist of requirements that must be, and typically are, met to make projects eligible for the streamlining.

Some potential methods to streamline permitting beyond current requirements are listed below:

1) Enable online permit submissions and over-the-counter permits for larger PV systems (beyond the <10 kW systems currently fast-tracked)
2) Use public-private partnerships to pilot solar design software that uses integrated City-approved design parameters to only create designs that are already permit-approved with respect to the City's requirements.
3) Enable virtual safety inspections for solar installations through mobile phone video calls that can be scheduled and conducted on short notice

Currently, AB2188 requires over-the-counter permit approval and a 3-day turnaround for online submissions for all systems under 10 kW. Table 6.1 below shows how much further potential would be enabled by an expansion of this threshold[47]:

Table 6.1: Solar Fast-Track Approval Potential by Streamlining Threshold

Solar Streamlining Threshold	Cumulative Additional Solar Capacity (MW)	Cumulative % of Total Commercial and Industrial Solar Capacity
< 20 kW	16 – 21	16%
< 30 kW	27 – 36	29%
< 40 kW	31 – 41	33%
< 50 kW	43 – 57	45%
< 60 kW	50 – 66	53%
< 70 kW	55 – 72	57%
< 80 kW	57 – 75	60%

[47] Data based on statistical solar potential estimates based on building sizes

< 90 kW	61 – 81	65%

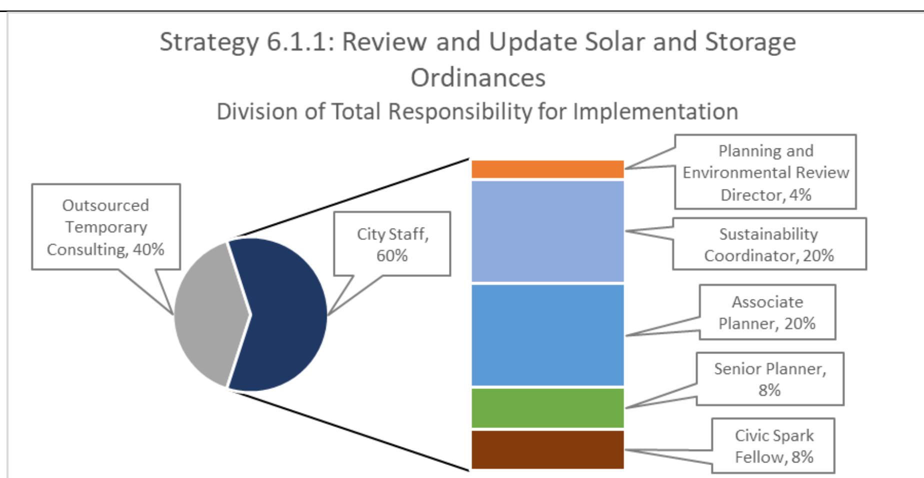
Contributions to the goal, as modeled below, are currently shown for a 40-kW threshold for streamlined expansion, to target roughly 1/3[rd] of the commercial solar installation potential in the city.

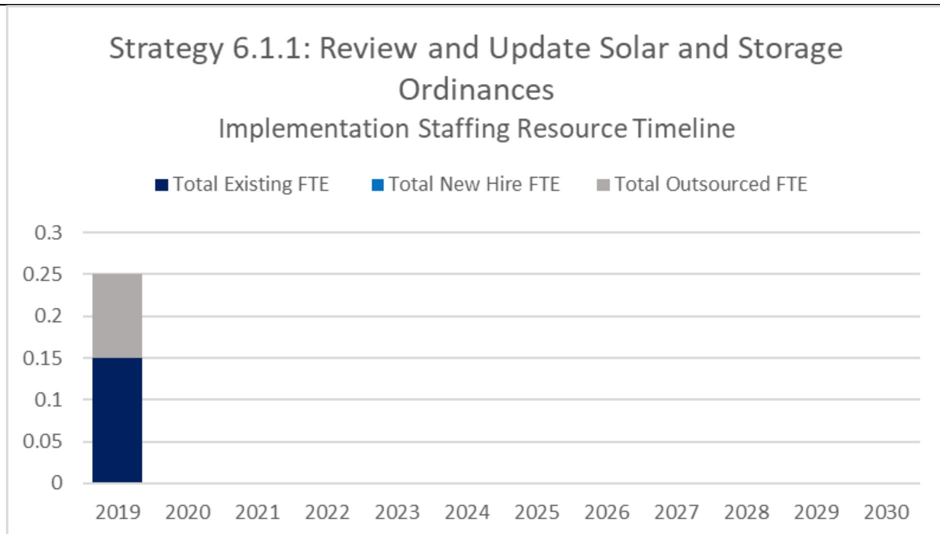
Action Plan – Project

2019

1. Explore funding strategies for municipal projects
2. Compile outstanding questions and list of necessary Request for Proposal (RFP) materials for inclusion in a scope of work for site assessment consultants
3. Conduct best practices review of residential and small commercial solar and solar + storage permitting processes of other cities
4. Use the results of the SEP statistical analysis to identify solar potential at each new system size threshold (e.g., MW potential < 10 kW, < 20 kW, < 30 kW, etc.)
5. Work with Building Official and other members of the Building and Safety Division to draft revised ordinances for solar and solar + storage
6. Circulate draft ordinance to all relevant City stakeholders for written feedback
7. Obtain approval from City Council

Funding Requirements, Staffing Requirements, and Energy Impacts





Total FTE Requirement	***Year 1:*** *0.25 FTEs (~500 hours)*
FTE Position Breakdown	***Year 1:*** *Sustainability Coordinator: 100 hours/year* *Civic Spark Fellow: 40 hours/year* *Planning and Environmental Review Director: 20 hours/year* *Associate Planner: 100 hours/year* *Senior Planner: 40 hours/year* *Outsourced Consultant: 200 hours/year* *Building Official: 200 hours/year reduction*
Estimated Annual Staffing Cost	***Year 1:*** *$20,000*
Estimated Annual Consulting and Capital Costs	***Year 1:*** *$10,000*
2030 Annual Electricity Impact	*4 GWh (~1,450 households)*

Case Study: Streamlined Permitting through Virtual Inspections

Los Angeles County has recently launched a virtual inspection program for residential photovoltaic installations. This program is not mandatory and must be agreed to by the inspector. The process requires that 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, through the phone's video application. 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.

6.1.2 – Institute Energy Benchmarking Policy for Large Commercial Buildings

Strategy Description

While state-wide building codes are aimed at making new construction more energy-efficient, energy benchmarking is aimed at reducing the energy use of already constructed buildings. Energy benchmarking involves comparison of how much energy buildings use, normally specified per square foot so that it applies to buildings of different sizes. Depending on the implementation, the benchmarking can be either voluntary or mandatory. Currently, AB802 requires all buildings greater than 50,000 ft^2 to benchmark their energy consumption by June 1st, 2018.[48] This requirement could apply to between 36 – 89 buildings in Goleta, based on JDL mapping data[49] and SLED data, taken from CoStar Realty Information.[50] Impacts are currently estimated based on the latter data.

The state can levy fines against those who do not comply, although no specific levels are stated. Benchmarking policies can also penalize building owners who do not meet certain energy thresholds per square foot, or reward buildings who do meet them.[51]

Impacts currently assume a mandatory requirement operating along the following schedule:

Table 6.2: Proposed Energy Benchmarking Intensity Schedule

Year	% Over Average Usage	Energy Intensity Benchmark (kWh/ft^2)
2022	50%	9.6
2023	45%	9.2
2024	40%	8.8
2025	35%	8.3
2026	30%	7.9
2027	25%	7.4
2028	20%	6.9
2029	15%	6.4
2030	10%	5.8

Energy benchmarking is generally only applied to buildings of a certain minimum size. The lower the threshold for applicability, the more buildings are included, and therefore the more impact this policy can have. However, as more buildings are included, additional administrative burdens also exist. Additionally, since larger buildings use more energy than smaller buildings, they comprise a proportionally larger amount of Goleta's energy use, furthering the impacts of this strategy. The table below shows how many buildings and how much square footage would be included under various applicability thresholds:

[48] California Assembly, *AB-802 Energy Efficiency.* (Assembly, 2015) <https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160AB802> [accessed 10 April 2019].
[49] JDL, *Building Sizes in Goleta*, 2019.
[50] US Department of Energy, 'State & Local Energy Data', 2018 <https://apps1.eere.energy.gov/sled/#/results/transportation?city=Lafayette&abv=CO&section=electricity&currentState=Colorado&lat=39.9935959&lng=-105.08970579999999>.
[51] California Energy Commission, 'Building Energy Benchmarking Program', 2019 <https://www.energy.ca.gov/benchmarking/> [accessed 10 April 2019].

Table 6.3: Goleta Commercial Building Data

Energy Benchmark Threshold	% of Commercial Buildings	% of Commercial Square Footage
> 5,000 ft^2	64%	95%
> 10,000 ft^2	37%	86%
> 15,000 ft^2	28%	81%
> 20,000 ft^2	22%	76%
> 25,000 ft^2	19%	72%
> 30,000 ft^2	16%	68%
> 35,000 ft^2	14%	66%
> 40,000 ft^2	12%	63%
> 45,000 ft^2	12%	61%
> 50,000 ft^2	11%	60%

Although only roughly 1/10th of commercial buildings are greater than 50,000 ft^2, these buildings comprise 60% of the total commercial building space, and therefore roughly 60% of the total commercial energy use. Modeled impacts from this strategy are currently shown with a threshold of 10,000 ft^2 to reflect the ambition of Goleta's goal, but a higher threshold would come with lower administrative costs. It should be noted as well that this data reflects the significant number of large commercial buildings in Goleta. In comparison, only 4% of the commercial buildings in Santa Barbara City are greater than 50,000 ft^2.

