

CleanPowerSF Growth Plan

May 2017 | Final Report



San Francisco
Water
Power
Sewer



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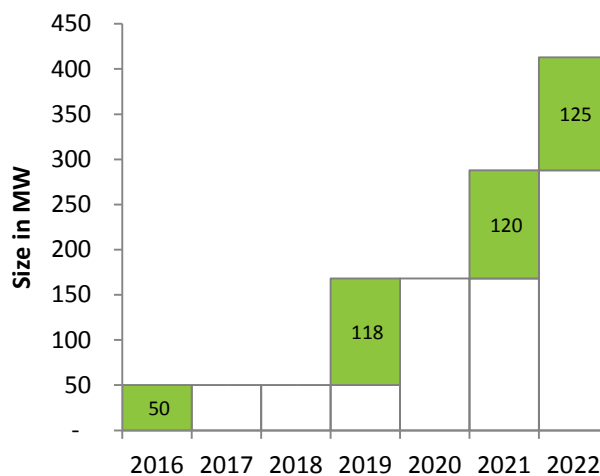
Acronyms and Abbreviations

CARB	California Air Resources Board
CARE	California Alternate Rates for Energy
CalCCA	California Community Choice Association
CEC	California Energy Commission
CAISO	California Independent System Operator
CPUC	California Public Utilities Commission
CCA	Community Choice Aggregation
CRM	Customer Relationship Management
DA	Direct Access
ERRA	Energy Resource Recovery Account
ESP	Energy Service Provider
FFS	Franchise Fee Surcharge
FTE	Full Time Equivalent
GW	Gigawatt
GRC	General Rate Case
GHG	Greenhouse Gas
IRP	Integrated Resource Plan
ITC	Investment Tax Credit
IOU	Investor-owned Utility
KWh	Kilowatt Hour
LSE	Load Serving Entity
MCE	Marin Clean Energy
MW	Megawatt
MWh	Megawatt Hour
MDMS	Meter Data Management System
NEM	Net Energy Metering
PG&E	Pacific Gas and Electric
PCIA	Power Charge Indifference Adjustment
PPA	Power Purchase Agreement
PCC 1	Product Content Category 1
PCC 2	Product Content Category 2
PCC 3	Product Content Category 3
PGC	Public Goods Charge
REC	Renewable Energy Credit
RPS	Renewable Portfolio Standard
RFO	Request for Offers
RFP	Request for Proposals
RA	Resource Adequacy
SFPUC	San Francisco Public Utilities Commission
SCP	Sonoma Clean Power

1.0 Introduction: Growth Plan Purpose and Approach

In December 2015, the San Francisco Public Utilities Commission (SFPUC) Power Enterprise staff presented a Business Plan for the launch of CleanPowerSF. The 2015 Business Plan laid out the initial schedule (Figure 1) for growing CleanPowerSF beyond 2016’s planned Phase I launch of 50 MW¹, showing CleanPowerSF growing in 100-125 MW blocks of average electricity demand until reaching full service of approximately 350,000 customers and 413 MW of average demand in 2022 (assuming a 20% opt-out rate).²

Figure 1: Business Plan Growth Projection (Average Demand in MW)



Guided by the Commission-adopted program goals³ and Business Practice Policies (included as Appendix A-1), CleanPowerSF launched service to approximately 7,800 customers in May 2016. A second large auto-enrollment was conducted in November 2016, bringing the total Phase 1 *active* enrolled customers to approximately 75,000. In this time the program has maintained an opt-out rate of about 3.2%, and has attracted approximately 1,700 pre-enrollments and 2,350 upgrades to 100% renewable *SuperGreen* service.

With the launch of Phase I completed in November, and in response to Commission and stakeholder interest, SFPUC staff has turned its focus on planning for program growth to citywide service. ***The purpose of this Growth Plan is to determine the best options – consistent with program goals – for expediting the expansion of CleanPowerSF service throughout the City and County of San Francisco.***

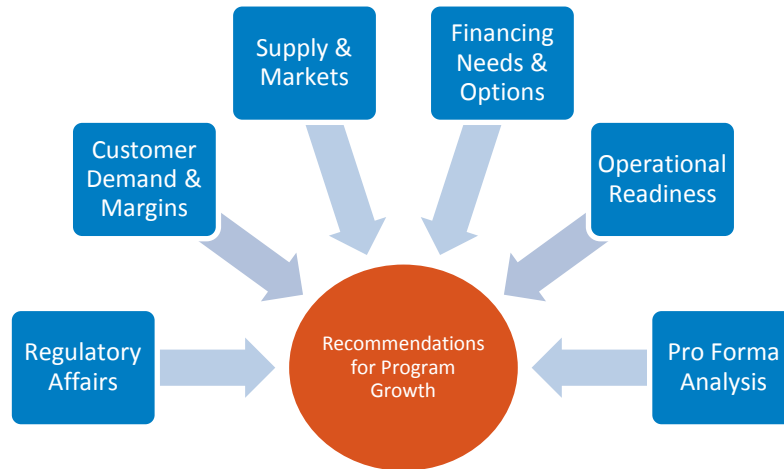
¹ The Business Plan projected an average program annual demand after opt-out of 50 MW in 2016, but the popularity of CleanPowerSF led to unexpectedly low opt-out rates, resulting in an average demand of 60 MW.

² The 2015 Business Plan assumed a 20% opt-out citywide, which is higher than current expectations.

³ CleanPowerSF goals are: 1) Provide affordable and reliable service; 2) Develop an electricity portfolio that offers San Franciscans cleaner energy alternatives; 3) Invest revenues in new local renewable projects and jobs when feasible and cost-effective; and 4) Provide for long-term rate and financial stability.

Over the past several months, CleanPowerSF staff, supported by consultants and personnel across the SFPUC, has conducted research and analysis to determine the feasibility and best approach to program expansion. This work was divided up across a number of subject areas identified in Figure 2 below.

Figure 2: Growth Plan Approach



To complete this work, CleanPowerSF staff:

- Reviewed CCA regulatory compliance and reporting obligations;
- Analyzed electricity usage and customers in the City to better understand the economics of providing service;
- Analyzed electricity market price trends and the availability and pricing of renewable energy;
- Interviewed a number of power suppliers to better understand their interest in supplying the program, their company’s approach to credit and what kinds of projects they had in their development pipeline;
- Interviewed financial institutions to understand their interest in providing financial services to CleanPowerSF and CCAs generally;
- Assessed the requirements to become operationally ready to serve more than 300,000 accounts;
- Examined the organizational structure and staffing of other operating CCAs, including functions they have prioritized for internal staffing versus functions they outsource;
- Worked internally across the SFPUC to understand program scaling requirements and timelines for developing new systems to support greater operational independence; and
- Conducted analyses to understand the total financial requirements, risks and feasibility of growth.

What follows in the sections below are staff’s recommendations for expanding CleanPowerSF service citywide and detail regarding the findings of this research and analysis. A timeline for implementing program expansion is provided at the end of this report.

2.0 Recommendations

CleanPowerSF staff has developed the following recommendations on growth pace, processes, staffing and policies.

2.1 Complete Citywide Enrollment by the End of Fiscal Year 2018-2019

Enrolling all of the remaining electricity customers in San Francisco represents a significant jump in the number of accounts and energy demand to be served by CleanPowerSF (see Figures 3 and 4 below). Citywide expansion will take the program from 75,000 accounts today to approximately 350,000 accounts at full scale (more than 4.5 times the number currently served, assuming a future opt-out rate of about 10%). It will also increase program revenues from approximately \$38 million per year today to \$260 million per year at full scale (more than 6 times the amount of energy currently served).

Figure 3: Customer Count Phase 1 to Citywide

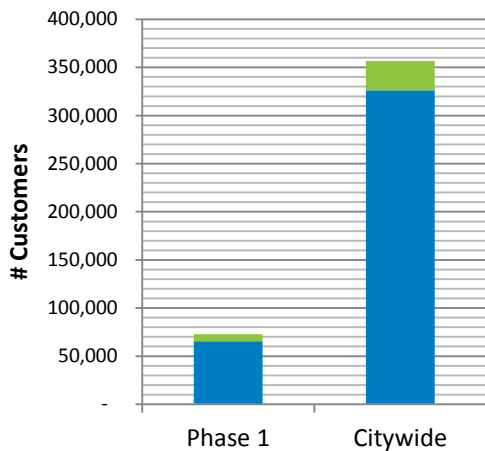
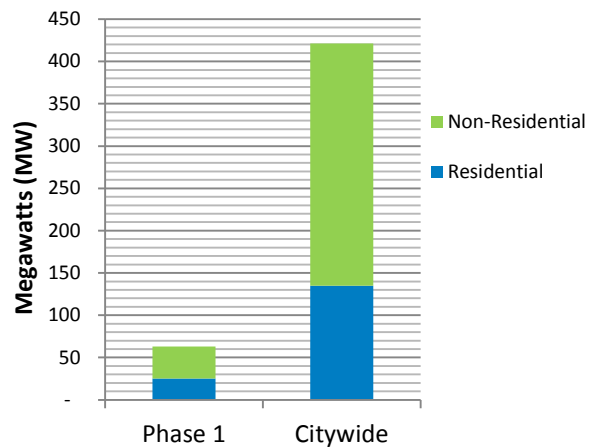


Figure 4: Program Energy Demand Phase 1 to Citywide



Staff recommends completing citywide enrollment within two years, by the end of FY 2018-2019, with the next major auto-enrollment phase to occur in May 2018. Staff has determined that May is a good month for conducting auto-enrollment because residential customers’ electricity and natural gas usage is lower during this time of year, making it less likely residential customers will mistake higher PG&E energy bills with CleanPowerSF enrollment. The exact timeline for achieving full enrollment will depend on the results of staff’s efforts to secure financing, additional power supplies and the ability to meet program phasing policy criteria (such as meeting or beating PG&E rates).

Just as when CleanPowerSF launched in 2016, some of these elements can only be determined after receiving bids for power supply (See Recommendation 2.3 below). Additionally, it is important to have as much certainty as possible regarding what PG&E rates will be for the enrollment period, especially the Power Charge Indifference Adjustment (PCIA). The PCIA is reset on January 1st each year, so it is prudent to conduct auto-enrollments with large numbers of customers after this date.

Staff therefore believes that two years is a reasonable amount of time to conduct the necessary procurement to serve citywide demand and acquire the staffing, consulting and other operating resources necessary to successfully execute citywide service. This timeframe will provide CleanPowerSF with some flexibility to manage power market price and supply risk⁴, and the lead time needed to add staff and other resources to support growing operations.

The proposed two-year timeline is notably faster than the timeline presented in the 2015 Business Plan, which projected completion of citywide auto-enrollment in 2022. Since CleanPowerSF is operating – and growing – in a dynamic environment (including changing market conditions and regulatory requirements), it is important that the SFPUC remain flexible in how it approaches program expansion. As a risk management measure, the SFPUC should be willing to slow things down if market or regulatory conditions do not warrant expansion; similarly, the SFPUC should consider speeding up expansion if opportunities arise.



Photo 1: Shiloh Wind Farm (primary source for SuperGreen product)

⁴ For example, by spreading the increments of power purchased to serve the entire city over a couple of years, the program may be able to reduce the likelihood of short-term supply scarcity driving up power supply costs.

2.2 Issue a Request for Proposals to Acquire Third Party Financing Support

Significant additional financial resources will be required to grow the CleanPowerSF program citywide. Staff estimates that at full-scale, the credit requirements associated with program power supply could be upwards of \$60 million and fully funding the reserves (Operating Fund and Rate Stabilization Fund) will require as much as \$80 million by 2021.

CleanPowerSF has been established as a financially separate entity within the SFPUC to provide financial transparency to program stakeholders, suppliers, and the financial community and to protect the Power Enterprise from undue financial risk.

To support the financial requirements of program growth, staff proposes to issue a Request for Proposals (RFP) for third party financial services by July 2017. A key purpose of this financial support will be to secure CleanPowerSF's power purchase transactions. These services may include a variety of financial instruments such as revolving letters of credit for power supply, or a term loan for working capital. Staff plans to approach acquiring financial services in a manner that avoids any additional financial support from the Power Enterprise.

2.3 Issue a Request for Offers for Power Supply to Serve the Program at Full-Scale

The ability to offer CleanPowerSF service citywide – on any timeline – will depend on the availability of cost-effective supplies of electricity that meet program goals. As a result, to support program service expansion citywide, CleanPowerSF staff proposes to issue a Request for Offers (RFO) for power supplies by July 2017.

The proposed RFO will seek bids to serve the program's projected demand at full scale. This will allow staff to determine whether there is sufficient power supply at cost effective prices to expand and how quickly service expansion can be completed. The solicitation will also seek bids from both operating and new, or to-be-constructed, renewable energy plants. Ultimately, a goal of the program is to develop new renewable energy resources. If the solicitation returns insufficient renewable energy from operating projects, the program can focus on developing new projects to meet customer demand. Future customer enrollments can then be synchronized with the dates that new renewable energy resources come on-line.

Based on research and discussions with suppliers and project developers, staff believes that it is possible to acquire the energy needed to significantly expand CleanPowerSF service next year. However, the exact scale of growth will be dependent on the amount of *cost-effective* renewable and GHG-free energy available in the market in the next 12-36 months. Due to the significant volume of renewable energy that CleanPowerSF will be seeking to acquire, staff believes that it is prudent to see what the renewable energy market can provide in the near-term before committing to a specific enrollment schedule.



Photo 2: CleanPowerSF Signs First Power Supply Contracts

2.4 Adopt a Goal of 50% Renewable Energy for the Default *Green* Product by 2020

In December 2015, the Commission adopted a Portfolio Content Policy for the CleanPowerSF program establishing a goal of providing 35% renewable energy content for the default *Green* product of at program launch. CleanPowerSF exceeded that goal in 2016 by delivering 40% renewable energy in its *Green* product. Increasing San Francisco’s reliance on renewable energy, and eliminating greenhouse gas emissions from the electricity supply serving San Francisco by 2030, is a City goal, and a goal of the CleanPowerSF program.⁵ Moreover, increasing the program’s renewable energy content, while remaining competitively priced, is central to the program’s value proposition to customers.

To provide CleanPowerSF program with a portfolio content target that helps it maintain its competitive position and provide value to San Francisco, staff recommends the SFPUC adopt a goal for the *Green* product of 50% renewable energy content by 2020. Research conducted during this growth planning process points to the likely availability of renewable energy supply in California to support this objective, if action is taken immediately to begin engaging with the renewable energy suppliers.

⁵ Board of Supervisors, “Greenhouse Gas Emissions Reduction” Resolution (158-02) and Ordinance 8108, San Francisco Environmental Code § 902

In addition to helping the City combat climate change, meeting the program's renewable energy goal will be the major driver of new clean energy job creation. Sourcing more renewable energy within California will create jobs in the construction and operation of renewable power plants. Staff has estimated 1,300 to 5,000 jobs may be created over the next 4 to 5 years to support CleanPowerSF's achievement of the proposed 50% by 2020 renewable energy goal.⁶ The ultimate number of jobs created will depend on the amount of energy sourced from new versus operating renewable energy plants.

2.5 Staff up to Run the Program Successfully, Adding Staff to Core Functions Immediately

Finally, to support all of the operating and customer service needs of the program, CleanPowerSF will need to staff up. Citywide service will significantly increase CleanPowerSF's power supply requirements, and adding staff resources to procure and manage those contracts will be critical to success.

In the near-term, staff proposes focusing hiring on functions that are most immediately critical to the success of the program:

- Energy Supply Portfolio Management
- Power Settlements
- Risk Management
- Regulatory and Legislative Affairs
- Account Management
- Customer Service

Staff has identified 14.5 full time equivalent (FTE) positions are needed immediately to support additional customer enrollment in May 2018. The addition of these positions would bring total CleanPowerSF-funded staff to 30 FTEs. Professional services contractors will also be needed to fill gaps in the near and medium-term.

Under this plan additional staff would be onboarded over the balance of the enrollment period, bringing CleanPowerSF funded positions to an estimated 50-55 FTEs. This staffing projection is consistent with MCE, the most mature CCA program operating in California, which has about 40-45 FTEs, and whose program sales are a bit lower than what is expected for CleanPowerSF at full scale.

2.6 Work with Stakeholders to Develop Initiatives that Support Low Income Participation

The CleanPowerSF program endeavors to offer cleaner electricity at stable rates that are affordable and competitive with PG&E's electricity rates for comparable service. Additionally, CleanPowerSF is

⁶ This projection assumes 20-80% of CleanPowerSF's renewable energy is sourced from newly constructed renewable plants.

committed to ensuring that all members of the community, regardless of income, have the opportunity to participate and receive the benefits of cleaner electricity service.

There are a number of options available to the City and the SFPUC to facilitate program participation from low-income members of the community. Examples include, but are not limited to:

- (1) prioritizing rate stabilization funds for qualifying low-income customers;
- (2) allowing CleanPowerSF customers or private companies doing business with the SFPUC, as part of a community benefits package, to donate to an “angel fund” to help low-income customers receive cleaner energy with either CleanPowerSF’s *Green* or *SuperGreen* service; and
- (3) providing targeted energy efficiency services to low-income customers to help them reduce their overall energy bills, making it easier for them to participate in CleanPowerSF.

Staff recommends working with stakeholders to identify and develop new initiatives that support low-income participation in the CleanPowerSF program. Staff recommends this work be undertaken in FY 2017-2018 so that new programming and policies can be available by the time CleanPowerSF completes citywide enrollment.



Photo 3: CleanPowerSF Net Energy Metering (NEM) Community Workshop

3.0 Detailed Findings

The findings that led to these recommendations are detailed below, organized by research and analysis conducted in the following areas:

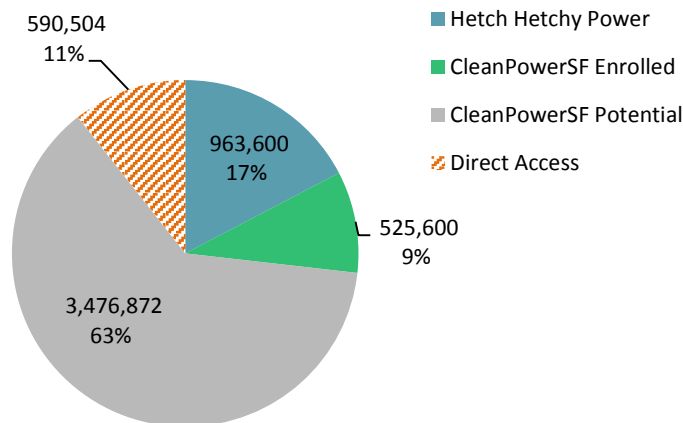
- Customer Makeup & Demand
- Power Supply & Markets
- Financing Needs & Options
- Operational Readiness
- Regulatory and Legislative Affairs
- Pro Forma Financial Analysis

3.1 Customer Makeup and Demand

For the purpose of planning program growth and configuring enrollment phases, it is critical to understand the potential energy demand and characteristics of the full potential customer base to be enrolled. Electricity usage in San Francisco varies by customers class, as do the rates PG&E charges for generation service. This is important because the cost to serve different customer classes varies, as does the revenue potential for CleanPowerSF, given the goal of offering affordable and competitive rates compared to PG&E.

Figure 5 shows San Francisco’s total electricity consumption of more than 5 million megawatt-hours (MWh) annually.

Figure 5: Average MWh Usage (MWh, %)



For purposes of this plan, CleanPowerSF’s total potential customer base is the sum of the customers currently enrolled (shown in the bright green pie slice), and customers currently purchasing power generation through PG&E’s bundled service (shown in the grey pie slice). Together, these slices total approximately 4 million MWh annually – or about 460 MW of average demand (i.e., before opt-out is calculated for future enrollment). Customers already served by the SFPUC’s Hetch Hetchy power are public power customers and are not eligible for CleanPowerSF enrollment. Direct Access (DA) customers are eligible for CleanPowerSF, by

statute, but auto-enrolling may not be the best strategy to attain them. DA customers receive service under contract with third party Energy Service Providers (ESPs). Auto-enrolling these customers could break their ESP supply contracts and may imperil their ability to return to DA service, participation in which is capped and currently has a waiting list for new participants. The CleanPowerSF team is proposing that DA customers be enrolled only at a customer’s request or otherwise held out of the program’s auto-enrollment plans until all other eligible customers have been enrolled.

3.1.1 CleanPowerSF Potential Customer Overview

As shown in Figures 6 and 7 below, 91% of the City’s eligible CleanPowerSF accounts are residential (green slices of the pie), but these accounts represent only 31% of the total citywide energy usage. In contrast, commercial and industrial customers represent 9% of all accounts, but make up 68% of the total CleanPowerSF potential energy demand.

