



**Report on
Potential Enhancements
to the CCA Program
Resource Portfolio**

(Task 5 of 5)

(DRAFT REPORT)

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Executive Summary

The San Francisco Public Utilities Commission (SFPUC) retained George E. Sansoucy, P.E., LLC (GES) to prepare this Task 5 report on measures that the SFPUC and/or San Francisco Local Agency Formation Commission (SF LAFCo) could take regarding the use of renewable resources and energy efficiency measures to assure a robust and successful San Francisco Community Choice Aggregation (CCA) Program. This report summarizes our findings and recommendations regarding the resource portfolio contemplated in the CCA Draft Implementation Plan (DIP) to satisfy customer demand in the current market environment. In particular, the findings address that portion of the DIP which sets forth the CCA Program targets for in-City and renewable resource standards and are not intended to be a comprehensive review of all CCA Program components.

CCA Program Resource Portfolio Goals

- Customer choice in the CCSF
- Local renewables and energy efficiency
- Promote specific technologies
- 51% renewables standard by 2017
- Rates that are competitive with PG&E's rates

The objectives of the CCA Program are to increase the amount of control the City and County of San Francisco (CCSF) has over its electric supply and to promote local renewable energy development, resource conservation, and energy efficiency measures within the CCSF. The DIP contemplates accomplishing these goals by contracting with a third party Energy Service Provider (ESP) to construct or procure electric resources within and outside of the CCSF to satisfy the electric requirements of CCA Program customers. The target resource mix includes 360 megawatts (MW) of renewable and distributed generation along with energy efficiency measures including 210 MW located within the CCSF. The in-City resource targets include 107 MW of load reduction or energy efficiency measures, 31 MW of in-City solar energy, and 72 MW of distributed energy. In addition, the DIP calls for 150 MW of wind turbine capacity outside of the CCSF and a 51% renewables standard by 2017 at prices which are competitive with Pacific Gas and Electric Company's (PG&E) rates.

The analysis performed by GES in Tasks 1 through 4 was designed to develop a bottoms-up analysis of the technical and economic potential of the DIP targets relative to other options in the marketplace. The analysis is designed to estimate the cost of electricity as specified in the DIP and compare these prices to the PG&E rates as well as two portfolios that use alternative targets over a 20-year period. The bottoms-up analysis illustrates that the use of renewable resources as directed by the DIP, whether located within or outside of the CCSF, would result in estimated wholesale rates that exceed PG&E's rates. However, the use of market purchases and less ambitious targets for the use of renewable resources result in comparable or lower wholesale prices. In

