Sonoma Clean Power

2018 Integrated Resource Plan

Approved October 4, 2018

Contents

Executive Summary

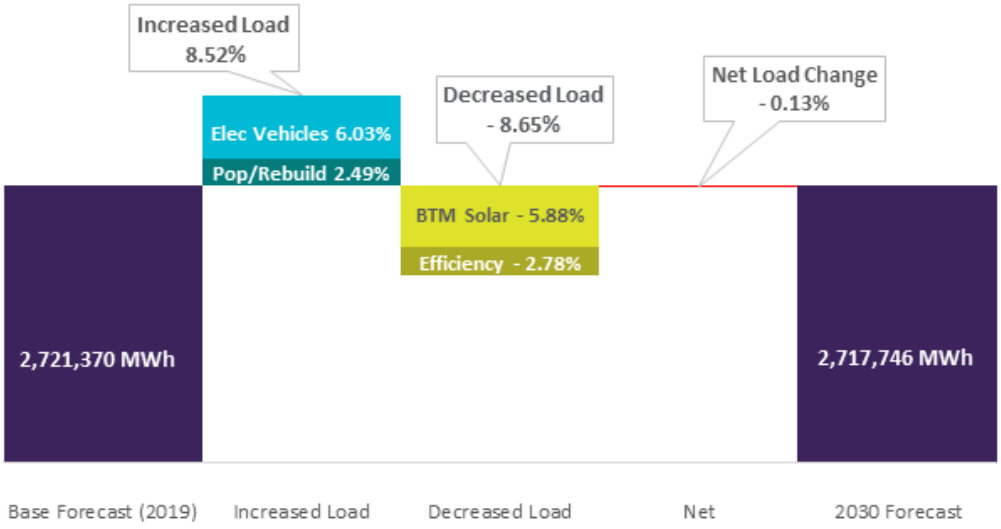
Sonoma Clean Power Authority (SCP) is a public power provider operating as a community choice aggregator (CCA) and the default electricity provider for Sonoma and Mendocino Counties. SCP exists to provide broad public benefits relating to affordability, reliability, climate change and sustainability, coordination with local agencies, customer programs, and to support the local economy.

This Integrated Resource Plan (IRP) identifies the necessary resources to serve customer needs through 2030. It differs from the IRP requested by the California Public Utilities Commission (CPUC) under D.18-02-018 in that it contains SCP's best available information on actual load and generation, and important information about SCP's goals and vision. SCP's Board of Directors has directed staff to file the CPUC's mandated compliance IRP (see Exhibit A), however the Board requests that all statewide planning be based on the more accurate information contained in *this* IRP. More detail on the differences can be found in Exhibit A. Many thanks to SCP's Community Advisory Committee and its ad hoc group for working with staff on early versions of the IRP.

Important conclusions from SCP's planning process include:

1. While a low-carbon mix of power sources is essential, the use of electricity to displace gasoline in cars and natural gas in buildings (sometimes called "electrification" or "fuel shifting") should be prioritized at an even higher level in California. SCP is working to facilitate the reduction of total greenhouse gas (GHG) emissions across all sectors, for example with programs to rebuild burned homes with 24/7 renewable sources and no natural gas, bulk discounts on electric vehicles, and construction of an "Energy Store" where customers can purchase zero carbon technologies.
2. Near-term grid reliability will require multi-year local resource adequacy (RA) obligations and upfront procurement of resources with local market power.
3. Energy affordability through 2030 will require deep customer engagement to reduce expensive and high-GHG evening energy usage, and to use smart-grid devices to avoid costly utility investments.
4. Concerns over the financial ability of CCAs to contract for new resources appears to be unfounded, and in any case, hasn't impacted SCP's ability to procure resources.
5. CCAs working with their local public agencies have the potential to add low-cost and high-value electric vehicle charging infrastructure to supplement Investor-Owned Utility (IOU) activities. Local agencies have detailed maps of locational needs, including disadvantaged community access sites, and some have developed maps of excess grid capacity that have the potential to avoid significant grid upgrade costs.
6. Solutions to system reliability will accelerate dramatically when actual smart meter data is used for all customers and public access is provided to all real-time distribution grid data.
7. As illustrated by Figure 1, SCP's load is expected to remain relatively stable through the planning horizon with a 0.13% decrease in load. Moving from left to right, the 2019 "Base" year forecast load increases by 2.49% from population and rebuilding and by 6.03% from electric vehicles. This increase in forecast load is offset by a projected decrease in load of 2.78% from energy efficiency and 5.88% from Behind-the-Meter (BTM) solar. The total net decrease in load from the "Base" year to 2030 is 0.13%.

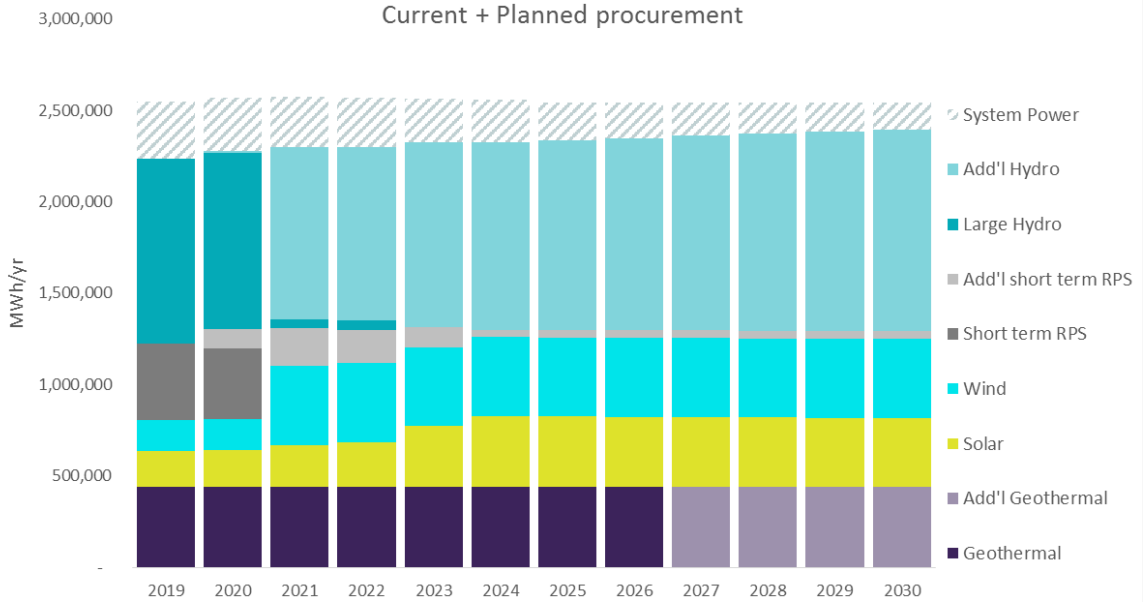
Figure 1
2030 Forecast MWh



8. SCP's peak load is expected in September and is forecast to decline slightly from 580 MW in 2017 to 558 MW in 2030 and is forecasted to shift further into the evening, as electric vehicles are returning to residences to be charged.

9. SCP is on track to reach its own ambitious greenhouse gas emissions intensity target of 75 lbs CO_2/MWh (0.034 MT CO_2/MWh) by 2030. SCP is also on track to reach its own target of 50% qualifying renewable sources by 2020, approximately six years ahead of California's new requirements (per SB 100, approved 9/10/2018). In 2017, SCP's estimated emissions (not yet third-party verified) totaled 128 lbs CO_2/MWh (0.06 MT CO_2/MWh), and SCP's qualifying renewable sources totaled 45%. Figure 2 shows SCP's current resources (i.e., resources under contract or in active negotiation) as well as SCP's planned resources (i.e., additional resources that SCP plans to procure through 2030).

Figure 2
Current + Planned procurement



CCAs are rapidly establishing themselves as renewable energy providers, sources for cutting edge programs in carbon reduction and sustainability, and trusted local community partners across California. SCP plays an important role in the governance of the statewide CCA association, CalCCA. SCP's CEO currently serves as the Legislative Liaison and Vice President of the organization, and SCP's regulatory, compliance, marketing, customer service and power services staff serve on key committees. CalCCA is playing a key role in sharing best practices, educating lawmakers about this new form of public power and encouraging new CCAs to better manage risks and evolve quickly.

1. Introduction to Sonoma Clean Power

A. Purpose

The Sonoma Clean Power Authority (SCP) is a public agency created in 2012 to provide broad public benefits in energy, climate and the economy. As a Community Choice Aggregator or "CCA," it provides public benefit investments and programs, and is the default electricity provider to customers in Sonoma and Mendocino Counties in California. SCP was created to provide customers with stable, affordable rates while working to solve the climate crisis. SCP's goals are defined in its Joint Powers Agreement (JPA) and include:

1. *Rate stability and affordability*. SCP seeks to reduce the volatility of customer electric bills through conservative contracting (i.e., managed risk), diverse portfolios of sources and suppliers, and rate-setting practices to reduce the frequency and magnitude of large swings in customer costs. SCP seeks improved affordability through competitive supply negotiations, accurate load forecasting and scheduling, low overhead costs, and through advocacy at California's regulatory agencies.

2. *Accelerate Climate Solutions*. SCP seeks to use its staff, finances, Board and Community Advisory Committee, and its close relationships with local public agencies to create rapid solutions to climate change in all sectors. This means that while SCP is not primarily responsible for greenhouse gas emissions in transportation and land use, for example, it still has an obligation to aid those sectors whenever it has the capacity to do so.

3. *Coordination with Local Agencies*. SCP coordinates its work on climate change with the Regional Climate Protection Authority, local transportation agencies, water agencies, open space districts and each of our member cities, town and counties. It is unreasonable to expect an Investor-Owned Utility (IOU) to interact so closely with every local public agency, but such coordination of the energy impacts of land use planning or the locational value of electric vehicle charging for low-income customers is critical.

4. *Customer Programs*. SCP seeks to support and supplement the existing customer programs offered by local agencies and Pacific Gas & Electric (PG&E) by delivering forward-thinking programs that are not allowed under California Public Utilities Commission (CPUC) rules (e.g., fuel substitution) or are not appropriate for an IOU to deliver (e.g., short duration, experimental, fast-paced, or targeted to specific neighborhoods or industry).

5. *Local Investment*. SCP seeks to invest in local electric sources and reliability services, use local professional services, donate to local charities and generally seeks to invest its reserves in local funds and banks.

B. Service

SCP began serving customers in May 2014 and in September 2018 serves a population of about 525,000 people with 224,000 electric accounts across Sonoma and Mendocino counties. In aggregate, 86% of SCP's accounts are residential, accounting for approximately 50% of its load.

Community Programs

As part of its mission to reduce greenhouse gas (GHG) emissions across all sectors and supply electricity to Sonoma and Mendocino counties, SCP offers programs related to clean transportation and energy efficiency. Near-term, short-term and long-term program goals are defined in a Strategic Action Plan that is regularly updated, and is included in this document as Exhibit B. Load impacts and accomplishments of these customer programs are described in Chapter 7.

Community Engagement

The creation of SCP was spearheaded by local community groups, local government, environmental activists, local labor and businesses. As a result, SCP is closely connected with its community. SCP participates in more than 100 public events in its territory each year, sponsors numerous non-profits, and many SCP employees serve on local boards and committees. SCP also engages in a leadership role in the community where appropriate, such as responding to local needs following the 2017 firestorm.

Immediately following the October 2017 fires, SCP lent staff to the County of Sonoma to manage the protection of creeks and watersheds and committed $1 million to relief efforts. More importantly, however, SCP began hosting a conversation among fire survivors, developers, city and county staff, and other stakeholders about how to rebuild homes to be more energy efficient, more affordable, and climate smart. Out of that dialog, the Advanced Energy Rebuild program was born.

For the Advanced Energy Rebuild, SCP recruited PG&E and Bay Area Air Quality Management District (BAAQMD) to partner on a joint program to incentivize rebuilding homes with deep energy efficiency, EV charging, onsite renewable energy with storage, and bonuses for building all-electric with no natural gas connection. A rebuilt home that doesn't use any natural gas can earn up to $17,500 in incentives.

SCP is also demonstrating how the "community solar" option in the 2020 Title 24 code could be expanded for the 2022 Title 24 update. The proposed code improvement will be tested in the Advanced Energy Rebuild and will allow two refinements: (1) a clarification that the intent was to promote local RPS-eligible renewables and not solar alone; and (2) a recognition of the growing importance of connecting real-time supply and real-time load with storage or baseload renewable supply from local sources, such as SCP's EverGreen option. Customers are able to pre-purchase a 20-year commitment to local, renewable 24/7 energy.

Customer Supply Options

SCP offers its customers two supply options. The default service is *CleanStart*, which provided customers in 2017 with 45% renewable power and an additional 42% from large hydro. SCP's 100% renewable option is *EverGreen*, currently priced at a premium of 2.5 cents per kWh, coming from qualifying renewable sources located entirely inside SCP's territory and designed to closely match the real-time profile of customer demand. SCP also offers *NetGreen*, a net energy metering program which allows customers to offset their consumption of SCP-supplied power (whether *CleanStart* or *EverGreen*) with customer-owned renewable energy.

SCP customers have the choice to opt out of SCP's default service and buy energy from PG&E. As of June 30, 2018, SCP serves 87% of eligible customers. All SCP customers remain PG&E transmission and distribution customers. While SCP provides energy generation, customer programs and customer service, it does not deliver or meter the physical power, nor does it distribute customer bills. PG&E is the

only option for delivery and metering, and SCP partners with PG&E for billing services. All of SCP's customers receive one consolidated bill from PG&E that includes both the SCP generation charges and PG&E's delivery charges. PG&E also charges SCP customers for their share of the above-market procurement costs incurred by PG&E while such customers were bundled PG&E customers. This charge, called the "Power Charge Indifference Adjustment," is required by California law to ensure that neither bundled utility customers nor CCA customers are financially harmed by the existence of community choice programs.

Customer Service

SCP has a Customer Service team devoted to helping its customers, which include residential, commercial, industrial and agricultural accounts. The Customer Service team's primary operational capabilities are:

- Navigating and interpreting billing issues with both in-house and through a local third-party call center
- Industry-specific engagements, such as the Economic Development Board, Farm Bureau, Winegrape Commission, etc.
- Facilitating SCP program participation: DriveEV, Demand Charge Reduction Program, Technical Assistance and Auditing Program, DIY Toolkits, etc.
- Interfacing directly with the California Public Utilities Commission (CPUC) and PG&E on a range of co-ventures (Time-of-Use Pilot Program, Residential Rate Reform, CCA/PG&E Joint Rate Mailers, etc.).

C. Governance

SCP is a joint powers authority governed by an eleven-member Board of Directors consisting of officials appointed by its members from the Counties Mendocino and Sonoma, the Cities of Cloverdale, Cotati, Fort Bragg, Petaluma, Point Arena, Rohnert Park, Santa Rosa, Sebastopol, Sonoma, Willits, and the Town of Windsor. The Board of Directors oversees a Community Advisory Committee to review important decisions and provide advice to the Board.

CCAs are variously referred to as a "Community Choice Aggregator," a "Retail Electric Provider," and a "Load Serving Entity (LSE)" under California law. CCAs were made possible by the adoption in 2002 of Assembly Bill 117, as one of the State's efforts to insert more public oversight over energy markets and reduce risk following the energy crisis.

The purpose, structure and rules of SCP were initially developed between 2010 and 2013 by a Stakeholder Committee of representatives from local governments, labor, environmental groups, businesses and taxpayer and ratepayer advocates, and which were ultimately codified in the Joint Powers Agreement (JPA) that formed SCP. Since formation, the Board of Directors has updated the JPA and adopted policies to manage risk, increase transparency, provide for customer rights, adopt personnel rules, set internal procurement authorities and govern other business matters.

D. Territory

SCP provides service to nearly all of Sonoma and Mendocino Counties, excluding only the incorporated cities of Healdsburg and Ukiah, which are served by municipal utility districts.

Sonoma County is known for its wine, dairy products, hops, apples and beautiful coastline and countryside. Major industries include tourism, agriculture, ranching, healthcare and medical devices, technology and education. SCP began serving Sonoma County in 2014.