Figure 6: Electricity Accounts

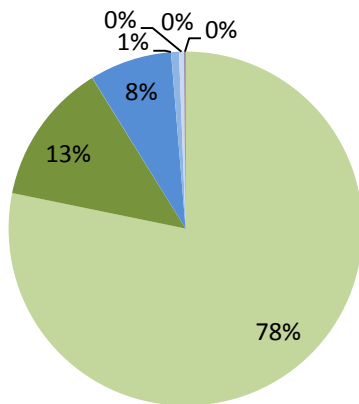
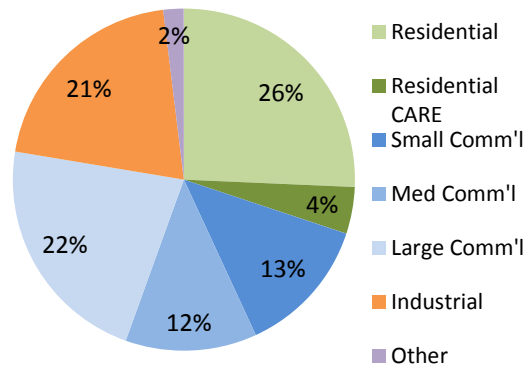


Figure 7: Electricity Usage



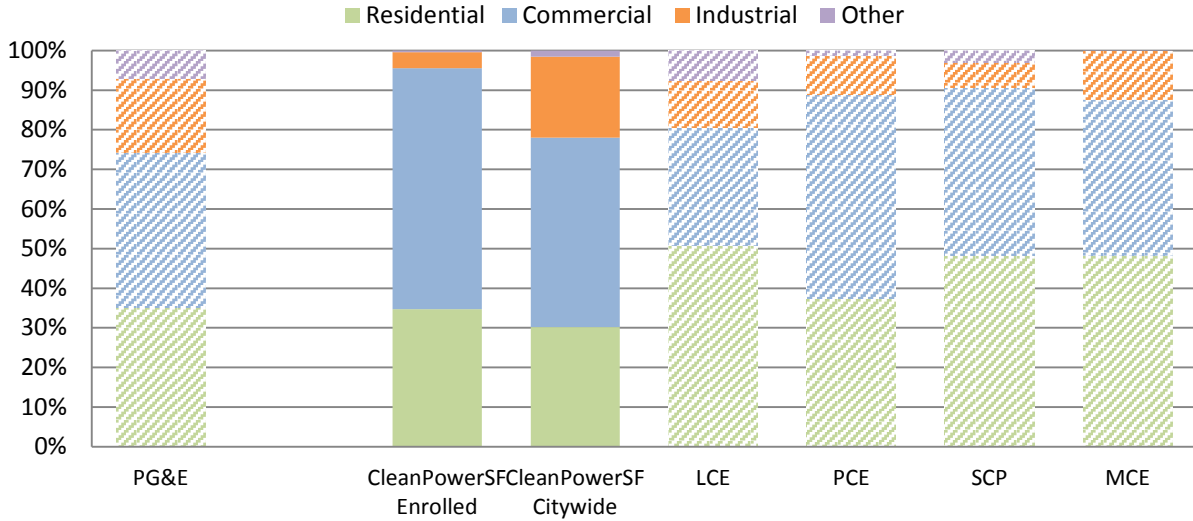
3.1.2 Comparing Customer Makeup with other Load Serving Entities

Identifying how the CleanPowerSF potential customer mix compares to the makeup of other load serving entities (LSEs) is helpful in understanding the implications for program design and financial performance of adding more customers and potentially changing the customer class composition of the program.

Figure 8 below shows that CleanPowerSF’s citywide potential customer composition and energy sales vary somewhat from other entities in that its customer base is less residential and has a higher percentage of commercial and industrial usage. CleanPowerSF’s citywide potential energy sales vary slightly from CleanPowerSF current enrollment in that it is slightly less residential, and significantly more industrial.



Figure 8: Customer Class Distribution by Load Serving Entity



Under state law, a CCA must offer service to all residential customers in its service territory. Figures 9 and 10 below show that CleanPowerSF is expecting an average annual use per residential account of just over 3,700 kWh in Phase 1 and 3,500 kWh once citywide residential enrollment is complete. On average, San Francisco residents use 35-55% less electricity than the residential customers of the other operating CCAs, which feature average per-household consumption of 5,300 to 7,900 kWh per year.

Figure 9: Energy Usage Per Account: Residential Customers

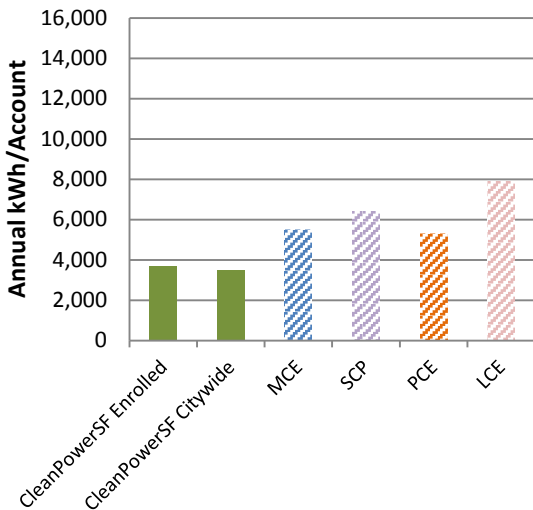
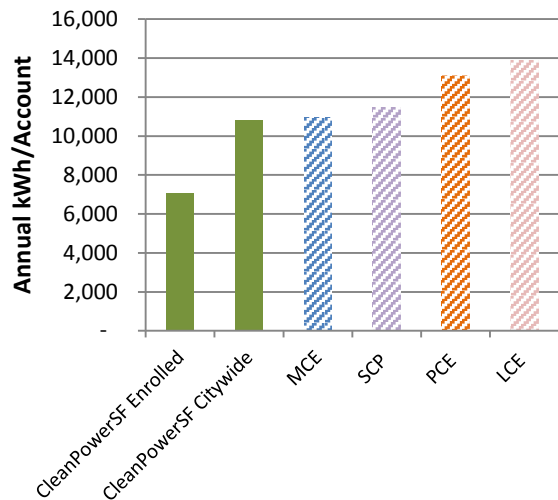


Figure 10: Energy Usage Per Account: All Customers



While this is great news from an environmental sustainability perspective, it makes fixed costs a higher portion of the per kilowatt-hour revenues, diminishing net revenue available for other

purposes (e.g., reserves, build-out, etc.). This is an important takeaway since non-residential enrollment is optional – but this analysis shows that it is desirable. The counterpoint to this takeaway is that non-residential customers carry with them more sales when they opt-out of the program, which can impose greater risk of revenue loss.

3.1.3 Customer Rate Analysis

By analyzing data on the number of accounts, average per-account energy use by customer class, and PG&E generation rates for CCA-eligible San Francisco electricity customers, staff evaluated the financial impacts to CleanPowerSF of enrolling different customer types.

Figure 11 below shows a high-level comparative analysis conducted using the CleanPowerSF Phase 1 average *Green* Product rates by rate class. Each bar in the chart represents the average generation rate to a CleanPowerSF customer in the identified customer class (using rates in place at the time of program launch on May 1, 2016). The first bar represents the average rate to all customers currently served by CleanPowerSF. The variation across the classes seen below can be explained by (1) variation in PG&E’s PCIA charges across rate classes, (2) variation in rates by customer class, and (3) variation in costs by rate class due to fixed per-account costs. The PCIA is included to show the total generation rate as seen by the customer.

Figure 11: Average *Green* Product Rate to Customer by Rate Class

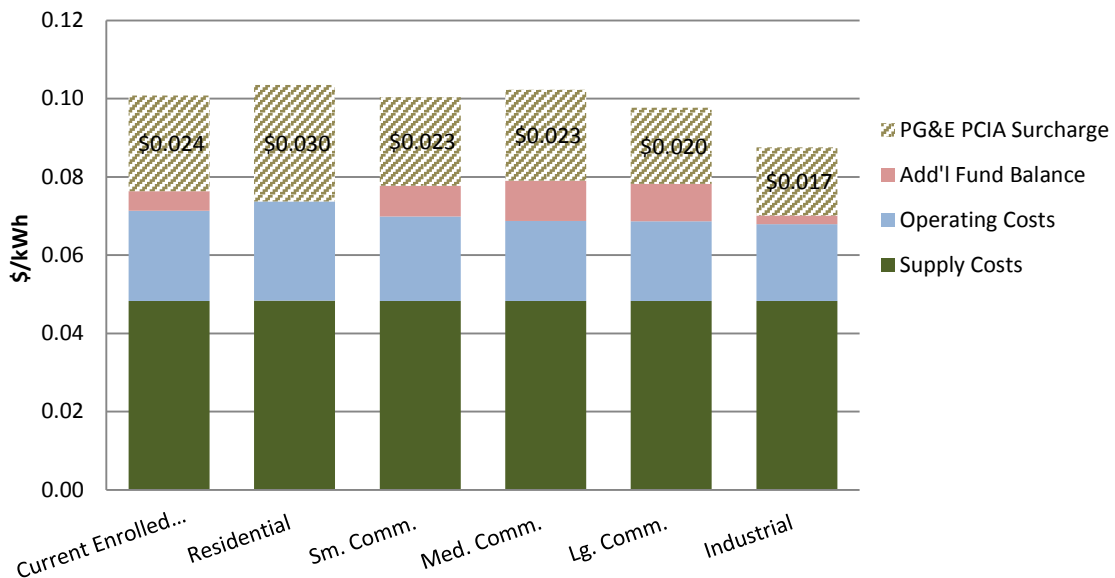


Figure 11 indicates that there are financial benefits to mixing residential enrollment with customer classes from which higher per kilowatt-hour revenues are expected– specifically, small and medium commercial and to some degree large commercial classes. The above also suggests that no single customer class poses a critical financial risk; rates recover costs for all classes.

However, this could change in the future if CleanPowerSF must lower its generation rates to remain competitive.

3.1.4 Customer Considerations for Program Outreach and Communications

As CleanPowerSF plans future auto-enrollments, it will also be critical to consider how the program will communicate with customers and whether outreach efficiencies might be gained. From the perspective of communications and enrollment management:

- **Organizing phases by geography rather than by customer class allows for more efficient outreach.** Combining residential and non-residential rollout in a District where possible maximizes the value of advertisements/canvassing and simplify communications and mailing efforts.
- **Territories in which residents and businesses express the most favorable outlook on CCA service and clean energy should be prioritized for auto-enrollment phases.** This guidance was considered in the selection of geographic areas to be included in Phase 1, and Phase 1 has achieved a lower-than-expected opt-out rate.
- **Readiness to communicate in key languages may be a reason to advance or hold off on enrolling a certain territory.** CleanPowerSF is currently staffed for Spanish-speaking outreach, but will need new staff resources for Chinese-speaking outreach to serve Chinatown in District 3, and Districts 1 and 4.
- **CleanPowerSF should consider direct outreach to the largest customers.** Large accounts are unique; they require additional account management services, have a greater impact on energy supply procurement planning, and may benefit from their own enrollment schedule. Due to their large energy usage, these accounts pose the greatest opt-out risk to the program. As CleanPowerSF prepares for additional phases, staff recommends delaying the auto-enrollment of the largest customers until staff can conduct separate outreach to better understand their interest and likelihood to stay in the program.

3.1.5 California Alternate Rates for Energy (CARE) Customers

Approximately 13% of San Francisco's electricity accounts are enrolled in the California Alternate Rates for Energy (CARE) program. The CARE program offers discounted electricity service to qualifying residential and commercial customers.⁷ Customers enrolled in CleanPowerSF continue to receive the same discount as PG&E bundled customers because it is applied to the distribution portion of the electric bill.

Managing year-over-year changes in PG&E's CCA exit fee (the Power Charge Indifference Adjustment, or PCIA) can make it challenging to ensure that CARE customers pay no more for service with CleanPowerSF than they would with PG&E. For example, on January 1, 2017, PG&E increased the PCIA it charges to customers by 25% for residential customers (increasing the per-

⁷ For more information on the CARE program, see: <http://www.cpuc.ca.gov/esap/>

kilowatt hour rate from 2.4 cents to 3 cents). Even though CleanPowerSF's rate did not change over this time period, the increase in PG&E's PCIA meant CleanPowerSF customers were paying about 2% more on their total bills.⁸ If CleanPowerSF were serving all CARE customers and wanted to reduce rates to prevent CleanPowerSF service from costing more than PG&E bundled service, it would have cost the program approximately \$1 million per year to do so (assuming no further change).

To protect CARE customers from increased costs associated with PCIA increases mid-rate cycle, the SFPUC can prioritize the use of its rate stabilization funds for CARE customers. The SFPUC can also develop angel funds or other mechanisms that allow non-CARE customers in San Francisco to contribute through an on-bill mechanism toward additional rate protection or discounts.

Customer Makeup and Demand Findings

- ✓ **A diverse customer mix is important:** While costs and revenues vary across customer classes, no customer class is expected to be uneconomic to serve at today's rates and operating costs. Enrollment of commercial customers will help balance the narrower margins (and higher per account fixed costs) expected of residential customers.
- ✓ **Enrolling CARE customers may require additional rate protections:** Prioritizing the protection of CARE customers requires financial reserves – which may be reason to allow time for reserve fund building and planning prior to auto-enrollment of CARE customers.
- ✓ **Geographic enrollment can provide communications efficiencies and support customer class diversity:** Enrollment of customers by Supervisory District, rather than by rate class, will provide outreach/communications efficiencies and will also help to balance revenues by enrolling a mix of customer classes.
- ✓ **Staff should engage in direct outreach to the largest commercial customers and DA customers prior to enrollment:** Due to the significant amount of energy they use per account, delaying enrollment of the largest commercial accounts until direct outreach can be conducted is advisable. Customers on Direct Access should be treated similarly since auto-enrollment could affect their DA participation and eligibility. Staff can continue to support pre-enrollment of these accounts while it staffs up to conduct the more targeted outreach required for large commercial and DA accounts.

⁸ On April 11th, the SFPUC adopted new rates for CleanPowerSF, making them lower than PG&E even after accounting for PG&E's PCIA and FFS charges. The SFPUC's rate reduction, which goes into effect on July 1, 2017, ensures customers are paying no more for their electric service even after accounting for PG&E's higher fees.

3.2 Power Supply and Markets

The CleanPowerSF Phasing Policy requires power supply to be sufficient to meet projected new customer demand. Thus, to allow for citywide expansion, CleanPowerSF must develop an energy supply portfolio to serve its full customer base while meeting its other goals, including affordability and clean energy content. CleanPowerSF must determine the price and availability of various renewable and other energy sources, and the legal and regulatory requirements for energy supply as a load serving entity (LSE), in order to plan a supply portfolio and procurement strategy that best serves its customers and meets its goals.



Photo 4: City Hall (powered by Hetch Hetchy Power) At Night

3.2.1 Product Content

For its May 2016 launch, the CleanPowerSF Product Content Policy set a target renewable content for the default *Green* energy product of 35%. The Policy also set forth a goal of relying on Product Content Category 1 (PCC 1) renewable resources to the extent that it is economically and financially feasible – meaning that Renewable Energy Credits (RECs) purchased for the program are "bundled" with their underlying electricity and delivered directly into a California electric balancing authority area. As of the end of 2016, the *Green* product is 40% PCC 1 renewable and 76% GHG-free, exceeding the goals initially set.

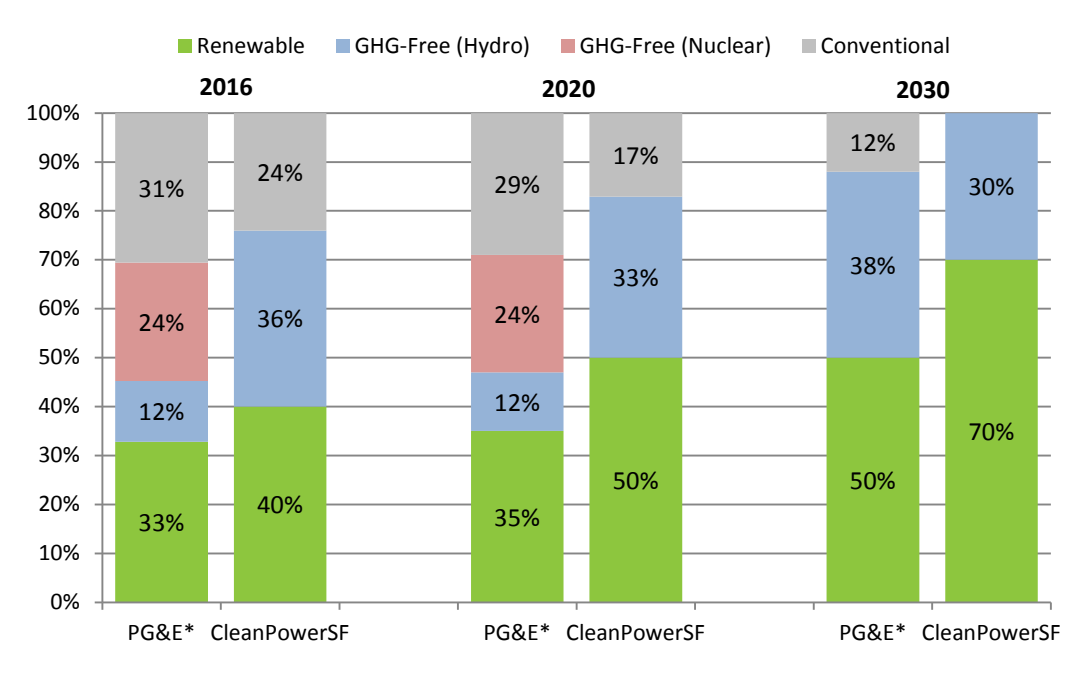
CleanPowerSF is currently unique among operating CCAs for supplying all its renewable energy to-date through PCC 1-compliant renewable energy. It is important to note that these resources come at a significant premium over other Product Content Categories (discussed further below).

For purposes of this growth plan, CleanPowerSF created a baseline projection of the program’s default *Green* product renewable and GHG-free content minimum targets for the CleanPowerSF supply portfolio (Figure 12). The annual targets are intended to achieve the power content objectives:

- Maintain renewable content minimums that are at least 10% above a pro-rata of PG&E’s state requirement of 50% renewable by 2030;
- Achieve a renewable content that is 50% renewable by 2020; and
- Reduce the GHG-emitting power content each year to achieve San Francisco’s goal of a 100% GHG-free electricity supply by 2030.

As Figure 12 indicates, the resulting renewable energy target is at least 70% by 2030. The remaining 30% of the portfolio is assumed to be sourced from GHG-free hydroelectric or additional renewable energy supplies.

Figure 12: Comparison of PG&E and CleanPowerSF Power Content Projection

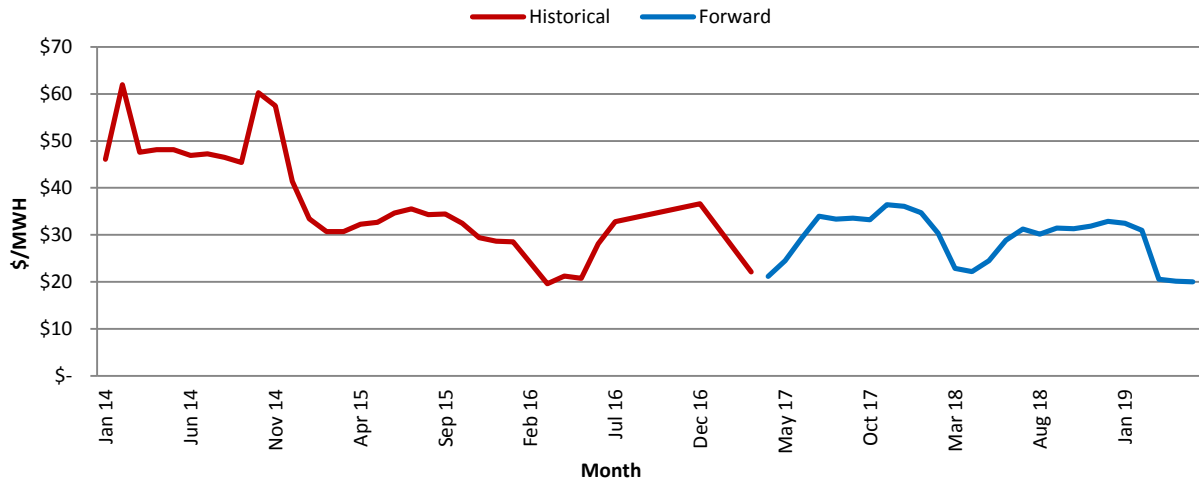


*PG&E data interpolated using PG&E’s 2016 Form 10-K filing, California RPS targets and Table 2-3 of PG&E’s Testimony in the Diablo Canyon Application (A.16-08-006)

3.2.2 Observations in the Wholesale Electricity Market

A review of California Independent System Operator (CAISO) wholesale electricity prices indicates that, on average, prices have been on a decline in recent years. Current forward price curves indicate that wholesale market prices are expected to stay in the \$20-40 range over the next couple of years.

Figure 13: Historical and Forward Wholesale Energy Prices (CAISO NP15)



Source: California ISO OASIS (historical data) at: <http://oasis.caiso.com/mrioasis/logon.do>; ICE Reports (forward data) at: <https://www.theice.com/marketdata/reports>

The decreasing price trend that can be observed in Figure 13 is attributable to a number of factors, including: 1) significant amounts of new renewable energy capacity (mostly solar) coming on-line in recent years, 2) historically low natural gas prices driving down the cost of natural gas-fired electric generation, and 3) more hydroelectric supply in California in 2015 and 2016 than in the previous two years.

As shown in Figure 13, there is also a seasonal trend to wholesale electric pricing. Generally speaking, lower prices are found in spring (with hydroelectric resources coming on the market) and higher prices in late summer due to higher statewide energy use. In 2016, this meant wholesale prices trending primarily within \$20-\$40/MWh in the day ahead market (at the NP-15 trading hub); however, more instances of negative pricing are occurring during certain hours of the year due to the increasing amounts of variable renewable generation.

