City of Irvine, California

Community Choice Energy
Feasibility Study and Technical Assessment

Prepared for:
The City of Irvine, California

FINAL DRAFT
June 18, 2019

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ATTACHMENT 2

DRAFT

EES Consulting, Inc.

June 13, 2019

Ms. Sona Coffee
City of Irvine
P.O. Box 19575
Irvine, CA 92623-9575

SUBJECT: Draft Community Choice Energy Feasibility Study and Technical Assessment

Dear Ms. Coffee:

Please find attached the Final Draft Community Choice Energy Feasibility Study and Technical Assessment (Study) for City of Irvine, California (the City).

It has been a pleasure working for the City and we very much appreciate all the effort this working team has spent on the Study.

We look forward to receiving all stakeholder comments after which we will finalize this Study.

Very truly yours,

Gary Saleba
President/CEO

Contents

Executive Summary

As part of preparations for future energy demands, the City of Irvine's City Council approved funding for two initiatives which will help define an energy vision for Irvine (City): a Strategic Energy Plan and a Community Choice Aggregation (CCA) Feasibility Study. Commonly referred to as Community Choice Energy (CCE), these programs have grown significantly in California since the State's first CCE program was launched in Marin County in 2010. There are currently 19 operating CCEs in California with potentially another dozen planning to launch between now and 2021. CCEs currently serve over 10 million customers who were previously covered by investor-owned utilities (IOUs).

The City's CCE Feasibility Study efforts are one of the first to be conducted by a jurisdiction within Orange County and will be the most comprehensive. This Study's results show that even though a CCE in Irvine is financially possible, there are risks that need to be mitigated. The Study estimates that a CCE can provide a 2% discount on electricity rates to Irvine customers when compared to Southern California Edison (SCE) while matching SCE's projected renewable energy portfolio. This discounted rate translates to an estimated $7.7 million in electricity savings to the community each year. Further, a CCE can provide other local benefits to the City and its constituents such as rebates to incentivize energy efficiency and economic development opportunities. Lastly, this study assumes that the CCE will meet all known state environmental goals and mandates[1] and shows that a CCE program is a viable method for the City to utilize in meeting City-initiated environmental goals related to clean energy programs, renewable energy utilization, and City-wide greenhouse gas emissions reductions.

Key Study Findings

CCEs and utilities must meet State-mandated Renewable Portfolio Standard (RPS) requirements. Therefore, the base case scenario presented in the financial results of this Study illustrate a renewable portfolio option equivalent to SCE's portfolio which meets the State's RPS mandate. Other, higher renewable energy content portfolios are also evaluated in the Study. Based on the Study's analysis of the City's electricity demands, power procurement costs, forecast of SCE rates and stranded costs, the formation of a CCE by the City is financially feasible and would yield considerable benefits for all participating residents and businesses. This Study assumed that the City would form its own CCE program, and as discussed in the Governance section of the Study, potential benefits and drawbacks are described if the City were to join other CCE programs or partner with other jurisdictions in creating a regional CCE.

The following key findings and conclusions are made based on the City operating its own CCE program:

[1] Included under SB 100 and SB 350.

- Electric retail rates are predicted to be at least 2% lower than current SCE rates using extremely conservative modeling parameters and assuming participation rates for residential customers of 95% and non-residential customers participation rates of 90%. These assumptions on customer participation are conservative compared with recent CCE program participation.
- City-wide electricity cost savings are estimated to average about $7.7 million per year for Irvine residents and businesses. Annual City municipal utility account cost savings are estimated at $112,000.
- CCE start-up and working capital costs (estimated at $10.05 million, and assumed to be financed) could be fully recovered within the first three years of CCE operations while still achieving a 2% rate discount compared to SCE's current rates. The City could also choose to recoup costs associated with the Study development and Implementation Plan.
- The Study analyzed CCE rate results under scenarios with high and low participation rates, high and low market power costs, and high and low stranded costs. The findings identify key risks with regard to stranded cost recovery (via SCE) and power supply. The Study's section on Risks and Sensitivity Analysis describes the magnitude of those risks and measures for mitigating risks.
- The CCE is estimated to have an average, annual $3.4 million revenue stream after start-up and working capital are repaid, as well as financial reserves being met, that can be used for electric customer-related programs such as:
  - Funding for customer energy efficiency programs.
  - Local renewable energy resource programs, such as renewable energy net-metering.
  - Customer rate savings beyond the 2% target.
- The savings to customers under the CCE's rates would drive additional local economic development benefits, such as 85 new jobs and an a total of $10 million in annual economic output.

The City will need to fund some of the upfront costs of developing a City CCE. These are expenses that would need to be paid prior to obtaining financing including: staffing expenses prior to program launch, payment of various bonds to the CPUC and SCE, and consultant costs. Staffing costs assume City staff are required to manage the Implementation Plan development, consultant costs in support of pre-launch activities, developing joint power authority (JPA), if applicable; and meeting with SCE and stakeholders. Consultant costs would include support to City staff on these tasks and updating the program's technical and financial Study forecasts. These costs are estimated at $600,000 based on the experience of other operating CCEs. The City could recoup these expenses after program launch; typically CCE's consider these costs as part of the startup loan. Depending on the governance structure selected, these costs may vary.

Key Operating Figures for a City-CCE as modeled against SCE's current power portfolio are shown in Exhibit ES-1 below:

Exhibit ES-1 CCE Key Operating Figures	
First Year Operating Budget	$82.9 Million
First Year Revenues	$86.9 Million
First Year Net Income	$4 Million
First Year Load Served	1,466 GWh
Average Operating Budget (2021-2030)	$130.5 Million
Average Revenues (2021-2030)	$141.1 Million
Average Net Revenue (2021-2030)	$10.6 Million
Average Annual Municipal Cost Savings	$112,000
Average Load Served (2021-2030)	1,910 GWh
Startup Loan (Including Pre-Startup Costs and Working Capital)	$10.05 Million
Startup Loan Term	60 Months
Early Repayment of Startup Loan	36 Months
Economic Impacts: Orange County	85 New Jobs/year $10 million in output/year
Greenhouse Gas Reductions, tons CO2/year	SCE Equivalent Portfolio: 0 100% Renewable by 2035: 191,000 100% Renewable: 360,000

Risks and Mitigation Measures

While the study shows that forming a CCE is financially feasible under a wide range of scenarios, doing so is not without risk. The feasibility of the CCE, that is maintaining customer rates competitive with SCE, primarily depends on power supply costs (which make up approximately 90% of the overall CCE operating budget) and how those costs compare to SCE's power supply costs, and ultimately their customer rates. Other factors impacting the financial viability of the CCE include: costs that SCE directly passes through to all customers (including the Power Charge Indifference Adjustment or PCIA), market supply of renewable power, availability and cost of financing CCE operations, and legislative and regulatory actions.

To assess the magnitude of the risks imposed on the CCE by these factors, the Study includes a Sensitivity and Risk Analysis section which established a range of high and low scenarios for: prices for CCE-procured market power, SCE's customer rates, CCE financing costs, and the level of SCE's PCIA. As a result of the impact on CCE rates of these risk scenarios, the Sensitivity and Risk Analysis section also assumed a worst case CCE customer retention level and its impact on CCE rates.

The results of the Sensitivity and Risk Analysis indicate under what scenarios the CCE's rates may exceed SCE's customer rates, and also suggest actions the CCE may take to manage those risks. The risk mitigation actions consist of industry standard best operating practices and strategies employed by other operating CCEs including: conservative power procurement strategies employing market risk management policies, developing a cash reserve fund from annual net revenues, and engaging in regulatory and legislative issues through the Statewide CCE organization– the California Community Choice Association (CalCCA).

Conclusions

The Study results suggest that CCE implementation is financially feasible, and the risks are manageable, should the City wish to further pursue it. The City CCE is expected to offer customers lower rates than both SCE's base rate and 100% renewable rate. The City CCE is estimated to generate average, annual net revenues of $10.6 million which can be used for multiple CCE-related purposes; including building CCE operations financial reserves, lowering customer rates, or offering customer programs. The savings to City ratepayers can drive additional economic output and create new jobs in the region.

The positive impacts on the City and its constituents of forming a CCE documented in this Study were determined under a very conservative set of technical and financial assumptions. Particularly, power supply costs are estimated at rates above current prices for long-term renewable contracts; customer participation rates are lower than recent Statewide CCE experiences; and the forecasted growth in SCE generation rates is lower than the historic average. The CCE could collect sufficient net revenues and operating cash reserves and continue to operate even if power prices are higher than forecasted, participation rates are as low as 80%, or SCE's stranded cost recovery rate is higher than forecast. Even under extreme conservative risk scenarios on these factors which impact CCE financial viability, the risks are manageable through what is developing as industry standard, CCE best operating practices, such as conservative power procurement strategies and development of a cash reserve fund.

Suggested next steps for the City include: complete an internal review of this Study, conduct public outreach activities to share the results of the Study with City constituents and other stakeholders and receive their input, adopt the Study results through City Council action and determine whether to move forward with CCE implementation.

1. Introduction – Summary of Findings

1.1 Introduction

Since the State's first CCE program was launched in Marin County in 2010, many communities across the State have benefitted from reduced electricity costs and community-specific activities and programs associated with Community Choice Energy (CCE) operations. To date, 19 CCEs comprising multiple counties and cities are operating with more scheduled to commence operations in 2020 and 2021. To better understand the benefits and risks associated with CCE programs, the City of Irvine selected EES Consulting to prepare a report that assesses the feasibility of CCE operations as a mechanism to lower electricity rates to customers and potentially increase the utilization of renewable energy in the region. In this report, EES examines the technical and financial viability of a CCE program to serve City of Irvine constituents. The City's Feasibility Study efforts are one of the first to be conducted by a jurisdiction within Orange County and will be the most comprehensive.

Exploring a CCE program for City constituents is an important part of evaluating the City's clean energy future. A CCE program would give the City local control over power supply and revenue to fund energy-related programs. The Study models power supply and operating expenses against the alternative service from SCE and finds that a CCE can provide lower electric rates while meeting or exceeding State mandates for renewable power utilization. The Sensitivity and Risk Analysis confirms these findings under likely combinations of conservative ranges of factors impacting financial viability for a City-operated CCE.

While the primary analysis provides the feasibility results for the case where the City operates its own CCE, other options are available such as joining an existing CCE Joint Powers Authority (JPA) or teaming with other jurisdictions. These other options could result in additional cost savings but might also impact local (City) decision-making authority. These trade-offs are introduced in the Governance Section of the Study.

Finally, as requested by the City, the Study includes discussion on working with SCE and addresses potential impacts on the utility-operated distribution grid by CCE operations.

1.2 Overview of Community Choice Energy

California Assembly Bill 117 allowed local governments to form Community Choice Aggregations (CCAs, referred to as Community Choice Energy programs in this study or CCE) that offer an alternative electric power supply option to constituents currently served by investor owned utilities (IOUs). CCEs in California are "opt-out" programs, meaning that customers are automatically placed into CCE service, unless they proactively choose to continue receiving service from the IOU. Under the CCE model, local governments purchase and manage their community's electric power supply; sourcing power from a preferred mix of traditional and renewable generation sources, while the incumbent IOU continues to provide distribution service. This gives CCEs the opportunity to design and potentially reduce retail rates for their constituents, promote local economic development and offer a cleaner power supply, all while satisfying the CCE's goals and community priorities. Specifically, local energy programs can be tailored to meet the community's goals and needs. The remainder of this introduction briefly describes the mechanics of the study and provides a brief description of key findings in each section of the report.

1.3 Mechanics of the Feasibility Study

- Acquire the City's annual energy consumption data for all customers and develop consumption profiles across all time periods.
- Develop energy portfolio options (similar to existing CCEs) which include differing amounts of renewable power to be supplied that meet or exceed State mandates.
- Determine the cost of acquiring energy to meet the consumption profiles and other load serving requirements, and determine the cost to operate the CCE.
- Develop CCE customer rates which would cover all CCE operating costs and financial considerations.
- Forecast future SCE rates based on materials filed at the CA Public Utilities Commission (CPUC) and compare CCE rates against forecasted SCE rates.
- Run a sensitivity analysis to compare CCE and SCE rates under a range of varying operating and market conditions.
- Analyze and describe the financial and other benefits of a viable CCE.
- Assess risks to City of operating or participating in a CCE program, and identify mitigation measures.
- Describe options for governance of a City CCE or a multiple jurisdiction CCE.

1.4 Expected Costs of Launching a CCE Program

CCE start-up and working capital costs of $10.05 million are estimated to launch a CCE in Irvine, including obtaining services to procure energy for the CCE program, provide pre-launch opt-out notices, financial and technical consultant costs, and legal and regulatory support. Power supply costs make up the largest operating costs for the CCE. In the City's case, power supply costs represent 93% of the initial operating year budget. Non-power supply costs (including billing, staffing, consultants and other administration and general costs) make up 7% of the initial operating year budget.

Operational and administrative costs may vary depending on the proportion of City internal staff to be used by the CCE versus contracted consulting services. Typically, California CCEs have initially kept City/County internal staffing to a minimum and relied primarily on consultants with expertise in technical, financial, regulatory and legal responsibilities of the CCE. Debt service payments for an assumed initial loan of $10.05 million are included and are required to pay back loans needed to provide start-up capital and initial operations working capital.

Exhibit 1 provides a summary of the annual operating budget and net income for the CCE.

Exhibit 1 CCE Key Operating Figures	
First Year Operating Budget	$82.9 Million
First Year Revenues	$86.9 Million
First Year Net Income	$4 Million
First Year Load Served	1,466 GWh
Average Operating Budget (2021-2030)	$130.5 Million
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Economic Impacts: Orange County	85 New Jobs/year $10 million in output/year
Greenhouse Gas Reductions, tons CO_2/year	SCE Equivalent Portfolio: 0 100% Renewable by 2035: 191,000 100% Renewable: 360,000

1.5 Findings

Based on the analysis conducted in this Study, the following findings and conclusions are made:

- The formation of a CCE by the City is financially feasible and could yield considerable benefits for all participating residents and businesses.
- Electric retail rates are predicted to be at least 2% lower compared with current SCE rates using extremely conservative modeling parameters, assuming participation rates for residential customers of 95% and non-residential customers participation rates of 90%. These are discussed in more detail in the Load Requirements section of the Study (Section 4). These savings are estimated at $7.7 million per year for Irvine residents and businesses. The annual City municipal utility account cost savings are estimated at $112,000.
- Power supply options studied for the CCE include: matching SCE's renewables resource mix, providing a higher-than-SCE renewable resource mix, and providing 100% renewable power to all customers – if the City decides to provide higher amounts of renewables than required.
- Financed CCE start-up costs could be fully recovered within the first three years of CCE operations while still achieving a 2% rate discount compared to SCE's forecast rates.
- A CCE could design and offer their own customer programs using energy efficiency funds available to CCEs, revenues from the collection of retail rates, other funding sources available to local governments, and through the design of retail rates which could spur specific customer behaviors to conserve energy.

- The savings to customers under the CCE's rates would drive additional local economic development benefits, such as 85 additional jobs and a total of $10 million in economic output.
- An assessment of the impacts of potential development of local renewable power generation projects within the City to provide power to the CCE is provided.
- Given the variety of CCE operations models that exist in the State, the City has options on how it may wish to further pursue CCE; including operating as City only, inviting other cities to join a City CCE, or joining other operating CCEs. These options are described in this Study.

Additional information about specific elements of the Study are described below.

1.6 Study Methodology

SCE provided data on the City's power consumption. This historic data is forecast using state energy consumption growth figures. The Study then estimates future power supply costs, under one scenario similar to the SCE portfolio and two scenarios which involve higher renewable power portfolio levels – including a 100% renewables option to provide customer choice. The power prices in the Study are based on the abundant recent utility and CCE solicitation experience in power procurement.

An assessment of additional, non-power supply costs under CCE operations is provided including: personnel, consultants, financing, administrative and other operating costs. CCE rates are developed to determine revenue requirements which cover all CCE operating costs and other items such as funds for customer programs, CCE operations reserve funds, and financing costs. If these rates are then lower than SCE rates, the CCE may be determined financially feasible.

Finally, the Study predicts the CCE's rates against a range of high and low scenarios for variables such as: power supply costs, SCE rates, customer participation, and stranded costs. This sensitivity analyses predicts that there is no reasonable set of scenarios under which the CCE will not be financially viable. In addition, the analysis confirms none of the extreme scenarios analyzed has yet been observed under past CCEs' operating histories.

1.7 CCE Governance Options

This Study evaluates the feasibility of operating a CCE as a single jurisdiction as this option provides the most conservative scenario for power supply and operating costs, and provides the greatest level of local control. Because the City of Irvine is relatively large, it is recommended that the City review other options, but focus its efforts on forming its own CCE program. Other options for the City to participate in a CCE program include:

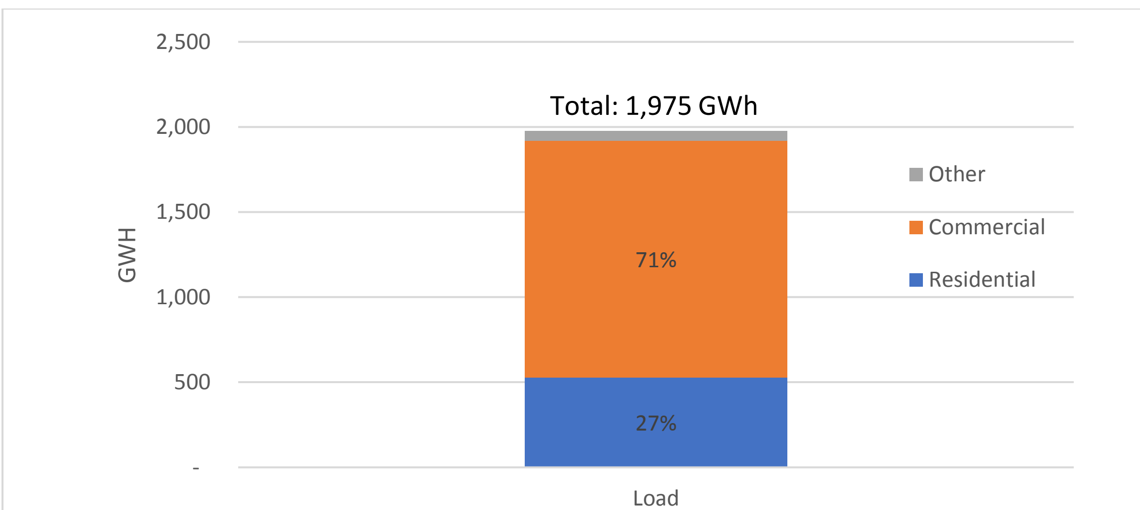
- Joining an existing CCE;
- Creating a new Joint Powers Authority (JPA) and allowing other jurisdictions to join the City CCE; or
- Partnering with other CCEs to share operating costs under another formal agreement.

If the City joins an existing JPA, the start-up activities are simpler as the organization is already operating and programs have been developed. However, the overall governance issues would have to be established prior to joining an existing CCE. And the existing JPA may require the City to make a payment towards the initial start-up and operating costs of that CCE. Before moving forward with CCE implementation, it is recommended that the City evaluate the governance options in more detail. For example, the cities of Encinitas, Carlsbad, and Del Mar have committed to moving forward with CCE formation. However, the cities are currently reviewing governance options before making final decisions on forming a new JPA or joining an existing organization. Due to the sizes of some of these cities (i.e., Del Mar), they would need to join an existing CCE or partner with neighboring jurisdictions to make CCE viable for their city.

1.8 Electricity Consumption in Irvine (Load Requirements)

The City's energy load is comprised of 100,600 residential accounts and 15,900 commercial accounts. Exhibit 2 shows the 2016 energy usage within the City by SCE rate class. Residential and commercial customers make up the majority of energy use, 27% and 71% respectively. The "Other" category in Exhibit 2 includes street lighting and agriculture rates.[2] For 2016, Irvine consumed 1,975 GWh, which is similar in size to Sonoma Clean Power and would be one of the larger CCEs in California.

Exhibit 2
2016 City Load[3]



1.9 Power Supply Scenarios

The Study analyzed the City CCE rate under different scenarios for renewable power content in the power supply mix. At a minimum, the CCE would need to meet State mandated Renewable

[2] Commercial category includes all commercial customers plus industrial customers.

[3] 1 Gigawatt hour (GWh) is 1 million kilowatt-hours. The typical California home uses 400-600 kWh/month. The average home in Irvine uses 450 kWh/month.

Portfolio Standard (RPS) requirements, current RPS targets are 33% by 2020, 40% by 2024, 52% by 2027 and 60% by 2030. The CCE SCE-Equivalent Renewable Portfolio option meets the minimum RPS mandate; therefore, the CCE SCE-Equivalent Renewable Portfolio represents the base case scenario for this Study. The CCE's program operating costs are described in Exhibit 3 and earlier are from this base case scenario; the other two portfolios are evaluated as well and the program operating costs are provided later in the report (Section 6 Cost of Service: Operating Cost for Base Scenario). The three scenarios are described below.

The first scenario (SCE-Equivalent Renewables Portfolio which matches SCE's current and forecast renewables content) program operating costs are illustrated below in Exhibit 3. The second and third scenarios described below are: CCE 100% Renewable by 2035 and CCE 100% Renewable in all years. These scenarios align with the power supply mix of existing CCE programs. The CCE's financial viability was examined under all three of these scenarios.

1) SCE-Equivalent Renewable Portfolio: Achieves between 33% and 60% of power supply from Renewable Portfolio Standard (RPS)-qualifying resources in 2021 through 2029, based on SCE's planned renewable energy procurement. Achieves 60% RPS beginning in 2030.
2) 100% Renewable by 2035 Portfolio: 50% of retail loads are served with RPS-qualifying beginning in 2021 ramping up to 80% in 2025, 90% in 2030 and 100% by 2035.
3) 100% Renewables Portfolio: 100% of retail loads are served with RPS-qualifying renewable resources in all years.

SB 100 sets a target for 100 percent zero-carbon electricity by 2045. The SCE-Equivalent Renewable Portfolio reaches 60% renewable energy by 2030. In order to achieve the SB 100 target, the CCE would need to purchase renewable or greenhouse gas free energy for the remaining 40% of the portfolio over the next 15 years. Portfolios 2 and 3 meet the SB 100 target early, by 2035.

1.10 Cost of Service: Operating Costs for Base Scenario

Exhibit 3 shows CCE program costs where the percentage of renewable power is equal to SCE's current levels (base case). The Cost of Energy shows all power supply expenses estimated to serve all City loads including 34% renewable energy and an additional 6% greenhouse gas free energy. Greenhouse gas (GHG) free energy costs are included to meet the equivalent share of GHG free energy in SCE's portfolio. The Power Charge Indifference Adjustment (PCIA or exit fee), is not included in the operating costs since this is not a cost to the CCE, but a rate paid by CCE customers. The PCIA is an important consideration for CCE feasibility studies since ratepayers will be comparing the total cost of generation via the CCE versus the incumbent IOU. The PCIA scenarios are assessed and discussed in the Cost of Service: Operating Costs for Base Scenario section of the detailed Study (Section 6).

Non-power supply costs (Operating & Administrative) are also shown in Exhibit 3. Billing and data management includes services provided by a third party for collecting and providing billing information and data to SCE. These costs are generally billed on a $/customer basis. Scheduling fees include the cost of hiring a third party to schedule CCE power deliveries to the electric grids. SCE set-up and start-up fees are the costs SCE incurs to set up billing for CCE service plus the ongoing cost for billing and managing customer accounts. Consulting services cover assistance from consultants during launch and after to assist in meeting regulatory requirements, rate setting, and other operating functions.

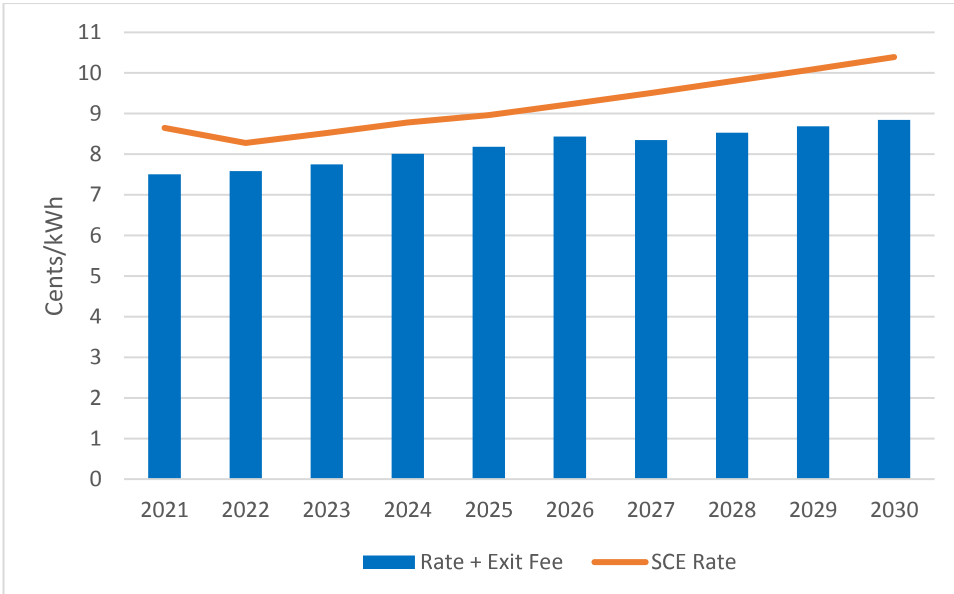
Exhibit 3 2021 CCE Costs, SCE-Equivalent Renewable Portfolio $Millions	
Cost of Energy	$77.45
Operating & Administrative	
Billing & Data Management	$1.20
Scheduling Fees	$0.47
SCE Setup and Start-up Fees	$0.15
Consulting Services	$0.40
Staffing	$1.26
General & Administrative Expenses	$0.42
Debt Service	$1.59
Total O&A Costs	$5.48
Total Cost	$82.94

The operational and administrative costs for the CCE are estimated based on costs incurred by other CCEs launched in California in recent years. The CCE's first year of operation assumes customers begin taking service in April 2021. Assuming the City submits an Implementation Plan to the CPUC by the end of 2019, the earliest the program can launch is January of 2021. April 2021 was selected as the CCE start date based on current CCE practices relative to utilities' rate structures. SCE's current seasonal rates collect significantly higher revenue in the summer months, as would the CCE's. However, it is recommended that the CCE launch prior to the seasonal rate change taking effect to minimize bill confusion on the transition to CCE service. Specifically, higher opt-out rates might be expected if the first power bill from the CCE includes the higher summer rates.

Exhibit 4 illustrates the 10-year financial comparison of the rates paid by CCE customers for the generation portion of their bills. This Exhibit shows the comparison for the base case described earlier. Under the base case assumptions, the CCE can provide a rate discount of 2%, approximately $7.7 million annually, compared with the base case SCE rate. In addition to the rate discount, the Study recommends the CCE will retain a portion of retail rate revenues (estimated at $3.4 million per year on average) for future local incentive programs and building cash reserves.

SCE generation rates are forecast to escalate at approximately 3% per year. This cost escalation is consistent with historic generation rate increases averaging from 2 to 4% per year. The escalation of the SCE generation rate contributes to the CCE's ability to offer a rate discount due to the forecast increase in power supply costs. The average SCE generation rate over the study period is $0.0922/kWh compared with the average CCE rate forecast at $0.0819/kWh (including the exit fee, paid to SCE).

Exhibit 4
Bundled Load and Accounts in 2016



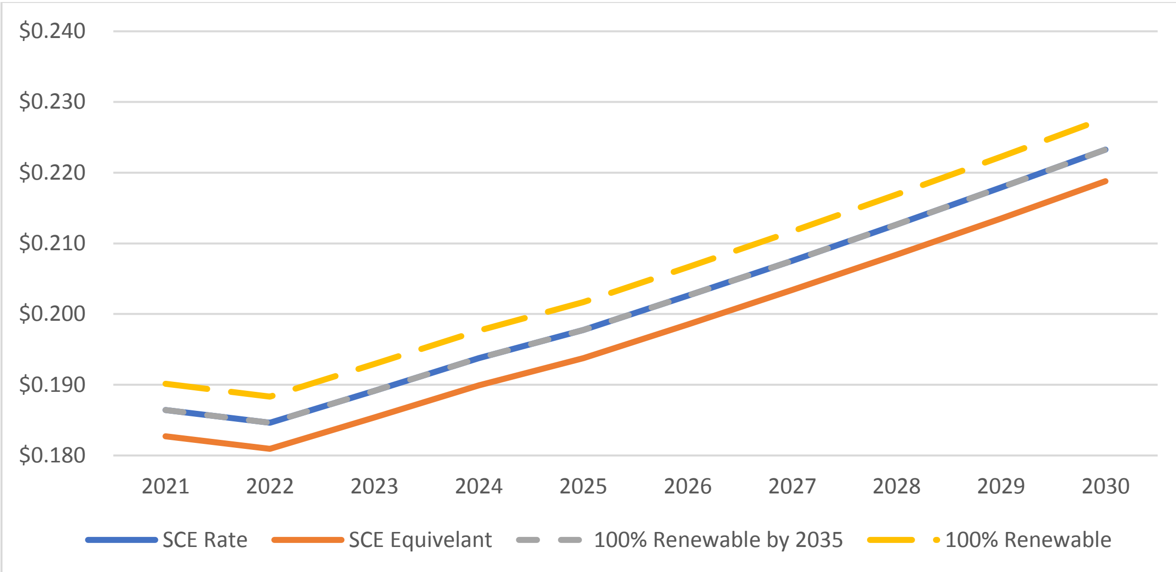
1.11 Rate Comparison

Based on the CCE's projected power supply costs, PCIA, operating costs, and SCE's power supply and delivery costs, forecasts of CCE and SCE total rates are developed. The analysis balances the rate discount, collection of reserves and the share of renewable and GHG-free resources purchased. If the discount is too high, the CCE will not be able to collect enough reserves to meet reserve targets within the first 5 years.