Mendocino County is known for its rugged coastline and redwood forests. Economic activity is driven by agricultural products, forest products, fishing and tourism. SCP began serving Mendocino County in June 2017.

2. Rethinking Integrated Resource Planning

In February 2018 (D.18-02-018), the CPUC directed LSEs to share (by August 1, 2018) "Integrated Resource Plans," consisting of specific data and based on CPUC-required templates. To comply with this requirement, SCP staff completed the CPUC-required templates, obtained approval from SCP's Board of Directors on July 12, 2018 and submitted the IRP compliance filing in July 2018 (see Exhibit A for a full copy of the submission). However, in addition to complying with CPUC requirements, SCP has developed *its own internal* Integrated Resource Plan, which is believed to better reflect SCP's actual projected load and resources, and includes important information about SCP's vision and values (see Exhibit A, Table 3 for more detail). As a result, this IRP serves two purposes:

- Provides SCP's most accurate information to be used in statewide planning; and
- Identifies additional IRP responsibilities necessary to maintain energy affordability and reliability while meeting the State's climate goals.

A. Responsibility Beyond Supply and Demand

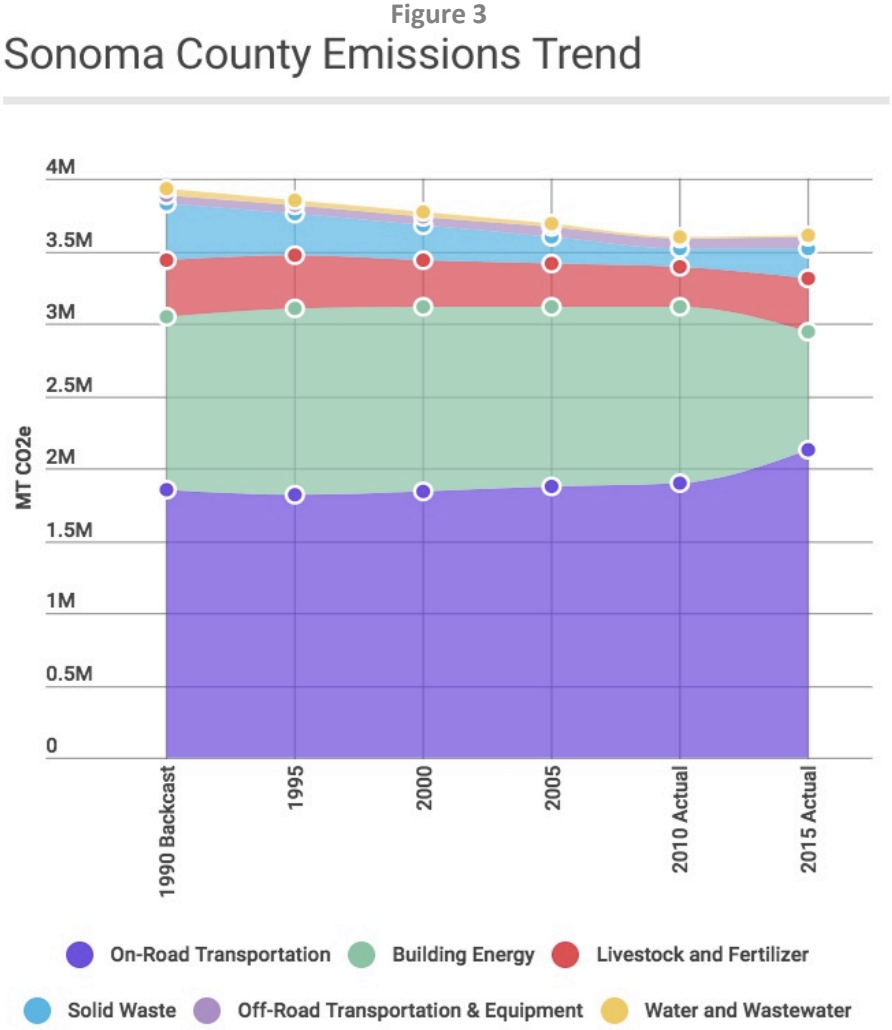
Historically, integrated resource planning has been based on forecasting customer demand as modified by assumed efficiency program impacts and then ensuring sufficient supply resources to meet that demand. More recently, integrated resource planning has incorporated efforts to increase the use of renewable sources and decrease GHG emissions. In the last few years, an effort has begun to plan for "renewable integration," the work necessary to ensure grid reliability as more of California's energy comes from solar and wind resources.

While these planning steps are necessary, they fail to ensure that California's climate goals are met. California's current planning process seeks to provide affordable, reliable, low-carbon electricity, but it doesn't go far enough in examining the responsibility of the electric power sector to maintain affordability while also displacing other energy sources like gasoline. It also largely ignores the importance of customer participation in grid reliability measures. The result is that most projections of our energy future fall short of the necessary goals, as articulated in Senate Bill (SB) 350 (De León 2015) and Assembly Bill (AB) 32 (Núñez/Pavley 2006):

> By 2030, reduce GHG emissions to 40 percent below 1990 levels
>
> By 2050, reduce GHG emissions to 80 percent below 1990 levels

Electric providers have so far made good progress in decarbonizing each megawatt-hour of electric energy produced. But focusing solely on decarbonization of electricity resources ignores an essential component for achieving California's climate goal: using clean electricity to displace other fuels, particularly petroleum for on-road transportation and natural gas for building heating and water heating. According to Sonoma County's July 2016 *Climate Action 2020* report, these two sources make up nearly 80% of Sonoma County's greenhouse gas emissions and are replaceable with clean electricity (see Figure 3).

Figure 3



Data from Sonoma County's Climate Action 2020, July 2016.

For these reasons, this IRP addresses all of the ordinary IRP elements, but also addresses the responsibility of SCP in achieving the climate goals of other (non-electric) sectors, and explores the possible large-scale expansion of using customer-owned technology and controls to provide essential grid reliability services.

B. How This IRP Differs from the CPUC's IRP

As an LSE, SCP has core responsibilities for planning supply and demand, maintaining affordability and reliability, and for planning ahead to ensure California's climate goals can be met.

One of SCP's core responsibilities is to forecast its customer load and develop a plan to serve such load in alignment with its Board of Directors' vision and values and in accordance with regulatory requirements. In 2015, California codified this responsibility with the passage of SB 350, which requires the CPUC to establish and oversee an Integrated Resource Planning process. Across the United States, Integrated Resource Plans (IRPs) are often 10 to 20 year plans that map out both the supply-side and demand-side resources required for meeting customer needs. Given the complexity of the grid and the time required

to plan and build generating facilities, IRPs are a critical part of planning for affordable and reliable clean power.

In California, Senate Bill 350 (2015) has driven integrated resource planning towards a more specific goal: helping the State meet its ambitious near-term GHG-reduction targets of 40% below 1990 levels by 2030. Accordingly, the CPUC has developed a capacity expansion model (called *Resolve*) that limits GHG emissions from California's electric sector and—while meeting reliability, regulatory and other requirements—intends to produce a cost-effective portfolio of resources. The CPUC calls this portfolio its Reference System Plan and has produced a scenario assuming 42 MMT[1] of electric sector GHG emissions per year in 2030.

While SCP must meet the criteria of SB 350 and show its compliance to the CPUC for certification, State law allows and requires SCP's governing board to determine how to achieve those goals, whether to use CPUC models as part of SCP's planning process, and to approve SCP's IRP.

Since this is SCP's first complete IRP, SCP's process will necessarily be refined in subsequent plans. In addition to seeking to improve the CPUC's internal process for sharing IRP data, SCP has also invited the CAISO to meet late in 2018 to discuss what additional data it needs to more accurately identify necessary reliability resources in the year-ahead Resource Adequacy (RA) process, particularly for sub-local areas.

The following chapters will discuss SCP's customer load, the resources required to meet such load and SCP's procurement processes. In addition, this IRP illustrates how SCP's planned activities fulfill SCP's governing board's vision, values and regulatory requirements.

SCP's efforts to go beyond traditional resource planning include:

1. *GridSavvy.* A grid reliability platform being built to provide the capability of automatically dispatching electric vehicle chargers, heat pumps, thermostats and stationary batteries to both increase and decrease load on a fast signal. The goal of GridSavvy is to achieve Proxy Demand Response participation in 2020, Non-Generating Resource participation in 2024 and qualified System Resource Adequacy in 2030. By 2030, SCP aims to provide a minimum of 5% of RA from GridSavvy. The technical potential of GridSavvy appears to be sufficient to supply a small majority of real-time and hourly load shaping by 2050, but none of the reliability needs of the *Dunkelflaute*.[2]

2. *Portfolio.* SCP purchases long-term PPAs of renewable sources with a goal of matching real-time customer load as closely as practical *before* utilizing shaping or other strategies. The intent of this strategy is to minimize our reliance on system power and reduce the corresponding financial risk to our customers. Specifically, we:

    - Buy geothermal, wind, solar, hydro, biomass and other non- and very low-GHG sources in an effort to best match hourly and seasonal customer demand, while purchasing high-value RA from these same sources and negotiating for curtailment rights on solar and wind; then

[1] "MMT" means millions of metric tons of carbon dioxide equivalent emissions.

[2] "Dunkelflaute" is a German word that describes when it is both dark and calm, a time during which neither solar nor wind resources can produce a sufficient amount of power.

- Plan to utilize GridSavvy, targeted customer programs (e.g., residential evening-hour efficiency), and energy storage to shape the real-time demand profile to better match the available supply; then
- Purchase natural gas energy (often as an open position or "unspecified source") to meet the remaining need; while
- Utilizing natural gas Resource Adequacy sources to ensure system reliability for those portions not already met by renewable Power Purchase Agreements (PPAs).

3. *Programs.* SCP specifically operates its customer programs to deliver the greatest reduction in total regional greenhouse gas emissions across all sectors and does not view its electric portfolio emissions factor itself as the primary goal, but rather as a means to achieving a societal reduction in emissions. This means:
    - Transportation Fuel Shift. Electrification of transportation is SCP's number one environmental objective as this is where the bulk of Sonoma and Mendocino county greenhouse gas emissions originate. SCP currently operates a bulk discount electric vehicle program, offers customers free charging stations for their homes, and partners with local non-profits to deploy electric vehicles in our community.
    - Building Fuel Shift. Reducing and eliminating natural gas from buildings is SCP's number two environmental objective. SCP is actively rolling out programs in heat pumps, induction cooking, and building decarbonization education.
    - Time of Efficiency. Efficiency during evening hours – when grid prices and grid GHG intensities are both high – is extremely important, while efficiency during mid-day hours, when the grid is cheap and very low-GHG, is relatively unimportant. Through programs like GridSavvy, Sonoma Clean Power can begin to pair fuel-shifting and energy efficiency programs with aggregated customer load shaping strategies.
4. *Engagement*. SCP regularly meets with our regional transportation, water, land use, and planning agencies to coordinate and jointly prioritize climate action. We now have joint mapping, policies and legislative action, and coordinate electric vehicle charging station deployment, for example.

Fundamentally, SCP views its obligation as utilizing affordable and reliable clean sources of electricity to replace other sources of energy.

C. SCP's Role in Creating Needed Energy Market Changes

It is worth celebrating that solar and wind power are now frequently the lowest cost new energy resource. This is good news, but producing renewable energy is now the easy part. Ensuring reliability with a growing fraction of variable (solar) and intermittent (wind) sources is harder.

Our IRP thus begins with certain principles, summarized here:

Measure Actual Climate Impacts, Not Proximate Ones

California climate policy should move away from simply promoting the construction of new renewable sources (e.g., percent RPS or megawatts of new RPS sources) and toward metrics that will support a

reliable near-zero carbon grid (e.g., total tons of CO_2 emitted per geographic territory, from all sources, with credit to electric providers for contributing to reductions regardless of the sector).

SCP's Role: SCP no longer considers the addition of new renewable sources equivalent to a reduction in emissions, for example, and instead focuses on total tons of emissions in its service territory. The reason is that the addition of new sources can expand total energy use, and may not reduce absolute emissions at all, or at least not in proportion to the new construction. Construction-oriented policies also tend to overlook less expensive options, such as conservation, controls and efficiency.

Improve Market Stability for Natural Gas Turbines While Planning Ahead to Reduce Reliance on Them

There is an urgent need to shore up the market for natural gas units to sell reliability through and beyond the closure of the Diablo Canyon nuclear power plant. A multi-year compliance obligation to purchase Resource Adequacy will stabilize the market and help avoid the risk of early plant closures. Moving toward California's climate goal requires *both* a clear plan to reduce reliance on natural gas units for shaping and reliability over the next twenty years, *and* multi-year RA obligations to ensure that gas units needed for reliability can remain operational.

SCP's Role: Advocate for multi-year RA obligations, implement GridSavvy, and continue to improve the match between real-time supply and demand.

Make a Plan for Dunkelflaute

Ensuring reliability when it is both dark and without wind (Germans call this "Dunkelflaute") will likely require all of the following: (a) increased energy storage at scale and duration, (b) retention of significant gas plant resources for reliability for the next thirty years, (c) improved segmentation of circuits and back-up power to ensure reliability to critical services, while (d) we reconsider our current reliability standards for non-critical loads. Today's IOUs plan for a specific up-time. But that standard was set when nearly all resources were dispatchable. As California presses forward with plans to decarbonize, ratepayers should be informed about the cost of that reliability standard and provided with alternative standards which may greatly lower costs.

SCP's Role: convene conversations about affordable reliability that other market actors cannot or should not (e.g., the CAISO should not be expected to initiate a conversation about changing California's reliability standards).

Open Access to Data for Innovation

California needs detailed open public data on distribution grid infrastructure and competitive markets for providing distribution grid reliability. Such data can be provided in a manner that continues to protect customer privacy. As more of our energy comes from renewable sources, our options for dispatching supply sources will continue to diminish and our need to manage load and distributed energy resources will increase. These pressures demand more creativity from customers, technology companies and community choice aggregators, and that requires open access to real-time circuit information and improved use of smart meter data.

SCP's Role: Identify specific data needed and advocate for those data to be provided in GIS, APIs and other usable formats. Advocate for actual load profiles to be used for settlements for residential and

small business customers, so that customers can be fully compensated for their participation in demand response.

Improve Affordability with Better Distribution Reliability Markets

The CPUC, CAISO and other stakeholders need to define better markets for reliability services from customer-owned and third-party-owned resources. Today, only very limited markets exist for customers, CCAs and third parties to provide reliability services (e.g., the DRAM), stifling creativity and meaning that near-zero-cost solutions (e.g., behavioral changes driven by smart phone apps) are undervalued. Nearly all reliability investments today are still focused on utility-owned equipment. However, affordability can be significantly improved when customers can utilize readily-available technology, such as smart inverters, smart EV chargers and even phone apps to provide large-scale reliability. Concerns about the dependability of customer-provided reliability can be addressed through large-scale programs with broad statistical diversity and a credit-worthy aggregator.

SCP's Role: Provide more details to the California Public Utilities Commission (CPUC), California Independent System Operator (CAISO) and the California Energy Commission (CEC) on GridSavvy and SCP's attempts to fully value customer-owned, CCA-owned and third-party-owned reliability resources. Advocate for improved reliability markets and improved procedures to ensure adequate notice of reliability needs and ability to propose lower cost non-wires alternatives.

Create a Plan to Avoid Building New Natural Gas Plants

Even if there is no buyer for the energy, gas turbines used for electric reliability must still run at their minimum settings (typically between 20% and 30%) and therefore would create sufficient emissions to make reaching California's 2050 climate goals challenging if nearly all reliability is still provided by natural gas turbines in 32 years. SCP expects that a significant fraction of reliability services will still be met by natural gas turbines in 2050, but seeks a statewide dialog now to ensure that California's climate goals can still be met.

SCP's Role: Participate in long-term reliability planning, advocate for an extremely high bar to approve any new construction of natural gas power facilities and better noticing and market signals for alternatives to be developed whenever possible.

D. Preparing for an Upside-Down Grid

As part of SCP's efforts to achieve California's climate goal, we have identified a number of problems that we seek broad industry collaboration to solve.