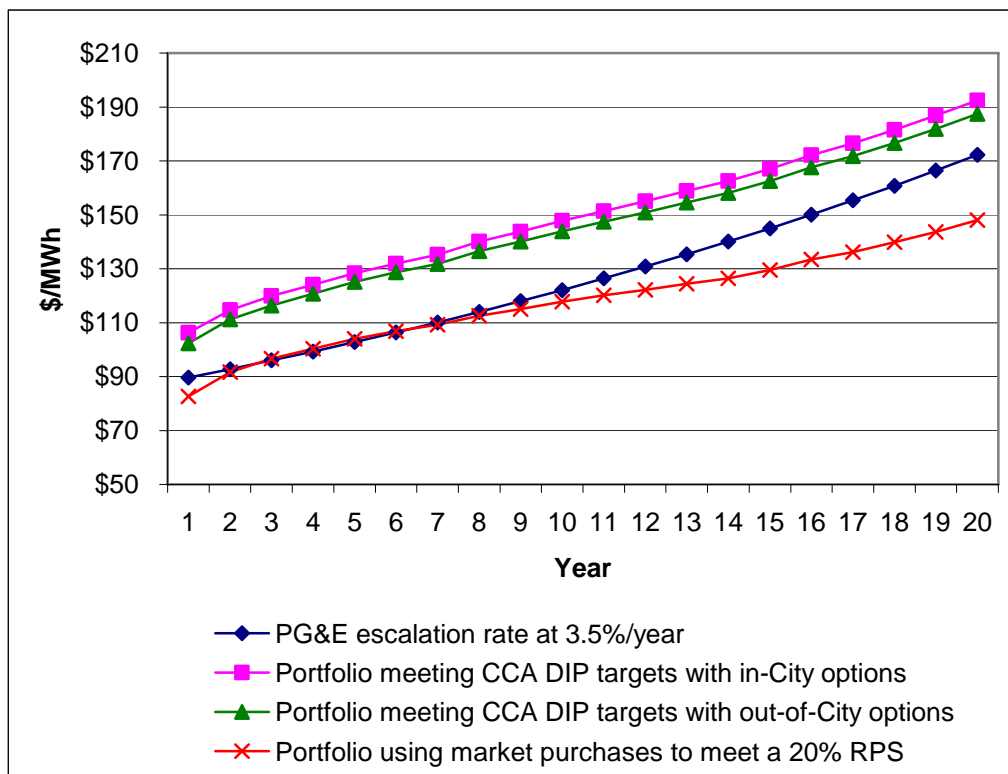
Summary of Resource Portfolio Findings

in addition, the high costs of in-City resources result in the estimated rates associated with a supply portfolio similar to that envisioned under the DIP being the most expensive option.

The estimated rates for each scenario along with the estimated PG&E rates are set forth in Figure 1. The scenarios presented below illustrate that utilizing a resource portfolio as set forth in the DIP will most likely exceed PG&E's rates. The supply scenarios are described as follows:

- Portfolio based on the DIP targets utilizing in-City renewable energy resources and a 51% renewable energy mix.
- Portfolio utilizing out-of-City renewable resources to meet the type and level of renewables established by the DIP and a 51% renewable energy mix. This portfolio contains the same level and type of renewables as the DIP portfolio but uses out-of-City resources instead of in-City resources.
- Portfolio utilizing out-of-City resources to satisfy a 20% Renewables Portfolio Standard (RPS).

Figure 1
Comparison of Wholesale Supply Costs for Various Scenarios
Compared with Estimate of PG&E's Wholesale Rates



Summary of Resource Portfolio Findings

The high cost of the resource portfolio defined in the DIP relative to PG&E's estimated rates is attributed to several factors which include:

- Timing of renewable energy development and 51% renewables standard
- Location of the resource
- Level and type of renewable resource proposed

Changing one or more of these DIP targets would result in lower rates that may be beneficial to the CCA Program success by assuring customer retention and meeting long-term objectives. However, lower rates may not be the only factor in determining the appropriate targets for the CCA Program resource portfolio. Therefore, both the resource mix and price of the portfolio should be considered to assure that the selected resources meet the environmental and social goals of the CCA Program.

Scope of Analysis

The information and analysis presented in this report are based on the work performed by GES for the SFPUC and are summarized by task as follows:

- Task 1 includes the theoretical and technical potential for renewable resources within the CCSF.
- Task 2 includes the economic potential of those resources considered theoretically and technically viable within the CCSF. This task addresses the cost of these resources to CCA Program customers using the estimated capital cost, operating and maintenance expense, and financial incentive for each of the resources selected and analyzes the use of both for-profit and not-for-profit capital structures and financing.
- Task 3 includes an analysis of out-of-City renewable resources and the cost to CCA Program customers relative to the in-City resources identified in Tasks 1 and 2. This task assesses the cost of those resources in a manner identical to that used in Task 2.
- Task 4 compares the information and costs developed in Tasks 1 through 3 relative to whether these resources are cost effective and allow the CCA Program to be competitive with PG&E's expected rates for CCA Program customers.