The rate forecasts are illustrated below in Exhibit 5.

- A rate discount of 2% is targeted for the SCE-Equivalent Renewable Portfolio.
- The 100% Renewable by 2035 portfolio is at parity with SCE rates.
- The 100% Renewable Portfolio rates are calibrated to be as close to SCE rates as possible while collecting the reserves needed for CCE operation; due to the additional costs of a 100% renewable portfolio, these rates are at a premium to SCE rates of 2%.

Exhibit 5
Average Total Retail Rate Comparison – With Savings Targets



The CCE rates calculated in this Study are for comparison purposes only. Under formal operations, the CCE policymakers would determine the actual rates offered to its customers.

An analysis of existing, operational CCE rates in SCE territory is provided as a check against the findings of the Study.

1.11.1 Comparison to Local CCE Programs Rates

Clean Power Alliance of Southern California, (CPA) launched in the LA County area in 2018 by first serving non-residential customers. Currently CPA offers a 1% to 2% discount off SCE rates for its default product (Lean Power) which is the SCE-Renewable Equivalent Portfolio, currently 36% renewable energy. Their Clean Power product is offered at a 0% to 1% rate discount (compared to the SCE-Renewable Portfolio base rate) for energy that is 50% renewable. Finally, Green Power is 100% renewable and costs 8% to 9% more than SCE base rates.[4] In February 2019, CPA began serving 1 million residential customers. Ventura County, and certain cities within that County, joined CPA in 2018 and launched service to their customers in 2019. Some cities within Ventura County and LA County opted to have Green Power (100% renewable) as the default (or only initial) offering to their customers. Customers could proactively opt back to the Lean or Clean Power rates.

[4] https://cleanpoweralliance.org/wp-content/uploads/2018/12/CPA-2019-Proposed-Residential-Rates.pdf

This Study estimates that the City's CCE could offer power portfolios with the same levels of mandated renewable energy as SCE, at rates that are at least 2% lower than current SCE-Renewable Portfolio. These estimates are consistent with what CPA has experienced and could even become more favorable. Greater rate discounts could be achieved for the City CCE given that the PCIA impacts to the City's CCE rates could be lower than the impacts to CPA's rates. The City's CCE is more likely to enter into longer-term power supply contracts at lower rates than what is available to CPA when they executed power contracts. More on power supply costs can be found in the balance of this Study.

California Clean Choice Energy Authority (CalChoice), formerly California Choice Energy Authority, was created by the Lancaster Clean Energy (LCE) CCE and the San Jacinto Power CCE. The City of Lancaster and the City of San Jacinto joined forces to create CalChoice, a JPA designed to offer cities that elect to become a CCE centralized services through CalChoice. CalChoice is governed by the Lancaster City Council with each member city joining as an associate member of the JPA. Each associate City Council would set rates for their City, purchase their energy and contract their CCA services through existing CalChoice contracts. Current member CCEs include: Lancaster Clean Energy, Pico Rivera Innovative Municipal Energy (Prime), San Jacinto Power (SJP), Apple Valley Choice Energy (AVCE), and Rancho Mirage Energy Authority (RMEA). Exhibit 6 illustrates their rates compared to SCE and confirms the Study's estimates that the City's CCE rates can be lower than SCE's. All of these CCEs operate as individual city CCEs and all have much smaller populations than the City of Irvine. These rates were taken from the websites of each individual CCE. The variance in rates versus SCE, especially in the 100% renewable comparison is likely explained as a combination of their power supply portfolios and individual CCE design of their rates reflective of their perception of their ratepayer desires.

Exhibit 6
CalChoice Rates

	Base Rate vs. SCE	100% Renewable vs. SCE
Lancaster Community Energy		
Residential*	2.1 % lower	1.3% lower
Commercial**	1.6% lower	1.7% lower
Pico Rivera (PRIME) PRIME default rate is 50% renewable		
Residential	2.6% lower	1.4% lower
Commercial	6.1% lower*	4.8% lower
San Jacinto Power		
Residential*	1.3% lower	14.3% lower
Commercial**	1.4% lower	3.5% lower
Apple Valley Choice Energy		
Residential*	1.4% lower	14.1% lower
Commercial**	1.4% lower	9.3% lower
Rancho Mirage Energy Authority	3.5% lower	13.3% lower
Residential*	1.4% lower	13.3% lower
Commercial**	3.5% lower	8.7% lower

Exhibit 6 CalChoice Rates		
	Base Rate vs. SCE	**100% Renewable vs. SCE**
*Domestic D Rate **GS 1 TOU Rate		

1.12 Economic and Environmental Impacts

1.12.1 Economic Development

The macroeconomic impacts anticipated from the 2% rate savings are estimated in the study. Under the CCE's lower electric rates, residents and businesses can reallocate those savings for other purposes increasing economic activity as predicted using standard economic modeling. The average annual rate savings of $7.7 million is modeled in an Orange County economic model. The total additional economic output for one year of rate savings is estimated at nearly $10 million. These figures include the value estimated for creating an additional 85 full time jobs each year.

1.12.2 Environmental Impacts

Two of the power portfolios analyzed in the Study would lower GHG emissions for the City compared with SCE's forecast resource mix. The SCE Renewable Equivalent Portfolio is not expected to reduce GHG emissions compared with service from SCE; however, the CCE program allows for more local control that could result in locally-focused or targeted programs to achieve a greater level of environmental sustainability. As noted below, a City CCE has the potential to create and fund local energy programs that would positively contribute to the overall environmental benefit of the community. If the City pursued a renewable energy portfolio greater than SCE, GHG reductions could amount to 360,000 metric tons of CO_2e per year compared with SCE's forecast portfolio.

1.12.3 Local Energy Programs

The financial analysis showed that a City CCE would be able to collect revenue in excess of costs and reserve requirements that can be used for other programs. These programs could include attractive compensation rates for excess energy purchased through net energy metering or feed-in tariffs; funding for local renewable energy projects; investments in vehicle electrification such as charging stations; or additional support for low income families through electric bill discounts or energy efficiency programs.

1.13 Sensitivity and Risk Analysis

In addition to the base case assumptions, uncertainties which could impact CCE rates were evaluated under different best- and worst-case scenarios. Uncertainties analyzed included: higher or lower PCIA costs, higher market power costs, and higher or lower loads served by the CCE. Exhibit 7 shows the results of the sensitivity analysis; in most cases, the CCE could continue to offer rate discounts under the scenarios described. Note that a negative rate discount means that rates for the CCE would be higher than SCE rates. Also note that the CCE 100% Renewable by 2035 and CCE 100% Renewable (all years), under the Base Assumptions, are equal to and 2% higher, respectively than the SCE-Expected Renewable Portfolio due to offering a higher renewable portfolio content.

If a high PCIA and high power costs are in place simultaneously, the CCE would no longer be financially feasible due to rates that are higher than SCE. In the cases where high power costs result in CCE rates greater than SCE rates, the impact could likely be mitigated by offsets in both the PCIA and SCE generation rates due to SCE power costs likely increasing as well. Under this scenario, the CCE needs to avoid making power supply decisions that would increase their costs versus SCE's costs. There are several strategies the CCE may use to mitigate possible rate impacts including flexibility in its power supply. For example, the City may adjust its renewable energy goals to respond to potential changes in market conditions for renewable energy that would lower the rate discount that can be offered.

Exhibit 7
CCE Rate Sensitivity
10-Year Levelized Rate and Average Discount 2021-2030

	SCE-Equivalent Renewable Portfolio		100% Renewable by 2035		100% Renewable	
Sensitivity	**¢/kWh**	**Rate Discount**	**¢/kWh**	**Rate Discount**	**¢/kWh**	**Rate Discount**
Base Assumptions	$0.22	2.00%	$0.23	0.00%	$0.23	-2.00%
High PCIA	$0.23	-1.50%	$0.23	-3.48%	$0.24	-5.48%
Low PCIA	$0.22	2.00%	$0.23	0.54%	$0.23	-1.46%
High Power Costs[1]	$0.23	-2.96%	$0.24	-6.13%	$0.25	-8.25%
Low Load	$0.22	2.00%	$0.23	0.00%	$0.23	-2.00%
High Load	$0.22	2.00%	$0.23	0.00%	$0.23	-2.00%

[1]The CCE purchases power supply at costs higher than SCE.

1.14 Conclusions

Based on the analysis conducted in this Study, the following findings and conclusions are made:

- The formation of a City CCE is financially feasible and could yield considerable benefits for all participating residents and businesses.

- Benefits could include electric retail rates that are estimated at least 2% lower compared with SCE rates, assuming participation rates for residential customers of 95% and non-residential customers participation rates of 90%.
- Other benefits include local control over power supply, economic development incentives, and targeted energy efficiency programs.
- CCE start-up costs could be fully recovered within the first three years of CCE operations while still achieving a 2% rate discount. The cost of this Study and Implementation Plan can be recovered as well.
- After this cost recovery, revenues that exceed costs could be used to finance a rate stabilization fund, new local renewable resources, customer incentive programs, economic development projects and/or lower customer electric rates.
- The sensitivity analysis shows that the ranges of prices for different market conditions will for the most part not negatively impact CCE rates compared to SCE rates. Where negative impacts may exist, those risks can be mitigated through planning, organization structure, and preemptive strategies.
- Local electric rate savings are expected to stimulate economic development within the City and surrounding region.

The positive impacts on the City and its constituents of forming a CCE are documented in this Study under a very conservative set of technical and financial assumptions. The Study includes a sensitivity analysis around a range of values for these assumptions and concludes that no likely combination of sensitivities would change the recommendation that CCE is financially feasible based on the detailed analysis contained in the balance of this Study.

The Study results suggest that CCE implementation is feasible and should be considered further by the City. Suggested next steps for the City include: complete an internal review of this Study, conduct public outreach activities to share the results of the Study with City constituents and other stakeholders and receive their input, adopt the Study results through Council action and determine whether to move forward with CCE implementation.

2. Study Methodology

2.1 Introduction

The Study assumes that a CCE would provide information, which would support analyses and assessment of Citywide energy objectives under the forthcoming City Strategic Energy Plan. The Study also addresses the following objectives:

- Assess options for increasing the renewable energy content in the CCE power mix to exceed the renewable energy baseline offered by SCE;
- Quantify potential greenhouse gas (GHG) emissions reductions throughout the City from electricity consumption of higher amounts of renewable energy;
- Provide competitive or lower rates compared to SCE's rates;
- Provide local control and decision-making over renewable energy content and in retail customer rate setting;
- Provide choices to customers (residents and businesses) on amount of renewable energy power supply options;
- Assess the impacts to CCE operations and the local economy of supporting development of local renewable power generation projects;
- Assess the viability of developing and supporting CCE customer incentive programs like energy efficiency and others.

While the City has not yet officially adopted these goals, they serve as the foundation for this Study. Once the City's goals are refined, adopted, and prioritized; modifications to this Study may be appropriate.

2.2 Pro Forma Analysis

This Study evaluates the estimated costs and resulting rates of operating a CCE for the City and compares these rates to a SCE rate forecast for the years 2021 through 2030. This pro forma financial analysis models the following cost components:

- Current and Future Power Supply Costs:
  - Wholesale purchases
  - Renewable purchases
  - Procurement of Resource Adequacy (RA) power products which meet power supplier reliability requirements for California (System Capacity, and Local and Flexible Capacity products)
  - Other power supply and charges

- Current and Future Non-Power Supply Costs:
  - Start-up costs
  - CCE staffing and administration costs
  - Technical consulting support

- Legal and regulatory support
- SCE and regulatory charges
- Costs of acquiring and paying back financing

- Allowable Specific Charges to CCEs from SCE:
    - Transmission and distribution charges
    - Power Charge Indifference Adjustment (PCIA) Charge

The information above is used to determine the projected retail rates for the CCE. The CCE rates are then compared to the SCE projected rates for the City's CCE service area. Detailed descriptions of the assumptions and methodologies used in the cost analysis above are described later in this Study. Later in the Study, elements of the Sensitivity Analysis were conducted to determine CCE rates against SCE rates using high and low case scenarios for changed rate model inputs. A description of how the CCE may mitigate outcomes of the Sensitivity Analysis are provided. Once the analysis determined that the CCE was financially viable; assessments of possible Citywide GHG reductions, local renewable power generation potential, and CCE-funded customer incentive programs potential was conducted. In addition, a discussion of CCE governance options is included. The remainder of this report describes these parts of the Study elements.

3. CCE Governance Options

3.1 Introduction

There are several options for governance and organizational staffing to be considered when deciding to pursue a CCE program. Exhibit 9, shown later in this section, provides some context for other CCE programs in California so the City can get a better understanding of the various governance and organizational structures utilized. It is recommended that the City further discuss the governance options to clearly understand all the pros and cons. If the City Council provides direction to move forward with CCE implementation, this work will be conducted in Task 2.2 of the Feasibility Study.

This Study evaluates the feasibility of operating a CCE as a single jurisdiction as this option is the most conservative option from a cost standpoint, and it provides the greatest level of local control. Other CCEs in the State operate with multiple jurisdictions under a JPA with as many as 30 or more members. Without evaluating specific options, it would be difficult to rank the JPA options in terms of most or least viable.

If the City joins an existing JPA, the start-up activities are simpler as the organization is already operating and programs such as net energy metering and energy efficiency have been developed. However, the City would need to understand the requirements for joining the JPA, the operations terms and conditions, and any potential liabilities of being a member of the JPA before joining an existing CCE.

In order for EES to evaluate the City joining an existing JPA, the City would need to issue a Request for Proposals to obtain information about joining currently operating CCEs and what is required to join. Generally, JPAs will vary in their size of membership and geographic coverage while their governance around operations are somewhat similar. Overall, CCEs that operate under a JPA are viable because they benefit from economies of scale in procurement and operating costs.

3.2 CCE Governance Options

This section describes the various options the City may explore for implementing a CCE program. The governance options range from individual/single-City CCEs to joining existing CCEs or creating a new JPA. The following criteria are used to describe strengths and weaknesses of each governance option: Financial Viability, Governance, Local Control, and Other Attributes. Risks and Key Benefits are also discussed.

3.2.1 The City Forms an Individual CCE

- Financial Viability: This is viable for the City as confirmed by the results of the Study. EES has analyzed this option as the base case assumption in the financial pro forma results and confirmed it is financially viable for Irvine to launch an individual CCE program. To launch an individual CCE program, the City can expect to invest $600,000 to cover costs associated with pre-launch activities including consultant support for program and rate design, payment of bonds to SCE and CPUC, hiring staff, and meetings with SCE and other stakeholders.

- Governance: A single City CCE creates less complicated governance. The City Council serves as the Board authorizing CCE structure and programs.
- Local Control: Decision-making is more locally focused. The City would make all decisions regarding power portfolio content, retail rate designs, utilization of local generation, implementation of customer programs, and marketing and outreach. Under a single City CCE, the City alone would determine the overall CCE objectives around: City-wide environmental objectives, cost of operations, customer rate discounts, local economic development, and design of customer programs.
- Risks: Operating a City CCE requires special care to protect the City's General Fund from CCE obligations. Specifically, if the CCE signs power purchase agreements and then fails to deliver power, the General Fund will be liable to pay for any costs of the agreement not recovered in the sale of the power on the wholesale market. While opt out rates are a concern for smaller CCEs, the Study has concluded that the City's population is large enough that a City CCE is viable up to an opt out rate of at least 20%. This level of opt out has not been experienced historically with most CCEs operating with opt out rates around 5%.
- Key Benefits: Operating as a single jurisdiction CCE provides for the greatest level of local control for both program offerings, power supply choices, and rate designs.
- Other Attributes: Solana Beach, Pico Rivera, San Jacinto, and King City are examples of smaller City CCEs that are similar in size to Irvine and operating independently; although Pico Rivera and San Jacinto participate in the California Clean Choice Energy Authority (Cal Choice - described below) to share non-power costs with other individual City CCEs. Under this scenario the City would need to apply to the CPUC directly for energy efficiency funds rather than being able to rely on the JPA and share the costs.

3.2.2 Irvine Forms a JPA with Other Orange County Jurisdictions Joining

- Financial Viability: This option is financially viable. If other Orange County cities or the County wanted to join Irvine's CCE, the multiple jurisdiction CCE would remain viable and non-power costs per jurisdiction would be lower.
- Governance: Under a JPA, likely each city/jurisdiction would be a voting board member. Having limited board membership keeps governance nimble and local/regional focused. The City would have control over the JPA voting structure to the extent that other jurisdictions would accept an offer to join. Each participating city would need to adopt the JPA. This type of structure is similar to Clean Power Alliance in LA and Ventura counties.
- Local Control: If other cities have similar energy management or other goals, decisions around the CCE's operations should be less complicated. With similar goals, decisions about wholesale power portfolio, rate designs, local distributed generation, and customer clean energy programs should be easier to make. Depending on the voting structure established by the JPA, and the number of participating cities, the amount of local control for Irvine will be reduced accordingly.
- Risks: The same risks would apply to the Irvine JPA model as the individual CCE model regarding opt out rates. Whether other jurisdictions would join will be based on alternatives.

Alternatives for large enough cities would include the single jurisdiction model, or joining other CCE programs. The alternatives will evolve in the future as CCE feasibility studies are conducted and other jurisdictions establish JPAs.

- Key Benefits: A JPA could provide financial protection of the City's general funds from CCE obligations; the City's attorney would need to verify impacts and risk to the general fund. Also, a JPA could apply to the CPUC for energy efficiency program funds on behalf of the cities. Finally, a JPA can mitigate power supply risk as a larger pool of customers will help build operating reserves and stabilize the CCE program when faced with regulatory changes or market conditions.
- Other Attributes: A JPA like this is ideal for allowing other Orange County cities (or the County) that don't create their own CCEs to join. Consideration of consistent goals, local programs and operations design should be included as criteria for others who want to join. Operational savings on non-power supply costs (administration, legal, regulatory, and other services) would likely occur as more customers are added to the CCE program.

3.2.3 The City Joins Another CCE

- Financial Viability: This option is financially viable and would benefit the net revenue margins for the larger CCE organization under the assumption that economies of scale would be realized, particularly for non-power costs. The City is likely large enough that joining a larger CCE organization would not significantly impact power purchase costs for energy delivered to City rate payers. It is not possible to determine the exact financial impacts of joining another CCE as they are all of different load and customer sizes and different tenures of operation. In addition, the existing CCEs may require new members to contribute a fee to offset any loans that may have been utilized for start-up and initial operations. These impacts can be determined through a formal inquiry to CCEs at a later date.
- Governance: This option requires the City adopt a resolution to join a JPA. Governance would be more complicated, especially if the City joins a CCE JPA with many members. However, there are CCEs that operate with many members across contiguous and non-contiguous borders despite having large governing boards (e.g. Clean Power Alliance of Southern CA, Marin Clean Energy, Sonoma Clean Power).
- Local Control: Local decision-making on operations (power portfolio contents, rates, local generation, customer programs) would be diminished, especially under a CCE JPA with many members (e.g., 20-30 or more).
- Risks: Governing Boards of these types of JPAs must approve operations policies and program decisions that could apply across differing community demographics. Financial and other risks to the City of joining an existing CCE should be determined by the City's attorneys. For example, if the City joins an operating CCE, they may be liable for contractual obligations should they decide later to leave the CCE.
- Key Benefits: A JPA might provide financial protection of city general funds from CCE obligations, but this should be confirmed by the City's attorneys. Economies of scale would apply for non-power supply costs in this scenario as well but as mentioned above they would be impossible to predict absent a formal inquiry to the CCE.

- Other Attributes: Net revenue margins for the organization benefit from large memberships. How those revenues are utilized to benefit members must be determined by many cities, likely with differing local goals regarding CCE operations. A larger JPA of CCEs could apply for larger amounts of energy efficiency funds (because of population/load), but the design of the programs becomes more complicated if local/city desires are to be individually addressed.

3.2.4 Irvine Joins a JPA of Individual CCEs or Creates an Orange County Region JPA of Individual CCEs

- Financial Viability: This option is financially viable.
- Governance: Under this option, individual cities need to adopt resolutions to become a CCE. For example, the California Clean Choice Energy Authority (CalChoice) is a JPA of individual city CCEs (currently members are Lancaster, Pico Rivera, San Jacinto, and Rancho Mirage and Apple Valley – they have 6 other cities in process of joining them including cities in Los Angeles and Tulare Counties). The City could also create a CleanChoice-type JPA for Orange County-region CCEs and provide similar, centralized services and benefits.
- Local Control: CCEs that join Clean Choice CCEA (or create a similar, Orange County-region organization) retain local decision-making control over CCE operations (power portfolio mix, rates, local generation and programs) and will see net revenue benefits by sharing centralized services. However, the details of how these shared services are utilized and paid for need to be confirmed (in the case of Clean Choice) and developed (in the case of an Orange County-region effort).
- Risks: Each CCE member of this type of organization takes on the same risks as described above for the City-only CCE option.
- Key Benefits: This option provides centralized services such as: power procurement, power scheduling and dispatching, bill data management and regulatory/legal services. Each CCE city is a voting member of the CCE board but since each city is its own CCE, decisions on CCE operations are made by each CCE.
- Other Attributes: Creating an Orange County-region JPA of CCEs makes it easier for Orange County cities (and the County) to become a CCE in that acquiring start-up and operational services support would already be established under the JPA. A JPA provides financial protection of cities general funds from CCE obligations that should be confirmed by City's attorneys. Each city CCE in the JPA could apply for energy efficiency funding at the CPUC. Currently there is an effort in Orange County by Sustain SoCal to implement a JPA of neighboring jurisdictions including Orange County and its cities. The Sustain SoCal CCE program would provide for groups of cities to determine the financial feasibility of creating a CCE.

Exhibit 8 summarizes the estimated start-up costs the City may need to fund upfront (prior to financing the start-up costs) for each governance option. Once the program has launched, the City could recover these initial funds.

Exhibit 8 Pre-Launch City-Funding Estimates by Governance Option		
	Estimated Pre-Launch Funds from City	**Examples**
1. City-Only CCE	$600,000	CPUC bond: $100,000 SCE Bond: $100,000 Staffing/Consultant Costs for rate design, financial analysis, obtain funding
2. Irvine Creates JPA with Other Jurisdictions Joining	< $600,000	Less than City-only estimate assuming other jurisdictions share in pre-launch costs
3. Join Existing CCE	$0-??	Clean Power Alliance offered $0 joining fee during roll-out. Need to request information to obtain cost estimates.
4. Joins with Other Jurisdictions to Form JPA	< $600,000	Less than City-only estimate assuming other jurisdictions share in pre-launch costs

3.3 CCE Organizational Staffing Options

If the City operates as a single jurisdiction CCE, there are several staffing options available. These costs are recovered through the CCE retail rates. One option is to operate the CCE with minimal staff, such as a General Manager, Power Supply Manager and a Customer Service Manager, to oversee consultants that would perform all necessary operations tasks. Another option is to minimize the use of outside consultants and hire enough staff in-house to manage all necessary tasks. Most operating CCEs have started with minimal staffing and then transitioned over time to additional staff in-house. A third option is to have an independent third-party completely operate the CCE.

For this Study, it is assumed that the CCE would begin with limited staff supported by consultants experienced in power procurement, data management and utility operations. If the City decides to transition some administrative and operational responsibilities to internally staffed positions, the CCE could reach a full-time staff of approximately 10 employees to perform its responsibilities primarily related to program and contract management, legal and regulatory, finance and accounting, energy efficiency, marketing and customer service. The staff size level is based on similarly sized CCEs currently operating. Technical functions associated with managing and scheduling power suppliers and those related to retail customer billings would likely still be performed by an experienced third-party consultant.

3.4 CCE Programs in California

Exhibit 9 below summarizes current and pending CCE programs in the State. Several neighboring jurisdictions to the City are either currently operating or are conducting feasibility studies, or plan to conduct feasibility studies for CCE implementation. The City could partner with other jurisdictions to form a larger CCE and spread out administrative costs. As mentioned above, the trade-off will be regarding local control depending on what type of partner the City finds would best suit its goals.

Organization structures and financial positions are broadly defined in Exhibit 9. Most CCEs operate utilizing in-house staff. Staffing levels vary widely and all CCEs utilize consultants to some extent.

Exhibit 9
CCE Programs Across the State

CCE/Entity		**Status**	**Latest Financial Net Position**[1]
PG&E Community Choice Programs			
Multiple Jurisdictions That Are Part of a Single, CCE Joint Power Authority (JPA) *			
Marin Clean Energy	Marin and Napa Counties and cities within, cities in Solano and Contra Costa Counties	Launched 2010	$50MM Baa2 Credit Rating
Sonoma Clean Power	Sonoma and Mendocino Counties and cities within	Launched 2014	$90 MM
Peninsula Clean Energy	San Mateo County and cities within	Launched 2016	$85 MM Baa2 Credit Rating
Silicon Valley Clean Energy	Santa Clara County and cities within (except San Jose)	Launched 2017	$78 MM
Pioneer Clean Energy	Placer County and cities within	Launched 2018	N/A[2]
Monterey Bay Community Power	Monterey, Santa Cruz and San Benito Counties and cities within, cities of San Luis Obispo and Morro Bay	Launched 2018	$40MM
East Bay Community Energy	Alameda County and cities within	Launched 2018	N/A
Valley Clean Energy	Yolo County, Cities of Davis and Woodland	Launched 2018	$2.5 MM
* all these CCEs are seeking expansion with other jurisdictions			
Multiple Jurisdictions That are Part of a Single CCE Under a Previously Existing JPA			
Redwood Coast Energy Authority	Humboldt County and cities within	Launched 2017	$1.1 MM
Single Jurisdiction CCEs That Are Operated Under Their Local Government			
San Francisco Clean Energy	City/County of San Francisco (SF Public Utilities Commission)	Launched 2017	N/A (part of SFPUC)

Exhibit 9
CCE Programs Across the State

CCE/Entity		Status	Latest Financial Net Position[1]
San Jose Clean Energy	City of San Jose	Launched 2018	($1.1 MM) partial year operation
King City Community Power	City of King City	Launched 2018	N/A
CCEs In Formation, Under Development			
Butte County Community Choice	Butte County, other cities being approached	Feasibility Study Completed	
SCE Community Choice Programs			
Multiple Jurisdictions That are Part of a Single, CCE Joint Power Authority (JPA)**			
Clean Power Alliance of Southern California	Los Angeles and Ventura Counties and cities within	Launched 2018	($2.6 MM) partial year operation
Single Jurisdiction CCEs Operated by Local Governments and Under a Joint Powers Authority for Shared Services**			
Lancaster Clean Energy	City of Lancaster, Member of California Choice Energy Authority (CalChoice)	Launched in 2015	$2.5 MM
Apple Valley Clean Energy	City of Apple Valley, Member of CalChoice	Launched 2017	N/A
Pico Rivera Innovative Municipal Energy	City of Pico Rivera, Member of CalChoice	Launched 2017	0.45 MM
San Jacinto Power	City of San Jacinto, Member of CalChoice	Launched 2018	N/A
Rancho Mirage Energy Authority	City of Rancho Mirage, Member of CalChoice	Launched2018	$0.76 MM
**CPA and CalChoice are seeking expansion with other jurisdictions			
CCEs in Formation, Under Development			
Desert Community Energy	Coachella Valley Association of Governments cities	Launching 2019	
Western Community Energy	Western Riverside Council of Governments cities	Launching 2020	
Hanford Community Choice	City of Hanford	Feasibility Study Underway	

Exhibit 9 CCE Programs Across the State			
CCE/Entity		**Status**	**Latest Financial Net Position[1]**
	Santa Barbara County, cities of Santa Barbara, Goleta, Carpinteria	Feasibility Study Completed	
	Cities of Long Beach, Pomona, Baldwin Park, Commerce, Mission Viejo	Feasibility Studies Underway	
	Riverside County, Laguna Beach, Laguna Woods	Feasibility Study Completed	
	Huntington Beach, Forest Hills	RFP Issued – No Award	
Multiple City Feasibility Study Proposal			
Sustain Southern California CCE Program	Seeking cities in Orange and San Diego Counties for Feasibility Study	Awaiting Cities Enrollment to Begin Feasibility Study	
SDG&E Community Choice Programs			
Single Jurisdiction CCE Operated by Local Government* **			
Solana Energy Alliance	City of Solana Beach	Launched 2018	$1.2 MM
CCEs in Formation, Under Development* **			
	City of San Diego	Feasibility Study completed	
	Cities of Encinitas, Oceanside, Carlsbad, Del Mar	Joint Feasibility Study Completed	
	Cities of La Mesa, Chula Vista, and Santee	Feasibility Study Underway	
***Regional discussions are underway regarding formation of a JPA			

1 Reflects mid or end of 2018. Note that for newer CCEs, their financial position can change significantly month to month based on power supply costs.

2 N/A indicates not available

3.5 Recommendation

If the City moves forward with CCE implementation, it should further investigate each of the governance and staffing options. A detailed assessment of the options for joining existing organizations or developing new, local/regional organizations should be developed as outlined in Task 2.2 of the CCE Study, should City Council decide to move forward with CCE implementation. In order to evaluate a City initiated JPA that includes additional cities, the feasibility analysis would be expanded to include additional data obtained from SCE for interested cities. Similarly, the City could solicit information from existing CCE organizations regarding costs and other requirements for joining these organizations. That information should then be compared to potential costs and requirements of creating a new, local/regional CCE organization. If joining another CCE is the preferred option for the City, a request for proposal (RFP) should be issued to each potential existing CCE to define the terms of joining an existing CCE.