One set of problems comes from the fact that the transition to an extremely low-carbon society is flipping the grid "upside-down." Historically, California's grid has used dispatchable *resources* to meet forecast demand. A low-carbon grid will rely much more on forecast supply (e.g., solar and wind) and therefore will require much greater amounts of dispatchable *load*. Existing demand response programs are insufficient because they are too low value, too slow to react, and too complex for most businesses and residential customers to implement.

Most conversations about solutions to this problem are too narrow in scope, focusing on one solution, such as batteries. But SCP's analysis finds it is more likely that affordable solutions to this problem will involve a number of elements, including:

1. Very close collaboration with customers, who will be increasingly paid to provide reliability services.
2. Improved access to smart meter and distribution grid data, and improved markets for distribution grid reliability to allow innovation.
3. Increased use of stationary batteries at high-value locations informed by real-time distribution grid data.
4. Broad use of automated demand response, including both up- and down-regulation of loads and distributed energy resources.
5. Increased curtailment of renewables, but with improved clarity from CAISO on curtailment risks associated with new projects.
6. Changes to the CAISO market to facilitate easier exporting and importing of power, reducing the risks associated with solar and wind curtailment, and increasing access to cheaper clean generation during times of high net demand (e.g., during CAISO evening ramps).
7. Changes to building codes to ensure heating and water heating with heat pumps having dispatch capability.
8. Time-of-Use rates to encourage workplace and other mid-day EV charging, and other rate restructuring to better reflect wholesale costs.

No doubt this is a partial list, and there are additional actions that will be needed for addressing the "upside-down grid." SCP therefore seeks to create a forum for analyzing and discussing the appropriate balance of approaches to ensure affordability and reliability in a decarbonized future. What other strategies should California be planning now to facilitate the transition to a near-zero-carbon grid?

SCP seeks partners to regularly discuss this topic, update our processes and regulations and collaborate.

3. Portfolio Regulatory Requirements

A. Regulatory Deliverables

As a California load serving entity, SCP must comply with numerous regulations, many of which deal with ensuring grid reliability and limiting greenhouse gas emissions. The tables below list SCP's regulatory deliverables (required and voluntary) as well as the frequency and regulatory jurisdiction for each deliverable. Each table represents a specific regulatory topic, and key topics are explained in greater detail in subsequent sections of this chapter.

Resource Adequacy (RA)

Frequency/Timing	Regulatory Deliverable	Jurisdiction
Annual: January	Flexible Capacity Needs Assessment	CAISO
Annual: February	Historical Capacity Price Data Request	CPUC
Annual: March	Historical Load Used for Year-Ahead RA Process	CPUC/CEC
Annual: April	Going Forward Capacity Volumes Data Request	CPUC
Annual: April	Year-Ahead Load Forecast Used for Year-Ahead RA Process	CPUC/CEC
Annual: June	Import Capability & Path 26 Allocation Processes Begin	CAISO
Annual: August	Revised Year-Ahead Load Forecast Used for Year-Ahead RA Process	CPUC/CEC
Annual: September	Review Draft Posted Net Qualifying Capacities (NQCs) and Effective Flexible Capacities (EFCs)	CAISO
Annual: October	Year-Ahead RA Demonstration	CAISO
Annual: October	Year-Ahead RA Demonstration	CPUC/CEC
Monthly	2.5 Months Ahead Load Migration Forecast	CEC/CPUC
Monthly	45 Days Ahead RA Demonstration	CPUC/CEC
Monthly	45 Days Ahead RA Demonstration (cure period ends T-30 Days)	CAISO

Renewables Portfolio Standard (RPS)

Frequency/Timing	Regulatory Deliverable	Jurisdiction
Annual: Q2	Retire RECs and Prepare WREGIS Reports for Suppliers	N/A
Annual: July	WREGIS: Compliance Report, e-Tag Report, Attestation	CPUC/CEC
Annual: July	RPS Procurement Plan	CPUC
Annual: July	RPS Data Request related to Workforce Development & Diversity	CPUC
Annual: August	RPS Compliance Report	CPUC

Energy Storage Procurement

Frequency/Timing	Regulatory Deliverable	Jurisdiction
Biennial: January	Energy Storage Procurement Tier 2 Advice Letter	CPUC

Greenhouse Gas (GHG) Reporting

Frequency/Timing	Regulatory Deliverable	Jurisdiction
Annual: February	Emission Performance Standard Advice Letter	CPUC
Annual: June	Retail Load Reporting for MRR	CARB
Annual: June	GHG Reports due to The Climate Registry	Voluntary
Annual: December	GHG Report Published by The Climate Registry	Voluntary

Power Source Disclosure (PSD)

Frequency/Timing	Regulatory Deliverable	Jurisdiction
Annual: April	Third party verification of retail sales by product	N/A
Annual: June	PSD Report submitted to CEC	CEC
Annual: June	SCP-PG&E rate comparison mailed to customers	CPUC
Annual: August	Power Content Label mailed to Customers and CEC	CEC
Annual: October	Independent audit of PSD Report, Power Content Label	CEC

Integrated Resource Planning (IRP)

Frequency/Timing	Regulatory Deliverable	Jurisdiction
Biennial: June*	CPUC Templates Submitted to CPUC for Verification	CPUC
Biennial: TBD	SCP's IRP (including CPUC templates) posted to SCP website	Voluntary

**The CPUC extended the 2018 IRP deadline to August 1, 2018*

Energy Information Administration (EIA) Reporting and Quarterly Fuel and Energy Report (QFER)

Frequency/Timing	Regulatory Deliverable	Jurisdiction
Annual: April	Annual 861 Filing	EIA
Quarterly	Quarter Behind QFER (1306B Filing)	CEC
Monthly	Month Behind 861 Filing	EIA

Integrated Energy Policy Report (IEPR)

Frequency/Timing	Regulatory Deliverable	Jurisdiction
Biennial: April	Integrated Energy Policy Report - Load Forecasts	CEC
Biennial: April	Integrated Energy Policy Report - Resource Plans	CEC

Wind Power Procurement

Frequency/Timing	Regulatory Deliverable	Jurisdiction
Quarterly	Quarter Behind CA Wind Power Procurement (1386 Filing)	CEC

Congestion Revenue Rights (CRRs)

Frequency/Timing	Regulatory Deliverable	Jurisdiction
Annual: August	Annual CRR Allocation Process Begins	CAISO
Monthly	1.5 Month Ahead Load Forecast for CRR Allocations	CAISO

PG&E Energy Resource Recovery Account (ERRA)

Frequency/Timing	Regulatory Deliverable	Jurisdiction
Annual: February	Year-Ahead Load Forecast Used for PG&E ERRA	CPUC
Annual: September	Revised Year-Ahead Load Forecast Used for PG&E ERRA	CPUC

Advanced Metering Initiative (AMI) Data

Frequency/Timing	Regulatory Deliverable	Jurisdiction
Triennial	AMI Data Privacy Audit	CPUC
Annual: April	AMI Data Privacy Annual Report	CPUC

Officer Certification

Frequency/Timing	Regulatory Deliverable	Jurisdiction
Annual: April	Annual Officer Certification Form	CAISO

B. Resource Adequacy (RA)

In the aftermath of California's electricity crisis (2000-2001), the California Public Utilities Commission (CPUC) introduced a new requirement in 2004 to better ensure grid reliability. More specifically, the CPUC required load-serving entities to secure adequate capacity well in advance of the real-time need and make such capacity available to the California Independent System Operator (CAISO), which is the balancing authority (i.e., grid operator) for the majority of California. This requirement, called "Resource Adequacy," has evolved over the years since 2004, and today's program (jointly administered by the CPUC, CAISO and California Energy Commission) is comprised of three products: (1) System RA, (2) Flexible RA, and (3) Local RA.

System RA

In order to meet its CPUC-jurisdictional System RA requirements, SCP must demonstrate that it has secured capacity equal to 115% of its expected peak load for each month of the year. However, instead of making such a demonstration all at once, SCP is instead required to make a year-ahead filing as well as twelve individual month-ahead filings. For the year-ahead filing (October 31st of the preceding year), SCP must demonstrate 90% of the 115% requirement for the coming year's five summer months: May through September. For the 12 monthly filings (each submitted 45 days in advance of the month), SCP must demonstrate 100% of the 115% requirement. For reference, the 115% requirement is often referred to as the expected peak load plus a 15% "planning reserve margin." Also, to be more precise, the CPUC makes several adjustments to SCP's expected monthly peak loads; one of these adjustments is to account for the fact that SCP's peaks do not perfectly coincide with CAISO's peaks.

When demonstrating System capacity, SCP must count only the "Net Qualifying Capacity" of each resource it includes in its filings. At a high level, the Net Qualifying Capacity (NQC) of a resource, published by the CAISO, is the capacity (one number for each month of the year) that can be relied upon to meet that month's peak load system conditions. For wind and solar resources, the NQC calculations must take into account the intermittent and seasonal nature of such resources and are based on an Effective Load Carrying Capacity (ELCC) methodology. For example, solar resources receive no capacity value in December and January.

When demonstrating System capacity, SCP must also consider three other factors. First, due to limited capacity on Path 26 (a cluster of critical transmission lines that allow power to flow between northern and southern California), SCP must secure the bulk of its system resources from north of Path 26 (thereby reducing the need to use the path). In order to comply with CPUC rules, SCP is only allowed to procure a certain amount of capacity from south of Path 26, with the specific number being provided each year by the CAISO through the CPUC. Second, due to limited capacity on the interties that connect the CAISO grid with other western grids, SCP must secure the bulk of its system resources from within the CAISO grid. Again, SCP is only allowed to procure a certain amount of capacity from outside of the CAISO grid, with the specific number being provided each year by the CAISO and CPUC. Third, each year SCP is allocated a certain amount of capacity that was procured by the CAISO for reliability purposes or by PG&E due to policy mandates. These allocations are known as Reliability Must Run (RMR) and Cost Allocation Mechanism (CAM) allocations, and SCP is given this capacity because its customers are charged for it. The CPUC notifies SCP of its RMR and CAM allocations on a quarterly basis (approximately two months in advance of each quarter).

Flexible RA

In order to meet its Flexible RA requirements, SCP must demonstrate that it has secured Flexible capacity equal to its assigned share of the CAISO's flexibility need (based in part on the largest expected three-hour ramp of system load) for each month of the year. However, instead of making such a demonstration all at once, SCP is instead required to make a year-ahead filing as well as twelve monthly filings. For the year-ahead filing (October 31st of the preceding year), SCP must demonstrate 90% of its assigned flexible capacity requirement for each month of the coming year. For the twelve individual monthly filings (each submitted 45 days in advance of the month), SCP must demonstrate 100% of its assigned flexible capacity requirement.

When demonstrating Flexible capacity, SCP must count only the "Effective Flexible Capacity" of each resource it includes in its filings. At a high level, the Effective Flexible Capacity (EFC) of a resource, published each year by the CAISO, is the capacity (one number for each month of the year) that can be relied upon to help meet that month's system ramping needs. For this reason, only resources that can ramp and sustain energy output for at least three hours are eligible to receive an EFC value.

When procuring Flexible capacity, SCP must choose among three categories: (1) Base Flexibility; (2) Peak Flexibility; (3) Super-Peak Flexibility. Each category of capacity must be economically bid into the California ISO's markets (i.e., each category is subject to "must-offer obligations"), but the exact requirements differ by category. In addition, load serving entities must procure flexible capacity in accordance with the following rules: (A) For the summer months (May through September), SCP must procure at least 55% of its Flexible Capacity portfolio with Category 1 (Base Flexibility) capacity; (B) For the non-summer months, SCP must procure at least 38% of its Flexible Capacity portfolio with Category 1 capacity; (C) SCP may only procure up to 5% of its Flexible Capacity portfolio with Category 3 (Super-Peak Flexibility). Since the inception of Flexible Capacity, SCP has procured only Category 1.

Local RA

In order to meet its Local RA requirements, SCP must demonstrate that it has secured capacity in specific transmission-constrained (i.e., "Local") areas equal to its assigned share of the CAISO's need for each month of the year. For the year-ahead filing (October 31st of the preceding year), SCP must demonstrate 100% of its assigned local capacity requirements for each month of the coming year. To be clear, the assigned requirement for each local area is one number for the entire year, but SCP must show that it has secured enough capacity in each month to meet this number. Also, the CAISO has established a list of seven local areas in PG&E's transmission area: (1) Humboldt; (2) North Coast/North Bay; (3) Sierra; (4) Stockton; (5) Greater Bay; (6) Greater Fresno; (7) Kern. However, the CPUC has established a less granular list of only two local areas in PG&E's transmission area: (1) Bay Area; (2) Other PG&E Areas. As a result, SCP has two separate local RA compliance obligations: a CPUC-defined obligation and a CAISO-defined obligation.

When demonstrating capacity to meet CPUC Local RA requirements, SCP must use the August Net Qualifying Capacity (NQC) of each resource. This means that if SCP has a solar resource in a local area, and that resource has a March NQC of 5 MW and an August NQC of 20 MW, then for purposes of Local RA compliance, SCP can and must list 20 MW across the year for that specific resource (even though this would seem to overstate the capacity in March by a factor of 4).

SCP's System, Flexible and Local RA requirements are all based in part on SCP's load data. The first step in SCP's RA compliance cycle is to submit historical load data to the CPUC and CEC in March of the preceding year. The following month (in April of the preceding year), SCP is required to submit an initial year-ahead load forecast. Based in part on this data, the CPUC then provides SCP with draft year-ahead RA obligations; these are provided in late July or early August of the preceding year. The following month (in August of the preceding year), SCP is required to submit a revised year-ahead load forecast. Accordingly, the CPUC then provides SCP with revised year-ahead RA obligations; these are provided in September of the preceding year. Based on these obligations and as discussed in the section above, SCP then must make its year-ahead filing on October 31st of the preceding year.

Once the year-ahead process is completed on October 31st of the preceding year, the month-ahead process begins. As explained in the section above, SCP is required to make RA submissions 45 days in advance of each month. In addition to making such RA submissions, SCP is also required to submit load forecasts 2.5 months in advance of each month. In fact, it is these load forecasts that are used to modify SCP's 45 day-ahead System requirements, in order to capture load migration. For example, in mid-January SCP is not only required to submit its March RA plan, but it is also required to submit an April load forecast. It is this April load forecast that is used the following month (in mid-February) to determine SCP's remaining April System RA need.

C. Renewable Portfolio Standard

Established in 2002 under Senate Bill 1078, accelerated in 2006 under Senate Bill 107, expanded in 2011 under Senate Bill 2, expanded again in 2015 under Senate Bill 350, and expanded once more in 2018 under Senate Bill 100, California's Renewables Portfolio Standard (RPS) requires California load serving entities to supply their retail sales with minimum portions of eligible renewable energy. As shown in the table below, the RPS requirements have increased over the years, and such requirements (expressed as percentages of retail sales) are enforced within compliance periods. For each compliance period, load-serving entities (LSE) like SCP and PG&E, are required to meet the weighted average of the RPS requirements for that period, with retail sales providing the weights. For example, in compliance period #3, LSEs are required to supply their retail sales with at least the following portion of renewable energy: [(2017 sales x 27%) + (2018 sales x 29%) + (2019 sales x 31%) + (2020 sales x 33%)] / [2017 through 2020 sales].

Year	Compliance Period	RPS Requirement (% of Retail Sales)
2011	1	20.0
2012	1	20.0
2013	1	20.0
2014	2	21.7
2015	2	23.3
2016	2	25.0
2017	3	27.0
2018	3	29.0
2019	3	31.0
2020	3	33.0
2021	4	35.8
2022	4	38.5
2023	4	41.3
2024	4	44.0
2025	5	46.7
2026	5	49.3
2027	5	52.0
2028	6	54.7
2029	6	57.3
2030	6	60.0

In order to supply their retail sales with minimum portions of renewable energy, load serving entities must acquire and retire renewable energy credits (RECs). Each REC represents the environmental/renewable attributes associated with 1 MWh of eligible renewable energy and is created at the moment the electricity is generated; accordingly, each REC is assigned a vintage year and month. RECs are created in a database known as the "Western Renewable Energy Generation Information System (WREGIS), which is used across the Western Interconnection to track the environmental/renewable attributes of wholesale electricity.

