



Resiliency Strategy

Approved by Board of Directors: January 23, 2020

Executive Summary

This strategy document outlines Peninsula Clean Energy Authority's (Peninsula Clean Energy) planning for programs to provide energy resiliency in the event of grid outages related to natural disasters or Public Safety Power Shutoff (PSPS) events.

Peninsula Clean Energy is San Mateo County's official electricity provider. It is a local public agency, controlled by the communities it serves, that provides all electric customers in San Mateo County with cleaner electricity at lower rates than those charged by the local incumbent utility. Peninsula Clean Energy saves customers an estimated \$18 million a year. Peninsula Clean Energy, formed in March 2016, is a joint powers authority made up of the County of San Mateo and all 20 cities and towns in the County. The agency serves approximately 290,000 accounts. Peninsula Clean Energy is governed by a Board of Directors comprised of one representative from each of the twenty cities in San Mateo County, two representatives from the County Board of Supervisors and two emeritus Board representatives.

1. Background

In Spring 2019, Pacific Gas and Electric Company (PG&E) announced that it would expand its PSPS program in order to prevent wildfires across the state. A PSPS event occurs when PG&E decides it is necessary to turn off electricity in certain areas because dry conditions and gusty winds have created a heightened fire risk. The expansion of this program can put lives at risk, cause significant economic impacts, disrupt operations as well as increase greenhouse gas (GHG) emissions and worsen local air quality when diesel generators are operated for backup power. In addition to PSPS events, the Bay Area is vulnerable to natural disasters, including floods, wildfires, and earthquakes, which can all threaten safety and access to power.

Currently, the most common electricity back-up option in the event of a power outage is a diesel fuel generator, which has significant air quality and safety impacts. In addition, diesel fuel availability may be very difficult to obtain in a major emergency which could limit the generator's usefulness. Fortunately, there are reliable, clean, and economic alternatives to diesel generators for energy resiliency, namely solar photovoltaic (PV) systems paired with energy storage systems, commonly referred to as microgrids. PV systems with storage have the added value of reducing utility bills for a home or business through net energy metering (NEM), reducing overall consumption from the grid, and shifting consumption of grid supplied energy from higher priced peak hours to lower priced off-peak hours.

At the Board of Directors meeting on October 21, 2019, the Board approved development of a plan to invest up to \$10 million over three years towards programs that address the problems created by PSPS events and natural disasters that can impact Peninsula Clean Energy's customers access to electricity. This document identifies a strategy and budget for how this commitment would be used to develop programs, accelerate regulatory changes, and outreach to community partners. It defines how Peninsula Clean Energy is well positioned to help drive systematic change to ensure our communities are resilient.

2. Priorities

Energy resiliency means energy consumers have access to safe and affordable clean energy vital to maintaining wellbeing, productivity, and essential needs, even in the face of a grid failure. Through the programs described below, Peninsula Clean Energy is committed to supporting customers who may be especially sensitive to the impacts of a loss of power. This may include medically threatened or low-income residents or businesses in areas with a high concentration of these customers.

Peninsula Clean Energy has identified four strategic objectives for the timeline of this strategy:

1. Provide solutions to the most threatened customers ahead of the start of the next fire season in late summer 2020.
2. Leverage resilience programs towards Peninsula Clean Energy's goal to be 100% renewable on an hourly basis.
3. Establish a business model for ongoing energy resiliency.
4. Identify opportunities to create a paradigm shift towards more integrated and pervasive energy resiliency over the longer term.

In consultation with local community groups, we have identified the following three priority program areas to meet these objectives:

1. Backup generation to medically fragile residential customers;
2. Community-scale emergency response centers outfitted with energy resiliency; and
3. Critical infrastructure such as police/fire stations, hospitals and other healthcare facilities, communications facilities that support emergency first responders, and wastewater / sewage / water pumping facilities, transportation infrastructure.

Finally, we recognize that the scale and need for resiliency will require resources and planning over a time horizon beyond what is outlined in this strategy. The initial programs that are deployed as part of this strategy will help to inform how to approach resiliency over the longer term. The lessons learned and opportunities identified will inform Peninsula Clean Energy's ongoing resiliency strategy, and the insights will be shared with other community choice aggregators (CCAs) and other load serving entities (LSEs) as well as with regulators and policy makers to identify and remove barriers to the development of a more resilient electricity system.

3. Solutions

Peninsula Clean Energy is well-positioned to facilitate programs to increase energy resiliency in San Mateo County due to its role as a public agency, its connection to customers and its position in the electricity market. Peninsula Clean Energy can employ a variety of mechanisms for this facilitation, ranging from direct incentives to education to electricity rate structures. We have identified programs across the priority areas identified above to meet our strategic objectives for this resiliency strategy.

Figure 1 identifies which programs align with each priority area and Table 1 provides a short description of each program in development.

Figure 1: Priorities Areas and Programs

**PENINSULA CLEAN ENERGY
MAJOR RESILIENCE PROGRAMS BY CUSTOMER CLASS**

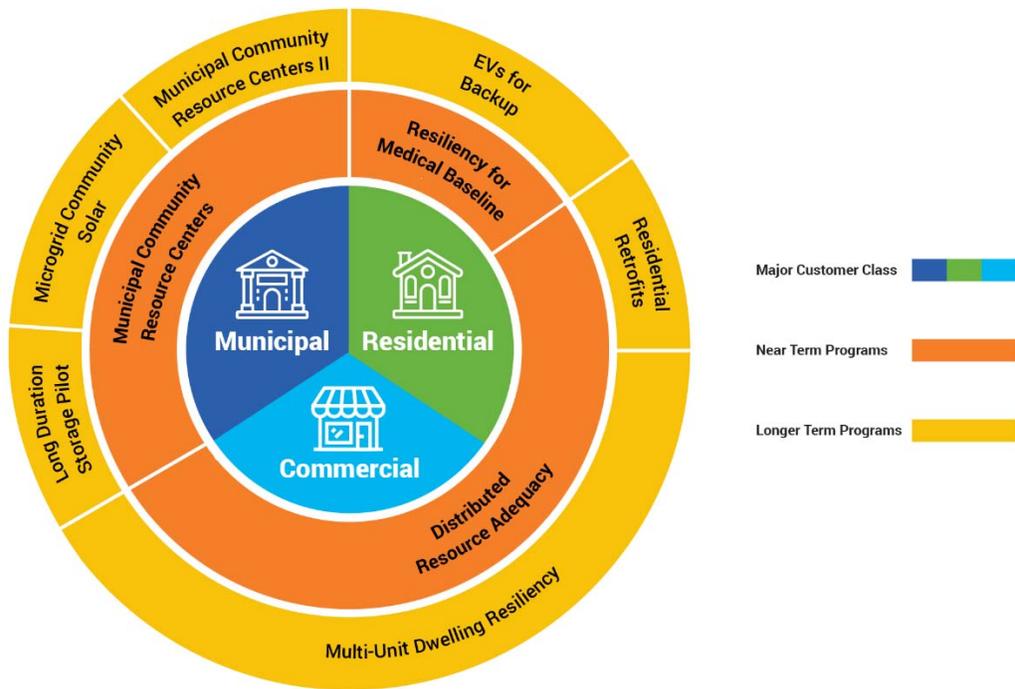


Table 1: Description of Programs

Program	Summary
Medically Fragile Customers	Microgrids for customers who are medically threatened and live in high fire threat districts; Hospital partnerships to identify customers with medical needs - coordinate with East Bay Community Energy (EBCE)
Municipal Community Resiliency Centers (CRC)	Scope and deploy clean backup power CRCs – (includes BAAQMD funded joint project with EBCE)
Critical Infrastructure	Identify and catalog the existing critical facilities in our service territory to inform future resiliency programs
Distributed Resource Adequacy (RA)	Microgrids for residential and commercial customers; local/distributed RA procurement for Peninsula Clean Energy

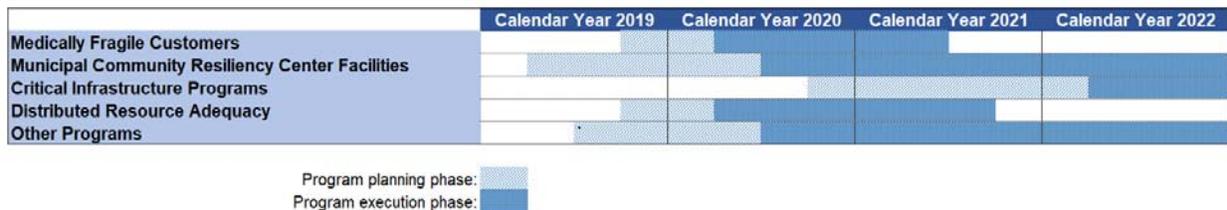
Table 2 describes the expected outcomes in terms of megawatt (MW) and megawatt hour (MWh) deployed and customers impacted by these programs.

Table 2: Summary of Expected Program Outcomes

Program	MW	Customers
Medically Fragile Customers	4 MW Solar / 16 MWh Storage	675
Municipal CRCs	5.8 MW Solar / 23 MWh Storage	9,000 – 18,000
Critical Infrastructure	TBD	TBD
Distributed RA	40 MWh Storage	900

Figure 2 outlines the expected timeline for program deployment including planning and execution phases.

Figure 2: Resiliency Programs Timeline 2019 - 2022



Peninsula Clean Energy is budgeting up to \$10MM over three years to launch and implement the programs described above. Table 3 below provides a summary of the budget by program area.

This is a high-level summary of the expected expenditures. Any actual budget commitments would need to be approved by Peninsula Clean Energy’s Board in accordance with our policies. For Fiscal Year 2020 (FY2020), the budget will be allocated from a portion of the Programs budget, which is not expected to be used during the current fiscal year. In future fiscal years, these programs will follow Peninsula Clean Energy’s normal budgeting process. For some budget areas, such as Power Procurement, the budget does not change, but the technologies utilized for procuring different resources as described in this document, are changed. Similarly, budgets planned for Program Administration and Marketing and Outreach may not change significantly, but rather be allocated to reflect this emphasis on these programs. In all cases, more details for funding for each particular program will be brought to the board for approval as they are launched.

In developing programs to support energy resiliency, Peninsula Clean Energy will leverage third party funding in addition to Peninsula Clean Energy’s funds. The Appendix identifies third party

funding sources that we have currently identified. As we develop and refine programs, we will continue to work to identify funding sources that can be leveraged for these efforts.

Table 3: Budget Summary by Program

	FY-2020	FY-2021	FY-2022	Totals
Medically Fragile Customers	\$ 500,000	\$ 1,010,000	\$ 1,040,000	\$ 2,550,000
Municipal CRCs	\$ 150,000	\$ 1,150,000	\$ 1,240,000	\$ 2,540,000
Distributed Resource Adequacy	\$ 120,000	\$ 900,000	\$ 800,000	\$ 1,820,000
Critical Infrastructure Programs		\$ 200,000	\$ 300,000	\$ 500,000
Customer Education	\$ 30,000	\$ 50,000	\$ 30,000	\$ 110,000
Future Programs		\$ 860,000	\$ 1,880,000	\$ 2,740,000
FY Totals	\$ 800,000	\$ 4,170,000	\$ 5,290,000	\$ 10,260,000

4. Implementation

Successful implementation of our energy resiliency efforts will require consideration of customer awareness and outreach as well as identification of regulatory and legislative barriers and strategies to remove or overcome these barriers.

An important aspect of deploying any program is ensuring that customers are aware of the program and its benefits. A portion of this outreach and communication will be conducted by Peninsula Clean Energy through direct outreach to customers. In certain cases, we will also partner with community organizations that have strong ties to engage targeted segments of our customer base that are traditionally more difficult to reach including the elderly, non-English speakers, those with physical and mental disabilities, and the medically fragile.

A second part of this resiliency strategy will focus on identifying regulatory or legislative barriers to deploying distributed energy resources (DERs) for energy resiliency and working to remove or overcome these barriers. We are currently working in two specific areas – community microgrids and RA. Presently, widescale deployment of community-scale microgrids is inhibited by regulatory barriers. Peninsula Clean Energy is very active in regulatory proceedings to ensure CCAs have a clear and positive role in facilitating deployment of microgrids in their communities.

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I. Introduction

This strategy document outlines Peninsula Clean Energy Authority's (Peninsula Clean Energy) planning for programs to provide energy resiliency in the event of grid outages related to natural disasters or Public Safety Power Shutoff (PSPS) events.