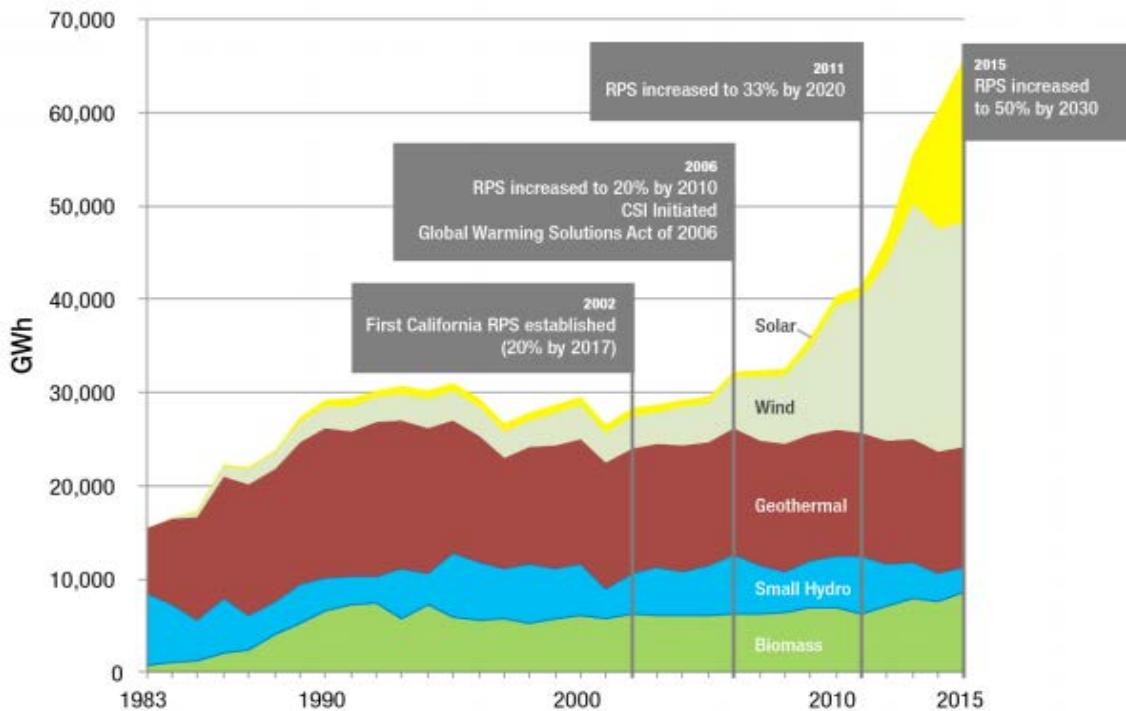
Low prices can mean it is a good time to be a buyer in the wholesale electricity market. Lower wholesale prices mean cheaper energy for consumers and lower credit and collateral thresholds for wholesale buyers, like CleanPowerSF. However, all else being equal, low wholesale prices can also drive down retail generation rates and are a major contributor to an increasing Power Charge Indifference Adjustment (PCIA), as the resources in PG&E’s portfolio become more expensive relative to their market value. An increasing PCIA can greatly reduce the amount of revenues CleanPowerSF may generate while remaining competitively priced vis-à-vis PG&E.

Pricing and Availability of Premium Products: California Renewables

As new CCAs come on-line and seek to serve their ratepayers with greater renewable energy content, CleanPowerSF must consider whether this increased demand for renewable energy products will challenge supply and drive prices upward.

Renewable supply tracking by the California Energy Commission (CEC) indicates that renewable energy supply has been exceeding the projected demand associated with RPS compliance. As of October 2016, CEC tracking shows that California is ahead of schedule for meeting the RPS requirements. In-state renewable capacity has almost quadrupled between 2001 and 2016, increasing from 6,800 MW to 23,600 MW over that time span. Furthermore, approximately 10,600 MW of new renewable capacity is currently permitted and either in construction or pre-construction. As one would expect, renewable energy production has also been on a rapid rise over this time period as shown in Figure 14 below.

Figure 14: Renewable Energy Production in California 1983-2015



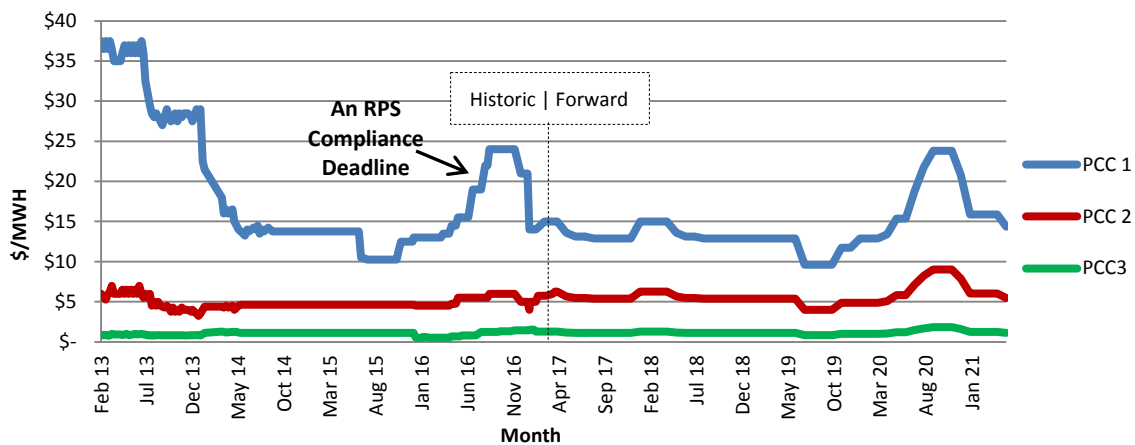
Source: California Energy Commission, "Tracking Progress," available at: http://www.energy.ca.gov/renewables/tracking_progress/#renewable

The renewable capacity growth figures noted above suggest that developers have scaled renewable capacity quickly in response to market demands. Furthermore, CleanPowerSF staff discussions with renewable energy developers indicate that significant additional capacity can be

developed. This has led to the conclusion that access to renewable energy supply sufficient to meet CleanPowerSF’s ambitious goals is not an obstacle.

As noted above, CleanPowerSF’s Product Content Policy set forth a goal of relying on PCC 1 renewable resources, to the extent feasible. To date, CleanPowerSF has fulfilled this goal, procuring its renewable energy using only PCC 1 products. However PCC 1 renewable energy products come at a significant premium over other Product Content Categories (PCC 2 and PCC 3). Some of this premium can be mitigated through careful supply portfolio planning that avoids the need to purchase prior to compliance deadlines, when prices are highest (shown in Figure 15).

Figure 15: Spot Renewable Energy (REC) Prices (Historical and Future)



Existing Renewables

Recent reports (as of October 2016) indicate that wholesale renewable energy resources in Northern California total 6.9 gigawatts⁹ (GW), or approximately 35% of the state’s total renewable energy capacity. Of that, 3.0 GW, or about 14% of the state’s renewable capacity, is located in the 9-county Bay Area (See Table 1 below).¹⁰

Table 1: Comparison of Statewide, Northern California and Bay Area Renewable Resources

Technology / Fuel Type	Wholesale Renewable Capacity					
	All California		Northern California		9-County Bay Area	
	MW	%	MW	%	MW	%
Biomass	1,328	6%	780	11%	63	2%
Geothermal	2,716	11%	1,998	27%	1,238	41%

⁹ A gigawatt is 1,000 megawatts and 1,000,000 kilowatts

¹⁰ See the California Energy Commission, Tracking Progress – Renewable Energy, available at: http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf

Small Hydro	1,764	9%	1,261	17%	3	<1%
Solar PV	8,171	39%	1,646	22%	141	5%
Solar Thermal	1,257	6%	-	0%	-	0%
Wind	6,053	29%	1,721	23%	1,593	52%
% of Statewide Total		100%		35%		14%

The types of available renewable energy vary by region as well; existing renewable capacity in the 9-county Bay Area is dominated by wind and geothermal (mostly the Geysers in Sonoma and wind in Altamont Pass and Solano County). Areas of Northern California outside the Bay Area and Southern California have much greater concentrations of solar and small hydro resources.¹¹

It is important to note that local renewables tend to come at a price premium over renewables sourced from other parts of the state.¹² There are a number of reasons for this including, but not limited to: 1) limited space in densely populated areas reduce the scale economies that can be achieved, especially from solar; 2) higher property values increase project land costs; 3) higher regional wages increase project labor costs; and 4) the renewable resource may be more productive elsewhere (e.g., solar radiation is 22% better in Lancaster, California than in San Francisco).¹³ In addition, with the number of CCAs existing and forming in the Bay Area, and the tendency for these CCAs to express a preference for local energy supply, one would expect greater competition for limited supplies, which could drive up prices further. All of this suggests that CleanPowerSF must have a flexible approach to sourcing its renewable energy supply, balancing the potentially higher cost of local renewable energy sources against the lower cost of renewable energy produced in other areas of the state.

3.2.3 Contract Credit and Collateral

Credit provisions are an important element of wholesale power purchase agreements, specifying the agreed-upon protections against the risk of default by parties to the agreement. Credit provisions for wholesale power contracts often include posting of collateral in the form of a letter of credit, cash deposit, or other form of mutually agreed-upon security.

Securing energy supply contracts can be a significant cost to a new CCA program that does not have a credit rating. The cost of posting collateral was a constraint on the size of CleanPowerSF's Phase 1 launch, and is expected to be a factor in the pace of future growth.

¹¹ See MRW & Associates, "Technical Study for Community Choice Aggregation Program in Alameda County," available at: <https://www.acgov.org/cda/planning/cca/documents/Feas-TechAnalysisDRAFT5312016.pdf>

¹² For example, MRW & Associates recently estimated a 15% premium for solar projects located in Alameda County.

¹³ Average annual solar radiation is 5.27 kWh/m²/day at SFO International Airport and 6.44 kWh/m²/day in Lancaster, CA. See PVWatts Calculator at: <http://pvwatts.nrel.gov/index.php>

Research indicates that as it grows, CleanPowerSF will likely find lower collateral requirements in comparison to those encountered in the 2015-2016 supply contracting for Phase 1 and anticipated in the 2015 Business Plan. This is due to many factors, including increased familiarity of power suppliers with CCAs and a demonstrated CleanPowerSF track record.

The amount and form of collateral required of a CCA can vary based on the financial standing of the CCA and a number of other factors, described further in the Financing section below. However, collateral requirements also tend to vary with contract type. Through conversations with suppliers, staff has found that collateral requirements are typically greater for conventional energy supply contracts that offer firming or shaped energy, and/or additional ancillary energy services, and may be minimal for long term contracts with developers of renewable resources. Ultimately, collateral posting needs will tie to contract volume and length, making having a narrow open position for an extended period of time (e.g., fixing a large part of supply for multiple years) more costly from a supply financing perspective.



Photo 5: CleanPowerSF Billboard in District 5

3.2.4 Portfolio Management and Open Position

As CleanPowerSF grows from a 60 MW program to a 400+ MW program, its supply portfolio – and associated contracting needs – will also grow. The size of the program is not the only reason for growing contracting needs; CleanPowerSF will seek to diversify its portfolio as it moves from mostly short-term (3 years or less) conventional and short-to-medium term (5 years or less) renewable agreements, to long-term (10 year or more) renewable and local development agreements.

CleanPowerSF’s general approach to supply management is to diversify its supply portfolio across suppliers, technologies, project size and location, price terms, and contract tenor. This diversified procurement strategy will result in relatively fixed pricing for CleanPowerSF’s customers over the short- and intermediate term. Such a portfolio structure is consistent with the stated preferences of customers, who generally are averse to price volatility, even if prices are slightly higher on an expected value basis.

The following figure presents a stylized portfolio and hedging structure for a 10-year forward projection of the CleanPowerSF supply portfolio (at full scale).

Figure 16: Stylized Resource Portfolio and Hedging Structure

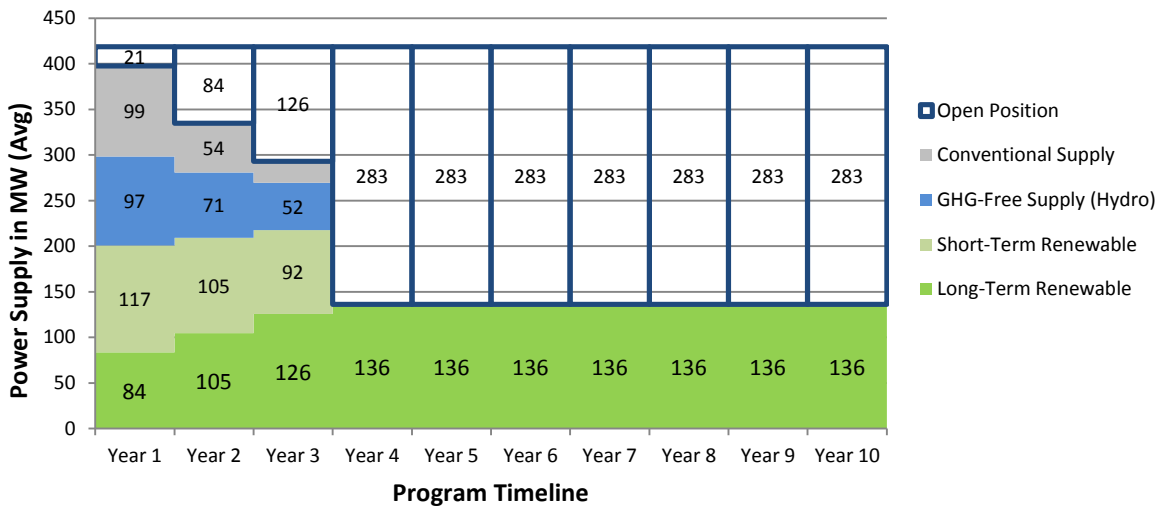


Figure 16 shows the resource types and the tenure of contracts that CleanPowerSF would secure to meet its program supply content, regulatory requirements and rate objectives. The laddered portfolio structure reflects a forward contracting position of 95% of the upcoming year’s (Year 1) supply requirements, minimizing CleanPowerSF’s exposure to short-term price volatility. In this example, the forward commitment would step down to 85% of the supply requirement for Year 2, 70% for Year 3, and 33% for Years 4-10. Laddering contracts means that power will be procured using staggered, multi-period contracts instead of through a single contract, or several contracts that expire all at once, creating significant market exposure. It also means that CleanPowerSF will conduct energy supply procurements each year to fill future open positions. This type of supply portfolio structure is common in deregulated electricity markets and is consistent with what CleanPowerSF staff have observed as a best practice among other operating CCA programs.

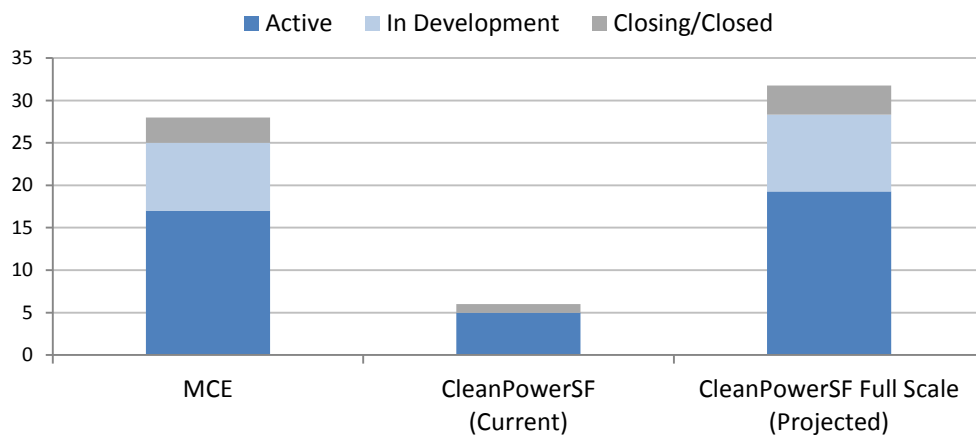
Expected Number of Contracts

Based on market research and studies previously conducted by the SFPUC on renewable energy potential in San Francisco and SFPUC properties, it is expected that renewable energy projects developed locally will be smaller in scale than projects developed elsewhere in California. The

program’s goal to spur local renewable energy development combined with the smaller expected size of local projects will likely result in a greater number of contracts required to supply the program. As noted earlier, CleanPowerSF will also seek to diversify across technologies, geography, and suppliers to manage risk, further increasing the potential number of supply contracts it may execute.

To illustrate the number of supply contracts CleanPowerSF may execute as the program grows, Figure 17 shows a breakdown of MCE supply contracts by contract status (active, in development, closing).

Figure 17: Number of Energy Supply Contracts



Drawing from MCE’s 2015 IRP update and recent press releases, CleanPowerSF identified 28 contracts that are either active, negotiated/in development, or closed/closing that MCE is using to serve the approximately 365 MW of average demand of its 255,000 customers. If CleanPowerSF were to similarly contract for its total projected load of 400+ MW, the program could expect to have a total of 19 active/producing contracts, another 9 contracts negotiated/under construction, and another 3 closing at any given time. This number may ultimately be higher or lower depending on the number of contracts CleanPowerSF executes with small-scale projects (e.g., feed-in tariff).

Assigning sufficient staffing resources to energy supply contracting and portfolio management will be critical, as will be the development of a regular Integrated Resource Plan (IRP) process (underway now and expected in summer 2017).



Photo 6: CleanPowerSF at Earth Day SF 2017

3.2.5 Spurring Local Development

CleanPowerSF is committed to investing in the creation of new, preferably local renewable generating capacity and promoting demand-side efforts, including energy efficiency and conservation programs.

Supply-Side Local Development

A number of options exist to spur the development of local renewable energy supply, including Feed in Tariff programs, Community Solar programs, and larger-scale development of local resources through utility-led build out and/or power purchase agreements (PPAs). CleanPowerSF is working on a Feed in Tariff program, exploring the feasibility of developing a community solar program, and plans to develop additional discrete projects (such as on SFPUC property at Sunol or Tesla), once additional staff resources to develop and administer these programs are available. Due to their cost-effectiveness, CleanPowerSF anticipates most immediately seeking PPAs for new, local and renewable energy resources in its upcoming energy procurements.

Demand-Side Local Development

CleanPowerSF staff plan to develop demand-side program offerings following completion of citywide enrollment, further stakeholder engagement, and the identification of funding sources. One potential external source of funding (i.e., non generation revenue) for energy efficiency and

demand response programming is public goods charge (PGC) funds collected from all ratepayers and overseen by the California Public Utilities Commission (CPUC). Only one CCA, MCE, has applied for and successfully leveraged energy efficiency PGC funding to date, and it has borne substantial program design restrictions and administrative costs from the CPUC’s evaluation, monitoring, and verification requirements (which were created for IOUs). CleanPowerSF will continue to plan for demand-side programs and explore sources of funding.

3.2.5 New Renewable Energy Supply Will Drive New Job Creation

The major driver of job creation for the CleanPowerSF program, at least initially, will be sourcing more renewable energy within California. These new renewable energy jobs will come from the construction and operation of renewable power plants.

Using the National Renewable Energy Laboratory’s Jobs and Economic Development Impact (JEDI) model, staff has estimated that 1,300 to 5,000 jobs may be created over the next 4 to 5 years to support CleanPowerSF’s achievement of 50% renewable energy content in its *Green* product.¹⁴ Findings from this analysis are summarized in Table 2.

Table 2: Job Creation Estimates from Renewable Energy Project Development

	Construction Jobs		Plant Operations		Total Jobs	
	Low	High	Low	High	Low	High
Phase 1 ¹⁵	165	660	6	22	170	682
Full Scale ¹⁶	1,320	5,281	45	181	1,365	5,462

This job creation range is dependent on the amount of renewable energy supply being sourced from newly constructed renewable power plants. The projection assumes 20-80% of CleanPowerSF’s renewable energy supply comes from newly constructed renewable plants. The number of jobs ultimately created will depend on the amount of energy is sourced from new versus operating renewable energy plants.

CleanPowerSF can likely create more clean energy jobs through additional programing, but these jobs are difficult to quantify at this time. The CleanPowerSF team will report on job creation estimates as it brings proposals for new service and program initiatives to the Commission for approval.

¹⁴ This projection assumes 20-80% of CleanPowerSF’s renewable energy requirement is sourced from newly constructed renewable plants.

¹⁵ Job estimates for Phase 1 assume that on the low end the program builds new projects to serve 20% of its forecasted renewable energy requirement (19 MW of new renewable capacity) and on the high end 80% of its forecasted renewable energy requirement (76 MW of new renewable capacity).

¹⁶ Job estimates for Full Scale assume that on the low end the program builds new projects to serve 20% of its forecasted renewable energy requirement (140 MW of new renewable capacity) and on the high end 80% of its forecasted renewable energy requirement (560 MW of new renewable capacity).