When acquiring and retiring RECs to meet its RPS requirements, SCP must also comply with additional requirements related to three Portfolio Content Categories (PCCs), defined as follows:

- PCC 1: Bundled RECs from facilities with a first point of interconnection within a California Balancing Authority (CBA), or RECs from facilities that schedule electricity into a CBA, and without substitute energy. In other words, these are RECs that are bundled with electricity – all coming from the renewable energy facility. If that facility is outside a CBA, the electricity must be scheduled into the CBA, and only the fraction of the schedule actually generated by the renewable facility may count (i.e., any Ancillary Services needed to support the schedule are not counted).
- PCC 2: Bundled RECs – using substitute energy delivered within the same calendar year – from facilities that are outside of a California Balancing Authority (CBA). In other words, these are RECs that are bundled with electricity, but the electricity scheduled into the CBA does not have to come from the renewable energy facility in real time. Instead, the electricity is provided by a substitute facility, as long as the electricity is scheduled into the CBA within the same calendar year.
- PCC 3: Unbundled RECs originally associated with generation from an RPS-facility (but where no energy is actually procured) or unbundled RECs that do not qualify for PCC 1 or PCC 2. SCP's Board chose to never use PCC3 resources to reduce greenhouse gas emissions, and has avoided purchasing PCC3 altogether since the end of 2014.

In accordance with its RPS requirements, SCP must acquire and retire RECs in line with the following PCC-related restrictions:

Year	Compliance Period	RPS Requirement (% of Retail Sales)	PCC 1 Minimum (% of RPS)	PCC 3 Maximum (% of RPS)
2011	1	20.0	50	25
2012	1	20.0	50	25
2013	1	20.0	50	25
2014	2	21.7	65	15
2015	2	23.3	65	15
2016	2	25.0	65	15
2017	3	27.0	75	10
2018	3	29.0	75	10
2019	3	31.0	75	10
2020	3	33.0	75	10

Long-Term Contracting Obligation

Starting with Compliance Period 4 (which begins 1/1/2021), at least 65% of the RECs retired for the purpose of meeting the Procurement Quantity Requirement (PQR) must come from contracts that are 10 or more years in duration.

D. Energy Storage

In December 2013, the CPUC issued Decision 13-10-040 and adopted the Energy Storage Procurement Framework and Design Program for Investor Owned Utilities ("IOUs"), Electric Service Providers ("ESPs"), and CCA programs. In this decision, the CPUC established a goal for CCAs to procure energy storage

equal to 1% of their 2020 annual peak load. To count toward the 2020 goal, energy storage projects must meet the following eligibility requirements:

- Energy storage systems must be installed and operational after January 1, 2010
- Energy storage systems must be online and delivering by the end of 2024
- Distributed storage (i.e., customer-sited or customer-owned storage) qualifies
- Electric vehicle programs qualify
- Energy storage projects must further a relevant purpose (i.e., demonstrate their ability to provide grid optimization, integration of renewable energy, or reduction of GHG emissions)
- Government funded projects may be included
- Energy storage procurement must be cost-effective

E. Greenhouse Gas Reporting

California law requires the state to reduce its greenhouse gas (GHG) emissions to 1990 levels by 2020, and to 40% below 1990 levels by 2030. The first goal was recently reached, with 1990 levels of GHG emissions reached in mid-2018. To help achieve the reductions needed by 2030, the California Air Resources Board (CARB) – which is a department within the state's Environmental Protection Agency – enforces an emissions Cap & Trade program. This program, which covers electricity generators, electricity importers, industrial facility operators and fuel distributors, requires covered entities to obtain emissions allowances, the total supply of which is ramped down over time. As part of the Cap & Trade program, CARB also requires covered entities to report their emissions on an annual basis. One important note: CARB allows covered entities to exclude (for compliance purposes) the emissions associated with Category 2 RPS (i.e., the emissions associated with electricity used to firm and shape renewables from non-California balancing authorities). This compliance exception is known as the "RPS Adjustment."

SCP has contracts with electricity generators and electricity importers, but SCP is not itself a generator or importer. As a result, SCP is not a covered entity under California's Cap & Trade program. However, SCP is an "Electric Power Entity" as defined in the California Code of Regulations (CCR) and is therefore required to report its retail sales to CARB on an annual basis (17 CCR 95111). In addition, SCP voluntarily has its GHG emissions audited and reported by The Climate Registry (TCR), a non-profit organization that the investor-owned utilities have used for many years as their means to measure and communicate the impacts of their GHGs from retail sales. Through its Electric Power Sector Protocol, TCR audits SCP's emission factors, allowing SCP to have published utility-specific GHG emission factors that its customers can use to quantify their own emissions.[3] The use of TCR was long the only option for reporting emissions from retail sales because CARB's Mandatory Reporting Requirements were expressly developed for producers and importers and could not be used to measure impacts associated with purchased energy to serve retail customer load.

[3] Available online at: https://www.theclimateregistry.org/our-members/cris-public-reports/

The practice of relying on The Climate Registry for GHG reporting for retail sales will eventually be replaced by the CEC's rules under AB 1110 (see "Power Source Disclosure" section directly below), however that methodology is not yet finalized.

F. Power Source Disclosure

California law requires load-serving entities (LSEs) to disclose the types of power resources used to serve customers. This mandate, known as the Power Source Disclosure (PSD) program, is a consumer information program enforced by the California Energy Commission (CEC) on an annual basis. More specifically, LSEs are required to submit detailed reports to the CEC and mail simplified one-pagers to customers each summer. With respect to the one-pager, the CEC requires that LSEs use the exact same template, called the "Power Content Label," which allows customers to easily compare a specific LSE's resource mix to the California average. SCP's final 2017 Power Content Label is shown below in Figure 4 and was mailed to customers in August 2018.

Figure 4

2017 POWER CONTENT LABEL

Sonoma Clean Power Authority

ENERGY RESOURCES	SCP CleanStart	SCP EverGreen	2017 CA Power Mix**
Eligible Renewable	**45%**	**100%**	**29%**
Biomass & biowaste	0%	0%	2%
Geothermal	11%	100%	4%
Eligible hydroelectric	0%	0%	3%
Solar	11%	0%	10%
Wind	23%	0%	10%
Coal	**0%**	**0%**	**4%**
Large Hydroelectric	**42%**	**0%**	**15%**
Natural Gas	**0%**	**0%**	**34%**
Nuclear	**0%**	**0%**	**9%**
Other	**0%**	**0%**	**<1%**
Unspecified sources of power*	**13%**	**0%**	**9%**
TOTAL	**100%**	**100%**	**100%**

* "Unspecified sources of power" means electricity from transactions that are not traceable to specific generation sources.

** Percentages are estimated annually by the California Energy Commission based on the electricity sold to California consumers during the identified year.

For specific information about this electricity product, contact:	**Sonoma Clean Power Authority** **855-202-2139**
For general information about the Power Content Label, please visit:	http://www.energy.ca.gov/pcl/
For additional questions, please contact the California Energy Commission at:	844-454-2906

California Assembly Bill 1110, which was passed in 2016, directs the CEC to modify the Power Source Disclosure program as follows: the CEC must require LSEs to disclose (in addition to the power sources that they already disclose) the GHG emissions intensities associated with the portfolios they offer to their customers, beginning in 2020 for the 2019 reporting year. In order to implement this new law, the CEC began engaging stakeholders in 2017 and has shared pre-rulemaking staff proposals for modifying the Power Source Disclosure program. A final rulemaking is expected in late 2018 or early 2019.

4. Customer Load

A. Historical Number of Enrolled Customers

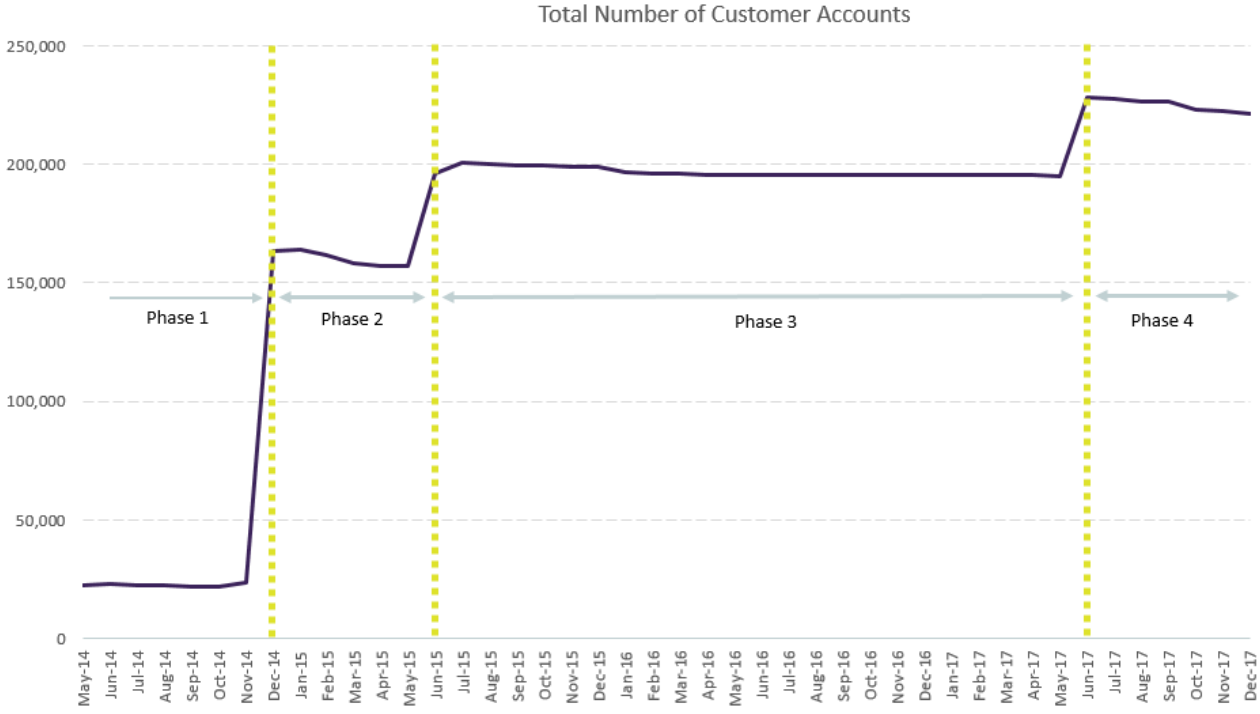
As previously stated, SCP is the default electricity provider for Sonoma and Mendocino counties, while customers have the right to opt-out and remain with PG&E. The current participation rate for SCP is 87%, meaning that 13% of eligible customers have opted out.

SCP began serving customers in May 2014 and has served Sonoma and Mendocino counties in the following phases:

- Phase 1- May 1, 2014 began serving commercial and industrial customers and a random selection of 5,000 residential customers in Unincorporated Sonoma County, Cotati, Santa Rosa, Sebastopol, Sonoma, and Windsor
- Phase 2- Dec 1, 2014 added the remaining residential customers in the jurisdictions listed above
- Phase 3- Jun 1, 2015 added all customers in Cloverdale, Petaluma, and Rohnert Park
- Phase 4- Jun 1, 2017 added all customers in Unincorporated Mendocino County, Fort Bragg, Point Arena, and Willits

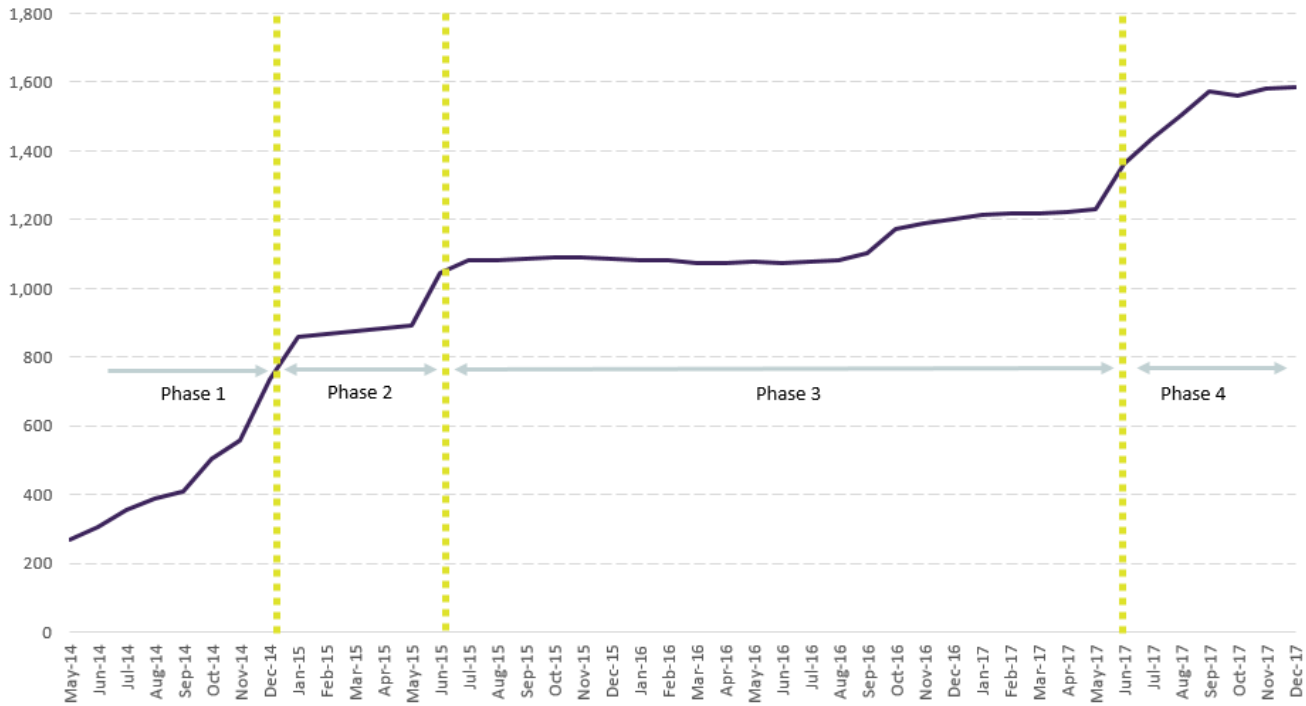
Figure 5 below shows the number of customer accounts through each phase. Note that in October 2017, the Wine Country fires destroyed thousands of structures which resulted in a loss of approximately 4,800 accounts (noting that the actual closing of these accounts occurred over several months). The number of customer accounts as of Dec 31, 2017 was 221,309 which was comprised of almost 86% residential accounts.

Figure 5



The number of EverGreen accounts (SCP's 100% local renewable option) has steadily increased through each of the phases as shown in Figure 6. The number of EverGreen customers as of Dec 31, 2017 was 1,587 (0.72% of SCP's total customers).

Figure 6
EverGreen Number of Customer Accounts



B. Historical Load (MWh)

The table below shows the historical annual load (MWh) for 2015-2017. Year 2014 is not included because it does not represent a full year and the phasing in of customers was not representative of SCP's typical customer base.

Load is given in Loss Adjusted Load (LAL) MWh and retail sales MWh. LAL is the amount of energy that is procured on behalf of SCP's customers at the sources of generation, retail sales is the amount of energy measured and invoiced at the customer meter as follows:

LAL MWh – line losses MWh - unaccounted for energy MWh = retail sales MWh.

	2015	2016	2017
Total MWh LAL	2,126,623	2,336,362	2,541,056
TOTAL MWh retail sales	1,987,001	2,186,726	2,379,874
CleanStart	1,980,353	2,178,195	2,366,381
EverGreen	6,648	8,531	13,493

The figures below present the historical MWh LAL across each month from 2015-2017. Figure 7 shows total MWh and Figure 8 shows kWh/meter (Note 1,000 kWh = 1 MWh). Energy load on a kWh/meter basis is significant for forecasting purposes when the number of customers changes between periods. For example, the historical load in May 2017 does not include Mendocino customers, so this will not account for the Mendocino customers for forecasting May into the future. To accommodate this, the historical kWh/meter can be used and then applied to the increased number of accounts.