Peninsula Clean Energy is San Mateo County's official electricity provider. It is a local public agency, controlled by the communities it serves, that provides all electric customers in San Mateo County with cleaner electricity at lower rates than those charged by the local incumbent utility. Peninsula Clean Energy saves customers an estimated \$18 million a year. Peninsula Clean Energy, formed in March 2016, is a joint powers authority made up of the County of San Mateo and all 20 cities and towns in the County. The agency serves approximately 290,000 accounts. Peninsula Clean Energy is governed by a Board of Directors comprised of one representative from each of the twenty cities in San Mateo County, two representatives from the County Board of Supervisors and two emeritus Board representatives.

At the Board of Directors meeting on October 21, 2019, the Board approved development of a plan to invest up to \$10 million over three years towards programs that address the problems created by PSPS events and natural disasters that can impact Peninsula Clean Energy's customers access to electricity. This document identifies a strategy and budget for how this commitment would be used to develop programs, accelerate regulatory changes, and outreach to community partners. It defines how Peninsula Clean Energy is well positioned to help drive systematic change to ensure our communities are resilient.

II. Problem

1. Background and Scale

In Spring 2019, Pacific Gas and Electric Company (PG&E) announced that it would expand its Public Safety Power Shutoff (PSPS) program in order to prevent wildfires across the state. The expansion of this program puts lives at risk, causes significant economic impacts, disrupts operations as well as increases greenhouse gas (GHG) emissions and worsens local air quality when diesel generators are operated for backup power. In addition to PSPS events, the Bay Area is vulnerable to natural disasters, including floods, wildfires, and earthquakes, which can all threaten safety and access to power. As we consider how to provide grid resiliency solutions for PSPS events, we must also plan for unanticipated disasters that might happen suddenly. Our customers need to be properly equipped with the means to get through power outages. For this reason, developing energy resiliency is an effort that can effectively mitigate the consequences of associated with potential disasters.

(a) Public Safety Power Shutoffs

A PSPS event occurs when PG&E decides it is necessary to turn off electricity in certain areas because dry conditions and gusty wind have created a heightened fire risk. No single factor drives a Public Safety Power Shutoff, as each situation is unique. PG&E considers the following factors when determining whether power should be turned off:

- A Red Flag Warning declared by the National Weather Service;
- Low humidity levels, generally 20 percent and below;

- Forecasted sustained winds generally above 25 mph and wind gusts in excess of approximately 45 mph, depending on location and site-specific conditions such as temperature, terrain and local climate;
- Condition of dry fuel on the ground and live vegetation (moisture content); and
- On-the-ground, real-time observations from PG&E's Wildfire Safety Operations Center and field crews.¹

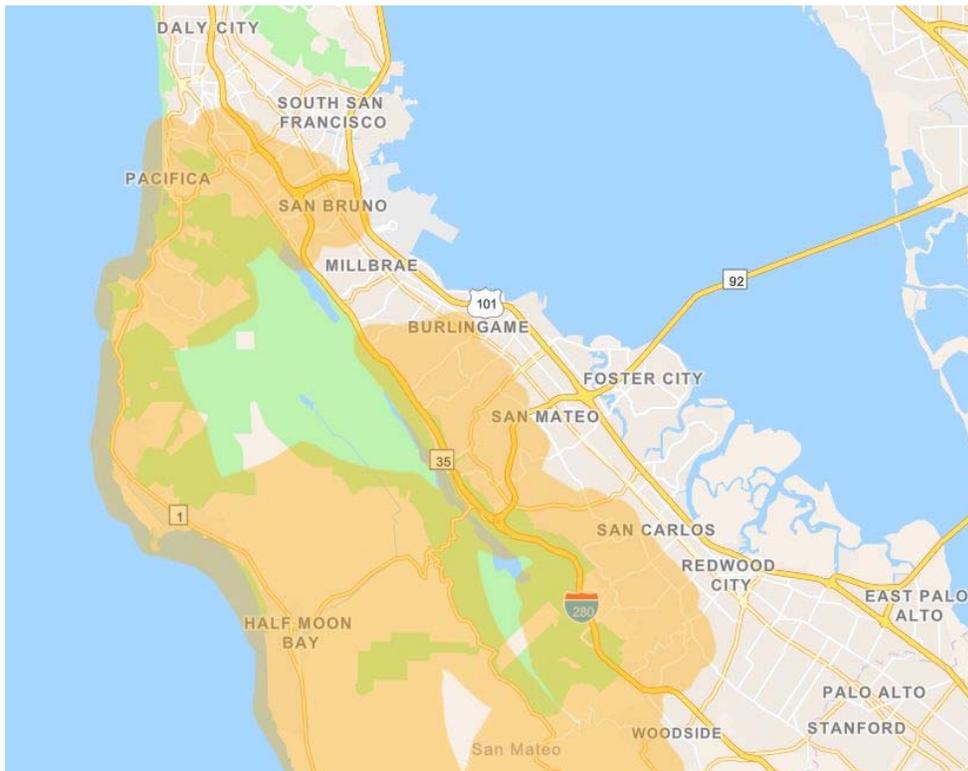
In October 2019, three PSPS events affected Peninsula Clean Energy customers in San Mateo County. These three events are detailed in Table 4 below. These events primarily impacted customers in coastal communities in the western part of the county as demonstrated in the map in Figure 3 below. Some of the customers impacted include Medical Baseline customers, which is a special rate class for customers with energy needs related to a medical condition.

Table 4: October 2019 PSPS Events Impacting Peninsula Clean Energy Customers

Event Dates	Peninsula Customers Impacted	Peninsula Medical Baseline Customers Affected	Total Californians Affected	Communities Affected	Outage Times
10/9 – 10/12	15,000 (5% of customer base)	270	730,000	<ul style="list-style-type: none"> • Half Moon Bay • Menlo Park • Pacifica • Portola Valley • Redwood City • San Mateo • Unincorporated areas 	17 – 38 hours
10/23 – 10/25	1,100 (0.3% of customer base)	23	177,000	<ul style="list-style-type: none"> • Half Moon Bay • Woodside • Unincorporated areas 	13 - 14 hours
10/26 – 10/28	57,000 (20% of customer base)	590	941,000	<ul style="list-style-type: none"> • Belmont • Burlingame • Daly City • Half Moon Bay • Hillsborough • Pacifica • Portola Valley • Redwood City • San Bruno • San Carlos • San Mateo • South San Francisco • Woodside • Unincorporated areas 	44 – 92 hours

¹ PG&E's Public Safety Power Shutoff Webpage: https://www.pge.com/en_US/safety/emergency-preparedness/natural-disaster/wildfires/public-safety-power-shutoff-faq.page

Figure 3: PG&E map of many Peninsula communities impacted by the October 26, 2019 PSPS event. Orange shading represents geographies that experienced a power outage



Unfortunately, to date, PG&E has offered few solutions to customers affected by PSPS events. Peninsula Clean Energy has an opportunity to lead by offering solutions to those customers who will be most at risk in future PSPS events, which will revolve around future fire seasons that typically occur in summer and autumn.

(b) Other Power Shutoff Hazards

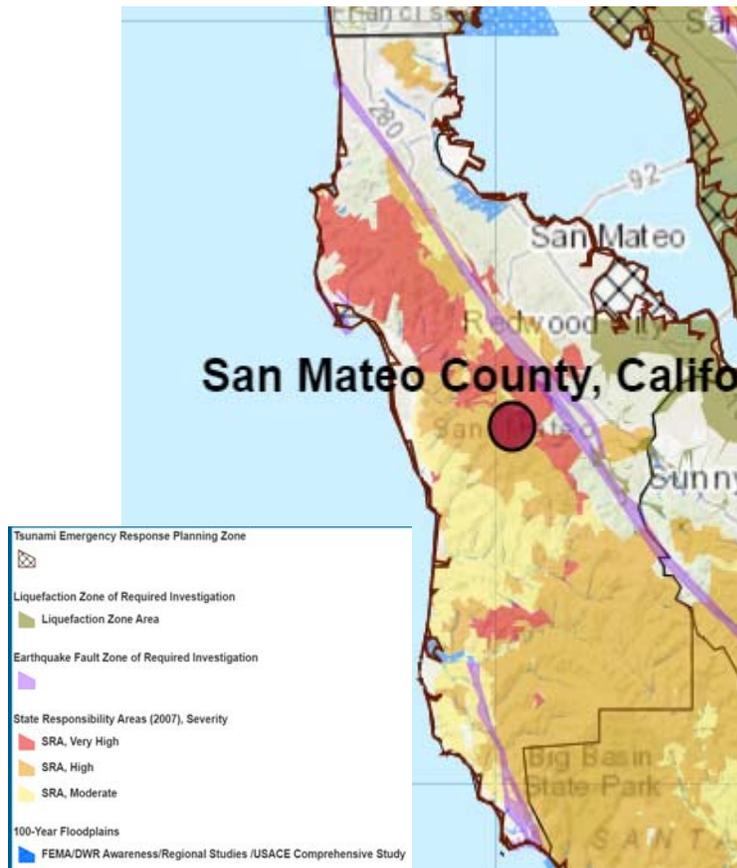
San Mateo County is vulnerable to a variety of other hazards which may cause customers to lose power including the following:

- wildfires;
- flooding and storms;
- earthquakes (including earthquake caused liquefaction and landslides);
- sea level rise; and
- tsunami inundation.

Figure 4 shows areas that are especially vulnerable to these threats according to the California Office of Emergency Services.² Additional maps related to specific hazards are available in the Appendix.

² “Cal OES MyHazards”: <http://myhazards.caloes.ca.gov/>

Figure 4: Map of Hazards in San Mateo County



(c) Back-up Power Options

Currently, the most common electricity back-up option in the event of a power outage is a diesel fueled (or other fossil-fueled) generator. In the days leading up to the first PSPS event, and during the event, there was an increase in diesel generator sales. Some stores even sold out.³ Diesel generators produce significant local air quality impacts including some GHG impacts and nitrogen oxide, which can combine with other compounds to form ozone and particulate matter with serious health impacts. Moreover, diesel generators can present a fire hazard and may be unable to generate power in an emergency due to difficulties with fuel access or delivery. The proliferation of diesel generators runs directly counter to Peninsula Clean Energy’s mission to reduce GHG emissions in San Mateo County, and to state-wide goals to improve air quality and reduce GHG emissions.

Fortunately, there are cleaner, economical alternatives to diesel generators for energy resiliency, namely a solar photovoltaic system paired with energy storage systems, commonly referred to as a microgrid. A microgrid is one system or a series of systems that is capable of disconnecting from the grid during a blackout to serve critical load. By disconnecting from the

³ “Northern California faces massive power outage as PG&E hedges wildfire risk”: https://www.washingtonpost.com/national/northern-california-faces-massive-power-outage-as-pgande-hedges-wildfire-risk/2019/10/09/576facfa-ead9-11e9-9306-47cb0324fd44_story.html

grid, these energy resiliency systems serve local power needs that help our customers comfortably, safely, and cleanly get through power outages that can last for days. A solar energy system paired with battery storage is well-equipped to handle outages that last for several hours at a time, and often even days if there is continued sunlight throughout these events. Peninsula Clean Energy believes that solar and storage play a crucial role in creating a resilient electricity system in San Mateo County. Further, new technologies are emerging now to address the gap that exists between customers' demand for clean, long-duration (10+ hours) backup power, and market solutions that are geared towards only temporary blackouts.

2. Sensitive Customers and Communities

Peninsula Clean Energy is committed to supporting customers who may be especially sensitive to the impacts of a loss of power. This may include medically threatened or low-income residents or businesses in areas with a high concentration of these customers. There currently are several methodologies that are used to identify sensitive customers and communities. These methodologies listed below will inform program design and targeting.

(a) CalEnviroScreen

The Office of Environmental Health Hazard Assessment, on behalf of the California Environmental Protection Agency (CalEPA), created the California Communities Environmental Health Screening Tool (CalEnviroScreen - CES) to identify California communities by census tract that are disproportionately burdened by, and vulnerable to, multiple sources of pollution.⁴ CalEnviroScreen uses environmental, health and socioeconomic information to produce a numerical score for each census tract in the state.

SB 535 (DeLeon) directed CalEPA to determine a definition of "Disadvantaged Communities" (DACs) to target investment of the state's cap-and-trade funds. CalEPA defined DACs as those falling in the top 25% highest scoring census tracts as measured by the CalEnviroScreen 3.0 tool. As this measure is used to target investment of the state's cap and trade funds, many of the state-level funding sources for distributed energy resources (DERs) including Self-Generator Incentive Program (SGIP) use this definition.

