Community Choice Energy:
What Is the Local Economic Impact?
San José, California, Case Study



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Presented by Center for Climate Protection

center for climate protection

Economic Analysis Prepared by fosterra™ Clean Energy Consulting

Introduction from the Executive Director

The Center for Climate Protection is pleased to present this report about potential local economic benefits from Community Choice Energy (CCE).

The purpose of this report is to support Community Choice entities in realizing the vision to be game-changing innovation platforms, and to take strategic steps today to become increasingly competitive in the dynamic energy market of the future. To accomplish this, CCEs must be more than mini Investor Owned Utilities (IOUs).

Commendably, California's CCEs currently provide their customer's electricity with a higher mix of renewables at lower rates than their competition. Emerging CCEs aim to follow suit. And there are many of them. By 2020, CCEs may serve as much as sixty percent of the eligible California market.

CCEs decide the mix of local and remote sources of electricity. What factors must CCEs consider when making the decision about their energy mix, in addition to the cost of electricity? This study attempts to assist in making such decisions by quantifying the local economic benefits from procuring power from local sources.

Fourteen experts from the solar industry, the policy arena, economics, and CCE have reviewed this report. From a business-as-usual perspective, some of the scenarios we examine may seem aggressive, but energy market policies and system structures are all changing in California, and we believe Community Choice can help accelerate and take advantage of those changes. What seems challenging today will be much easier in just a few years.

This report focuses on solar photovoltaic because of this technology's proven track record for scalability, the beneficial experience that California CCEs have demonstrated with solar, and the existence of a tested model for estimating the local economic impact of solar deployment.

It also focuses on San Jose, California. Since 2013 the Center for Climate Protection has worked in Silicon Valley, especially San Jose, to educate community leaders on the benefits of Community Choice Energy. We chose this region due to its size and influence. It has the human, financial, and technological resources to contribute significantly to the evolution of the CCE model in California, while increasing the benefits to the community.

This report is just a start in quantifying the economic impacts of Community Choice Energy. We hope that it stimulates further research on the topic.

Sincerely,

Ann Hancock
Executive Director
Center for Climate Protection

Abstract

This report is intended to support policymakers, specifically those in San José, to realize the vision of Community Choice Energy (CCE[1]) as a game-changing innovation platform. It begins to address the question: *To what extent will the community realize local economic benefits from local clean energy development enabled by a CCE program?*

The report evaluates three potential scenarios of local clean energy purchasing as part of a San José CCE strategy to increase renewable power supplied to their customers. The report describes the rationale for each scenario as well as the approach and assumptions used in the analysis. Economic impacts focus on total incremental jobs and economic growth, with annual estimates over a six-year period through 2023. For the purpose of this analysis, the primary clean energy technology is solar photovoltaic, and the "local region" includes the City of San José and surrounding Santa Clara, San Mateo, and Alameda Counties.

This report finds that local economic benefit is directly correlated with local renewable energy investment. Under the scenario with the highest level of local solar deployment, this report projects more than 2,000 jobs per year will be created regionally from CCE activity, with an associated $1.25 billion of incremental economic activity over six years, from 2018 to 2023. Using current deployment percentages by jurisdiction, San José could realize $425 million of the total estimated economic impact within the city itself.

[1] *This paper uses Community Choice Energy and the abbreviation CCE to refer to the policy also known as Community Choice Aggregation or CCA.*

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Fosterra is a clean energy consulting firm dedicated to accelerating sustainable practices and projects worldwide for the public sector, public companies, and utilities. Its principal, Ben Foster has worked in over 300 jurisdictions across the United States and in China on clean energy policy, programs, and projects from planning to implementation. *www.fosterra.com*

Report Background and Purpose

Policymakers considering Community Choice Energy[2] programs invariably ask two related questions: Will the program boost the local economy, and if yes, to what extent? Until recently, data to answer these questions was mostly unavailable due to a lack of operating CCE programs in California. In the absence of relevant data, technical analyses conducted for California CCEs[3] estimated local economic benefits of renewables using models of general economic impact without consideration of locally-driven renewable deployment and its related impact.

Now that four operational CCE programs exist in the state[4], data can begin to be extracted from them based on their current and projected energy procurement. To conduct the analysis of this data, the Center for Climate Protection engaged and worked with Fosterra Consulting, an independent firm with expertise in economic impact analyses of clean energy deployment. Fosterra developed the approach, analyses, and findings for this report.

In 2002 Community Choice law, Assembly Bill 117, was passed in California. Community Choice, once adopted by a community, becomes the default electricity service provider in its service territory. Customers who wish to remain with the incumbent utility must opt out of the CCE. Given this program design, when the service "cut-over" occurs at the launch of a CCE program, the millions of dollars of generation revenues are redirected from the control of the utility to the control of the newly formed CCE agency. In San José for example, about $356 million will be redirected into the control of the city's CCE agency.[5] This is the single most powerful economic aspect of Community Choice because it can leverage billions in investments over time to purchase electricity that is generated locally.

Three common goals of California CCEs are to deliver competitive rates, reduce greenhouse gas emissions, and increase local economic activity. But these goals can conflict. For example, renewable energy generated locally may be more expensive than renewable energy generated remotely. This report is intended to fill a knowledge gap about the economic benefits of locally-generated renewables, help policymakers navigate the tradeoffs among goals, and support more informed decisions.