4. Load Requirements

4.1 Introduction

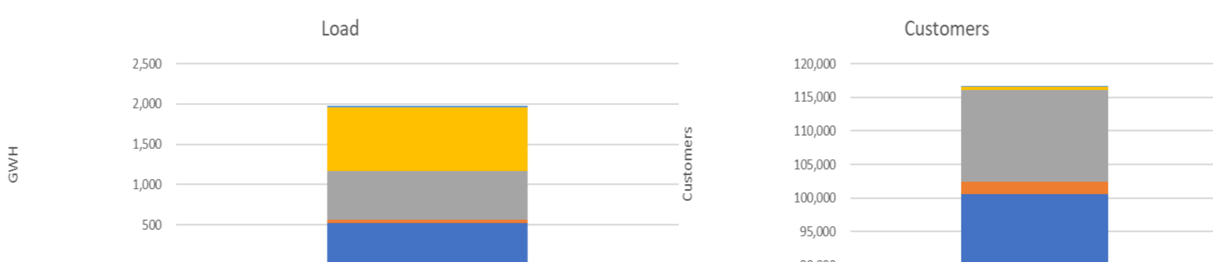
One indicator of the viability of a CCE is the number of customers that participate in the CCE as well as the quantity and timing of energy these customers consume. This section of the Study provides an overview of these projected values and the methodology used to estimate them. This section also describes Direct Access customers and the feasibility of the CCE program without providing service to these customers.

4.2 Historical Consumption

SCE provided hourly historical data on energy use (kWh) for City customers receiving power supply services from SCE (bundled customers) for the 2015 and 2016 calendar years. Bundled customers currently purchase the electric power, transmission and distribution from SCE. This data was aggregated by rate class in each month for bundled (full service) customers. In total, bundled residents and businesses within the City purchased 1,975 GWh of electricity in 2016 from SCE.

Exhibit 10 summarizes energy consumption and number of accounts for bundled customers in 2016.

Exhibit 10
Bundled Load and Accounts in 2016



	Load
Agricultural	17
Large Commercial/Industrial	793
Small/Medium Commercial	597
Lighting	39
Residential	528

	Customers
Agricultural	62
Large Commercial/Industrial	381
Small/Medium Commercial	13,732
Lighting	1,769
Residential	100,630

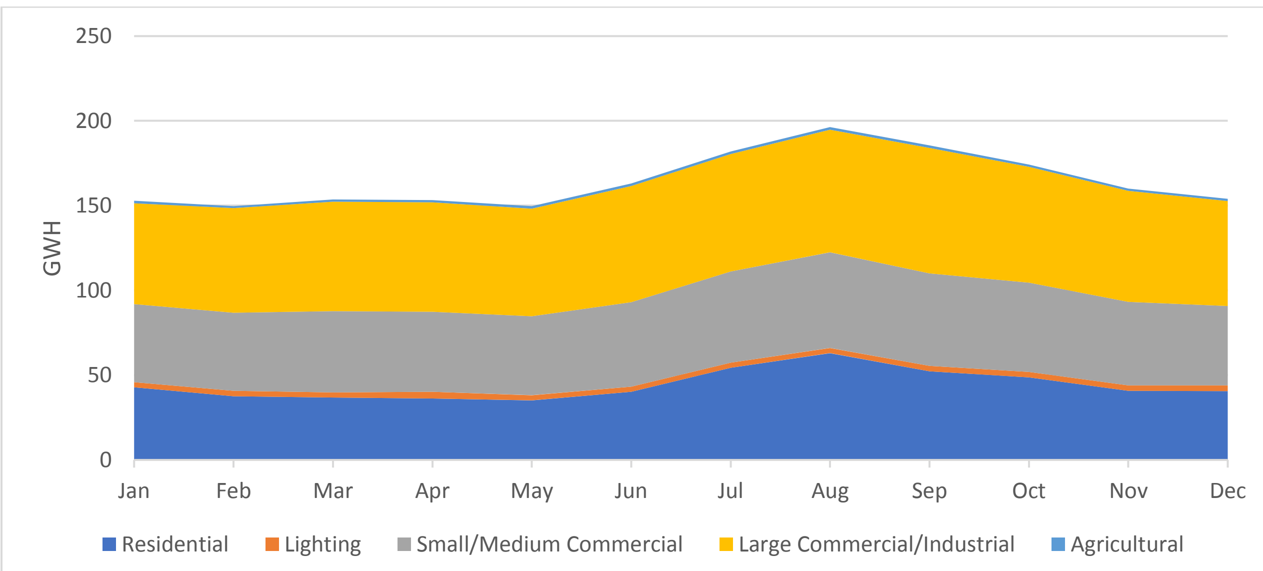
Direct Access (DA) customers buy only the transmission and distribution service from SCE and purchase power from an independent and competitive Electric Service Provider (ESP). SCE also provided energy usage for DA customers. Once operating, the CCE may decide to provide service options to DA customers with expired contracts, however, excluding DA customers offers the most conservative analysis of feasibility. After the formation of a CCE, Direct Access customers typically opt to continue to receive power under contract from their ESP due to contracting limitations and/or lower cost power, for this reason DA customers were not included in the load forecast.

In California, eligibility for DA enrollment is currently limited to non-residential customers and subject to a maximum allowable annual limit for new enrollment measured in gigawatt-hours of new load and managed through an annual lottery.[5]

CPUC rulemaking to date has not addressed how vintage would be handled for DA customers that opt to switch to receive electric power from a CCE rather than their current ESP.[6]

Monthly historic load from 2016 is shown in Exhibit 11. Understanding the timing around when energy is consumed by customers is important because the time of power usage impacts the cost and thus the generation rates. As shown in the graphic, the majority of the energy consumed in Irvine is by commercial and industrial customers, with peak use in the summer months.

Exhibit 11
2016 Monthly Aggregated Load



4.3 CCE Participation and Opt-Out Rates

A CCE program is an opt-out program where eligible electric customers are enrolled automatically unless they elect to opt out. This Study anticipates an overall customer participation rate of 94% across all accounts. For residential accounts, it is assumed that approximately 95% of customers would remain with the CCE. For commercial and industrial accounts, the opt-out rate is 10%

[5] S.B. 286 (CA, 2015-2016 Reg. Sess.)

[6] The most recent ruling on PCIA vintaging was issued on 10/5/2016: http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M167/K744/167744142.PDF.

which adjusts historic opt-out rates for the new cap on direct access.[7] These opt-out assumptions are conservative and based on participation rates in other CCEs; however, this Study's sensitivity analysis tested CCE feasibility under higher opt-out scenarios. Operating CCEs in California have experienced overall participation rates ranging from 83% (Marin Clean Energy) to 98% (Peninsula Clean Energy). For recent CCEs, 90 to 97% of all potential customers have stayed with their CCE.[8]

Before customers are served by a CCE, they receive two notices with their monthly energy bills, 60 days and 30 days before the CCE's launch, and notices 30 days and 60 days after the CCE launches. These notices provide information customers need to understand the terms and conditions of service from the CCE and explain how customers can opt-out, if desired. Notices typically provide a rate comparison between the CCE and the IOU. All customers that do not follow the opt-out process specified in the customer notices prior to launch would be automatically enrolled into the CCE.[9]

As such, the CCE would provide a minimum of four opt-out notices to customers to notify and educate them about the CCE's product offerings and their option to opt-out. Customers automatically enrolled would continue to have their electric meters read and billed for electric service by SCE. The CCE bills processed by SCE would show separate charges for power supply procured by the CCE, along with all other charges related to delivery of the electricity by SCE and other utility charges that would continue to be assessed.

4.4 Conceptual CCE Launch Phasing

The California Public Utilities Commission (CPUC) recently issued Resolution 4723, which requires new CCEs to file their Implementation Plan by January 1 of any year, resulting in the earliest possible CCE launch date of January 1 the following year. This new requirement, and the timing of this feasibility Study means that the City's CCE launch could begin in 2021. Additionally, SCE is planning to update its Customer Information System in the first half of 2020. If there are delays in SCE's program updates, it could delay launch of a City CCE since SCE will not enroll customers into new CCE programs while the update is taking place.

This Study reviewed phasing options for when to enroll and serve various customer classes within the City based on factors such as load consumption patterns and seasonal market power pricing and concluded that a phased approach is not necessary given the size of the potential City CCE.

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[7] Opt-out rates were increased to account for a 16% increase in the amount of non-residential load that is allowed to move to direct access schedules. California Senate Bill 237: September 20, 2018. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB237

[8] Average opt-out rate determined based on published number of customers and opt-out rates of Marin Clean Energy, Peninsula Clean Energy, Sonoma Clean Power, Apple Valley Clean Energy, and Lancaster as found at the following document http://www.vvdailypress.com/news/20170818/apple-valley-choice-energy-prompts-thousands-of-customer-calls. Published 8/18/2017; accessed 2/15/2018.

[9] Typically, this doesn't apply to DA customers as the CCE would assume that these customers are not interested in being served by the CCE unless otherwise confirmed prior to launching service.

When CCEs were first launching, IOUs could move only a limited number of customers to CCE service each month. Because of these data limitations, CCEs initially launched in phases. However, as more CCE programs have been launched, IOUs have updated their systems to handle larger enrollments. The largest CCE program, Clean Power Alliance (CPA),which started in Los Angeles County, has launched in three phases due to the number of customers numbering in the millions. Other CCEs such as Western Community Energy and Desert Community Energy have customer counts in the hundred thousands and are planning launches in a single phase. Given the number of electric accounts within the City, the Study assumes that service would be offered to all customers by April 2021 in one phase, as noted in Exhibit 12.

Exhibit 12
First Year CCE Load, Customers, and Revenue

Assumed Start	Eligibility	Average Customer Accounts	Total Retail Load Year (GWh)	Peak Demand (MW)	Normalized Annual Operating Revenues to the CCE
Apr-21	All Customers	114,107	1,465	346	$116 million

This strategy would enable the City CCE to provide service to all customers as soon as possible. The number of customers and projected total load is similar to the number of customers enrolled by other CCEs launching in a single phase.[10]

4.5 Forecast Consumption and Customers

The number of customers enrolled in the City CCE, and the retail energy they consume, are assumed to increase at 0.63% per year. This forecast is selected as the midpoint based on the California Energy Commission's (CEC) mid-demand baseline forecasts for SCE service territory.[11] Peak demands are calculated using hourly consumption data provided by SCE. The forecast of load served by the CCE over the next five years is shown in Exhibit 13. The forecast of GWh sales in Exhibit 13 reflects the single-phase roll-out and customer enrollment schedule discussed previously. Because there are line losses between the point where the City CCE would purchase wholesale energy and the total energy used by the retail customer, the City CCE would need to purchase more energy than it would sell. Annual wholesale energy requirements, after accounting for losses,[12] are shown below in the last column of Exhibit 14.

[10] For example, Silicon Valley Clean Energy enrolled 180,000 residential customers and Monterey Bay Clean Energy enrolled 235,000 residential customers at one time.

[11] http://www.energy.ca.gov/2017_energypolicy/documents/

[12] Line losses are energy waste resulting from the transmission of energy across power lines.

Exhibit 13
Projected Load by Class

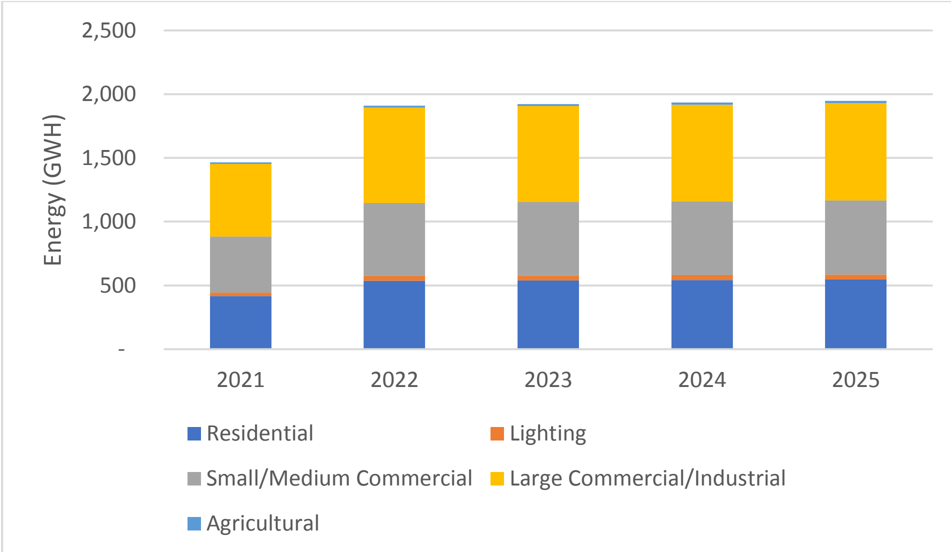


Exhibit 14
CCE Projected Annual Energy Requirements (GWh)

Year	Total Retail Sales	Losses[13]	Total Wholesale Energy Requirement
2021	1,465	82	1,547
2022	1,911	107	2,018
2023	1,923	108	2,030
2024	1,935	108	2,043
2025	1,947	109	2,056
2026	1,959	110	2,068
2027	1,971	110	2,081
2028	1,983	111	2,094
2029	1,996	112	2,107
2030	2,008	112	2,120

[13] Transmission and Distribution power losses were estimated at 6.6% based on the California Energy Commission's Public Electricity and Natural Gas Demand Forecast published 4/20/2015 at http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-03/TN204261-9_20150420T154646_Pacific_Gas_and_Electric_Company's_Notes_re_2015_IEPR_Demand_Fo.pdf.

5. Power Supply Strategy and Costs

5.1 Introduction

This section of the Study discusses the City CCE's resource strategy, projected power supply costs, and resource portfolios based on the City CCE's projected loads.

Long-term resource planning involves load forecasting and supply planning on a 10- to 20-year time horizon. Prior to launch, the City's CCE planners would develop integrated resource plans that meet their supply objectives and balance cost, risk, and environmental considerations. Integrated resource planning also considers demand side energy efficiency, demand response programs, and non-renewable supply options. The City's CCE would require staff or a consultant to oversee planning even if the day-to-day supply operations are contracted to third parties. This staff or consultant would ensure that local preferences regarding the future composition of supply and demand side resources are planned for, developed, and implemented.

5.2 Resource Strategy

This Study assumes that the City CCE would be interested in minimizing overall community energy bills, achieving GHG emissions reductions, stimulating local economic development, and meeting or exceeding the State's renewable energy requirements. The City CCE can likely achieve these goals within 5 years by taking advantage of relatively low wholesale market prices and abundant GHG-free energy. For reference, Exhibit 15 summarizes the power content products offered by existing CCEs. Forecast power content information is not available.

Exhibit 15
CCE Program Product Offerings

CCE Program	Product Offerings	IOU Service Area
Clean Power Alliance	Lean Power: 36% Renewable Clean Power: 50% Renewable 100% Green Power: 100% Renewable	SCE
Desert Community Energy (Not yet launched)	Desert Saver: 35% Renewable, 50% Carbon Free Carbon Free: 100% Carbon free	SCE
Monterey Bay Community Power	MB Choice: RPS minimum MB Prime: 100% Renewable	PG&E
Silicon Valley Clean Energy	Greenstart: 50% Renewable, 100% Carbon Free GreenPrime: 100% Renewable	PG&E
Apple Valley Choice Energy	CoreChoice: 35% Renewable MoreChoice: 50% Renewable	SCE
Rancho Mirage Energy Authority	Base Choice: 35% Renewable, 50% Carbon Free Premium Renewable Choice: 100% Renewable	SCE
East Bay Community Energy	Bright Choice: 38% Renewable 85% Carbon Free Brilliant 100: 40% Renewable, 100% Carbon Free Renewable 100: 100% Renewable	PG&E

Exhibit 15
CCE Program Product Offerings

CCE Program	Product Offerings	IOU Service Area
Pioneer Community Energy	Default product only	PG&E
Sonoma Clean Power	CleanStart: 45% Renewable, 87% Carbon Free EverGreen: 100% Local Renewable	PG&E
Marin Clean Energy	Light Green: 50% Renewable Deep Green: 100% Renewable Local Sol: 100% local solar energy	PG&E
Solana Energy Alliance	SEA Choice: 50% Renewable, 75% Carbon Free SEA Green: 100% Renewable	SDG&E

As discussed in greater detail below, the City CCE's electric portfolio would be guided by the City CCE's policymakers with input from its scheduling coordinator and other power supply experts. The scheduling coordinator would obtain sufficient resources each hour to serve all the City CCE customer loads. The City CCE policymakers would guide the power supply acquisition philosophy to achieve the City CCE's policy objectives.

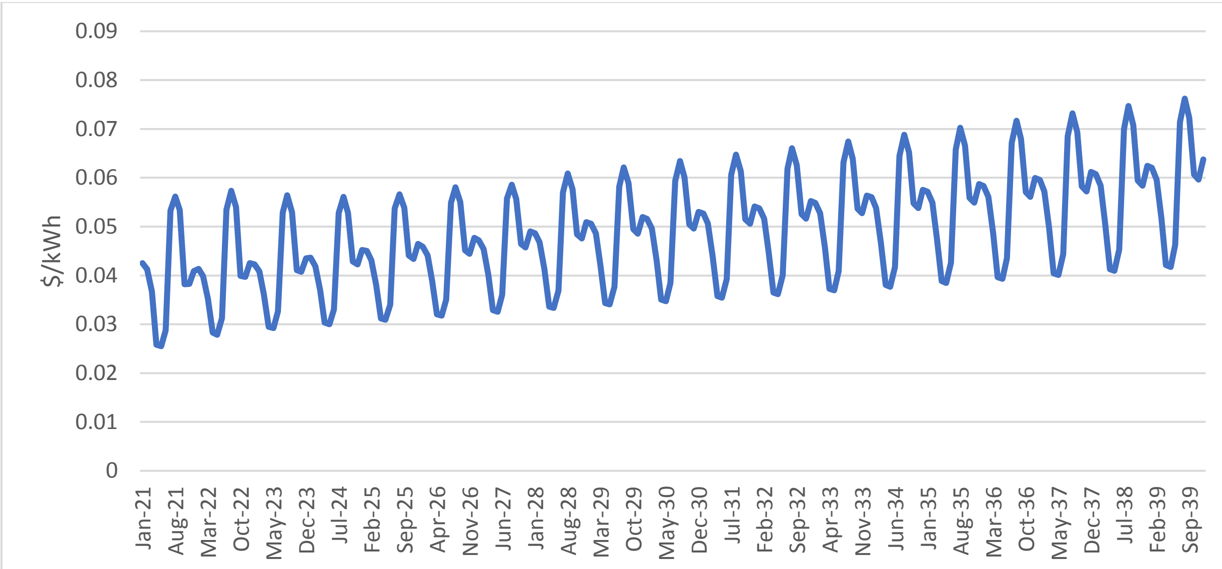
5.3 Projected Power Supply Costs

This Study presents the costs of renewable and non-renewable generating resources as well as power purchase agreements based on current and forecast wholesale market conditions, recently transacted power supply contracts, and a review of the applicable regulatory requirements. In summary, the City CCE would need to procure market purchases, renewable purchases, ancillary services, resource adequacy, and power management/schedule coordinator services. The Study determines the base case assumption for each of these cost categories as well as establishing a high and low range for each to be used for the risk analysis later in the Study.

5.3.1 Market Purchases

Market prices for Southern California (referred to as SCE prices) were provided by EES' subscription to a market price forecasting service, S&P Global. Exhibit 16 shows forecast monthly southern California wholesale electric market prices. The levelized value of market purchase prices over the 10-year study period is $0.0407/kWh (in 2019 dollars) assuming a 4% discount rate.

Exhibit 16
Forecast Southern California Wholesale Market Prices – Nonrenewable Energy



Wholesale market power prices have been used to calculate balancing market purchases and sales. When the City CCE's loads are greater than its resource capabilities, the City CCE's scheduling coordinator would schedule balancing purchases. When the City CCE's loads are less than its resource capabilities, the City CCE's scheduling coordinator would transact balancing sales and the City CCE would receive market sales revenue. Balancing market purchases and sales can be transacted on a monthly, daily and hourly basis.

5.3.2 Renewable Energy

The wholesale market prices shown above in Exhibit 16 are for non-renewable power (i.e., this product does not come with any renewable attributes). The cost of renewable resources varies greatly. Wind and solar levelized project costs vary from $0.030 to $0.060/kWh. Geothermal project costs can vary from $0.070 to $0.100/kWh. While geothermal projects have higher costs, they also have higher capacity factors than wind and solar projects and, as such, can bring additional value to the City CCE as baseload resources. Geothermal resources also bring value from a resource adequacy perspective since they can provide capacity benefits. The availability of off-shore wind and ocean power in the marketplace is minimal, so these resources were not included in this assessment of renewable energy market prices.

This Study assumes, in the base case, that long-term renewable contracts are available starting in 2021 and are priced at $0.035/kWh. This price is lower than non-renewable prices; however, it is representative of the prices CCEs are currently obtaining for long term renewable PPAs. This long-term price is only available for 65% of the RPS targets in 2021 growing to 75% of target by 2030. At a minimum, the CCE is required to purchase 65% of its renewable energy requirement via long-term contracts lasting at least 10 years. Renewable energy above the requirement is priced at $0.055/kWh to represent a blend of short-term and long-term wind and solar resource contracts. This pricing is based on a survey of renewable resources currently in operation and new projects coming on-line. It is assumed that renewable energy contract prices will be stable for the 10-year Study period to balance the influence of two trends. First, renewable energy prices are being driven down by the rapidly declining cost of solar and wind projects. This trend has persisted over the past several years and is expected to continue over the Study's forecast period. However, this trend is expected to be balanced out by the impact of increasing statewide demand for renewables due to California's renewable portfolio standards (RPS) laws and changes in Federal tax laws. These assumptions regarding renewable energy prices have been independently confirmed by current market trends in southern California.

RPS compliance requirements for all load serving entities, including CCEs, are 33% in 2020, with interim goals until the requirement reaches 60% in 2030. At a minimum, comparability with SCE's renewable energy procurement plan is recommended. To provide information about the cost difference between renewable resource portfolios, this Study analyzes the following 3 portfolios:

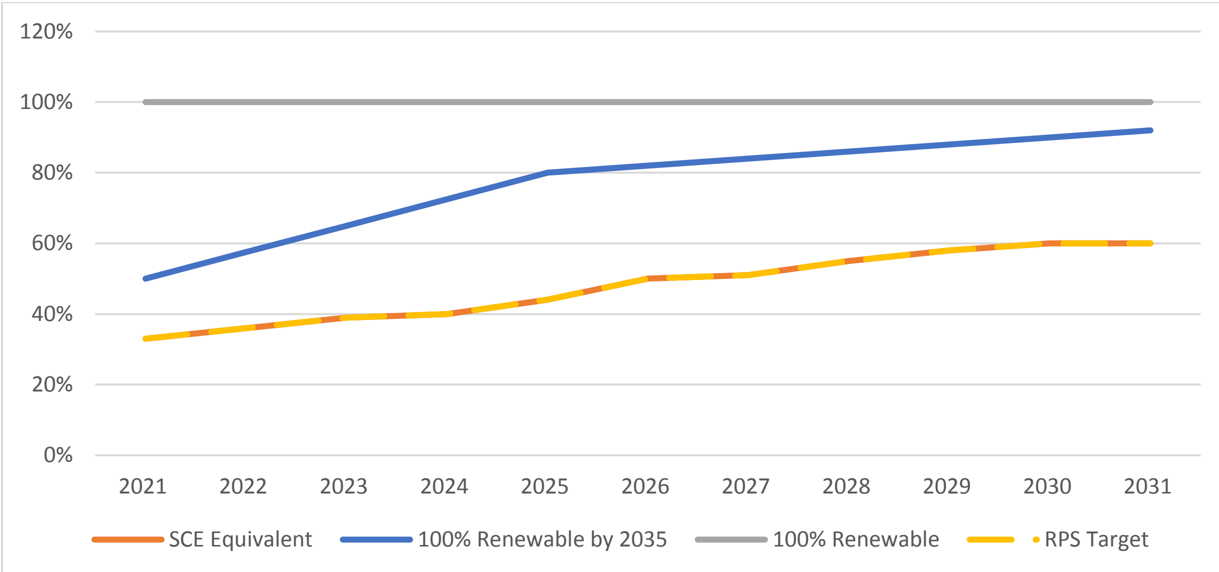
1) **SCE Equivalent Renewable Portfolio** – Renewable energy equal to SCE's projected portfolio meeting the RPS requirement of 60% by 2030. SCE's renewable share was 32% in 2017. At launch in 2021, SCE' renewable share will be between 33% and 44%. Greenhouse gas free resources will also be consistent with the projected SCE portfolio. In 2017, SCE's GHG free share was 46% including 32% renewable, 8% large hydro, and 6% nuclear.[14]
2) **100% Renewable by 2035** – 50% retail loads served with RPS-qualifying renewable resources at launch in 2021 increasing steadily to 80% by 2025, 90% by 2030, then 100% by 2035 and afterward.
3) **100% Renewable** – 100% of retail loads are served with RPS-qualifying renewable resources in all years.

The resource portfolios will be discussed in greater detail in the "Resource Portfolios" section below. It should be noted that the City CCE policymakers may opt for other resource portfolios but those selected above should give the City a sound basis for evaluating other resource portfolio options. The renewable energy targets of the three portfolios included in the power cost model, plus the RPS target scenario, are shown below in Exhibit 17.

Important to note there are differences between renewable energy and GHG free energy that will be discussed in the Resource Portfolio section below. The CCE would need to procure 100% GHG free energy by 2045 in order to meet California's goals (SB 100).

[14] Southern California Edison. 2017 Power Content Label. Version July 2018. https://www1.sce.com/wps/wcm/connect/6ee40264-673a-45ee-b79a-5a6350ed4a50/2017PCL.pdf?MOD=AJPERES

Exhibit 17
Renewable Energy Purchase Scenarios Compared to RPS Requirements[15]Like



5.3.3 Renewable Energy Credits (RECs)

California load serving entities (LSE), including CCEs, must purchase bundled energy and/or renewable energy credits (RECs) that meet certain eligibility requirements across three Portfolio Content Categories (PCC) or buckets. Each of the buckets represents a different type of renewable product that can be used to meet up to a specific percent of the total procurement obligation during a compliance period. The permitted percentage shares of each bucket type changes over time. The three buckets and the type of energy included in each bucket can be summarized as follows:

- **Bucket 1**: Bundled renewable resources and RECs – either from resources located in California or out-of-state renewable resources that can meet strict scheduling requirements ensuring deliverability to a California Balancing Authority (CBA);

[15] http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M158/K845/158845742.PDF

- **Bucket 2**: Renewable resources that cannot be delivered into a CBA without some substitution from non-renewable resources.[16] This process of substitution is referred to as "firming and shaping" the energy. The firmed and shaped energy is bundled with RECs.

- **Bucket 3**: Unbundled RECs, which are sold separately from the electric energy.[17]

Under the current guidelines, the number of RECs that can be procured through Buckets 2 and 3 is limited and decreases over time. SBX1 2 (April 2011) established a 33% RPS requirement for 2020 with certain procurement targets prior to 2020. SB350 (October 2015) increased the RPS requirement to 50% by 2030. SB 100 (September 2018) increased the target to 60% renewable by 2030. The share of renewable power that can be sourced from Bucket 2 or 3 energy after 2020 is expected to be the same as the 2020 required share of total RPS procurement.[18]

Purchasing unbundled RECs from existing renewable resources does not increase the number of renewable projects in the State. In addition, the REC market is not as liquid as it once was. For these reasons, this Study does not rely on unbundled REC purchases to meet renewable energy purchase requirements under the RPS.

However, in practice, small quantities of unbundled RECs may be used to balance the CCE's annual renewable energy purchase targets with the output from renewable resources. Due to the variable size and shape of the renewable energy purchases, the annual modeled renewable energy purchases do not typically match up perfectly with annual renewable energy purchase targets. In some years there are small REC surpluses, and, in others, there are small REC deficits. These surpluses and deficits can be balanced out using small unbundled REC purchases and sales. This methodology was used to simplify the modeling. Small REC surpluses and deficits would most likely be handled by banking RECs between years. For the Base Case, unbundled REC prices are assumed to increase from $18.00/REC in 2021 to $22.78 in 2030 (2.4% annual escalation).

5.3.4 Ancillary Service Costs

The CCE would pay the California Independent System Operator (CAISO) for transmission congestion and ancillary services. Transmission congestion occurs when there is insufficient

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[16] This may occur if a California entity purchases a contract for renewable power from an out of state resource. When that resource cannot fulfill the contract, due to wind or sun intermittency for example, the missing power is compensated with non-renewable resources.

[17] For example, a small business with a solar panel has no RPS compliance obligation, so they use the power from the solar panel, but do not "retire" the REC generated by the solar panel. They can then sell the REC, even though they are not selling the energy associated with it.

[18] California Public Utilities Commission Final Decision, 12/20/2016, accessed at: http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M171/K457/171457580.PDF, on 1/19/2017. 75% of the RPS procurement must be Bucket 1 resources and less than 10% of the RPS procurement can come from Bucket 3 resources.

capacity to meet the demands of all transmission customers. Congestion is managed by the CAISO by charging congestion charges in the day-ahead and real-time markets. The Grid Management Charge (GMC) is the vehicle through which the CAISO recovers its administrative and capital costs from the entities that utilize the CAISO's services.

In addition, ancillary services are the services necessary to support the transmission of electric power from seller to purchaser given the obligations of control areas and transmitting utilities within those control areas to maintain reliable operations of the interconnected transmission system. Because generation is delivered as it is produced and, particularly with respect to renewables, can be intermittent, deliveries need to be firmed using ancillary services to meet the CCE's load requirements. Ancillary services and products need to be purchased from the CAISO based on the CCE's total load requirement. Based on a survey of transmission congestion and ancillary service costs currently paid by CAISO participants, the CCE Base Case ancillary service costs are estimated to be approximately $.0036/kWh, escalating by 20% through 2026 and then at 5% annually for the remainder of the study period. Ancillary service costs are expected to increase significantly as California works toward the RPS requirements over the next 10 years.

5.3.5 Resource Adequacy

In addition to purchasing power, the City CCE would also need to demonstrate it has enough physical power supply capacity to meet its projected peak demand plus a 15% planning reserve margin. This requirement is in accordance with Resource Adequacy (RA) regulations administered by the CPUC, CAISO and the CEC. In addition, the CCE must meet the local and flexible resource adequacy requirements set by the CPUC, CAISO and CEC every year.