As identified in Table 5, there are six census tracts in San Mateo County that fall into this measure. According to CalEnviroScreen 3.0, approximately 35,000 people live in these areas and Peninsula Clean Energy has estimated that this represents approximately 7,000 customer accounts. Please refer to Figure 5 below for a map of the communities in San Mateo County that meet this threshold.

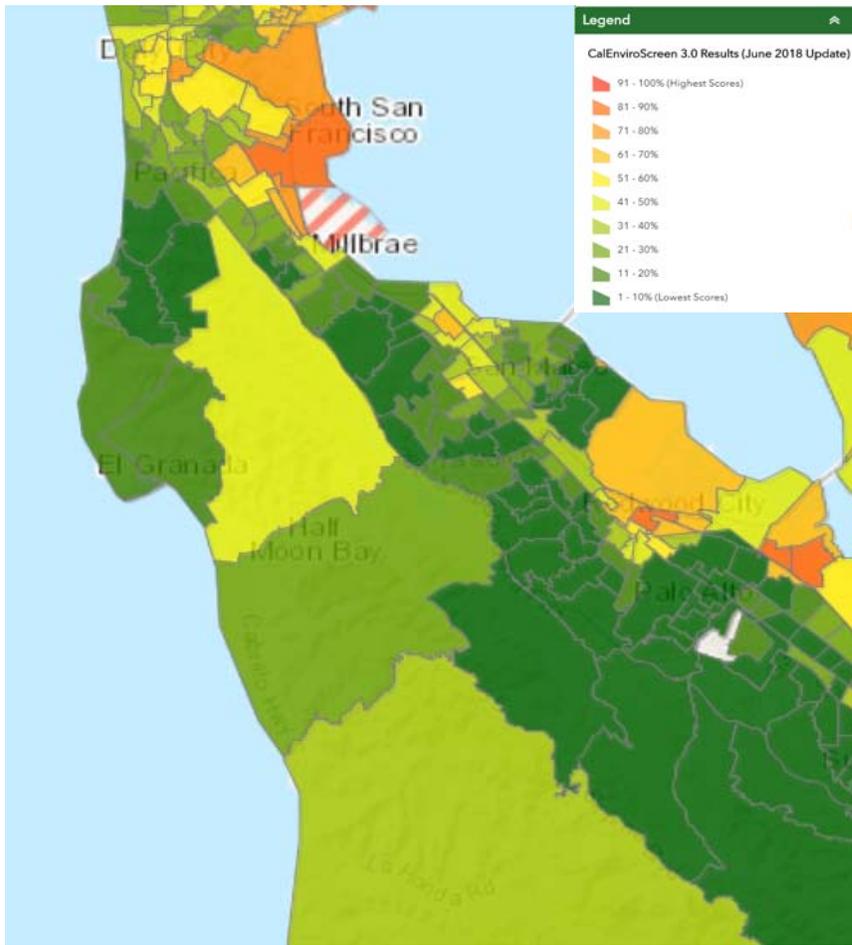
⁴ "CalEnviroScreen 3.0": <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30>

Table 5: San Mateo County's Disadvantaged Communities

CalEnviroScreen (CES) 3.0 Results						Peninsula Clean Energy DACs ⁵	Demographics (%)					
	Census Tract	CES 3.0 %	CES 3.0 % Range	City	Population	Customer Accounts	Hispanic	White	African American	Native American	Asian American	Other
1	6081611900	86.85	86-90%	East Palo Alto	10,325	1,235	56.9	6.8	19.8	0.1	13.3	3.1
2	6081612000	81.70	81-85%	East Palo Alto	7,327	710	72.8	3.2	13	0.1	9.0	2.0
3	6081602300	80.89	81-85%	South San Francisco	3,753	1,160	45.4	19.5	1.5	0.2	30.3	3.2
4	6081610201	80.20	81-85%	Redwood City	5,764	2,125	74.4	12.1	2.5	0.4	8.3	2.2
5	6081602100	77.93	76-80%	South San Francisco	3,615	943	72.4	9.0	1.9	0.4	14.1	2.1
6	6081604200	75.46	76-80%	San Bruno	4,170	888	56.9	14.9	0.9	0.5	23.1	3.7
				Total	34,954	7,061						

⁵ Not included in CalEnviroScreen 3.0 results; figures calculated by PCE.

Figure 5: Map of CalEnviroScreen 3.0 Results; Census Tracts in top 25% are considered disadvantaged communities (DACs)



(b) San Mateo County Community Vulnerability Index

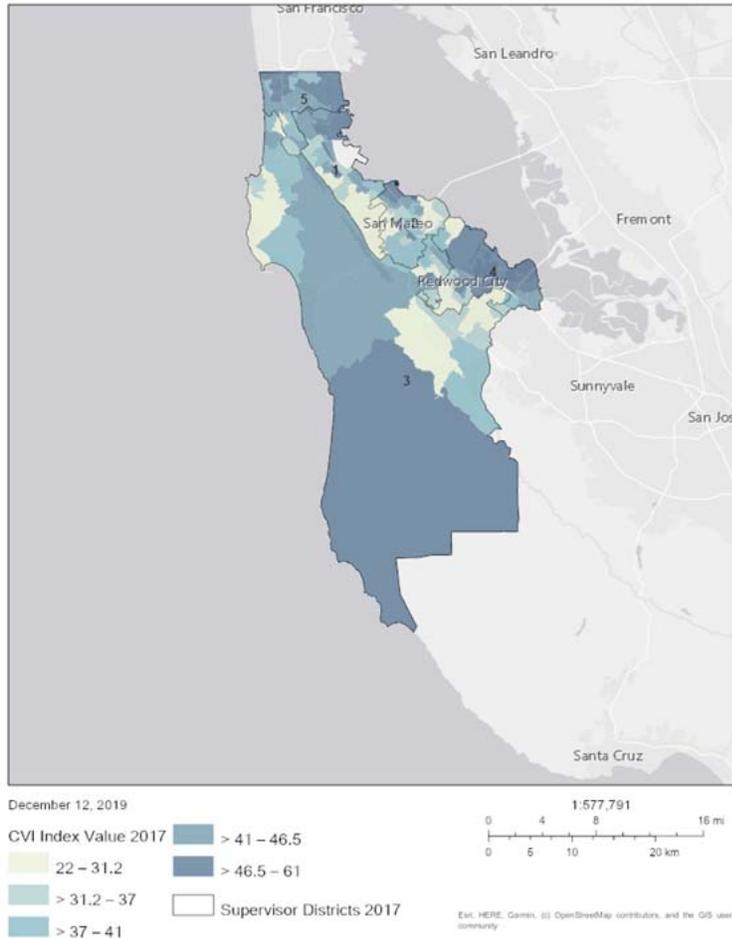
A second measure is the San Mateo County Community Vulnerability Index (CVI)⁶. This is an initiative of the County Manager’s Office and aims to demonstrate the geographical distribution of the overall vulnerability of the residents of the county. Indicators have been standardized and combined to create dimension scores, on a scale from zero to 100, with the highest score representing the most vulnerable communities. The CVI evaluates the following seven indicators of vulnerability:

- health insurance coverage;
- educational attainment;
- supplemental security income;
- gross rent as a percentage of income;
- poverty;
- unemployment; and
- disability status.

⁶ “Community Vulnerability Index”: <https://cmo.smcgov.org/cvi>

The CVI identifies a large vulnerable population on the San Mateo County coast that has been directly impacted by each PSPS event in the County to date. Please refer to Figure 6 below for a map of the Community Vulnerability Index for San Mateo County.

Figure 6: Map of San Mateo County Community Vulnerability Index. A dark shade of blue represents a high degree of vulnerability



(c) Low Income Households

A third definition of disadvantaged communities is based on income level. Low income is often defined as household income below 80% of the area’s median income. We estimate that more than 120,000 households in San Mateo County fall within this definition.

Low income can also be defined as median household incomes at or below the threshold designated as low income by the Department of Housing and Community Development’s list of state income limits adopted pursuant to Health and Safety Code (H&SC) Section 50093. Finally, low income could be defined as households eligible for certain electric rates including California Alternate Rates for Energy (CARE) or Family Electric Rate Assistance (FERA) program. Income levels for CARE are set by the CPUC at 200 percent or less of the federal poverty guidelines and income levels for FERA are set at 250% or less of the federal poverty

guidelines. Peninsula Clean Energy has 29,262 accounts enrolled in the CARE rate and 858 accounts enrolled in the FERA program.

(d) Medically Threatened

A fourth measure is defined as medically threatened customers, which includes customers that rely on electricity to power a critical medical device. The Medical Baseline program is an assistance program for residential customers with special energy needs due to medical conditions. Enrollment in this program provides a lower rate on energy bills and extra notifications in advance of PSPS events.^{7,8}

Peninsula Clean Energy has approximately 4,300 known Medical Baseline customers. During the largest of the four PSPS events in October, over 1,000 Medical Baseline customers lost power out of the total 55,000 customers who were affected by that event.

While the Medical Baseline Program helps identify an important customer segment, it is a flawed measure for holistically identifying medically threatened customers. It is currently undersubscribed in San Mateo County. In addition, the requirements to join the Medical Baseline Program are much broader than what constitutes a life-threatening event resulting from loss of power.

(e) Other Measures of Priority Customers

It is imperative that Peninsula Clean Energy defines, identifies, and maps out which of our customers are most affected by blackouts. That mapping effort will take into consideration customers' susceptibility to blackouts as measured above, as well as the following:

- Distance from planned community resiliency centers;
- Proximity to emergency response support;
- Areas that are historically slow to reenergize after blackouts;
- Tier-2 and Tier-3 High Fire-Threat Districts (T2 / T3 HFTDs); and
- Susceptibility to other natural disasters, such as sea level rise and earthquakes.

Once an inclusive measure is established and mapped out, we will use this to target our programs to these most sensitive communities.

⁷ "Apply for the Medical Baseline Program": https://www.pge.com/en_US/residential/save-energy-money/help-paying-your-bill/longer-term-assistance/medical-condition-related/medical-baseline-allowance/medical-baseline-allowance.page?WT.mc_id=Vanity_medicalbaseline

⁸ "Medical Baseline": <https://www.cpuc.ca.gov/medicalbaseline/>

III. Priorities

Peninsula Clean Energy has identified four strategic objectives for the timeline of this strategy as well as recognition that creating a resilient energy grid will require resources and planning over a longer time horizon. As part of the initial strategy and programs, we will work to document lessons learned that can inform the longer planning needs.

1. Strategic Objectives & Priority Areas

PSPS events and natural disasters in San Mateo County will be both a threat to resiliency and a driver of clean energy development and innovation. This strategy aims to address the following high-level objectives:

1. Provide solutions to the most vulnerable customers ahead of the start of the next fire season in late summer 2020. Peninsula Clean Energy along with community stakeholders have identified customers that rely on critical medical equipment as the highest priority to target. As part of this strategy, we will design programs for this subset of customers as the highest priority.
2. Leverage resiliency programs towards Peninsula Clean Energy's goal to be 100% renewable on a time-coincident basis by designing programs where infrastructure can be used to meet this goal when not needed for resiliency purposes. This will also increase the value of these programs.
3. Establish a basis for an ongoing resiliency business model. By using the lessons learned in deployment of early programs, we can identify the characteristics of successful programs which enable Peninsula Clean Energy to continue to serve its customers.
4. Identify opportunities to create a paradigm shift towards pervasive resiliency wherein resiliency is built into complementary areas of Peninsula Clean Energy initiatives over the longer term. For example, this may include increasing energy efficiency to decrease the amount of load that needs to be supported in a power outage or changes to the building code to support resiliency.

One of Peninsula Clean Energy's most aggressive organizational goals is to design a power portfolio that is sourced by 100% renewable energy by 2025 on a time-coincident basis, provided it is economically viable. Solar energy and energy storage solutions for backup power provide Peninsula Clean Energy the opportunity to utilize these assets outside of power outage events. This can help bridge the gap that currently exists between San Mateo County's electric load and Peninsula Clean Energy's renewable energy supply.

As energy resiliency is a long-term challenge, we will lead the development of resiliency solutions with a lens beyond the immediate timeframe of initial programs. A wide variety of long-term strategic factors will be taken into consideration as we mobilize and incentivize energy resiliency solutions in our county. Those factors include Peninsula Clean Energy's ability to provide ongoing service, models of infrastructure and asset ownership, replicability and scalability, programmatic efficiency, and technological innovation.