Collectively these four tasks present a bottoms-up analysis which addresses the availability and cost of renewable resources and energy efficiency within and outside of the CCSF jurisdiction that could comprise a resource portfolio for the CCA Program. The availability and cost of the resources which would most likely comprise a portfolio

Summary of Resource Portfolio Findings

consistent with the DIP targets are used to measure the electricity cost for the CCA Program relative to those charged by PG&E as well as other supply options in the marketplace. The comparison of the resource mix under the DIP relative to PG&E rates and other options in the marketplace is intended to illustrate how price competitive the DIP resource targets are in the current market environment. This analysis provides a range of potential wholesale electric rates and lends insight into how modifications to the original targets could impact these estimated electric rates. Modifications to the targets set forth in the DIP might include the timing, location, amount, and type of resource used to satisfy customer load.

Alternative Portfolio and Procurement Strategies

The amount and type of resource used to satisfy the CCA Program customer demand directly impact the cost of the supply. There are several strategies for addressing the appropriate mix of resources which satisfy the goals of the CCA Program. If price is of primary importance, the level and type of renewable could be modified to include amounts that are less ambitious which allow for more competitive prices. If, however, a high percentage of renewables are significant factors in the portfolio, prices may have to reflect these goals and the environmental and social attributes of these resources. Finally, the CCA Program could offer supply options with various types and levels of renewables which are priced relative to the makeup of the resources contained in each portfolio.

Renewable resources, or green electricity, typically command a premium in the marketplace and asking consumers to pay a higher price for this type of supply is common in the electric industry. Therefore, having higher levels or specific types of renewable resources will typically result in prices that exceed the minimum renewable requirements as delivered by PG&E. However, offering a more environmentally and socially attractive alternative, even at a higher price, provides the customer with a choice that is currently lacking in the CCSF. The use of this flexible portfolio strategy, that prices each product relative to its value to the customer, is expected to promote greater customer retention and CCA Program success as it allows the customer to choose the value of these services.

The following sections discuss possible enhancements to the CCA Program that balance local renewable resources, energy efficiency, and high levels of renewable resource goals with competitive prices for CCA Program customers. These enhancements are intended to address the high cost associated with increased levels of renewable resources relative to PG&E's requirement of a 20% RPS that may utilize a wide range of resources throughout the state.

These recommendations are expected to be the most beneficial in balancing CCA Program customer retention and the CCSF's policy goals for CCA. Additional recommendations have also been presented which address obvious actions that the CCA

Summary of Resource Portfolio Findings

Program or its ESP should take in developing a resource portfolio. However, these recommendations are considered to have less impact on the overall supply costs and are considered to be elements that a prudent ESP would pursue or incorporate. These items include the use of State and federal incentives to lower the cost of renewable resources, working with the CCSF to assure renewable development is efficient and cost effective, using the best available financing options (municipal bonds or other long term financing), and using the most efficient procurement, construction, and operation practices to assure resources are developed and operated efficiently.

Timing of Renewable Resources

The timing of renewable energy development and the establishment of a 51% renewables target are significant drivers in the ability of the CCA Program to compete with PG&E's wholesale rates. A modification to the timing of the 51% target could be a beneficial enhancement that promotes the original objectives of the DIP using an alternative timeline.