The purpose of this report is to support San José policymakers and stakeholders as they consider a potential CCE program for their jurisdiction, and to enhance the broader dialogue about the

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[2] This report assumes that readers are familiar with CCE basics. For readers who would appreciate more background information on CCEs, this is provided starting on page 21.
[3] See, for example, a recent study from Peninsula Clean Energy that has calculated a range of potential total statewide economic impacts from a new CCE, but does not specifically contain local deployment scenarios. http://www.peninsulacleanenergy.com/resources/technical-study/
[4] Currently operational CCEs are Marin Clean Energy, Sonoma Clean Power, Lancaster Choice Energy, and the newly operationalized CleanPowerSF. Peninsula Clean Energy will start serving customers in October 2016.
[5] This figure represents the total annual energy purchases for the CCE and is based on the estimated CCE total sales of 3,556.5 million kWh per year times the average supply cost that PG&E currently pays per their latest annual report.

benefits of Community Choice, using San José as an example. This report is intended to be indicative, not comprehensive, and focuses on local energy generation, one part of CCE activity and benefits. Although CCEs can create local programs in energy efficiency, storage, electric vehicle charging, and other new technologies, this report addresses only the impact of local solar photovoltaic development.[6]

This analysis projects the economic impact of investments in local renewable energy that a San José CCE might make. Renewable energy generated at large, remote solar and wind projects may cost less per kilowatt hour than that from local sources. However, local renewable energy investments provide benefits in addition to generated electricity, including local job creation and economic development, and avoided resource adequacy procurement[7]. Future benefits for a CCE include potential synergy between development of local resources and creation of grid services, storage and microgrids, low-carbon fuel standard credits for electric vehicle charging, and others, all of which could add value to customers.

A more precise assessment of the economic value of these benefits is crucial to CCEs that are developing their integrated resource plans (assessing their current and future energy supply and demand), and to local decision makers as they allocate resources among procurement, local development, and financial reserves. This study moves us along the path of increasingly precise assessments. Tariff rate setting is not included in this analysis, nor any calculations of cost savings and related economic impact from various levels of customer electricity costs. While reduction of rates within a CCE are possible and have been realized by the three CCEs that were studied, there are a large number of factors, both objective and subjective, that go into ratemaking. Therefore, we defer that aspect of the analysis to the full feasibility assessment for a potential San José CCE and future operational planning processes.

Analytical Methods, Inputs, and Scenarios

This analysis began with interviews of representatives of three operational CCEs in California: Marin Clean Energy, Sonoma Clean Power, and Lancaster Choice Energy. The purpose of the interviews was to discover and understand the CCEs' goal-setting processes, local benefits, project tracking, and other factors used to guide their performance. Interview responses were combined with statewide goals to formulate three scenarios as a range of potential adoption levels of San José CCE's local renewable procurement. The scenarios were used to forecast potential outcomes including economic impacts corresponding to each of the scenarios.

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[6] Although additional technologies were considered, solar photovoltaic was the only renewable energy source used in this analysis due to solar's scalability, its broad potential for deployment, the successful track records with solar for existing CCEs, and the availability of outstanding solar resources.

[7] Resource adequacy is a mandatory planning and procurement process to ensure resources are secured by load serving entities to meet the ISO's forecast system, local, and flexible capacity needs. More information about topic in California can be found at: https://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Reliability%20Requirements

Table 1 below summarizes selected attributes of each CCE that was evaluated:

Table 1 CCE Attributes

CCE Attributes	San José	MCE	SCP	LCE
Territory Served	City of San José	Marin County, Napa County, Benicia, El Cerrito, Richmond, San Pablo, Walnut Creek, Lafayette	Sonoma County	City of Lancaster
Local Region	Santa Clara County, San Mateo County, Alameda	Territory + 100 mile radius	Sonoma County	Antelope Valley
Land Area (sq. mi.)	2,477	1,397	1,576	95
Population (SJC)	1,015,785	680,979	502,146	168,049
CCE Sales 2020 Est. (MWh)	3,556,613	3,000,000	2,406,000	554,000
Green Program Offers	TBD	50%, 100%	36%, 100%	35%, 100%
Total Renewable Energy Goal	TBD	80% by 2020	50% by 2020	In Progress

Key concepts and terms used to build the scenarios are defined as follows:

CCE Territory – The defined service territory where CCE customers are served.

Local Region – The area where clean energy systems can be located to generate power for the CCE and drive local economic benefits, which includes the CCE territory and potentially adjacent or nearby areas as recognized by CCE leadership. Local geographic and built-environment constraints and costs may impact the amount of renewable energy generation from within this area.

CCE Sales – The total estimated annual aggregated electricity that is consumed and sold within the CCE territory to CCE customers (not including customers who remain as bundled customers of the incumbent utility). The CCE-specific consumption is the total volume of usage from customers that have opted-in to the CCE and therefore is available to be re-directed to incorporate more local renewables. For this analysis, only City of San José electricity consumption has been used based on 2015 data from PG&E, with a further refinement that residential and commercial loads are included (less estimates for opt-out customers), but not industrial or direct access loads due to their low rate schedules and unique contracting requirements. If any customers in excluded categories opt-in to the CCE, the base aggregated load served by the CCE would increase.