Action Plan - Project

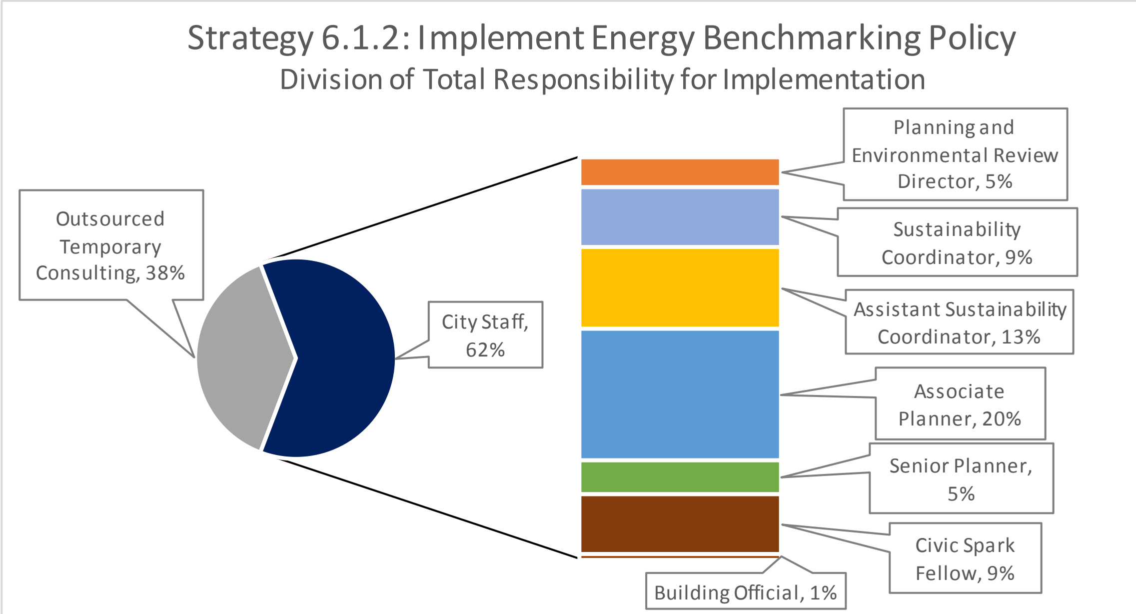
2020

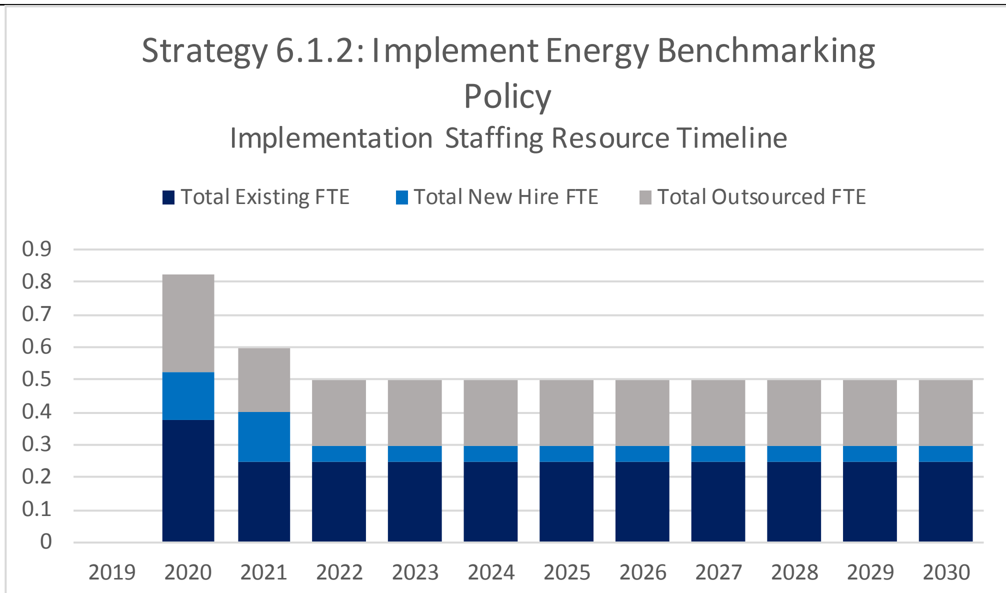
1. Assemble an internal team with the Chief Building Official to review current and potential energy disclosure policies and best practices
2. Engage local realtor associations and large commercial property owners to gather feedback on implementation
3. Formulate draft disclosure and benchmarking policy based on best practices review
4. Circulate draft disclosure and benchmarking policy to relevant stakeholders for feedback.

2021

5. Create ordinance template based on feedback.
6. Present template to relevant commissions and subcommittees.
7. Present ordinance to Council for approval.

Funding Requirements, Staffing Requirements, and Energy Impacts





Total FTE Requirement	***Year 1:*** *0.825 FTEs (~1650 hours)* ***Year 2:*** *0.6 FTEs (~1200 hours)* ***Continuing:*** *0.5 FTEs (~1000 hours)*
FTE Position Breakdown	***Year 1:*** *Sustainability Coordinator: 100 hours/year* *Assistant Sustainability Coordinator: 300 hours/year* *Civic Spark Fellow: 100 hours/year*

	Planning and Environmental Review Director: 50 hours/year *Associate Planner: 300 hours/year* *Senior Planner: 100 hours/year* *Building Official: 100 hours/year* *Outsourced Consultant: 600 hours/year* ***Year 2*** *Sustainability Coordinator: 100 hours/year* *Assistant Sustainability Coordinator: 300 hours/year* *Civic Spark Fellow: 100 hours/year* *Planning and Environmental Review Director: 50 hours/year* *Associate Planner: 200 hours/year* *Senior Planner: 50 hours/year* *Outsourced Consultant: 400 hours/year* ***Continuing:*** *Sustainability Coordinator: 100 hours/year* *Assistant Sustainability Coordinator: 100 hours/year* *Civic Spark Fellow: 100 hours/year* *Planning and Environmental Review Director: 50 hours/year* *Associate Planner: 200 hours/year* *Senior Planner: 50 hours/year* *Outsourced Consultant: 400 hours/year*
Estimated Annual Staffing Cost	***Year 1:*** *$60,000* ***Year 2:*** *$40,000* ***Continuing:*** *$35,000*
Estimated Annual Capital and Consulting Costs	***Year 1:*** *$30,000* ***Continuing:*** *$20,000*
2030 Annual Electricity Impact	*5 GWh (~1,750 households)*

Case Study

Several cities have instituted energy disclosure and benchmarking policies, including Berkeley, CA, and Boulder, CO. Berkeley's Building Energy Saving Ordinance (BESO) has required disclosure and reporting for buildings greater than 25,000 sq. ft. starting July 1st, 2019.[52] However, there is no requirement to meet any specific energy efficiency retrofits or energy intensity targets. In comparison, Boulder's Building Performance Program initially requires only disclosure and reporting but will begin requiring lighting upgrades and retro-commissioning[53] from 2021 – 2023 and implementation of retro-commissioning from 2023 – 2027, with smaller buildings having more time to comply. Boulder's program does not specify exact energy intensity targets to hit, only that these actions be taken.[54]

6.2 – Utility Program Area

6.2.1 – Evaluate the Benefits of a CCA and Consider Establishment

Strategy Description

Community Choice Aggregations (CCAs) provide local governments more authority and decision-making ability 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 City meet its renewable energy goals include:

- Creating rates and programs such as a Performance-Based Incentive to boost the financial viability of renewable energy projects
- Developing programs for community solar and microgrid[55] 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 RECs. A CCA would not have to procure all its renewable electricity locally but could still do so through introducing new programs such as a feed-in tariff (FIT) rate. The ability to establish a FIT applying to local projects, instead of lobbying SCE, is a significant benefit of a CCA. A FIT would provide a standardized method to find an off-taker for small to medium wholesale projects, which would otherwise not be profitable with SCE due to the administrative requirements of responding to a traditional RFP process for renewables procurement.

The County, in partnership with the Cities of Goleta, Carpinteria, and Santa Barbara, 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.[56] However, in 2018, the CPUC allowed IOUs to recalculate and increase the Power Charge Indifference Adjustment (PCIA) that they were charging CCAs for the loss in customers for previously-procured energy, which may reduce the viability of new CCAs. The County and Cities have already re-commissioned the study to account for the new PCIA rates, the results of which are expected by summer 2019. If the County and Cities choose not to proceed with a CCA at this

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[52] City of Berkeley, 'BESO Benchmarking Buildings', 2019 <https://www.cityofberkeley.info/benchmarking_buildings/> [accessed 10 April 2019].

[53] Retro-commissioning is the application to existing buildings of the commissioning process of ensuring that all installed systems are properly functional.

[54] City of Boulder, 'Boulder Building Performance', 2019 <https://bouldercolorado.gov/sustainability/boulder-building-performance-home> [accessed 10 April 2019].

[55] Microgrids are connected and clustered sets of distributed energy resources and loads that can connect to the grid or disconnect from it as necessary.

[56] Pacific Energy Advisors, *Technical Feasibility Study on Community Choice Aggregation: All Santa Barbara County Scenario*, 2017 <https://doi.org/10.1142/9781860949371_0008>.

time, Goleta should, given the benefits of a CCA and its importance to reaching a 100% renewable goal, continue to explore alternative pathways toward community choice energy. This could include future commission of an independent feasibility study to provided updated costs and benefits of a potential South County (or Goleta-only) CCA or exploration of joining established CCAs in SCE territory.

The County's study focused on a single set of rates for the entire county, whereas a study focused purely on Goleta or Cities in the southern Santa Barbara County could have different results. While the study focusing purely on the City of Santa Barbara showed less viable results than a county-wide CCA,[57] delayed rollout scenarios were not analyzed. In most cases, serving certain customer classes can be more profitable for an energy provider due to higher per unit margins embedded in utility rate designs by customer class. As such, a delayed rollout of a new CCA could allow a CCA to serve these classes first to build up greater margins and cash pool for hedging against possible losses from serving less profitable customer classes The results of the feasibility study currently underway will provide further insight into which customer classes are most viable for near-term versus delayed rollout.

PCIA rates should decrease over time as there will be fewer long-term utility contracts that result in PCIA charges. A delayed rollout would spread out the PCIA over a longer period, reducing the negative impact on customer rates. Additionally, if the PCIA results in a short-term loss of revenue for the CCA, serving a smaller number of customers would reduce this loss. This can be taken full advantage of if a future CCA initially serves only municipal government accounts as part of Goleta's 100% renewable electricity goal.

Goleta could also choose to join an already existing CCA such as the Clean Power Alliance (CPA) in Los Angeles and Ventura Counties, the Monterey Bay Community Power (MBCP) in Monterey, San Benito and Santa Cruz Counties, as well as various cities in San Luis Obispo County or the California Choice Energy Authority led by the City of Lancaster. While this would help Goleta reach its 100% renewable energy goal through a higher rate of renewable procurement, it would not necessarily help Goleta meet its other resiliency goals, as Goleta's leverage within the group would be lessened by the number of other members. The Action Plan below provides guidance for additional scoping of the most viable CCA scenario after the results of the current feasibility study are available. This scoping will enable the City to determine the most realistic path forward. If County-wide CCA does proceed, the City should continue to offer support and staffing where necessary, but the staffing resources listed below, particularly the outsourced FTE cost, will be reduced.

Action Plan - Project

2019

1. Review commissioned study on CCA viability and compare new rates to those in previously commissioned study
2. Conduct outreach to neighboring cities such as Santa Barbara and existing CCAs such as the Clean Power Alliance and Monterey Bay Community Power to determine viability of being a secondary CCA member.

[57] Pacific Energy Advisors, *Technical Feasibility Study on Community Choice Aggregation: City of Santa Barbara Scenario*, 2017 <https://doi.org/10.1142/9781860949371_0008>.

IF CCA MOVES FORWARD

3. Identify internal staff lead and outsourced consultant lead
4. Secure remaining formation and early operational budget
5. Create new City department
6. Create educational programs to increase knowledge about CCA benefits and increase buy-in
7. Establish contact with representatives of other CCAs to gather advice and assistance

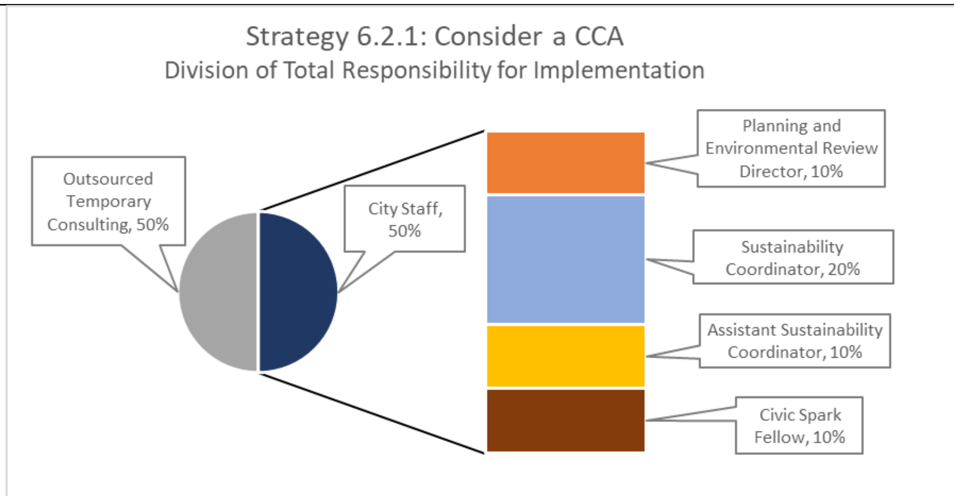
2020

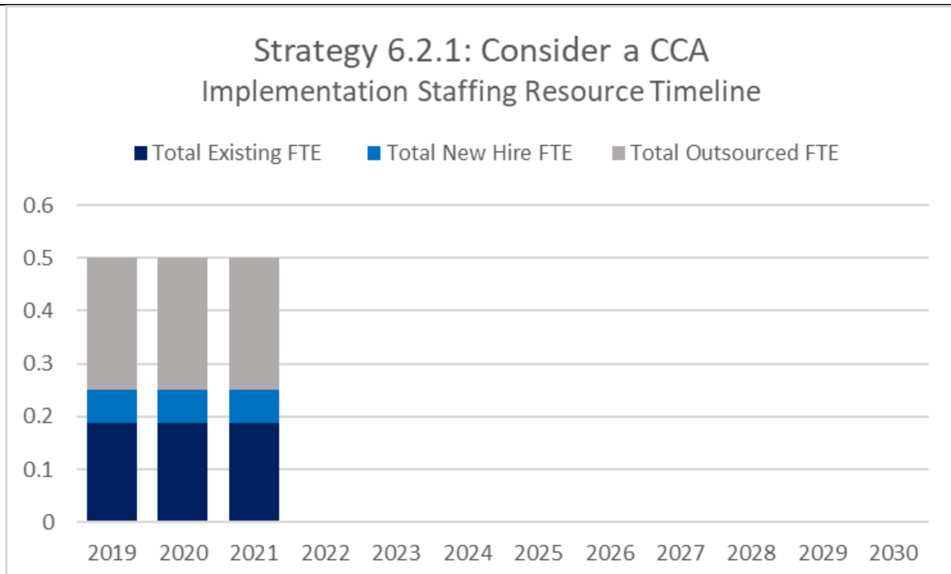
8. Execute service agreements with IOUs
9. Conduct start-up activities such as hiring, securing office space, load forecasting, power procurement, rate-setting, branding, outreach, etc.
10. Provide customer notifications as required by statute
11. Release a Request for Indicative Pricing from independent power producers
12. Work with internal City stakeholders to create a CCA Board
13. Create and issue RFP for further rate and regulatory studies to implementation consultants and advisors