Supply Findings Summary

- ✓ **Energy market findings:** Energy prices are stable, and have lowered slightly over the past few years. Data show that the renewable and other energy products that CleanPowerSF may seek for growth are available at reasonable prices, but a solicitation is required to determine the scale and cost of supplies required for citywide service.
- ✓ **Procure aware of compliance deadlines:** Historical and forward price curves for renewable energy indicate that prices increase during the final year of state RPS compliance periods. 2017 is the first year of a new compliance period, making it a good time to buy in the market as prices will likely increase towards the end of the current compliance period (2020).
- ✓ **Prioritizing Bucket 1 renewables:** To date CleanPowerSF has purchased only PCC 1 and no PCC 2 or PCC 3 renewable products. CleanPowerSF continues to prioritize PCC 1 over other renewable energy product types, at a cost of two to three times the cost of PCC 2 and ten to twenty times the cost of PCC 3 products. Given CleanPowerSF's multiple goals, it may be prudent to maintain the option to procure PCC 2 as a means of increasing renewable content to support program growth while also achieving ratepayer affordability. PCC 2 resources could be used as a bridge to maintain desired renewable energy content until new California or Bay Area projects can be constructed to serve CleanPowerSF load.
- ✓ **Local development:** CleanPowerSF local development goals can be supported in the near-term through new long-term local renewable PPAs continuing development of CleanPowerSF's Feed-in-Tariff program. Additional staffing resources will allow CleanPowerSF to explore and pursue additional development paths such as utility-led community renewables.
- ✓ **New jobs will be created:** Meeting the program's renewable energy goals will be the major driver of new job creation. The jobs created from sourcing more renewable energy within California will come from the construction and operation of renewable power plants. Staff has estimated 1,300 to 5,000 jobs may be created over the next 4 to 5 years to support the CleanPowerSF's achievement of the proposed 50% renewable energy goal. The ultimate number of jobs created will depend on the amount of energy is sourced from new versus operating renewable energy plants.
- ✓ **Credit and collateral constraints:** Supply contract collateral and financing requirements can vary by product and supplier. In general, firm and shaped contracts from more conventional suppliers require significantly more collateral than long term renewable PPAs, which may require very little or no collateral. Collateral needs tie to contract volume and length, making a narrow open position more costly from a supply financing perspective.
- ✓ **Risk management requires portfolio management:** Contract diversification and active portfolio management will be critical to program success (and successful growth). Research points to the use of short-term conventional contracts and long-term renewable PPAs – the latter of which may be with unrated developers, making diversification valuable as a risk mitigation strategy. Assigning appropriate expertise and bandwidth for portfolio management will be critical, as will be the development of a strong **Integrated Resource Plan (IRP)** (underway and to be completed summer 2017).
- ✓ **Administrative efficiency in supply contracting is critical to achieve competitive pricing:** The SFPUC must continuously work to improve power contracting practices to allow the Power Enterprise to respond to favorable market opportunities in a timely manner. Continuing to standardize contracting documents, procedures and supporting systems will support this goal.

3.3 Financing Needs and Options

CleanPowerSF's growth will rely on the ability to access cost-effective financing for liquidity for basic program operations as well as collateral for power supply purchases. The availability, cost and terms of financing for program expansion are core considerations of the CleanPowerSF growth plan.

Financing for CCA activities is a rapidly evolving market. SFPUC staff, in partnership with financial consultant Clean Energy Capital, have gathered information on the state of CCA operations and supply purchase collateral financing through outreach with financial institutions, power suppliers, and the power purchasing staff at other CCAs.

3.3.1 Credit Availability

The research conducted by CleanPowerSF over the past several months suggest credit is available, potentially with limited or no recourse to the Power Enterprise. However, parties still have different views on CCA credit, based principally on varying views of CCA program risk.

Through this research staff has learned that financing costs and collateral requirements can be influenced by a number of factors, including:

- **Financial stability and track record:** Demonstration that CleanPowerSF's performance is meeting financial projections and plans can provide confidence to suppliers and financial partners. The longer the track-record with this type of performance, the greater the value.
- **Cash on hand:** A number of suppliers have been willing to remove collateral or dedicated reserve requirements if a CCA's financials show liquidity and strong net position.
- **Customer retention:** Low opt-out rates provide financial and power supply entities with a sense of security that revenues are stable and will continue to come in.
- **Financial transparency:** All suppliers and financing entities have mentioned the value of transparency. Specifically, the provision of monthly financial statements (unaudited) by CCAs such as MCE and SCP have supported successful negotiations with lenders and suppliers.
- **Establishment of a lockbox:** having a financial institution and/or supplier(s) party to a lockbox that receives IOU-delivered customer revenues has been stated as desirable by some, but not all, financial and power supply parties.

Based on this research and the program's current financial standing, staff estimates that CleanPowerSF could currently access sufficient credit to support supply transactions of approximately 200 MW. This assumes that the supply portfolio is composed of a mix of shorter term conventional and longer term renewable contracts similar to other operating CCAs. Ultimately, the desirability of the available credit will need to be reviewed through a more formal process, such as a Request for Proposals (RFP).

Because the exact financing needs will depend on the needs and terms of CleanPowerSF's intended supply contracts, CleanPowerSF staff anticipates that financing options would most opportunely be assessed through an RFP process held in parallel with an energy supply Request for Offers (RFO) process. CleanPowerSF and SFPUC Business Services staff are in the process of preparing this upcoming financing RFP.



Photo 7: Davies Symphony Hall Solar Panel Installation

3.3.2 Considering a Lockbox

As CleanPowerSF considers tools and methods to optimize its collateral and credit terms, staff has reviewed the possibility of setting up a lockbox. A lockbox is a financial arrangement in which a third-party financial institution, or trustee, maintains a set of accounts on behalf of a CCA entity. The CCA entity assigns the trustee its right to receive revenues from power sales, and the utility responsible for billing customers (PG&E) pays the trustee directly. The trustee applies the revenues it receives in accordance with a pre-defined waterfall of priorities. In a single-party lockbox, the first priority is payment of monies due to a single power supplier, typically the full-requirements power supplier selected by the CCA entity. In a multi-party lock-box, multiple power suppliers (and potentially financial institutions) designated by the CCA entity share this first-priority position.

As used in the CCA sector, the lockbox has two primary functions. The first is to establish a priority of payments that grants designated creditors (such as the full-requirements power supplier) a senior position; the second is to empower a third-party financial institution to administer the established priority of payments. Discussions with suppliers and financing entities

revealed that the transparency and the effective one month's reserves provided by the lockbox flow of payments are also attractive to some participants. In general, conventional suppliers and financial institutions were more likely to see value in or strongly recommend using a lockbox. Some conventional suppliers and renewable developers expressed ambivalence to a lockbox with a preference for more traditional forms of security such as cash posting, prepayment, or letters of credit.

Unique among CCAs, CleanPowerSF has not implemented a lockbox and instead collects and disburses funds as an internal administrative function. Research shows that CCA experience with utilization of a lockbox is mixed. Some CCA representatives found the lockbox burdensome and costly to administer (primarily citing legal fees for managing modifications for multi-party use); some also cited challenges of supplier unease and cash flow restrictions. However, most found use of a lockbox valuable for the purpose of lowering collateral and credit requirements, in particular in the early stages of that CCA's establishment and before the existence of a financial track record.

3.3.3 Options for Financial Independence and Credit Rating Development

Per CleanPowerSF's 2015 Business Plan and Business Practice Policies, CleanPowerSF has been established as a financially-independent entity within the SFPUC Power Enterprise, with separate and defined ratepayers. This means the revenues, expenses, assets and liabilities of CleanPowerSF remain separate from the rest of the Power Enterprise and SFPUC. Financial independence allows CleanPowerSF revenues and expenditures to be excluded from the Power Enterprise bondholder pledge, and also sets CleanPowerSF on a path to establishing a clear financial track record (and eventual independent credit rating) to support favorable negotiations with financial institutions and energy suppliers.

However, the Power Enterprise has provided limited financial backing to support CleanPowerSF's launch, in the form of an \$8 million loan and securitization of letters of credit. Given the projections of credit availability discussed above, CleanPowerSF will be seeking to grow its program using third party financing and without using any further recourse to the Power Enterprise, while continuing its debt service payments to the Power Enterprise on the established payment schedule. Ultimately, the feasibility of implementing this strategy will be confirmed by the financing RFP and energy supply RFO processes, which will clarify the cost and amount of credit that will be required.

3.3.4 Valuing Reserves

Fully funding program reserves is a critical strategy for maintaining strong program operations, as well as CleanPowerSF's ability to deliver on its goals of rate affordability, reliability and stability. Per its Business Practice Policies, CleanPowerSF is dedicating a portion of its net revenue to reserves with the goal of growing operating reserves equal to 3 months of operating expenses, and rate stabilization reserves of 15% of total annual revenues, in three years. Rate stabilization reserves will be a particularly critical tool to mitigate external risks factors (e.g., changes in the

PCIA or PG&E generation rate) affecting CleanPowerSF’s affordability and competitiveness on a total-bill basis. As noted earlier, reserves will also be particularly important for the rate protection of CARE customers.

In a survey of suppliers, financial institutions and CCAs, CleanPowerSF staff found that reserves are a key piece of supplier/financier review of a CCA’s financial suitability, which may help lower financing burdens and/or reduce or waive collateral requirements. A survey of the reserve policies of other CCAs has revealed that other CCAs have set similar reserve targets.¹⁷

Financing Findings Summary

- ✓ **Availability and cost of credit:** Financial institutions have expressed interest in providing credit support to CleanPowerSF, at a scale that would support significant growth in program demand (likely up to 200 MW). However, the availability and cost of this credit must be determined through a Request for Proposals process, which would be most productive if conducted in parallel with an energy supply Request for Offers.
- ✓ **Financial best practices:** CleanPowerSF should consider taking actions to make itself a desirable counterparty to energy suppliers and financial institutions – such as offering transparency in monthly financials, building a strong net position and program reserves, and demonstrating how program performance aligns with projections – in order to reduce financing costs and ultimately build a path to financial independence and a CleanPowerSF credit rating.
- ✓ **Lockbox as a potential strategic tool:** The lockbox payment structure is an option for securing power purchases if third party credit support solicited through the proposed financing RFP is insufficient or too costly. While the lockbox is a proven means of securing CCA power supply transactions and may lower the cost of financing, these benefits should be weighed against the administrative costs and other potentially limiting factors, such as reducing the interested power supplier pool. CleanPowerSF should also explore whether or not the benefits of a lockbox can be provided to counterparties through alternate methods, such as an internally-administered priority of payments structure.
- ✓ **Suitability of reserve policy:** CleanPowerSF’s current reserve policy is comparable to those of other CCAs. Funding reserves are and should continue to be a critical component of CleanPowerSF’s financial strategy.

¹⁷ See MCE’s Feb 3rd 2016 discussion of a reserve target policy in its Executive Committee Meeting materials: <https://www.mcecleanenergy.org/wp-content/uploads/2016/01/2.3.16-ExCom-Meeting-Packet.pdf>; this policy was voted in on February 18th, 2016: <https://www.mcecleanenergy.org/wp-content/uploads/2016/03/2.18.16-Board-Minutes.pdf>. Sonoma Clean Power’s reserve policies were adopted in January 2015: <https://sonomacleanpower.org/wp-content/uploads/2015/01/Revised-Board-Policies-amended-2015.05.07.pdf>.

3.4 Regulatory and Legislative Affairs

As CleanPowerSF expands, it will continue to confront complex and evolving regulatory and legislative challenges. CleanPowerSF must remain in compliance with state and federal regulations and staff resources are needed to understand key issues, conduct compliance activities, and oversee the process. CleanPowerSF must also diligently monitor regulatory and legislative activity to ensure fair competition and to protect the interests and investment of San Francisco in the CleanPowerSF program. Regulatory and legislative intervention will be critical to ensure CleanPowerSF is able to compete on a level playing field with PG&E and to manage program costs.

3.4.1 Regulatory Compliance

As for all CCAs, the compliance burden for CleanPowerSF is significant. Approximately 50-60 compliance reports must be developed and submitted each year to state and federal agencies, including:

- California Public Utilities Commission
- California Energy Commission
- California Air Resources Board
- California Independent System Operator
- California Board of Equalization
- U.S. Energy Information Agency
- Western Renewable Energy Generation Information System

As compliance is not optional, CleanPowerSF must ensure it has staff bandwidth and knowledge to fulfill these requirements. Regulatory and Legislative Affairs has been identified as a high priority for near-term staff additions. A full list of CleanPowerSF compliance requirements per its current programming is included as Appendix A-2.



Photo 8: CleanPowerSF at Earth Day SF 2017

3.4.2 Regulatory and Legislative Advocacy

To protect the interests of San Francisco ratepayers – both CCA and non-CCA participants alike – the Power Enterprise regulatory staff and the City Attorney’s Office must monitor and engage in many proceedings before State regulatory agencies as well as monitor bills at the State Legislature. Appendix A-2 lists the proceedings staff is actively engaged in and/or monitoring now. This list will evolve over time, as CleanPowerSF priorities shift, new proceedings begin, and existing proceedings close. Further, as staff resources increase and decrease, the time and attention staff may dedicate to these proceedings will change.

As CleanPowerSF continues to evaluate its regulatory priorities, it is helpful to have a framework to analyze the potential impact of new and existing issues. Similar to what has been put in place by other CCAs, staff recommends a regulatory and legislative advocacy framework focused on the following three issues:

- **Competitiveness:** Ensuring that CleanPowerSF competes in a fair environment without other providers receiving undue advantage.

- **Cost:** Ensuring the costs and responsibilities imposed on CleanPowerSF ratepayers through regulations and/or legislation are fair and lend to the most efficient means of achieving program goals.
- **Local Responsibility:** Ensuring that local decision-making authority over CleanPowerSF energy procurement – a key driver of the CCA model –remains intact while providing opportunities for CCAs to be proper stewards of their place in the greater electric system.

Issues that involve multiple areas of the framework are more likely to significantly impact the goals and/or operations of the program and are deserving of more staff attention and resources.

Figure 18: CCA Regulatory Involvement Framework



Table 3: Examples of Regulatory Proceeding Priorities

	Key Issues	Example Activities/ Proceedings
Cost	<ul style="list-style-type: none"> • Ensuring CCA procurement requirements don't unduly increase supply costs • Managing cost burdens of additional energy programs (e.g., energy efficiency) 	<ul style="list-style-type: none"> • Integrated Resource Plan (IRP), long term contracting requirements, Resource Adequacy (RA) • Renewable Portfolio Standard (RPS) • SB 350 implementation
Competitiveness	<ul style="list-style-type: none"> • Ensuring non-bypassable charges (e.g., PCIA, FFS) are fair, equitable and transparent • Ensuring PG&E rates appropriately reflect costs – and that those costs are borne by the appropriate service provided (generation, transmission, distribution) 	<ul style="list-style-type: none"> • PCIA and FFS setting in PG&E ERRRA • General Rate Case • Transmission Access Charge • Investor owned utility applications and advice letters for new power contracts • Cost allocations to PG&E Solar Choice
Local Responsibility	<ul style="list-style-type: none"> • Ensuring state oversight applied to investor-owned LSEs does not challenge local control <p>CleanPower provides SF as a CCA</p>	<ul style="list-style-type: none"> • IRP • Long term contracting requirements • RA

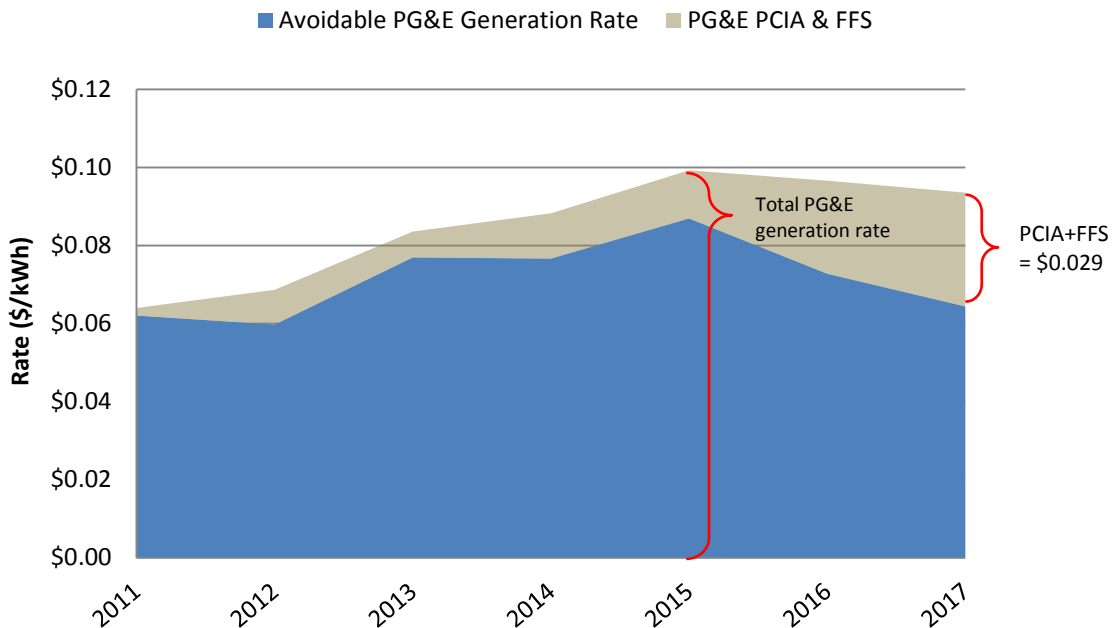
Table 3 above shares key proceedings currently requiring active advocacy and engagement from CleanPowerSF regulatory staff. It is important to note that as CleanPowerSF grows and matures, the addition of new programs may necessitate additional advocacy and compliance engagement. For example, the development of customer-side programming using PGC funding overseen by the CPUC carries significant compliance and advocacy requirements. A list of current advocacy proceedings and items is included in Appendix A-2.

3.4.3 Keeping Stride with the PG&E Generation Rate and PCIA/Franchise Fee Surcharge (FFS)

CleanPowerSF is committed to offering affordable service with rates that are competitive with PG&E. To achieve this, CleanPowerSF strives to maintain total generation rates that compete with PG&E's, even after accounting for PG&E's Power Charge Indifference Adjustment (PCIA) and Franchise Fee Surcharge (FFS), also known as non-bypassable charges. PG&E's generation rates vary by customer rate class, may change multiple times in a year, and have varied over the last ten years from a low of just over \$0.06/kWh for the largest commercial accounts in 2012 to a high of over \$0.10/kWh for medium commercial in 2015. Rates climbed steadily from 2012 to 2015, but decreased in 2016 and 2017.

The chart below shows how the addition of the PCIA and FFS charges affect the threshold that CleanPowerSF must meet to maintain competitiveness with PG&E on a total-bill basis.

Figure 19: PG&E Generation Rate and PCIA Since 2011 (Residential)



At current levels, PG&E's PCIA and FFS charges force CleanPowerSF to set generation rates approximately 20-30% below PG&E's in order to offer service to customers at a similar cost. The magnitude of the non-bypassable charges' effect on CleanPowerSF rate competitiveness and affordability illustrates the importance of building and maintaining appropriate regulatory advocacy resources to ensure that these charges are determined in a fair and reasonable manner.

Regulatory and Legislative Affairs Findings Summary

- ✓ **Compliance is not optional:** With as many as 60 regulatory compliance reports due every year, it is critical that staffing is sufficient to plan, prepare and demonstrate compliance.
- ✓ **Regulatory and legislative advocacy will be critical to the long-term success of CleanPowerSF:** State regulations and new legislation can directly affect CCA operations, authority, and competitiveness. This is best illustrated by the significant impact the PCIA can have on program rate competitiveness. It is critical that Regulatory and Legislative Affairs be adequately resourced to ensure that the City and CleanPowerSF is well-represented in these forums.
- ✓ **Additional regulatory bandwidth needs can be triggered by new programming:** Additional regulatory compliance and advocacy needs may be triggered by the launch of new program offerings, such as PGC energy efficiency funding.

3.5 Operational Readiness

Having sufficient staff and technology systems in place to support CleanPowerSF's growth will be essential to continue operating efficiently and to meet program goals. While several core functions of CleanPowerSF are scalable to meet the needs of program growth, the strategic application of additional resources will be important to take advantage of customer acquisition opportunities, manage risk, develop complementary program services, moderate workload and promote staff satisfaction. A total staff increase from 15.5 full time equivalent (FTE) employees to approximately 50-55 FTEs employees over the course of program expansion is recommended to serve greater program operational needs.

3.5.1 Current Staffing

The Power Enterprise's CleanPowerSF team is comprised of 8.5 FTEs that are devoted to program development and administration. This team works closely with SFPUC External Affairs on communications and outreach activities. Across the Power Enterprise and External Affairs Bureau, a total of 15.5 FTE positions are funded and directly support CleanPowerSF.

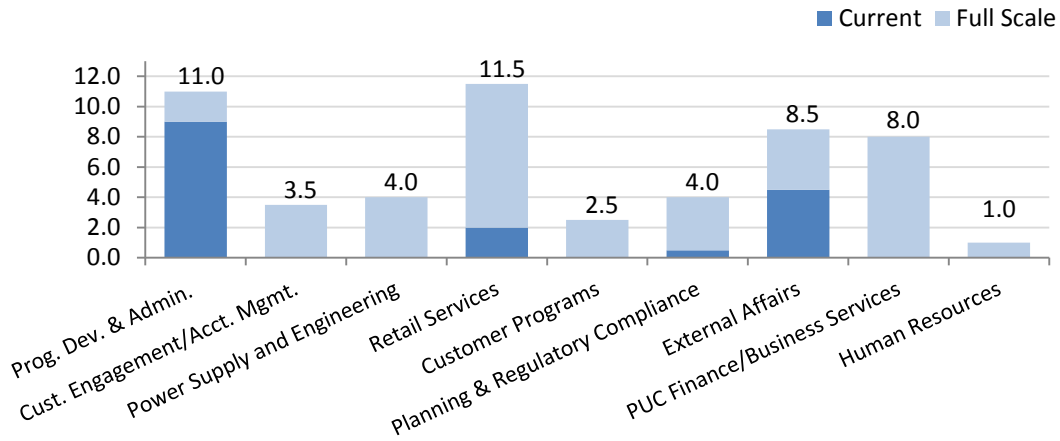
A number of departments across SFPUC and the City and County of San Francisco also support program operations. Within SFPUC, Business Services, Infrastructure, and Human Resources provide critical support functions. CleanPowerSF also depends on a number of departments across the City and County of San Francisco, most notably the Office of the Controller, Office of the City Attorney, Department of Human Resources, and Department of the Environment. An organizational chart showing the support functions provided by these entities is provided in Appendix A-3.