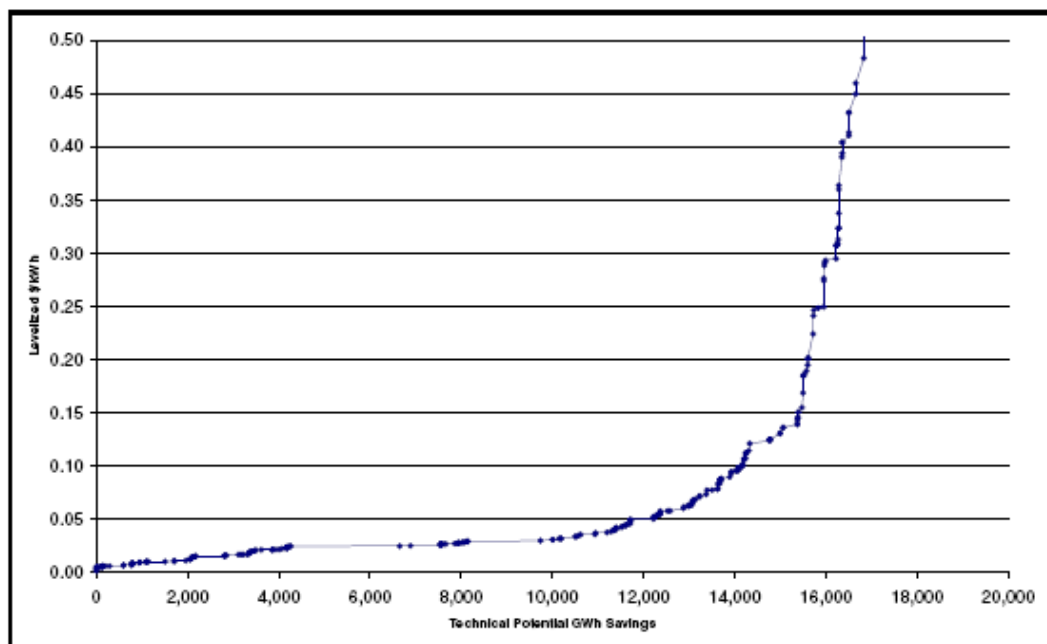
Altering the timeline would allow the CCA Program to benefit from rates comprised of renewable and non-renewable electricity purchased from the marketplace in the near-term which, as illustrated in Figure 1, is less expensive than constructing in-City resources and considered to be price competitive with PG&E's wholesale rates. In developing a supply portfolio that is 51% renewables, the CCA Program could benefit from being flexible on the timing based on the price and availability of renewable resources in the marketplace. Since the price of renewable resources typically rises with demand, flexibility in attaining a 51% renewables standard allows the CCA Program to better control the rates it charges customers. The ability to control rates is expected to lead to higher customer retention and a more robust CCA Program that will allow for the long-term development of renewables both within and outside of the CCSF.

A flexible approach to the addition of renewable resources will allow the CCA Program to grow into its renewable resource targets while at the same time retaining the greatest number of customers. The ability to match renewables to an established customer base is the most effective method of developing the appropriate level of renewables relative to customer demand. This approach also allows the CCA Program to take advantage of market opportunities to develop or procure renewable resources as opposed to imposing a specific amount and type of renewable on a CCA supplier or into the supply portfolio which may result in prices that are not competitive with PG&E's wholesale rates. In addition, establishing a specific level of renewable that must be developed within or outside of the CCSF may result in an imbalance between the resources developed and actual customer demand.

Summary of Resource Portfolio Findings

An example of how artificially establishing levels of renewable energy efficiency may impact price is seen by looking at the cost of energy efficiency which in small amounts is very cost effective however, as additional supply is required prices increase rapidly. The cost of energy efficiency measures are illustrated in Figure 2.

Figure 2
Cost of PG&E Energy Efficiency Measures



Source: Itron, Inc. *California Energy Efficiency Potential Study*, September, 10, 2008 p. 4-35 at: http://www.calmac.org/publications/PGE0264_Final_Report.pdf

The levelized costs in Figure 2 illustrate that saving or reducing electric consumption by 2,000 gigawatt-hours (GWh) is very cost effective at levelized prices of less than 2.5¢/kWh. However, the cost of energy efficiency measures dramatically increase beyond 14,000 GWh as the “low hanging fruit” has been utilized and additional energy efficiency measures are significantly more expensive. In this example, energy efficiency becomes uneconomical after 14,000 GWh with costs in excess of 0.10¢/kWh, or more than PG&E’s levelized cost of wholesale power.