Planning Horizon – This analysis forecasts potential impacts starting in 2018 and going through 2023. The basis for this timeframe is the forecast that a new potential CCE in San José would be fully in place and capable of effectively procuring local supply as early as the beginning of 2018, and the fact that the Investment Tax Credit for solar PV would be at its maximum under current law through 2020, and then declining until expiring in 2023.[8]

[8] *Source: SEIA Solar Investment Tax Credit Factsheet accessed April 2016, http://www.seia.org/policy/finance-tax/solar-investment-tax-credit*

Solar Photovoltaics (PV) – Electricity production from direct conversion of sunlight into electricity. This is the technology selected for forecast in this analysis due to its enormous growth and potential in California for both medium-scale and distributed generation at competitive costs in nearly every community. The type and size of solar PV deployment used for the forecasts in this report is primarily in the commercial to small utility-scale.

Current Trends – As of December 2015, total non-distributed generation solar deployment in the three county San José region was 27MW of combined capacity.[9] This forms the baseline for "business as usual" with PG&E. For forecasting purposes, this scale of deployment is not material to the analysis of the three scenarios but is shown for reference purposes.

Land Area –Total land area within the local region that may be used for local renewable deployment, both developed and un-developed.

Population – Population within the CCE territory that may directly benefit from increased economic activity and CCE programs.

Jobs and Job-Years – All job numbers included in this report are in job-years, as typically treated in the federal solar job forecasting model. The number of jobs created in any given year depends on the speed of project deployment and variables including the type of job and how they are created or maintained, so for clarity and consistency they have been calculated using job-years. For example: one full-time job for one year is one job-year. If that job continues for another 12 months, it's two job years. 12,000 job-years means that on average 2,000 distinct full-time equivalent jobs were created and retained for a 6-year period.

Assumptions used as inputs to the economic analysis are described in the reference section at the end of this report.

Scenario-Specific Assumptions and Inputs

Three scenarios were developed for renewables deployment in the San José local region within the planning horizon by 2023, expressed in percentage of total CCE electricity consumption. It is assumed that total renewables provided to customers will be higher than the amounts in the scenarios because the CCE's power mix will include renewables generated both inside and outside the local region. This analysis' economic impact calculations are limited to the portion of the renewables generated inside the local region. For San José the local region includes the City of San José and the rest of Santa Clara County, plus San Mateo and Alameda Counties.[10]

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[9] Source: table 3 from CPUC renewables report accessed May 2016, http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf

[10] As of June 2016, both San Mateo County and Alameda County are evaluating the implementation of their own CCEs, which could create competition for local solar sites while supporting greater local economic impact.

Development of these scenarios is based on the following goals for CCE resource planning:

- Desire to provide levels of renewable energy that exceed current statewide RPS goals
- Ability to direct project activity to local or preferred sites
- Goals to improve the regional environment, economy, and energy choices
- Reasonable deployment given availability of property, resources, and costs

In 2015, solar installation capacity in Santa Clara County reached 129 megawatts (MW[11]). Across the three-county region, total solar capacity reached 227 MW.[12] Business-as-usual (BAU) expectations are that solar deployment will continue to grow through voluntary customer action, but not at a sufficient rate to achieve local and state renewable energy goals[13].

Scenario 1: Conservative Target – 10% solar PV from local region by 2023

This scenario represents a "conservative target" for new locally-produced clean energy as a baseline for beginning to realize positive economic impact from CCE implementation.

Rationale: There is ample potential for deployment of solar PV across all scenarios. However if significant obstacles are encountered due to permitting, interconnection, or other challenges, this 10% target represents a minimum, conservative goal for deployment that should be attainable within the planning horizon under nearly any circumstance. This level of deployment would be well below two of the currently operating CCE local renewable target levels but still result in faster implementation than current regional trends, and would likely be strongly supported as a baseline by CCE leaders and regional stakeholders.

Scenario 2: Growth Target – 20% solar PV from local region by 2023

This scenario represents a "growth target" for locally-produced clean energy based on the potential for generating significant new local jobs and economic activity.

Rationale: As of 2015, PG&E had already reached 28% renewable energy content in their supply. However, it is not sourced evenly statewide. In contrast, a CCE could direct power procurement dollars locally. Sonoma Clean Power is close to reaching 20% locally-sourced renewables[14] and intends to continue supporting local deployment beyond this level. Based on Marin Clean Energy's latest Integrated Resource Plan, including their forecast for total local net metered solar, feed-in-tariff projects, and direct PPA procurement will approach nearly 20% of total load by 2021.[15]

Scenario 3: Leadership Target – 33% solar PV from local region by 2023

[11] *All solar capacity shown in megawatts (MW) is using nameplate capacity in DC (direct current).*
[12] *Sources: http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf and https://www.californiasolarstatistics.ca.gov/reports/locale_stats/*
[13] *Existing utility BAU assumptions for this analysis are that the majority of CCE impact does not include NEM deployment because consumers can and will largely continue to adopt solar on-site based on available rate tariffs which are not within the scope of this report. Rather, the addressable impact is for non-NEM deployment, specifically RPS-compliant solar project development, which has been included in the BAU baseline trend.*
[14] *SCP was in the unique position of being able to procure at launch geothermal power from the world's top resource, The Geysers in Sonoma County.*
[15] *MCE had a relatively long ramp-up period due to hurdles they faced as the first CCE in California. Subsequent CCEs benefit from MCE's effort, as well as from decreased renewable energy costs, and therefore can achieve these baseline targets sooner.*