The CPUC undertakes annual policy changes to the RA program, so these requirements may change by the time program launch occurs. Different types of resources have different capacity values for RA compliance purposes, and those values can change by month. Moreover, recent rule changes have reduced the RA values for wind and solar resources as more of these technologies are added to the system. As such, other types of renewables, including geothermal and biomass, could have an overall better value in the portfolio compared to relying on RA solely from gas-fired resources.

The CPUC's RA standards applicable to a CCE require several procurement targets. CCEs must secure the following three types of capacity and make it available to the CAISO:

- System capacity is capacity from a resource that is qualified for use in meeting system peak demand and planning reserve margin requirements;
- Local capacity is from a resource located within a Local Capacity Area capable of contributing to the local capacity requirement; and
- Flexible capacity is capacity from a resource that is operationally able to respond to dispatch instructions to manage variations in load and variable energy resource output.

5.3.6 Power Management/Scheduling Coordinator

Given the likely complexity of the City CCE's resource portfolio, the City CCE would want to engage an experienced scheduling coordinator to efficiently manage the City CCE's power purchases and wholesale market transactions. The City CCE's resource portfolio would ultimately include market purchases, shares of some relatively large power supply projects, as well as shares of smaller, most likely renewable resources with intermittent output. Managing a diverse resource portfolio with metered loads that will be heavily influenced by distributed generation may be one of the most important and complex functions of any CCE.

The City CCE should initially contract with a third party with the necessary experience (proven track record, longevity and financial capacity) to perform most of the City CCE's portfolio operation requirements. This would include the procurement of energy and ancillary services, scheduling coordinator services, and day-ahead and real-time trading.

Portfolio operations encompass the activities necessary for wholesale procurement of electricity to serve end use customers. These activities include the following:

- *Electricity Procurement* – assemble a portfolio of electricity resources to supply the electric needs of the City CCE customers.

- *Risk Management* – standard industry risk management techniques would be employed to reduce exposure to the volatility of energy markets and insulate customer rates from sudden changes in wholesale market prices.

- *Load Forecasting* – develop accurate load forecasts, both long-term for resource planning, and short-term for the electricity purchases and sales needed to maintain a balance between hourly resources and loads.

- *Scheduling Coordination* – scheduling and settling electric supply transactions with the CAISO, with related back office functions to confirm SCE billing to customers.

The City CCE should approve and adopt a set of protocols that would serve as the risk management tools for the City CCE and any third-party involved in the City CCE portfolio operations. Protocols would define risk management policies and procedures, and a process for ensuring compliance throughout the City CCE. During the initial start-up period, the chosen electric suppliers would bear most of the risk and be responsible for managing those risks. The protocols that cover electricity procurement activities should be developed before operations begin.

Based on conversations with scheduling coordinators currently working within the CAISO footprint, the estimated cost of scheduling services is in the $0.0001 to $0.00025/kWh range for large operating CCEs. This Study very conservatively assumes a cost of $0.0004/kWh, escalating at 2.5% annually, in all portfolios as a starting cost. Over time, as the City CCE is operating, it is expected that the scheduling costs will decline to the $0.0002/kWh range.

5.4 Resource Portfolios

Projected power supply costs were developed for three representative resource portfolios. Portfolios are defined by two variables:

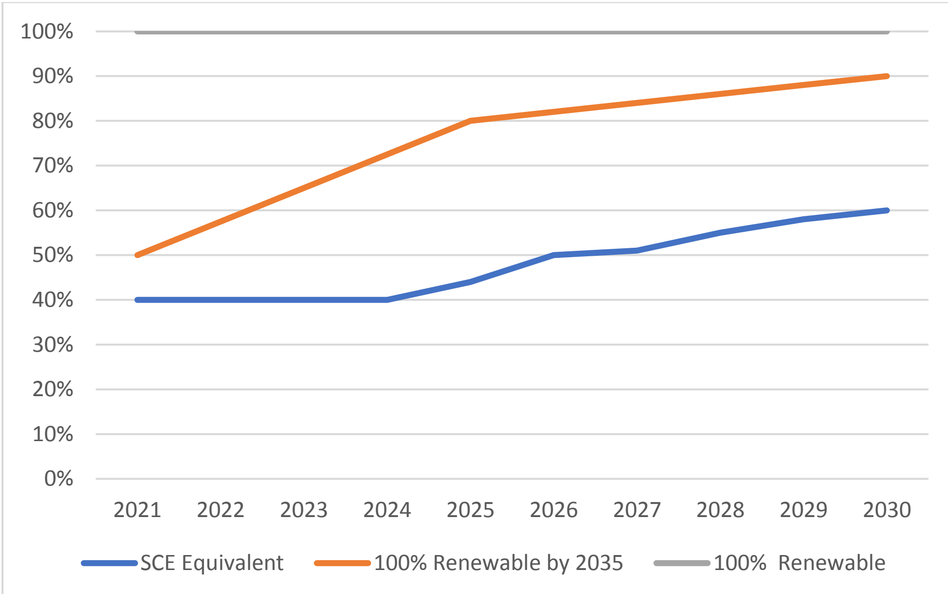
(1) the share of renewable energy in the power mix (per the “Renewable Energy” discussion above), and
(2) the share of resources that are GHG-free in the power mix.

Renewable resources refer to resources that qualify under State and Federal RPS, such as solar, wind, geothermal, biomass, and small hydropower. GHG-free power refers to energy sourced from any non-GHG emitting resource, including both the RPS-compliant sources mentioned above as well as nuclear power and large hydroelectric power. However, while nuclear and large hydroelectric (over 30 MW) are GHG-free sources, they are not considered renewable resources in California under the current statute. For this Study, no nuclear resources were included in the resource portfolio analysis.

SCE’s resource portfolio in 2017 included 32% renewable energy resources, 20% natural gas resources, 8% hydroelectric and 6% nuclear as well as 34% unspecified (market) purchases. In 2017, SCE’s resource portfolio was 46% GHG-free. As the amount of load served by renewable resources increases each year, so too would the amount of load served by GHG-free resources. This is true of all portfolios included in the Study.

In the “SCE-Renewable Equivalent” scenario, it is assumed that the City CCE resource portfolio is between 46% and 60% GHG-free. In the “100% Renewable by 2035 Portfolio” it is assumed that the City CCE’s resource portfolio is 50% GHG-free in 2021 and ramps up to 90% GHG-free in 2030. The 100% Renewable portfolio assumes 100% GHG free resources in all years. The RPS targets are the drivers of the amount of GHG-free resources in the portfolio. The GHG-free targets for each scenario are shown below in Exhibit 18.

Exhibit 18
GHG-Free Targets in Resources Portfolios



To achieve the GHG-free targets shown above, it was assumed that a portion of the market power purchases used to serve load in each resource portfolio are sourced to GHG-free resources and that the City CCE pays a premium for market Power Purchase Agreements (PPAs) sourced to GHG-free resources. A calendar year 2021 GHG-free premium of $0.004/kWh was assumed based on a survey of other CCEs. The GHG-premium is assumed to escalate annually by 5%. Given the assumed escalation rate, the premium paid for GHG-free power increases from $0.004/kWh in 2020 to $0.007/kWh in 2030. Including GHG-free premiums in the costs associated with a portion of market PPA purchases results in a $0.010/kWh increase in the 10-year levelized cost of each portfolio. Market purchases via PPA are analyzed in the sensitivity analysis.

5.4.1 Resource Options

For each of the three resource portfolios assessed, a combination of resources has been assumed to meet the renewable energy and GHG-free targets, resource adequacy targets, and ancillary and balancing requirements. The mix of resources included in each portfolio are for indicative purposes only. The CCE should be flexible in its approach to obtaining the renewable and non-renewable resources necessary to meet these requirements.

Exhibit 19 shows the 10-year levelized resource costs used in this Study.

Exhibit 19
10-Year Base Case Levelized Resource Costs ($/kWh)

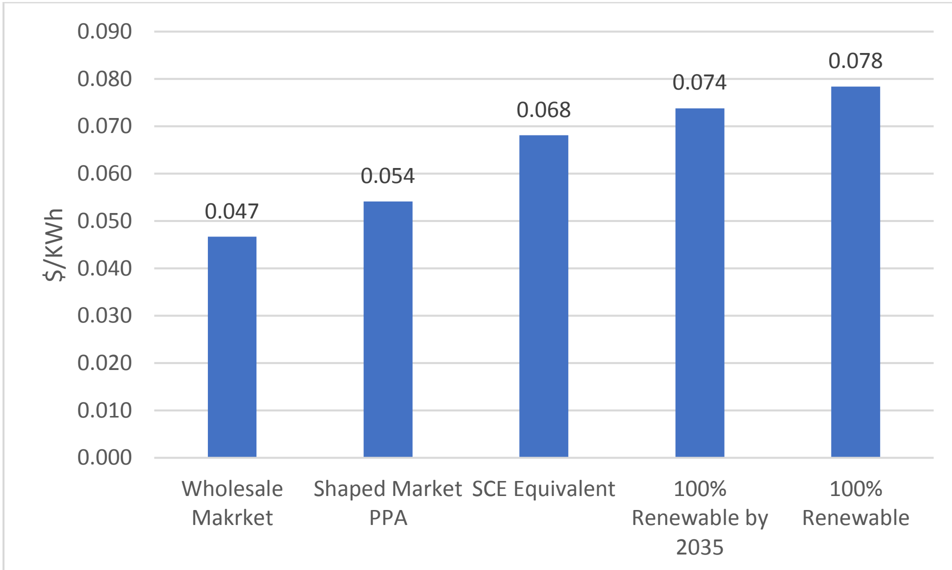


Exhibit 19 above shows a 10-year levelized price of $0.068/kWh for the SCE Equivalent Renewable; $0.074/kWh for the 100% by 2035 Portfolio, and a price $0.078/kWh under the 100% Renewables Portfolio. The higher price in the 100% Renewables Portfolio is in recognition of the fact that the City CCE may have to sign contracts for higher priced renewables to find sufficient supply of renewables to meet the higher targets. A breakout of the costs for the three portfolios analyzed in this Study can be found later in this section in Exhibit 23.

Exhibit 19 also shows both spot wholesale market cost at $0.047 per kWh and market PPA cost at $0.054 per kWh. Wholesale market prices are for non-renewable power. Market PPA costs are greater than spot wholesale market costs in recognition of the cost of the PPA supplier absorbing the market fuel price risk associated with providing a long-term PPA contract price.

The capacity factor for market PPA purchases is assumed to be 100% (flat monthly blocks of power). Capacity factor is equal to average monthly generation divided by maximum hourly generation in a given month. A 100% capacity factor implies that the same amount of power was purchased or generated each hour. The average monthly capacity factor for renewable resources and local renewables is assumed to be 33% based on the capacity factors of existing renewable resources operating in California.

5.4.1.1 Local Resources

On a $/watt basis, the cost of smaller scale solar projects is greater than the cost of large-scale solar projects. It is expected that the cost of smaller local renewable energy is $0.065/kWh based on information related to recent projects. The advantage of local renewable projects is lower transmission costs and less stress on the congested transmission grid. This Study assumes that local projects will be funded through new programs administered by the City CCE. Funds available for new programs or additional discounts are discussed in the results section of the Study.

5.4.1.2 Renewable Requirements

CCEs are required to comply with California's RPS. The renewable energy requirements in the State's RPS are based on retail energy sales. Retail energy refers to the amount of energy sold to customers as opposed to the amount of energy purchased from generation sources (wholesale energy). Wholesale energy purchases must always exceed retail energy sales to account for transmission and distribution system losses. To be consistent, it was assumed that the renewable energy targets included in the portfolios apply to retail energy sales.

1. *SCE-Renewable Equivalent Renewables Portfolio (Baseline Scenario)*

In this portfolio, the renewable energy purchases match the expected SCE renewable share based on recent information.[19] In Exhibit 20, the orange bars show renewable energy purchases. The grey bars show GHG free purchases to supplement bucket 2 renewable energy purchases.

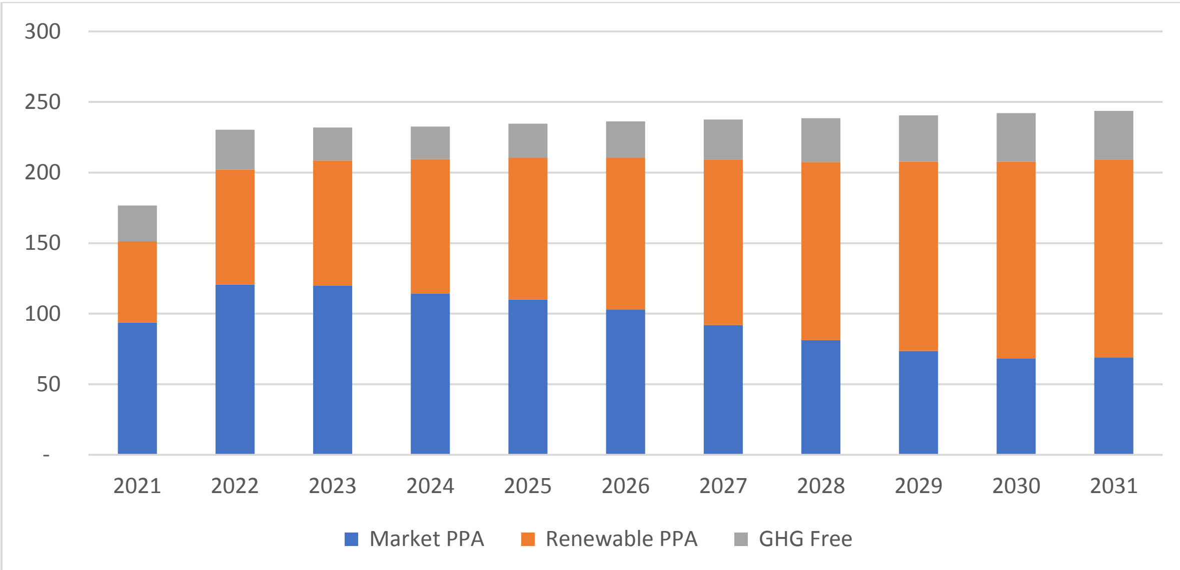
The share of renewable energy increases each year along with California's RPS requirements. In all four portfolios it is assumed that local renewables would begin serving load in year five of operation (2026). For example, one year after launch, Sonoma Clean Power helped bring 13.5 MW of county solar online via its feed in tariff program. Similarly, in 2018 SCP installed 1 MW of local solar. The ultimate relative cost of power supply and SCE rates will determine how quickly and what mechanisms can be used to encourage local resource development. Not all resource development may be through direct contracts.

The source of the "market" purchases shown in Exhibits 20 to 22 is unspecified. These market purchases could ultimately be sourced to a mix of renewable and non-renewable resources based on the availability of surplus resources in California and resources bid into CAISO for balancing energy purchases. For this Study's purposes, "market" purchases are assumed to be sourced to non-renewable generating facilities.

The "GHG-Free Market PPA" purchases shown in Exhibits 20 to 22 are market purchases that are sourced to hydroelectric generating facilities. These market purchases would be procured through long-term PPAs. The cost of hydro power is assumed to be greater than the cost of unspecified market purchases. The premium of $.0004/kWh applied to the cost of hydro power is discussed above in the "Resource Portfolios" section.

[19] https://www.sce.com/sites/default/files/inline-files/2017PCL_0.pdf

Exhibit 20
SCE-Renewable Equivalent Portfolio (aMW)

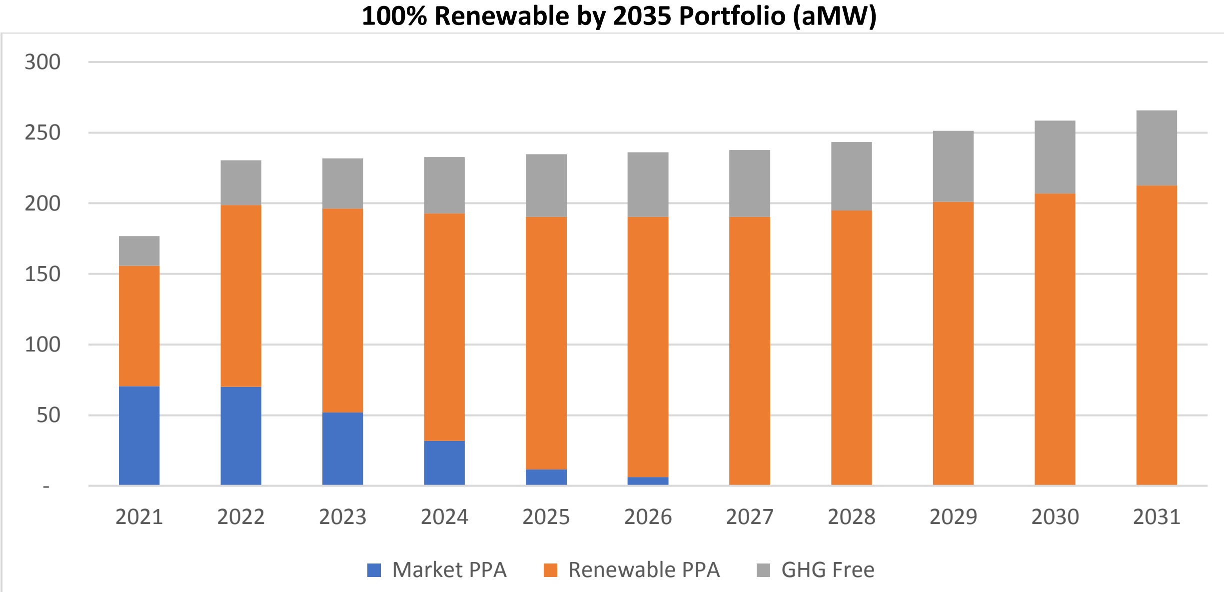


*Average annual megawatt or aMW is equal to annual megawatt-hours divided by the number of hours in a year.

2. 100% Renewables by 2035 Portfolio

In this portfolio, a minimum of 50% of retail load is served by renewable resources through 2025, 80% through 2025, 90% by 2030 and 100% by 2035. Exhibit 21 illustrates this portfolio. In this portfolio, a combination of long-term renewable resource contracts and REC purchases fully offset the Market PPAs by 2027.

Exhibit 21
100% Renewable by 2035 Portfolio (aMW)

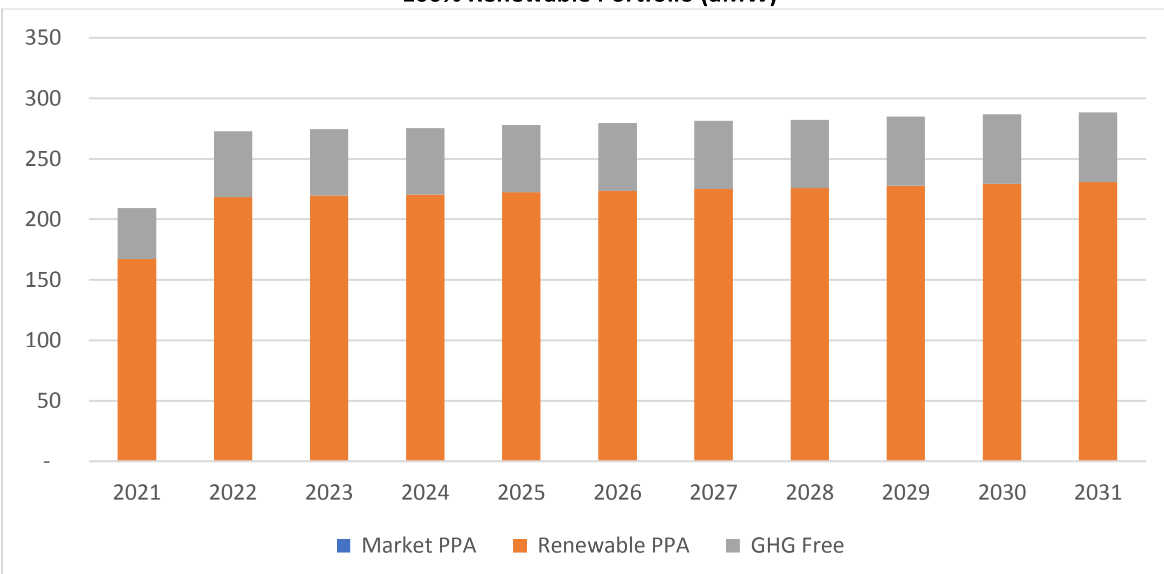


*Average annual megawatt or aMW is equal to annual megawatt-hours divided by the number of hours in a year.

3. 100% Renewables Portfolio

In this portfolio, 100% of retail load is served by renewable resources in all years. As shown below in Exhibit 22 renewable energy purchases are much of the portfolio where market PPAs (non-renewable purchases) and GHG-Free Market PPAs are used only for load following.

Exhibit 22
100% Renewable Portfolio (aMW)

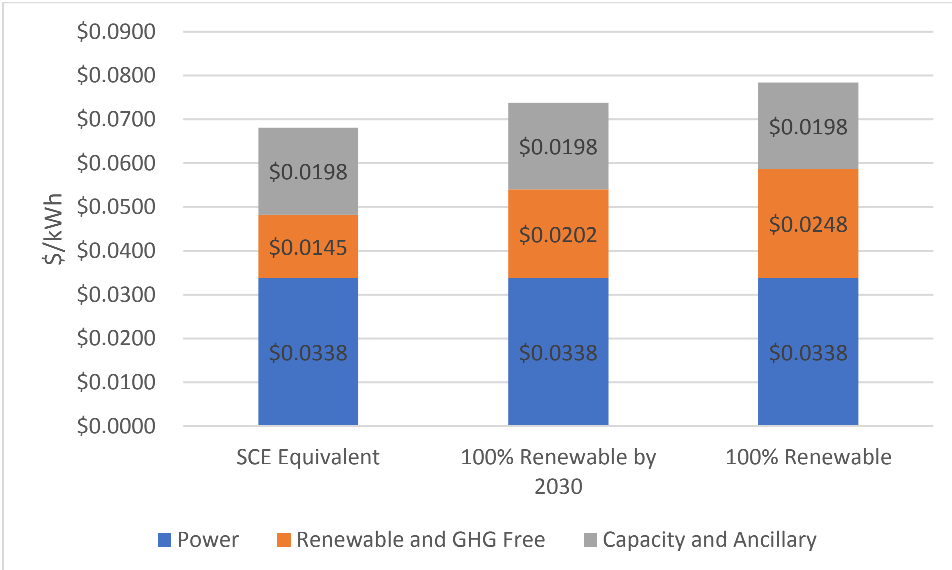


*Average annual megawatt or aMW is equal to annual megawatt-hours divided by the number of hours in a year.

5.4.13 10-Year Levelized Portfolio Costs

The 10-year levelized costs have been calculated based on the base case assumptions detailed above regarding resource costs and resource compositions under the three portfolios. Exhibit 23 shows a breakdown of power, ancillary service and scheduling costs associated with each portfolio.

Exhibit 23
10-year Levelized Base Case Portfolio Costs



As shown above, power costs under the portfolios considered are similar. The low variance in power costs between these portfolios is due to the small difference in price between market PPAs and renewable energy purchases.

5.5 Resource Strategy

The electric portfolio may be managed by a third-party vendor, at least during the initial implementation period. This Study assumes that a third-party would manage the City CCE's power contracts and the cost of this management is reflected in the operating costs. Through a power services agreement, the City CCE can obtain full service requirements electricity for its customers, including providing for all electricity, ancillary services and the scheduling arrangements necessary to provide delivered electricity.

After operations have begun, the City could decide to sign long-term PPAs, which could minimize the City CCE's exposure to market prices and provide the City CCE with the ability to increase the renewable percentage over time. Additionally, it is recommended that the City CCE engage with a portfolio manager or schedule coordinator, who has expertise in risk management and would work with the City CCE to design a comprehensive risk management strategy for long-term operations. A portfolio manager or schedule coordinator would actively track the CCE's portfolio and implement energy source diversification, monitor trends and changes in economic factors that may impact load, and identify opportunities for dispatchable energy storage systems or automatic controls for managing energy needs in real-time with the CAISO.

Once operational, the City CCE will be subject to energy storage targets once operating under AB 2514. The California Energy Storage Bill, AB 2514, was signed into law in September 2010 and established energy storage targets for IOUs, CCEs, and other LSEs in September 2013. The applicable CPUC decision established an energy storage procurement target for CCEs and other

LSEs equal to 1% of their forecasted 2020 peak load. The decision requires that contracts be in place by 2020 and projects be installed by 2024. The costs for energy storage projects are included in the operational costs under new program spending.

5.5.1 Product Choice

While the Study evaluates the financial feasibility of distinct portfolio choices, in practice, more than one retail product may be offered. Depending on the City CCE goals, City CCE customers might have a choice between a default energy product and a greener, more renewable power supply option. Almost all CCEs offer at least two choices in rates and products. The final decision regarding product offerings will be made by the CCE Board of Directors or City Council, depending on governance structure.

6. Cost of Service: Operating Costs for Base Scenario

6.1 Introduction

This section of the Study describes the financial pro forma analysis and cost of service for a CCE for the City. It includes estimates of staffing and administrative costs, consultant costs, power supply costs, uncollectable charges, and SCE charges. In addition, it provides an estimate of start-up working capital and longer-term financial needs.

6.2 Cost of Service for CCE "Base Case" Operations

The first category of the pro forma analysis is the cost of service for a CCE for the City's operations. To estimate the overall costs associated with CCE operations, the following components have been included:

- Current and Future Power Supply Costs:
  - Wholesale purchases
  - Renewable purchases
  - Procurement of Resource Adequacy (RA) power products which meet power supplier reliability requirements for California (System Capacity, and Local and Flexible Capacity products)
  - Other power supply and charges

- Current and Future Non-Power Supply Costs:
  - Start-up costs
  - CCE staffing and administration costs
  - Technical consulting support
  - Legal and regulatory support
  - SCE and regulatory charges
  - Costs of acquiring and paying back financing

- Allowable Specific Charges to CCE Customers from SCE:
  - Transmission and distribution charges
  - Power Charge Indifference Adjustment (PCIA)

Once the costs of CCE operations have been determined, the total costs can be compared to SCE's projected rates. A detail of the various costs noted below is included in Appendix C.

6.3 Power Supply Costs

A key element of the cost of service analysis is the assumption that electricity would be procured under a power purchase agreement (PPA) for both renewable and non-renewable power for an initial period. Power supply would likely be obtained by the City CCE's procurement consultant prior to commencing operations. The products and services required from the third-party procurement consultant are energy, capacity (System, Local and Flexible RA products), renewable energy, GHG-free energy, load forecasting, CAISO charges (grid management and congestion), and scheduling coordination.

The calculated 10 year levelized cost of electric power supply, including the cost of the scheduling coordinator and all regulatory power requirements, is estimated between $0.075 and $0.082 per kWh as discussed in the previous section. This price represents the price needed to meet the load requirements of the CCE customers while meeting required regulations and objectives of the City CCE. The variation in price is a function of the desired level of renewable resources.

As mentioned in the previous section, three power supply scenarios are modeled for this Study. The scenarios are a SCE Equivalent Renewable Portfolio, a portfolio that begins at 50% renewable and grows to 100% renewable by 2035, and a 100% renewable portfolio. Power Supply costs for the baseline scenario (SCE Equivalent) are approximately 90% of the annual operating costs.

6.4 Non-Power Supply Costs

While power supply costs would make up the vast majority of costs associated with operating the CCE (roughly 80-90% depending on the portfolio scenario), there are additional cost components that must be considered in the pro forma financial analysis. These additional non-power supply costs are noted below.

6.4.1 Estimated Staffing Costs

Staffing is a key component of operating a CCE. All staffing costs are detailed in Exhibit 24 and can be recouped through CCE rates.

The City CCE would have discretion to distribute operational and administrative tasks between internal staff and external consultants in any combination. For this Study, two scenarios are explored that are at the maximum and minimum of this spectrum. The first option involves hiring internal staff incrementally to match workloads involved in forming the CCE, managing contracts, and initiating customer outreach/marketing during the pre-operations period (Full Staff Scenario). In the alternative approach, the City CCE would hire just four staff internally and contract out the remaining work to consultants (Minimum Staff Scenario). Throughout the rest of this Study, it is assumed that the City CCE will opt for the Full Staff Scenario to be conservative in the Study's economic analysis, but both options are discussed. The Full Staff Scenario is likely the most-costly option that the City CCE could pursue and the details of the staffing plan would be decided later.

6.4.1.1 Full Staff Scenario

Exhibit 24 provides the estimated staffing budgets for a full staff City CCE scenario for the start-up period (Pre-launch in 2020 through full operating in 2021). Staffing budgets include direct salaries and benefits. Prior to program launch, it is assumed that an operating team would be employed per the example of other CCEs in California thus far to implement the launch of a CCE program. This operating team typically includes an Executive Director, a Director of Administration and Finance, a Communication Outreach Manager and a Director of Power Resources. The remaining functions would be filled as quickly as possible.

Exhibit 24
CCE Staffing Plan

CCE Staff Positions	2021* Launch	2022
Executive Director	1	1
Director of Marketing and Public Affairs	1	1
Account Service Manager	1	1
Account Representative	1	1
Communication Outreach Manager	1	1
Communication Specialist	1	1
Director of Power Resources	1	1
Power Resource Analyst	1	1
Power Supply Compliance Specialist	1	1
Administrative Assistant	1	1
Total Number of Employees	**10**	**10**
Total Staffing Costs	$1,260,000	$1,710,000

*Represents only partial year due to launching in April (9 months).

Based on this staffing plan, the City CCE would initially employ 4 staff members. Once the City CCE launches, it is anticipated that staffing would increase to approximately 10 employees within the first year of operation.