Over the last few months, Peninsula Clean Energy staff have met with a variety of public and non-profit organizations, including San Mateo County Healthcare, the Commissions on Aging and Disabilities, the Red Cross, the Office of Emergency Services, and the Redwood City Fire Chiefs, among other stakeholders. They all expressed major concerns about PSPS events and view PSPS events as a threat to their communities and operations. Through these conversations, Peninsula Clean Energy has identified the following three priority program areas:

1. Backup generation to medically fragile residential customers;
2. Community-scale emergency response centers outfitted with energy resiliency; and
3. Critical infrastructure such as police/fire stations, hospitals and other healthcare facilities, communications facilities that support emergency first responders, and wastewater / sewage / water pumping facilities, transportation infrastructure.

2. Long-Term Resiliency & Replicability

This strategy will leverage up to \$10 MM in Peninsula Clean Energy funds over the next three years. However, as noted above, the scale and need for resiliency goes far beyond what can be accomplished in this time frame and with this budget. Further, as the impacts of climate change become more pronounced in our community, there will be continued need to create resilient buildings, homes and electric infrastructure.

Over the long term, considerations of resiliency will need to be built into the development and construction of all homes and other buildings. In order to address the scale of existing homes and businesses, we will need to identify cost-effective turnkey programs for deploying technological solutions.

It is important that Peninsula Clean Energy considers how our programs can and will be replicated across other load serving entities' (LSEs') service territories within California and beyond. The initial programs that are deployed as part of this strategy will help to inform how to think about resiliency over the longer term. We will document lessons learned and use these to inform Peninsula Clean Energy's future strategies around resiliency, share these lessons with CCAs and other LSEs as well as with regulators and policy makers to identify and remove barriers to the development of a more resilient electricity system. Our efforts are relevant not only to California, but also in parts of the country where energy resiliency is threatened by mass flooding, hurricanes, windstorms, and aging grid infrastructure.

Additionally, the current transmission and distribution infrastructure has a lot of vulnerabilities as evidenced by PG&E's use of PSPS to avoid fire risk and the resulting power outages that affected millions of Californians in 2019. While Peninsula Clean Energy does not own and is not responsible for maintaining the distribution infrastructure, there may be ways to locate DERs to increase resiliency not just for a particular customer, but for the grid overall through the deployment of non-transmission alternatives. As part of our resiliency strategy and through the deployment of programs, Peninsula Clean Energy will explore how we may be able to contribute to the resiliency of the electric grid by working with PG&E or through the programs that we deploy.

Through our efforts to lead the charge in deploying energy resiliency solutions we can bring about wide systematic change to automatically include energy resiliency into the built

environment, ensuring that San Mateo County is positioned for long-term wellbeing, economic health, and technological innovation.

3. Metrics

The programs that we deploy and consider deploying will be evaluated using the following metrics, which are further defined in the Appendix:

- Avoidance of power outage costs to cities;
- Avoidance of disruption to critical infrastructure;
- Cost of deployment to Peninsula Clean Energy;
- Number of customers directly impacted by our programs;
- Number of customers indirectly impacted by our programs;
- Number of medically threatened customers directly impacted by our programs;
- Number of medically threatened customers indirectly impacted by our programs;
- Number of customers in sensitive communities directly impacted by our programs;
- Number of customers in sensitive communities indirectly impacted by our programs;
- Air quality improvements;
- Impact on goal to be 100% renewable energy on a time coincident basis;
- Reduction in GHG emissions;
- Scale of deployment as measured in megawatt (MW) and megawatt hour (MWh).

IV. Solutions

Peninsula Clean Energy is well-positioned to facilitate programs to increase energy resiliency in San Mateo County due to its role as a public agency, its connection to customers and its position in the electricity market. There are a variety of mechanisms that Peninsula Clean Energy can use for this facilitation ranging from direct incentives to education to electricity rate structures. We have identified programs across the priority areas identified above to meet our strategic objectives for this resiliency strategy.

1. Why Peninsula Clean Energy?

CCAs are in a unique position to facilitate the proliferation of alternative forms of backup power. Our distinctive role in our community, and in the energy market, allows us to 1) leverage existing customer relationships, 2) aggregate backup energy systems to create new value streams, and 3) mobilize our public health and disaster preparedness community in order to identify and respond to high priority concerns.

Peninsula Clean Energy has a direct connection to our customer base, which stands to benefit from a more resilient energy system. Each of the 20 cities in San Mateo County, as well as the Unincorporated County, has a representative on our Board of Directors. Our Board members provide a link to each of their communities. We can leverage these relationships to inform the direction of our programs and to fully understand the needs and priorities of our communities. Additionally, Peninsula Clean Energy's Citizens Advisory Committee (CAC) provides another direct link to our customers and their concerns. We met with representatives of the Board and the CAC to solicit ideas in developing this strategy and will continue to work with them as we deploy the strategy.

In addition, when not being utilized for backup power, these systems can be aggregated together for use in the wholesale energy market, helping Peninsula Clean Energy to hedge against peak energy prices. Creating these new value streams aligns well with Peninsula Clean Energy's goals to foster innovation in the electricity sector, support energy resilience and keep costs low for our customers.

2. Tools for Energy Resiliency

There are many ways that Peninsula Clean Energy can spur energy resiliency solutions. The following are some, but not all, of the ways that Peninsula Clean Energy can motivate new energy resiliency solutions within San Mateo County. By enabling supplementary value streams, we may increase value and reduce risk in a way that can expand the number of feasible projects. This may also allow Peninsula Clean Energy to reduce the amount of energy we buy from the energy markets thereby decreasing our procurement costs. In addition, we will look to leverage third-party funding sources to offset the cost of these programs to Peninsula Clean Energy. In the Appendix, we have identified a number of these funding approaches that Peninsula Clean Energy can utilize.

1. **Upfront and Volumetric Incentives:** Provide upfront or volumetric (per unit of energy generated) incentives for the rollout of new energy systems or resiliency programs, either directly to customers or vendors, or on customers' electricity bills. These incentives buy-down the cost of new energy systems.
2. **Power Purchase Agreement:** Execute a long-term contract to buy energy generated by a distributed energy system. This allows the developer to finance the system and means the customer does not have a large, up-front expense.
3. **Resource Adequacy (RA) Procurement:** Execute a long-term contract to purchase RA from new energy systems, thereby providing a guaranteed, contracted revenue stream to vendors on top of energy sales. This may enable systems that would not be financially feasible without this revenue stream.
4. **Wholesale Market Participation:** Peninsula Clean Energy can facilitate distributed energy resources' participation in wholesale energy markets.
5. **Peak Load Reduction:** Dispatch – or incentivize the dispatch of - energy storage at times when we anticipate our service territory's load to reach peak levels, which is when we generally see the highest energy prices. Reducing our peaks can also decrease the amount of RA we are required to purchase in future years.
6. **On-bill Financing:** Provide zero or low-interest loans to Peninsula Clean Energy customers. Regular monthly loan payments would be collected by Peninsula Clean Energy through customer's monthly utility bill until the loan is repaid. Many on-bill programs require "bill neutrality." In other words, savings from the funded improvements are expected to equal or exceed the new on-bill loan payments.⁹

⁹ "On-Bill Financing: Overview and Key Considerations for Program Design," NRDC Issue Brief: <https://www.nrdc.org/sites/default/files/on-bill-financing-IB.pdf>

7. Credit Support: Provide credit support to customers with low or no credit scores to enable them to take advantage of power purchase agreement (PPA) or lease structure financing, which do not require up-front capital.
8. Procurement Backstop: Procure power from excess generation that exceeds customer load. The added value stream to energy systems can reduce contracted revenue risk to PPA financiers, thus expanding access to clean energy solutions.
9. Energy Rates: Create alternative tariffs specifically to incentivize customer participation in programs that expand energy resiliency and distributed energy resources.
10. Net Energy Metering (NEM): NEM is a special billing arrangement that allows customers with solar PV systems to get the full retail value of the electricity their system generates. The customer's meter tracks the difference between the amount of electricity produced by solar panels and the amount of electricity used during each billing cycle. When the solar panels produce more electricity than used, customers receive a credit on their bill. We could change the structure of this NEM program to more highly incentivize systems with a storage component or that otherwise contribute to grid resiliency.
11. Marketing Leverage to Deliver Reduced Cost of Customer Acquisition: Customer acquisition represents a significant portion of overall solar system costs –approximately 17% in 2017 and expected to be approximately 20% through 2022¹⁰. We can help developers reach our customer base at a lower cost than their traditional methods. This can reduce the overall cost of a system and the savings can be passed on to customers or, for customers with low or no credit, the resulting increase in total value captured by vendors can offset customer credit risk, thereby enabling systems that would not otherwise be feasible.
12. Outreach Grants: Cover part of the cost for public agencies or non-profits to reach out to customers and sensitive or hard-to-reach communities and inform them of their options for energy resiliency and provide information on Peninsula Clean Energy's programs.
13. Education: Develop and provide educational materials to customers on their options for backup power generation and other ways to make their homes and businesses more resilient.
14. Research: There are many aspects of how to foster widespread clean energy resiliency that need additional research. Peninsula Clean Energy can partner with research institutions to help guide and fund that research or host pilot programs to inform research. Areas for research may include safety measures for lithium-ion energy storage, economic loss to San Mateo County and cities from power outages caused by natural disasters and PSPS events, identifying vulnerable residents most impacted by PSPS events, and identifying critical areas of the electric grid in San Mateo County that are vulnerable or where a loss of a transmission or distribution line would impact a large number of people.

¹⁰ "Costs to Acquire US Residential Solar Customers are High and Rising":
<https://www.greentechmedia.com/articles/read/costs-to-acquire-us-residential-solar-customers-are-high-and-rising>

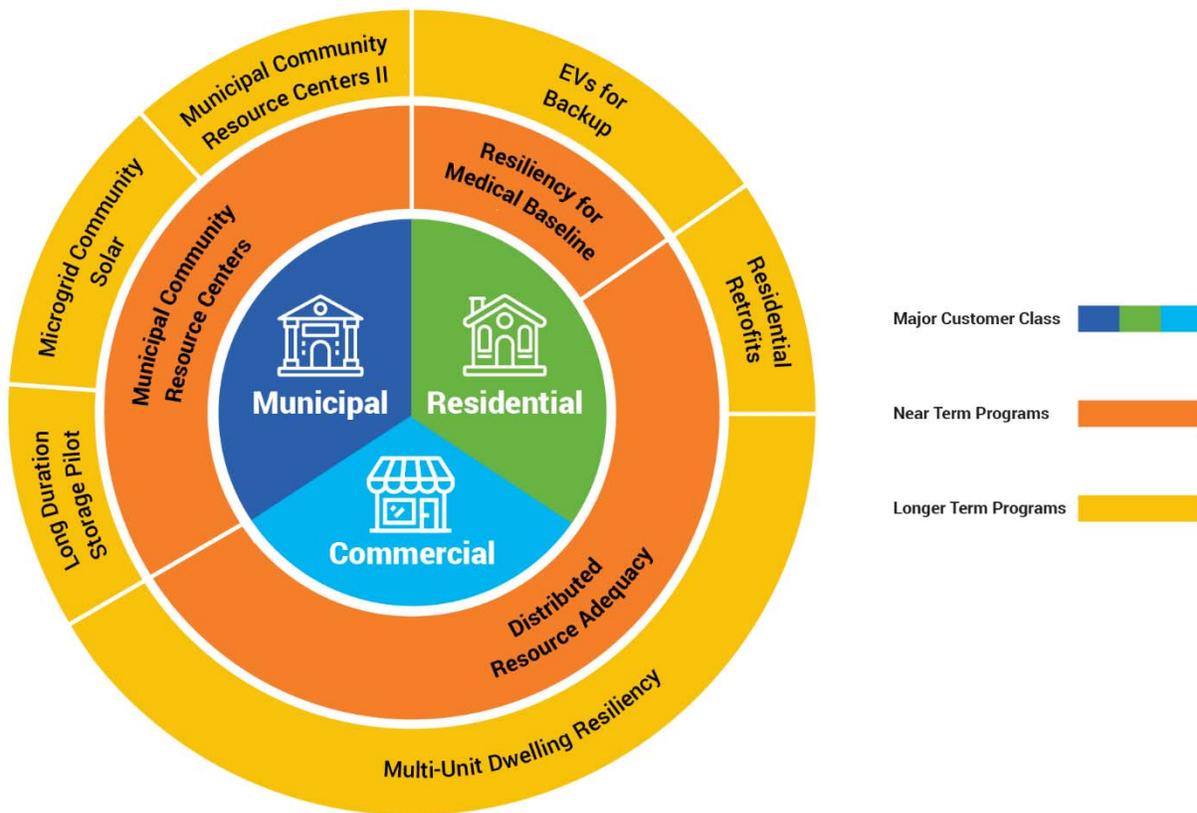
15. Technology Innovations: Energy resiliency from clean sources is a relatively new industry, and there are emerging technologies that can be accelerated such as long-duration storage and alternative generation systems. Pilot programs can be an effective way to advance new solutions.