This scenario is considered a "leadership target" because it aligns with statewide goals and enables significant progress toward overall clean energy deployment in California and nationally. Rationale: This target tracks with the current statewide goal by 2020 for total renewables and supports the City of San José's established target of 100% clean energy communitywide by 2022 according to its green vision goals.[16] It assumes that the CCE could procure solar PV within the local region using a variety of tools and project types to meet this goal while also procuring additional supply outside of the area. As a point of reference, the overall renewable energy goals for SCP and MCE by 2020 are 50% and 80% respectively.

It is assumed that the levels of local power electricity supply procurement described in the three scenarios would not be achieved if San José continues to receive power procured by PG&E, based upon the company's existing procurement practices and construction of utility owned generation. Also, it is assumed that all contracted renewable supply will be cost competitive with the blended average of alternatives and less than PG&E average electricity supply costs.

According to PG&E's latest financial report (2015), their current average cost of procured electricity is $0.10/kWh.[17] Looking forward, PG&E's latest general rate case filing requests and subsequent settlement agreement indicate increases to total electric generation revenue of 7.8%, 4.0%, 3.2%, and 3.1% for 2017 through 2020 respectively,[18] indicating that costs will continue to increase, even in light of low natural gas prices. Fortunately, both MCE and SCP are seeing new solar PPA supply contracts for large-scale projects currently being offered at prices that are very close to average wholesale system energy supply costs, and are likely to continue to be cost competitive by 2018 and beyond. Additionally, both MCE and SCP have net metering and local procurement programs (including feed-in-tariffs and collaborative development with municipal partners) to further encourage local solar PV supply. Even though these distributed generation resources cost significantly more, their development supports important regional goals for renewable energy deployment and creates local economic stimulus that utility-scale renewable energy outside of the region does not.

Economic Impact Analysis - JEDI Model

Incremental economic impact estimates were made using the National Renewable Energy Labs Jobs and Economic Development Impact model (NREL JEDI)[19] starting with new solar PV capacity requirements for each scenario listed above using average solar system productivity levels in the region. Regional impacts are divided into three categories for both jobs and economic growth:

1. Direct - created directly from new project activity. These jobs are primarily in construction and trades working on-site or in preparation for on-site activities.

[16] Source: San José website: http://www.sanjoseculture.org/index.aspx?NID=2737
[17] Source: PG&E 2015 Annual report accessed April 2016, http://s1.q4cdn.com/880135780/files/doc_financials/2015/2015-Annual-Report-Final.pdf
[18] Source: http://www.ora.ca.gov/general.aspx?id=2034
[19] Latest NREL JEDI Model 03.24.14 was used for this analysis

2. Indirect - created in support of new project activity. These jobs are primarily in project development, financing, services, and sales.
3. Induced - created as a result of the incremental spending and activity from the Direct and Indirect categories. These jobs are in a large variety of areas including services and retail where direct and indirect employees spend their earnings.

Inputs and assumptions for the JEDI model calculations took into consideration California-based pay scales, permitting, taxes, costs, and induced impacts from local purchasing. Equipment sourcing assumptions were adjusted for local sources of solar panels, inverters, equipment, sub-contractors and financing. San José is fortunate that many of the leading companies in these fields are located within the region and therefore the local region would benefit from a higher level of economic impact from a CCE's clean power procurement than most regions in California or nationally. Detailed inputs for the economic modeling are provided in the Reference section of this report.

Additional Considerations Regarding the Existing Investor-Owned Utilities

CCEs exist in a dynamic business environment that has a multitude of interested parties and market participants, including regulatory bodies, local officials, and competitive utilities. These forces will impact CCE operations, customer offers, costs, and prices. While this report contemplates a fairly consistent set of market rules and alternative offers from PG&E, the utility serving San José, future developments that may impact this analysis include:

- *Programs for customers* – PG&E may expand its offers for customers to serve their desire for more clean energy at affordable price points. They may also provide value-added services in new technologies in novel ways that a CCE may not be able to match.

- *Competition for renewable energy development* – As PG&E seeks to meet California's 50% mandate for clean power, their efforts may become more aggressive in local power purchasing, both increasing economic activity and perhaps driving costs of development up if available space, equipment, and labor becomes scarce. Beyond 2020, renewable incentives within the federal investment tax credit (ITC) are scheduled to sunset from the current 30% level and return to standard levels of 10%.

- *Negative economic incentives for CCEs* – In response to the increasing volume of customer purchases that are served by a CCE instead of an investor-owned utility (IOU), either regulators or the IOUs or both may begin to adopt pricing structures that further increase costs of operation and electricity purchases for CCEs and their customers. These include higher exit fees and/or power charge indifference adjustments which can add up to 14% to a CCE customer's total electricity bill.

- *Interconnection for distributed generation* – The current processes are controlled and managed by the IOU in CCE territory, and are subject to future changes, restrictions, and incremental costs that could discourage solar project development either because of

complexity, additional requirements, or upgrade costs making project not economically feasible in both residential and non-residential sectors.