Both 2015 and 2017 historical MWh loads included phasing in new customers in June. In 2015, SCP enrolled Cloverdale, Petaluma and Rohnert Park, and in 2017 SCP enrolled in Mendocino County. Year 2016 is the only full calendar year that did not phase in new service territory. The load is relatively flat throughout the year with higher loads in January, December, and the summer months. The higher load in January and December is likely due to increased lighting and space heating needs and the higher load in summer months is likely due to increased air conditioning needs. Note that the load significantly decreased in October 2017 due to the wildfire power outages and destroyed accounts.

Figure 7

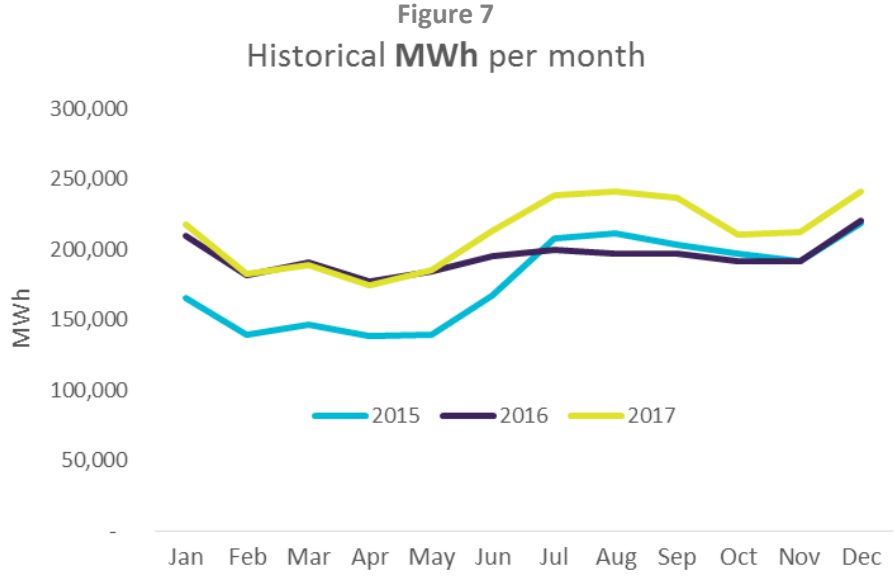
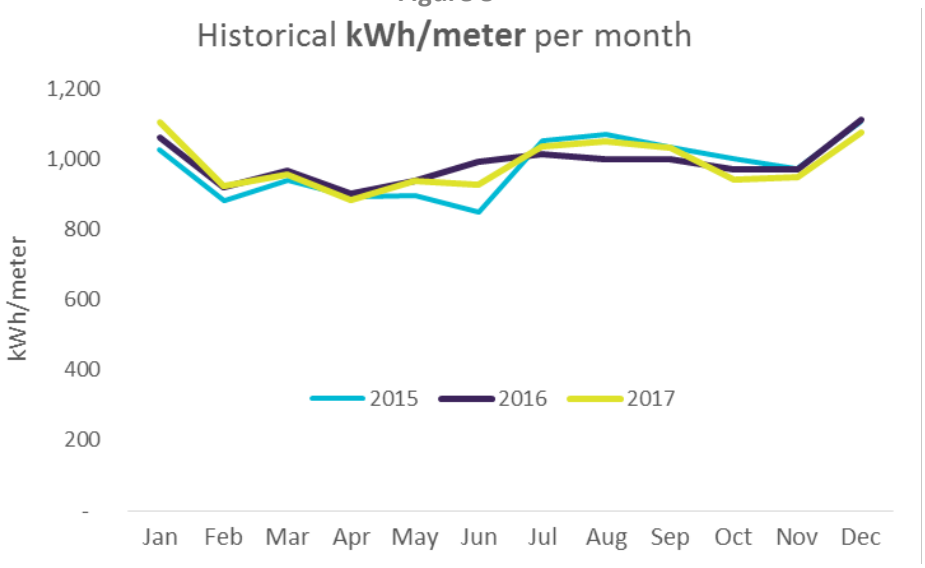


Figure 8



On an annual basis, SCP's load is comprised of about 50% residential energy use. Figure 9 below shows the load breakdown for 2017.

Figure 9
SCP 2017 Load Breakdown

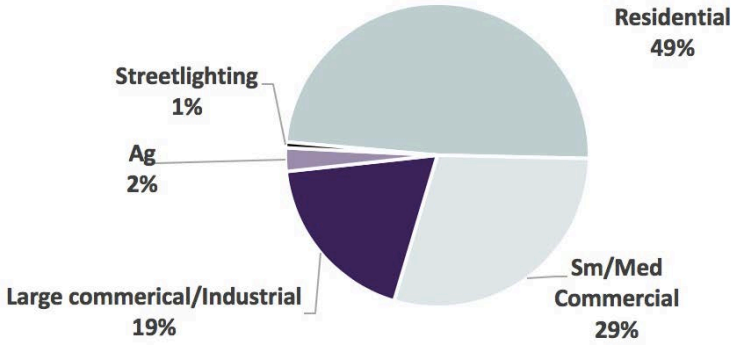
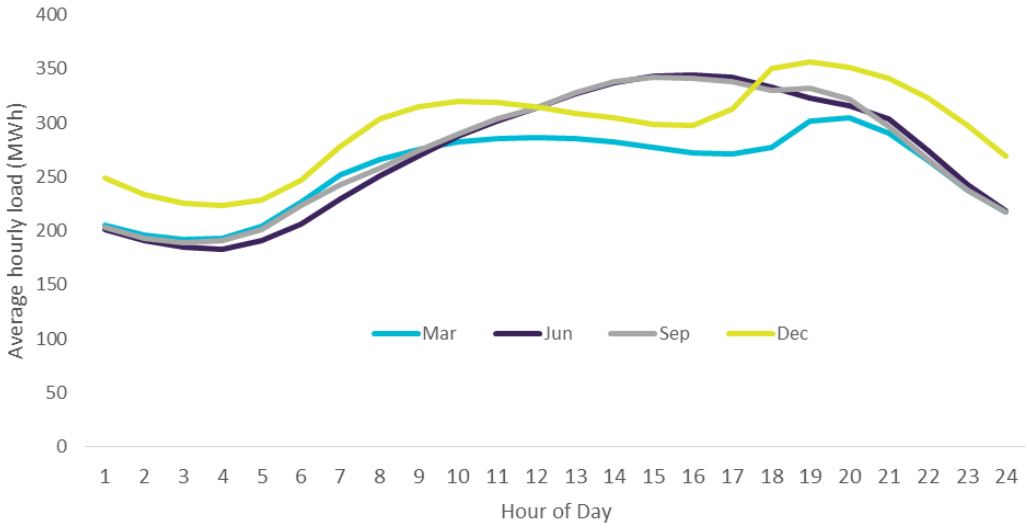


Figure 10 shows the average daily profile for the months of Mar, Jun, Sep, and Dec of 2017. These are representative of seasonal variations in load across the year. Note that since these are averages across every day of the month, they do not represent the peak hourly load in any given month. Figure 10 shows load at the customer meter, so it already accounts for reductions in load due to behind-the-meter solar installations. This graph does not reflect any supply resources, which will be covered in subsequent sections of this report.

June and September follow similar average daily profiles with the most usage in the afternoon likely due to increased air conditioning needs. March is similar to June and September from 8 pm to 10 am. Midday in March shows lower loads than June and September likely due to the milder temperatures decreasing the need for air conditioning. March and December usage spikes in the early evening likely due to residential lighting needs from shorter days. The average load for December nighttime hours is higher than the other seasons likely due to holiday lights and space heating needs. Similarly, December usage is higher than March during the daytime hours likely due to increased space heating needs.

Figure 10
Historical Average daily hourly load profile



C. Historical Peak (MW)

SCP's annual peak load for 2015-2017 is shown in the following table. SCP's peak load has consistently occurred in September in the afternoon.

	2015	2016	2017
Peak MW	489	454	580
Day of Peak	Thu, Sep 10	Mon, Sep 26	Fri, Sep 1
Hour of Peak	3 pm	3 pm	4 pm

The figures below present the historical peak across each month from 2015-2017. Figure 11 shows the total peak MW and Figure 12 shows the peak kW/meter (Note 1,000 kW = 1 MW). Peak kW/meter is significant for forecasting purposes because the number of customers and meters change over time. Peak kW/meter serves as a better forecast indicator than total historic peak KW. It is interesting to note that while January and December have increased load (MWh) as shown in Figure 8, both months' peak hourly MW is less than the peak hourly MW in the summer.

Figure 11

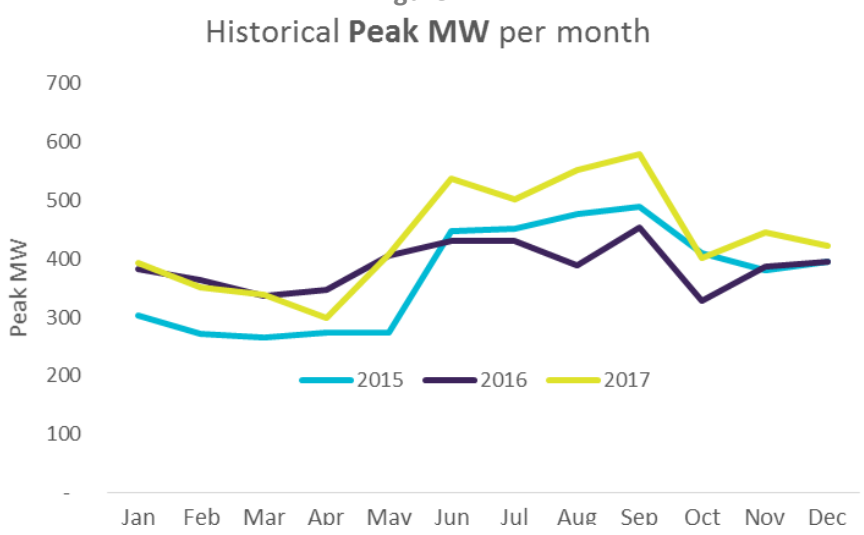
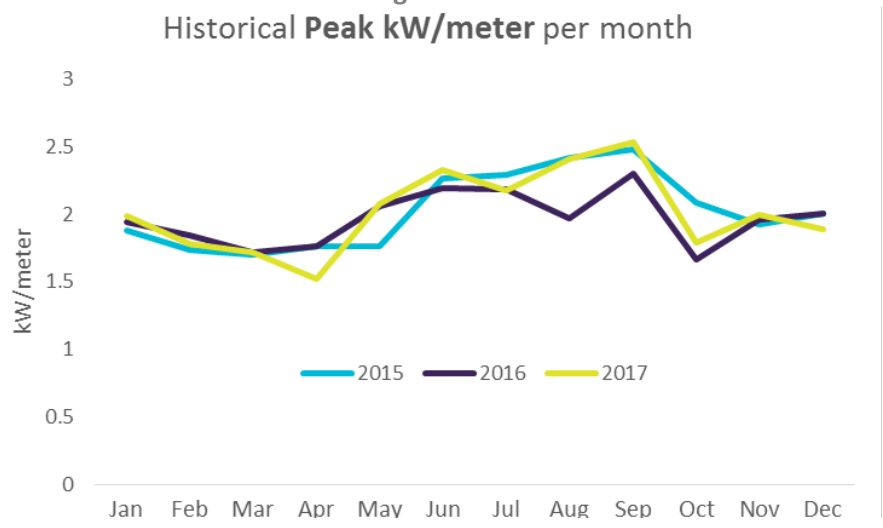


Figure 12



D. Forecast Customer Load

The historical data previously presented is essential to forecasting load (MWh) and peak (MW) into the future. Load forecasting is critical to support SCP's procurement activities. The financial exposure to real-time markets when the forecasted load does not match the actual load, along with procurement requirements of supply resources to meet that load, drive the need to forecast future loads with as much certainty as possible.

Reliable load forecasting enables resource procurement that seeks to minimize imbalances and provide predictable costs that in turn support stable and competitive pricing. SCP load forecasting uncertainty is most affected by the following factors:

1. The number of customers taking service from SCP, including population changes in Sonoma and Mendocino Counties and customers switching their electric service between SCP and PG&E;
2. Under- or over-performance of SCP programs that impact load (such as NetGreen net energy metering, electric vehicle programs, energy efficiency and fuel switching);
3. Load changes from external factors such as economic business cycles or new emerging industries; and,
4. Weather patterns or events, which can unexpectedly impact customer electric consumption.

Forecasting methodology

SCP's load forecast uses actual recorded historical data in order to forecast forward. For the purpose of this IRP, SCP has forecast through 2030 and has used the following process:

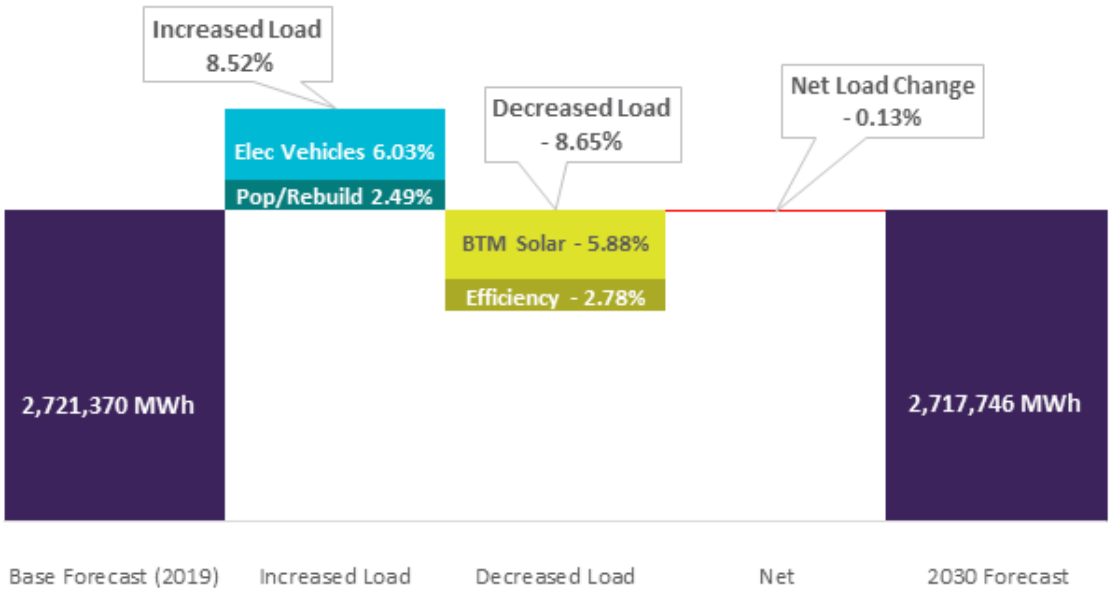
1. Forecast number of customer meters
   - Establish historical steady-state opt-out and participation rates (excluding the first couple months following a phase-in) for each customer type.
   - Use U.S. Census Bureau historical population and housing unit increases for Sonoma and Mendocino counties.
   - Develop fire rebuild estimates to forecast the number of returning customer meters.
2. Forecast kWh/meter profile:
   - Establish historical (2015-2017) kWh/meter profiles using actual recorded kWh and the quantity of meters for each customer type for each hour.
   - Choose a representative kWh/meter profile for each month based on historical kWh/meter averages, weather, extreme natural events, economic and behavioral shifts.
3. Calculate kWh profile
   - Multiply the total forecasted quantity of meters (#1 above) by the kWh/meter profile (#2 above) to arrive at a base kWh profile for each customer type.
   - Incorporate additional factors that impact load over the planning horizon

- Current efficiency and building electrification trends were forecast forward through 2030. These numbers will be refined in future planning processes as more data is available on SCP program uptake.
- Behind-the meter solar capacity forecast was determined using yearly capacity increase trends reported for Sonoma and Mendocino counties from California Distributed Generation Statistics http://www.californiadgstats.ca.gov/charts/ .
- Electric vehicle goals of SCP's programs were used to forecast transportation electrification.

Forecast Load (MWh)

Figure 13 shows the 2030 forecasted load due to each factor described above. It illustrates that SCP's load over the planning horizon is projected to decrease slightly. Moving from left to right, the 2019 "Base" year forecast load increases by 2.49% from population and rebuilding and by 6.03% from electric vehicles. This increase in forecast load is offset by a projected decrease in load of 2.78% from energy efficiency and 5.88% from Behind-the-Meter (BTM) solar. The total net decrease in load from the "Base" year to 2030 is 0.13%.