The costs in Figure 2 also illustrate how market forces should play a role in the timing as well as the type and amount of renewable resources so as to develop the most cost effective resource portfolio. Therefore, the CCA Program could be enhanced by allowing flexibility in the timing of renewable resources and energy efficiency development and matching the development of both in- and out-of-City renewables to actual demand for these resources.

Summary of Resource Portfolio Findings

Location of Resources

Location is another factor in the price of renewable resources and the impact each has to the CCA Program wholesale rates. In general, resources located within the CCSF cost more than resources outside of the CCSF. Even taking into consideration transmission and distribution costs and behind-the-meter installations, out-of-City resources are expected to be more economical. This is due to the ability of developers to utilize sites with more renewable energy potential and take advantage of lower costs of land, construction, and operating costs.

The use of out-of-City renewable energy which maximizes the resource could be a near-term modification to the DIP targets of in-City resources. In addition to lower costs, out-of-City renewable projects may benefit from the additional economies of scale and provide risk mitigation to the CCA Program by allowing the ESP to diversify its purchases over several facilities or portions of facilities.

The use of out-of-City resources does not eliminate the goal of developing in-City resources but allows for a two-part approach to utilize resources within and outside of the CCSF. The use of out-of-City resources allows the CCA Program and/or ESP to utilize the broadest range of projects to provide the most economic alternative. Out-of-City options could also be a temporary measure for procuring resources until there are cost effective in-City options. This two-part approach provides the increased flexibility of meeting the DIP targets using the most economic alternatives in the near-term while maintaining the long-term goal of promoting in-City resources.

Type and Amount of Renewables in the Portfolio

The type and amount of renewable resources and energy efficiency are also a major factor in the cost associated with the CCA Program supply portfolio. California law directs all utilities to procure 20% of their energy from renewable resources by 2010. As illustrated in Figure 1, if the CCSF CCA Program included this level of resources it would have wholesale rates generally lower or similar to those charged by PG&E and it is reasonable to assume that a CCA supplier could provide electric services which were comparable with PG&E's wholesale rates. However, as the levels of renewables and energy efficiency measures increase, and arguably the quality and desirability of the portfolio, the cost to procure these resources also increases. The fact that renewable electricity is typically priced at a premium is a well established concept in the electric industry. In addition, as specific types of resources are mandated, costs may increase relative to the supply and demand relationship for various types of resources and the associated electricity.

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The costs of various in- and out-of-City resources are illustrated in Figure 3.