3. Programs

Peninsula Clean Energy has developed and is developing a variety of programs to help address the needs of our residential, commercial, and municipal customers. Each customer class can face serious consequences from a power outage. The types of programs we design and deploy will differ depending on the targeted customer class.

Figure 7: Priority Areas and Programs

PENINSULA CLEAN ENERGY MAJOR RESILIENCE PROGRAMS BY CUSTOMER CLASS



Our highest is on residential customers who rely on electric medical equipment to support their lives. Their health is directly threatened by power outages. The first program identified below addresses that threat.

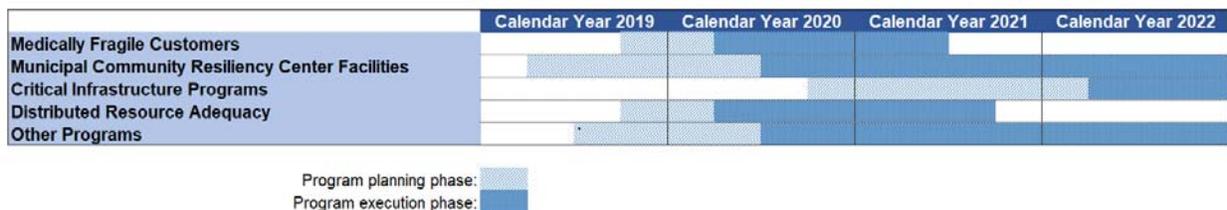
Peninsula Clean Energy will also support cities and the County in developing Community Resiliency Centers (CRCs) that provide our customers backup power and shelter, can serve as communications hubs, allow people to charge their phones and laptops, allow people to charge their medical devices, receive refrigerated food and medication, and stay updated as power outages eventually conclude.

Another high priority area is supporting the continued operations of critical infrastructure, including police/fire stations, hospitals and other healthcare facilities, communications facilities that support emergency first responders, wastewater / sewage / water pumping facilities, and transportation infrastructure even in times of power outages. Although many of them have diesel generators as a backup power source, not all do, and diesel brings additional challenges including safety and availability of fuel during an outage. In order to start to address this challenge, we have designed programs to first identify and catalog resilient critical infrastructure facilities.

Partnering with third-party organizations will be key for the success of many of our programs. Peninsula Clean Energy will seek other LSEs that might be interested in supporting their customers' efforts in getting on-site backup generation. This expanded participation will draw more responses to the program, which will lead to more robust planning from bidders, and more competitive pricing. We will also work with local police, fire and other emergency responders, hospitals, non-profit and other community organizations. This will help to ensure that we are creating programs that will have the most impact on minimizing the impacts of power outages.

Figure 8 below highlights several programs that are underway to address the backup power needs of these high-priority customers already, as well as future programs that we are planning.

Figure 8: Peninsula Clean Energy Resiliency Programs Timeline 2019 - 2022



A summary of the expected outcomes, customers impacted, and associated partners for each of the energy resiliency efforts can be found below in

Table 6.

Table 6: Summary of Expected Program Outcomes

Program	MW	Customers	Tools	Partners
Medically Fragile Customers	4 MW Solar / 16 MWh Storage	675	RA, Outreach Grants, Incentives, Cost of Acquisition	CCAs, Hospitals, Public Health Agencies, Non-Profits
Municipal CRCs	5.8 MW Solar / 23 MWh Storage	9,000 – 18,000	Education, RA, Cost of Acquisition, PPA	EBCE, BAAQMD, Arup, Cities, County
Critical Infrastructure	TBD	TBD	Education, Research	Cities, County
Distributed RA	40 MWh Storage	900	RA, Cost of Acquisition	EBCE, Silicon Valley Clean Energy (SVCE), Silicon Valley Power (SVP), TerraVerde Energy, Optony

(a) Solar Energy Resiliency for Medically Fragile Customers

Grid outages are inconvenient and expensive for residents and businesses. However, they can be life threatening for people that depend on electricity to power medical equipment such as left ventricular assist devices (LVADs), ventilators, or oxygen concentrators. These customers need backup power and/or an alternate risk mitigation plan in place prior to a prolonged power outage. Clean backup power will allow customers that are unable to leave their homes to safely stay at home during a power outage. It could also reduce power outage-related calls that these customers place to emergency services.

Peninsula Clean Energy has approximately 4,300 Medical Baseline customers. Medical Baseline provides certain protections for residential customers that have special energy needs due to qualifying medical conditions. During the largest of the four PSPS events in October, approximately 600 Medical Baseline customers lost power out of the total 57,000 customers who were affected by that event.

Medical Baseline enrollments may not accurately capture all medically vulnerable customers, and customers that are enrolled in Medical Baseline do not all have the same needs and risks. We also believe the Medical Baseline program is undersubscribed, with many eligible customers not enrolled and therefore not reflected in these numbers. Peninsula Clean Energy is working with some of the community partners to better identify electricity-dependent medical customers, assess their needs, and figure out the best plan for helping them during an outage.

Medically threatened customers may live in single-family homes and / or multi-unit dwellings. Deploying solutions on single family homes will likely be significantly easier and faster to install than multi-unit dwellings. For this reason, we have separated these activities in the program description below.

This program will support three primary activities:

1. **Outreach and Identification:** Peninsula Clean Energy will partner with local public health institutions such as hospitals, municipal emergency services and non-profit agencies to identify and conduct outreach to customers with critical, electricity dependent medical needs in our service territory. This effort entails reaching across the greater Bay Area by working with hospitals who serve a geographically diverse patient pool. Hospital facilities often serve customers who live in different counties. In partnership with other local Bay Area CCAs, we will work with local hospitals who will help us share information about resiliency programs with families that are located in Peninsula Clean Energy's service territory and may need backup power solutions. We will work with these partners to identify customers, assess needs, and develop appropriate solutions.
2. **Single-Family Homes:** Peninsula Clean Energy will run a solicitation to identify private sector partners to facilitate the deployment of solar and battery energy solutions on the homes of 65 medically threatened customers before the 2020 wildfire season. This will deliver immediate relief and test the approach and pricing for this solution. These back-up power systems will allow customers that are unable to leave their homes to safely stay at home during a power outage. There are four ways that we can reduce the cost of these solutions for the end customer – direct incentives, power purchase agreement, purchasing RA, reducing cost of customer acquisition.
3. **Multi-Unit Dwellings (MUD):** Peninsula Clean Energy will work with community partners to identify an apartment complex or other MUD with a higher concentration of medically threatened customers. We will work with public and private sector partners to identify solutions for deploying backup power in multi-unit dwellings.
4. **Comprehensive Solution:** We will leverage the learnings from these three activities to develop a comprehensive solution for all types of Medical Baseline and other customer dependent on electricity for medical needs.

A major motivator for this program is the current availability of funds from the CPUC under the SGIP. Medical Baseline customers who are located in Tier 2 or Tier 3 high fire threat districts (T2 / T3 HFTDs) are eligible to receive an incentive level that amounts to nearly the full cost of an energy storage system. This will help ensure that systems purchased or financed by our customers provide a near guarantee of economic savings.

(i) Program Partners

This customer class is traditionally hard to reach and therefore, we will need to rely on external community outreach partners to market this program. We have already identified and begun discussing this issue with several County agencies and key stakeholders to help us educate these customers on energy resiliency solutions, and to connect them with vendors. Most of these external partners are public sector organizations that might require education and funding that Peninsula Clean Energy may provide.

(ii) Expected Outcomes, Timeline, and Budget

We expect to target 65 homes and one multi-unit dwelling in the initial phase targeting deployment ahead of the most vulnerable part of the 2020 fire season starting in late summer. Over the longer term, we will leverage lessons learned in the initial phase to expand this to target all medically threatened customers. In the first phase, we expect this to result in approximately 400 kilowatts (kW) of solar and 400 kW / 1,600 kilowatt hours (kWh) of storage with an average solar installation of 6 kW for single family homes and 30 kW for the multi-unit dwelling. Once we roll this out to all medically threatened customers in future years, we expect this to result in 4 MW of solar and 4 MW / 16 MWh of storage.

In Q1 of 2020, Peninsula Clean Energy will continue to foster relationships with community outreach partners to identify outreach tactics and develop amore refined indicative program size. We will hold a solicitation in late Q1/early Q2 to identify on one or multiple vendors to address this issue.

Between outreach, request for proposal (RFP) administration, volumetric incentives, and RA procurement, we plan to budget \$2,550,000 for this program over the next three years.

(b) Municipal Community Resiliency Center (CRC) Facilities

Peninsula Clean Energy already has momentum behind the proliferation of energy storage systems for CRC, which provide a central location for residents to shelter in case of a power outage. In May 2019, Peninsula Clean Energy, in partnership with East Bay Community Energy (EBCE), commenced a project to scope public facilities in San Mateo and Alameda Counties for their solar and energy storage potential. This effort was funded by a 12-month, \$300,000 Bay Area Air Quality Management District (BAAQMD) grant. Once the scoping is complete, Peninsula Clean Energy and EBCE plan to facilitate a procurement of microgrid systems for high-priority municipal accounts identified in this effort. These microgrid systems will enable additional energy resiliency at various facilities and areas throughout the County.

CRC locations will be informed by several technical considerations, including the size of the population within a 30-minute walk, and proximity to disadvantaged communities. For those who are capable of leaving their residence during an emergency event, these CRCs will serve as energy hubs and shelters. While this portion of our energy resiliency strategy does not provide a backup power option for one's home directly, a combination of household-scale and community-scale solutions will be necessary to adequately provide backup power for San Mateo County residents. Additionally, systems developed at these CRCs will be able to achieve economies of scale and provide energy at a much more competitive cost compared to solutions geared for individual homeowners.

While CRCs exist today, they are primarily powered by diesel generators. Peninsula Clean Energy and EBCE are currently studying the potential for solar and battery storage to provide backup power to CRCs to provide emergency services during natural disasters and PSPS events.

In 2019, Peninsula Clean Energy requested that cities in San Mateo County identify potential sites for this program. Eleven municipalities responded with a list of 118 prospective facilities, which were studied for their solar potential, hazard risk to natural disasters, and proximity to customer populations. Based on a scoring matrix developed by our partners at Arup Group, we have identified 92 facilities that are potentially viable. Peninsula Clean Energy will be meeting

with these 11 municipalities in Q1 2020 to provide an update and review the results of this study.

The next step in the scoping phase is to develop a financial model, mechanism, or strategy that results in affordable and widespread deployment of resiliency solar systems. Finally, we will design and assist in the collective procurement for solar+storage installations at priority critical facilities to reduce costs for interested agencies.

The overall scoping study performed will serve as a basis for assessing the full scope of a prospective procurement. EBCE and Peninsula Clean Energy are planning to release a Request for Information (RFI) in February 2020 to field industry perspectives on potential resiliency solutions, and how to organize procurement for multiple municipalities under one structure.

Following that RFI, we will design and administer a joint RFP in Q2 2020. This is anticipated to be a collective procurement for solar and storage installations at priority community facilities throughout both San Mateo and Alameda Counties. We are aiming to select awardees in Q2 2020. Energy development cycles at this scale are significantly lengthier than cycles for residential customers. We expect new energy resiliency systems to be deployed starting Q2 2021 into Q2 2022.

(i) Program Partners

We are working with EBCE, who is leading this program. Arup Group is the organization leading the technical evaluation of our facilities. BAAQMD provided the grant to perform this scoping study.

Eleven cities in San Mateo County provided facilities for study: Belmont, Brisbane, Colma, Foster City, Half Moon Bay, Hillsborough, Millbrae, Pacifica, Redwood City, San Carlos, and San Mateo. As part of this procurement, we will expand this program to include other cities in San Mateo County.