2021

14. Receive approval of CCA rate viability, Board structure, and implementation support contracts
15. Draft and submit implementation plan to CPUC
16. Release RFPs for power contracts
17. Sign power contracts
18. Launch CCA and begin serving community load

Funding Requirements, Staffing Requirements, and Energy Impacts





Total FTE Requirement	***Years 1-3:*** *0.5 FTEs for planning (~1,000 hours combined)*
FTE Position Breakdown	***Years 1-3:*** *Sustainability Coordinator: 200 hours/year* *Assistant Sustainability Coordinator: 100 hours/year* *Civic Spark Fellow: 100 hours/year* *Planning and Environmental Review Director: 100 hours/year* *Outsourced Consultant: 500 hours/year*
Estimated Annual Staffing Cost	***Years 1-3:*** *$25,000*
Estimated Annual Capital and Consulting Costs	***Years 1-3:*** *$25,000*

2030 Annual Electricity Impact	67 GWh (~24,000 households)

Case Study: Apple Valley Choice Energy (AVCE)

Apple Valley Choice Energy (AVCE) is the best-case study for a Goleta-only CCA as it is the most comparable city-only CCA in population to Goleta, with a population of 71,000. Apple Valley funded start-up costs for AVCE by borrowing $2.5 million from its General Fund, which began to be paid once AVCE became operational in 2017. Roughly 1.65 total FTEs were required during this start-up process, with 1.3 FTEs being budgeted annually for operation.

6.2.2 – Work with IOUs to Develop a Community Solar Project

Strategy Description

Community solar projects are solar projects sized similarly to large commercial installations, in the 1-3 MW range. These projects can be subscribed to by residents and businesses that cannot install solar PV on their own facilities due to either technical or ownership constraints or a lack of financial capability. They also provide other important benefits to the community by being locally sited, such as resiliency and jobs for the local solar industry. Local siting also reduces reliance on long distance transmission by adding a large project to the regional distribution grid.

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. SCE has a current pathway for community solar programs, but due to the high administrative burdens placed on the project developer, no community solar projects have proceeded to date. SCE is currently asking for funding from the CPUC to develop a set of alternative community solar programs to begin in 2020. Despite the lack of CPUC approval on SCE's proposed green programs at the time of writing, due to the uncertainty of a CCA moving forward and the lack of historical precedent for community solar projects in SCE territory, the action plan below is geared towards participating in one of the proposed SCE programs.

The proposed SCE Community Renewables Program would also require an entity such as a City, 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. City partakes in SCE Request for Information (RFI) to assess community requirements such as resiliency and location and find a suitable site host
2. City identifies co-anchors if necessary
3. SCE issues RFP for development of project and selects a winner
4. City collaborates with developer to ensure smooth project installation and program launch

Action Plan - Project

2020

1. Assign a City staff member and team to lead project development and review status of SCE Community Renewables program
2. Conduct an analysis of large City-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 enrolment in the project
5. Respond to SCE RFI with site details and proceed through process as directed by SCE

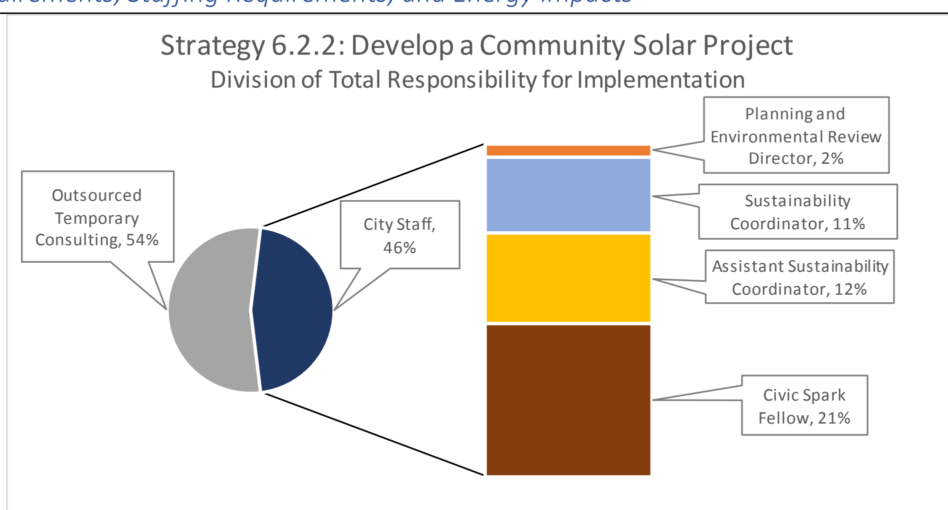
2021

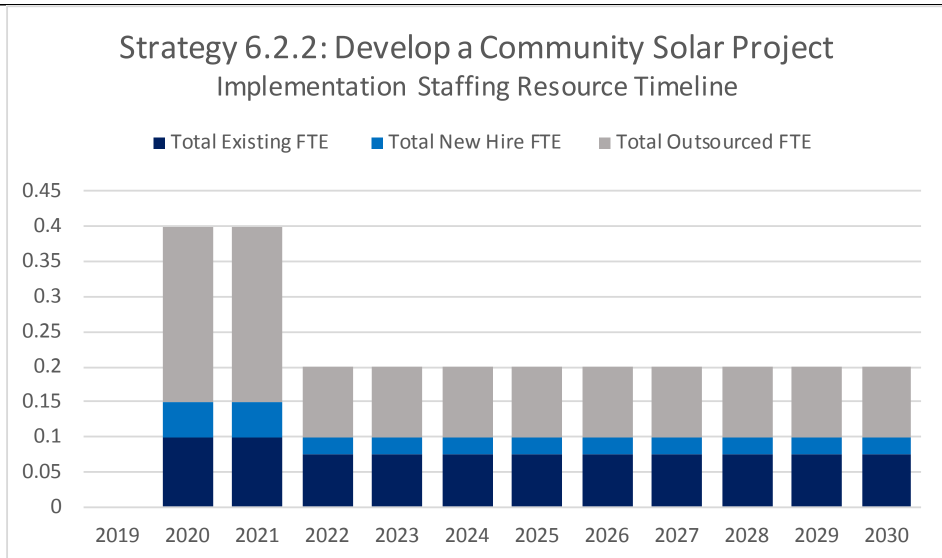
6. Obtain approval for participation in SCE Community Renewables program from City Council
7. Return to Council as necessary for additional contract approvals
8. Begin and monitor project construction

2022

9. Complete construction and interconnection of project and launch program

Funding Requirements, Staffing Requirements, and Energy Impacts





Total FTE Requirement	***Years 1-2:*** *0.4 FTEs in planning (~800 hours combined)* ***Continuing:*** *0.2 FTEs in enrolment and operation (~400 hours)*
FTE Position Breakdown	***Years 1-2:*** *Sustainability Coordinator: 50 hours/year* *Assistant Sustainability Coordinator: 100 hours/year* *Civic Spark Fellow: 100 hours/year* *Planning and Environmental Review Director: 50 hours/year* *Outsourced Consultant: 500 hours/year* ***Continuing:*** *Sustainability Coordinator: 50 hours/year* *Assistant Sustainability Coordinator: 50 hours/year* *Civic Spark Fellow: 100 hours/year* *Outsourced Consultant: 200 hours/year*
Estimated Annual Staffing Cost	***Years 1-2:*** *$15,000* ***Continuing:*** *$10,000*
Estimated Annual Capital and Consulting Costs	***Years 1-2:*** *$25,000* ***Continuing:*** *$10,000*
2030 Annual Electricity Impact	*1.4 GWh (~500 households)*

6.2.3 – Pilot Backup Inverter Program

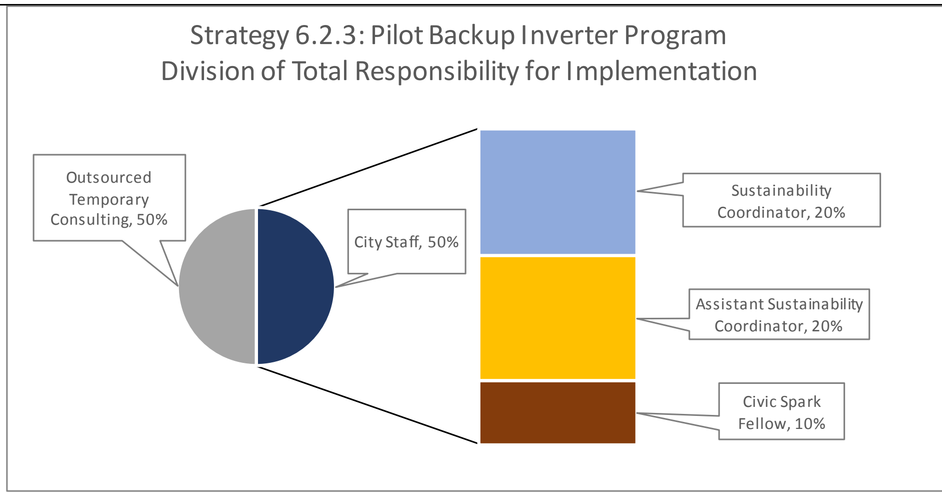
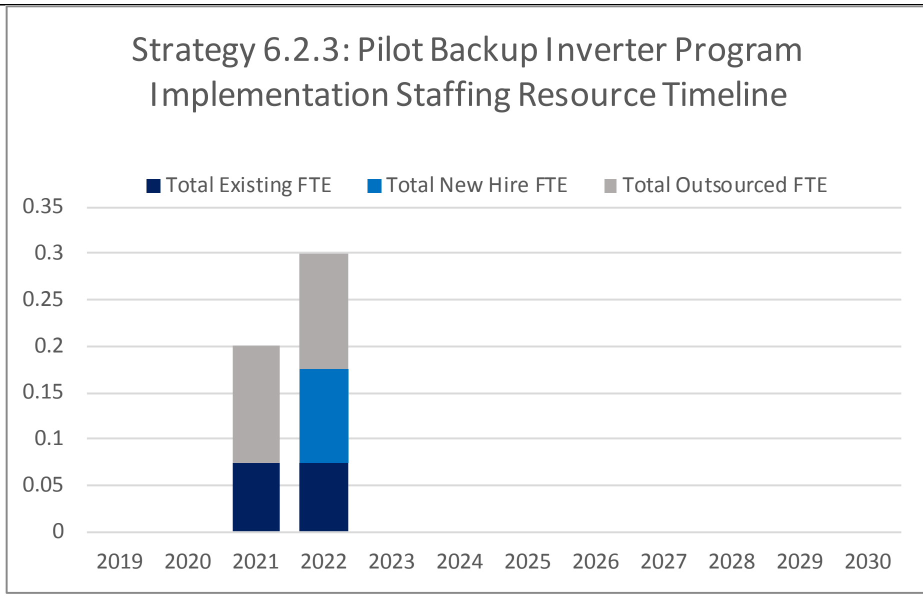
Strategy Description

This program is a resilience focused strategy that aims to promote backup inverters to bridge the gap between the low up-front costs and high emissions of a backup generator and the high up-front costs and lack of emissions from battery storage. Backup inverters provide a small amount of power from solar panels while they are active, but as with solar panels without batteries, do not provide power during the night. There is currently only one commercially widespread backup inverter, the SMA Sunny Boy Secure Power Supply.[58] The City would need to avoid pushing a specific vendor or solution, but if the City releases an RFO for vendors to provide solutions, they may receive more applicants.