Figure 13
2030 Forecast MWh



The table below shows the forecasted annual load (MWh) for 2020, 2025, and 2030.

	2020	2025	2030
Total MWH LAL	2,720,980	2,717,657	2,717,746
TOTAL MWh retail sales	2,547,735	2,544,621	2,544,706
CleanStart	2,522,258	2,506,452	2,493,812
EverGreen	25,477	38,169	50,894

Figure 14 presents the actual 2015-2017 monthly load (MWh LAL) compared to the forecast for 2030. The forecast load shows a shift toward more pronounced lower usage in the summer months compared to winter months due to the increased behind-the-meter solar in summer months and forecast electrification of space heating in winter months.

Figure 14
Forecast 2030 **MWh** per month

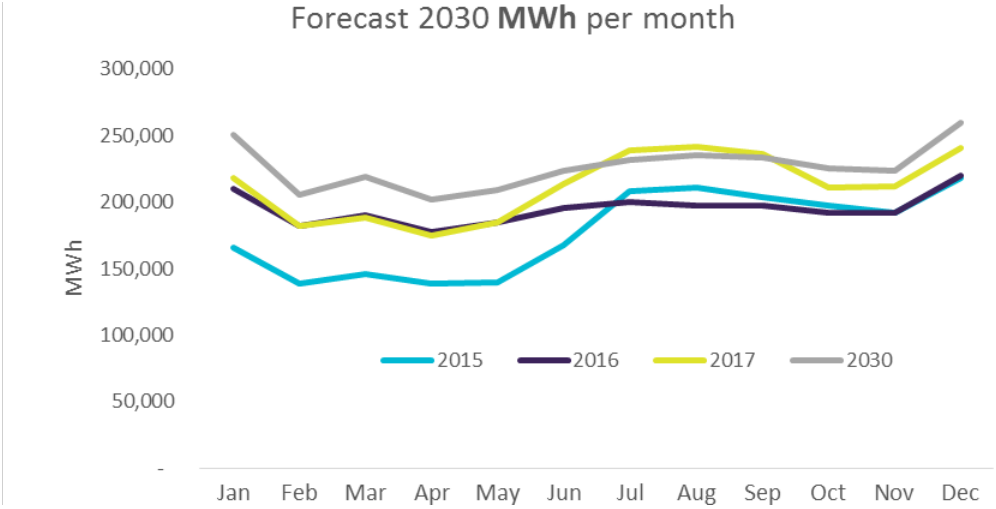
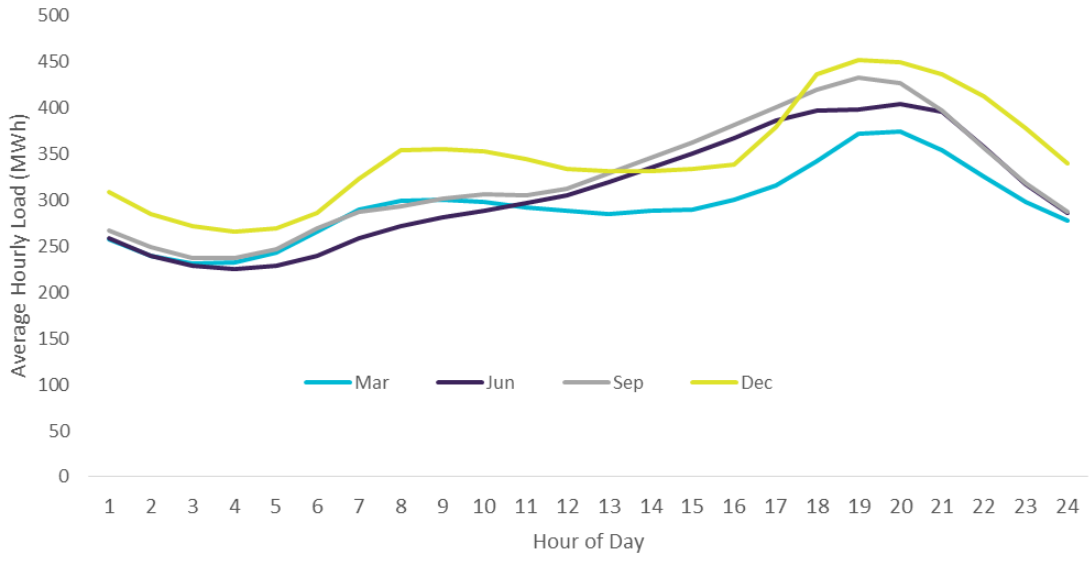


Figure 15 presents the forecast average daily profile for the months of Mar, Jun, Sep, and Dec for 2030. These are representative of seasonal variations in load across the year. Note that since these are averages across every day of the month, they do not represent the peak hourly load in any given month. As more efficiency and behind the meter solar installations occur, the average daily load in 2030 is expected to increase into the evening as electric vehicles are returning to residences to be charged. The load is expected to drop off again as people go to sleep and lights and appliances are turned off. The impacts of building electrification, behind the meter storage, and GridSavvy will be assessed each year and as data becomes available, SCP peak forecast may be adjusted.

Figure 15
2030 Forecast Average Daily Hourly Load Profile



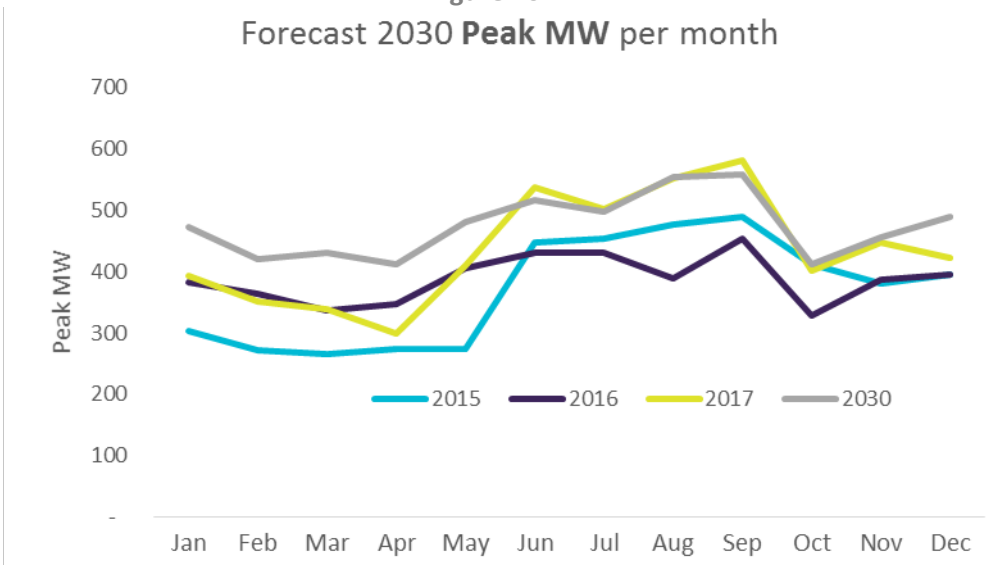
Forecast Peak (MW)

SCP's forecast annual peak MW load for 2020, 2025, and 2030 is shown in the following table. SCP's peak load is forecast to continue to occur in September, however as continued efficiency and behind the meter solar installations occur, the afternoon peak is expected to shift more and more into the evening as electric vehicles are returning to residences to be charged. The impacts of building electrification, behind the meter storage, and GridSavvy will be assessed each year and as data becomes available, the peak forecast may be adjusted.

	2020	2025	2030
Peak MW	571	561	558
Day of Peak	Fri, Sep 4	Fri, Sep 3	Thurs, Sep 12
Hour of Peak	4 pm	5 pm	7 pm

Figure 16 shows the actual 2015-2017 historical peak for each month compared to the forecasted peak for 2030.

Figure 16



5. Resource Plan

A. Strategy

SCP employs a number of wholesale procurement strategies to secure low-cost, and low cost-volatility power. For example, SCP procures a diverse mix of generation types through contracts that are primarily long-term. In addition, SCP has structured a hedging plan and uses congestion revenue rights to reduce its exposure to basis risk. SCP also maintains a low overhead cost structure with a small staff.

SCP also takes a strategic influential approach to matters beyond its direct control that have an impact on its community. SCP has the influence, and therefore the responsibility, to actively work on a number of important areas, including:

- Land use policies that promote development in transit-friendly, energy efficient and lower-cost-of-service locations
- Customer-owned distributed energy resources to support an affordable, reliable, low-carbon grid
- Universal access to electric vehicles and charging infrastructure
- Efficient and zero carbon buildings that rely less on "netting" and more on meeting real-time energy needs
- Low energy intensity agriculture
- Non-wires alternatives to both transmission and distribution reliability
- Advocating for lower cost energy policy and regulations

Ability to Contract

While the newness of CCAs means that conversations around credit are a part of every supply contract negotiation, SCP has been able to successfully execute all of its intended transactions. It is SCP's understanding this experience is common to all of the 18 operating CCAs, suggesting that concerns about credit by new CCAs do not appear to be well founded—at least so far.

SCP has prepared to obtain even stronger credit positioning through careful and conservative financial management. SCP incurred debt for set-up costs prior to launch, however in the four years since SCP launched service, it has gone from a peak of $7.5 million in bank debt plus $1.7 million in debt to Sonoma Water to a net position of $75 million (May 2018) with no debt. SCP currently holds reserves equal to four months of expenses and its Board has adopted a financial policy to continue building reserves until six months of expenses are held.

Reliability Planning

In addition to providing system reliability, SCP has roles in integrating renewable sources and helping avoid some IOU investments. With respect to providing reliable power, SCP takes great pride in moving rapidly toward providing over 90% of all energy from zero and near-zero GHG sources in a manner that all electric providers could afford to copy. It requires significant effort to support a reliable grid while using variable (wind and solar) resources in growing amounts. SCP has accomplished this by:

- Procuring a diverse portfolio of renewable and hydropower sources designed to match real-time customer load to the greatest extent practical.
- Negotiating for curtailment rights and flexibility from solar and wind resources, and plan to begin integrating storage into future solar and wind facilities.
- Being prepared to aggregate large amounts of customer load through automated demand response to provide hourly load shaping with both up and down regulation. Include stationary storage in this resource.

SCP also recognizes the significant potential ratepayer savings from using customer-owned resources to provide distribution system reliability, and advocates for the ability to provide non-wires alternatives.

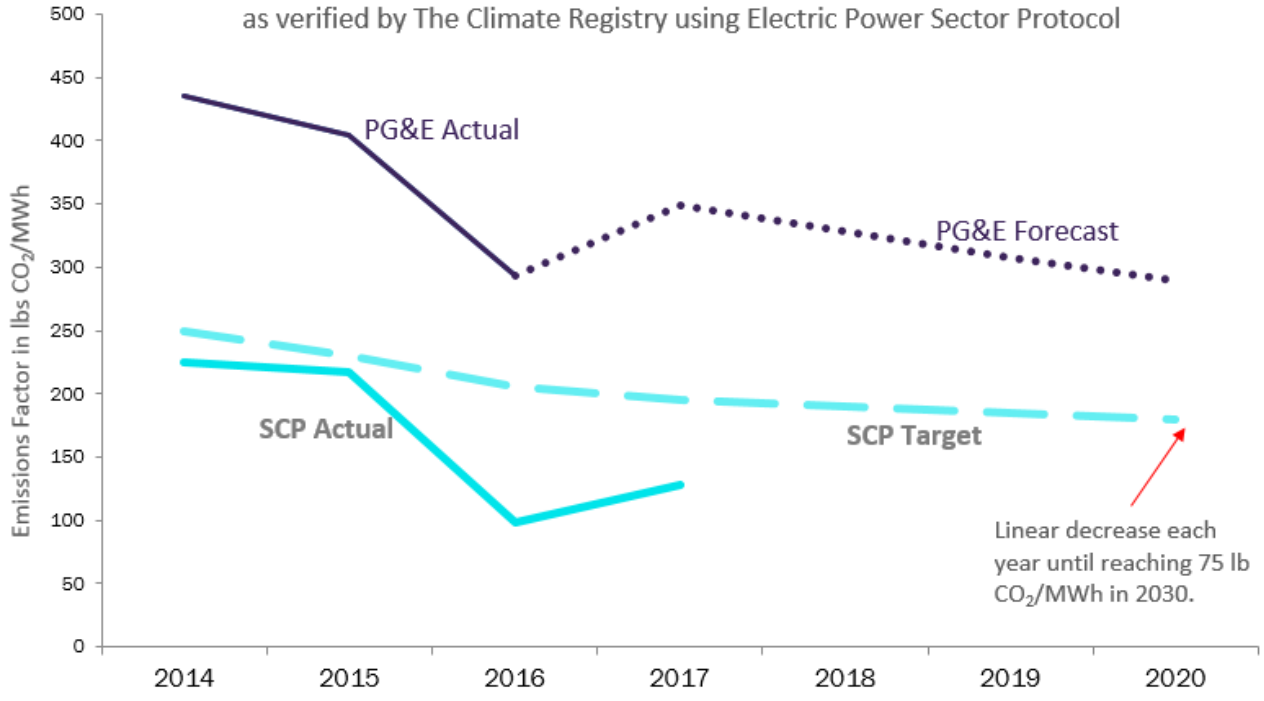
B. Resource Plan Overview

SCP has a policy to plan ahead to ensure its sources for default service are a minimum of 30% lower in GHG intensity than PG&E's default service. SCP's long-term goal is to nearly-eliminate its portfolio emissions and has set ambitious targets of:

- 75 lb CO_2/MWh (0.034 MT CO_2/MWh) by 2030
- 50% RPS-eligible energy by 2020, approximately 6 years ahead of its new CPUC requirement (per SB 100, passed on 9/10/2018)

SCP is on track to achieve these goals. Figure 17 shows the third party verified emission factors from The Climate Registry for PG&E and SCP since SCP's inception along with PG&E's forecast and SCP's targets.

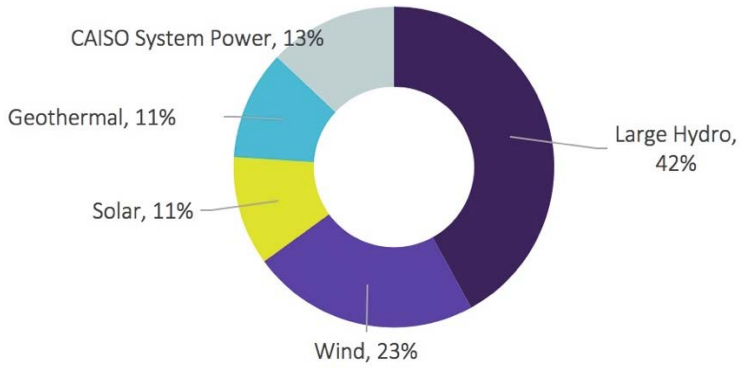
Figure 17
Greenhouse Gas Emissions Factors
as verified by The Climate Registry using Electric Power Sector Protocol



Current Power Supply

SCP works to power Sonoma and Mendocino Counties with clean electricity, while keeping customer rates low and stable. In 2017, SCP provided 13,487 MWh of geothermal energy to its retail EverGreen customers and provided its retail CleanStart customers with 2,367,075 MWh of electricity, 87% of which was sourced from renewables and large hydro, as illustrated in Figure 18. The remaining 13% of SCP's retail CleanStart load was sourced from CAISO system power.

Figure 18
SCP's 2017 Power Sources



To produce the 2017 CleanStart power portfolio illustrated above, SCP had the following contracts:

- 50 MW (249,313 MWh) of local baseload geothermal from the Geysers facility in Sonoma County (13,487 MWh also went to the EverGreen portfolio).
- 100 MW (264,832 MWh) of utility-scale solar from 3 solar projects in Lemoore, CA (30 MW of this solar will discontinue after 2017, so SCP will only have 70 MW beyond 2017).
- 46 MW (6,805 MWh) of utility-scale wind (which went commercial in November 2017) from a repowered wind facility in Livermore, CA
- Energy contracts for large hydro (997,015 MWh) from out-of-state delivered to the CAISO
- Energy contracts for PCC 2 (542,067 MWh). This is renewable power that is generated within the Western Interconnection and delivered (using substitute power) to the CAISO within the calendar year. Such contracts are known as Portfolio Content Category 2 (PCC 2) and qualify as renewable contracts under California's Renewable Portfolio Standard (RPS) regulations.
- CAISO System Power (307,043 MWh). SCP bids/schedules all of its load and contracted supply into the markets run by the CAISO. From a net settlements perspective, this means that SCP buys CAISO system power when its load is greater than its contracted supply, and SCP sells power to the CAISO when its contracted supply is greater than its load.