(ii) Expected Outcomes, Timeline, and Budget

We expect to site approximately 6 MW+ of new solar and 6 MW+ / 24 MWh+ of new energy storage at San Mateo County municipal facilities as a result of these efforts although final numbers will depend on the outcome of the scoping study.

Once the program is launched and CRCs are deployed, Peninsula Clean Energy will leverage the lessons learned through the first phase to develop a sequel program that expands the number of CRCs utilizing solar and storage systems.

Between program administration and RA procurement, we are budgeting \$2,540,000 for this program over three years.

(c) Identify and Catalog Critical Infrastructure

A third area identified as a priority by Peninsula Clean Energy and our community partners is backup power for critical infrastructure facilities. These critical infrastructure facilities may include the following:

- Fire stations
- Police stations
- First responders
- Emergency response centers
- Water pump stations
- Wastewater treatment plants
- Hospitals and medical facilities
- Cell towers
- Transportation infrastructure
- Communications hubs
- Shipping ports

Some of these facilities may be covered in the Municipal Community Resiliency Center program described earlier. The immediate need for understanding the scope of how Peninsula Clean Energy can support the operations of these critical infrastructure facilities is to identify and catalog the existing critical facilities in our service territory and map their vulnerability to power outages. Once we have defined our sensitive communities, we will map out their access to critical infrastructure facilities. If these facilities discontinue their operations due to power outages, some of Peninsula Clean Energy's customers will feel that impact harder than others. We need to fully understand that potential impact. How we develop programs catering to critical facilities will depend a lot on the outcomes of this research.

Peninsula Clean Energy will also continue to work with our community partners to understand how we can best support solutions for creating energy resiliency for various infrastructure, and to start the planning process for implementing these solutions. Many of these facilities have some access to backup power already in the form of diesel generators. By assisting in their transition away from polluting power sources, Peninsula Clean Energy has an opportunity to further improve local air quality. Additionally, these assets that increase energy resiliency can also provide value to Peninsula Clean Energy outside of power outage events and help to meet our goal to be 100% renewable on a time-coincident basis.

We plan to budget \$500,000 for this program over the next three years. This will be primarily used for research and technical analysis.

(d) Distributed Resource Adequacy

Following the PSPS events in October, Peninsula Clean Energy along with several Bay Area LSEs released an RFP for RA from DERs located at residential and commercial customers' properties. DERs are eligible to help LSEs meet their RA compliance through a mechanism called Proxy Demand Response (PDR). PDR allows DERs to participate in California wholesale energy markets. However, only a small amount of RA has been provided through this mechanism due to complexities around how RA is measured and how resources can count toward an LSE's RA obligation.

Like other programs outlined in this strategy, the Distributed RA RFP takes advantage of LSEs' central connection to their customers. The LSEs will serve as a channel partner between solar and storage vendors and a subset of our residential and commercial customer accounts. Additionally, by purchasing RA from these systems, we provide an additional revenue stream to the vendors, which can lead to lower energy rates for our customers, and/or expanded customer participation.

(i) Program Partners

The partners involved in this program include East Bay Community Energy (CCA), Silicon Valley Clean Energy (CCA), and Silicon Valley Power (municipal utility). Optony Inc. is administering the RFP. TerraVerde is assisting Peninsula Clean Energy in their evaluation of proposals.

(ii) Expected Outcomes, Timeline, and Budget

The RFP was released on November 5, 2019 and closed on December 23, 2019. We received 19 responses to the RFP and are currently reviewing those responses. We expect to announce awardees in April 2020 and to begin deploying new energy systems in Q3 2020.

From this solicitation, Peninsula Clean Energy plans to procure at least 10 MW of new, distributed RA provided by at least 10 MW of new energy storage, which will likely be paired with existing or new solar energy systems. Half of program capacity will be deployed on residential customers' homes and half will be deployed at commercial customers' businesses. These systems will be installed by September 2021.

We have mandated that at least 5% of program volume be installed in sensitive communities as defined below. This is approximately in-line with San Mateo County's proportion of sensitive communities relative to our total county population. For the purposes of this RFP, we defined sensitive community as follows: census tracts in the top 25% of scoring on the CalEnviroScreen 3.0 tool; census tracts with median incomes at or below 80% of the median income for San Mateo County; and census tracts with median household incomes at or below the threshold designated as low income by the Department of Housing and Community Development's list of state income limits pursuant to Health and Safety Code Section 50093.

As we are only purchasing RA under this program, the budget mostly revolves around associated RA costs. The high volume of expected new energy systems for this program requires a high budget. Outreach, program administration, and RA procurement amount to \$1,820,000 for this program over three years. However, this will decrease the amount of RA that will need to be purchased from fossil fuel sources and which is already accounted for in Peninsula Clean Energy's budget.

(e) Future projects and programs

There are several other community-scale solutions that could realistically provide energy resiliency benefits to San Mateo County over the coming years. We have budgeted \$2,740,000 for these future programs in later years of the strategy. Peninsula Clean Energy will continue to refine and evaluate these opportunities.

1. California Energy Commission (CEC) grant opportunities: The CEC often deploys grant funding to test and deploy new technologies and business models. In the near-term there is a grant opportunity for demonstrating the use of long-duration (greater than 10 hours), non-Lithium energy storage to assist with critical operations in

disadvantaged or low-income communities that Peninsula Clean Energy is evaluating.

2. **Community-Scale Microgrid Projects:** Community-scale microgrids connect multiple adjacent facilities with solar and storage that can island from the electricity grid in the case of a power outage. Peninsula Advanced Energy Communities was a CEC-funded project led by the Clean Coalition to identify opportunities for community-scale microgrids in San Mateo County. Peninsula Clean Energy participated in the second phase grant opportunity in 2018 with a match commitment. While we were not awarded, we can build on the analysis and research completed for this effort to deploy microgrids in San Mateo County.
3. **Backup power at direct current fast charging (DCFC) electric vehicle (EV) chargers:** Power outages exacerbate range-anxiety concerns among current and potential EV drivers by limiting charging options in affected areas. Deploying DCFC stations with energy storage could provide additional confidence to EV drivers that they can charge their EVs in the event of power outages. Priority can be given to sites located in high fire threat districts. Outside of power outages, the localized energy storage can help Peninsula Clean Energy shape load on the grid. The system can prioritize charging the battery during midday and discharging during evening hours, reducing the load during the highest demand and more expensive evening hours. Additionally, due to the high power draw from these charging stations, storage will help to reduce the demand charges the owners of these chargers will see.
4. **EVs as backup power:** EVs require powerful batteries and therefore represent an energy asset that can act as a virtual power plant, charging their batteries with renewable energy during the daytime, and discharging their batteries to the grid when there is high demand during evening hours. Additionally, these fleets can provide backup power by reserving a portion of their overall capacity in the event of a power outage. Nissan is currently using their EV Leaf in this way in Japan. In the U.S., there are some limits around using EVs in this way due to limitations in warranties. However, we expect this to change over time as “V2Home” (Vehicle to Home) programs started being implemented by the car companies and/or other third-party suppliers.
5. **Electric buses for backup power:** Buses for schools and public transit stand to benefit from statewide electrification incentives, and San Mateo County’s bus system, SamTrans, expects to electrify its fleet of 300+ buses between 2020-2030. These long-range EVs can potentially serve as mobile power stations that provide backup power during prolonged grid outages.
6. **Solar and storage systems for MUDs:** We will leverage lessons learned in deploying solar and storage at MUDs for medically threatened customers to expand this program to other customer classes. In this program, we will work with vendors who have existing relationships with MUD businesses and affordable housing agencies.

7. Residential solar retrofits: A significant volume of solar energy is already deployed in San Mateo County. However, most of that solar is stand-alone, without an energy storage device to shift the solar output to the evening hours and without the ability to island from the grid in the event of a power outage. Peninsula Clean Energy can incentivize the rollout of battery storage to couple with existing solar installations. This will provide customers the benefit of backup power with a battery and can also help them manage time-of-use (TOU) rates by reducing the amount of electricity they draw from the grid during expensive evening hours.

4. Budget

Peninsula Clean Energy is budgeting up to \$10MM over three years to launch and implement the programs described above. Table 7 below provides a summary of the budget by program area. Table 8 provides a budget summary by cost area.

This is a high-level summary of the expected expenditures. Any actual budget commitments would need to be approved by Peninsula Clean Energy’s Board in accordance with our policies. For Fiscal Year 2020 (FY2020), the budget will be allocated from a portion of the Programs budget, which is not expected to be used during the current fiscal year. In future fiscal years, these programs will follow Peninsula Clean Energy’s normal budgeting process and are expected to be allocated to the cost areas indicated in Table 8. For some budget areas, such as Power Procurement, the budget does not change, but the technologies utilized for procuring different resources as described in this document, are changed. Similarly, budgets planned for Program Administration and Marketing and Outreach may not change significantly, but rather be allocated to reflect this emphasis on these programs. In all cases, more details for funding for each particular program will be brought to the board for approval as they are launched.

In developing programs to support energy resiliency, Peninsula Clean Energy will leverage third party funding in addition to Peninsula Clean Energy’s funds. The Appendix identifies third party funding sources that we have currently identified. As we develop and refine programs, we will continue to work to identify funding sources that can be leveraged for these efforts.

Table 7: Budget Summary by Program

	FY-2020	FY-2021	FY-2022	Totals
Medically Fragile Customers	\$ 500,000	\$ 1,010,000	\$ 1,040,000	\$ 2,550,000
Municipal CRCs	\$ 150,000	\$ 1,150,000	\$ 1,240,000	\$ 2,540,000
Distributed Resource Adequacy	\$ 120,000	\$ 900,000	\$ 800,000	\$ 1,820,000
Critical Infrastructure Programs		\$ 200,000	\$ 300,000	\$ 500,000
Customer Education	\$ 30,000	\$ 50,000	\$ 30,000	\$ 110,000
Future Programs		\$ 860,000	\$ 1,880,000	\$ 2,740,000
FY Totals	\$ 800,000	\$ 4,170,000	\$ 5,290,000	\$ 10,260,000

Table 8: Budget Summary by Cost Type

	FY-2020	FY-2021	FY-2022	Totals
Marketing and Outreach	\$ 380,000	\$ 400,000	\$ 330,000	\$ 1,110,000
Program Administration	\$ 420,000	\$ 750,000	\$ 700,000	\$ 1,870,000
Power Procurement	\$ -	\$ 2,160,000	\$ 2,380,000	\$ 4,540,000
Other	\$ -	\$ 860,000	\$ 1,880,000	\$ 2,740,000
FY Totals	\$ 800,000	\$ 4,170,000	\$ 5,290,000	\$ 10,260,000

V. Implementation

As part of the implementation of these programs, we have developed preliminary plans for outreach and education. Additionally, we are working in the regulatory and legislative areas to identify barriers to deployment of distributed solutions for resiliency and will provide lessons learned through the deployment of the programs identified above to regulators and legislators to facilitate the expansion of these types of systems.

1. Outreach and Education

An important aspect of deploying any program is ensuring that customers are aware of the program and its benefits. A portion of this outreach and communication will be conducted by Peninsula Clean Energy through direct outreach to customers. Additionally, we will partner with community organizations that have strong ties to targeted customer segments.

(a) Potential Outreach and Community Engagement Partners

As part of Peninsula Clean Energy’s plans to outfit our customers with resilient energy systems, we recognize that communication with some customers will be more effective coming from established and familiar community partners. With these partners, we can build a coalition of support to engage parts of our customer base that are traditionally more difficult to reach. These customer segments include those the elderly, non-English speakers, those with physical and mental disabilities, and the medically fragile. By working with community partners, we will collect information to help us develop programs that will be most effective and have the most impact on these customers and will communicate to these customers more successfully about the availability of programs.

We have begun the process of identifying some of the stakeholders that Peninsula Clean Energy can work with to reach these populations. Each of the stakeholders can serve as an outreach partner in support of Peninsula Clean Energy’s effort to develop resilient energy solutions in San Mateo County.

Table 9 identifies some of these potential partners and the communities they serve.