- *Rate tariff changes* – The various applicable tariffs for interconnected solar projects are undergoing revisions that over time may or may not be favorable to solar project owners. In addition to the potential impact to pure cost-benefit calculations, the uncertainty about future rates can also discourage investment in new projects.

- *Collaboration opportunities* – PG&E and CCEs may find ways to collaborate on customer services, programs, electric vehicles charging, and other opportunities that enable better outcomes for all parties.

CCE Programs and Goal Setting

CCE agencies can implement numerous programs to drive renewable deployment locally and realize the related benefits, often faster and more efficiently than a traditional investor-owned utility. These programs can be operationalized via an integrated resource planning process that incorporates specific goals, timelines, and budget based on target levels of local impact using the scenarios provided in this report, or others. Examples of CCE-driven programs, both solar and non-solar related, include the following:

- Annual "open season" for new regional project development
- Aggregated project development for residential and/or commercial sectors
- Feed-in-tariffs
- Enhanced net metering tariff
- Electric vehicle adoption programs
- Aggregated demand management programs
- Targeted project financing programs
- Low income customer solar discounts
- Electric storage purchasing programs
- Collaborative efforts with local officials to streamline permitting

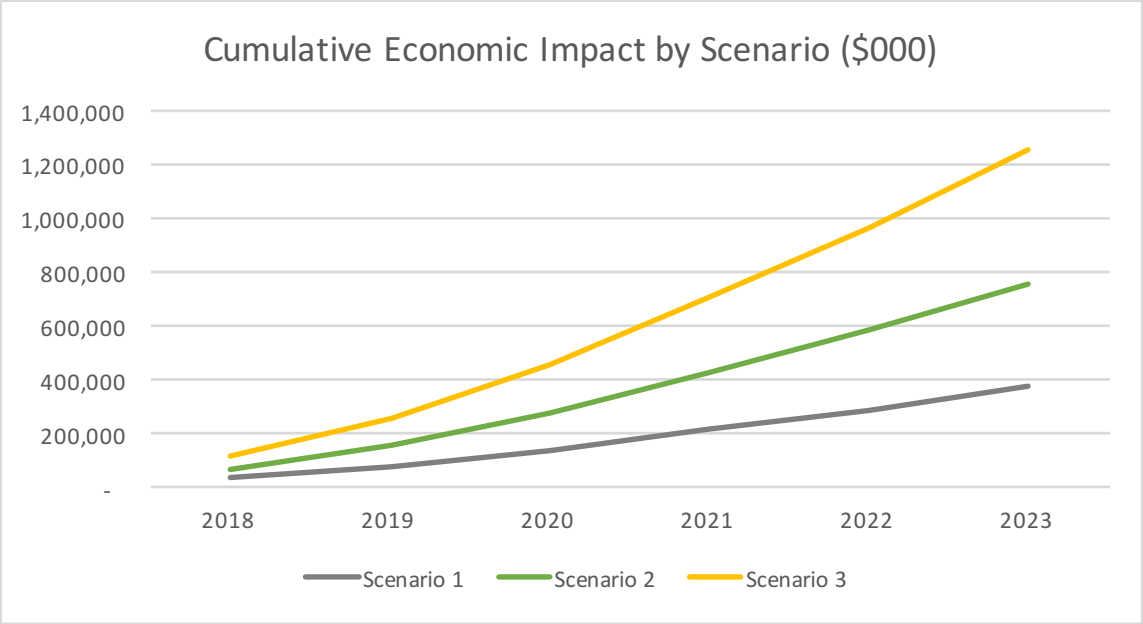
Economic Impact Findings

This section summarizes the increased economic activity through 2023 based on the three scenarios described above. The local region has significant potential for siting of new renewables, driving economic and environmental benefits for San José residents including potential electricity cost savings, new jobs, improved capture of clean energy resources, and increased direct, indirect and induced economic activity. The directly comparable BAU activity within the region that is shown in Table 3 below is renewable non-distributed

San José has the potential to realize up to $1.25 Billion in total new economic activity by 2023.

generation (DG), which is forecasted to grow from 27MW in the region to 54MW as a baseline assumption with PG&E procurement.[20]