Action Plan - Project
2019 1. Conduct research on possible solutions and vendors for backup power supplies. 2. Create draft RFO with request for solar + backup inverter standard offers, with specifications including amount of backup power and cost. 3. Circulate to vendors and internal stakeholders for feedback. 4. Revise draft RFO based on feedback and present to Council for approval. **2020** 5. Release RFO for vendor bids. 6. Review bids and select shortlist of winners. 7. Create website advertising standard offers from selected bids.

Funding Requirements, Staffing Requirements, and Energy Impacts

[58] LLC SMA America, *Secure Power Supply - Technical Description*, 2013 <http://files.sma.de/dl/18726/EPS-US-TB-en-11.pdf> [accessed 12 April 2019].

	
	
Total FTE Requirement	***Year 1:*** *0.2 FTEs (~400 hours combined)* ***Year 2:*** *0.3 FTEs (~600 hours combined)*
FTE Position Breakdown	***Year 1:*** *Sustainability Coordinator: 100 hours/year* *Civic Spark Fellow: 50 hours/year* *Outsourced Consultant: 250 hours/year* ***Year 2:*** *Sustainability Coordinator: 100 hours/year* *Assistant Sustainability Coordinator (new): 200 hours/year* *Civic Spark Fellow: 50 hours/year*

	Outsourced Consultant: 250 hours/year
Estimated Annual Staffing Cost	***Year 1:*** *$10,000* ***Year 2:*** *$15,000*
Estimated Annual Capital and Consulting Costs	***Years 1-2:*** *$12,500*
2030 Annual Electricity Impact	*1 GWh (~350 households)*

6.3 – Financial and Funding Program Area

6.3.1 – Create New Financing Mechanisms for the Community

Strategy Description

The goal of this strategy is to enable residents and businesses without the available cash to buy solar and solar + storage projects up-front. There are two potential pathways for the City to achieve this:

1) Work with private foundations to create a low-interest source of funding for residential and commercial PACE
2) Work with private foundations and a local water or sanitation utility to create a low-interest source of funding for a community solar OBF program

It is recommended that the City pursue only one of these two scenarios, to create one main financing method. A partnership with a private foundation or bank would allow the City to use a loan loss reserve, as the County did with the emPower program. By using its money only to insure its partner against bad loans, rather than providing loans directly, the City can effectively help write many more loans than it would be able to otherwise with its limited funding, as well as potentially provide a lower rate.

PACE programs are much more established than solar OBF programs, which have few case studies. Given that PACE already exists in the unincorporated Santa Barbara County and the Cities of Lompoc and Santa Barbara, a remodel of the PACE program would be easier than starting an OBF program from scratch. Additionally, an expansion of PACE would result in a single City-sponsored program for both solar and energy efficiency financing. In comparison, a solar OBF program would likely need to begin as a pilot and would require coordination with a public agency such as the Goleta Water or Sanitary Districts, since the City does not administer its own utility bill. However, OBF programs allow residents and businesses to pay for projects with smaller monthly payments, rather than a larger annual payment, a financing arrangement which appeals to many.

Action Plan - Project
2020 1. Assign OBF staff lead

2. Contact managers of existing OBF programs to gather advice and best practices
3. Explore OBF programs not operated by IOUs, focusing on regulatory and legal requirements for running OBF on non-electricity bills such as waste and water
4. Work with Finance Department to investigate ability to replicate loan loss reserve used in County emPower program
5. Conduct outreach to available funding partners
6. Decide upon a funding partner and program structure regarding whether to use traditional or non-profit capital
7. Conduct outreach to residents and businesses neighboring the project to educate them about the need for solar development in that area
8. 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

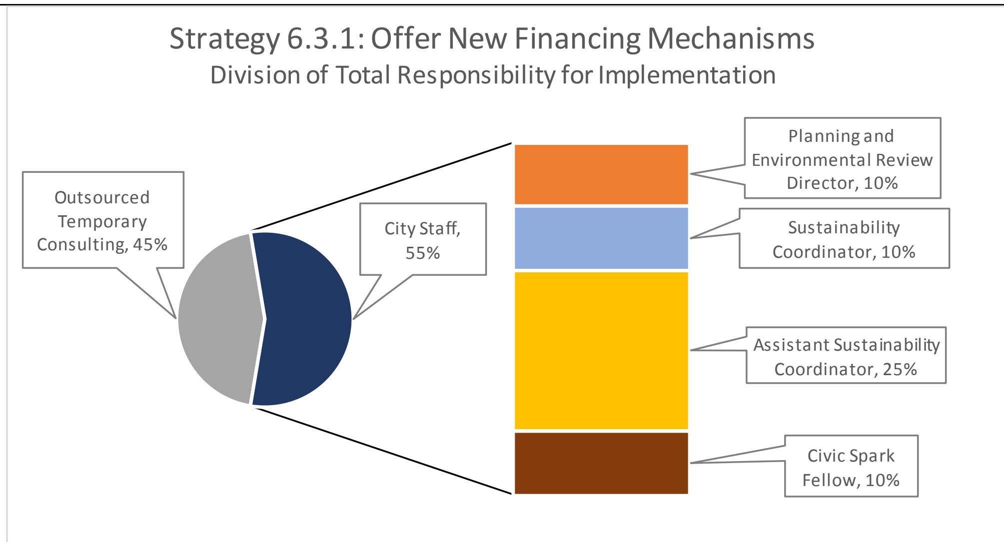
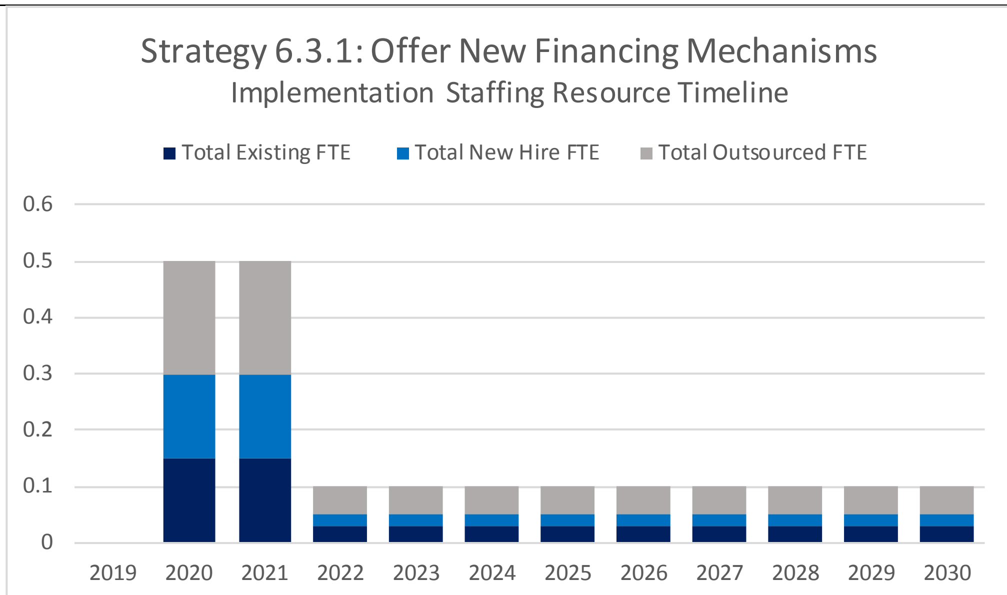
2021

9. Conduct community outreach to gather feedback on program design and iterate upon it
10. Work with 3rd party funding partner and program manager to design parameters of a pilot
11. Work with either Water or Sanitary districts to establish process for including charges on water or waste bill
12. Launch pilot program

2022

13. Adjust program based on pilot results
14. Launch full program

Funding Requirements, Staffing Requirements, and Energy Impacts

	
	
Total FTE Requirement	***Years 1-2:*** *0.5 FTEs in planning (~1000 hours combined)* ***Continuing:*** *0.1 FTEs in operation and enrolment (~200 hours)*
FTE Position Breakdown	***Years 1-2:*** *Sustainability Coordinator: 100 hours/year* *Assistant Sustainability Coordinator: 300 hours/year* *Civic Spark Fellow: 100 hours/year* *Planning and Environmental Review Director: 100 hours/year* *Outsourced Consultant: 400 hours/year* ***Continuing:***

	Sustainability Coordinator: 20 hours/year *Assistant Sustainability Coordinator: 40 hours/year* *Civic Spark Fellow: 20 hours/year* *Planning and Environmental Review Director: 20 hours/year* *Outsourced Consultant: 100 hours/year*
Estimated Annual Staffing Cost	***Years 1-2:*** *$30,000* ***Continuing:*** *$5,000*
Estimated Annual Capital and Consulting Costs	***Years 1-2:*** *$20,000* ***Continuing:*** *$5,000*
2030 Annual Electricity Impact	*3.1 GWh (~1,100 households)*

Case Study: Lafayette Low-Interest On-Bill Financing Pilot

Lafayette, Colorado, is currently running a 6-year pilot project where residents can apply for 1.5% fixed APR loans for energy efficiency improvements through Boulder County's Energy Smart Program. Participants can pay loans over a 1, 3, or 5-year period through their municipal water utility bill, depending on the loan amount.[59] The program was kickstarted by a $30,000 contribution towards Lafayette's Energy Efficiency and Renewable Energy Revolving Loan Fund from Energy Outreach Colorado.

6.3.2 – Introduce Financial Incentives to Increase Economic Payback

Strategy Description

Performance-Based Incentives (PBIs) can directly fill the loss in economic value for solar PV installation from ToU rate changes or otherwise support marginal projects to move past the tipping point of financial viability. Rather than an up-front rebate or credit, PBIs provide money only per kWh generated, which prevents paying incentives to systems that underproduce or stop working entirely and promotes maintenance. There are also several creative methods in which a PBI can be altered to meet other goals:

- Provide a higher PBI for projects with battery storage
- Vary the PBI with time of generation
- Provide a higher PBI for storage projects that can be used by the community for emergency services during extended outages

Due to capital cost requirements, PBIs are recommended as a later-stage strategy. This would provide the City with more time to gather a funding source and would allow the PBI to be adjusted based on progress towards meeting city-wide solar targets. Additionally, a PBI is more easily offered through a CCA because revenue from electricity sales provides capital to be reinvested in the community. Recommending a PBI as a later-stage strategy allows uncertainty around the City's CCA pathway to abate and keeps this easier

[59] City of Lafayette, *Low Cost Opportunity for Home Energy Improvements* (Lafayette, 2018) <https://cityoflafayette.com/DocumentCenter/View/22643/On-Bill-Flyer_100118> [accessed 10 April 2019].

implementation option open. Modeled impacts currently assume a 1 c/kWh PBI for projects without battery storage, and a 2 c/kWh PBI for projects with battery storage.

One interesting additional incentive structure that could be considered by the City is to provide an upfront incentive for customers that are adding a storage system to an existing solar system. This would enable those customers to begin capturing the additional economic benefits associated with storage under the new time-of-use rates and promote resilience. This program may have significant uptake because the target customers have already shown interest in investing in DERs, however, additional outreach and scoping would be needed to determine whether the potential pool of participants is enough to support an investment of City resources.