3.5.2 Considerations for Growth

From program inception through launch, CleanPowerSF has operated under an "all hands on deck" approach. Having a small team and ambitious timeline to roll out service to the first phase of customers required staff to wear many hats and collaborate extensively. In recent months, several staff members have been added, which has not only increased CleanPowerSF's capacity but has begun to allow for distinct competency areas to develop. Among these are customer data analysis, back office operations, energy supply procurement, demand forecasting, and customer program development. As the program continues to grow, it will gain efficiency by further developing these operating groups and, where feasible, integrating with other Power Enterprise teams working on similar functions.

The staffing recommendations offered in this Growth Plan are drawn from discussions with key Power Enterprise and SFPUC personnel as well as a comparative analysis of the CleanPowerSF organization with other CCA organizations. The following areas were identified as priorities for additional staffing and systems resources to support program expansion. The program staffing proposal by functional area is summarized in Figure 20.

Figure 20: CleanPowerSF Staff Growth by PUC Group (54 FTEs)



Origination and Power Contracting (Power Supply and Engineering Group)

As CleanPowerSF’s energy demand grows, the program will need to significantly increase the number of energy supply contracts and counterparties in its energy supply portfolio to control costs, best take advantage of market opportunities, and manage risk. Over the next 12-24 months, the SPFUC will need to execute a significant number of new power supply contracts. Because energy supply represents the vast majority of program costs, strong management and staffing support in this area is essential to CleanPowerSF’s financial stability and competitiveness.

Staff recommends immediately adding staff to support this critical program growth and operating function. A team should be developed that is devoted to resource planning, solicitations, and contract administration. This capacity can be shared with other Power Enterprise business lines.

Customer Engagement / Account Management

The expansion of CleanPowerSF to other districts in San Francisco will bring about shifts in the customer base, necessitating strategic changes in customer engagement. Enrolling medium and large commercial accounts will require a more direct and intensive engagement approach to retain customers and promote *SuperGreen* adoption. Expanding to certain residential neighborhoods across the City will require grassroots, community-based engagement in Chinese and Spanish to ensure customers are well-informed, build trust, and foster customer retention.

Staff recommends building a team of account managers dedicated to relationship development, customer service, billing analysis, and sales, with two staff added prior to the next major enrollment period (May 2018). After Citywide enrollment has been achieved, the focus of the team should shift to furthering *SuperGreen* adoption, forging marketing partnerships, and marketing new customer services.

Demand Forecasting, Scheduling and Settlements, and Risk Management and Business Analysis (Wholesale and Retail Services Group)

While these teams currently support CleanPowerSF, new systems and additional staff resources are needed to provide better coverage and staffing depth to support scaling to City-wide



enrollment. These critical program operating functions must be able to maintain operations when staff is absent due to vacation, leave, or turnover/attrition.

Staff recommends adding staff immediately to support the increasing workload in the load forecasting, power scheduling and settlements and risk management functions. CleanPowerSF should pursue developing shared staffing and system resources with other Power Enterprise business lines to capture economies of scale. Staff may be added incrementally as the program grows to increase coverage.

Energy Data Systems (Whole and Retail Services Group)

Better leveraging customer and program data is essential for future planning, research, and demand forecasting efforts. In the longer term, the strategic benefits of transitioning away from contractors and building customer service and/or billing administration capabilities internally will necessitate large-scale systems implementation efforts.

Staff recommends the following:

- Add professional services consulting capacity to support near and long-term data management and data systems planning and development.
- Expand data systems capabilities (e.g., in MDMS) to receive interval level meter data and other related customer data, making this information more accessible for analysis.
- Add staffing resources to the Power Enterprise Energy Data Systems team and the SFPUC's Information Technology group to support the expanded and on-going information systems and technology requirements of CleanPowerSF and the Power Enterprise.

Regulatory and Legislative Affairs (Planning and Regulatory Compliance Group/SFPUC External Affairs)

As discussed in Section 3.4, it is critical for CleanPowerSF to track and participate in many state-level proceedings and rate cases to ensure the program stays in compliance with its regulatory obligations and is able to compete on a level playing-field. In addition, CleanPowerSF must stay actively engaged in state legislative proposals that may affect how CCA programs operate. Going forward it will be important that SFPUC External Affairs is sufficiently equipped to support the significant legislative needs of the CleanPowerSF program.

CleanPowerSF urgently needs Regulatory and Legislative Affairs staff capacity within the Power Enterprise and the SFPUC External Affairs group to bolster efforts in this important area. CleanPowerSF should also continue to collaborate with other CCAs through the CalCCA forum to leverage the collective regulatory and legislative resources of all CCAs.

Customer Service and Billing Administration (SFPUC Finance and Business Services)

The support of an experienced contractor, Calpine Energy Solutions, in providing Customer Service and Billing Administration services has been critical to CleanPowerSF's success in rapidly launching the program and meeting the significant customer service requirements of enrollment periods. However, an evaluation of the long-term value of using a contractor versus building internal capacity for these services is warranted.

When it comes to customer service, it is important that the City be the face of the program. Call center and customer care expertise exists within the SFPUC today, and internal capacity to serve CleanPowerSF may be added incrementally, over time.

However, billing administration for CleanPowerSF requires complex processes and parallel skill sets do not currently exist within SFPUC (because CleanPowerSF's systems must interface with PG&E's systems). If brought in-house, this technical and highly specialized capacity would need to be developed.

In the near term, staff recommends incrementally building internal capacity for Customer Service, by adding 1-2 staff to answer customer calls and emails, using Calpine's CRM and phone system. Consultants will be needed to evaluate the data systems needs for fully incorporating customer service and billing administration, and to develop a business case for proceeding with integration of one or both services. Second, staff recommends issuing an RFP for systems implementation and ongoing support, and then transitioning CleanPowerSF customer service staff to SFPUC's Customer Contact Center as a full team is hired and SFPUC-managed CRM and phone systems are implemented.



Photo 9: Shiloh I Wind Farm

Table 4 below identifies the distribution of proposed positions, assuming the program grows in two additional phases – a second phase that brings the program to 250 MW of average demand and then at full scale. The projected staffing levels identified in each phase represent the total staff funded by the program at each proposed phase (Phase 1, Phase 2, Full Scale).

Table 4: CleanPowerSF Staffing Plan (FTEs by Program Phase/Size)

SFPUC/Power Enterprise Division	Phase 1 ≈60MW	Phase 2 ≈250MW	Full-Scale 400+MW
Program Development and Administration	9.00	9.00	11.00
Customer Engagement/Account Management	0.00	1.00	3.50
Power Supply and Engineering	0.00	2.50	4.50
Origination and Power Contracting	0.00	2.50	3.50
Retail Services	2.00	6.00	11.50
Forecasting	0.00	1.00	2.00
Scheduling and Settlements	1.00	2.00	3.50
Risk Management and Business Analysis	0.00	1.00	2.50
Energy Data Systems	1.00	2.50	3.50
Customer Programs	0.00	1.00	2.50
Planning and Regulatory Compliance	0.50	2.50	4.00
Regulatory and Legislative Affairs	0.00	2.50	4.50
External Affairs	4.50	6.00	8.50
Outreach and Communications	4.50	6.00	7.50
SFPUC Government Affairs	0.00	1.00	1.00
SFPUC Finance/Business Services	0.00	2.00	8.00
Customer Care / Call Center	0.00	1.00	6.00
Finance	0.00	1.00	2.00
SFPUC Human Resources	0.00	1.00	1.00
Total	16.00	32.00	54.00

Operational Readiness Findings Summary

- ✓ **At full-scale CleanPowerSF will need the support of approximately 50-55 full-time staff:** It is projected that CleanPowerSF will require the support of approximately 50-55 full-time staff. This staffing projection is consistent with other CCAs, particularly MCE, which has about 40-45 FTEs and is currently a bit smaller than CleanPowerSF's expected size at full scale. Six of the additional positions recommended in this plan for CleanPowerSF are call center staff, which MCE does not presently perform in-house.
- ✓ **Near-term staffing support is needed in critical program functions:** In the near term, growing CleanPowerSF is going to require the addition of significant new power supplies and financial support. Additional staff are needed immediately to support RFP processes, contract execution, and risk management. Furthermore, increasing regulatory and legislative activity at the State level highlights the need for increased resources to ensure the City's interests are well-represented. Finally, additional support from SFPUC Business Services and Finance, External Affairs and Human Resources will be needed in the very near-term to support the growth process.
- ✓ **Professional services contractors will be needed to fill gaps during growth:** Recognizing that it will take time to staff up the program, professional services will continue to play an important role in filling staffing gaps in program planning and operations. After program growth is complete, CleanPowerSF staff should turn its attention on in-housing operating functions that can be supported by City staff and systems.

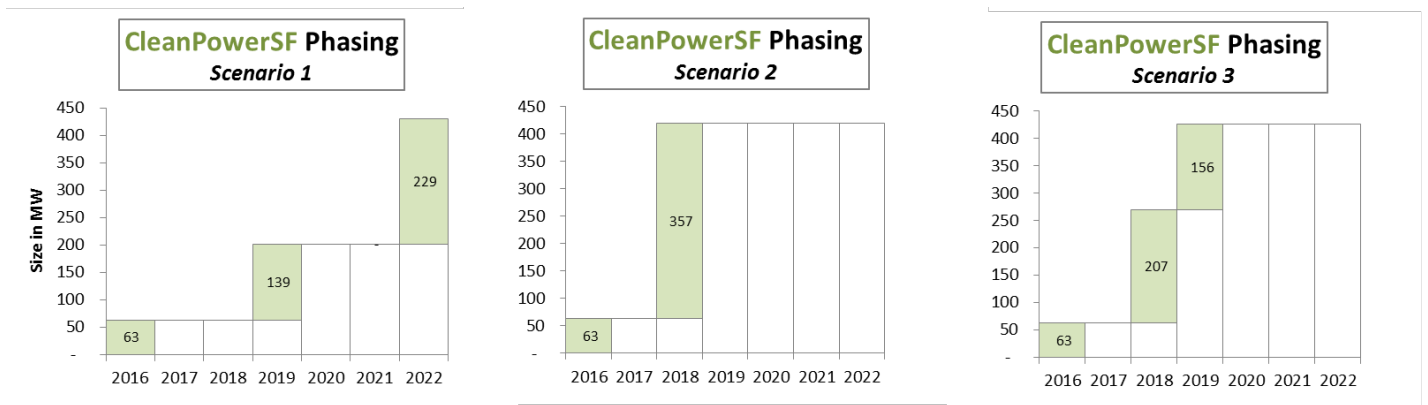
3.6 Proforma Financial Analysis

3.6.1 Scenarios

Drawing from the customer demand, power supply, financing, regulatory, and operational readiness findings described above, CleanPowerSF staff conducted financial and risk analyses of several scenarios that serve as options for CleanPowerSF program growth:

- Scenario 1: Growth to Citywide Service by 2022, Per 2015 Business Plan Phasing Strategy
- Scenario 2: Growth to Citywide Service by 2018 in One Additional Phase
- Scenario 3: Growth to Citywide Service by 2019 in Two Additional Phases

Figure 21: Program Phasing Scenarios



The purpose of this analysis is to understand the financial requirements and performance of different rates of program growth. The analysis identifies the program reserves and estimated collateral requirements for acquiring the power supply needed to meet the program demand in each growth scenario. It is important to note that this analysis does not address whether the energy supplies are available in the market to meet the respective enrollment timelines. As discussed in the Power Supply and Markets Section, the availability of energy supply will need to be established through a power supply RFO.

Pro Forma Assumptions

For these analyses, CleanPowerSF has updated its proforma with a number of assumptions covering product content minimums, financing needs, rate projections, market price projections, supply portfolio makeup, staffing needs, and more. These assumptions reflect information conveyed in the detailed findings above. More information on the assumptions used in this analysis is provided in Appendix A-6.

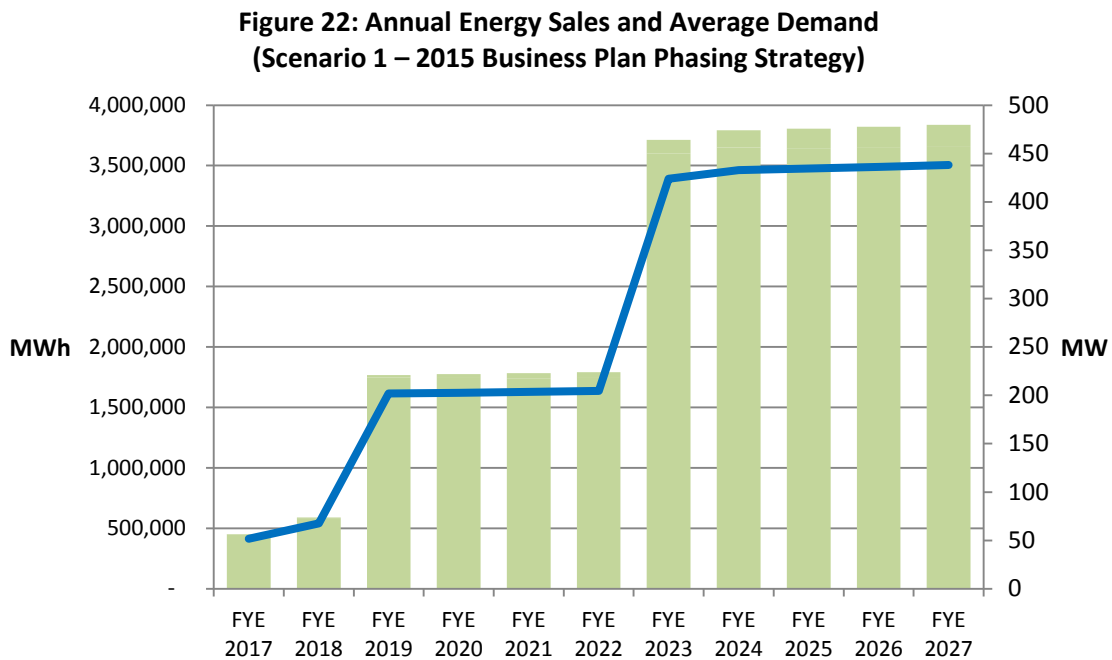
Scenario 1: Growth to Citywide Service by 2022 Per 2015 Business Plan Phasing Strategy

In the CleanPowerSF Business Plan shared with the Commission in December 2015, a plan to phase service to the full City was laid out using three additional auto-enrollment phases to be completed by 2022. The timing of these auto-enrollment phases was determined through

analysis that required CleanPowerSF to complete the self-funding of its reserves and any projected power purchasing collateral requirements in excess of the \$40 million credit support secured by the Power Enterprise prior to enrolling additional customers. The key constraint of this scenario is that it assumes that no external credit support is provided to grow the program and that no additional financial support is provided by the Power Enterprise beyond \$40 million credit support and the \$8 million working capital loan.

This proposed schedule and structure for growing the program has been refreshed as part of the growth planning process, using updated information on market prices, power supply financing needs, competitor rate trends and new data on customer usage gained through CleanPowerSF operations to date. However, the key financial constraints for this scenario remain the same – no additional financial support is provided by the Power Enterprise beyond \$40 million in credit support and the initial \$8 million working capital loan.

Figure 22 below illustrates the projected Scenario 1 load growth. As you can see from the chart, under Scenario 1, the program would grow in two additional phases, a 150 MW phase in June 2018 and another phase of 246 MW in July 2022, which is when the program would begin providing service citywide.



Under this growth scenario, program revenues are projected to grow from approximately \$33.7 million in FYE 2017 to approximately \$128.8 million by FYE 2020. The first year of citywide program sales in Scenario 1 occurs in FYE 2023. This analysis projects that the Operating Reserve target of 90 days of program expenses and the Rate Stabilization Reserve of 15% of annual revenue can be fully funded by program revenues during FYE 2025, about three years after the

program achieves full scale. Scenario 1 assumes \$40 million in credit support from the Power Enterprise is used for power supply transactions. This exceeds the approximately \$17 million that was used to support program launch, and does not leverage third party credit support that staff believes may be available to support expansion (as indicated in the Financing Needs and Options Section above).

Figure 23: Annual Energy Sales and Average Demand (Scenario 1 – 2015 Business Plan Phasing Strategy)

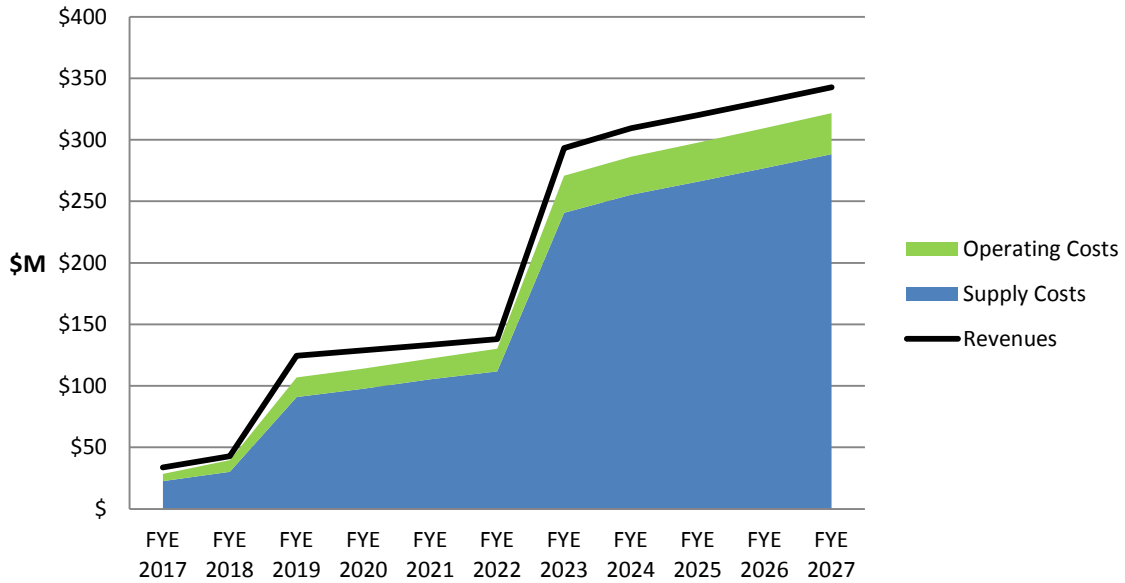
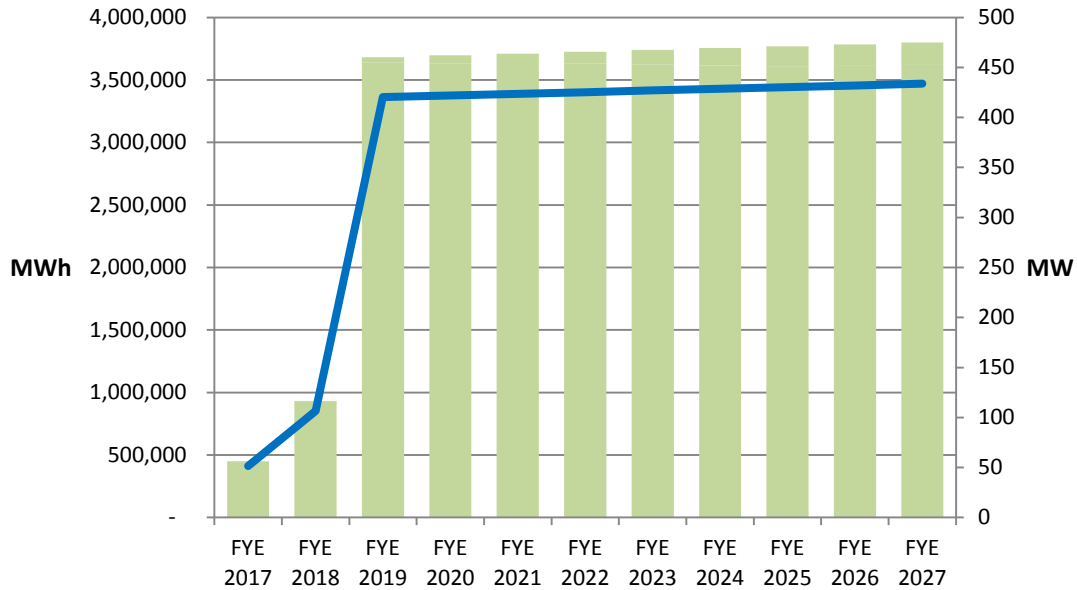


Photo 10: Sunset Reservoir Solar Panels (a CleanPowerSF source of power supply)

Scenario 2: Growth to Citywide Service by 2018 in One Additional Phase

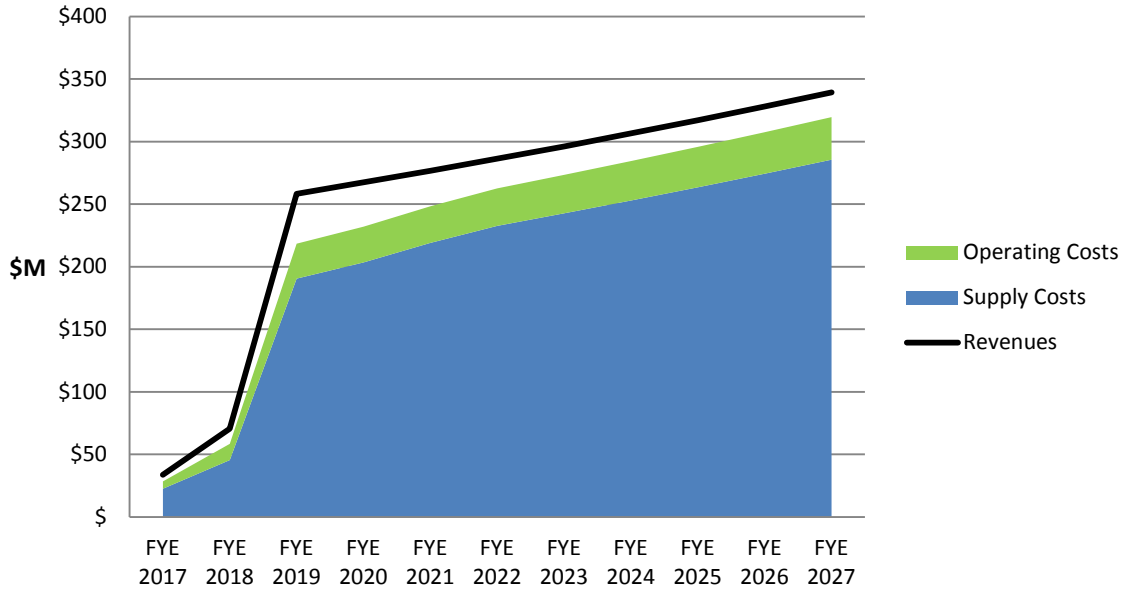
Scenario 2 examines an expedited auto-enrollment schedule phasing in all remaining eligible citywide load in one additional phase in May 2018. The Scenario 2 load growth scenario is summarized in Figure 24 below. FYE 2018 shows an increase in sales volume associated with the May and June months. The full extent of the sales growth in Scenario 2 begins to be reflected in FYE 2019. Sales growth beyond 2019 reflects an assumed 0.5% per year natural load growth.