Figure 3
Levelized Costs of Electricity
Not-for-Profit Ownership Structure

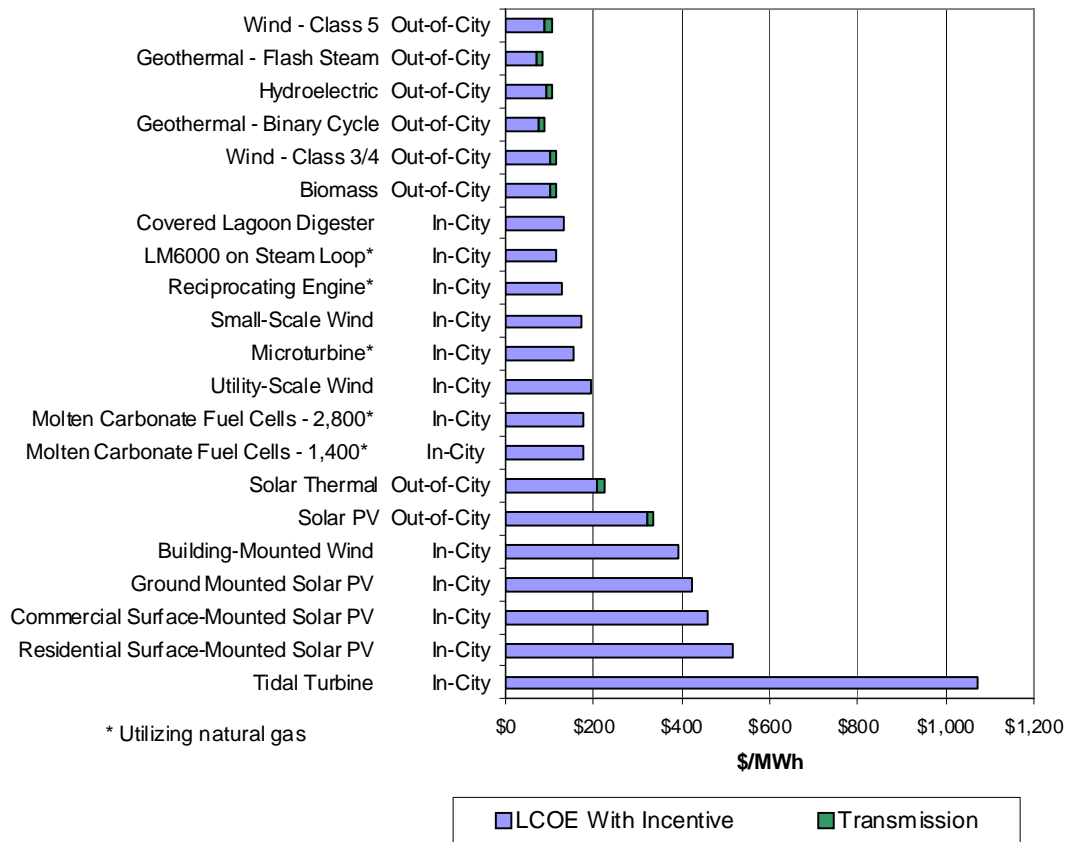


Figure 3 demonstrates that as specific resources are utilized in a portfolio the costs will vary dramatically. For example, using in-City wind is more cost effective on a levelized basis than in-City solar or tidal turbines. The cost comparisons demonstrate how preselecting specific resources as opposed to allowing competition to select resources could result in higher prices for the CCA Program resource portfolio.

Conclusions and Recommendations

The use of one or more of the options discussed above may assist the CCSF in assuring a successful and robust CCA Program. This success will be measured by customer retention and the CCA Program's ability to adhere to its original objectives of local, cost effective renewable electricity and energy efficiency. The use of a flexible approach in the procurement of resources and CCA Program design is the most effective means of promoting renewable resources, allowing for greater customer choice, and promoting the environmental and social objectives of the CCA Program. This flexibility is demonstrated in the SFPUC's November 5, 2009 RFP for electricity supply services which allows bidders to propose a wide range of supply options in meeting the needs of the CCA Program.

Possible Enhancements to the CCA Program

- Timing of Renewable Resources
- Location of Resources
- Type and Amount of Renewables in the Portfolio

The following recommendations are intended to enhance the potential for customer retention and successful implementation of the CCA Program and include:

- The CCSF could consider the timing, type, and location of renewable resources used to satisfy the CCSF's goals. This might include utilizing a different mix or implementation strategy for renewable resources than that set forth in the DIP.
- The CCSF could consider altering the amount of in-City renewable resources.
- The CCSF could consider the development of renewable resources outside of the CCSF.
- The CCSF could consider altering the use of specific renewable resources or the use of renewable energy credits (RECs) in the near-term.
- The CCSF could consider marketing various types of wholesale energy that meet the resource mix set forth in the CCSF's goals at prices which reflect the quality and desirability of the resource mix.
- The CCSF could implement a strategy of developing in- and out-of-City renewables that is related to its established customer load and profile rather than a preset level developed in anticipation of customer retention.
- The CCSF should monitor the market and seek to implement the CCA Program or development of renewable resources under the best possible market conditions.

Summary of Resource Portfolio Findings

- The CCSF should seek to take advantage of State and federal programs such as Clean Renewable Energy Bonds (CREBs) to finance renewable resource projects.
- The CCSF should continue to address the sharing of risk between the CCA Program customers and ESP to strike a balance that best meets the goals of the CCA Program.