Action Plan - Project

2024

1. Create a program development team to lead the strategy
2. Identify most important customer segments (e.g. single-family residential, commercial, multi-family residential, 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

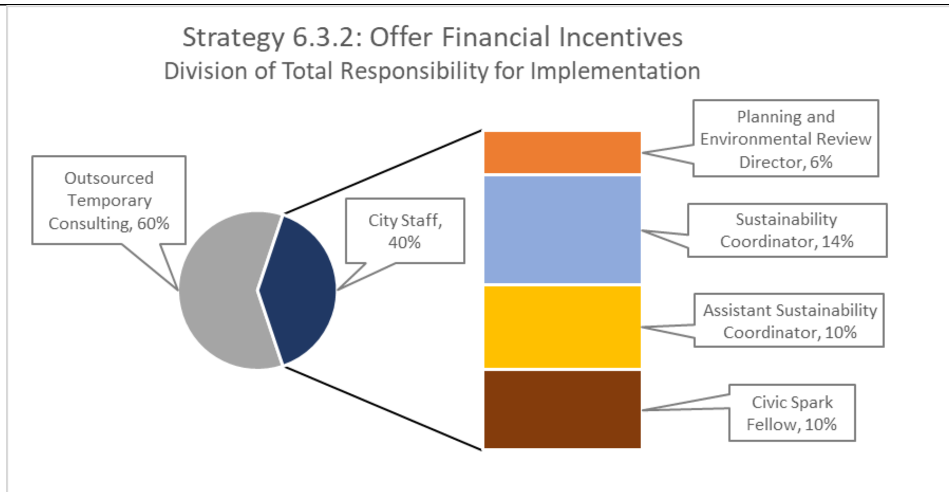
2025

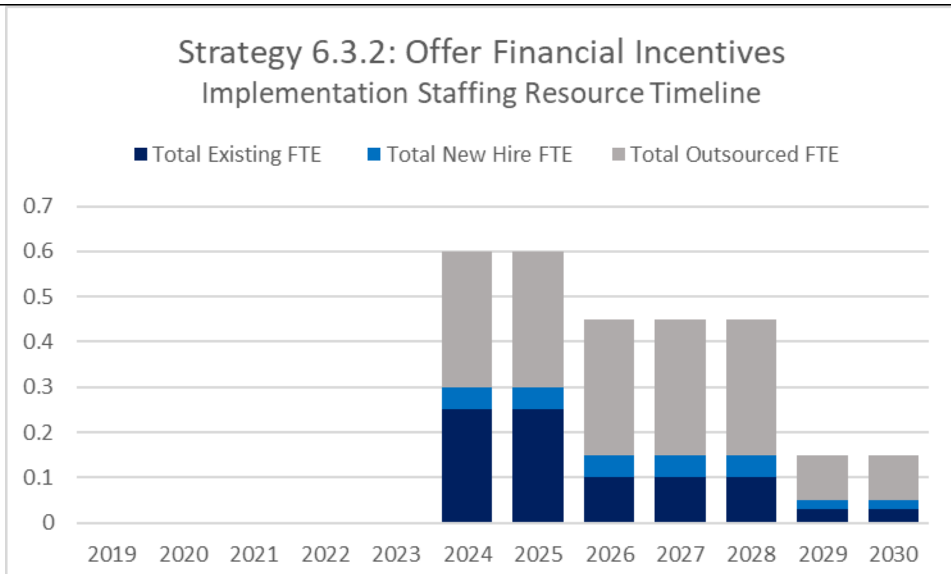
5. Create program guidelines, including project eligibility, length of program, length of incentive, type of incentive, reporting requirements, and amount of incentive to be offered
6. Assess potential risks and legal protections for the City
7. Determine estimated capital needs
8. Identify gaps in City expertise for implementation and program design
9. Finalize program design based on consultant advice
10. Present draft guidelines to vendor community for feedback
11. Obtain City Council approval for required funding

2026

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

Funding Requirements, Staffing Requirements, and Energy Impacts





Total FTE Requirement	***Years 1-2:*** *0.6 FTEs in planning (~1,200 hours combined)* ***Years 3-5:*** *0.45 FTEs in operation and enrollment (~900 hours)* ***Years 6-9:*** *0.15 FTEs in operation (~300 hours)*
FTE Position Breakdown	***Years 1-2:*** *Sustainability Coordinator: 200 hours/year* *Assistant Sustainability Coordinator: 100 hours/year* *Civic Spark Fellow: 200 hours/year* *Planning and Environmental Review Director: 100 hours/year*

	Outsourced Consultant: 600 hours/year ***Years 3-5:*** *Sustainability Coordinator: 100 hours/year* *Assistant Sustainability Coordinator: 100 hours/year* *Civic Spark Fellow: 50 hours/year* *Planning and Environmental Review Director: 50 hours/year* *Outsourced Consultant: 600 hours/year* ***Years 6-9:*** *Sustainability Coordinator: 40 hours/year* *Assistant Sustainability Coordinator: 40 hours/year* *Civic Spark Fellow: 20 hours/year* *Outsourced Consultant: 200 hours/year*
Estimated Annual Staffing Cost	***Years 1-2:*** *$30,000* ***Years 3-5:*** *$15,000* ***Years 6-9:*** *$5,000*
Estimated Annual Capital and Consulting Costs	***Years 1-2:*** *$30,000* ***Years 3-5:*** *$160,000 - $415,000* ***Years 6-9:*** *$140,000 - $395,000*
2030 Annual Electricity Impact	*23 GWh (~8,100 households)*

Case Study: Connecticut Green Bank PBIs

The Connecticut Green Bank was formed by the Connecticut legislature in 2011. It uses a relatively low amount of public investment to achieve a multiplier effect by supporting private lenders rather than directly subsidizing clean energy. For every $1 of public funding, $6 of additional private funding occurs due to the CT Green Bank.

Through its Residential Solar Investment Program (RSIP), CT Green Bank offers both an ongoing Performance-Based Incentive and an up-front Expected Performance-Based Buydown (EPBB), depending on whether the homeowner is purchasing the system directly or paying for it through a PPA. The CT Green Bank also offers C-PACE for commercial customers and energy efficiency financing options to spread out overhead costs over a larger number of programs.[60]

[60] Connecticut Green Bank, ‘Green Energy Solutions in Connecticut’, 2017 <https://www.ctgreenbank.com/programs/all-programs/> [accessed 10 April 2019].

6.3.3 – Diversify City Funding Streams

Strategy Description

Diversifying funding streams is extremely important to ensuring the City has a stable funding stream that is not dependent on any one source. These are methods for the City 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 SCE to maximize the City's share of existing renewable program funding
3) Partner with other nearby regional governments to create energy programs

Continuing to work with the CPUC and the IOUs in Santa Barbara County would allow the City both to maximize its intake from a utility funding stream that may decrease and to receive CPUC funding that would otherwise go to utilities to administer local programs.

One method the City could use to directly receive this funding is to increase its involvement in the County's new partnership with the Counties of San Luis Obispo and Ventura as part of the Tri-County Renewable Energy Network (3C-REN), The 3C-REN is currently planning on providing residential and multi-family energy efficiency programs, codes and standards compliance programs, and workforce education and training programs.[61] This scope could be expanded to include a community solar program. SCE recently applied for $5 million 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 on behalf of the City, given that the City has a more direct relationship with residents and businesses.

Additionally, the City of Goleta could use a portion of the new funds from the marijuana business tax passed in November 2018, Measure Z. Measure Z implemented taxes between 1% – 5% on marijuana distributors/nurseries, manufacturers, cultivators, and retailers, and is expected to bring in somewhere between $300,000 to $1,400,000 in the first year.[62] The City is also expected to save a large amount of money in utility bills from its upcoming acquisition, upgrade, and rate switching of the majority of the Goleta streetlighting system. Once this project is paid off, the future savings could be allocated to energy projects and policies.

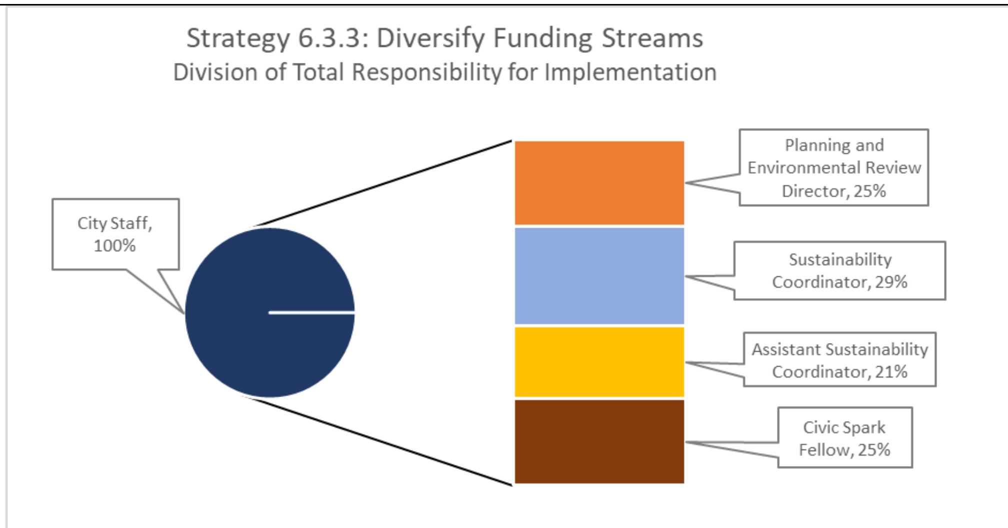
Action Plan - Project	
2019	
	1. Request a portion of the expected Measure Z revenue in the upcoming budget. 2. Request that excess savings from current and future energy projects go towards the creation of a fund for future energy and climate initiatives.

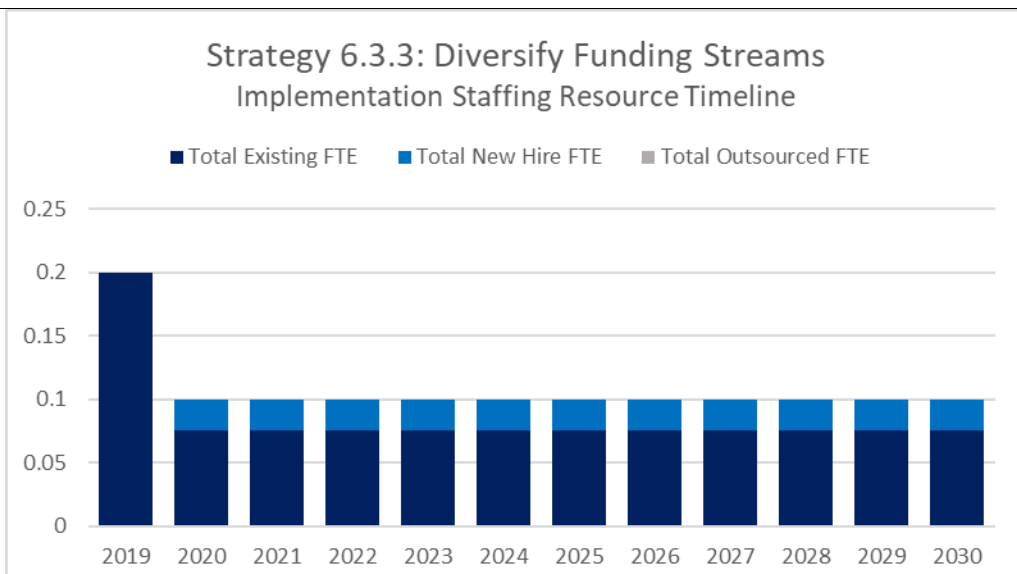
[61] County of Ventura, 'Tri-County Regional Energy Network', 2019 <https://www.ventura.org/environment/tricountyren/> [accessed 10 April 2019].

[62] County of Santa Barbara, *Cannabis Business Tax*, 2018 <https://countyofsb.org/uploadedFiles/CARE/Elections/Upcoming_Elections/2018_November_6/Z2018 – City of Goleta Cannabis Business Tax.pdf> [accessed 10 April 2019].