Figure 24: Annual Energy Sales and Average Demand (Scenario 2 – Single Phase Expansion)



Projected program costs and revenues associated with Scenario 2 are summarized in Figure 25 below (See Appendix A-8 for projected annual sources and uses information). The analysis indicates that the program is projected to recover costs and collect reserves for operating and rate stabilization. Under Scenario 2, program revenues will grow from approximately \$33.7 million in FYE 2017 to approximately \$258 million by FYE 2019, the first year of citywide program sales. The Operating Reserve target of 90 days of program expenses and the Rate Stabilization Reserve of 15% of annual revenue can be fully funded by program revenues during FYE 2021, two years after the program achieves full scale. This means the program will require external financial support to cover these needs until this time.

**Figure 25: Program Costs and Revenues
(Scenario 2 – Single Phase Expansion)**

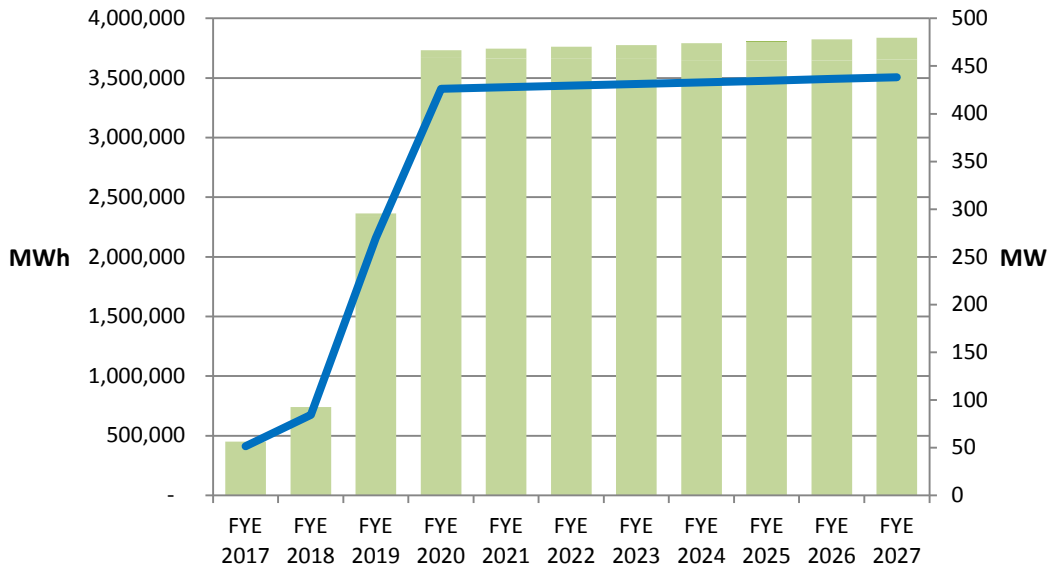


Scenario 3: Growth to Citywide Service by 2019 in Two Additional Phases

Scenario 3 examines a program expansion schedule, in which all remaining eligible citywide load is enrolled in two additional phases, one in May 2018 and one in May 2019.

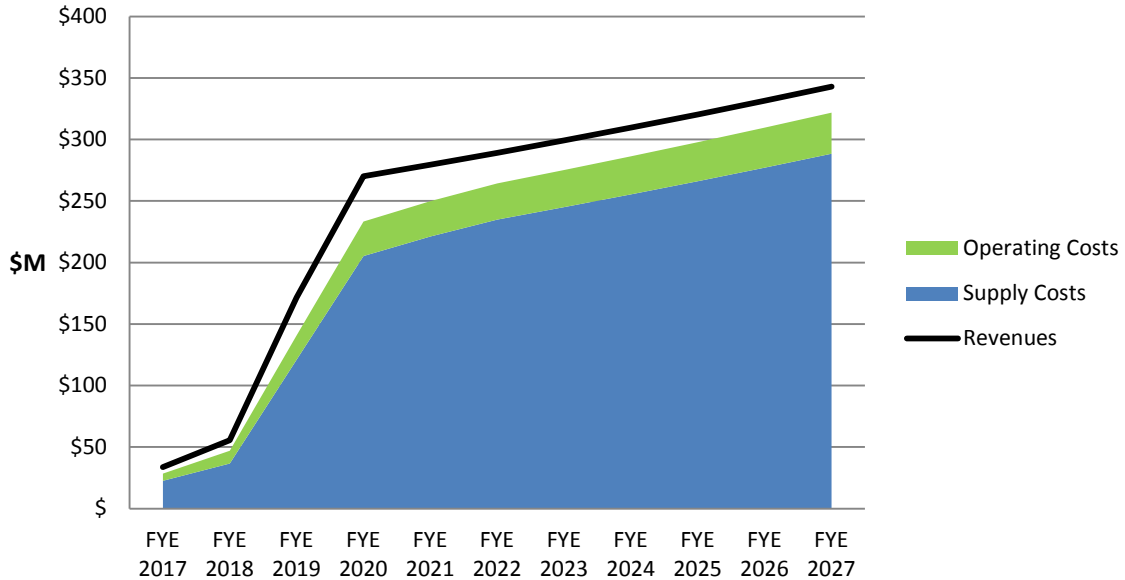
The Scenario 3 load growth scenario is summarized in Figure 26 below. FYE 2018 shows an increase in sales volume associated with the Phase 2 completion in May. The increased sales represent two months of additional demand that occurs at the end of FYE 2018. The growth in sales in FYE 2019 reflect a full year of Phase 2 sales and the Phase 3 enrollment in May. The full extent of the sales growth in Scenario 3 shows up in FYE 2020. Sales growth beyond 2020 reflects an assumed 0.5% per year natural load growth.

**Figure 26: Annual Energy Sales and Average Demand
(Scenario 3 – Two Phase Expansion)**



Projected program costs and revenues associated with Scenario 3 are summarized in Figure 27 below (see Appendix A-9 for projected annual sources and uses information). The analysis indicates that the program is projected to recover costs and collect reserves for operating and rate stabilization. Under this growth scenario, program revenues will grow from approximately \$33.7 million in FYE 2017, to \$171.7 million by FYE 2019, and \$270.1 million at the end of FYE 2020, the first full year of citywide program sales. Like Scenario 2, the Operating Reserve target of 90 days of program expenses and the Rate Stabilization Reserve of 15% of annual revenue can be fully funded by program revenues during FYE 2021, one year after the program achieves full scale. This means the program will require external financial support to cover these needs until this time.

**Figure 27: Program Costs and Revenues
(Scenario 3 – Two Phase Expansion)**



Scenario Considerations

Table 5 below compares key factors staff have identified regarding execution of the enrollment pace for Scenarios 2 and 3.

Table 5: Comparison of Scenario 2 and Scenario 3 Enrollment Pace Factors

Factor	Scenario 2 (1 Add'l Phase)	Scenario 3 (2 Add'l Phases)
Operational Readiness	Findings on operational readiness suggest that current staffing levels will not be sufficient support expansion to the full City load in May 2018. At a minimum, additional staffing is required to support priority operational functions such as supply portfolio management, load forecasting and scheduling, account management and communications.	A two-phase approach to growth spread out over a 6 to 12 month time period is preferable from an operational readiness perspective as it will allow for additional time to staff up. This will also allow the SFPUC to better align new operating costs with program revenues (i.e., spreading those costs out over a longer period of time) and reduce the immediate administrative burden of hiring, training, and building institutional knowledge about the program.
Energy Procurement	Diversity of energy supply will be a central piece of energy supply risk management – which, as the greatest program cost is central to rate affordability and program	Spreading the development of a 400 MW+ energy supply portfolio over two phases (compared to one) will provide the CleanPowerSF team

Factor	Scenario 2 (1 Add'l Phase)	Scenario 3 (2 Add'l Phases)
	<p>success. Acquiring sufficient cost-effective renewable energy to meet the program's needs at one time may prove challenging. Ultimately, the results of the power supply RFO will help establish if sufficient cost-effective supplies are available on this timeline.</p>	<p>greater flexibility to optimize the portfolio for cost and other attributes important to success. It may also support risk management by providing more time to execute a great number of supply contracts and diversifying the portfolio than can be accomplished under the shorter Scenario 2 timeline.</p>
Financial	<p>Similarly to Energy Procurement, the SFPUC needs to determine if sufficient financial support is available from third parties to acquire the energy needed to grow the program at this rate. A financing RFP, in conjunction with the power supply RFO, will provide answers to these open questions.</p>	<p>Dividing citywide enrollment into multiple phases rather than just one may allow the SFPUC to finance citywide expansion without any additional financial support from the Power Enterprise.</p>
Communications	<p>While some efficiencies in rollout would be gained from a single additional phase to Citywide service, particularly mass media, staff are concerned about the ability to conduct comprehensive outreach across the city on this timeline, particularly given current staffing levels.</p>	<p>Breaking citywide enrollment out into multiple phases will grant the SFPUC the time needed to conduct comprehensive outreach throughout the city. Depending on the availability of financing and power supplies it may be possible to split the rest of the city into two enrollment periods during the 2018 calendar year, which would give staff more time to conduct a thorough outreach and education campaign. Staff will revisit this option after it has received bids for power supply and program financial support.</p>

It should also be noted that program operating costs (excluding supply costs) are shown to be between 15-20% of total revenues in Phase 1 and decrease to approximately 10-11% of revenues once the program is full scale. This indicates that there may be scale benefits to growth from an operating perspective.

3.6.2 Risk Analysis

In order to identify potential financial risks with expedited growth, a sensitivity study was conducted on Scenarios 2 and 3. It focused on the following four variables that staff has identified as having the greatest potential impact:

- Changes to PG&E's Power Charge Indifference Adjustment:** Staff evaluated the impact of variation in PG&E's PCIA rate on program revenues. An increase of 30% and decrease of 15% from the predicted base case PCIA rates were tested, while assuming that in each

scenario CleanPowerSF would adjust its rates to maintain cost parity with bundled customers.

- **Changes to PG&E’s Generation Rates:** Staff evaluated the impact of variation in PG&E's generation rates on program revenues. An increase of 5% and a decrease of 5% in PG&E's rates from those predicted in the pro forma were tested, assuming that CleanPowerSF adjusts its rates to maintain cost parity with bundled customers and that program costs do not change.
- **Renewable Energy Prices:** Sensitivity analysis was conducted to ascertain the financial impact of renewable energy prices increasing or decreasing by 25%.
- **Renewable Content:** The sensitivity to the renewable content in CleanPowerSF’s portfolio was also explored by increasing the base renewable content by 5% or decreasing it by 2%.

Table 6 below shows the results of the sensitivity analyses in terms of the annual net impact in FYE 2020 dollars and as a percent of revenue. FYE 2020 was selected because CleanPowerSF would have its first full year of sales in both scenarios, thus providing the impact of each risk factor on the program at full scale.

Table 6: Sensitivity Analysis

Sensitivity Factor	Change from Base Case	FYE20 Net Impact	% of Revenue
PCIA Change	PCIA decrease by 10%	+ \$8.6M	+ 3.2%
	PCIA increase by 30%	- \$25.9M	- 9.7%
PG&E Rate Change (No Change in Cost)	Rate increase by 5%	+ \$17.8M	+ 6.6%
	Rate decrease by 5%	- \$17.8M	- 6.6%
Renewable Prices	REC cost decrease by 25%	+ \$7.0M	+ 2.6%
	REC cost increase by 25%	- \$7.0M	- 2.6%
Renewable Content	Base product renewable content decrease by 2%	+ \$0.9M	+ 0.3%
	Base product renewable content increase by 5%	- \$2.2M	- 0.8%

As shown above, the impact of changes to renewable energy pricing (with no changes to content) and the impact of changes to renewable energy content (with no increase or decrease to pricing) was relatively minimal. Changes in renewable energy pricing, tested at 25% above or below current pro forma assumptions, produce a \$7.0 million (2.6%) change in revenue. Sensitivity to changes in renewable energy content is a bit more significant, increasing revenues by \$900,000 if renewable content was decreased by 2% and decreasing revenues by \$2.2 million if renewable content was increased by 5%. Another way of looking at these sensitivities is that every 1% change in renewable pricing produces a \$280,000 change in net annual revenue. For every 1% change in

renewable energy content the program incurs about a \$450,000 (0.15%) change in net annual revenue.

Changes in PG&E’s PCIA and generation rates have the biggest effect on program revenues. As noted above, these sensitivities assume that CleanPowerSF will change its rates in response to a PG&E PCIA or generation rate change. Here, a 5% change in PG&E’s generation rates could result in an impact of \$17.8 million (6.6% change in revenue); or, every 1% change in PG&E generation rates results in a \$3.6 million (or 1.3%) change in revenue. In addition, a 10% decrease in the PCIA could result in a \$8.6 million increase in revenue (about 3%) and a 30% increase in the PCIA would decrease program revenues by approximately \$25.9 million (9.7%). For every 1% change in the PCIA, one can expect an approximately \$860,000 (or 0.4%) change in revenue when the program is full scale.

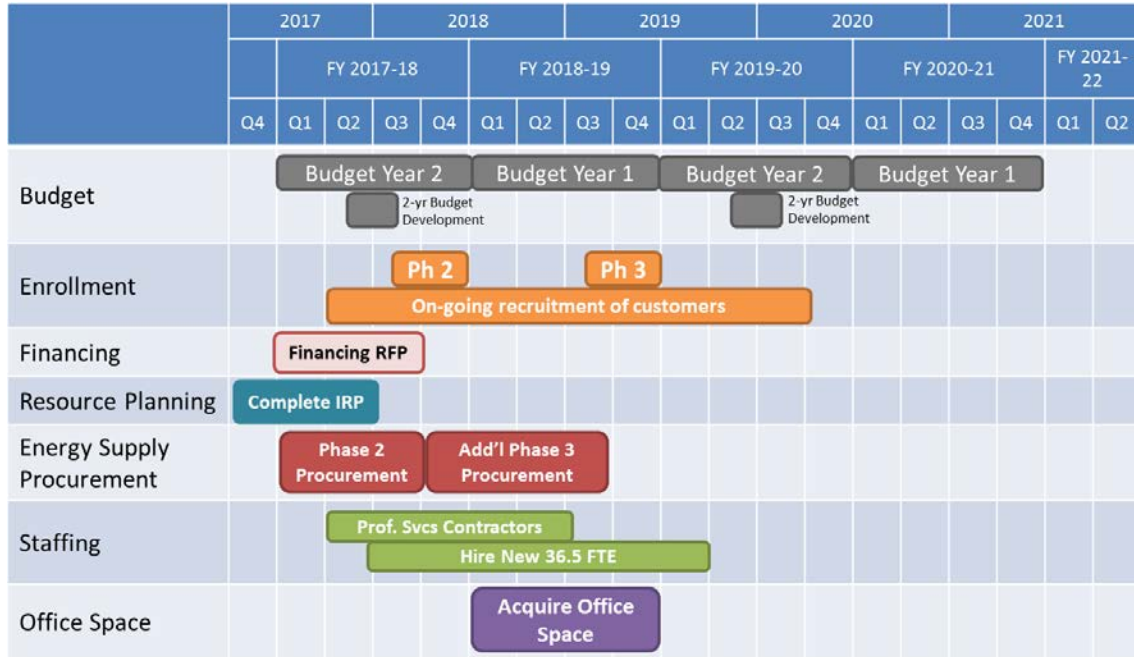
It must be noted that these sensitivities assume that PG&E’s rates are changing independent of CleanPowerSF’s power costs. Since CleanPowerSF and PG&E will be participating in the same wholesale markets, this is not likely to occur. On the other hand, if CleanPowerSF is highly hedged (i.e., most of its generation costs are fully locked-in on a multi-year basis) and PG&E is refunding a large over-collection (or making up for a large under-collection) from the prior year, a 10% impact is not impossible, especially given the accompanying effect of the PCIA.

Proforma Financial Analysis Summary

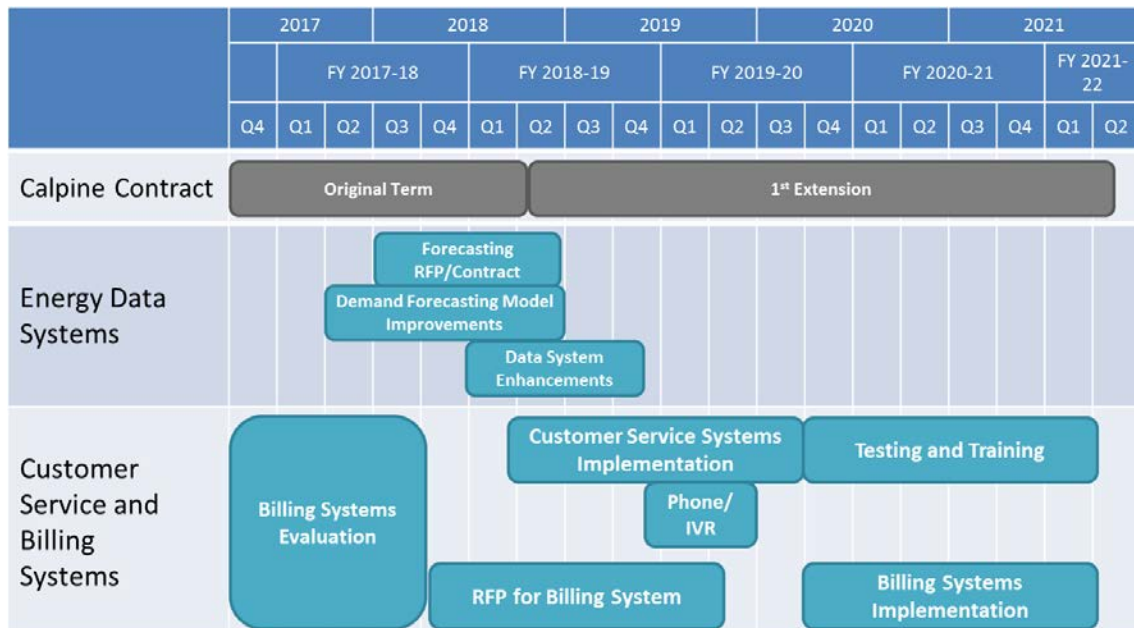
- ✓ **The program is financially feasible at different rates of growth:** Each of the scenarios analyzed show that the program is feasible at the different rates of growth considered, given the assumptions used. Given this finding, other factors – such as staffing requirements and supply and financing procurements – play a central role in determining the optimal Scenario for growth.
- ✓ **A key constraint to growth is access to working capital and credit for power purchases:** The analysis projects that the program is expected to need \$40-60 million in credit support and/or collateral to secure power purchase agreements at full-scale. In addition, fully funding financial reserves will require about \$80+ million. Scenarios 2 and 3 indicate that reserves can be fully funded by revenues within 2 years of program expansion citywide, however third party credit support will likely be needed for growth prior to this time.
- ✓ **Changes to PG&E generation rates and the PCIA pose the greatest risk to program financial stability:** The sensitivity analysis indicates that changes in PG&E generation rates and the PCIA have the greatest impact on program revenues and can quickly erode program margins.
- ✓ **Scale efficiencies may be achieved with growth:** Program operating costs (excluding supply costs) are shown to be between 15-20% of total revenues in Phase 1 and decrease to approximately 10-11% of revenues once the program is full scale. This indicates that there may be scale benefits to growth from an operating perspective.

4.0 Timeline

4.1 Implementation Timeline



4.2 Systems Development Timeline



Appendices

Appendix A-1: CleanPowerSF Business Practice Policies

CleanPowerSF

Business Practice Policies

Adopted on December 8, 2015

(Amended on May 9, 2017)

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1. **Product Content Policy**
2. **Rate Setting Policy**
3. **Phasing Policy**
4. **Supply Management Policy**
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6. **Program Performance Reporting Policy and Metrics**

Product Content Policy

Renewable Content

All entities that provide electric power to end-use consumers in the state are required to comply with the California Renewable Portfolio Standard (RPS). The RPS establishes the minimum amount of renewable generation a load serving entity must utilize to serve its retail customers, the renewable technologies eligible for compliance to meet that minimum, and the relative amounts of the bundled and unbundled renewable products that may be used. The RPS was established in 2002 under Senate Bill 1078, accelerated in 2006 under Senate Bill 107 and expanded in 2011 under Senate Bill 2 and in 2015 under Senate Bill 350 (Public Utilities Code § 399.11-32). The RPS mandates that 33% of electricity sold to consumers must be generated by eligible renewable resources by 2020 and 50% by 2030.