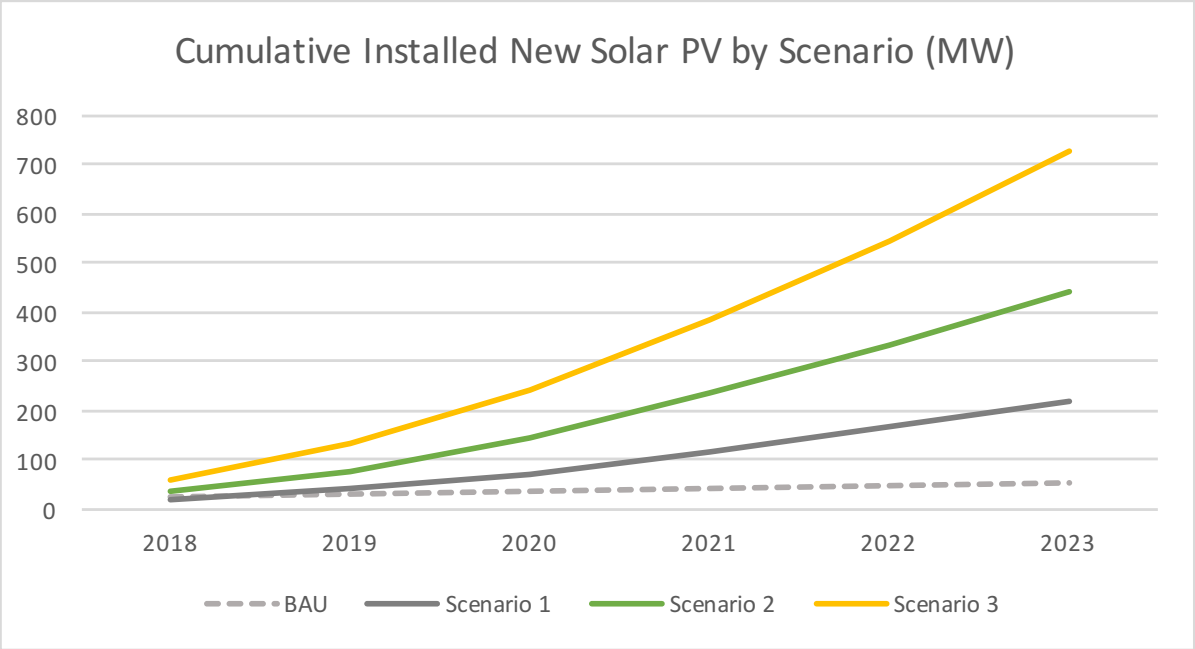
Table 2 Cumulative Total Economic Impact by Year for Three Scenarios
San José Region



To determine total and annual impact in the region, each scenario's total deployment level was spread across the six years in the planning horizon for this report with a ramp-up as the CCE builds its organizational capacity. We anticipate significant opportunity beyond 2023, but a defined period for the analysis provided clear boundaries for estimations and forecasts. Table 3 below shows the cumulative new solar PV deployment for each scenario along with the baseline trend for non-DG deployment within the region.

[20] *This volume of RPS procurement in the three county San José region is based on CPUC renewables reporting with a forecast that increases total regional deployment by 27MW to reflect ongoing activity, but at a much lower level than required to meet either of the three scenario targets. The latest renewable report as of December 2015 can be found here:*
http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf

Table 3 – Total New Solar Installations by Year for Three Scenarios
San José Region



At the highest level, each scenario is based on making purchasing decisions to shift renewable power purchases from remote locations to new local sources. PG&E customers in San José currently use nearly 4,000 Gigawatt hours of electricity annually (GWH). Then for each scenario, the assumption for the CCE's customer load retention is 85%, the total of which is then used for the 10%, 20%, and 33% levels of local renewable energy consumption. Shown in Table 4 below are the key findings for the three scenarios in terms of total and average annual deployed new solar PV, along with the economic impact from those deployment levels over the entire planning horizon.

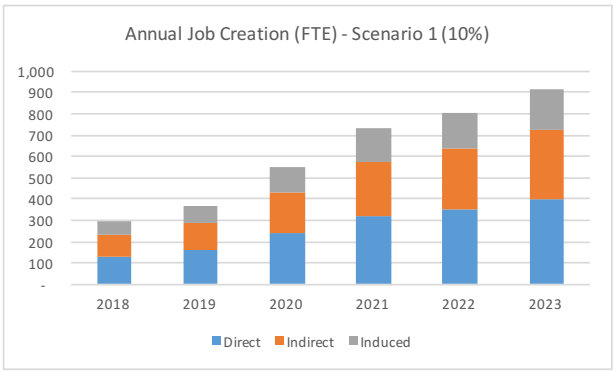
Table 4 – Summary of Findings by Scenario

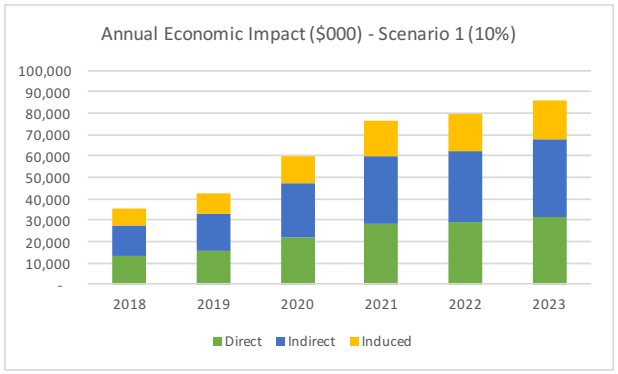
San José Electricity Consumption (2015 PG&E GWh)	
Residential	1,807
Non-Residential	2,178
Total	**3,985**
2020 Estimated CCE Sales *(85% Retention)*	**3,557**

	Scenario 1 (10%)	Scenario 2 (20%)	Scenario 3 (33%)
Local Clean Power Purchases (GWh)	**356**	**711**	**1,174**
Shift to Local Energy Spending (annual)	$ 35,566,125	$ 71,132,250	$ 117,368,213
Equivalent Solar PV Capacity (MW)	220.2	440.4	726.7
Average Annual Solar Installations (MW)	36.7	73.4	121.1
Average Annual Economic Impact	$ 63,203,879	$ 126,407,758	$ 208,572,800
Average Annual Jobs	609	1,219	2,011

Shown below are charts for both scenarios with annual job creation in the categories of direct, indirect, and induced activity, as well as annual incremental economic activity (output).