Ongoing	3. Monitor federal, state, IOU, and private foundation grants and funding programs for applicability to the County 4. Monitor approval progress of IOU requests for funding, particularly the Community Renewables Program 5. Identify best opportunities for the County to request funds from CPUC on behalf of the City to replicate IOU role through 3C-REN

Funding Requirements, Staffing Requirements, and Energy Impacts





Total FTE Requirement	***Year 1:*** *0.2 FTEs in analysis (~400 hours)*

	Continuing: *0.1 FTEs in ongoing monitoring (~200 hours)*
FTE Position Breakdown	***Year 1:*** *Sustainability Coordinator: 200 hours/year* *Civic Spark Fellow: 100 hours/year* *Planning and Environmental Review Director: 100 hours/year* ***Continuing:*** *Sustainability Coordinator: 50 hours/year* *Assistant Sustainability Coordinator: 50 hours/year* *Civic Spark Fellow: 50 hours/year* *Planning and Environmental Review Director: 50 hours/year*
Estimated Annual Staffing Cost	***Year 1:*** *$25,000* ***Continuing:*** *$10,000*
Estimated Annual Capital and Consulting Costs	*$0*

6.4 – City Facility Program Area

6.4.1 – Create 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 sites so that they continue to operate in the event of any disaster or electricity outage. This will increase the reliability of critical services and community hubs such as the Goleta Emergency Operations Center or the Community Center. 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 City-owned buildings, facilities, and infrastructure that are most critical from a resiliency perspective, such as sites used as emergency operation centers or community gathering spots, as well as street and stop lights
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, to the extent it is applicable within the City

Action Plan - Project

2019

1. Assemble internal energy assurance team with representation from the Fire Department and the Emergency Services Office
2. Create mission and vision statements for the Energy Assurance Plan
3. Conduct external outreach to Cities with existing EAPs to gather advice and guidance
4. Research IOU, state, and federal funding opportunities available for energy assurance support
5. Work with Advance Planning Division to identify existing City plans that could incorporate the EAP
6. Identify key issues and critical facilities and sites to be covered in an EAP

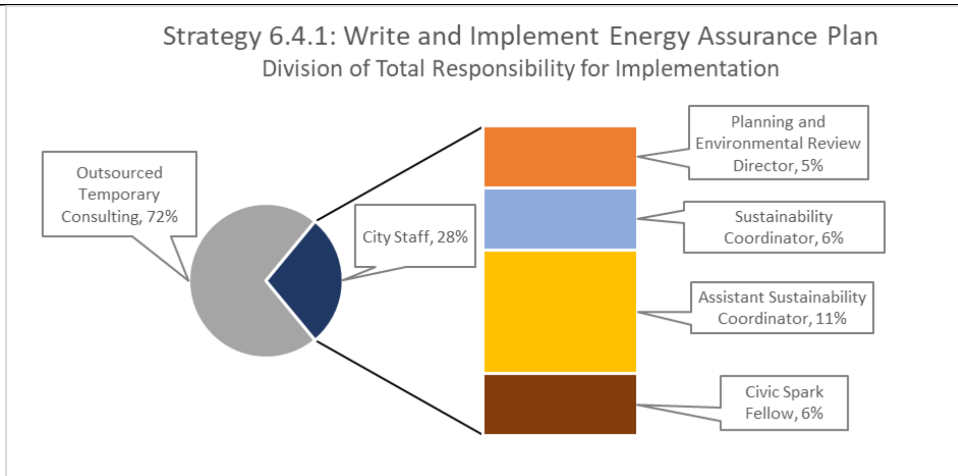
2020

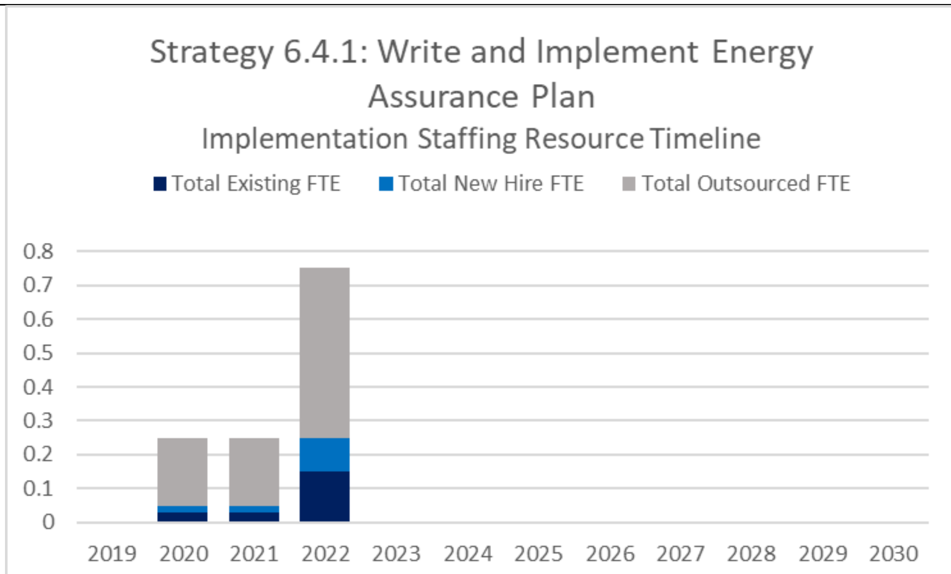
7. Conduct outreach to external community stakeholders for feedback on resiliency issues and challenges faced by the community
8. Create and release RFP to write the EAP
9. Review proposals and negotiate contract with winning bid
10. Obtain City Council approval for contract
11. Work with consulting team to write draft EAP, focusing on opportunities for renewable energy and battery storage at identified sites
12. Circulate draft EAP for comments and feedback from internal and external stakeholders, and iterate upon it

2021

13. Implement EAP recommendations

Funding Requirements, Staffing Requirements, and Energy Impacts





Total FTE Requirement	***Years 1-2:*** *0.25 FTEs in planning (~500 hours combined)* ***Year 3:*** *0.75 FTEs for execution and implementation (~1500 hours)*
FTE Position Breakdown	***Years 1-2:*** *Sustainability Coordinator: 20 hours/year* *Assistant Sustainability Coordinator: 40 hours/year* *Civic Spark Fellow: 20 hours/year* *Planning and Environmental Review Director: 20 hours/year* *Outsourced Consultant: 400 hours/year* ***Year 3:*** *Sustainability Coordinator: 100 hours/year*

	Assistant Sustainability Coordinator: 200 hours/year *Civic Spark Fellow: 100 hours/year* *Planning and Environmental Review Director: 100 hours/year* *Outsourced Consultant: 1000 hours/year*
Estimated Annual Staffing Cost	***Years 1-2:*** *$6,000* ***Year 3:*** *$25,000*
Estimated Annual Capital and Consulting Costs	***Years 1-2:*** *$40,000* ***Year 3:*** *~$ 1,200,000 to implement renewable energy recommendations. This cost assumes the use of PPAs, as available. The estimated capital is reserved to maintain flexibility for the City by enabling cash purchase of equipment if a desirable PPA is not available, enabling City to buydown cost of a PPA with upfront investment or enabling the City to buy-out PPAs and own the systems outright (would have payback and resilience benefits)*
2030 Annual Electricity Impact	*1.3 GWh (~460 households)*

6.5 – Outreach and Advocacy Program Area

6.5.1 – Support a County-wide One-Stop Shop to Lead Education Efforts in the City

Strategy Description

Establishing a One-Stop Shop creates a flexible mechanism for community outreach and engagement around energy issues in a range of ways. A One-Stop Shop would act as the main hub and point of contact for information for all new programs and policies implemented due to SEP recommendations. The One-Stop-Shop would also act as the main method for the City 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.

The One-Stop Shop can also increase knowledge about clean energy technologies and the industry as a whole, such as opportunities to participate in regional or state energy programs, alerting local residents and businesses to the falling costs of solar and energy efficiency projects and the role that local utility-scale generation and distributed backup storage can play in increasing resiliency, and therefore reliability, of the electricity supply.

Additionally, representatives from a One-Stop Shop can act as trusted representatives to facilitate energy projects in the following ways:

- Provide energy advice and comparisons between wholesale electricity projects and projects for on-site consumption
- Support the use of "green leases" for commercial properties that allow building owners to charge higher rates to tenants in exchange for undertaking energy projects

A One-Stop Shop could serve as a method through which to target specific stakeholders, as well as continue the outreach that has already begun through the workshops conducted as part of the SEP process. Essential stakeholders include Goleta's largest commercial property owners, realtors, and investors, local environmental groups, and non-profits. In public workshops, these key stakeholders expressed interest in participating in quarterly learning sessions with renewable energy developers, with facilitation by the City.

Continued general outreach to the residential community to maintain grassroots enthusiasm and participation in meeting Goleta's goals is important, as well, and can be conducted through social media marketing and engagement campaigns conducted with schools to reach local youths. Messaging to the general residential community should focus on simple actions residents can take, likely in the energy efficiency realm, to align their energy usage habits with the City's goal. With additional funding, the One-Stop Shop could also host targeted behavior change programs that create competitions between community units (such as schools or neighborhoods) that incentivize reductions in electricity usage.

Due to Goleta's small size and limited funding, providing support to a County-wide resource center would allow Goleta to receive the benefits with less investment in staffing and other resources.

Action Plan - Project

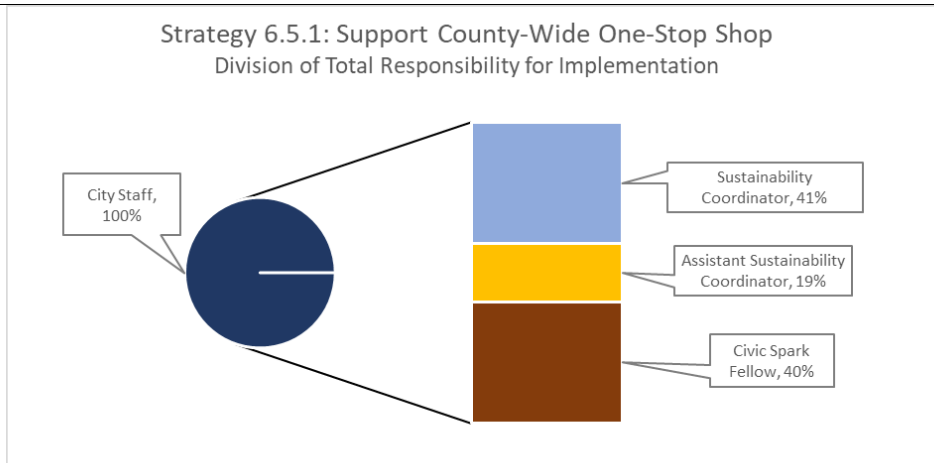
2019

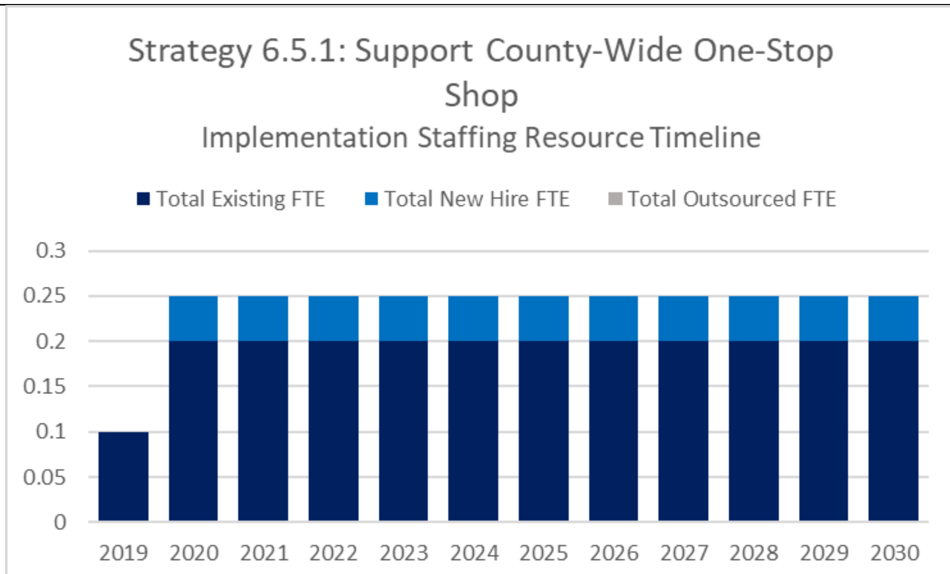
1. Use SEP process to execute initial outreach and promotional campaign through a series of workshops targeted at different customer segments such as commercial property owners, agricultural land owners, special districts and other public agencies, and opportunity zone investors
2. Continue building relationships with partners across the city 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