6.4.1.2 Minimum Staff Scenario

To build the minimum staff possible to run the City CCE, all necessary tasks would be completed by consultants on a contract basis. It is assumed that these contracts would be managed by the Executive Director and two in-house staff, such as the Communication Outreach Manager, a Director of Administration and Finance and a Director of Power Resources. In addition, consultants would have to be hired to manage the tasks not managed by full-time staff.

6.5 Administrative Costs

Overhead needed to support the organization includes computers and other equipment, office furnishings, office space, utilities and miscellaneous expenses. These expenses are estimated at $28,000 during program pre-start-up. Office space and utilities are ongoing monthly expenses that would begin to accrue before revenues from program operations commence, and are; therefore, included in start-up costs that would be financed.

It is estimated that the per employee start-up cost is approximately $10,000. This expense covers computer and furniture needs. An additional annual expense of about $75,000 for office space, and approximately $160,000 in assorted expenses related to program start-up including office supplies, utilities costs, cost of mailing notifications, meetings, communication and other start-up activities is expected. Finally, additional miscellaneous expense budgets are estimated for general start-up costs in 2020. All administrative costs for start-up are shown in Exhibit 25. These costs are based on other start-up CCE operations. These costs are a very small portion of total operating costs and even a doubling of these costs from the assumptions below would not change the Study findings and recommendations. Note that the first year is higher to get the City CCE up and running. Costs estimates for 2022 would be stable thereafter but would escalate at the rate of inflation.

Exhibit 25
Estimated Overhead Cost by Year (Full-Staff Scenario)

	2021	2022
Infrastructure Costs		
Computers	$51,000	$0
Furnishings	$51,000	$0
Office Space	$55,080	$74,909
Utilities/Other Office Supplies	$0	$0
Miscellaneous Expenses	$158,508	$78,030
Total Infrastructure Costs	**$315,588**	**$152,939**

The above costs are based on a full staff scenario. If the City CCE determines in its business plan that hiring consultants rather than staff would be more cost-effective, then administrative costs would be reduced, improving the feasibility of the City CCE.

6.6 Outside Consultant Costs

Consultant costs would include outside assistance for legal and regulatory work, communication and marketing, data management, financial consulting, technical consulting and implementation support, even with the full staffing scenario.

CCE data management providers supply customer management system software, and oversee customer enrollment, customer service, as well as the payment processing, accounts receivable and verification services. The cost of data management is charged on a per customer basis and has been estimated based on existing contracts for similar sized CCEs. For this Study, the cost for data management is estimated at $1.15 per customer per month.

In addition, estimated funding for other consulting support (such as HR, legal, customer service, etc.) is provided. These costs have been estimated based on the experience of start-up consulting costs at other CCEs. Exhibit 26 shows the estimated consultant costs except for data management during the first three years. Consultant fees are provided on a monthly and annual basis in Appendix C.

Exhibit 26 Estimated Consultant Costs by Year		
	2021	**2022**
Legal/Regulatory*	$71,298	$96,965
Communication	156,672	0
Scheduling Consultant	466,500	634,440
Other Consulting/City Functions	168,300	228,800
Total Consultant Costs	**$862,770**	**$960,205**

*Legal/regulatory consulting refers only to legal counsel regarding CPUC compliance, filings, etc.

The estimate for each of the services is based on costs experienced by other CCEs. Consultant costs are increased by inflation every year. The above costs are recovered through the CCE energy rate.

6.7 SCE Billing & Metering Costs

SCE would provide billing and metering services to the CCE based on SCE Schedule CCE: Transportation of Electric Power to City CCE Customers. The estimated costs payable to SCE for services related to the City CCE start-up include costs associated with initiating service with SCE, processing of customer opt-out notices, customer enrollment, post enrollment opt-out processing, and billing fees.

Customers who choose to receive service from the CCE would be automatically enrolled in the program and have 60 days from the date of enrollment to opt-out of the program. A total of four opt-out notices would be sent to each customer. The first notice would be mailed to customers approximately 60 days prior to the date of automatic enrollment. A second notice would be sent approximately 30 days later. Following automatic enrollment, two additional opt-out notices would be provided within the 60-day period following customer enrollment.

Based on SCE's current rate schedules, and CCE participation assumptions, SCE billing charges would be approximately $389,000 annually and initial setup costs and noticing would be on the order of $180,000 per year for 2020 and 2021, as shown in Exhibit 27.

Exhibit 27 Utility Transaction Fees			
	2020	**2021**	**2022**
Total SCE Billing Fees	$0	$389,000	$390,000
Notification and Setup Costs	$180,000	$184,000	$0

6.8 Uncollectible Costs

As part of its operating costs, the City CCE must account for customers that do not pay their electric bill. While SCE would attempt to collect funds, approximately 0.2% of revenues are estimated as uncollectible.[20] This cost is therefore included in the City CCE operating costs, or expense budget.

6.9 Financial Reserves

The City CCE is assumed to receive capital financing during its start-up through full operation. After a successful launch, the City CCE must build up a reserve fund that is available to address contingencies, cost uncertainties, rate stabilization or other risk factors faced by the City CCE. Therefore, this Study assumes that the City CCE would begin building its reserve immediately upon launch. After 4 full operating years, it is estimated that the City CCE will have accumulated enough reserves to cover four months of expenses, including power supply costs. This level of reserves represents the *minimum* industry standard for electric utilities and would provide financial stability to assist the City CCE in obtaining favorable interest rates if additional financing is needed. After that point, revenues that exceed costs could be used to finance a rate stabilization fund, new local renewable resources, economic development projects and/or lower rates. Exhibit 28 provides the estimate of the reserves available for local programs or rate stabilization.

Exhibit 28
Estimated Reserves Under Base Scenario
Assuming 2% Rate Discount Off SCE Rates

	Cumulative Surplus*	Operating Reserves (4 months O&M)	New Programs or Additional Rate Reduction
2021	$3,926,442	$27,267,140	$0
2022	$9,485,919	$39,297,334	$0
2023	$16,175,776	$40,628,967	$0
2024	$22,743,225	$42,457,459	$0
2025	$29,557,018	$43,902,349	$0
2026	$36,532,874	$44,947,817	$0
2027	$50,534,364	$45,508,988	$10,486,152
2028	$66,466,105	$46,971,225	$15,931,742
2029	$84,902,471	$48,322,946	$18,436,365
2030	$106,162,053	$49,738,212	$21,259,582

* Includes cash from financing

The new program funding amount decreases over time due to the conservative 3% growth in SCE generation rates and relative size of the PCIA. The PCIA is the charge paid by departing load customers to SCE to hold bundled customers harmless for the decision to depart from bundled service. After 2030, SCE stranded costs are expected to decrease significantly as contracts expire (resulting in lower PCIA rates). It is expected that programs and rate discounts could be provided well beyond the term of this Study. These financial reserves are documented in Appendix B.

[20] Based on SCE 2019 GRC uncollectible revenue as percent of total revenue.

6.10 Financing Costs

To estimate financing costs, a detailed analysis of working capital needs, as well as start-up capital, is estimated. Each component is discussed below.

6.10.1 Cash Flow Analysis and Working Capital

This cash flow analysis estimates the level of working capital that would be required until full operation of the City CCE is achieved. For the purposes of this Study, it is assumed that the City CCE pre-operations implementation costs begin in July 2020. In general, the components of the cash flow analysis can be summarized into two distinct categories:

1. Cost of the City CCE operations, and
2. Revenues from City CCE operations.

The cash flow analysis identifies and provides monthly estimates for each of these two categories. A key aspect of the cash flow analysis is to focus primarily on the monthly costs and revenues associated with the City CCE and specifically account for any transition or "phase-in" of the City CCE customers.

The cash flow analysis also provides estimates for revenues generated from the City CCE operations or from electricity sales to customers. In determining the level of revenues, the cash flow analysis assumes all customers are enrolled at the same time and assumes that the City CCE offers rates that provide a discount compared to projected SCE rates corresponding to a total bill discount of 2% for each customer class.

The results of the cash flow analysis provide an estimate of the level of working capital required for the City CCE to move through the pre-operations period. This estimated level of working capital is determined by examining the monthly cumulative net cash flows (revenues minus cost of operations) based on payment terms, along with the timing of customer payments.

The cash flow analysis assumes that customers will make payments within 60 days of the service month, and that the City CCE would make payments to power suppliers within 30 days of the service month. It is assumed that payments for all non-power supply expenses would need to be paid in the month they occur. Customer payments typically begin to come in soon after the bill is issued, and most are received before the due date. Some customer payments are received well after the due date. Therefore, the 30-day net lag in payment is a conservative assumption for cash flow purposes.

For purposes of determining working capital requirements related to power purchases, the City CCE would be responsible for providing the working capital needed to support electricity procurement unless the electricity provider can provide the working capital as part of the contract services. In addition, the City CCE would be obligated to meet working capital requirements related to program management, the CPUC Bond of minimum $180,000[21] and a potential SCE program reserve. SCE requires a program reserve in absence of a credit rating. Because of their start-up nature, most CCEs elect to pay the program reserve rather than go through a credit rating process. While the City CCE may be able to utilize a line of credit, for this Study it is assumed that this working capital requirement is included in the financing associated with start-up funding.

A summary of working capital needs is presented below on Exhibit 29.

Exhibit 29
Working Capital Needs

	2020 Pre-Launch	2021 Launch
Bonding & Security Requirement (CPUC)	$0.2 million	-
SCE Program Reserve	$0.3 million	-
Start-up Costs	$1.5 million	-
Working Capital (Cash Flow)	-	$8.0 million
Total Capital Needed	**$ 2.05 million**	**$8.0 million**

For comparison, Marin Clean Energy (MCE) started with $3.3 million in pre-launch funding[22] and is now operating with $21.7 million in working capital.[23] At initial launch MCE served electrical load roughly equivalent to 80-90% of the CCE's estimated load.[24] Similarly, Sonoma Clean Power (SCP) acquired $6.2 million in pre-launch capital,[25] and now maintains working capital reserves of $25 million[26] while serving 50% more than the City CCE's estimated load.[27] The working capital needs after launch assumed in this Study are reflective of the experience of successfully operating CCEs on a $/GWh basis.

6.10.2 Total Financing Requirements

The start-up of the City CCE would require a significant amount of start-up capital for three major functions: (1) staffing and consultant costs; (2) overhead costs (office space, computers, etc.) and (3) CPUC Bond and SCE security deposits.

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[21] CPUC Decision 18-05-022

[22] https://www.mcecleanenergy.org/wp-content/uploads/2016/01/MCE-Start-Up-Timeline-and-Initial-Funding-Sources-10-6-14-1.pdf

[23] https://www.mcecleanenergy.org/wp-content/uploads/2016/09/MCE-Audited-Financial-Statements-2015-2016.pdf

[24] https://www.mcecleanenergy.org/wp-content/uploads/2016/01/Marin-Clean-Energy-2015-Integrated-Resource-Plan_FINAL-BOARD-APPROVED.pdf

[25] https://sonomacleanpower.org/wp-content/uploads/2015/01/2014-SCPA-Audited-Financials.pdf

[26] https://sonomacleanpower.org/wp-content/uploads/2015/01/2016-05-SCP-Compiled-Financial-Statements.pdf

[27] https://sonomacleanpower.org/wp-content/uploads/2015/01/2015-SCP-Implementation-Plan.pdf

Staffing, consultant and other program initiation costs have been discussed previously. In addition, the Public Utilities Code requires demonstration of insurance or posting of a bond sufficient to cover reentry fees imposed on customers that are involuntarily returned to SCE service under certain circumstances. These circumstances may include cessation of the City CCE program. SCE also requires a bond equivalent to the reentry fee for voluntary returns to the IOU. This corresponds to the fees outlined in the CCE rate schedule from SCE, which are $1.12/customer for 2018. In addition, the bond must cover incremental procurement costs. Incremental procurement costs are power supply costs incurred by the IOU when a customer provides notice and returns to IOU bundled service.

The total City CCE financing requirement, including working capital, during the pre-launch to full operations, is estimated to be approximately $2 million, with approximately another $8 million needed following full enrollment. With more flexible power payment terms and/or customer payments of less than 60 days, capital requirements can be reduced.

6.10.3 Current CCE Funding Landscape

The CCE market is rapidly expanding with increasingly proven success. To date, there are 19 operational CCEs in California and existing CCEs have demonstrated the ability to generate positive operating results. The early sources that funded CCE start-up capital costs were community banks located in the CCE service territory, but now a mix of regional and large national banks have shown increased levels of interest evidenced by additional banks submitting proposals to CCEs looking for financing. As such, the City CCE would likely have access to an adequate number of potential financial counterparties.

As CCEs have successfully launched across the State and a more robust data set of opt-out history becomes available, the financial community has demonstrated an increased level of comfort in providing credit support to CCEs. Most programs that have launched to date, and those in development, have relied on a sponsoring entity to provide support for obtaining needed funds. This support has come in varied forms, which are summarized in Exhibit 30.

Exhibit 30
Forms of Support

CCE Name	Date	Pre-Launch Funding Requirement[1]	Funding Sources
Marin Clean Energy	2010	$2- $5 million	Start-up loan from the County of Marin, individual investors, and local community bank loan.
Sonoma Clean Power	2014	$4 - $6 million	Loan from Sonoma County Water Authority as well as loans from a local community bank secured by a Sonoma County General Fund guarantee.
CleanPowerSF	2016	~$5 million	Appropriations from the Hetch Hetchy reserve (SFPUC).
Lancaster Choice Energy	2015	~$2 million	Loan from the City of Lancaster General Fund.
Peninsula Clean Energy	2016	$10 - $12 million	PCE has also obtained a $12 million loan with Barclays and almost $9 million with the County of San Mateo for start-up costs and collateral.
Silicon Valley Clean Energy	2017	$2.7 million	$2.7 million loans from County of Santa Clara and member Cities. $21 million Line of Credit with $2 million guarantee (subset of total loan from members), otherwise no collateral.
Clean Power Alliance	2018	$41 million	$10 million loan from Los Angeles County and $31 million Line of Credit from River City Bank.
Solana Clean Energy	2018	N/A	Vendor Funding
East Bay Clean Energy	2018	$50 million	Revolving Line of Credit from Barclays.

[1] Source: Respective entity websites and publicly available information. These funds are representative of CCE funding at different times of start-up.

A review of the current state of options for obtaining funds for these initial phases is detailed below:

Direct Loan from Cities – The City could loan funds from its General Fund for all or a portion of the pre-launch through launch needs. Start-up funding provided by the cities would be secured by the City CCE revenues once launched. The City would likely assess a risk-appropriate rate for such a loan. This rate is estimated to be 4.0% to 6.0% per annum. Lancaster provided a direct loan for program start-up.

Collateral Arrangement from City – As an alternative to a direct loan from the City, the City could establish an escrow account to backstop a lender's exposure to the City CCCE. The City would agree to deposit funds in an interest-bearing escrow account, which the lender could tap should the City CCE revenues be insufficient to pay the lender directly. The City would be secured by

City CCE revenues collected once the City CCE achieves viability. This method was used by SCP, PCE, and CPA.

Loan from a Financial Institution without Support – Silicon Valley Clean Energy Authority (SVCEA) was able to use this option to fund ongoing working capital. After member agencies funded a total of $2.7 million in start-up funds, SVCEA obtained a $21 million line of credit without collateral. This is the most common financing options used by emerging CCEs. This arrangement requires a "lockbox" approach with a power provider. A lockbox arrangement requires the CCE to post revenues into a "lockbox" which power suppliers can access to get paid first before the CCE. This arrangement reduces the required reserves and collateral held by the CCE.

Vendor Funding – The CCE could negotiate with its power suppliers to eliminate or reduce the need for supplemental start-up and operating capital. However, the vendor funding approach can be less transparent as the vendor controls expenses and activities, and the associated cost may outweigh the benefit of eliminating or reducing the need for bank financing. This method was used by Solana Energy Alliance.

Revenue Bond Financing – This financing option becomes feasible only after the CCE is fully operational and has an established credit rating.

6.10.4 CCE Financing Plan

While there are many options available to the City CCE for financing, the initial start-up funding is expected to be provided via short-term financing with a loan from a financial institution. The City CCE would recover the principal and interest costs associated with the start-up funding via subsequent retail rate collections. This Study demonstrates that the City CCE start-up costs would be fully recovered within the first three years of City CCE operations.

The anticipated start-up and working capital requirements for the City CCE through launch are approximately $2 million. Once City CCE program is operational, these costs would be recovered through retail rate collections. Actual recovery of these costs would be dependent on third-party electricity purchase prices and the rates set by the City CCE for customers.

Based on several recent examples of CCE's obtaining financing for start-up and operating costs, this financial analysis assumes that the City CCE would be able to obtain a loan for all $8 million with a term of 5 years at a rate of 3.86%. Repayment could be accelerated to 3 years based on meeting reserve targets. This is very conservative as most CCEs will operate on a line of credit for most working capital needs.

The detail of the base case cash flow analysis is provided in Appendix D.

7. Rate Comparison

7.1 Introduction

This section provides a comparison of rates between SCE and the City CCE. Rates are evaluated based on the City CCE's total electric bundled rates as compared to SCE's total bundled rates. Total bundled electric rates include the rates charged by the City CCE, including non-bypassable charges, plus SCE's delivery charges.

7.2 Rates Paid by SCE Bundled Customers

Customers served by SCE will pay a bundled rate that includes SCE's generation and delivery charges. SCE's current rates and surcharges have been applied to customer load data aggregated by major rate schedules to form the basis for the SCE rate forecast.

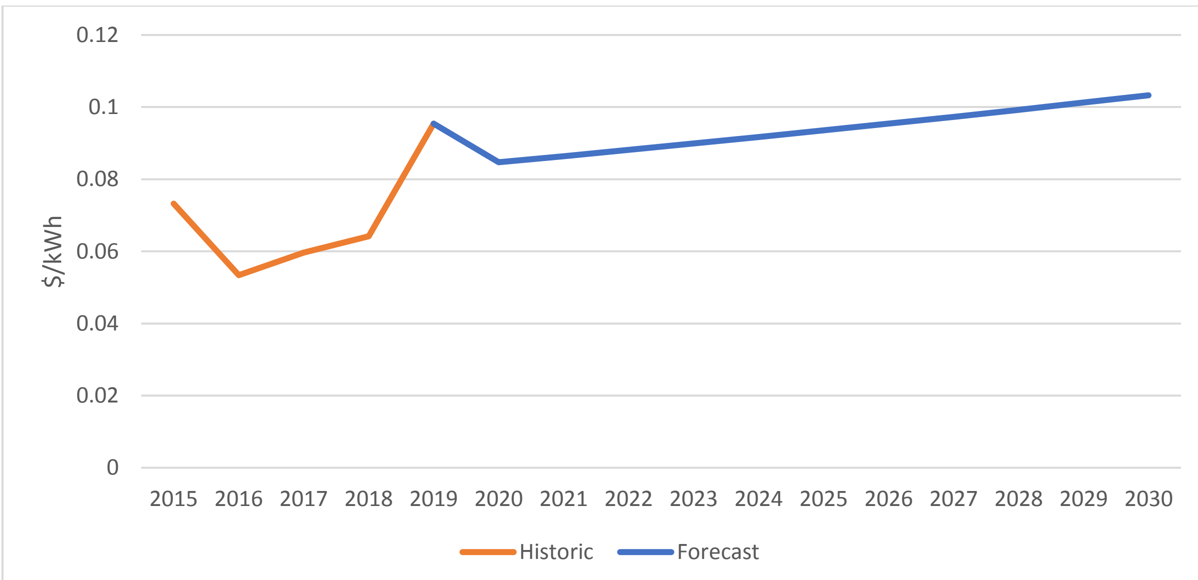
The average SCE delivery rate, which is paid by both SCE bundled customers and City CCE customers, has been calculated based on the forecasted customer mix for the City CCE. The SCE rate forecast assumes that delivery costs will be based on SCE's recent General Rate Case (GRC) filing for 2019 to 2021. The delivery rates are paid by both City CCE and SCE bundled customers. As such, changes in delivery rates impact all customers equally and, therefore, it is assumed that the delivery costs will remain stable during the study period.

Similarly, the average power supply rate component for SCE bundled customers has been calculated based on the projected City CCE customer mix. Finally, the SCE generation rates have been projected in the short-term based on the most recent rate filings. In the long term, SCE generation rates are forecast to increase based on the renewable and non-renewable market price forecast, and the state's regulatory requirement for RPS, energy storage, and resource adequacy objectives.

In the short-term, SCE's generation rate is forecast to increase 16% in April 2019 following the November 2018 ERRA filing which includes the under collection from 2018 estimated at $825 million. The general rate case phase 1 application filed by SCE is expected to reduce generation rates in summer 2019 by 4% to 5%. The driving factors behind this rate decrease are the new tax laws. SCE will file another ERRA in Spring 2019 followed by an update in Fall 2019. At this time, it is unclear what generation rate changes will be requested for 2020 in the next ERRA proceeding.

In the long-term, SCE generation rates are forecast to change as existing contracts expire, additional loads depart, and wholesale power costs change. It is projected that SCE-owned resources and renewable cost escalation will be less than the CCE over the 10-year analysis period. SCE does not provide detailed cost information or power supply price forecasts for the utility. Based on SCE's 2017 resource mix and RPS requirements, approximately half of SCE's resources come from market purchases and natural gas resources for which costs grow based on market price changes. Market costs are expected to increase at a rate of 1% to 3% annually. The remainder of SCE's resources are from high priced long-term renewable contracts. While the cost of market purchases and natural gas are expected to increase, the cost of the renewable portfolio is expected to decrease over time as SCE's current contracts expire and new lower cost renewable contracts are obtained. SCE's current contracts largely begin to expire after 2030. The Study uses a conservative 3% growth rate for SCE generation costs beginning in 2020 through 2030. This growth rate is consistent with the annual growth rate that the CCE is forecasting for its power supply. The SCE generation rate forecast is in Exhibit 31.

Exhibit 31
SCE Generation Rate Forecast



7.3 Rates Paid by CCE Customers

The Study assumes that the City CCE's rate designs would initially mirror the structure of SCE's rates so that similar rates can be provided to the City CCE's customers and bill comparisons can be made on an apples-to-apples basis. SCE is moving towards Time-of-Use (TOU) rates for all customers and it is assumed that the CCE would follow this transition initially. Operating CCEs like SCP structure their rates to mirror the incumbent IOU; this makes it easy for customers to compare rates. In determining the level of CCE rates, the financial analysis assumes all customers are enrolled at the same time and that the implementation phase costs are financed via start-up loans.

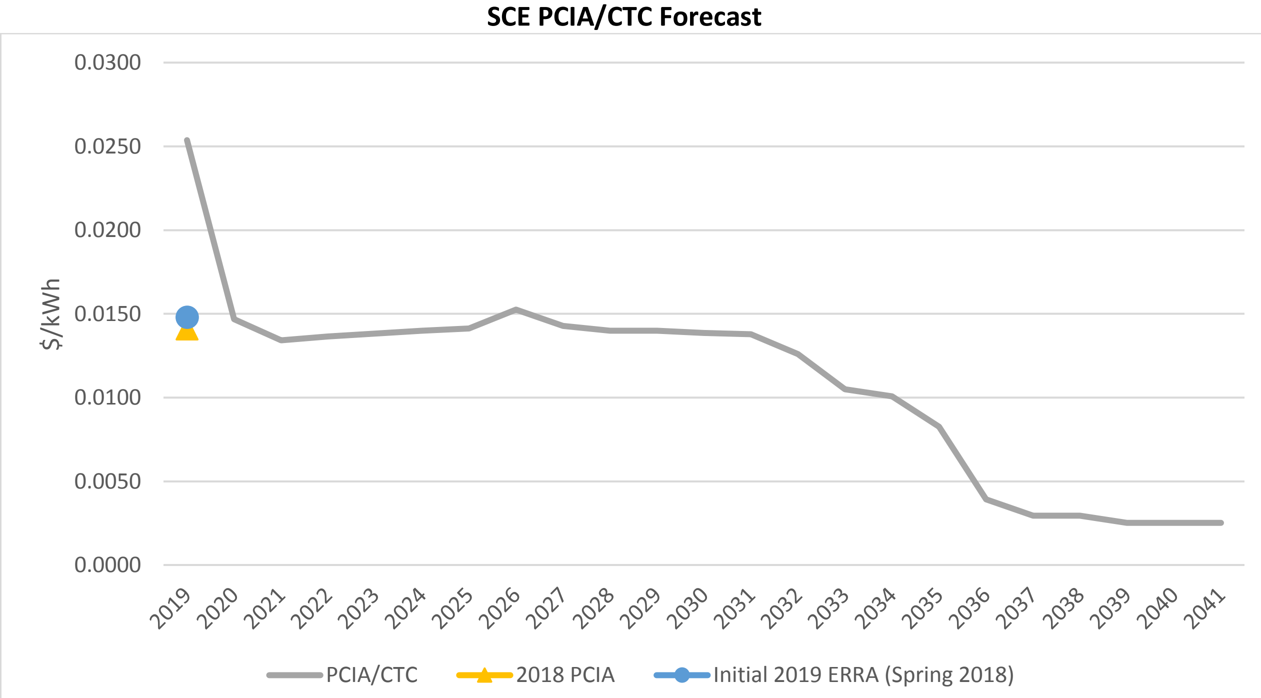
In addition to paying the CCE's power supply rate, City CCE customers would pay the SCE delivery rate and non-bypassable charges also referred to as the Cost Responsibility Surcharge (CRS). The CRS is comprised of the following components: 1) Department of Water Resources Bond Charge (DWRBC), 2) Ongoing Competition Transition Charge (CTC) and 3) Power Charge Indifference Adjustment (PCIA). The DWRBC and CTC are charged to SCE's bundled customers in the SCE delivery charge. It is therefore assumed that the CCE customers would pay these charges as part of the delivery charges, as well. As such, the only additional non-bypassable charges that are payable to SCE by CCE customers is the PCIA.

7.3.1 Power Charge Indifference Adjustment

The PCIA is an exit fee that is added to CCE rates to cover an IOU's stranded costs associated with energy purchases made to anticipated, but unrealized demand because of customers leaving bundled service to receive service from a CCE.

On October 11, 2018 the CPUC voted unanimously to revise the PCIA methodology adopting the Alternative Proposed Decision (APD) methodology. This new methodology allows for more utility-owned resources to be included in the calculation and gets rid of the limits on cost recovery previously embedded in the old PCIA methodology. In addition, the new methodology allows for reductions in the stranded cost due to the value of renewable energy and resource adequacy provided by the resources. The APD methodology is not completely final as a Phase 2 study began in late 2018 to define some of the additional components of the methodology. However, the IOUs filed their 2019 PCIA calculations using the new methodology and current market conditions. The forecast below incorporates the latest decision, market conditions, and forecast stranded costs for departing SCE customers as seen in Exhibit 32.

Exhibit 32
SCE PCIA/CTC Forecast

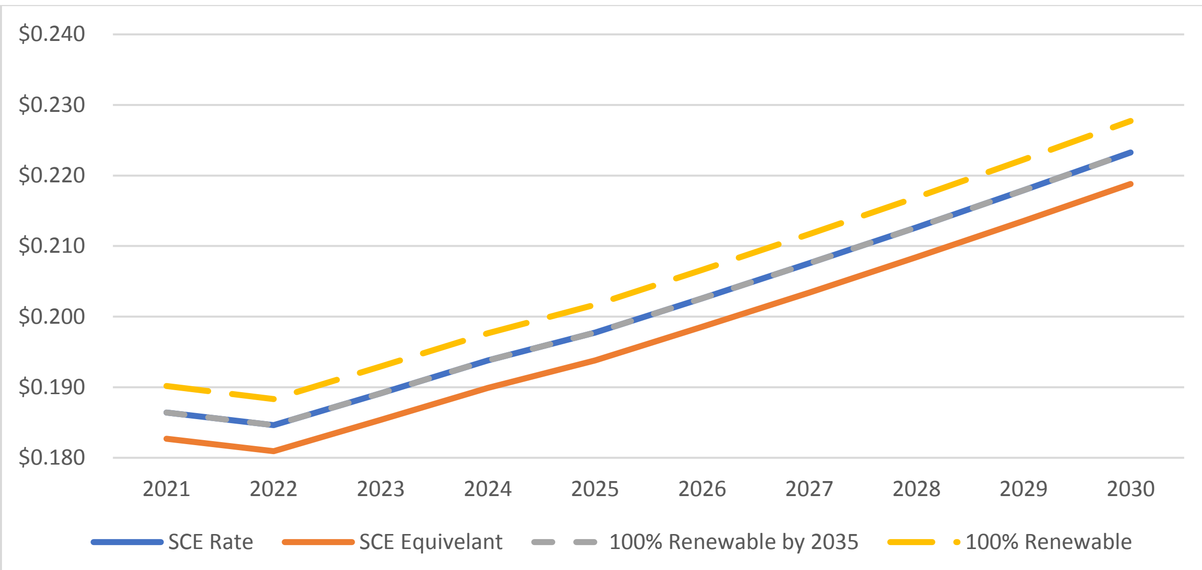


7.4 Retail Rate Comparison

Based on the CCE's projected power supply costs, PCIA, operating costs, and SCE's power supply and delivery costs, forecasts of City CCE and SCE total rates are developed. The analysis balances the rate discount, collection of reserves and the share of renewable and GHG-free resources purchased. If the discount is too high, the City CCE will not be able to collect enough reserves to meet reserve targets within the first 5 years.

The rate forecasts are illustrated below in Exhibit 33. A rate discount of 2% is targeted for the SCE-Equivalent Renewable Portfolio. The 100% Renewable by 2035 portfolio is at parity with SCE rates. The 100% Renewable Portfolio rates are calibrated to be as close to SCE rates as possible while collecting the reserves needed for City CCE operation; due to the additional costs of a 100% renewable portfolio, these rates are at a 2% premium to SCE rates.

Exhibit 33
Average Total Retail Rate Comparison – With Savings Targets



Based on estimated City CCE discounts, Exhibit 34 provides a comparison of the indicative bundled rates for City CCE products based on the projected 2021 SCE rates. These indicative rates are calculated as a percentage off SCE's bundled rates. The City CCE rates calculated in this Study are for comparison purposes only. Under formal operations, the City CCE policymakers would determine the actual rates offered to its customers.