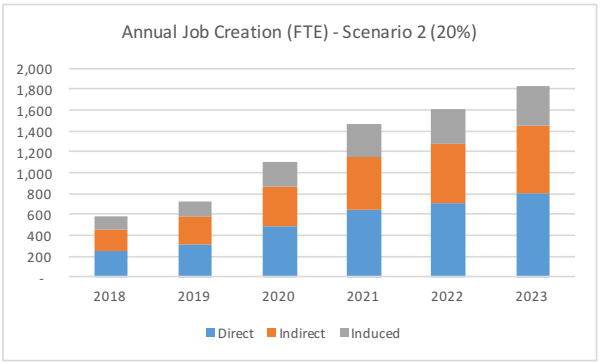
Scenario 1 – 10% Local Solar PV – Total Economic Activity: $379 Million over 6 Years San José Region

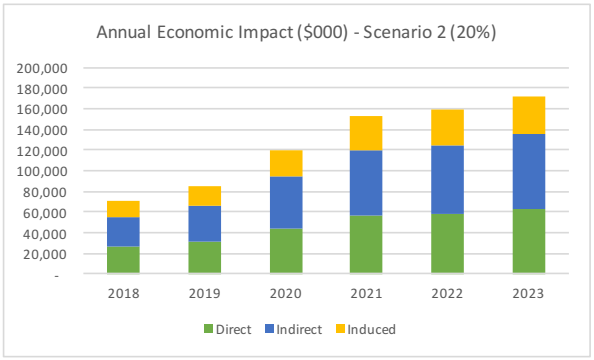




This scenario produces an estimated average of over 600 jobs per year, plus an additional 22 annual direct Operations and Maintenance (O&M) jobs at full capacity deployment in 2023.

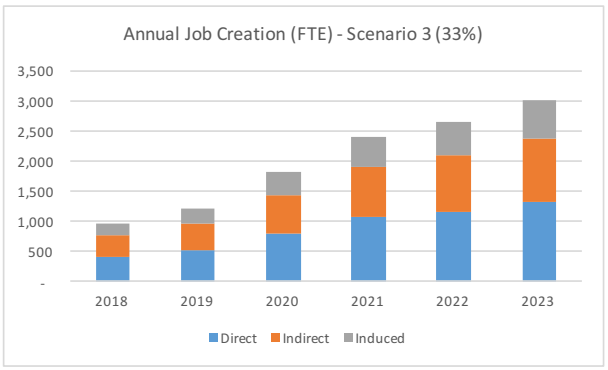
Scenario 2 – 20% Local Solar PV – Total Economic Activity: $758 Million over 6 Years San José Region

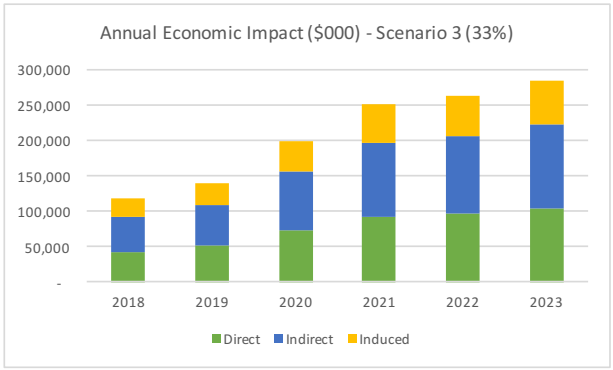




This scenario produces an estimated average of over 1,200 jobs per year plus an additional 44 annual direct Operations and Maintenance (O&M) jobs at full capacity deployment in 2023.

Scenario 3 - 33% Local Solar PV – Total Economic Activity: $1.25 Billion over 6 Years San José Region





This scenario produces an estimated average of over 2,000 jobs per year plus an additional 73 annual direct Operations and Maintenance (O&M) jobs at full capacity deployment in 2023.

By comparison to an existing industry, construction companies in Silicon Valley employed nearly 68,000 people in 2015.[21] This new solar project activity, by itself, could increase the employment base by the equivalent of 3.0% per year for six years (Scenario 3). Total regional economic impact for both scenarios are shown in Table 5 below. These forecasts have been further refined to allocate economic activity to San José specifically, based on the total cumulative deployment of solar power in 2015 where approximately 34% of the solar capacity in the three county region was

[21] *Source: Joint Venture: Silicon Valley 2016 Index, Appendix A: http://siliconvalleyindicators.org/pdf/index2016.pdf*

installed within the City of San José itself. This ratio was then applied to future deployment to calculate the amount of future estimated activity in San José.[22]

Table 5 Summary of Cumulative Economic Impact by Scenario
San José Region

Entire Region (3 Counties Total)	Total Jobs (FTE-years)	Total Economic Output ($000)	Annual Local Energy Spending ($)
Scenario 1	3,656	379,223	35,566,125
Scenario 2	7,311	758,447	71,132,250
Scenario 3	12,064	1,251,437	117,368,213

San José Only (Estimated Allocation)	Total Jobs (FTE-years)	Total Economic Output ($000)	Annual Local Energy Spending ($)
Scenario 1	1,243	128,936	12,092,483
Scenario 2	2,486	257,872	24,184,965
Scenario 3	4,102	425,489	39,905,192

Conclusion

Based on this report's findings, there is a large potential regional economic benefit if San José's CCE agency purchases local clean power, with a direct correlation between the amount invested in local renewable energy and the amount of regional economic benefit. The sources of power may be supplied through programs such as feed-in-tariffs, net metering, Power Purchase Agreements (PPAs), and direct development efforts by the CCE.