Funding Requirements, Staffing Requirements, and Energy Impacts





Total FTE Requirement	***Year 1:*** *0.1 FTE in planning (~200 hours)* ***Continuing:*** *0.25 FTEs to manage outreach (~1000 hours)*
FTE Position Breakdown	***Year 1:*** *Sustainability Coordinator: 100 hours/year* *Civic Spark Fellow: 100 hours/year* ***Continuing:*** *Sustainability Coordinator: 200 hours/year* *Assistant Sustainability Coordinator: 100 hours/year* *Civic Spark Fellow: 200 hours/year*
Estimated Annual Staffing Cost	***Year 1:*** *$8,000*

	Continuing: *$20,000*
Estimated Annual Capital and Consulting Costs	*$0*
2030 Annual Electricity Impact	*0.2 GWh (~70 households)*

6.5.2 – Advocate for City Goals at the State and Federal Level

Strategy Description

As a relatively small city, Goleta has limited ability to advocate on its own. However, by adding its voice to others such as the County, the City can work to amplify existing advocacy. Some advocacy goals are listed below:

1) Support existing efforts at the state level to protect state oversite of streamlined DER interconnection processes, establish a statewide mandate for utilities to remove barriers preventing DERs from participating in the wholesale electricity market and explore the creation of tariffs that value the services DERs can provide
2) Work with the State of California to develop a "Public Power Pool" to aggregate utility-scale renewable procurement by public entities

The first objective involves exploring ways to support legislative efforts led by existing groups such as the Solar Rights Alliance to strengthen residents' and businesses' right to leverage their solar resource and store electricity they generate. Recent efforts, such as AB 288, to do this have been met with significant opposition from utilities. Preserving and expanding these rights at the state level will enable Goleta residents to effectively support the City in meeting its energy goals.

The second objective involves advocacy for the creation of an aggregated power pool of off-site but in-state renewable projects that can take advantage of the ITC prior to it reducing and that can be bundled together to receive better PPA rates for governments, public agencies and non-taxpaying special districts. Although it is likely too late to implement a Public Power Pool in time for the 30% credit, immediate action could allow implementation prior to the credit reducing to 10%. The recently launched Texas Public Power Pool[63] provides an example of this concept in action and is enabling smaller public entities to leverage their shared buying power to capture the economic benefits of renewables.

The Regional Climate Collaborative being explored by the County of Santa Barbara may create one avenue for these advocacy goals to be effectively communicated to decision makers at the state level.

6.6 – Funding and Staffing Summary

For scheduling purposes, it is important to analyze the cumulative requirements across all recommended program areas and strategies. The graph on the following page summarizes total year-by-year staffing requirements.

[63] PR Newswire. "Texas Power Pool gathering public entities for renewable electricity aggregation", January 7, 2019. https://www.prnewswire.com/news-releases/texas-power-pool-gathering-public-entities-for-renewable-electricity-aggregation-300773960.html [Accessed 20 June 2019]

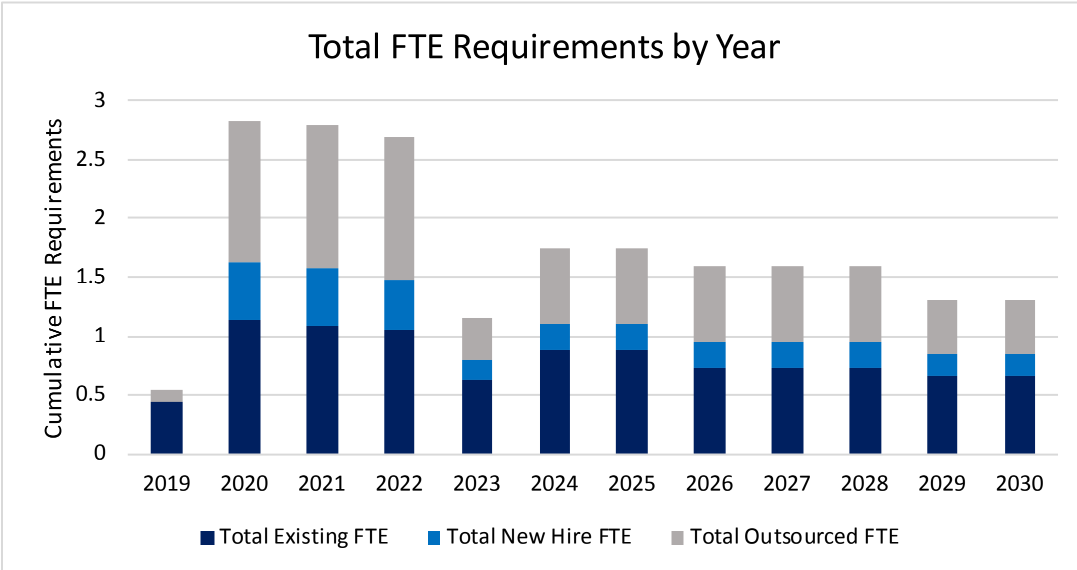


Figure 6.1: Total SEP Staffing Requirements

Strong staffing commitment will be required over the first several years, peaking in the first several years due to the need for strong and immediate action. Relatively less staff time is used in 2019 since SEP implementation will likely not start until the second half of 2019. Additionally, some time is dedicated towards a new Assistant Sustainability Coordinator hire in the Sustainability Division to support initiatives across divisions, including work in the Planning Department, as well as other non-SEP related sustainability issues. Many of the strategies included in the SEP require strong internal collaboration between different departments to implement, particularly in the regulatory program area.

6.7 – 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 City Council.

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 City Council 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.

6.7.1 – Utility Tax

A utility tax can be placed on a utility bill, whether water, waste, natural gas, or electricity. Since the City does not have its own bill, it would need to partner with a public agency or a utility 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 will lower 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.

Goleta does not currently have any level of Utility Users Tax, but Santa Barbara City places a tax of 6% on all of water, electricity, waste, and natural gas, through which it raises roughly $14M annually. With a similar rate, Goleta could raise approximately $5M annually with a tax on all four sectors, or approximately $2.5M on only the electricity bill.

A consumption-based electricity tax has existed in Boulder, Colorado since 2007, called the CAP tax. 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. These numbers equate to roughly 1% of electricity costs, or $450,000 - $500,000 annually in Goleta. These rates could be raised to match the amounts raised by a Utility Users Tax.

6.7.2 – Sales Tax Increase

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, City staff should review business activity in Goleta 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 would be placed on all purchases made within Goleta and 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.

Appendix A: Detailed Statistical Solar Analysis Description

A ground-up statistical analysis of rooftop and parking lot solar potential was conducted. A total of 753 such representative rooftops and 241 representative carport locations were measured, and the resulting solar potential scaled to the full city.

To conduct this analysis, the city was divided into 4 regions based on geography, zoning types, and building stock. These zones were defined using the City zoning maps and aerial imaging to visibly confirm boundaries of building type and density. The four zones included 2 residential zones and 2 commercial zones. The two commercial zones and the two residential zones differ from each other in their building density, parking lot density, and roof structure.

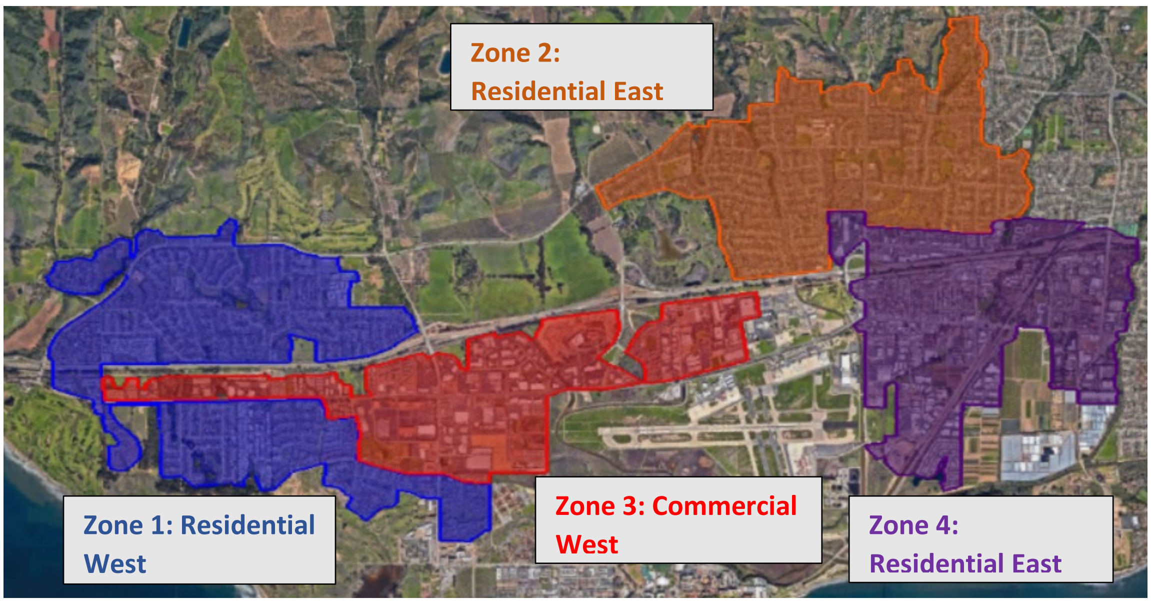


Figure AA.1: Statistical Solar Zones in the City of Goleta

Importantly, the boundaries of these sample zones did not exactly follow the City 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, the area of Bishop Ranch is excluded, since it represents a significant size of land that is set to remain undeveloped. However, where possible to determine, areas that were undeveloped but set to become developed were included. As such, the analysis accounts for future in-City development (but not City boundary growth)

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: Commercial West Solar Zone with Statistical Blocks

The blocks varied in both area and the number of buildings. The residential zones were larger in area, but had lower building density and higher shading, whereas the commercial zones were the opposite, and had much more 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 physical rooftop and parking space was measured:

Figure AA.3: Statistical Samples in a Block

The table below provides a summary of the estimated area of each zone and the number of structures:

Table AA.1: Statistical Structural Estimates in Goleta

	Area (sq. miles)	Measured Structures	Total Structures (est.)	Measured Carports	Total Carports (est.)
Zone 1: Residential West	1.61	236	~4,300	3	~50
Zone 2: Residential East	1.43	234	~2,650	7	~100

Zone 3: Commercial West	1.15	98	~550	131	~750
Zone 4: Commercial East	1.33	185	~1,850	100	~1,000
TOTAL	5.53	753	~9,350	241	~1,900

The figure below shows the structural distribution by size on a city-wide scale. Small and medium structures dominate, with a long tail of larger structures. Gaps occur in the measured structure data for larger buildings due to smaller sample sizes. This does not necessarily mean that there are no structures of those sizes- most likely, there would be a re-distribution of the large buildings to fill in those gaps. This increases the potential variance in solar potential for those sizes.