By a vote of the people, San Francisco established City policy "... that the use of unbundled renewable energy credits for CleanPowerSF customers shall be limited to the extent deemed feasible by the SFPUC.... For renewable energy provided by CleanPowerSF that exceeds the minimum requirements of state law, the voters urge the SFPUC to apply the same limitations on the use of unbundled renewable energy credits, to the extent feasible." (San Francisco Environment Code § 2102(b), Proposition H, 2015.)

In directing the SFPUC to begin development of San Francisco's Community Choice Aggregation program, the Board of Supervisors found that through such a program "...the City could have additional means of increasing the scale and cost-effectiveness of conservation, energy efficiency and renewable energy ...(and) a means of exercising local control over electricity prices, resources and quality of service, and designing local energy systems to protect against future blackouts and rate shocks." (Ord. 86-04)

The SFPUC has developed the CleanPowerSF program to balance the sometimes competing objectives laid out by the Board of Supervisors – affordable, cleaner energy, including local generation and efficiency, while providing for long-term rate and financial stability. To achieve that balance, it is the policy of the SFPUC that the CleanPowerSF program shall offer two retail electricity products at launch: 1) a default "Green" product, with an initial target of 33% to 50% renewable energy content; and 2) a voluntary "SuperGreen" product, with 100% renewable energy content.

The renewable energy content goal of the Green product will be 35% renewable energy content when the program launches in 2016, **increasing to 50% renewable energy content by the end of 2020**. The Green product will at all times be no less than 33% renewable or the minimum statewide RPS target in effect at the time, whichever is greater.

CleanPowerSF will exceed the Green product renewable content commitments when it is cost-effective as market conditions allow while balancing affordability, financial and rate stability, and local project objectives.

It is the policy of the SFPUC that CleanPowerSF purchase renewable energy from projects located within the nine Bay Area Counties (San Francisco, San Mateo, Santa Clara, Alameda, Contra Costa, Solano, Napa, Sonoma and Marin), to the extent cost-effective and as market conditions allow.

The SFPUC shall implement the policy of the City that the use of unbundled renewable energy credits for CleanPowerSF be limited to the extent feasible, consistent with the goals of the program. For purposes of satisfying its renewable energy content objectives, at program launch CleanPowerSF will rely on Product Content Category 1 renewable resources, to the extent economically and financially feasible.

CleanPowerSF will follow the limitations of local and state law regarding the use of unbundled renewable energy credits to satisfy the applicable renewable portfolio standard. For renewable energy provided by CleanPowerSF that exceeds the minimum requirements of state law, the SFPUC will apply the same limitations on the use of unbundled renewable energy credits, to the extent feasible.

Carbon Content

In 2002, the Board of Supervisors passed the “Greenhouse Gas Emissions Reduction” Resolution (158-02), updated in 2008 (Ordinance 81-08, San Francisco Environment Code § 902), committing San Francisco to reduce citywide GHG emissions on a stepped-down schedule to 80% below 1990 levels by the year 2050. Implementing efforts recognize San Francisco’s Community Choice Aggregation program as a key contributor to achieving those goals.

Consistent with City policy and SFPUC Resolution 11-0035, a principal objective of the CleanPowerSF program is to facilitate the City’s shift to a greenhouse gas free electric energy supply. Toward these ends and to the extent economically and financially feasible, CleanPowerSF’s energy portfolio carbon content shall be lower than the levels of carbon in Pacific Gas and Electric Company’s electricity resource portfolio. Consistent with City policy and as economically and operationally feasible, CleanPowerSF will endeavor to reduce the total carbon content in its electricity resource portfolio over time with a goal of providing a carbon free electricity service no later than 2030.

For purposes of firming and shaping the electricity portfolio used to serve customers, CleanPowerSF will not utilize specified purchases of coal or nuclear energy.

Rate Setting Policy

As established in Ordinance 146-07, management and control of the CleanPowerSF program is being undertaken by the SFPUC pursuant to its responsibilities and authority under the Charter. As such, CleanPowerSF rates are set by the SFPUC Commission (Commission) pursuant to the authority and provisions set forth by the Charter (Section 8B.125). Among other things, the Charter requires the SFPUC to set rates, after one or more public hearings, based on the cost of service, and at levels sufficient to provide sufficient resources for the continued financial health (including appropriate reserves), operation, maintenance and repair of each enterprise.

SFPUC staff has estimated the cost to provide CleanPowerSF service, and conducted a risk assessment that identified and quantified potential variations in cost and revenue resulting from changes in key program assumptions. This effort demonstrates the viability of the program to meet program objectives, and forms the basis for the Commission to set rates for the initial program launch.

The Commission will adopt budgets and establish cost-based retail rates for CleanPowerSF that provide sufficient revenue for the continued financial health of CleanPowerSF. Program rates will be adequate to support program operations, including maintaining revenues necessary to pay CleanPowerSF's obligations under its power supply and other contracts, and future projects, taking into consideration program goals.

CleanPowerSF rates shall be adopted in a manner that is consistent with the SFPUC's Rates Policy principles, balancing *affordability, compliance, sufficiency, and transparency*. All CleanPowerSF budgets, rates, fees, and charges presented by SFPUC staff to the Commission will conform to the SFPUC Rates Policy. Any proposed deviations from this policy will be reported to the Commission along with any resulting impact to CleanPowerSF ratepayers.

In adopting rates for CleanPowerSF, the SFPUC will endeavor to minimize rate volatility. CleanPowerSF rates will be reviewed annually for the upcoming fiscal year and adjusted, as needed, to ensure sufficient revenue to meet its contractual, legal and regulatory obligations, while providing for program affordability.

Phasing Policy

It is the policy of the SFPUC that the CleanPowerSF program will be phased-in throughout San Francisco in a manner that is financially prudent and operationally feasible.

Initial and subsequent CleanPowerSF customer enrollments shall be conditional upon:

- Program rates being sufficient to cover program costs with rates 0.25% below PG&E generation rates when the program launches in 2016;
- Rates for a subsequent phase are projected to be at or below PG&E rates at the launch of each phase;
- Program supply commitments are sufficient to meet new projected customer demand;
- Staff and systems and/or qualified third party service providers can handle additional energy sales and customer account volumes;
- Sufficient and reasonably priced credit, collateral and working capital support is available; and
- All rate, contracts and financial support approvals have been obtained.

Supply Management Policy

In Ordinance 124-01, and again in Resolution 227-08, the City adopted policies prioritizing energy efficiency and conservation, demand response, renewable generation, distributed generation, and clean and efficient fossil-fired generation, in that order, to provide for a reliable, affordable electric supply. This prioritization, referred to as the “energy loading order”, supports the City’s efforts to reduce the impact of electric supply choices on the environment and to further its environmental justice goals.

As a retail electric service provider, CleanPowerSF will engage in several types of electricity procurement activities for an array of energy-related products. These products may include those related to energy, ancillary services, energy transmission and others that may be defined through legislative, regulatory and market design changes. CleanPowerSF’s procurement activities may include competitive solicitations, bilateral negotiations, programmatic purchases and activities (e.g., energy efficiency and feed-in tariff purchases), project development and participation in the markets run by the California Independent System Operator. As it engages in these procurement activities, CleanPowerSF will implement the City’s energy loading order.

CleanPowerSF initially will manage its supply costs in the near and mid-term by entering into fixed price contracts for specified volumes using contracts with qualified suppliers pursuant to its August 2015 Request for Offers.

After the first year of operation, CleanPowerSF will maintain a modest open position for mid-term and long-term supplies to provide flexibility to adapt to market conditions as they arise. To the greatest extent possible, CleanPowerSF will seek to develop a resource portfolio that is diverse from a resource/technology and supplier standpoint. To the extent Hetch Hetchy supplies are available, sales to CleanPowerSF shall be undertaken at fair market value, when not adverse to the public utility ratepayers of the Power Enterprise. CleanPowerSF power supply procurement activity and performance will be reviewed monthly, quarterly and annually.

Consistent with utility industry best practices, CleanPowerSF will conduct an annual Integrated Resource Planning (IRP) process to identify near-term and mid-term power supply needs and inform annual power purchasing activities, taking into account demand reductions projected to result from energy efficiency and demand response activities. The IRP process will (1) quantify CleanPowerSF’s energy resource needs over a 10-year planning period; (2) prioritize resource acquisition preferences and set forth other relevant energy supply policies; and (3) provide guidance to programmatic purchases and activities, electricity purchasing and resource development processes undertaken by CleanPowerSF staff. The IRP process will be conducted and presented to the Commission each year following the first year of service.

CleanPowerSF shall develop and implement processes that monitor and manage power supply cost and risk, consistent with best utility industry practice. CleanPowerSF's risk management practices shall include methods to model and calculate portfolio cost based on low probability circumstances (for example a 5% probability) and shall establish tolerance bands, which require reporting and corrective action, if exceeded. CleanPowerSF staff shall present its power supply risk management practices to the Commission on an annual basis.

The development of local clean energy projects and jobs is one of the objectives of the CleanPowerSF program. The clean energy project and job opportunities CleanPowerSF presents include employment in program administration and operation, behind-the-meter efficiency and generation services, electric vehicle charging and energy storage infrastructure development, and power supply.

To begin to achieve this objective in the near-term, CleanPowerSF will focus on regular, standardized power purchasing with an identified preference for local and regional projects, where cost-effective. CleanPowerSF will also develop and provide Net Energy Metering (for customer-sited behind-the-meter projects); a Feed-in Tariff program (to purchase power from new local projects); and will issue solicitations for the construction of new local and regional renewable energy and storage projects on City-owned and controlled property. Before making any future decisions to construct or cause the construction of specific renewable energy projects subject to the California Environmental Quality Act (CEQA) the SFPUC shall consider any environmental review documents prepared by the City or other lead agency in compliance with CEQA and, if it approves such projects, the SFPUC shall adopt any required CEQA findings as part of such approval actions. Additionally, to help encourage investment in local rooftop solar, CleanPowerSF customers will continue to be eligible for GoSolarSF incentive funds.

CleanPowerSF will ensure customers remain eligible for PG&E services beyond energy supply or develop comparable, more locally-responsive services to be provided by CleanPowerSF. For energy efficiency and demand response programs, CleanPowerSF will focus initially on helping customers understand the opportunities available to them from existing ratepayer-funded programs and then expand, starting with locally-responsive energy efficiency, storage and demand response pilot programs.

CleanPowerSF will balance local project funding with affordability, financial needs, and renewable content enhancements, while establishing spending limits to mitigate the risks of high costs and project failure.

Reserves Policy

The SFPUC will prudently manage CleanPowerSF operations in a manner that supports its long-term financial independence and stability, provides sufficient financial capacity to bridge shortfalls in cash flow and covers unanticipated expenditures, while at the same time reduces susceptibility to emergency rate increases due to revenue shortfalls and considers ratepayer impact and fairness.

Prudent reserve policies are critical to securing favorable commercial terms from both third-party service providers and lenders and to the development of a future stand-alone CleanPowerSF credit rating.

Consistent with this policy and with the San Francisco Charter, the SFPUC will adopt budgets and establish rates for CleanPowerSF that provide for adequate ratepayer protection in the form of an Operating Reserve Fund and a Contingency/Rate Stabilization Reserve Fund.

These Funds will be established at the following funding levels to mitigate short-term, unanticipated loss of revenues or increase in expenses; stabilize rates; and support the growth of the program:

- Operating Reserve Fund: equal to 90 days of operating expenditures; and
- Contingency/Rate Stabilization Reserve Fund: equal to 15% of projected annual revenues.

The SFPUC will adopt budgets and establish rates for CleanPowerSF with the goal of building up to the above target reserves funding levels within three years of program launch.

Program Performance Reporting Policy and Metrics

On an annual basis, CleanPowerSF shall report to the Commission on the program’s performance in the following areas and measures.

PERFORMANCE AREA	METRIC
Renewable Energy Content	Percentage (%) of power supply from renewable energy and resource types Location of projects supplying energy
Local Energy Production and Savings	Amount of energy produced and saved locally (MWh) Amount of capacity and energy supplied behind-the-meter (MW and MWh)
Environmental Benefits	GHG content of energy supplied (lbs/MWh) Citywide GHGs reduced (lbs CO ₂ e)
Economic and Social Benefits	Direct and indirect jobs created (# job-years) Customer bill savings, including energy efficiency and net metering (\$ and % saved)
Financial Metrics	Progress toward reserves balance targets Debt coverage ratio

Appendix A-2: Regulatory Engagement References

Compliance Requirements

Report Name	Description	Reporting Agency	Frequency
CAISO Officer Certification	Indicates and confirms requirements for participating in the CAISO market	CAISO	Annual
Voluntary Renewable Energy Report (CARB VRE)	Reporting to the ARB for voluntary REC retirement within the cap and trade regulation	CARB	Annual
Annual Retail Sales Report (CARB MRR)	Reports on greenhouse gases by major sources	CARB	Annual
Wind Power Purchases-Form 1386	Reports on all California wind power purchases of 1MW or more	CEC	Quarterly
IEPR-Demand Forecast	Projections of electricity planning for the next decade	CEC	Biennial (odd years)
IEPR-Resource Plans Update	Updates to changes in IEPR Demand Forecast report	CEC	Biennial (even years)
Power Source Disclosure	Inventory of all source-specific power purchases completed during the previous calendar year (REC-only and bundled)	CEC	Annual
QFER 1306B	Reports on location, revenue, and sales amounts of energy supply	CEC	Quarterly
Resource Adequacy (Historical Load Data-Previous Year)	Recorded demand by hour; recorded customer counts by month for residential, small commercial, large commercial, industrial, agricultural	CEC	Annual
RPS Closing Report	Finalized RPS report for the prior compliance period	CEC	As Requested
Resource Adequacy (Load Forecast Update)	Recorded and forecasted peak demand by month; residential, commercial, industrial, and agricultural if forecast has changed	CEC	As Needed
Resource Adequacy (Load Forecast-Year Ahead)	Energy by month; peak demand by month for residential and non-residential; recorded and forecast customers by month for residential and non-residential	CEC	Annual
Resource Adequacy (Compliance Demonstration: System, Local, Flexible)	Recorded and forecast peak demand by month; recorded and forecast customer counts by month for residential, commercial, industrial, and agricultural	CEC/CPUC/CAISO	Monthly

Report Name	Description	Reporting Agency	Frequency
Resource Adequacy (Year Ahead Compliance Demonstration Local/System-- Follows April Forecast)	Contracted Net Qualifying Capacity for 100% of local and flexible RA obligation for each month of the following calendar year	CEC/CPUC/CAISO	Annual
AMI Data Privacy Audit	Independent audit and report on internal AMI data privacy and security practices	CPUC	Triennial
AMI Data Privacy Report	Reports on third party access to AMI data and any data security breaches	CPUC	Annual
Energy Storage Tier 2 Advice Letter	Reports on energy storage procurement and obligations	CPUC	Biennial
GHG Emission Performance Standard Advice Letter	Indicates new resources that contracted with to ensure low/no emissions	CPUC	Annual
Resource Adequacy (Price Data Request)	Data request for RA contract pricing and volumes	CPUC	As Requested
RPS Procurement Plan	Future looking RPS procurement plan	CPUC	Annual
RPS Report	Report to demonstrate compliance with the state Renewable Portfolio Standard	CPUC	Annual
EIA 826	Monthly electric utility sales and revenue report	U.S. DOE	Monthly
EIA 861	Annual Electric Power Industry Report (peak load, generation, electric purchases, sales, revenues, customer counts and DSM programs, green pricing NEM, and DG capacity)	U.S. DOE	Annual
WREGIS REC Retirement Report	All retired RECs whether Bucket 1, 2, 3 or grandfathered	WREGIS	Annual

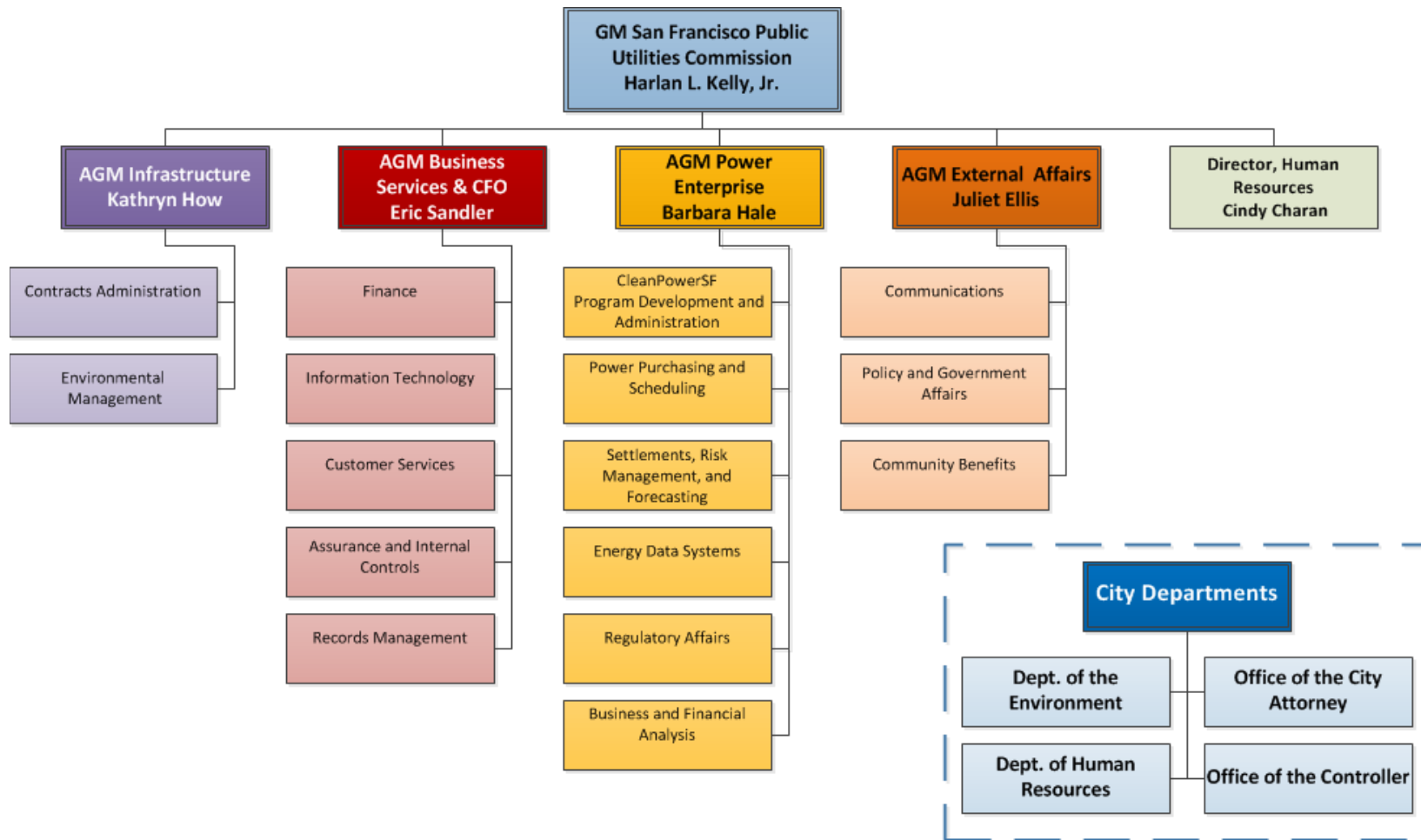
Regulatory Proceedings

Title	Type	Proceeding	Level of Engagement
PG&E 2017 GRC	Cost Allocation	A.15-09-001	Active
PG&E GRC Phase 2	Cost Allocation	A.16-06-013	Active
PG&E Proposal for the Closure of Diablo Canyon	Cost Allocation	A.16-08-006	Active
2016-2017 Resource Adequacy	Standards	R.14-10-010	Active
IRP and Long-term Procurement Planning	Standards	R.16-02-007	Active
Further Development of RPS	Standards	R.15-02-020	Active
Integrated Distributed Energy Resources	Innovation	R.14-10-003	Active
Distribution Resource Plan Rulemaking	Innovation	R.14-08-013	Active