Exhibit 34
Bundled Rate Comparisons
$/kWh

Rate Class	2021 SCE *	SCE Equivalent Renewable	100% Renewable by 2035	100% Renewable
Residential	0.2522	0.2472	0.2522	0.2573
Small Commercial	0.2552	0.2501	0.2552	0.2603
Medium Commercial	0.2307	0.2261	0.2307	0.2353
Street Lights	0.1591	0.1559	0.1591	0.1622
Agriculture	0.1964	0.1924	0.1964	0.2003
Total	0.1864	0.1827	0.1864	0.1902
Initial Rate Savings in 2021 from SCE Bundled Rate		**2.00%**	**0.00%**	**-2.00%**

*SCE bundled average rate projections based on SCE's 2018 Rates.

A financial pro forma in support of these rates can be found in Appendix B.

8. Economic and Environmental Impacts

8.1 Introduction

This section provides an overview of the potential environmental and indirect economic impacts to the Orange County area from the implementation of a CCE for City residents. In addition, potential future programs that could be offered by the City CCE are outlined.

8.2 Economic Impacts in the Community

So far, the analyses in this Study has focused only on the direct economic impacts of forming a CCE. However, in addition to direct effects, indirect microeconomic effects are also expected.

The indirect effects of creating a CCE include the effects of increased commerce and disposable income. An input-output (IO) analysis is performed to analyze indirect effects. The IO model estimates the local economic impact of lower electricity rates resulting from the formation of a CCE.

The savings estimated below are based on the economic construct that households would spend some share of the increased disposable income on more goods and services. This increased spending on goods and services would then lead to producers either increasing the wages of their current employees or hiring additional employees to handle the increased demand. This in turn would give the employees a larger disposable income which they spend on goods and services and thus repeating the cycle of increased demand. In addition, reduced inputs to production for non-residential electric customers would allow companies to invest in other areas to promote growth such as hiring new employees, offering additional training, and purchasing upgraded equipment.

Three types of indirect impacts are analyzed in the IO model. These are described below.

Local Investment – The CCE may choose to implement programs to incentivize investments in local distributed energy resources (DER). The CCE may choose to invest in local DER generation projects. These resources can be behind the meter or community projects where several customers participate in a centrally located project (e.g. “community solar”). This demand for local renewable resources would lead to an increase in the manufacturing and installation of DER, and lead to an increase in employment in the related manufacturing and construction sectors.

Increased Disposable Income – Establishing a CCE would lead to reduced customer rates for energy, more disposable income for individuals, and greater net revenues for businesses. These cost savings would then lead to more investment by individuals and businesses for personal or business purposes. This increase in spending would then lead to increased employment for multiple sectors such as retail, construction, and manufacturing.

Input-Output Modeling (IO Modeling) – City-wide electric rate savings and growth in manufacturing jobs and other energy intensive industries are expected to spur economic development impacts. Exhibit 36 shows the effect $7.7 million in rate savings could have on the County economy as estimated by the IMPLAN model.[28] The $7.7 million rate savings represents the minimum annual bill savings projected to occur once the City CCE has achieved full operation (SCE-Equivalent Renewable portfolio). The IMPLAN model is an IO model that estimates impacts to an economy due to a change to various inputs such as industry income, supply costs, or changes to labor and household income. Both positive and negative impacts can be measured using IO modeling. IO modeling produces results broken down into several categories. Each of these is described below:

- Direct Effects – Increased purchases of inputs used to produce final goods and services purchased by residents. Direct effects are the input values in an IO model, or first round effects.
- Indirect Effects – The value of inputs used by a firm that results from direct effects. Or, this is the economic activity that supports direct effects.
- Induced Effects – Results of Direct and Indirect effects (calculated using multipliers). Represents economic activity from household spending.
- Total Effects – Sum of Direct, Indirect, and Induced effects.
- Total Output – Value of all goods and services produced by industries.
- Value Added – Total Output less value of inputs, or the Net Benefit/Impact to an economy.
- Employment – Number of additional/reduced full time employment resulting from direct effects.

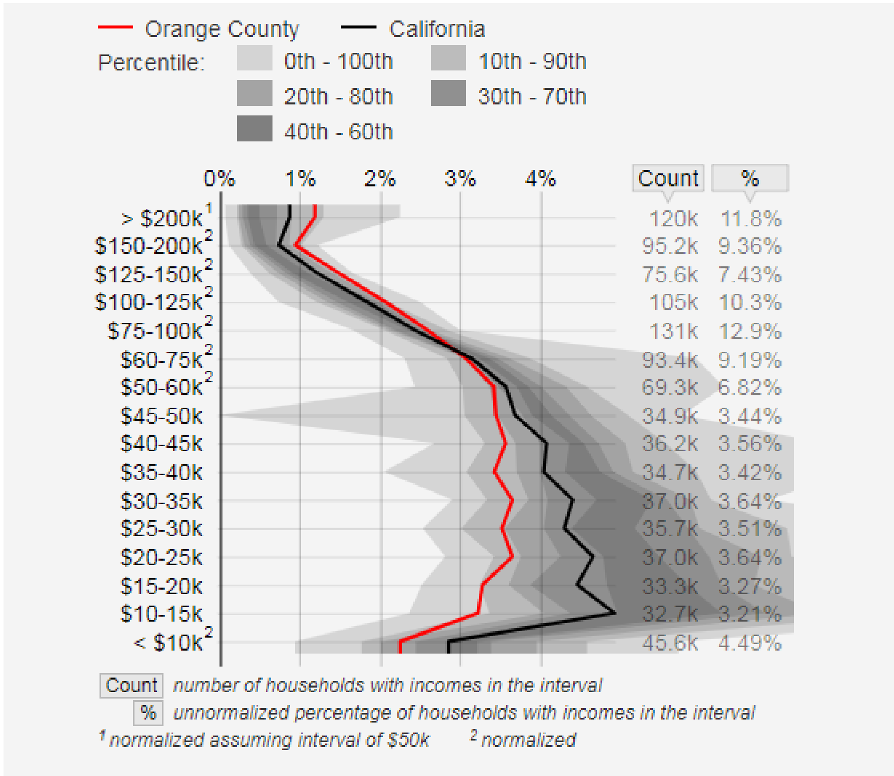
This Study uses Value Added and Employment figures to represent the total additional economic impact of the rate savings associated with City CCE formation.

The projected rate savings are modeled for residential, commercial, industrial, and agricultural sectors. For residential, the rate savings are modeled at different household income levels to estimate the impact on the economy from reduced bills. Estimated household income distribution is based on the income percentiles from the statistical atlas for Orange County.[29] Exhibit 35 summarizes the high-level breakdown for income distribution within the county compared with the rest of the State.

[28] http://www.implan.com/

[29] Statistical Atlas. Orange County, California. Available online: https://statisticalatlas.com/county/California/Orange-County/Household-Income data from U.S. Census Bureau.

Exhibit 35
Household Income Distribution, Orange County and California[30]



The change in household income assumes that all households are impacted proportionately; however, in practice lower income households typically see the most significant benefit due to the disproportionate amount of total household income that goes to costs associated with household electricity use. Generally, lower income families are not able to reduce their utility bills as easily through efficiency upgrades or modified behavior due to lack of disposable income. Therefore, the overall impacts are likely underestimated.

Non-residential impacts are estimated using the top 16 industries in Irvine. Rate savings are allocated to each industry based on the share of revenue. This method assumes that energy use is positively correlated with industry revenue. Major agricultural activities in the County include nursery products, avocados, lemons, limes, tomatoes, and herbs. Major commercial and industrial industries include professional, scientific, tech, manufacturing, education, healthcare, finance, retail, wholesale trade, and real estate.

[30] Normalized with respect to standard interval of $5k. Gray areas represent percentile bands from the counties in California. © OpenStreetMap contributors Available online: https://statisticalatlas.com/county/California/Orange-County/Household-Income

Exhibit 36 details the macroeconomic impacts anticipated from the 2% savings in the generation rate after forming the City CCE. The total Value Added for one year of rate savings is estimated at $5.89 million. Finally, the rate savings are estimated to produce an additional 85 full time jobs.

Exhibit 36
$7.7 Million Rate Savings Effects on the Orange County Economy[1]

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	39	$1,920,000	$1,950,000	$3,590,000
Indirect Effect	8	$500,000	$810,000	$1,350,000
Induced Effect	37	$1,770,000	$3,220,000	$5,220,000
Total Effect	85	$4,190,000	$5,980,000	$10,160,000

1. Full impacts to Orange county are estimated, it can be expected that a large share of these impacts would be realized within the City.

8.3 Environmental Impacts of Resource Plan on Greenhouse Gas (GHG) Emissions

8.3.1 Environmental and Health Impacts

With the creation of a City CCE, other non-commerce indirect effects would occur. These may be environmental, such as improved air quality or improved human health due to the City CCE utilizing more renewable energy sources, versus continuing use of traditional energy sources which may have a greater GHG footprint. While a change in GHG emissions is not modeled directly in economic development models used in this Study, the reduction of these GHG emissions are captured in indirect effects projected by the models to the extent that carbon prices are accounted for in the input-output matrix.[31] The City's Strategic Energy Plan will assess the GHG emissions reductions associated with CCE programs.

Currently, SCE's resource mix is 46%[32] GHG-free due to power supply from renewable resources. The passing of SB100 accelerates the Renewable Portfolio Standard (RPS) obligations for retail sellers (investor-owned utilities (IOUs), CCEs, energy service providers (ESPs), and Public Owned Utilities (POUs)) as follows:

a) from 40% to 44% by 2024;
b) from 45% to 52% by 2027; and
c) From 50% to 60% by 2030.

[31] Decreased health care costs have been modeled to make a major contribution to the local economy. e.g., DT Shindell, Y. Lee & G. Faluvegi, Climate and health impacts of US emissions reductions consistent with 2 °C; *Nature Climate Change* **volume 6**, pages 503–507 (2016)

[32] https://www.energy.ca.gov/pcl/labels/2017_index.html

The bill also establishes state policy that RPS-eligible and zero-carbon (Clean Energy) resources supply 100% of all retail sales of electricity to California end-use customers no later than December 31, 2045. SCE is therefore expected to be 60% renewable and GHG free by 2030 and 100% GHG free by 2045.

As outlined in the Resource Portfolio section above, the City CCE portfolio scenarios assumed that the City CCE's resource portfolio has the same GHG-free share as the forecasted SCE portfolio in all years. In the "SCE-Equivalent" scenario, it is assumed that the City CCE's resource portfolio starts at 40% GHG-free and grows to 60%. In the "100% Renewable by 2035" scenario it is assumed that the CCE's resource portfolio starts at 50% GHG-free in 2021 and that the GHG-free resources increase to 100% of the portfolio by 2035. In the "100% Renewable" it is assumed that the City CCE's resource portfolio is 100% GHG-free in 2021 and remains 100% GHG-free through the study period.

The portfolios would generate amounts of carbon dioxide as outlined in Exhibit 37. The average portfolio GHG-free percentage over the ten-year study period (48%) was used for this calculation, to account for the higher GHG-free levels in later years. Average annual emissions from the three portfolios for 2021-2030 are presented below. In each case, it was assumed that the full City CCE load (average of 1,948 GWH) was in each portfolio. In other words, if, for example, the City CCE decides to offer both 100% Renewable and SCE Equivalent Renewables products and some proportion of customers fall into each product bucket, the emissions would fall somewhere between zero and 359,766 metric tons of CO_2e/year.

Exhibit 37
Comparison of Average Annual GHG Emissions from Electricity, by Resource Portfolio (2021-2030)

	SCE Equivalent Renewable Portfolio	100% Renewable by 2030	100% Renewable	SCE
Avg./GHG Share	48%	76%	100%	48%
Avg. Emissions (Metric Tons CO2)	359,766	168,856	-	359,766
Difference SCE 60% Portfolio (Metric Tons CO2)	0	190,910	218,000	
Savings expressed as Number of Cars Off the Road[1]	0	41,344	47,000	0

[1] Passenger cars, based on 4.6 metric tons of CO2 per year assuming 22 mpg and 11,500 miles per year.

8.4 Local Resources/Behind the Meter CCE Programs

Local resources and behind-the-meter programs add to the environmental benefits of CCEs. The City CCE would have the option to invest in a range of programs to expand renewable energy use and enhance economic development in the City. Increased renewable energy use can be accomplished by supporting customers wishing to own small renewable generation, like rooftop solar (net energy metering), purchasing from small local for-profit renewable generators (feed-in tariffs), purchasing renewable resources directly, or supporting electric vehicle use. Each of these programs also yields economic development benefits by stimulating spending locally and saving local customers money. Economic development can also be accomplished by providing additional support for low-income customers or extra support for new or growing businesses. The following sections discuss these programs.

8.4.1 Economic Development Rate Incentive

There are several programs that CCEs can offer to stimulate indirect local economic development in their service area. One is a special economic development rate to encourage job providers to locate, move to, or expand operations within the CCE jurisdiction. This economic development may benefit the CCE and rate payers due to load diversification, which can reduce average power supply costs. Additionally, the City CCE could offer rebate programs to target the business sectors of interest to their service area. If, for example, a large industrial customer would like to locate within the City CCE service area, increased efficiency may result in decreased costs to all other customers due to overhead cost sharing, thus an incentive could be paid to the new industrial customer.

8.4.2 Net Energy Metering (NEM) Program

The City CCE could establish a Net Energy Metering (NEM) program for qualified customers in their service territory to encourage wider use of distributed energy resources (DER) such as rooftop solar. NEM programs allow energy customers who generate some or all their own power to sell excess generation to the grid and benefit from a credit for those sales when they become a NEM consumer.

SCE currently offers a NEM program in which customers receive an annual “true-up” statement at the end of every 12-month billing cycle. This allows customers to balance credit earned in summer months (when solar energy generation is highest) with charges accrued in the winter (when solar generation is lower, and customers rely more on SCE’s bundled service). Customers earn power credits at the value of electricity and the value of renewable energy credits, though they are not paid for excess generation. Credits unused at the end of each year expire. This policy therefore incentivizes customers to limit the size of their generation system, as excess generation supplied to the grid will not provide a return.

All the CCEs currently operating in California also offer NEM programs, and three of the most recently operational CCEs have offered them at the launch of service.[33] All of these CCE-managed NEM programs offer greater incentives for customers in their service area to invest in more and larger DER. Higher incentives up to the full retail rate have been offered. This has the benefit of increasing the supply of renewable resources available to these CCEs as well as encouraging high participation rates among current and potential NEM customers. The City CCE would have the

[33] https://pioneercommunityenergy.ca.gov/home/nem-solar/,https://www.poweredbyprime.org/faq, http://www.applevalley.org/home/showdocument?id=18607

option to implement a similar NEM program and the ability to stimulate local economic development in the form of new DER system investments and associated business activity.

8.4.3 Feed-in Tariffs

Feed-in tariffs (FIT) offer terms by which electric service providers such as IOUs and CCEs purchase power from small-scale renewable electricity projects within their service territory. In contrast with NEM programs, which typically target owners of homes and small businesses who wish to install a rooftop photovoltaic (PV) system, FIT programs target owners of larger generation projects, in the range of 0.5-3 MW. These could be larger rooftop photovoltaic (PV) systems located at industrial sites or ground-mounted solar shade structures in parking lots. In developing a FIT program of its own, the CCE could incentivize customers in their service area to develop local renewable resources.

8.4.4 Local Generation Resources Development

A final option to drive investment in local renewable generation resources within the CCE service area is for the City CCE itself to build or acquire generation resources. For example, Marin Clean Energy (MCE) currently has 10.5 MW of CCE-owned local solar PV projects under development and is planning to develop or purchase up to 25 MW of locally constructed, utility scale renewable generating capacity by 2021.[34] This model of CCE-owned resources provides CCEs with a guaranteed renewable power source as well as local economic stimulus.

8.4.5 Electric Vehicle (EV) Programs and Charging Stations

Encouraging electric vehicle use can both increase load serving entity total load and simultaneously reduce greenhouse gas emissions within its service area. Many LSEs offer special rates for electric vehicle charging. SCE offers three options for electric vehicle charging including time-of-use (TOU), EV-TOU-1 and the traditional tiered rate plans. EV-TOU customers install a separate meter explicitly for vehicle charging.[35] TOU rates encourage vehicle charging at times when energy is cheapest, or system load is lowest. MCE offers a similar program for their customers with lower rates than the IOU.[36]

In addition to targeted rate programs, CCEs can encourage electric vehicle use by investing in local electric vehicle charging stations. Silicon Valley Power (SVP) opened the largest public electric vehicle charging center in the State in April 2016. The facility features 48 Level 2 chargers and one DC Fast Charger.[37] Sonoma Clean Power (SCP) also provided qualified customers with

[34]https://www.mcecleanenergy.org/wp-content/uploads/2017/11/MCE-2018-Integrated-Resource-Plan-FINAL-2017.11.02.pdf
[35] https://www.sce.com/residential/electric-cars/residential-rates
[36] https://www.mcecleanenergy.org/electric-vehicles/
[37] http://www.siliconvalleypower.com/Home/Components/News/News/5036/2065

incentives to purchase EVs in 2016 and continued the program in 2017.[38] The City CCE could invest in similar projects to promote electric vehicle use within its service area.

8.4.6 Low Income Programs

SCE offers assistance to low-income customers on both one-time and long-term bases. For customers in need of sustained assistance, SCE offers rates that are up to 30% lower for qualifying households under the California Alternate Rate Energy (CARE)[39] program. The CARE program is mandatory for IOUs per California Public Utilities Code 739.1. The program is set up for electric corporations that have 100,000 or more customer accounts to provide 30-35% discount on electric utility bills on households that are at or below 200% of the federal poverty line. Funding for CARE is collected on an equal cents/kWh basis from all customer classes except street lighting. This program, like other SCE low income programs, would continue to be available to City CCE customers through SCE. Existing CARE customers do not need to reapply once transferred to City CCE service. New CARE enrollments would be handled through SCE.

In addition, the Family Electric Rate Assistance (FERA) Program can provide a monthly discount on electric bills. This program is designed for income-qualified households of three or more persons. Finally, the California Department of Community Services and Development (CSD) oversees a federal program, Low-income Home Energy Assistance Program (LIHEAP), which offers help for heating or cooling homes and help for weatherproofing homes.

At present, most California CCEs simply match their incumbent IOU's low-income programs, as in the case of MCE and SCP. The City CCE could provide the same support to low-income customers as does SCE.

[38] https://sonomacleanpower.org/sonoma-clean-power-launches-ev-incentive-program/

[39] https://www.sce.com/residential/assistance/care-fera21

9. Sensitivity and Risk Analysis

9.1 Introduction

The economic analysis provides a Base Case scenario for forming a CCE. This Base Case is predicated on numerous assumptions and estimates that influence the overall results. This section of the Study will provide the range of impacts that could result from changes in the most significant variables for the portfolios described in the Power Supply Strategy and Cost of Service sections of this Study. In addition, this section will address uncertainties that should be considered and mitigated to the maximum extent possible.

The following analysis is an overview of risks and their relative severity, followed by discussion of each factor. For variables where uncertainty is quantified, key assumptions are discussed, and a reasonable range of outcomes is established. The range in variable assumptions is meant to reflect probable scenarios, but do not demonstrate the full scope of possible outcomes. The CCE's rate impacts are estimated using a range of these scenarios and are presented in a comparison to SCE rates.

9.2 Risk Factors

When evaluating risks, it is important to note that power supply costs are approximately 93 percent of the total CCE operating costs; SCE non-bypassable (PCIA/CTC) charges equates to 12 percent of the SCE generation rate and CCE non-power supply related operating costs (staff, administration, financial reserves) account for 7 percent of total CCE revenue requirement. The figure below (Exhibit 38) illustrates this breakdown of CCE costs. Exhibit 39 provides discussion of each risk factor, summarizing the severity of the problem and potential mitigation strategies.

Exhibit 38
Rate Comparison SCE Renewable-Equivalent Portfolio

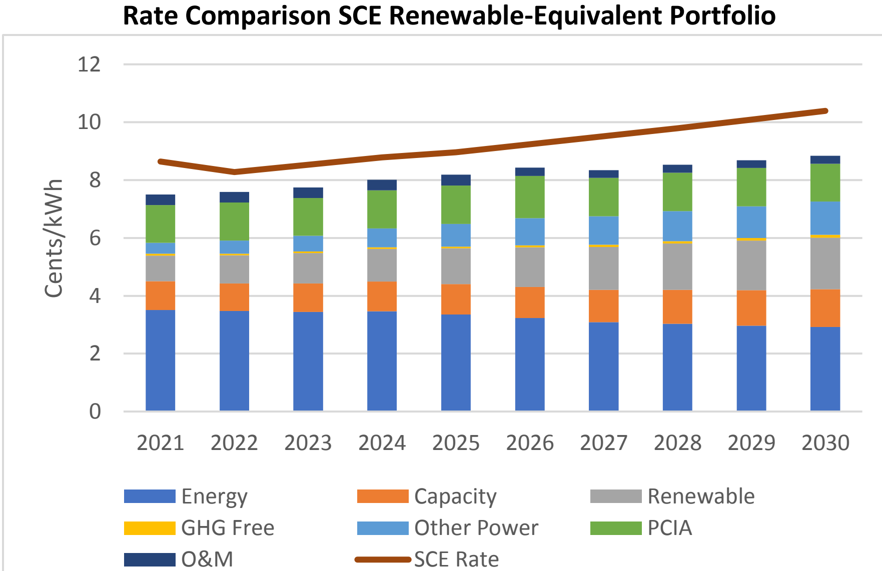


Exhibit 39
Comparison of Risks, Mitigation Strategies, and Risk Severity

	Risk	Description	Problem	Mitigation Strategy	Likelihood of Problem	Severity of Problem	Potential to "Suspend" CCE
1	SCE Rates and Surcharges	SCE's generation rates decrease or its non-bypassable charges (PCIA/CTC) increase	• CCE rates exceed SCE • Increased customer opt-out rate	• Establish Rate Stabilization Fund • Invest in a balanced energy supply portfolio to remain agile in power market •Emphasize the value of programs, local control, and environmental impact in marketing	High – most operating CCEs in California have undergone short periods of rate competition from the incumbent IOU.	Medium - CCEs have been able to buffer rate impacts using financial reserves, then adjust power supply to regain rate advantage.	Medium – depending on the outcome of the PCIA proceeding, CCEs may become infeasible
2	Regulatory Risks	Energy policy is enacted that compromises CCE competitiveness or independence.	• New costs incurred • Reduced authority	• Coordination with CCE community on regulatory involvement • Hire lobbyists and regulatory representatives to advocate for CCE	Low – existing regulatory precedent and a growing market share makes the likelihood of state policies that severely disadvantage CCEs low.	High – a worst-case scenario regulatory legislative decision limiting CCE autonomy or enforcing additional costs could hinder CCE viability.	Low – energy policy severe enough to make CCE infeasible is not likely.
3	Power Supply Costs	Power prices increase at crucial time for CCE. Impacted by natural gas prices and hydropower production.	• CCE rates exceed SCE • Increased customer opt-out rate	• Long-term contracts • Draw on CCE reserves to stabilize rates through price spike	Low – market prices are unlikely to spike enough to make CCE financially infeasible prior to CCE launch. From that point on, the CCE can limit its exposure through contract selection.	Medium – a poorly timed price spike combined with poor power supply contract management could require CCE to dig into reserves or delay launch.	Low
4	SCE RPS Share	SCE's RPS or GHG-free power portfolio grows to match or exceed CCE 's	Increased customer opt-out rate	• Increase renewable power portfolio • Emphasize rates and local programs in marketing	Medium – SCE's power portfolio is dynamic and could change rapidly because of other CCE departures.	Low – CCE would have capability to increase renewable energy purchases to match or exceed SCE if the event	Very Low – CCE is likely to respond effectively if this occurs.

	Risk	Description	Problem	Mitigation Strategy	Likelihood of Problem	Severity of Problem	Potential to "Suspend" CCE
						occurs. In addition, CCE would promote other benefits of its service to customers.	
5	Availability of RPS/GHG-free power	Unexpectedly high market demand or loss of supply of renewable resources; competition for renewables	• CCE unable to provide target power products	• Shift emphasis to GHG-free or RPS resources depending on availability • Secure long-term contracts • Invest in local renewable resources	Low – power procurement providers are projecting a plethora of RPS and GHG-free bids available on the market.	Medium – if CCE were unexpectedly unable to procure enough RPS or GHG-free power, it could emphasize other program strengths to retain customers until new resources came online.	Low – negligible chance of occurring.
6	Financial Risks	CCE is unable to acquire desired financing or credit	• Slower or delayed program launch • Unable to build generation projects	• Adopt gradual program roll-out • Establish Rate Stabilization Fund • Minimize overhead costs	Low – CCEs have become sufficiently established in California, such that financing is almost certainly available.	Medium – in the event CCE is limited in financing options, it can adopt a more conservative program design and gradual roll-out.	Low
7	Loads and customer participation	Unprecedented opt-out rate reduces competitiveness	• Excess power contracts • Poor margins	• Increase marketing • Reduce overhead • Expand to new customer markets • Consider merging with existing CCE	Low – as CCEs have become more common in California, and CCE marketing firms more experienced, opt-out rates have gone lower.	Low –CCE would have numerous viable options in the event they suffer unexpectedly low participation.	Low

9.3 SCE Rates and Surcharges

Sensitivity analyses were conducted for two components of SCE rates. The delivery rates are paid by both CCE and SCE bundled customers. As such, changes in delivery rates impact all customers equally and, therefore, are not included in the sensitivity analysis. A range of changes in the PCIA charged by SCE are included in the sensitivity analysis.

9.3.1 Generation Rate

SCE generation rates are projected to increase on average by 3% per year over the 10-year study period; a very conservative assumption based on past results. In addition to the base SCE rates assumptions, this study uses a high SCE rate and a low SCE rate. These rates are approximately 2% lower and 7% higher than the base assumptions.

9.3.2 PCIA

When legislation was introduced to allow the formation of CCEs, it was recognized that the IOUs currently serving the potential City CCE customers may face stranded generation costs. The PCIA methodology was established by the CPUC as a means for IOUs to recover those stranded costs. The PCIA faces several issues, however, including the source and transparency of data used for the calculation and the fact that the PCIA level is variable and contains a great amount of uncertainty.

The level of the PCIA, or other non-bypassable charges that will potentially replace the PCIA, would impact the cost competitiveness of the City CCE. To be competitive, the CCE's rates which include power supply costs plus PCIA and other surcharges (and non-power supply costs) must be at or lower than SCE's generation rates. Many factors influence the PCIA, but primarily the PCIA is determined by the cost of SCE's existing power contracts and the cost to SCE of the departing load served under those existing contracts. Uncertainties surrounding the PCIA include methodology assumptions unique to SCE, as well as to what degree previously acquired power contracts can be retired. The potential for the PCIA to increase sharply occurs when SCE must sell previously contracted power at times when current wholesale market power prices are much lower. The PCIA also has the potential to decrease since it reflects SCE's own resources and signed contracts obtained prior to load departure; once those contracts expire, the related PCIA would disappear. Therefore, over time the PCIA would vary, but it is expected that it would decline as market prices increase and grandfathered contracts expire.

Forecasting the PCIA is difficult since key inputs are heavily redacted from the rate filings and regulatory changes can significantly impact the PCIA calculation . The uncertainty associated with forecast PCIA rates is modeled considering historic PCIA increases as well as the recently adopted methodology used for the PCIA calculation (October 11, 2018). In addition to the Base Case PCIA, a low and high PCIA forecast are modeled. The low scenario is 10% lower than the Base Case. In the high scenario, the PCIA increases by the full cap of $0.005/kWh in the first 2 years then de-escalates at an average of 5% per year.

9.4 Working with SCE

SCE has a Customer Choice service department dedicated to coordination with developing CCEs. SCE's policy is to schedule meet and confer conferences with CCEs in different stages of implementation, launch, and operations. These conferences could be held for many reasons including: informing SCE of a jurisdiction's intent to investigate CCE, obtaining SCE staff review and comment on CCE preliminary implementation plans or goals; notifying SCE of changes in implementation plans or schedules; or understanding factors in SCE's Customer Choice service operations that may impact CCE schedules. Generally, SCE has practiced friendly and timely communication with CCEs which is important because SCE will still play a critical role in City CCE implementation including providing customer account information, conducting billing on behalf of the City CCE, and providing City CCE customer consumption data used to settle accounts with power providers.

9.5 Grid Reliability

Grid reliability refers to the continual and uninterrupted distribution and transmission of electricity throughout the State and directly to customers. Reliability is measured using the number, frequency, and duration of outages. If the City were to implement a CCE program, SCE would still be the entity in charge of maintaining a reliable distribution system. SCE recovers the cost to maintain and operate the distribution system through its delivery charge, which is still collected regardless of energy supplier. Therefore, City CCE program is not expected to impact grid reliability, certainly not distribution grid reliability, due to their purchase of wholesale power to serve their customers.

Local grid reliability is a concern of energy regulators and the IOUs as distribution grid operators. In the past, in order to operate and maintain a reliable distribution grid, IOUs have invested in maintenance projects and capital project upgrades which require CPUC approval and for which the IOUs then receive a shareholder return on those investments. In a variety of ongoing proceedings, the CPUC is investigating how the utilization of distributed energy resources (DERs) deployed at strategic locations on the distribution grid, may help improve grid reliability. These DERs may include permanent or scheduled reduced consumption (e.g., energy efficiency or demand response), permanent or scheduled increased consumption (e.g., electric vehicle charging, timely electric appliance usage), or the utilization of energy storage devices. Some CCEs are now exploring whether their flexibilities in retail rate design, local incentives for distributed generation, and development of customer programs may result in improving grid reliability.