In 2017, SCP's estimated emissions factor (not yet third party verified) for its CleanStart default service totaled 128 lbs CO_2 /MWh (0.06 metric tons CO_2/MWh).

In 2017, SCP provided 13,487 MWh of 100% geothermal energy to its retail EverGreen customers with an estimated emissions factor of 53 lbs CO_2 /MWh (0.02 metric tons CO_2/MWh).

Planned Future Power Supply

SCP plans to continue local renewable development and contracting for increased renewable and carbon-free resources. SCP specifically highlights the investment in local renewable development within Sonoma and Mendocino Counties. By 2030, SCP plans to have 56 MW of local renewable sources (50 MW geothermal, 6 MW solar) to specifically serve EverGreen customers and supplement the default CleanStart service.

Across all of its contracts—local and otherwise—SCP plans to have the following sources through 2030:

- Geothermal (RPS Portfolio Content Category 1) - In addition to the existing 50 MW of geothermal resources under contract from the Geysers facility in Sonoma County through 2026, SCP plans to procure comparable resources under long-term contract after 2026.
- Solar (RPS Portfolio Content Category 1) - In addition to the 70 MW of utility-scale solar in Lemoore, CA, SCP has 2 MW of Feed-In-Tariff solar in Sonoma County that came online in April 2018. SCP has another 3 MW of Feed-in-Tariff solar under contract in Sonoma County and 1 MW of Feed-in-Tariff solar under contract in Mendocino County. The Feed-in-Tariff projects are expected to come online in late 2018 and mid-2019. SCP is actively working on additional solar contracts to increase the total solar portfolio to 146 MW before 2030.
- Wind (RPS Portfolio Content Category 1) - In addition to the 46 MW of utility-scale wind built and operating in Livermore, CA, SCP recently executed a contract for another 80 MW of utility-scale wind in Northern California. It is expected to come online by January 1, 2021, for a total of 126 MW of wind in 2030.
- Large Hydro - SCP currently has several energy contracts for large hydro both in-state and out of state. Currently, SCP does not contract for shaped hydro.
- Additional short term RPS - SCP currently has PCC2 energy contracts for renewable power that is generated within the Western Interconnection and delivered (using substitute power) to CAISO within the calendar year. SCP plans to utilize short term RPS contracting for either PCC1 or PCC2 resources to true up any needs due to load forecasting variable resource forecasting adjustments through the planning horizon.
- Storage - In accordance with CPUC Decision 13-10-040, SCP must demonstrate storage equal to at least 1% of its 2020 annual peak load with such systems online and delivering by the end of 2024. Accordingly, SCP is actively working on a contract for 5 MW of storage starting in 2023. SCP is also allowed to count portions of customer-installed storage projects towards its 1% requirement, and such portions totaled 0.77 MW as of June 1, 2018. This totals 5.77 MW of currently planned storage in 2030. As more data becomes available on the operation of SCP's 5 MW storage project, SCP will revisit potential additional storage capacity targets.
- CAISO System Power- SCP plans on steadily decreasing its reliance on system power each year to comprise less than 10% of total power purchases by 2030.
- Resource Adequacy (RA)-Only- SCP currently has numerous RA-only contracts that it uses to supplement the long-term RA provided by its RPS PCC 1 contracts to comply with California's RA program. The RA program requires LSEs to demonstrate specific quantities of system, local and flexible capacity in the year-ahead and month-ahead time frames. SCP will continue to fully comply with all RA requirements, and SCP will continue its practice of procuring long-term, multi-year, year-ahead and month-ahead RA.

The following graphs show the current and planned resource generation for each year 2019-2030 as outlined above. Figure 19 (Current Procurement) shows resources under contract or in active negotiation. Figure 20 (Current + Planned Procurement) shows the additional resources that SCP plans to procure through 2030. Since storage only shifts the time generation is put on the grid and doesn't actually generate its own energy, it does not appear on the graph.

Figure 19
Current procurement

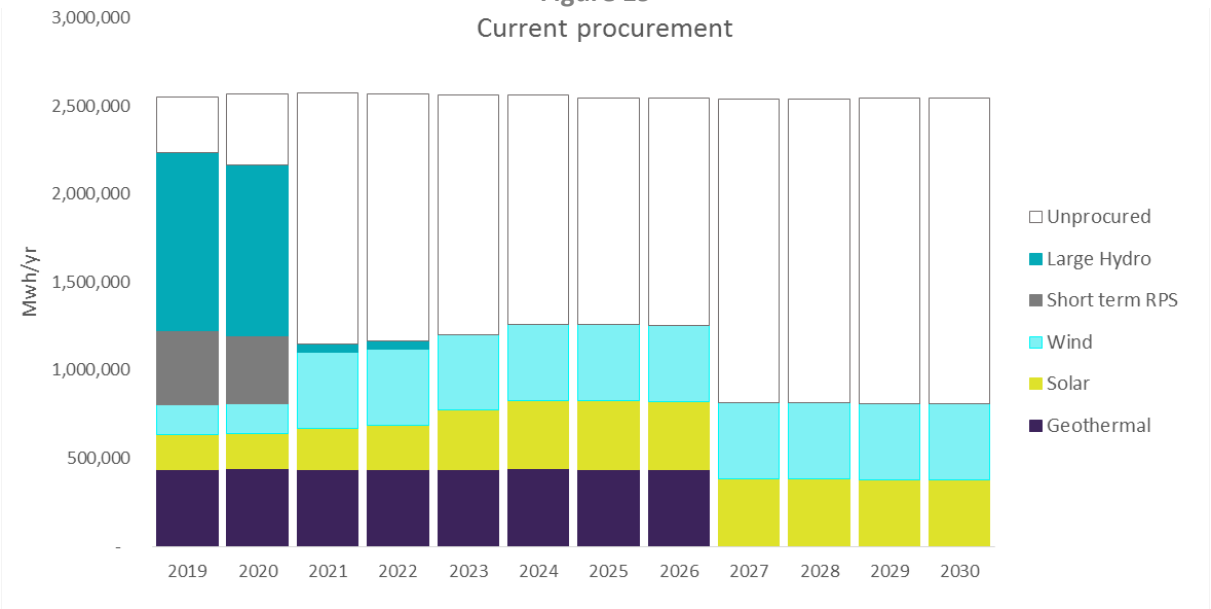


Figure 20
Current + Planned procurement

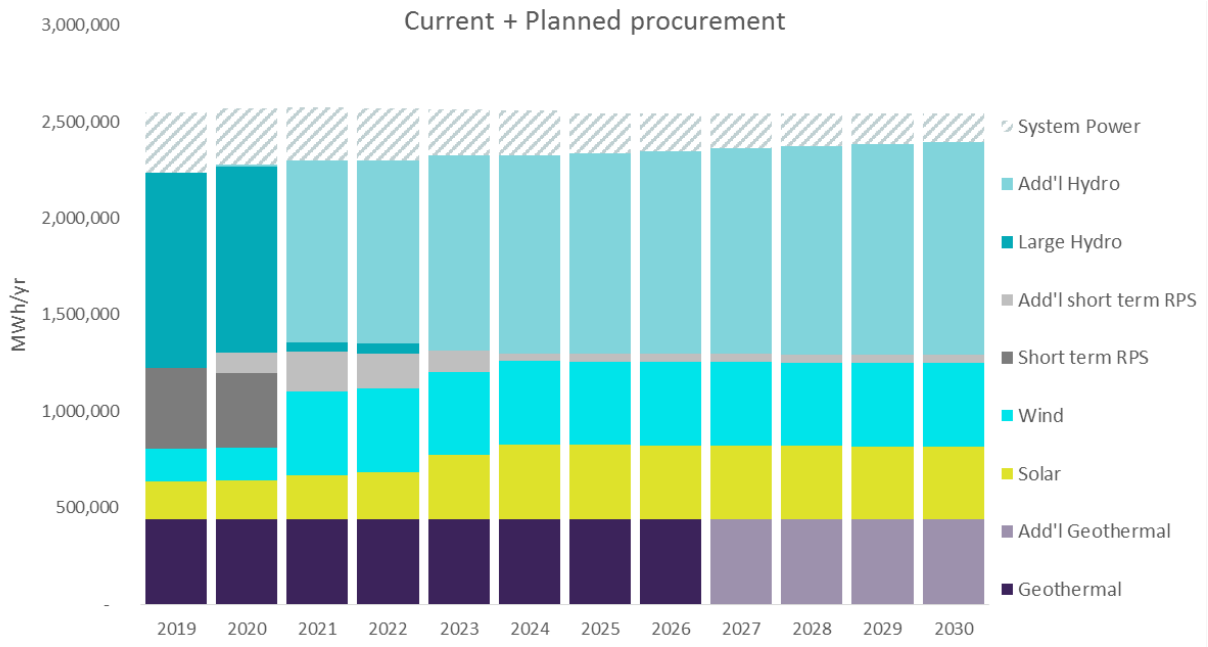
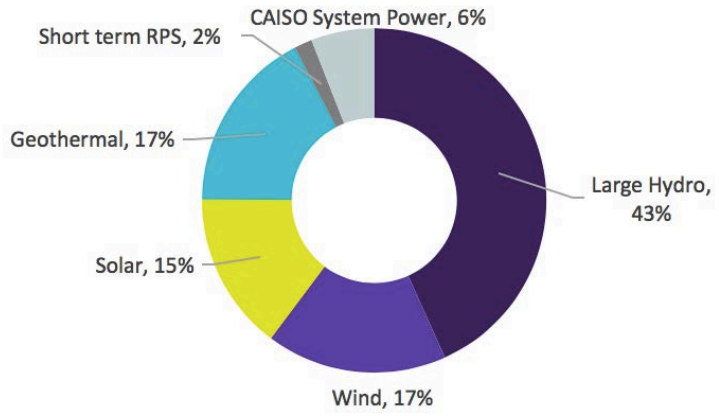


Figure 21 shows the SCP planned percent power mix for 2030.

Figure 21
SCP's 2030 Power Sources



Hourly Load and Supply Matching

In addition to realizing annual targets, the SCP procurement strategy is to work toward aligning the hourly resource supply with the hourly customer load demand. First, SCP procures resources to closely follow the typical demand profile, next SCP endeavors to adjust the load profile through customer programs that will closer align with and react to the real-time profile of the generation sources. This is described further in Chapter 7 Integrated Procurement of Supply and Demand Resources.

The 2030 forecasted hourly profile of SCP's renewable resources is matched with the forecasted load to obtain the hourly net open position as shown in Figure 22. The figure shows the amount of energy needed to procure to meet our load without utilizing hydropower or system power. SCP plans to procure hydropower through 2030, however SCP does not have insight into the dispatch profile of future hydropower contracts. This figure highlights the importance of hydropower in a portfolio to balance variable and seasonal renewable supply. This graph also helps SCP determine periods within the year that hydropower would be most beneficial (for example, the winter and fall months when solar and wind power is not as abundant). The figure shows a few hours of the year where SCP's forecasted renewable supply is greater than the forecasted load. Note that SCP also has the ability to curtail resources when desired and is actively working on contracts that allow for an agreed amount of curtailment hours without penalty or payment.

Figure 22

2030 Forecast Hourly Net Open MWh - without Hydro

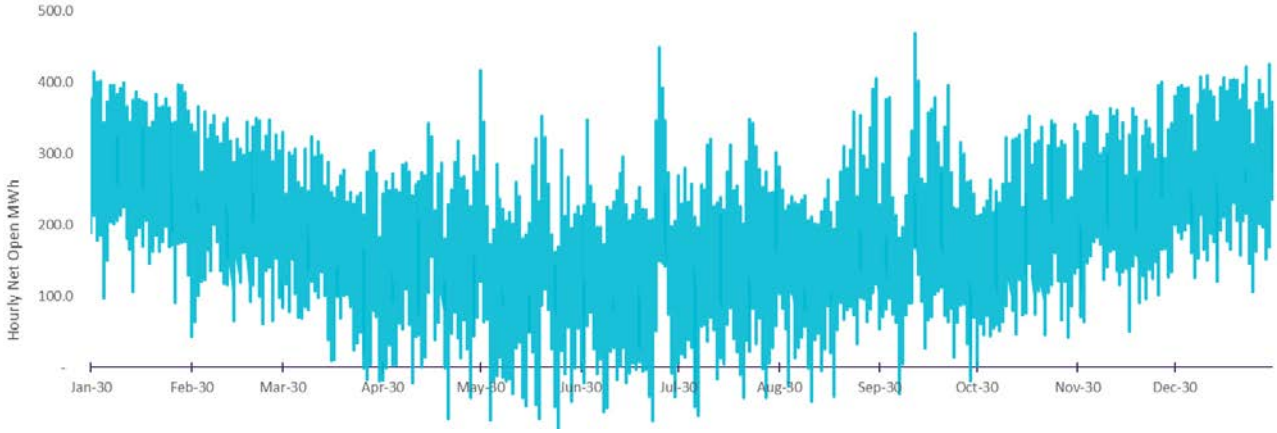


Figure 23 shows the average daily net open position for March, June, September, and December 2030. This level of forecasting shows seasonal variations in hourly open position that inform what hours are needed to fill with a potential future shaped hydropower contract.

Figure 23

2030 Average Daily Net Open MWh

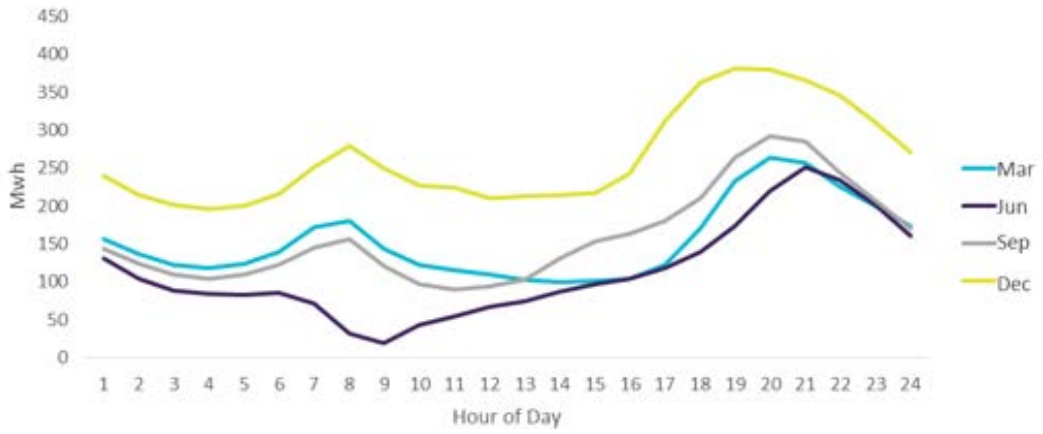
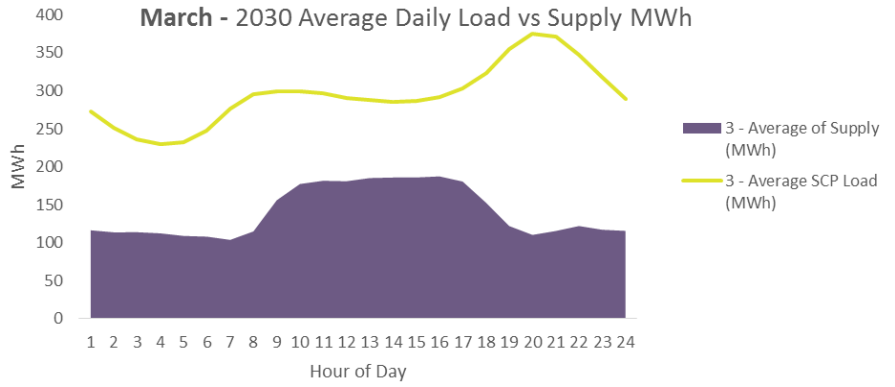
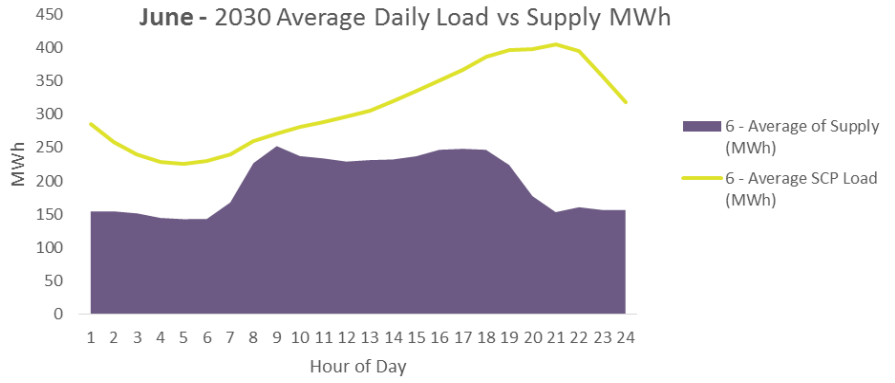
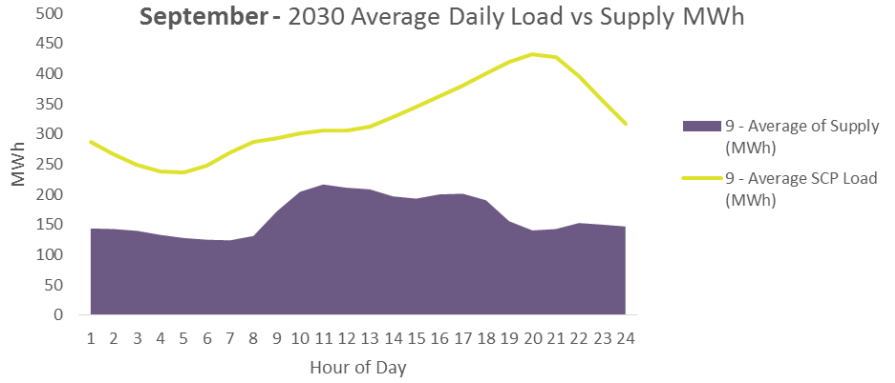