Table 9: Potential Community Outreach Partners

Outreach Partner	Communities Served
San Mateo County (SMC) Health	Aging and Adult Services, California Children's Services, mental health and substance abuse communities, and emergency medical services
SMC Healthcare Coalition	Hospitals, skilled nursing facilities, home health, hospices, dialysis centers, Red Cross, ombudsman
SMC and City Fire Chiefs	Fire stations, firefighters, medically fragile customers
SMC and City Police Chiefs	Police officers
SMC Sheriff	Law enforcement stakeholders, Latino community through Community Alliance to Revitalize our Neighborhood (CARON) program
Private Healthcare Providers	Patients, medical professionals, insurance providers
Medical Equipment Providers	Healthcare providers, hospitals, patients with medical appliances
Faith Institutions	Faith communities, homeless
Coastside Seniors	Older adults, adults with disabilities, caregivers on the coast
California Foundation for Independent Living Centers	People with disabilities
Red Cross	Donors, volunteers, at-risk communities, communities in a disaster, military
SMC Office of Emergency Services	Managers of critical infrastructure
Center for Independence of Individuals with Disabilities	Residents with disabilities
Center for Accessible Technologies	Residents with disabilities, seniors
Medical Health Operation Area Coordinator (MHOAC)	24/7 point of contact for 17 different foundations; representatives from 13 health divisions and the healthcare coalition (comprised of 60+ healthcare facilities)
Emergency Managers Association (EMA)	City emergency managers, HSA, Red Cross
Community Emergency Response Team (CERT)	Community volunteers, first responders
Medical Advisory Committee	Fire joint powers authorities, Emergency Medical Services (EMS), hospitals, 911 responders

Peninsula Clean Energy may provide support to these partner organizations in various ways including expanding our outreach grant program to target the type of organizations listed above and providing financial resources for outreach. Other options may include providing educational materials, partnering to find third party sources of funding, coordinating on research projects

related to these communities, or using partner organizations' communications channels for co-marketing efforts about these programs.

As mentioned above, part of the outreach process will require information collection to develop impactful programs and appropriately target customers. Some mechanisms we can employ in order to gather information on these customers include the following:

- Field surveys for customers with and without backup generation,
- Studies to identify different populations of our customer base,
- Research to identify the impact of grid outages related to PSPS events and / or natural disasters,
- Data collection and sharing, and
- Supporting County efforts to create a database of medically vulnerable customers.

(b) Education

San Mateo County is fortunate to have a community that is interested in and highly motivated to install solutions based in clean energy. However, using clean energy solutions for energy resiliency is a relatively new use case and there are many opportunities for Peninsula Clean Energy to educate our customer base on their options and our programs. We are a central agent capable of disseminating educational resources to our customers, and we plan to leverage that position by facilitating the creation of educational assets for our customers' consumption over the next several years.

These educational materials may include such topics as:

- Clean energy technologies for energy resiliency;
- The importance of being able to "island" during a power outage;
- Duration of power outage that distributed solutions can withstand;
- Impact of distributed resources on electricity bills under different rate schedules;
- Economic feasibility of installing storage with TOU arbitrage and demand charge management;
- Comparison of the economics of clean back up power versus diesel backup;
- Environmental, health and safety issues associated with diesel backup;
- Prioritizing which appliances or equipment should be run on backup power;
- Identifying local installers who can provide for resiliency needs.

Peninsula Clean Energy plans to develop informative material related to energy resiliency generally as well as the programs we deploy. Educational efforts can drive participation in high-touch community events where we can inform the public of our energy resiliency solutions.

2. Policy Considerations

As part of this resiliency strategy, Peninsula Clean Energy will also work to identify regulatory or legislative barriers to deploying DERs for energy resiliency and identify opportunities to educate policy makers or engage in policy processes.

(a) Community-Scale Microgrids

Presently, widescale deployment of microgrids is inhibited by regulatory barriers. The rules and regulations for investor-owned utilities to interconnect systems have not kept up with emerging microgrid technologies to allow deployment of microgrids to occur in a streamlined and cost-effective fashion. Interconnection standards and technical standards to guide utility review of proposed microgrids leave too much discretion to utility engineers who often request onerous system upgrades based on worst-case scenario analysis. Moreover, business models for microgrids are only now emerging after years of effort at the state level to define microgrids and support their deployment through grant funding.

However, this is starting to change with the passage of SB 1339 (Stern) in 2018, which requires the CPUC to remove barriers to microgrid development and facilitate the deployment of microgrids in the state by December 31, 2020. Peninsula Clean Energy supported this legislation as an avenue to foster innovation in the energy sector consistent with Board policies.

On September 12, 2019, the CPUC launched Rulemaking 19-09-009 to begin implementation of SB 1339. Peninsula Clean Energy has extensive contacts with stakeholders in the microgrid sector. Accordingly, we have taken a lead role in coordinating CCA activity in the docket including through the filing of joint CCA opening and reply comments on the scope and schedule for the docket. Our comments focus on near term efforts to be undertaken in early 2020 to facilitate the deployment of microgrids in advance of the 2020 wildfire season. A workshop was held on December 12, 2019 to identify these near-term activities. Redwood Coast Energy Authority and EBCE presented on CCA microgrid efforts and provided recommendations to stakeholders on rules and regulations that need to change to allow customer-operated microgrids to flourish. PG&E presented a proposal to provide resiliency to communities by identifying “safe circuits” which can remain energized during a PSPS event. We are engaging with PG&E to explore a partnership to develop “circuit-level” programs. Peninsula Clean Energy will continue to lead CCA efforts in this docket to ensure CCAs have a clear and positive role in facilitating deployment of microgrids in their communities.

If this docket stays on track, the programs developed by Peninsula Clean Energy will be able to take advantage of the streamlined processes authorized in the docket to accelerate deployment of microgrids in our service territory.

Additionally, it is anticipated that legislative efforts may occur in the 2020 legislative session to further support the deployment of microgrids including funding support from the state budget, greenhouse gas funds, or bonding authority. However, this is still at the very early stages and Peninsula Clean Energy is actively engaging with the relevant committees and stakeholders in the Capitol to work on the topic during the coming 2020 session by holding in-person meetings with key legislators and their staff and meeting with other stakeholders.

(b) Resource Adequacy

Unlocking new value streams for DERs is a way that CCAs can promote the proliferation of clean, distributed technologies. A potential value stream that Peninsula Clean Energy is helping to better define is RA. RA is a reliability product that Peninsula Clean Energy is required to purchase to maintain grid reliability. DERs are currently eligible to provide RA through the PDR mechanism. However, only a small amount of RA has been provided through this mechanism due to complexities around how RA is measured and how resources can count toward an LSE’s RA obligation.

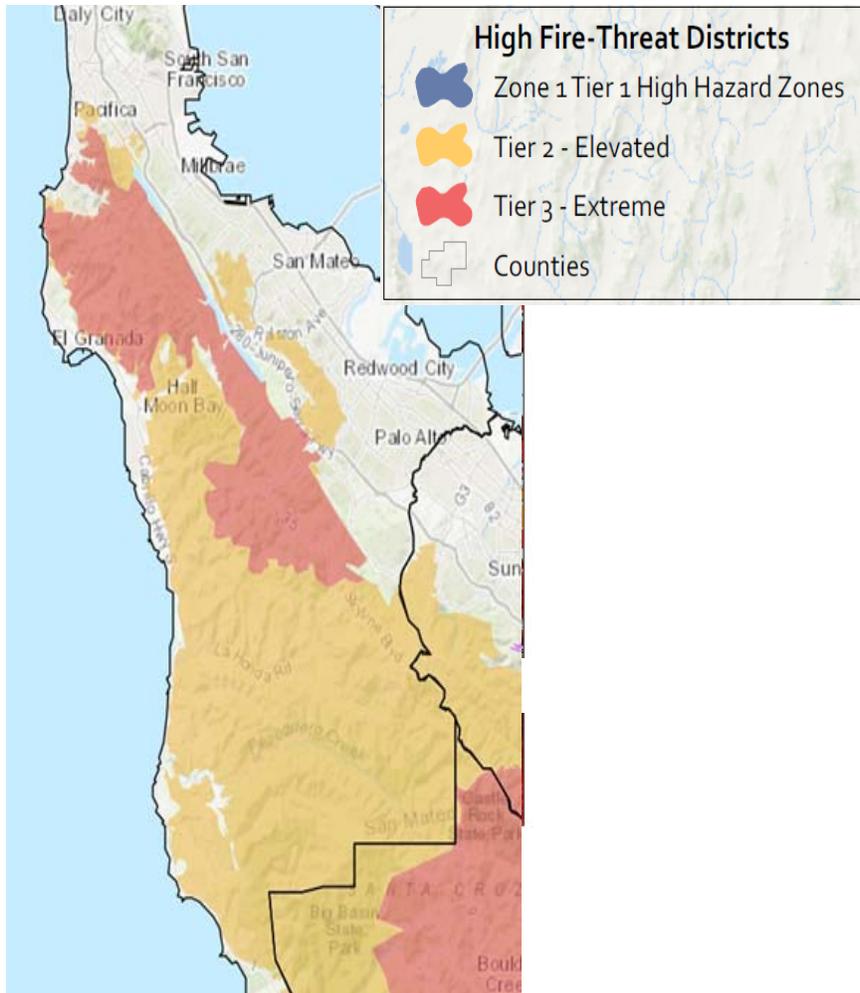
Over the past two years, Peninsula Clean Energy has been very active in Rulemaking 17-09-020, which addressed various topics concerning resource adequacy. On November 13, 2019, the Commission released its latest rulemaking (R.19-11-009) concerning the resource adequacy program to continue refinement and review of the program. On November 26, 2019, the CPUC issued a proposed decision on how to count hybrid (solar + storage) resources for RA purposes under the R.17-09-020. This decision declined to address the question of counting these types of systems for behind the meter resources and indicated this would be more fully addressed in the successor RA proceeding – R.19-11-009. We will continue to take an active role in this proceeding to ensure the RA rules are designed to allow CCAs to fully count local resources towards RA requirements.

Additionally, in July 2019, the California Independent System Operator (CAISO) issued a white paper regarding how it proposes to account for hybrid resources. Peninsula Clean Energy has been coordinating with other CCAs to engage in this stakeholder process, which is expected to conclude in Q2 2020.

VI. Appendix

1. Hazard Maps¹¹

Figure 10: High Fire Threat Districts



¹¹ Figure 10: <https://www.cpuc.ca.gov/FireThreatMaps/>; Figures 11 and 12: <https://planning.smcgov.org/documents/san-mateo-county-hazards-earthquake-liquefaction-shaking/>; Figure 13: <https://seachangesmc.org/vulnerability-assessment/>