The CPUC, the California Energy Commission, the California Independent System Operator and some State legislators have questioned whether CCEs are procuring power that meets reliability standards. The CPUC has established Resource Adequacy Requirements for load serving entities (LSE) to support Statewide system reliability. The RA requirements level penalties and establish trigger prices for certain types of RA. These mechanisms are meant to ensure all LSEs acquire the appropriate resources to support reliability; and they are meant to shield LSE's (such as CCEs) from inflated market RA prices.

The challenge of RA procurement has led to the proposal of a central, Statewide power procurement entity. This entity would purchase power and system grid resource needs on behalf of all load serving entities (IOUs, CCEs, and Direct Access providers). This activity emphasizes the need for CCEs to remain vigilant and engaged in all legislative and regulatory issues that involve CCE operations.

9.6 Regulatory Risks

There are numerous factors that could impact SCE's rates in addition to the market price impacts described above. Regulatory changes, generation plant or technology retirements or additions, and gas prices all can impact SCE's rates in the future. Regulatory issues continue to arise that may impact the competitiveness of the City CCE. The impact of these factors is difficult to assess and model quantitatively. However, California's operating CCEs have worked aggressively to address any potentially detrimental changes through effective lobbying in Sacramento and San Francisco.

New legislation can also impact the City's CCE. For example, new legislation that recently affected CCEs is SB 350. The CCE-specific changes reflected in SB 350 are generally positive, providing for ongoing autonomy regarding resource planning and procurement. CCEs must be aware, however, of this legislation's long-term contracting requirement associated with renewable energy procurement. Specifically, CCEs are required to contract 65% of renewable resources for 10 years or more by 2020.

In addition, there is a risk that additional capacity resource costs are pushed onto CCEs via the Cost Allocation Mechanism (CAM). The City CCE would need to continually monitor and lobby at the Federal, State and local levels to ensure fair and equitable treatment related to CCE charges. CCEs in California currently utilize their own staff and, primarily, the trade association representing all operating CCEs, the California Community Choice Association, or CalCCA. The City CCE would more than likely join CalCCA and support their efforts in representing CCEs in regulatory and legislative venues.

9.7 Power Supply Costs

Ramping services are predominantly provided by natural gas-fired generating resources. These resources are capable of ramping generation levels up and down quickly to assure that resources are equal to load requirements. Therefore, wholesale market prices are driven largely by natural gas prices. In addition, the City CCE's power supply mix has been modeled according to different levels of renewable energy. Renewable energy costs are forecast for the base case; however, several factors could influence future renewable energy costs including locational factors for new facilities, transmission costs, technology advancements, changes in state and federal renewable energy incentives, or changes in California or neighboring state RPS.

Since resource costs are based on forecast wholesale market and renewable market prices, it is prudent to look at the sensitivity of the 10-year levelized cost calculations to fluctuations in projected prices. Exhibit 40 below shows a summary of low, base, and high resource costs.

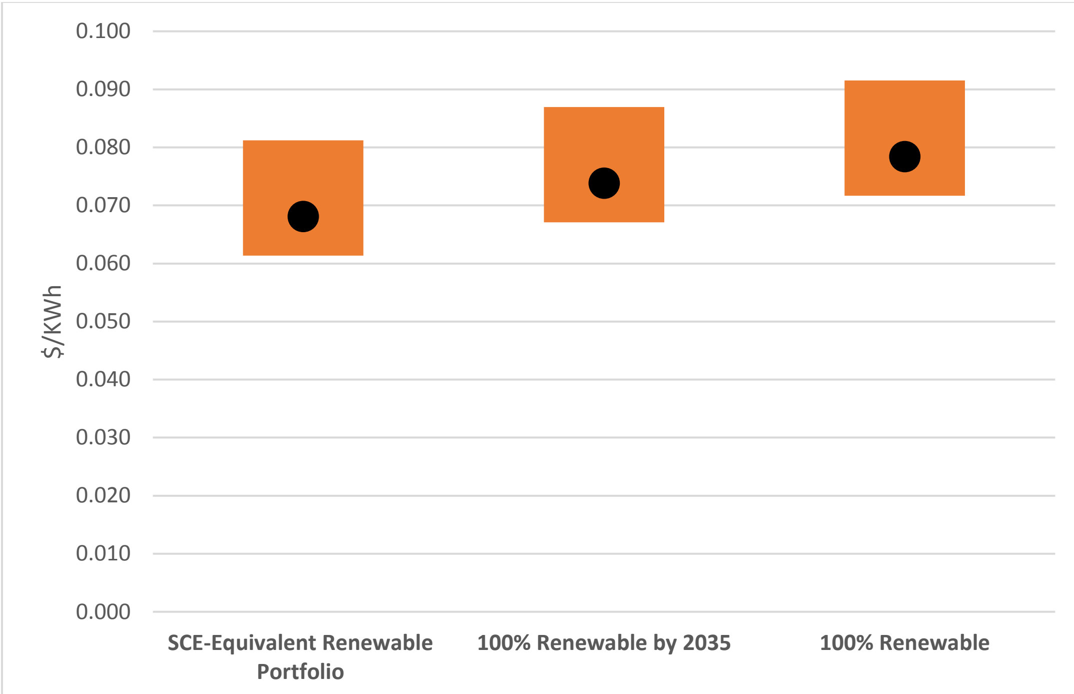
Exhibit 40
Power Supply Cost Sensitivity
10-Year Levelized Costs, $/kWh

Case	SCE-Equivalent Renewable Portfolio	100% Renewable by 2035	100% Renewable
Low Case	0.0614	0.0671	0.0717
Base Case	0.0681	0.0738	0.0784
High Case	0.0812	0.0869	0.0915

The Base Case renewable energy costs are based on the cost of PPAs currently being executed in the region. The Low Case renewable energy costs assume that the costs of renewable generating projects will, as expected, continue to decline and the City CCE would, over time, layer in PPAs sourced to the lower cost renewable resources that will be developed over the next five to ten years. The High Case renewable energy costs assume that the City CCE is not able to secure PPAs sourced to relatively new and lower cost renewable resources but, rather, signs PPAs sourced to older renewable resources with higher costs. The renewable costs in this case reflect the costs of renewable resources that were developed three to five years or more ago.

The 10-year levelized costs of each portfolio has been calculated using the range of resource costs shown above. The base case costs are depicted by the black dots in Exhibit 41, while the range projected between the High Case and the Low Case are depicted by the orange bar.

Exhibit 41
Sensitivity of Portfolio 10-year Levelized Costs $/kWh



The 100% Renewable portfolio, which relies on the most renewable energy purchases to serve retail load, has the highest projected costs that range from a low of $0.0717/kWh to a high of $0.0915/kWh. There is a low likelihood that renewable project costs would increase to the point that 20-year levelized costs of renewable purchases is near $0.100/kWh. Alternatively, it is far more likely that decreases in solar equipment costs on a $/watt basis will continue as more renewable power resources are developed.

While renewable energy costs continue to decline, the potential for market PPA prices to increase could be material. Wholesale market prices are dependent on many factors, the most notable of which is natural gas price. Natural gas prices are at historic lows, and because natural gas-fired resources are often the marginal resource in the market, wholesale market prices have followed. Natural gas prices are subject to a variety of local, national and international forces that could have a large impact on the current marketplace. For example, increased regulation in the natural gas industry with respect to the deployment of fracking technology could cause decreases in natural gas supplies and commensurate increases in natural gas prices. Additionally, increased costs associated with carbon taxes and/or carbon cap and trade programs could also cause upward pressure on wholesale market prices.

9.8 SCE RPS Portfolio

There are several factors that may impact the share of renewable energy in SCE's portfolio over the next decade. Customers departing SCE for CCE service throughout SCE territory would have the effect of shrinking SCE's load, thereby increasing the share of renewables made up by SCE's current RPS contracts. Finally, SCE could further strive to compete with CCEs in terms of the environmental impact of its power portfolio. In combination, these forces could drive up the share of renewable energy in SCE's power mix to match or exceed the CCE's planned power mix. To mitigate this risk, the City CCE would have the option to acquire more renewable energy in response to changes in SCE's portfolio.

9.9 Availability of Renewable and GHG-Free Resources

Often one of the goals of a CCE is to offer power products that are cleaner than those provided by the IOU. All the portfolios developed for this Study are modeled at 40% to 100% GHG-free. The Portfolios include enough renewable and GHG-free resources to meet or exceed the share of GHG-free resources in SCE's power supply portfolio, which is currently in the 40% to 50% range.

9.9.1 SCE Green Rate

SCE does offer additional renewable choice to customers. SCE's Green Rate allows the customer to sign up for "50% to 100% renewable power" as shown in Exhibit 42.[40] This program is available to both residential and non-residential customers. There is no minimum enrollment term and customers can decide to cancel participation at any time. The Green Rate currently results in a discount off SCE's standard rate, because new renewable resources are cheaper than the existing resources committed to by SCE. However, a Green Rate customer will have to pay the PCIA as would CCE customers.

Exhibit 42
Green Rates (Updated 02/10/2019)

Rate Component	Residential ($/kWh)	Small Commercial ($/kWh)	M/L Commercial and Industrial ($/kWh)	Agriculture ($/kWh)	Street Lighting ($/kWh)
Renewable Power Rate & Program Costs & Transmission	0.08711	0.08711	0.08711	0.08711	0.08711
Class Average Generation Credit	-0.08687	-0.08808	-0.06836	-0.074	-0.04614
Renewable Energy Value Adjustment	0.01095	0.00651	0.00395	0.0038	0.00386
Green Rate Differential	**0.01119**	**0.00554**	**0.0227**	**0.01691**	**0.04483**
PCIA	0.01566	0.01002	0.00914	0.0097	0.0001
Total Cost	**0.02685**	**0.01556**	**0.03184**	**0.02661**	**0.04477**

[40] https://www1.sce.com/NR/sc3/tm2/pdf/ce370.pdf

For residential customers, the cost per kWh for participating in the Green Rate is $0.01119 per kWh. After applying the PCIA, this rate increases to $0.02685 per kWh.

9.9.2 SCE Community Renewables Program

SCE's Community Renewables program allows the customer to contract directly with a renewable project developer and purchase the rights to a portion of the output from a new local renewable generating facility. Customers participating in the Community Renewables Program will receive a credit on their SCE bill reflecting the amount of renewable energy purchased through the developer. In addition, the customer pays the PCIA and other program costs, such as the administrative costs.

The primary risk associated with a high renewable resource strategy is whether enough renewable resources exist at prices that would keep the City CCE rates competitive with SCE's. The current market has sufficient renewable resources available. Utilities that submit requests for renewable power supply receive bids that far exceed the requested amounts at prices that are very competitive to non-renewable market resources. As RPS requirements and the share of renewable resources in CCE portfolios are increasing, competition for renewable resources could increase. However, it is important to note that the CCE movement does not change the total load. Rather, the renewable resource timeline may just have accelerated until targets have been reached. Increased competition would result in increased prices once supply cannot meet the demand, resulting in increased development of renewable resources. In addition, the CCEs would have the opportunity to aid in the development of renewable resources by fostering local resource development.

9.10 Financial Risks

Starting a new venture carries financial risks that will have to be considered and mitigated before proceeding with a City CCE. Depending on the organizational structure, a third-party may take on the financial obligations of the City CCE. These include establishing start-up financing, working capital funding such as lines of credit, and entering into contracts with suppliers and consultants. Other cities and counties have protected their General Funds by establishing JPAs or lockbox arrangements with vendors. These options were discussed previously.

The City could manage many of the financial risks associated with the uncertainty surrounding a City CCE start-up. While the goal is to provide clean power competitively with SCE, the most important consideration to the third-party financer is that the City CCE can increase rates if needed to ensure enough revenues are collected to meet costs. In addition, the City CCE can plan carefully by minimizing staff initially and only growing as fast as the size of the City CCE can support, thus minimizing the fixed costs of operating the City CCE.

The CCE would need to manage the financial risk associated with power supply costs by managing power market and load exposure through prudent hedging and power portfolio management. In addition, the establishment of rate stabilization reserves and sufficient working capital can mitigate financial risks to the third-party financer and to customers. The success of existing CCEs in managing the financial challenges of a City CCE start-up and setting rates that are competitive with the SCE and the other IOUs can be a valuable guide for the City CCE.

9.11 Loads and Customer Participation Rates

The Study bases the load forecasts on expected load growth, load profiles, and participation rates. To evaluate the potential impact of varying loads, low, medium, and high load forecasts have been developed for the sensitivity analysis.

Another assumption that can impact the costs of the City CCE is the overall City CCE customer participation rates. This Study uses a conservative participation rate of 95% for residential customers and 90% for non-residential customers as its base case. A higher participation rate, such as has been experienced by all of California's operating CCEs to date, would increase energy sales relative to the base case and decrease the fixed costs paid by each customer. On the other hand, a reduced participation rate would increase the fixed costs to the City CCE customers. A low participation scenario was analyzed as the worst case. The low participation scenario has an opt-out rate of 20% (80% participation). The results of this scenario are similar to the base case, the City CCE is able to offer a 2% discount and achieve its financial objectives. For reference, recent CCEs have experienced participation rates in the 90-97% range.

Sensitivity to changes in projected loads has been tested for the high and low load forecast scenarios. For the sensitivity analysis, the low case assumes a -0.14% growth in energy and customers after 2019, while the high scenario assumes a 1.36% growth in energy and customers.

The experience of existing CCEs suggest that only a small number of customers opt-out. For example, PCE has an opt-out rate of 2%, while CPA has a current opt-out rate of 0.7%. Once a CCE is operating, the number of customers switching back to the incumbent IOU have also been less than 5%. To mitigate the potential switching of customers, it would be important for the City CCE to implement prudent power supply strategies to address potential load swings from changes in participation and weather uncertainty, plus establish a rate stabilization fund. Keeping rates low as well as providing excellent customer service would lead to strong customer retention.

9.12 Sensitivity Results

Exhibit 43 provides the results of the sensitivity analysis for the SCE Renewable Equivalent Portfolio scenario, which is the most likely portfolio for the City CCE to pursue initially given its goals.

Exhibit 43
Base Case Portfolio – Bundled Rates ($/kWh)
10-Year Levelized Average System Rate

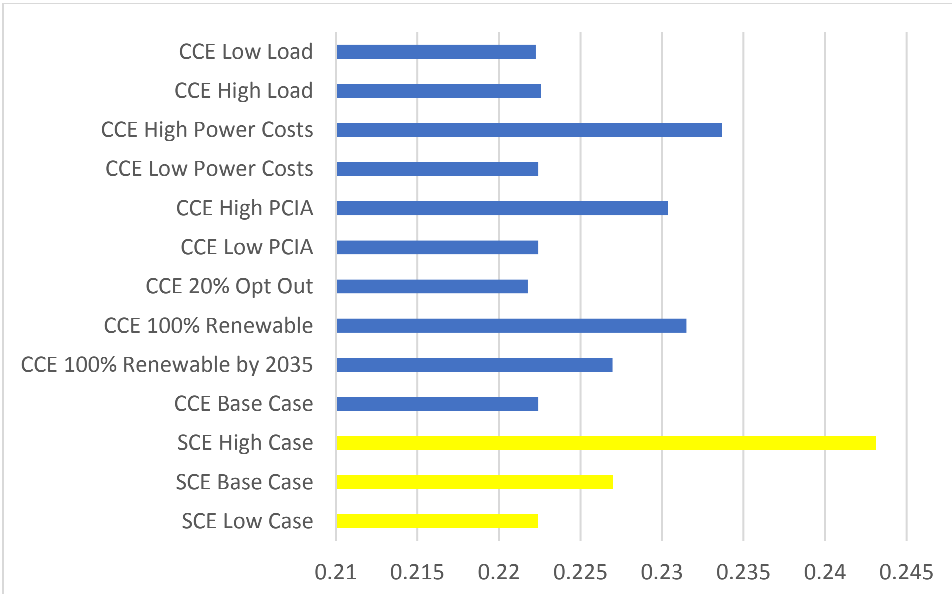


Exhibit 43 provides a comparison of the average system rate under several scenarios. This sensitivity shows that it is a significant risk to the City CCE if the City CCE's power costs increase based on the high-power cost scenario without any offsetting PCIA benefits. Even in a scenario that has a 20% opt out rate the City CCE can achieve target savings if power supply and PCIA costs remain close to expected levels.

Wholesale market prices for natural gas/electricity are currently at all-time lows. The probability of these market prices decreasing significantly from current levels is low. In addition, the City CCE would need to manage its supply portfolio so that it is not exposed to unmanageable risks associated with power costs.

While the City CCE would not be able to impact SCE's generation rates, the City CCE does have the opportunity to monitor and actively opine on the costs and methodology used to allocated non-bypassable costs to CCEs in SCE's service area, including the PCIA. Given recent history, this task would be shared with other CCEs and is an important and time-consuming task that can mitigate the impact on the City CCE's costs. SCE's PCIA is at a historic high; however, the design of the PCIA implies that the PCIA will decrease over time as SCE's high-cost contracts expire and market prices increase.

This Study assumes a relatively high customer opt-out percentage (10% for non-residential customers) compared to the more modest opt-out rates experienced by California's actively operating CCEs, which is closer to 5% overall. While there is a possibility that the City CCE does not reach the projected participation rates, careful monitoring and planning can reduce the potential impact of low loads through flexible power supply contracts and regular monitoring of administrative and general expenses.

The City CCE should also consider implementing a rate stabilization fund so that short-term events that result in lower SCE rates compared with the CCE rates can be mitigated with reserves rather than by rate increases. Reserves would help the CCE remain competitive and would provide rate stabilization for customers.

10.Conclusions and Recommendations

10.1 Rate Conclusions

The first benefit associated with forming the City CCE would be lower electricity bills for City CCE customers. City CCE customers should see no obvious changes in electric service other than the lower price and potentially more renewable power procurement, depending on the City CCE's goals. Customers would pay the power supply charges set by the City CCE and no longer pay the costs of SCE power supply but would still pay the costs of SCE distribution.

Given this Study's findings, the City CCE's rate setting can establish a goal of providing rates that are equal to or lower than the equivalent rates offered by SCE even under the 100% Renewable by 2035 portfolio. The projected City CCE and SCE rates are illustrated in Exhibit 44.

Exhibit 44
Bundled Rate Comparisons
$/kWh

Rate Class	Forecast 2021 SCE Rate*	SCE Equivalent Renewable	100% Renewable by 2035	100% Renewable
Residential	0.2522	0.2472	0.2522	0.2573
Lighting	0.2552	0.2501	0.2552	0.2603
Small/Medium Commercial	0.2307	0.2261	0.2307	0.2353
Large Commercial/Industrial	0.1591	0.1559	0.1591	0.1622
Agricultural	0.1964	0.1924	0.1964	0.2003
Total	0.1864	0.1827	0.1864	0.1902
Initial Rate Savings in 2021 from SCE Bundled Rate		**2.00%**	**0.0%**	**-2.00%**

*SCE bundled average rate projected based on SCE's 2019 Rates.

Once the City CCE gives notice to SCE that it will commence service and when it will commence service, the City CCE customers will not be responsible for costs associated with SCE's future electricity procurement contracts or power plant investments.[41] This is an advantage to the CCE customers as they would then have local control of power supply costs through the City CCE.

10.2 Renewable Energy Conclusions

A second benefit of forming a CCE would be an increase in the proportion of energy generated and supplied by renewable resources. The Study includes procurement of renewable energy sufficient to meet 33% or more of the City's CCE's electricity needs (initially). Most of this renewable energy would be met by new renewable resources over time. By 2030, SCE must procure a minimum of 60% of its customers' annual electricity usage from renewable resources

[41] CCEs may be liable for a share of unbundled stranded costs from new generation but would then receive associated Resource Adequacy credits.

due to the State Renewable Portfolio Standard and the Energy Action Plan requirements of the CPUC. The City CCE can decide whether to follow the same renewable goals or to implement more aggressive targets.

10.3 Energy Efficiency Conclusions

A third benefit of forming a CCE would be an increase in energy efficiency program investments and activities. The existing energy efficiency programs administered by SCE are not expected to change because of forming a City CCE. The City CCE customers would continue to pay the public benefits charges to SCE which funds energy efficiency programs for all customers, regardless of supplier. The energy efficiency programs ultimately planned for the CCE would be in addition to the level of investment by SCE that would continue in the absence of a CCE. Thus, the CCE has the potential for increased energy investment and savings with an attendant further reduction in emissions due to expanded energy efficiency programs. Also, the CPUC allows CCEs to receive utility ratepayer funding for CCE energy efficiency programs and serve as an independent Energy Efficiency Program Administrator with equal status and authority as the utilities.

10.4 Economic Development Conclusions

The fourth benefit of forming a CCE would be enhanced local economic development. The analyses contained in this Study have focused primarily on the direct effects of this formation. However, in addition to direct effects, indirect economic effects are also anticipated. The indirect effects of creating a City CCE include the effects of increased local investments, increased disposable income due to bill savings, and improved environmental and health conditions.

Exhibit 45 shows the effects of 2% in electric bill savings could have in Orange County. The 2% rate discount is about $7.7 million in rate savings and represents the estimated (maximum) bill savings per year achievable by the CCE once in full operation. It is estimated that the electric bill savings could create approximately 85 additional jobs in the County with over $4.1 million in labor income. It is also projected that the total value added could be approximately $6 million and output close to $10 million.

Exhibit 45
$7.7 Million Rate Savings Effects on the Orange County Economy[1]

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	39	$1,920,000	$1,950,000	$3,590,000
Indirect Effect	8	$500,000	$810,000	$1,350,000
Induced Effect	37	$1,770,000	$3,220,000	$5,220,000
Total Effect	85	$4,190,000	$5,980,000	$10,160,000

1. Full impacts to Orange county are estimated, it can be expected that a large share of these impacts would be realized within the City.

These savings are based on the economic assumption that households would spend some share of the increased disposable income on more goods and services. This increased spending on goods and services would then lead to producers either increasing the wages of their current employees or hiring additional employees to handle the increased demand. This in turn would give the employees a larger disposable income which they spend on goods and services and thus repeating the cycle of increased demand.

10.5 Greenhouse Gas (GHG) Emissions Conclusions

A fifth benefit of forming a CCE may be reduced GHG emissions. The amount of renewable power in SCE's power supply portfolio is 43% and will rise to 60% by 2030. Based on the power supply strategy described previously, the estimated GHG emission reductions are forecast to range from zero to 360,000 tons CO_2e per year by 2030 depending on the portfolio. The baseline for comparison is SCE's portfolio resource mix versus the potential City CCE resource mixes. Exhibit 46 details these reductions over the 10-year study period.

Exhibit 46
Comparison of Average Annual GHG Emissions from Electricity, by Resource Portfolio (2021-2030)

	SCE Equivalent Renewable Portfolio	100% Renewable by 2035	100% Renewable	SCE
Avg./GHG Free	48%	76%	100%	48%
Avg. Emissions (Metric Tons CO2)	360,000	169,000	-	360,000
Difference SCE 50% Portfolio (Metric Tons CO2)	0	191,000	360,000	

10.6 Findings and Conclusions

Based on the analysis conducted in this Study, the following findings and conclusions are made:

- The formation of a City CCE is financially feasible and could yield considerable benefits for all participating residents and businesses.
- Key risks include: power supply costs and regulatory changes impacting local control and the PCIA.
- Benefits could include electric retail rates that are at least 2% lower compared with SCE rates.
- Other benefits include local control over power supply, economic development incentives, and targeted demand-side management programs.
- City CCE start-up costs could be fully recovered within the first three years of City CCE operations.
- After this cost recovery, revenues that exceed costs could be used to finance a rate stabilization fund, new local renewable resources, economic development projects and/or lower customer electric rates.
- The sensitivity analysis shows that the ranges of prices for different market conditions will for the most part not negatively impact City CCE rates compared to SCE rates. Where negative impacts may exist, those risks can be mitigated.
- Local electric rate savings are expected to stimulate economic development.

The positive impacts on the City and its citizens of forming a CCE suggest that City CCE implementation should be considered with the following next steps: evaluate governance options, partnering options, and develop implementation plan.

10.7 Recommendations

Based on the Feasibility Study results, and recent CCE experiences in the State, the following recommendations are made pursuant City CCE formation:

- The City CCE should initially contract with a third party with the necessary experience (proven track record, longevity and financial capacity) to perform most of the City CCE's portfolio power supply operation requirements. This would include the procurement of energy and ancillary services, scheduling coordinator services, and day-ahead and real-time trading.

- The City CCE should approve and adopt a set of protocols that would serve as the risk management tools for the City CCE and any third-party involved in the CCE portfolio operations. Protocols would define risk management policies and procedures, and a process for ensuring compliance throughout the City CCE. During the initial start-up period, the chosen electric suppliers would bear most risks and be responsible for their management. The protocols that cover electricity procurement activities should be developed before operations begin.

- The City CCE should be conservative and flexible in its approach to obtaining power supply resources necessary to meet load requirements. This might mean seeking a variety of low-priced power suppliers as opposed to a single, or few, suppliers.

- Additionally, it is recommended that the City CCE engage with a portfolio manager or schedule coordinator, who has expertise in risk management and would work with the City CCE to design a comprehensive risk management strategy for long-term operations.

10.8 Summary

This Study concludes that the formation of a CCE for the City of Irvine is financially feasible and could yield considerable benefits for all participating residents and businesses if the City chose to implement a CCE. These benefits could include 2% lower rates for electricity, although higher rate reductions are possible. The City would also see positive impacts for their constituents due to the formation and operation of a City CCE. The City CCE could develop a number of customer programs that the City CCE could administer. And a City CCE would help contribute to established or future City clean energy goals. A City CCE would provide local self-determination and governance for energy use in the City.