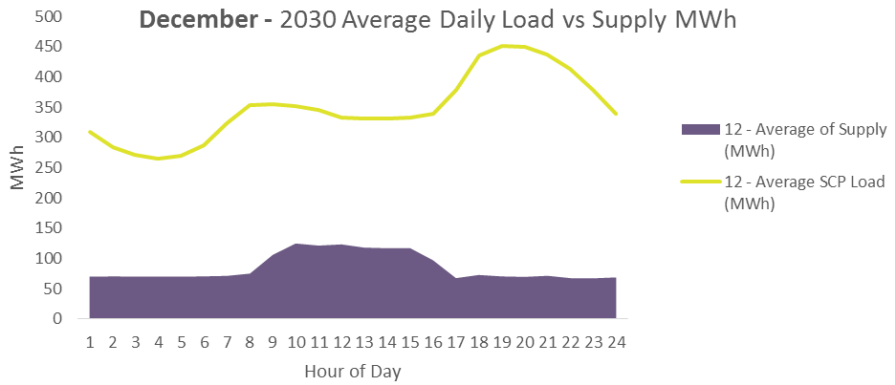
Figure 24 shows a series of graphs that provide another view Figure 23, however instead of just net open position, they explicitly show the 2030 forecasted average daily customer load and average daily resource supply. The difference between the load line and the supply area is the net open position.

Figure 24


March - 2030 Average Daily Load vs Supply MWh
MWh
Hour of Day
3 - Average of Supply (MWh)
3 - Average SCP Load (MWh)


June - 2030 Average Daily Load vs Supply MWh
MWh
Hour of Day
6 - Average of Supply (MWh)
6 - Average SCP Load (MWh)


September - 2030 Average Daily Load vs Supply MWh
MWh
Hour of Day
9 - Average of Supply (MWh)
9 - Average SCP Load (MWh)


December - 2030 Average Daily Load vs Supply MWh
MWh
Hour of Day
12 - Average of Supply (MWh)
12 - Average SCP Load (MWh)

6. Integrated Procurement of Supply and Demand Resources

A. Procurement

SCP procures both supply and demand resources to meet its customer needs. The integration of this effort, and the reliance on customer-owned resources, has growing importance as California continues to increase its use of solar and wind.

Supply Resources

SCP's procurement activities are structured to meet compliance obligations and agency goals. The exact portfolio characteristics selected must constantly adapt to legislative and policy changes, technological improvements, and new information about markets and risk. To manage this future uncertainty, SCP continuously examines and estimates supply and customer demand, including demand trends as they relate to population of customers served, climate, energy efficiency, distributed generation, electrification of vehicles and buildings, and emerging industries. SCP structures its procurement efforts to balance customer demand with resource commitments. SCP also considers the deliverability characteristics of its resources and reviews the respective risks associated with short and long-term purchases as part of its forecasting and procurement processes. These efforts have led to a diverse resource mix that addresses grid integration issues, closely matches our electrical supply to our customers' demand and reduces ratepayer risk. SCP examines the need to procure new resources when significant change in load is expected to occur (e.g. phasing in new territories). If further procurement is deemed necessary, bilateral transactions as well as Requests for Offers (RFOs) to fill these needs are issued to the market and offers are assessed to determine the best outcome for SCP's portfolio.

SCP also operates ProFIT, a feed in tariff program designed to promote medium-sized solar installations in Sonoma and Mendocino counties that has resulted in six contracts to build approximately 6 MW, 2 MW of which came on line in April 2018.

B. Demand Resources

SCP currently operates 17 customer programs, all of which are designed to keep energy affordable while reducing greenhouse gas emissions and supporting grid reliability. SCP does not currently see value in duplicating or competing with PG&E's customer programs, but instead advertises them to customers or thinks of creative ways to layer additional offerings on those programs. SCP's programs can be categorized to have the following impact on SCP loads: renewable integration/system reliability, load reducing, load shifting, and minimal load impact. For more comprehensive information on SCP's customer programs, see the *Programs Group Strategic Action Plan* (Exhibit B).

Programs that Support Renewable Integration and System Reliability

While SCP doesn't focus specifically on programs that build load, goals such as the displacement of petroleum in on-road transportation and natural gas in building heating and water heating have a natural effect of increasing customer electrical usage while reducing greenhouse gas emissions. Programs that build load are paired with strategies to shift this increased load to minimize additional need for supply resource procurement or costly grid infrastructure upgrades.

Through its Drive EV Program, SCP has negotiated bulk discounts averaging more than $11,000 per car for the purchase or lease of electric vehicles. Since the fall of 2016, 773 electric vehicles have been sold or leased through the program. Based on a post-program evaluation, the 2017 program is anticipated to save 4,985 metric tons of CO2 over the next three years.

Based on post-purchase surveys, most Sonoma and Mendocino county EV owners want to charge their vehicles at home. To this end, SCP provides Free Residential Level 2 Charging Stations to its customers. This program resulted in the shipment of 1681 (as of June 1, 2018) electric vehicle charging stations. SCP works to ensure charging stations are not used during the evening ramp period by integrating the chargers into its GridSavvy program.

A program to incentivize the purchase of EV's by local non-profits has resulted in 3 EVs being provided. This program will continue into 2019.

SCP is currently operating a workplace charging pilot program to help 5 workplaces in Sonoma and Mendocino counties evaluate the costs and benefits of installing large scale electric vehicle charging station projects. This program works collaboratively to funnel customers to PG&E's EV Charge Network program.

The Advanced Energy Rebuild Program is a unique program created in partnership with PG&E and the BAAQMD to incentivize those rebuilding their homes after the 2017 fires to do so in an energy efficient and carbon-free manner. While these homes will represent a significant reduction in load over their pre-fire equivalents, SCP expects to see a gradual increase in customer load as these homes come online.

Programs that Reduce Load

Load reduction programs tend to be cost effective per current CPUC cost-effectiveness metrics, which make them a natural fit for investor-owned utilities (IOUs) such as PG&E. Because of SCP's efforts to not duplicate existing PG&E programs and its ability to more quickly establish customer programs, SCP instead chooses to focus on areas where we can innovate and be more responsive to Sonoma and Mendocino counties' specific needs.

A net energy metering program called NetGreen has resulted in payments of $2.1 million to 4,400 customers who have produced excess local renewable energy.

SCP has partnered with the County of Sonoma and the Sonoma County Water Agency to provide Do-It-Yourself Energy and Water Saving Toolkits that include energy and water efficiency devices such as LED lightbulbs, low-flow devices, weatherstripping at almost all libraries in SCP's territory. The toolkits, which can be checked out for free just like a book, have been checked out 296 times as of June 2018.

In summer of 2018, a program designed to promote low income solar installations on homes was initiated in partnership with Grid Alternatives. The program is currently evaluating the installation of solar on 30 qualified Sonoma Clean Power customer leads.

SCP funds Solar Sonoma County, which provides support to local residents who wish to install renewable energy systems. Solar Sonoma County provides impartial advice regarding PV siting, financing and contractor selection.

SCP has a program to provide free assistance to commercial customers with energy audits or in planning and implementing energy efficiency upgrades on an as-needed basis.

SCP was awarded a $9.8 million grant from the CEC to promote energy efficiency and fuel substitution technologies in the residential sector. The goal of the grant is to deploy energy efficiency in a total of 300,000 square feet of customer space and reduce energy usage by 10% in participating residential projects and 20% in participating commercial projects.

Programs that Shift Load

SCP has progressed from traditional utility program models to start thinking about time-valuation of energy and how best to match customer load with procured supply.

A Commercial and Industrial Battery Storage Pilot Program was implemented to assist commercial customers in reducing their demand charges through battery storage. Properties for the pilot were targeted based on an analysis of SCP customers with the largest peak demand.

A market assessment of the potential for heat pump water heaters in SCP territory was completed. SCP is working with heat pump water heaters to ensure products are capable of receiving a remote OpenADR signal so that heat pump water heater thermal storage capacity can be more readily leveraged as a grid resource in the GridSavvy program.

GridSavvy is a grid reliability platform with the capability of automatically dispatching technologies such as electric vehicle chargers, heat pumps, thermostats and stationary batteries to both increase and decrease load on a fast signal. The goal of GridSavvy is to achieve Proxy Demand Response participation in 2020, Non-Generating Resource participation in 2024 and qualified System Resource Adequacy in 2030. Currently there are over 500 customers that are participating in GridSavvy's first offering, which controls electric vehicle charging stations.

Programs with Minimal Load Impact

An Induction Cooking Lending Program has been established so customers can borrow and test induction cooktops. While there is minimal direct load impact, it is hoped to encourage installation of induction cooktops in new construction and retrofit projects.

The SWITCH electric vehicle education program placed 5 electric kit cars in local high schools in Sonoma and Mendocino counties to educate students about the manufacture and maintenance of electric vehicles. While this program is not expected to have direct impacts on customer load, it is seen as an educational resource that may increase EV penetration in the future.

An Energy Education Program for Schools was initiated in the Fall of 2017 and ran through the school year, reaching over 10,000 students with information about energy efficiency, climate change and actions students can take to help the environment.

Methods for the long-term planning of demand resource grid impacts are still rudimentary, and lacking important sources of data. While SCP routinely makes estimates of EV adoption rates, residential efficiency programs, updates to Title 24 building codes, amounts of new customer-owned solar power, etc., there are a number of data sources that would greatly improve the ability to forecast demand resources and the financial value of those resources. These include:

- Use of actual residential smart meter data for scheduling loads into CAISO. Currently, IOUs use average profiles for residential customers rather than actual demand profiles, meaning that load-

serving entities cannot generate the same financial rewards from residential customer participation in demand response programs, thereby leaving these customers behind.

- Public access to gasoline and diesel fuel sales by ZIP code to allow more accurate fuel switching calculations from transportation electrification efforts.
- Public access to real-time electric circuit data and regular updates to approved connected loads and net-metered resources by circuit to allow improved distributed energy resource planning by customers, CCAs and third parties.

C. Managing Risks

Supply Resource Risks

When making power procurement decisions, SCP considers numerous market factors which may include the following:

- Market price risks (CAISO Locational Marginal Pricing (LMP), Resource Adequacy (RA) prices, eligible Renewable Portfolio Standard (RPS) prices, Specified-source prices, etc.)
- Locational price risk of physical resources
- Counterparty credit risk
- Contract language in long-term contracts
- Curtailments
- Variance from load forecasts
- SCP's customer participation/opt-out rate
- Assignment of unplanned resources (for example, through the Cost Allocation Mechanism (CAM), Reliability Must-Run (RMR), Capacity Procurement Mechanism (CPM))
- Legislative and regulatory changes (for example, RA, RPS, and Power Source Disclosure (PSD) requirements)

The primary price risks are legislative and regulatory. For example, SCP may procure its portfolio using current and existing guidelines in order to meet our agency goals while meeting or exceeding state mandates. Should the laws change or be implemented differently than originally intended, this would cause SCP to have to procure additional resources in order to meet the mandates, resulting in overprocurement and additional customer costs. Other common business risks include load forecast error, unexpected changes in customer participation, supply forecast error (e.g., variable generation output of solar and wind resources), generation curtailment risks, and forward pricing peak and off-peak unhedged energy.

These risks are managed through several common approaches, including diversity of supply technology, location, length, supplier, and financial hedging. SCP has signed long-term contracts with geothermal, solar, and wind renewable resources to minimize dependence on any one supply resource type. SCP's supply is also geographically diverse in Northern California to manage to price spread from the generator LMP to the load LMP. Using various locations in Northern California enable SCP to manage any large

variances between what we purchase from the CAISO (load bids) and what we sell to the CAISO (generation offers). SCP seeks to spread the mix of generation resources over various LMP locations, so that the price risk is not too concentrated in any one area. In addition to carefully selecting the physical location of renewable assets, SCP will stagger the contracting terms for our long-term contracts. Some long-term contracts are for 10 years, while others are for 20 years. SCP works with expert industry counsel to negotiate these long-term contracts in order to anticipate market changes that will enable SCP to be protected under changing conditions. SCP also financially hedges its position. Instead of making one big purchase to fill a position, SCP makes multiple purchases over time, providing flexibility to respond to market conditions while achieving budget predictability. SCP will benefit in periods of price declines, as well as have the security of knowing that price increases will be mitigated over time. This helps SCP achieve our business goals, manage price risk and achieve budget certainty.

Although the capacity market in California is evolving, SCP has taken steps to hedge our risk for changing market rules and conditions. Currently, the capacity market mandates an LSE must be 100% complete for meeting their Local Area capacity obligation 60 days before the beginning of a calendar year. SCP has gone out as far as 20 years to hedge some of that obligation. In fact, SCP has ~80% of its anticipated Local Area obligation purchased for the next four years.

Demand Resource Risks

Common risks associated with demand resources include:

- Availability of dispatch. Smart grid devices, such as thermostats, heat pumps, electric vehicle chargers, solar inverters and batteries, may be part of an aggregated resource bid into the CAISO's Proxy Demand Resource or Non-Generating Resource markets, PG&E's DRAM, or potentially full qualifying Resource Adequacy. However, a key element of each of these markets is the level of certainty that the resource will respond to a signal, when requested. SCP plans to mitigate this risk through statistical diversity of customers, including a margin for error, and operating networks to test availability and response before committing grid resources.
- Incomplete participation. The process for enrolling customer resources in grid services is cumbersome and complex, involving multiple forms, and several steps for registration. SCP is working to streamline enrollment to make participation easier. To date, SCP estimates that less than one quarter of installed smart grid resources are currently registered in a grid resource.
- Legislation. Barriers to customer participation in grid reliability are routinely proposed in legislation, likely because they pose a risk to supply-side resource providers. SCP works to ensure that customers retain the ability to use smart grid technologies and to receive full value for those technologies, including offsetting supply-side resources when appropriate.

7. Exhibit A: CPUC IRP Compliance Filing

8. Exhibit B: SCP Programs Strategic Action Plan