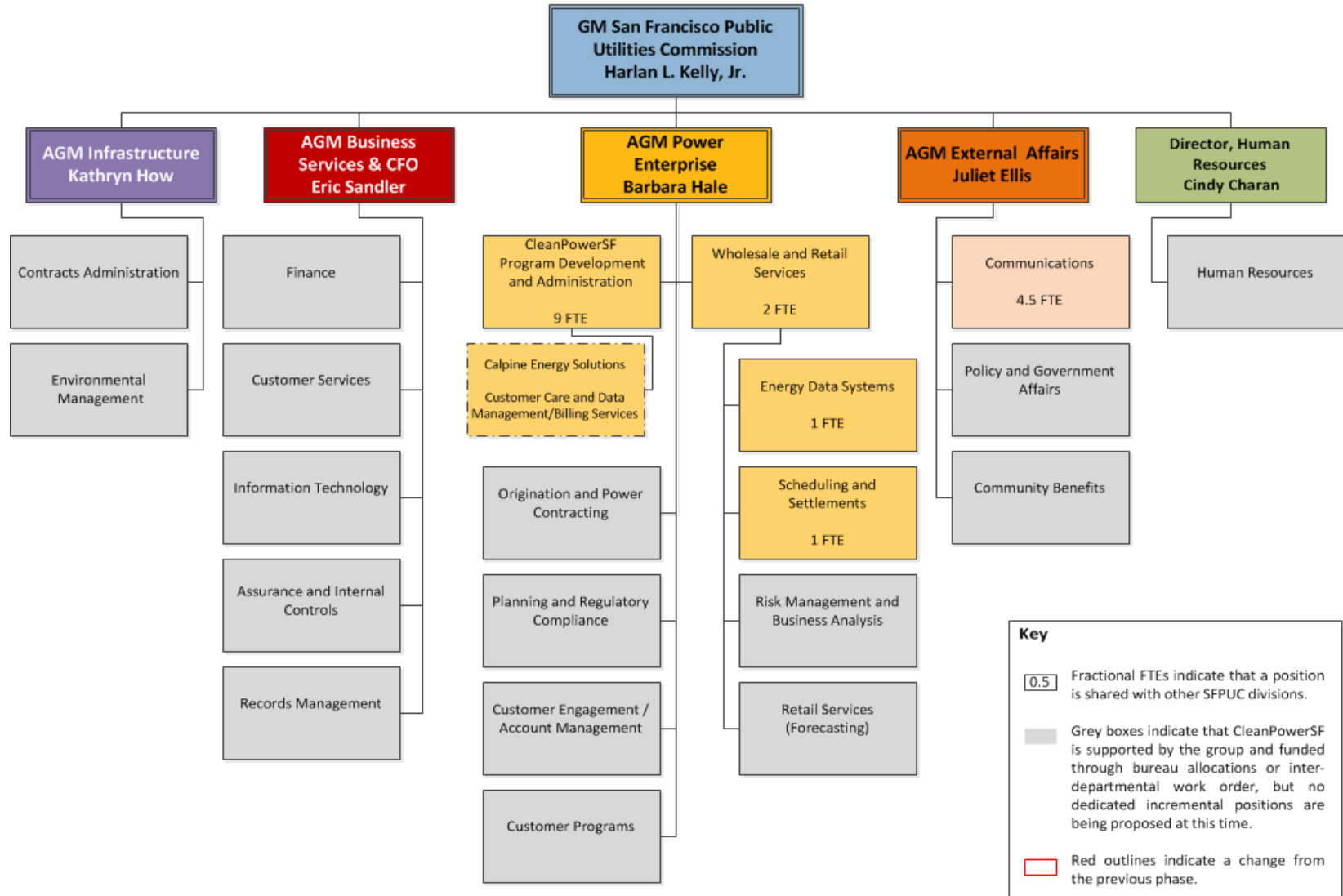
CleanPowerSF Growth Plan (May 2017)

Title	Type	Proceeding	Level of Engagement
Power Source Disclosure Program	CEC	CEC	Active
PG&E's 2017 ERRR Forecast Application	Cost Allocation	A.16-06-003	Active
Implement AB 117	Standards	R.03-10-003	Active
RPS Implementation and Administration	Cost Allocation	R.08-08-009	Monitoring
Energy Storage Roadmap	Standards	R.15-03-011	Monitoring
PG&E Electric Vehicle Application	Innovation	A.15-02-009	Monitoring
Energy Efficiency Rulemaking	Efficiency	R.13-11-005	Monitoring
IOU CARE Applications 2015-2016	Efficiency	A.14-11-007, et al.	Monitoring
MCE Energy Efficiency Application	Efficiency	A.15-10-014	Monitoring
Regional Resource Adequacy	CAISO	CAISO	Monitoring
Integrated Energy Policy Report 2016	CEC	CEC	Monitoring
PG&E 2015 ERRR Forecast	Cost Allocation	A.14-05-024	Monitoring
Energy Upgrade California (Implementation)	Cost Allocation	A.12-08-007	Monitoring
Green Tariffs Shared Renewables	Cost Allocation	A.12-01-008	Monitoring
Successor to Existing NEM Tariffs	Standards	A.12-08-007	Monitoring
Distributed Generation Rulemaking	Standards	R.12-11-005	Monitoring
Residential Rate Rulemaking	Standards	R.12-06-013	Monitoring
Time-of-Use Rates	Standards	R.15-12-012	Monitoring
Renewables Portfolio Standard	Standards	R.11-05-005	Monitoring
Alternative Fuel Electric Vehicles	Innovation	R.13-11-007	Monitoring
Demand Response Rulemaking	Innovation	R.13-09-011	Monitoring
PG&E Energy Storage	Innovation	A.16-04-024	Monitoring
Water Energy Nexus	Efficiency	R.13-12-011	Monitoring
CAISO – Transmission Access Charge	CAISO	CAISO	Monitoring
Regional Grid Operator Governance Structure	CAISO	CAISO	Monitoring
Low Carbon Fuel Standard (LCFS)	CARB	CARB	Monitoring
Mandatory Reporting Requirement	CARB	CARB	Monitoring
Cap & Trade (“C&T”)	CARB	CARB	Monitoring

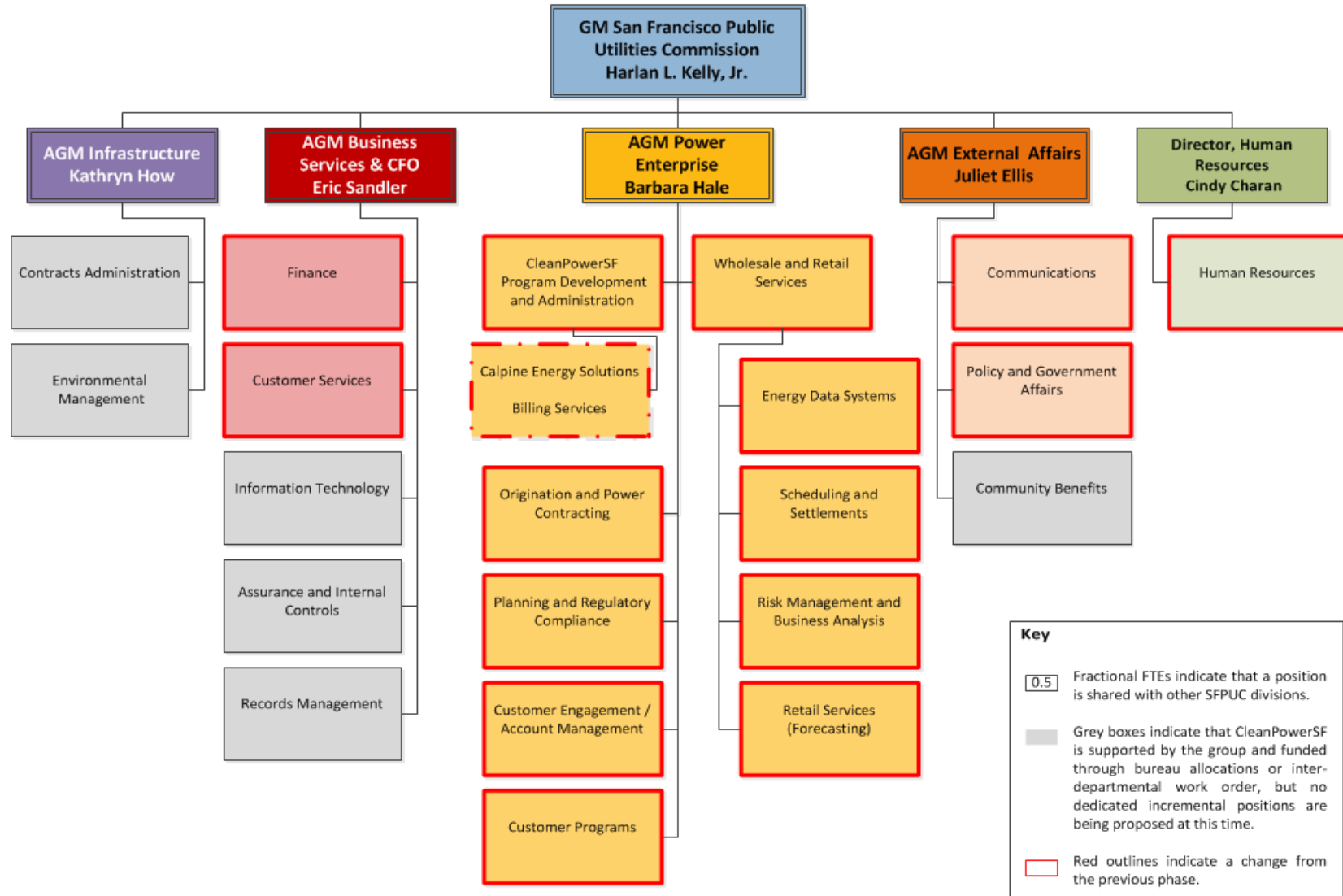
Appendix A-3: CleanPowerSF Organizational Chart



Appendix A-4: Current CleanPowerSF Staffing Levels



Appendix A-5: CleanPowerSF Staffing Levels at Full Scale



Appendix A-6: Proforma Customer Enrollment and Sales Assumptions

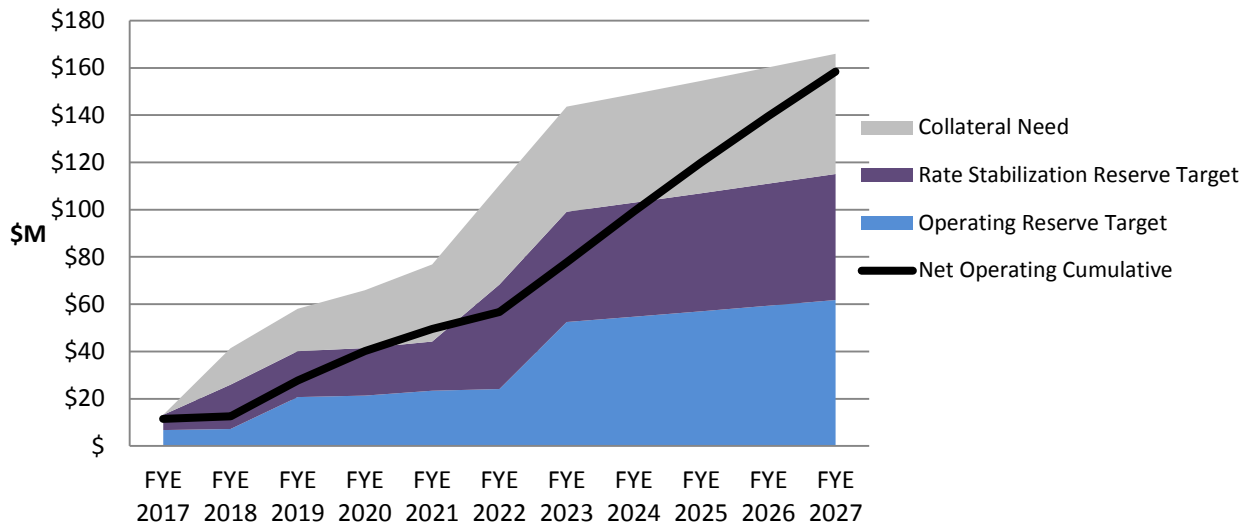
Variable	Scenario 1		Scenario 2	Scenario 3		Post-Phase / “Steady-State” Assumptions
	Reserve-based Expansion: Phase 2	Reserve-based Expansion: Phase 3	Single Phase Expansion (Phase 2 Only)	Two-Phase Expansion: Phase 2	Two-Phase Expansion: Phase 3	
Year	FYE 2019	FYE 2023	FYE 2018	FYE 2018	FYE 2019	N/A
Total Customers Enrolled	202,000 (Add'l 118,000)	394,000 (Add'l 192,000)	394,000 (Add'l 310,000)	243,000 (Add'l 159,000)	394,000 (Add'l 151,000)	
Non-Participation Rate (opt-out + 3% vacancy rate)	8%	7%	10%	8%	10%	None
Active Customer Count	185,000	368,000	357,000	223,000	362,000	Customer base grows by 0.5%
Annual Sales Volume (MWh)	1,768,000	3,777,000	3,682,000	2,364,000	3,732,000	Grows by 0.5%
<i>SuperGreen</i> Participation Rate	2.1% Residential: 2.5% Non-Res: 0.3%	4.1% Residential: 5.0% Non-Res: 2.0%	2.0% Residential: 2.5% Non-Res: 0.3%	2.3% Residential: 2.5% Non-Res: 0.3%	2.8% Residential: 3.5% Non-Res: 0.6%	Gradually increases annually to 5% by 2026
% <i>SuperGreen</i> Sales in First Year	1.2%	3.1%	1.1%	1.2%	1.7%	Gradually increases annually until 5% by 2026

Appendix A-7: Scenario 1 – 2015 Business Plan Phasing Strategy

Table A-7.1: Projected Sources and Uses (FYE 17 – FYE 22)

	FYE 2017	FYE 2018	FYE 2019	FYE 2020	FYE 2021	FYE 2022
SOURCES						
Green Sales Revenue	\$33.5M	\$42.6M	\$123.3M	\$126.8M	\$130.5M	\$134.5M
SuperGreen Sales Revenue	\$0.4M	\$0.5M	\$1.8M	\$2.7M	\$3.6M	\$4.2M
Uncollectibles	(\$0.2M)	(\$0.2M)	(\$0.6M)	(\$0.6M)	(\$0.7M)	(\$0.7M)
Total Sources	\$33.7M	\$42.8M	\$124.4M	\$128.8M	\$133.4M	\$138.0M
USES						
Energy Supply	\$22.6M	\$30.2M	\$90.9M	\$97.7M	\$105.4M	\$111.8M
Operating Costs	\$5.8M	\$9.5M	\$15.9M	\$16.3M	\$16.8M	\$18.4M
Debt	\$0.8M	\$2.0M	\$2.0M	\$2.0M	\$1.3M	\$0.0M
SuperGreen Programs/Projects	\$0.1M	\$0.1M	\$0.3M	\$0.4M	\$0.5M	\$0.6M
Contribution to Reserves	\$4.4M	\$1.1M	\$15.3M	\$12.4M	\$9.4M	\$7.2M
Total Uses	\$33.7M	\$42.8M	\$124.4M	\$128.8M	\$133.4M	\$138.0M
RESERVE BALANCES (TARGET)						
Operating Reserve	\$6.8M	\$7.2M	\$20.7M	\$21.3M	\$23.4M	\$24.1M
Contingency/Rate Stab. Reserve	\$6.5M	\$18.8M	\$19.4M	\$20.1M	\$20.8M	\$44.2M
RESERVE BALANCES (CUMULATIVE)						
Operating Reserve	\$6.8M	\$7.2M	\$20.7M	\$21.3M	\$23.4M	\$24.1M
Contingency/Rate Stab. Reserve	\$4.7M	\$5.3M	\$7.1M	\$18.8M	\$20.8M	\$32.6M
RESERVE TARGET MET?	NO	NO	NO	YES	YES	NO

Figure A-7.1: Projected Cumulative Net Margin and Reserves (Scenario 1)

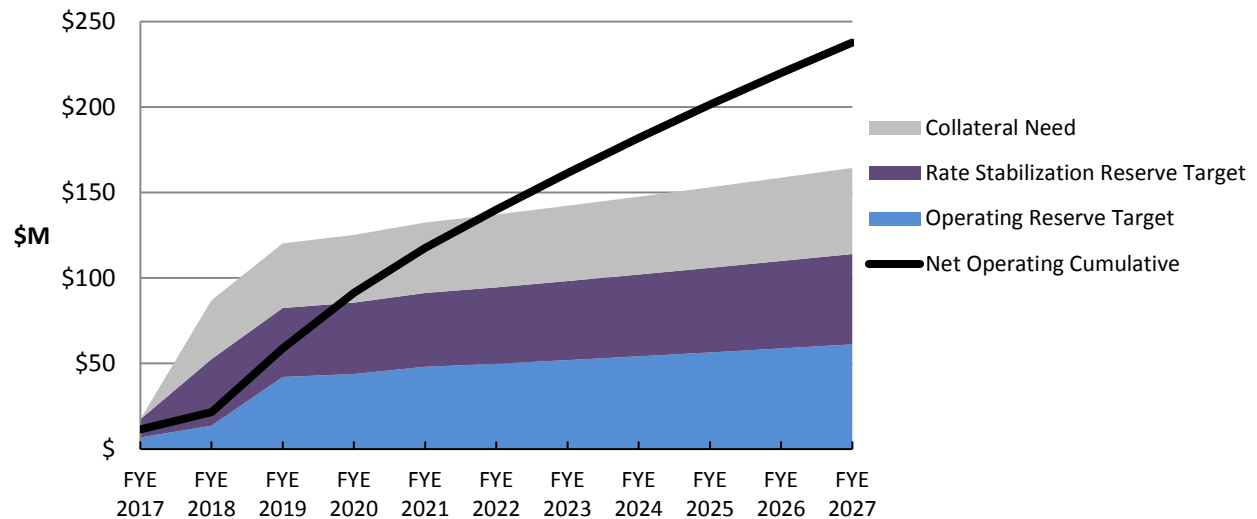


Appendix A-8: Scenario 2 – Single Phase Expansion Proforma Results

Table A-8.1: Projected Sources and Uses

	FYE 2017	FYE 2018	FYE 2019	FYE 2020	FYE 2021	FYE 2022
SOURCES						
Green Sales Revenue	\$33.5M	\$70.3M	\$256.2M	\$263.4M	\$271.0M	\$279.3M
SuperGreen Sales Revenue	\$0.4M	\$0.7M	\$3.4M	\$5.3M	\$7.1M	\$8.4M
Uncollectibles	(\$0.2M)	(\$0.4M)	(\$1.3M)	(\$1.3M)	(\$1.4M)	(\$1.4M)
Total Sources	\$33.7M	\$70.6M	\$258.3M	\$267.4M	\$276.7M	\$286.3M
USES						
Energy Supply	\$22.6M	\$45.5M	\$190.5M	\$203.4M	\$219.0M	\$232.6M
Operating Costs	\$5.8M	\$13.0M	\$27.9M	\$28.6M	\$29.3M	\$30.0M
Debt	\$0.8M	\$2.0M	\$2.0M	\$2.0M	\$1.3M	\$0.0M
SuperGreen Programs/Projects	\$0.1M	\$0.1M	\$0.6M	\$0.8M	\$1.1M	\$1.2M
Contribution to Reserves	\$4.4M	\$10.0M	\$37.3M	\$32.6M	\$26.1M	\$22.5M
Total Uses	\$33.7M	\$70.6M	\$258.3M	\$267.4M	\$276.7M	\$286.3M
RESERVE BALANCES (TARGET)						
Operating Reserve	\$6.8M	\$13.6M	\$42.1M	\$43.9M	\$48.1M	\$49.8M
Contingency/Rate Stab. Reserve	\$10.6M	\$38.9M	\$40.3M	\$41.7M	\$43.2M	\$44.7M
RESERVE BALANCES (CUMULATIVE)						
Operating Reserve	\$6.8M	\$13.6M	\$42.1M	\$43.9M	\$48.1M	\$49.8M
Contingency/Rate Stab. Reserve	\$4.7M	\$7.9M	\$16.7M	\$41.7M	\$43.2M	\$44.7M
RESERVE TARGET MET?	NO	NO	NO	YES	YES	YES

Figure A-8.1: Projected Cumulative Net Margin and Reserves (Scenario 2)



Appendix A-9: Scenario 3 – Two-Phase Expansion Proforma Results

Table A-9.1: Projected Sources and Uses

	FYE 2017	FYE 2018	FYE 2019	FYE 2020	FYE 2021	FYE 2022
SOURCES						
Green Sales Revenue	\$33.5M	\$55.3M	\$170.1M	\$266.0M	\$273.7M	\$282.1M
SuperGreen Sales Revenue	\$0.4M	\$0.6M	\$2.5M	\$5.4M	\$7.2M	\$8.5M
Uncollectibles	(\$0.2M)	(\$0.3M)	(\$0.9M)	(\$1.4M)	(\$1.4M)	(\$1.5M)
Total Sources	\$33.7M	\$55.6M	\$171.7M	\$270.1M	\$279.5M	\$289.1M
USES						
Energy Supply	\$22.6M	\$36.7M	\$121.1M	\$205.3M	\$221.2M	\$234.9M
Operating Costs	\$5.8M	\$10.4M	\$19.8M	\$28.1M	\$28.7M	\$29.4M
Debt	\$0.8M	\$2.0M	\$2.0M	\$2.0M	\$1.3M	\$0.0M
SuperGreen Programs/Projects	\$0.1M	\$0.1M	\$0.4M	\$0.9M	\$1.1M	\$1.2M
Contribution to Reserves	\$4.4M	\$6.5M	\$28.4M	\$33.9M	\$27.3M	\$23.6M
Total Uses	\$33.7M	\$55.6M	\$171.7M	\$270.1M	\$279.5M	\$289.1M
RESERVE BALANCES (TARGET)						
Operating Reserve	\$6.8M	\$10.5M	\$28.6M	\$44.3M	\$48.5M	\$50.3M
Contingency/Rate Stab. Reserve	\$8.4M	\$25.9M	\$40.7M	\$42.1M	\$43.6M	\$45.1M
RESERVE BALANCES (CUMULATIVE)						
Operating Reserve	\$6.8M	\$10.5M	\$28.6M	\$44.3M	\$48.5M	\$50.3M
Contingency/Rate Stab. Reserve	\$4.7M	\$7.4M	\$17.8M	\$36.0M	\$43.6M	\$45.1M
RESERVE TARGET MET?	NO	YES	YES	YES	YES	YES

Figure A-9.1: Projected Cumulative Net Margin and Reserves (Scenario 3)