Appendix A – Projected Schedule

			2019												2020												2021				
	Task	Due Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Feasibility Report	Final Draft Report	3/29/2019																													
	CCA Ad Hoc Council Subcommittee Meeting	4/15/2019																													
	Council Presentation	5/1/2019																													
	Public Workshops	8/15/2019																													
Ordinance	Approval of Ordinance and Resolution to Create CCA	8/31/2019																													
Organizational Setup	Form JPA	9/1/2019																													
	Hire Executive Director	1/1/2020																													
	Hire Staff	6/1/2020																													
CPUC Registration	Prepare Implementation Plan																														
	File Implementation Plan with CPUC	1/1/2020																													
	CPUC completes review of IP	4/1/2020																													
	Register with CPUC and submit Bond	4/1/2020																													
	CPUC confirms registration	5/1/2020																													
Resource Adequacy	File Historic Load Data with CPUC/CEC	3/17/2020																													
	File Year-Ahead Load Forecast	4/20/2020																													
	Revised Year-Ahead RA Load Forecast	8/16/2020																													
	January Month-Ahead RA Load Forecast Due	10/15/2020																													
Power Procurement	RFP & Contract for Scheduling Coordinator/Portfolio Mng	7/1/2020																													
	Develop risk management and procurement plan	9/1/2020																													
	Power Purchase and Contracting	1/1/2021																													
Banking & Credit	RFP & Contract for Line of Credit	8/1/2020																													
	Finalize financial Plan and Rates	10/1/2020																													
	Transaction Testing with SDG&E	12/1/2020																													
Customer Noticing	RFP & Contract for Data Mgmt, Billing, Call Cntr, and Mrkt	8/1/2020																													
	Systems Testing with SDG&E	10/1/2020																													
	CCA Website Finalized	11/1/2020																													
	Call Center and CRM Operational	12/1/2020																													
	Pre-Enrollment Notice 1	1/1/2021																													
	Pre-Enrollment Notice 2	2/1/2021																													
	Customer Program Transitions Notice	3/1/2021																													
	Program Launch	4/1/2021																													
	Post-Enrollment Notice 1	4/8/2021																													
	Post-Enrollment Notice 2	5/10/2021																													

Appendix B – Pro Forma Analyses

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Revenues from Operations ($)										
Electric Sales Revenues for CCE	$87,300,494	$125,717,455	$130,924,253	$136,390,840	$141,055,380	$144,414,202	$153,190,614	$159,600,554	$166,249,910	$173,413,712
Less Uncollected Accounts	$436,502	$628,587	$654,621	$681,954	$705,277	$722,071	$765,953	$798,003	$831,250	$867,069
Total Revenues for CCE	$86,863,992	$125,088,868	$130,269,632	$135,708,886	$140,350,103	$143,692,131	$152,424,661	$158,802,551	$165,418,661	$172,546,643
Cost of Operations ($)										
Cost of Energy	$77,452,975	$112,625,953	$116,568,839	$122,027,099	$126,307,920	$130,968,052	$133,189,130	$137,523,525	$141,519,212	$145,705,564
Operating & Administrative										
Data Management	$1,202,534	$1,636,018	$1,679,108	$1,723,335	$1,772,576	$1,819,264	$1,867,183	$1,916,364	$1,966,840	$2,018,645
Scheduling Coordinator	$466,500	$633,403	$646,071	$658,993	$673,273	$686,738	$700,473	$714,482	$728,772	$743,348
SCE Fees (includes billing)	$153,260	$230,237	$231,667	$233,107	$234,679	$236,137	$237,605	$239,082	$240,568	$242,063
Consulting Services	$396,270	$325,853	$332,370	$339,018	$345,798	$352,714	$359,768	$366,964	$374,303	$381,789
Staffing	$1,259,955	$1,710,739	$1,744,954	$1,779,853	$1,818,421	$1,854,790	$1,891,885	$1,929,723	$1,968,317	$2,007,684
General & Administrative expenses	$417,588	$153,793	$163,371	$166,638	$170,249	$173,654	$177,127	$180,670	$184,283	$187,969
Debt Service Payment on Financing	$1,588,468	$2,213,394	$2,213,394	$2,213,394	$2,213,394	$624,926	$0	$0	$0	$0
Total O&A Costs	$5,484,575	$6,903,437	$7,010,936	$7,114,338	$7,228,390	$5,748,224	$5,234,042	$5,347,284	$5,463,083	$5,581,497
Total Cost of Operations	$82,937,550	$119,529,391	$123,579,775	$129,141,436	$133,536,310	$136,716,276	$138,423,171	$142,870,809	$146,982,295	$151,287,061
Net Income	$3,926,442	$5,559,478	$6,689,857	$6,567,449	$6,813,793	$6,975,856	$14,001,490	$15,931,742	$18,436,365	$21,259,582
Cash From Operations and Financing										
Net Income From Operations	$3,926,442	$5,559,478	$6,689,857	$6,567,449	$6,813,793	$6,975,856	$14,001,490	$15,931,742	$18,436,365	$21,259,582
Cash from Financing	$10,050,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Cash Available	$13,976,442	$5,559,478	$6,689,857	$6,567,449	$6,813,793	$6,975,856	$14,001,490	$15,931,742	$18,436,365	$21,259,582
Net Income Allocation										
Reserve Fund Contribution	$13,616,442	$5,559,478	$6,689,857	$6,567,449	$6,813,793	$6,975,856	$3,515,338	$0	$0	$0
Start-up Funding Payments + Bonds + Collateral	$360,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Working Capital Repayment (Remainder)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Money Available for Discretionary Programs	$0	$0	$0	$0	$0	$0	$10,486,152	$15,931,742	$18,436,365	$21,259,582
Total Cash Outlays	$13,976,442	$0	$0	$0	$0	$0	$10,486,152	$15,931,742	$18,436,365	$21,259,582
Rate Stabilization Reserve Balance	$13,616,442	$19,175,919	$25,865,776	$32,433,225	$39,247,018	$46,222,874	$49,738,212	$49,738,212	$49,738,212	$49,738,212
Reserve Balance Target	$27,267,140	$39,297,334	$40,628,967	$42,457,459	$43,902,349	$44,947,817	$45,508,988	$46,971,225	$48,322,946	$49,738,212
CCA Total Bill	$267,829,898	$345,875,383	$356,545,761	$367,553,985	$377,376,394	$389,037,704	$401,068,848	$413,481,810	$426,289,038	$439,503,358
SCE Total Bill	$273,295,815	$352,934,064	$363,822,205	$375,055,087	$385,077,954	$396,977,256	$409,253,920	$421,920,215	$434,988,814	$448,472,814
Difference	$5,465,916	$7,058,681	$7,276,444	$7,501,102	$7,701,559	$7,939,551	$8,185,072	$8,438,404	$8,699,776	$8,969,456
Savings	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%

Appendix C – Staffing and Infrastructure Detail

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Infrastructure										
Computers	51,000	-	-	-	-	-	-	-	-	-
Furnishings	51,000	-	-	-	-	-	-	-	-	-
Office Space	55,080	74,909	76,407	77,935	79,494	81,084	82,705	84,359	86,047	87,768
Utilities and other Office supplies	-	-	-	-	-	-	-	-	-	-
Board travel	5,508	7,491	7,641	7,794	7,949	8,108	8,271	8,436	8,605	8,777
Memberships	76,500	78,030	79,591	81,182	82,806	84,462	86,151	87,874	89,632	91,425
Energy Coalition	76,500	-	-	-	-	-	-	-	-	-
Total Infrastructure Costs	315,588	160,430	163,638	166,911	170,249	173,654	177,127	180,670	184,283	187,969
Consulting										
Legal/Regulatory	71,298	96,965	98,905	100,883	102,900	104,958	107,058	109,199	111,383	113,610
Advertising/Communication	-	-	-	-	-	-	-	-	-	-
Human Resources firm	-	-	-	-	-	-	-	-	-	-
Technical Consultants	-	-	-	-	-	-	-	-	-	-
Data Management	1,206,415	1,644,349	1,687,660	1,732,112	1,777,735	1,824,560	1,872,618	1,921,941	1,972,564	2,024,521
Financial Consulting	-	-	-	-	-	-	-	-	-	-
Accounting Services	-	-	-	-	-	-	-	-	-	-
IT	15,300	20,808	21,224	21,649	22,082	22,523	22,974	23,433	23,902	24,380
Ongoing Customer Support	153,000	208,080	212,242	216,486	220,816	225,232	229,737	234,332	239,019	243,799
Customer Notification	156,672	-	-	-	-	-	-	-	-	-
Total Consulting Costs (excl Data Mgmt)	396,270	325,853	332,370	339,018	345,798	352,714	359,768	366,964	374,303	381,789
Power Management										
Scheduling Coordinator	466,500	634,440	647,129	660,071	673,273	686,738	700,473	714,482	728,772	743,348
Staffing										
Internal Staff	-	-	-	-	-	-	-	-	-	-
Benefits	326,655	444,251	453,136	462,199	471,443	480,871	490,489	500,299	510,305	520,511
Temporary Staffing	-	-	-	-	-	-	-	-	-	-
Total Staffing Costs	1,259,955	1,713,539	1,747,810	1,782,766	1,818,421	1,854,790	1,891,885	1,929,723	1,968,317	2,007,684

Appendix D –CCE Cash Flow Analysis

	2021	2021	2021	2021	2021	2021	2021	2021	2021	2021	2021	2021
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1	2	3	4	5	6	7	8	9	10	11	12
Cash Basis												
Cash Flow												
Revenues												
CCA Generation Revenues	0	$0	$0	$0	$697,317	$6,256,635	$7,579,603	$13,931,219	$15,891,723	$16,839,483	$16,543,934	$9,560,581
Uncollected accounts	$0	$0	$0	$0	$3,487	$31,283	$37,898	$69,656	$79,459	$84,197	$82,720	$47,803
CCA Revenues based on Projected Rates	$0	$0	$0	$0	$693,830	$6,225,352	$7,541,705	$13,861,563	$15,812,264	$16,755,285	$16,461,215	$9,512,778
Expenses												
Power Supply												
Power Procurement	$0	$0	$0	$0	$6,191,965	$6,183,645	$7,468,411	$12,440,013	$13,764,163	$13,615,676	$9,628,366	$8,160,736
CCA Program Costs												
Data Management	$0	$0	$0	$132,710	$133,087	$133,087	$133,769	$133,291	$134,913	$134,704	$133,295	$133,680
Scheduling Coordinator	$0	$0	$0	$51,833	$51,833	$51,833	$51,833	$51,833	$51,833	$51,833	$51,833	$51,833
IOU Fees (including Billing)	$0	$0	$0	$0	$19,018	$19,072	$19,170	$19,102	$19,334	$19,304	$19,102	$19,157
Consultants (notification)	$78,336	$0	$78,336	$26,622	$26,622	$26,622	$26,622	$26,622	$26,622	$26,622	$26,622	$26,622
Staffing	$0	$0	$0	$139,995	$139,995	$139,995	$139,995	$139,995	$139,995	$139,995	$139,995	$139,995
General & Admin	$0	$0	$0	$134,232	$108,732	$108,732	$32,232	$6,732	$6,732	$6,732	$6,732	$6,732
Debt Payment	$0	$37,624	$37,624	$37,624	$184,450	$184,450	$184,450	$184,450	$184,450	$184,450	$184,450	$184,450
CPUC Bond	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SCE Bond	$260,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pre-Startup Carry Forward	$1,449,603											
Total Expenses	$1,887,939	$37,624	$115,960	$523,016	$6,855,702	$6,847,436	$8,056,482	$13,002,038	$14,328,041	$14,179,315	$10,190,395	$8,723,205
Cash flow												
Beginning Balance	$0	$162,061	$124,437	$8,477	$7,485,461	$1,323,589	$701,505	$186,728	$1,046,252	$2,530,476	$5,106,446	$11,377,266
Additions												
Revenues	$0	$0	$0	$0	$693,830	$6,225,352	$7,541,705	$13,861,563	$15,812,264	$16,755,285	$16,461,215	$9,512,778
Financing	$2,050,000	$0	$0	$8,000,000	$0	$0	$0	$0	$0	$0	$0	$0
Reductions including debt service	$1,887,939	$37,624	$115,960	$523,016	$6,855,702	$6,847,436	$8,056,482	$13,002,038	$14,328,041	$14,179,315	$10,190,395	$8,723,205
Ending Balance	$162,061	$124,437	$8,477	$7,485,461	$1,323,589	$701,505	$186,728	$1,046,252	$2,530,476	$5,106,446	$11,377,266	$12,166,839

Appendix E – Glossary

Ancillary Services: Those services necessary to support the transmission of electric power from seller to purchaser given the obligations of control areas and transmitting utilities within those control areas to maintain reliable operations of the interconnected transmission system.

aMW: Average annual Megawatt. A unit of energy output over a year that is equal to the energy produced by the continuous operation of one megawatt of capacity over a period of time (8,760 megawatt-hours).

Baseload Resources: Base load power generation resources are resources such as coal, nuclear, hydropower, and geothermal heat that are cheapest to operate when they generate approximately the same output every hour.

Basis Difference (Natural Gas): The difference between the price of natural gas at the Henry Hub natural gas distribution point in Erath, Louisiana, which serves as a central pricing point for natural gas futures, and the natural gas price at another hub location (such as for Southern California).

Buckets: Buckets 1-3 refer to different types of renewable energy contracts according to the Renewable Portfolio Standards requirements. Bucket 1 are traditional contracts for delivery of electricity directly from a generator within or immediately connected to California. These are the most valuable and make up the majority of the RECS that are required for LSEs to be RPS compliant. Buckets 2 and 3 have different levels of intermediation between the generation and delivery of the energy from the generating resources.

Bundled Customers: Electricity customers who receive all their services (transmission, distribution and supply) from the Investor-Owned Utility.

Bundled and Unbundled Renewable RECs: Unbundled Renewable Energy Credits (RECs) are those that have been disassociated from the electricity production originally represented and are sold separately from energy. Bundled RECs are delivered with the associated energy.

California Independent System Operator (CAISO): The organization responsible for managing the electricity grid and system reliability within the former service territories of the three California IOUs.

California Balancing Authority: A balancing authority is responsible for operating a transmission control area. It matches generation with load and maintains consistent electric frequency of the grid, even during extreme weather conditions or natural disasters. California has 8 balancing authorities. SCE is in CAISO.

California Clean Power (CCP): A private company providing wholesale supply and other services to CCEs.

California Energy Commission (CEC): The state regulatory agency with primary responsibility for enforcing the Renewable Portfolio Standards law as well as a number of other, electric-industry related rules and policies.

California Public Utilities Commission (CPUC): The state agency with primary responsibility for regulating IOUs, as well as Direct Access (ESP) and CCE entities.

Capacity Factor: The ratio of an electricity generating resource's actual output over a period of time to its potential output if it were possible to operate at full nameplate capacity continuously over the same period. Intermittent renewable resources, like wind and solar, typically have lower capacity factors than traditional fossil fuel plants because the wind and sun do not blow or shine consistently.

CleanPowerSF: CCE program serving customers within the City of San Francisco. CleanPowerSF began service to 7,800 "Phase 1" customers in May 2016.

Climate Zone: A geographic area with distinct climate patterns necessitating varied energy demands for heating and cooling.

Coincident Peak: Demand for electricity among a group of customers that coincides with peak total demand on the system.

Community Choice Aggregation (CCA): Method available through California law to allow cities and Counties to aggregate their citizens and become their electric generation provider.

Community Choice Energy: A City, County or Joint Powers Agency procuring wholesale power to supply to retail customers.

Community Choice Partners: A private company providing services to CCEs in California.

Congestion Charges: When there is transmission congestion, i.e. more users of the transmission path than capacity, the CaISO charges all users of the congested transmission path a "Usage Charge".

Congestion Revenue Rights (CRRs): Financial rights that are allocated to Load Serving Entities to offset differences between the prices where their generation is located and the price that they pay to serve their load. These rights may also be bought and sold through an auction process. CRRs are part of the CAISO market design.

Demand Side Resources: Energy efficiency and load management programs that reduce the amount of energy that would otherwise be consumed by a customer of an electric utility.

Demand Response (DR): Electric customers who have a contract to modify their electricity usage in response to requests from a utility or other electric entity. Typically, will be used to lower demand during peak energy periods, but may be used to raise demand during periods of excess supply.

Direct Access: Large power consumers which have opted to procure their wholesale supply independently of the IOUs through an Electricity Service Provider.

EEI (Edison Electric Institute) Agreement: A commonly used enabling agreement for transacting in wholesale power markets.

Electric Service Providers (ESP): An alternative to traditional utilities. They provide electric services to retail customers in electricity markets that have opened their retail electricity markets to competition. In California the Direct Access program allows large electricity customers to opt-out of utility-supplied power in favor of ESP-provided power. However, there is a cap on the amount of Direct Access load permitted in the state.

Electric Tariffs: The rates and terms applied to customers by electric utilities. Typically have different tariffs for different classes of customers and possibly for different supply mixes.

Enterprise Model: When a City or County establish a CCE by themselves as an enterprise within the municipal government.

Federal Tax Incentives: There are two Federal tax incentive programs. The Investment Tax Credit (ITC) provides payments to solar generators. The Production Tax Credit (PTC) provides payments to wind generators.

Feed-in Tariff (FIT): A tariff that specifies what generators who are connected to the distribution system are paid.

Firming: Firm capacity is the amount of energy available for production or transmission which can be (and in many cases must be) guaranteed to be available at a given time. Firm energy refers to the actual energy guaranteed to be available. Firming refers to the financial instrument to change non-firm power to form power.

Flexible Resource Adequacy: Flexible capacity need is defined as the quantity of economically dispatched resources needed by the California ISO to manage grid reliability during the greatest three-hour continuous ramp in each month.

Forward Prices: Prices for contracts that specify a future delivery date for a commodity or other security. There are active, liquid forward markets for electricity to be delivered at a number of Western electricity trading hubs, including SP15 which corresponds closely to the price location which the City of Davis will pay to supply its load.

Implied Heat Rate: A calculation of the day-ahead electric price divided by the day-ahead natural gas price. Implied heat rate is also known as the 'break-even natural gas market heat rate,' because only a natural gas generator with an operating heat rate (measure of unit efficiency) below the implied heat rate value can make money by burning natural gas to generate power. Natural gas plants with a higher operating heat rate cannot make money at the prevailing electricity and natural gas prices.

Integrated Resource Plan: A utility's plan for future generation supply needs.

Investor-Owned Utility (IOU): For profit regulated utilities. Within California there are three IOUs - Pacific Gas and Electric, Southern California Edison and San Diego Gas and Electric.

ISDA (International Swaps and Derivatives Association): Popular form of bilateral contract to facilitate wholesale electricity trading.

Joint Powers Agency (JPA): A legal entity comprising two or more public entities. The JPA provides a separation of financial and legal responsibility from its member entities.

Lancaster Choice Energy (LCE): A single-jurisdiction CCE serving residents of the City of Lancaster in Southern California. LCE launched service in October 2015 and served 51,000 customers.

LEAN Energy (Local Energy Aggregation Network): A not-for-profit organization dedicated to expanding Community Choice Aggregation nationwide.

Load Forecast: A forecast of expected load over some future time horizon. Short-term load forecasts are used to determine what supply sources are needed. Longer-term load forecasts are used for budgeting and long-term resource planning.

Local Resource Adequacy: Local requirements are determined based on an annual CAISO study using a 1-10 weather year and an N-1-1 contingency

Marginal Unit: An additional unit of power generation to what is currently being produced. At and electric power plant, the cost to produce a marginal unit is used to determine the cost of increasing power generation at that source.

Marin Clean Energy (MCE): The first CCE in California now serving residents and businesses in the Counties of Marin and Napa, and the cities of Richmond, Benicia, El Cerrito, San Pablo, Walnut Creek, and Lafayette.

Market Redesign and Technology Upgrade (MRTU): CAISO's redesigned, nodal (as opposed to zonal) market that went live in April of 2009.

Net Energy Metering (NEM): The program and rates that pertain to electricity customers who also generate electricity, typically from rooftop solar panels.

Non-bypassable Charges: Charges applied to all customers receiving service from Investor-Owned Utilities in California, but which are separated into a separate charge for departing load customers, such as Community Choice Aggregation and Direct Access Customers. These charges include charges for the Public Purpose Programs (PPP), Nuclear Decommissioning (ND), California Department of Water Resources Bond (CDWR), Power Charge Indifference Adjustment (PCIA), Energy Cost Recovery Amount (ECRA), Competition Transition Charge (CTC), Cost Allocation Mechanism (CAM).

Non-Coincident Peak: Energy demand by a customer during periods that do not coincide with maximum total system load.

Non-Renewable Power: Electricity generated from non-renewable sources or a source that does not come with a Renewable Energy Credit (REC).

On-Bill Repayment (OBR): Allows electric customers to pay for financed improvements such as energy efficiency measures through monthly payments on their electricity bills.

Operate on the Margin: Operation of a business or resource at the limit of where it is profitable.

Opt-Out: Community Choice Aggregation is, by law, an opt-out program. Customers within the borders of a CCE are automatically enrolled within the CCE unless they proactively opt-out of the program.

Peninsula Clean Energy (PCE): Community Choice Aggregation program serving residents and businesses of San Mateo County. PCE launched in October of 2016.

Pricing Nodes: The ISO wholesale power market prices electricity based on the cost of generating and delivering it from particular grid locations called nodes.

Power Charge Indifference Adjustment (PCIA): A charge applied to customers who leave IOU service to become Direct Access or CCE customers. The charge is meant to compensate the IOU for costs that it has previously incurred to serve those customers.

Power Purchase Agreement (PPA): The standard term for bilateral supply contracts in the electricity industry.

Portfolio Content Category: California's RPS program defines all renewable procurement acquired from contracts executed after June 1, 2010 into three portfolio content categories, commonly referred to as "buckets."

Renewable Energy Credits (RECs): The renewable attributes from RPS-qualified resources which must be registered and retired to comply with RPS standards.

Resource Adequacy (RA): The requirement that a Load-Serving Entity own or procure sufficient generating capacity to meet its peak load plus a contingency amount (15% in California) for each month.

Renewable Portfolio Standard (RPS): The state-based requirement to procure a certain percentage of load from RPS-certified renewable resources.

Scheduling Coordinator: An entity that is approved to interact directly with CAISO to schedule load and generation. All CAISO participants must be or have an SC. A scheduling coordinator provides day-ahead and real-time power and transmission scheduling services.

Scheduling Agent: A person or service that forecasts and monitors short term system load requirements and meets these demands by scheduling power resource to meet that demand.

Shaping: Function that facilitate and support the delivery of energy generation to periods when it is needed most.

Silicon Valley Clean Energy (SVCE): CCE serving customers in twelve communities within Santa Clara County including the cities of Campbell, Cupertino, Gilroy, Los Altos, Los Altos Hills, Los Gatos, Monte Sereno, Morgan Hill, Mountain View, Saratoga, Sunnyvale, and the County of Santa Clara. As of the date of completion of this Study, SVCE had not yet launched service.

Sonoma Clean Power (SCP): A CCE serving Sonoma County and Sonoma County cities. On December 29th, SCP received approval of their implementation plan from the California Public Utilities Commission to extend service into Mendocino County.

SP15: Refers to a wholesale electricity pricing hub - South of Path 15 - which roughly corresponds to SCE and SCE's service territory. Forward and Day-Ahead power contracts for Northern California typically provide for delivery at SP15. It is not a single location, but an aggregate based on the locations of all the generators in the region.

Spark Spread: The theoretical grow margin of a gas-fired power plant from selling a unit of electricity, having bought the fuel required to produce this unit of electricity. All other costs (capital, operation and maintenance, etc.) must be covered from the spark spread.

Supply Stack: Refers to the generators within a region, stacked up according to their marginal cost to supply energy. Renewables are on the bottom of the stack and peaking gas generators on the top. Used to provide insights into how the price of electricity is likely to change as the load changes.

System Resource Adequacy: System requirements are determined based on each LSEs CEC adjusted forecast plus a 15% planning reserve margin.

Vintage: The vintage of CRS applicable to a CCE customer is determined based on when the CCE commits to begin providing generation services to the customer. CCEs may formally commit to become the generation service provider for a group of customers

Weather Adjusted: Normalizing energy use data based on differences in the weather during the time of use. For instance, energy use is expected to be higher on extremely hot days when air conditioning is in higher demand than on days with comfortable temperature. Weather adjustment normalizes for this variation.

Western Electric Coordinating Council (WECC): The organization responsible for coordinating planning and operation on the Western electric grid.

Wholesale Power: Large amounts of electricity that are bought and sold by utilities and other electric companies in bulk at specific trading hubs. Quantities are measured in MWs, and a standard wholesale contract is for 25 MW for a month during heavy-load or peak hours (7am to 10 pm, Mon-Sat), or light-load or off-peak hours (all the other hours).

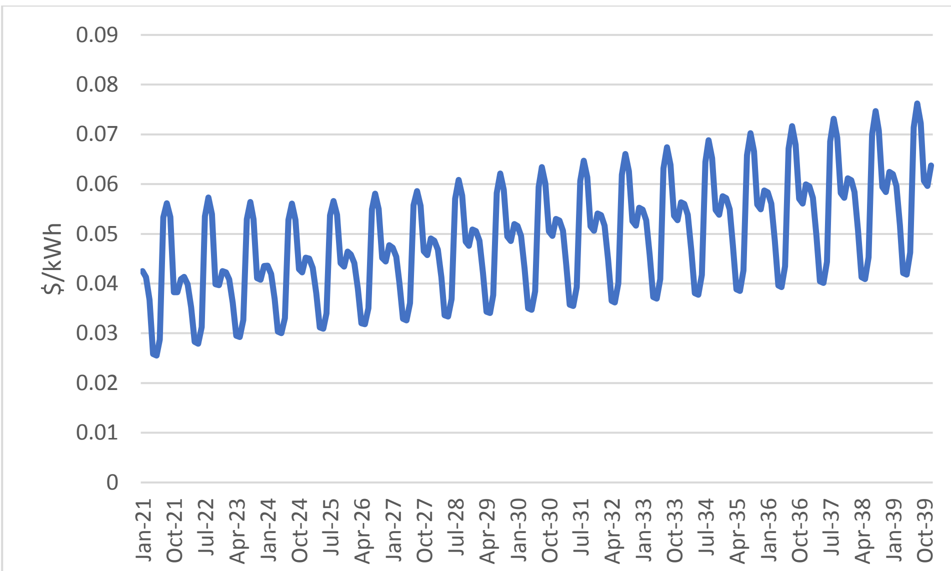
Western States Power Pool (WSPP) Agreement: Common, standardized enabling agreement to transact in the wholesale power markets.

Appendix F – Power Supply Detail

Wholesale Market Prices

Market prices for SCE, which is the SCE price market location, were provided by EES Consulting's subscription to a market price forecasting service. Figure F-1 below shows forecast monthly southern California wholesale electric market prices. The levelized value of market prices over the 10-year study period is $0.0407/kWh (2019$) assuming a 4% discount rate. Electric market prices peak in the winter and summer when there is large heating and cooling load.

Figure F-1
Forecast Southern California Wholesale Market Prices



Wholesale power prices have been used to calculate balancing market purchases and sales. When the CCE's loads are greater than its resource capabilities, the CCE's scheduling coordinator would schedule balancing purchases and the CCE would incur balancing market purchase costs. When the CCE's loads are less than its resource capabilities, the CCE's scheduling coordinator would transact balancing sales and the CCE would receive market sales revenue. Balancing market purchases and sales can be transacted on a monthly, daily and hourly pre-schedule basis.

Ancillary and Congestion Costs

The CCE would pay the CAISO for transmission congestion and ancillary services. Transmission congestion occurs when there is insufficient capacity to meet the demands of all transmission customers. Congestion refers to a shortage of transmission capacity to supply a waiting market and is marked by systems running at full capacity and still being unable to serve the needs of all customers. The transmission system is not allowed to run above its rated capacities. Congestion is managed by the CAISO by charging congestion charges in the day-ahead market. Congestion charges can be managed with Congestion Revenue Rights (CRR). CRRs are financial instruments made available through a CRR allocation, a CRR auction, and a secondary registration system. CRR holders manage variability in congestion costs. The CCE's congestion charges would depend on the transmission paths used to bring resources to load. As such, the location of generating resources used to serve the CCE load would impact these congestion costs.

The Grid Management Charge (GMC) is the vehicle through which the CAISO recovers its administrative and capital costs from the entities that utilize the CAISO's services. Based on a survey of GMC costs currently paid by CAISO participants, the CCE's GMC costs are expected to be near $0.5/MWh.

The CAISO performs annual studies to identify the minimum local resource capacity required in each local area to meet established reliability criteria. Load serving entities receive a proportional allocation of the minimum required local resource capacity by transmission access charge area and submit resource adequacy plans to show that they have procured the necessary capacity. Depending on these results of the annual studies, there may be costs associated with local capacity requirements for the CCE.

Because generation is delivered as it is produced and, particularly with respect to renewables can be intermittent, deliveries need to be firmed using ancillary services to meet the CCE's load requirements. Ancillary services would need to be purchased from the CAISO. Regulation and operating reserves are described below.

- *Regulation Service:* Regulation service is necessary to provide for the continuous balancing of resources with load and for maintaining scheduled interconnection frequency at 60 cycles per second (60 Hertz). Regulation and frequency response service is accomplished by committing on-line generation whose output is raised or lowered (predominantly using automatic generating control equipment) and by other non-generation resources capable of providing this service as necessary to follow the moment-by-moment changes in load.

- *Operating Reserves - Spinning Reserve Service:* Spinning reserve service is needed to serve load immediately in the event of a system contingency. Spinning reserve service may be provided by generating units that are on-line and loaded at less than maximum output and by non-generation resources capable of providing this service.

- *Operating Reserves – Non-Spinning Reserve Service:* Non-spinning reserve service is available within a short period of time to serve load in the event of a system contingency. Non-spinning reserve service may be provided by generating units that are on-line but not providing power, by quick-start generation or by interruptible load or other non-generation resources capable of providing this service.

Based on a survey of ancillary service costs currently paid by CAISO participants, the CCE's ancillary service costs are estimated to be near $0.0036/kWh. The Study's base case assumes ancillary service costs are $0.0036/kWh in 2020, escalating by 20% through 2026 and 5% annually thereafter. Serving a greater percentage of load with renewables would likely result in increased grid congestion and higher ancillary service costs. The scenarios included in this Study as shown below in Exhibit F-2.

Exhibit F-2
Base Case Ancillary Service Costs in Resource Portfolios

Portfolio	2019 Ancillary Service Costs, $/kW-month	Annual Escalation Factor
1- Meet RPS Targets	3.6	20% 2021-2026, 5% 2027+
2- Serve 50% of Retail Load with Renewables	3.6	20% 2021-2026, 5% 2027+
3- Serve 100% of Retail Load with Renewables	3.6	20% 2021-2026, 5% 2027+

Scheduling Coordinator Services

A scheduling coordinator provides day-ahead and real-time power and transmission scheduling services. Scheduling coordinators bear the responsibility for accurate and timely load forecasting and resource scheduling including wholesale power purchases and sales required to maintain hourly load/resource balances. A scheduling coordinator needs to provide the marketing expertise and analytical tools required to optimally dispatch the CCE's surplus resources on a monthly, daily, and hourly basis.

The CCE's scheduling coordinator would need to forecast the CCE's hourly loads as well as the CCE's hourly resources including shares of any hydro, wind, solar, and other resources in which the CCE is a participant/purchaser. Forecasting the output of hydro, wind, and solar projects involves more variables than forecasting loads. Scheduling coordinators already have models set up to accurately forecast hourly hydro, wind, and solar generation. Accurate load and resource forecasting would be a key element in assuring the CCE power supply costs are minimized.

A scheduling coordinator also provides monthly checkout and after-the-fact reconciliation services. This requires scheduling coordinators to agree on the amount of energy purchased and/or sold and the purchase costs and/or sales revenue associated with each counterparty with which the CCE transacted in a given month.

A scheduling coordinator provides day-ahead and real-time power and transmission scheduling services. Scheduling coordinators bear the responsibility for accurate and timely load forecasting and resource scheduling including wholesale power purchases and sales required to maintain hourly load/resource balances. A scheduling coordinator needs to provide the marketing expertise and analytical tools required to optimally dispatch the CCE's surplus and deficit resources on a monthly, daily and hourly basis.

Inside each hour, the CAISO Energy Imbalance Market (EIM) takes over load/resource balancing duties. The EIM automatically balances loads and resources every fifteen minutes and dispatches least-cost resources every 5-minutes. The EIM allows balancing authorities to share reserves, and more reliably and efficiently integrate renewable resources across a larger geographic region.

Within a given hour, metered energy (i.e., actual usage) may differ from supplied power due to hourly variations in resource output or unexpected load deviations. Deviations between metered energy and supplied power are accounted for by the EIM. The imbalance market is used to resolve imbalances between supply and demand. The EIM deals only with energy, not ancillary services or reserves.

The EIM optimally dispatches participating resources to maintain load/resource balance in real-time. The EIM uses the CAISO's real-time market, which uses Security Constrained Economic Dispatch (SCED). SCED finds the lowest cost generation to serve the load considering operational constraints such as limits on generators or transmission facilities. The five-minute market automatically procures generation needed to meet future imbalances. The purpose of the five-minute market is to meet the very short-term load forecast. Dispatch instructions are effectuated through the Automated Dispatch System (ADS).

The CAISO is the market operator and runs and settles EIM transactions. The CCE's scheduling coordinator would submit the CCE's load and resource information to the market operator. EIM processes are running continuously for every fifteen-minute and five-minute interval, producing dispatch instructions and prices.

Participating resource scheduling coordinators submit energy bids to let the market operator know that they are available to participate in the real-time market to help resolve energy imbalances. Resource schedulers may also submit an energy bid to declare that resources will increase or decrease generation if a certain price is struck. An energy bid is comprised of a megawatt value and a price. For every increase in megawatt level, the settlement price also increases.

The CAISO calculates financial settlements based on the difference between schedules and actual meter data and bid prices during each hour. Locational Marginal Prices (LMP) are used in settlement calculations. The LMP is the price of a unit of energy at a particular location at a given time. LMPs are influenced by nearby generation, load level, and transmission constraints and losses.