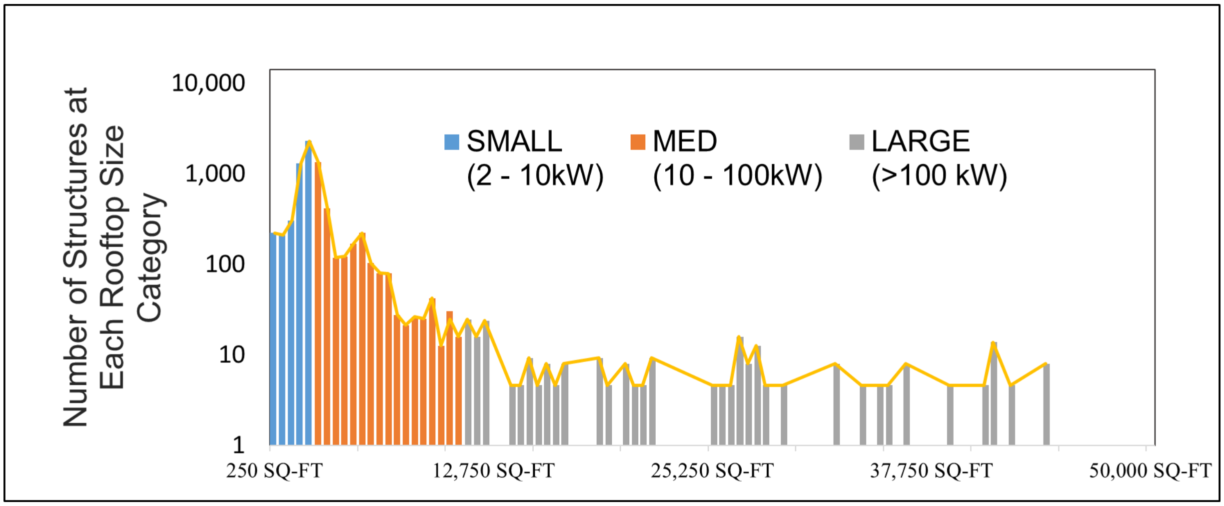


Figure AA.4: Estimated Distribution of Structures by Rooftop Size in Goleta

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 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 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.

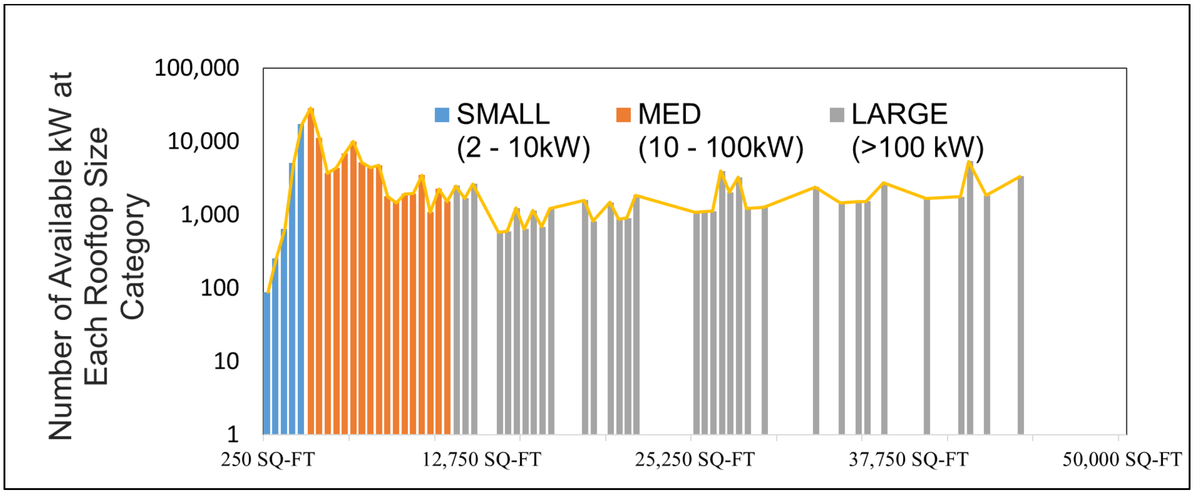


Figure 5: Estimated Distribution of Solar Potential by Rooftop Size in Goleta

Total citywide rooftop solar potential, assuming every single viable rooftop and parking lot installed solar PV, was calculated through this method to be roughly 215 MW, equating to generation potential of 301,000 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.

	Maximum Potential (MW)	Participation	Final Potential (MW)
Residential	23 – 24	25 – 35%	6 – 8
Small Commercial	82 – 94	55 – 65%	45 – 61
Large Commercial/ Industrial	51 – 58	55 – 65%	28 – 38
Carports	39 – 41	55 – 65%	22 – 26
TOTAL	195 – 217	52 – 61%	101 – 133

Levelized costs of energy can also be estimated but depend heavily on capital cost assumptions. Different sources report very different installation costs. Based on NREL data, avoided utility energy costs, or levelized benefits, exceed levelized solar costs at every size, whereas based on LBNL data, utility energy costs are lower than levelized solar costs 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.

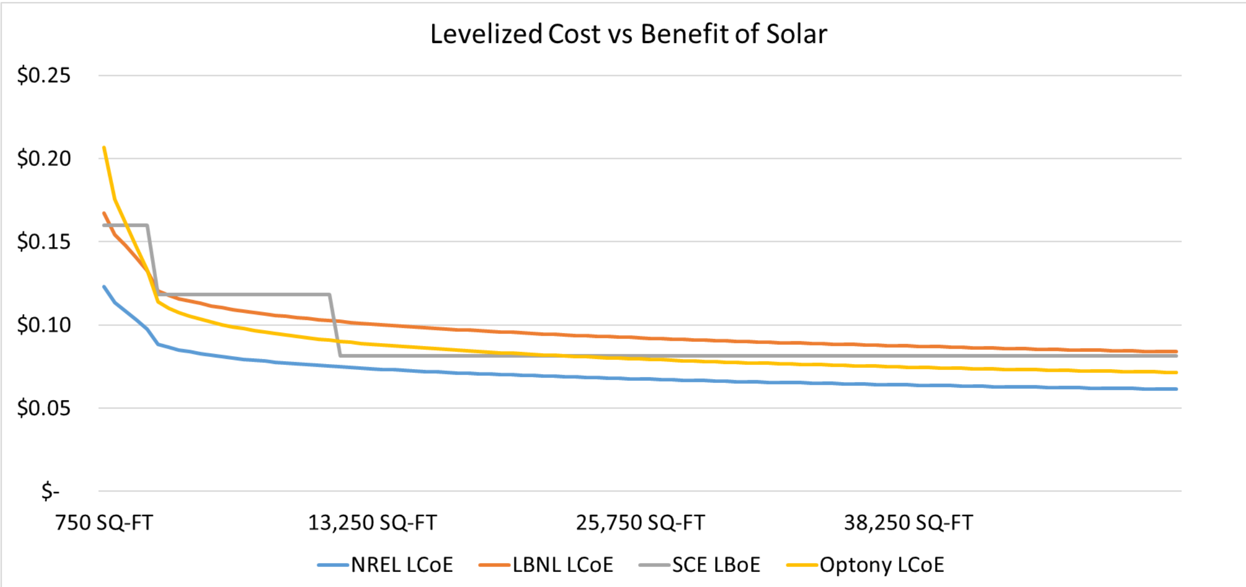


Figure AA.6: Cost vs Benefit of Solar Installations

Lastly, Figure AA.7 shows how local SCE distribution-level feeder constraints on wholesale renewable energy map onto the various solar zones in Goleta. 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. The majority of Goleta, including the commercial load centers, are not near constrained feeders, but some feeders in the Residential West zone may constrain solar development. However, there are unlikely to be wholesale projects in this zone.

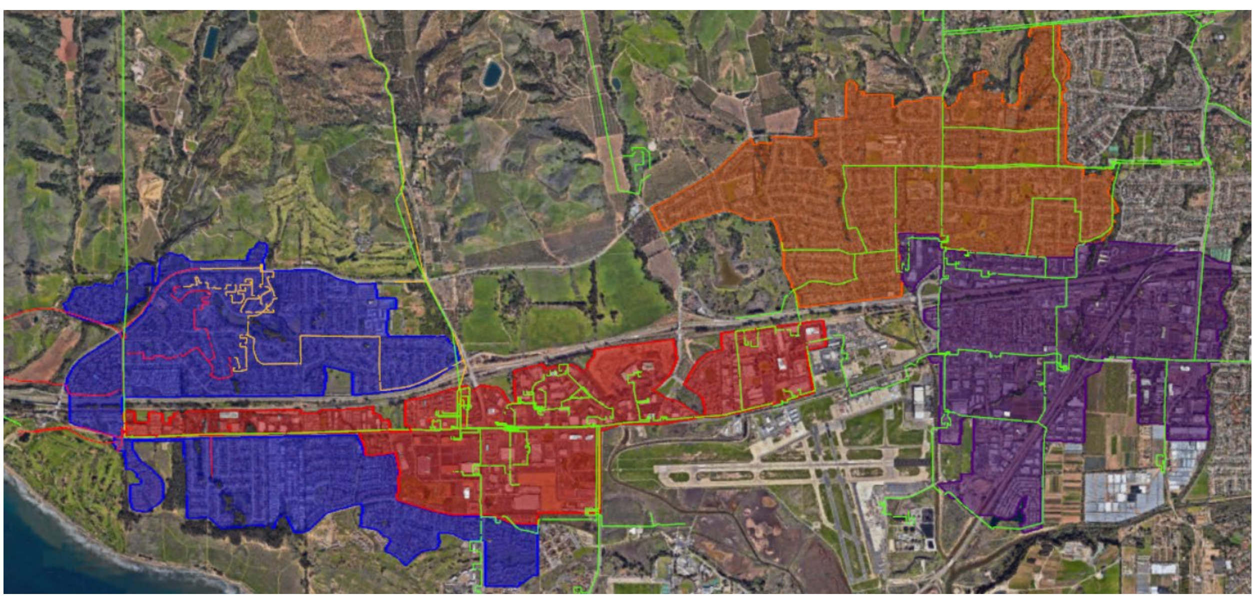


Figure AA.7: Goleta Distribution System Renewable Capacity

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 city limits.

Appendix B: Key Terms and Definitions

Behind-the-meter: Behind-the-meter refers to Distributed Energy Resources that are interconnected to the electrical grid on the customer's side of the meter. The electricity generated (or saved) by these resources offsets the utility bill that the customer pays to the utility.

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. They provide technical guidance, stakeholder outreach and coordination, and administer grant funding.

The 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. It limits 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, solar installation or set of installations that residents and businesses can subscribe to for the purposes of receiving local solar electricity even 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): 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 removing 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 preset 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 on a square foot basis to allow larger buildings to use more energy.

Energy Storage: A technology that can store energy to be used at a later point in time. It is particularly useful when paired with renewable energy sources, since many renewable energy sources are intermittent.

Front-of-meter: Front-of-meter refers to energy generating resources that are interconnected on the utility's side of the meter and feed directly into the electricity grid. These projects receive compensation for the electricity they generate directly from the utility or another off-taker who has agreed to purchase the electricity.

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.

Feed-In Tariff (FIT): A Feed-in Tariff is a mechanism to incentivize the development and interconnection of renewable energy generation by offering an incentive for every kilowatt hour of renewable electricity added to the grid. FITs often operate by providing a long-term contract that guarantees the incentive over a set number of years in order to provide economic certainty for the developer and system owner.

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 both normal operation or a period of emergency.

Home Energy Score: Developed by the US Department of Energy, it is a measure that provides home owners, 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 different 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).

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.

On-Bill Financing: On-bill financing (OBF) is a common tool for funding energy efficiency upgrades that has been used by utilities in the United States since the 1990s. Upfront capital for energy efficiency upgrades and renewable energy systems is provided to property owners and repayment is facilitate through monthly payments on the customer's utility bill.

Property Assessed Clean Energy (PACE): PACE is financing mechanism to finance renewable energy projects and energy efficiency upgrades at homes and businesses. Loans are repaid through a new line item on the property owners' property tax assessment bill. PACE programs are sponsored by public agencies and administered and funded through private capital. Interest rates are similar to fixed rate, fixed term home equity loans, generally ranging from 6% to 9%.

Public Safety Power Shutoff: A new utility protocol enabling utilities to proactively turn off 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.

Renewable Energy Credit (REC): A REC is a tradeable certificate that represents the generation of 1 megawatt-hour of renewable electricity. RECs can be bought and sold to transfer which entity holds the credit for generation of the renewable electricity associated with the REC.

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.

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 serving the remainder through renewable energy.

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