Figure 11: Earthquake Liquefaction and Landslide Risk

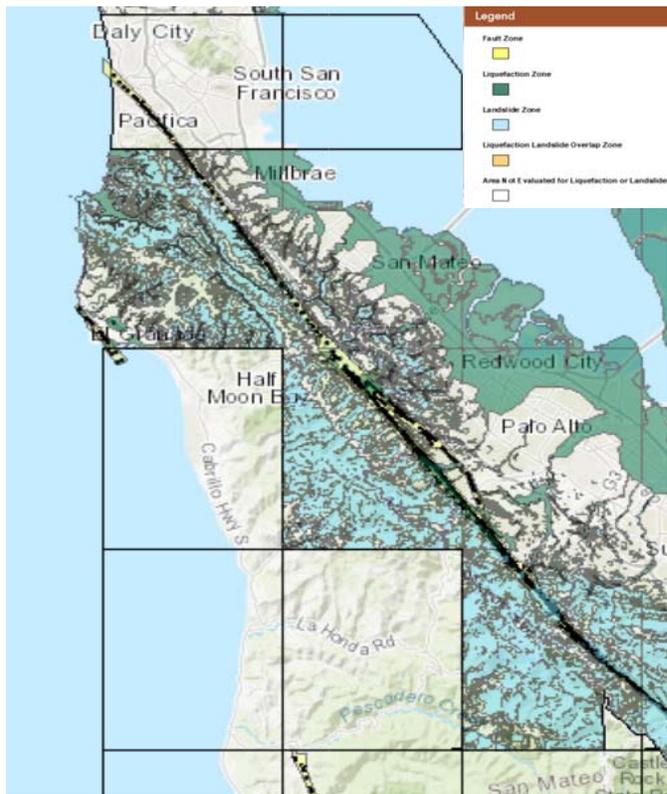


Figure 12: Earthquake Shaking Risk

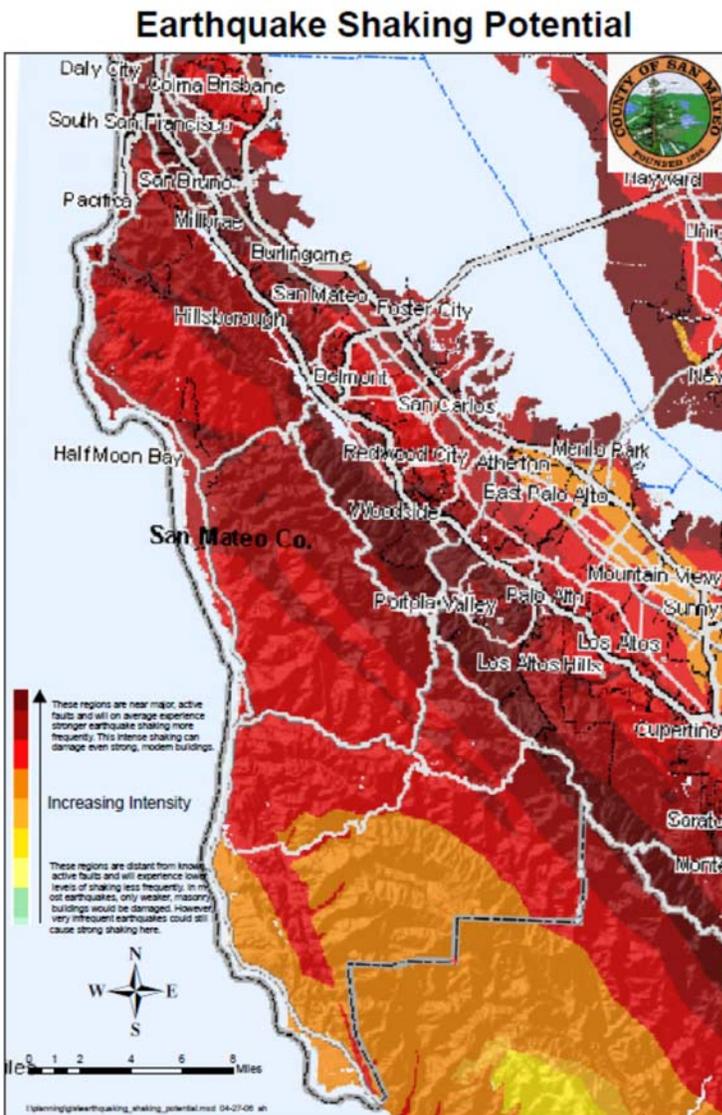
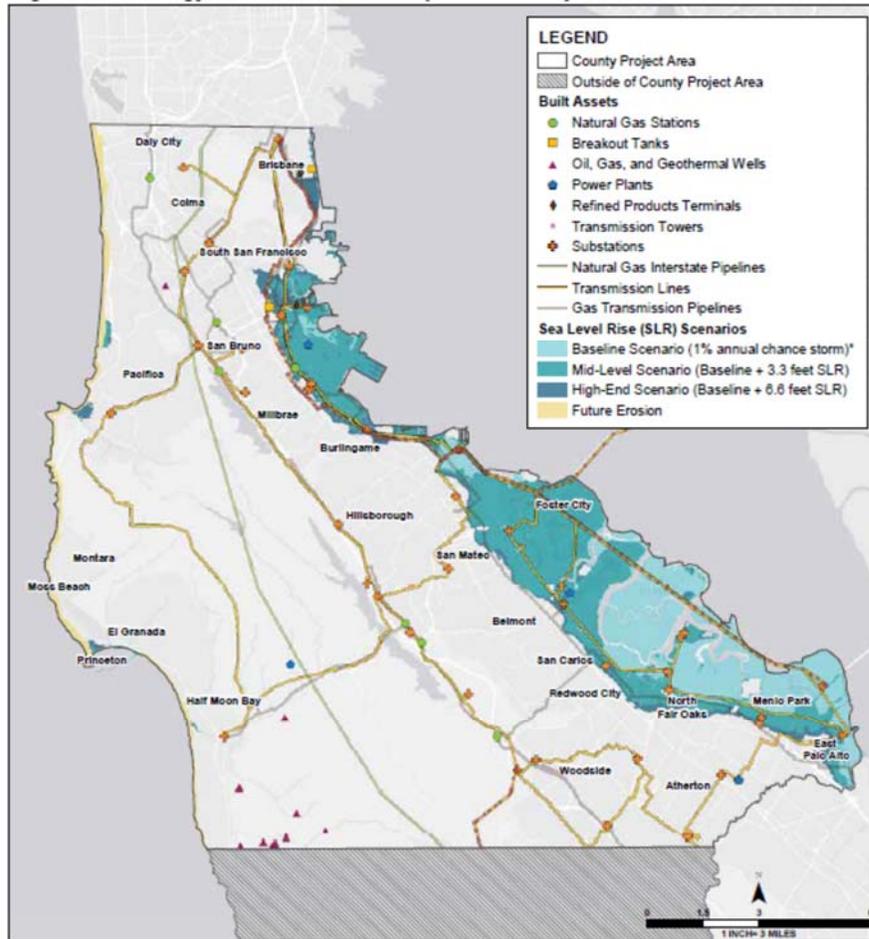


Figure 13: Sea Level Rise Risk and Energy Infrastructure

Figure 38.9 Energy Infrastructure and Pipelines in Project Area



Data source: National Pipeline Mapping System 2015; California Energy Commission 2015; California Energy Commission 2014; County of San Mateo 2015; Federal Communications Commission 2010; Wireless Telecommunications Bureau 2010

This map is intended to improve sea level rise awareness and preparedness by providing a regional-scale illustration of inundation and coastal flooding due to specific sea level rise and storm surge scenarios. This map is not detailed to the parcel-scale and should not be used for navigation, permitting, regulatory, or other legal uses.

*1% annual chance storm is a storm that has a 1 in 100 chance of occurring in any given year, and on the Bayside generally results in about a 42 inch increase of total water levels. On the Coastside, the water level increase could be greater due to wave action.

Note on erosion modeling: Erosion modeling used in this study does not consider shoreline armoring due to a lack of information on the condition and life expectancy of existing structures. The 2009 Philip Williams and Associates study recognizes that future shoreline protection is likely in general but could not predict where and how these would appear. In this case, developing predictive erosional models is impractical and exceedingly difficult.

2. Definition of Metrics

Avoidance of power outage costs to cities: Cities incur cost during power outages due to a range of factors, including additional or overtime personnel, damaged infrastructure, and added stress on medical facilities. By reducing the impact of power outages, our programs can reduce these costs, and we will endeavor to track those reductions.

Avoidance of disruption to critical infrastructure: Critical infrastructure, such as emergency response centers, hospitals, and water pump stations, need to operate even during times of power outages. Their continued operation is a vital need to the function of our society, and our energy resiliency solutions can help to reduce operational disruption.

Cost of deployment to Peninsula Clean Energy: Measure the cost of new programs in comparison to the benefits to Peninsula Clean Energy and our customers.

Number of customers directly impacted: Customers who receive a tangible and direct benefit from program participation, such as new microgrids on their homes.

Number of customers indirectly impacted: Customers who have access to new services, through Peninsula Clean Energy's program, including critical infrastructure remains operable or a Community Resiliency Center within walking distance.

Number of medically threatened customers directly impacted: Medically threatened customers with new energy system deployed at their house.

Number of medically threatened customers indirectly impacted: Medically threatened customers with access to services during a power outage including a Community Resiliency Center within walking distance.

Number of customers in sensitive communities directly impacted: Customers in sensitive communities with new energy system deployed at their house.

Number of customers in sensitive communities indirectly impacted: Customers in sensitive communities with access to services during a power outage including a Community Resiliency Center within walking distance.

Air quality improvements: Track emissions reductions due to replacing diesel generators with cleaner solutions. Emissions from diesel generators includes particulate matter that includes "numerous organic compounds, including over 40 known cancer-causing organic substances. Examples of these chemicals include polycyclic aromatic hydrocarbons, benzene, formaldehyde, acetaldehyde, acrolein, and 1,3-butadiene."¹²

¹² "Overview: Diesel Exhaust & Health":
<https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health>

Impact on goal to be 100% renewable on a time-coincident basis by 2025: New energy clean systems that address customers' backup power needs may be able to help Peninsula Clean Energy reach this goal when they are not used to mitigate the impacts of power outages by producing renewable energy to charge energy storage during the day, and discharging renewable energy from the energy storage in other hours.

Reduction in GHG emissions: Track GHG emissions reductions due to replacing diesel generators with cleaner solutions.

Scale of Deployment (MW or MWh): Volume of new systems deployed.

3. Additional Funding Sources

In developing programs to support energy resiliency, Peninsula Clean Energy will leverage third party funding in addition to Peninsula Clean Energy’s funds. Table 10 below identifies funding sources that we have currently identified. As we develop and refine programs, we will continue to work to identify funding sources that can be leveraged for these efforts.

Table 10: Third Party Funding Sources

Governing Body	Source	Funding Amount	Purpose
BAAQMD	Climate Tech Finance Budget	TBD	Direct loans to public agencies or loan guarantees to small businesses for emerging or early stage technologies that reduce GHG emissions – has expressed interest in funding resiliency solutions
California Alternative Energy and Advances Transportation Financing Authority (CAEATFA)	Small Business Financing Program (SBF)	\$10,000 - \$5M per project	Innovative and effective financing solutions to assist in reducing the state’s greenhouse gas emissions. SBF program helps small businesses access attractive financing terms for energy efficiency retrofits by extending a credit enhancement to finance companies, which helps them mitigate risk.
CEC	Energy Storage Demonstration Grant	\$20 MM	Demonstrate long-duration (10h+), non-Lithium energy storage technologies
CPUC	SGIP Equity Budget	\$830 MM	Incentives for new energy systems for vulnerable households located in Tier 2 and Tier 3 HFTDs, critical facilities serving those districts, and customers located in those districts that have participated in low-income solar programs. Economic and workforce development to DACs, gas generation reduction in DACs.
CPUC	SGIP Critical Resiliency Needs Budget	\$471 MM	Energy storage for residential customers in T2 / T3 HFTDs who are also eligible for the equity budget, Medical Baseline, or have a life-threatening condition if electricity is disconnected.
PG&E	TBD	TBD	Governor Newsom has called for PG&E to compensate communities affected by PSPS events. Cities are currently undergoing the cost accounting related to these efforts, and as such, PG&E might be required to provide funding for energy resiliency programs in the future.
State of California	CA General Fund appropriation	\$75 MM	Securing equipment, fuel storage, backup energy for critical facilities, communications equipment, developing and conducting plans for PSPS preparation, risk assessment, public access resource centers.

4. Acronyms

Acronym	Definition
BAAQMD	Bay Area Air Quality Management District
CAC	Citizens Advisory Committee
CAISO	California Independent System Operator
CalEnviroScreen (CES)	California Communities Environmental Health Screening Tool
CalEPA	California Environmental Protection Agency
CARE	California Alternate Rates for Energy
CARON	Community Alliance to Revitalize our Neighborhood
CCA	Community Choice Aggregator
CEC	California Energy Commission
CERT	Community Emergency Response Team
CES	California Communities Environmental Health Screening Tool
CPUC	California Public Utilities Commission
CRC	Community Resource Center
CVI	Community Vulnerability Index
DAC	Disadvantaged Community
DCFC	Direct Current Fast Charging
DERs	Distributed Energy Resources
EBCE	East Bay Community Energy
EMA	Emergency Managers Association
EMS	Emergency Management Services
EV	Electric Vehicle
FERA	Family Electric Rate Assistance
FY	Fiscal Year
GHG	Greenhouse Gas
HFTDs	High Fire Threat Districts
HPWH	Heat Pump Water Heater
kW	Kilowatt
kWh	Kilowatt-hour
LSE	Load-Serving Entity
LVADs	Left Ventricular Assist Devices
MHOAC	Medical Health Operation Area Coordinator
MUDs	Multi-Unit Dwellings
MW	Megawatt
MWh	Megawatt-hour
NEM	Net Energy Metering
PDR	Proxy Demand Response
PG&E	Pacific Gas and Electric Company
PPA	Power Purchase Agreement

PSPS	Public Safety Power Shutoff
PV	Photovoltaic
RA	Resource Adequacy
RFI	Request for Information
RFP	Request for Proposals
SGIP	Self-Generator Incentive Program
SMC	San Mateo County
SVCE	Silicon Valley Community Energy
SVP	Silicon Valley Power
T2 / T3 HFTD	Tier 2 / Tier 3 High Fire Threat District
TOU	Time-of-Use