A structural benefit of CCE planning and purchasing capabilities is that they are effectively buying power on behalf of their aggregated customer load, and therefore can create a market for new local renewables that previously did not exist. MCE provides great clarity to their developer community via their integrated resource planning process and an "open season" for new projects and has seen significant progress on renewables. The CCE model, overall, enables the community to reach its collective goals but without the necessity of investing public funds. By shifting spending to clean, local sources, the CCE generates new economic activity driven by and in collaboration with the private sector.

To best serve CCE customers, policymakers in San José and elsewhere must still balance local clean power procurement with the need for competitive rates and financial reserves. Input from stakeholders will help policymakers determine how to fully realize the potential economic impacts

[22] *This methodology is consistent with San José Office of Economic Development methodology that uses job site as the key attribute to determine location of economic impact.*

described in this report while designing CCE organizational structure and operational processes that incorporate local renewable goals.

Additional Finding

While conducting research for this report, it became clear that the CCE model is a highly effective platform for innovation. California's first three operational CCEs have undertaken multiple, market-leading projects and programs within short time frames. Examples include electrifying municipal busses, implementing demand-side management systems, and deploying novel program designs for local solar system implementation. With the emerging needs and market opportunities for these and other innovations in, for example, storage and vehicle fuel switching, the CCE model can contribute to a rapid transition to the clean energy future.

Recommendations for Further Study

More research is needed on the potential impact of investments in types of distributed energy resources other than solar PV such as storage, energy efficiency, and microgrids, and how these other resources might leverage investments in local solar. More detailed analysis could better quantify and monetize all the resulting benefits of these local investments, and thus offer policymakers better comparisons on which to base decisions regarding power procurement.

A related study currently underway for Marin Clean Energy (MCE), but not yet published, will address the overall economic impact of CCE operations communitywide. The MCE report is complementary to this San José region economic impact report. It is recommended that these two studies be reviewed together to increase overall understanding of total economic benefits from the CCE model.

References, Resources, and Assumptions

Listed below are key references, resources, and assumptions used to develop the scenario estimates and forecasted impact from local renewable deployment in this report.

Economic impact is expressed in three categories:

1) *Direct* – jobs and output that are created in the region directly from project development activity
2) *Indirect* - jobs and output in sectors within the region that supply goods and services to project development
3) *Induced* – jobs in the region that are related to household spending of the added income to direct and indirect workers

Total annual electricity consumption by county was used when detailed local data was not available and was gathered from the State of California energy data website: http://www.ecdms.energy.ca.gov/elecbycounty.aspx

San José energy consumption data was provided by the City via PG&E report by sector for 2015.

PG&E renewables supply data was gathered from the California PUC website and was used to evaluate progress toward statewide RPS goals and baseline deployment levels in the local region: http://www.cpuc.ca.gov/RPS_Reports_Docs/ and http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf

PG&E average annual electricity supply costs were based on their 2015 annual report to shareholders and were used to establish a baseline avoided cost for electricity supply: http://s1.q4cdn.com/880135780/files/doc_financials/2015/2015-Annual-Report-Final.pdf

Silicon Valley employment data was taken from Joint Venture: Silicon Valley's 2016 indicators and was used to consider job creation impacts relative to other industries: http://siliconvalleyindicators.org/pdf/index2016.pdf

Various city and county level demographics were gathered from Wikipedia statistics.

The customer retention rate for a potential CCE for San José is conservatively estimated at 85% of total PG&E sales based on recent implementations of the CCE model in Lancaster, CA, and expansion of MCE territory.

Existing CCE energy consumption data was gathered from their respective organizations and external references to historical and forecasted values: http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf

Marin Clean Energy's 2015 Integrated Resource Plan: https://www.mcecleanenergy.org/wp-content/uploads/2016/01/Marin-Clean-Energy-2015-Integrated-Resource-Plan_FINAL-BOARD-APPROVED.pdf

Average class A and B commercial real estate annual rental prices for the Silicon Valley region were gathered from the JLL quarterly report on Silicon Valley office statistics for Q1 2016: http://www.us.jll.com/united-states/en-us/research/6831/US-Silicon-Valley-office-statistics-Q1-2016-JLL

NREL JEDI version PV03.24.14 was used for detailed impact analysis including direct, indirect and induced job creation and increased economic activity (output): http://www.nrel.gov/analysis/jedi/

Key NREL JEDI model inputs include the following:

System size: the average system size used for this analysis is medium commercial scale (200kW with silicon modules and fixed mounting) to reflect a balance between smaller and larger systems that would be required to reach the total deployment targets contemplated in each scenario.

Average solar PV system costs: the analysis used $2.41/W as the overall average total installed system costs, in nominal dollars for the first year in the planning horizon (2018), taking into consideration higher land, labor and development costs in the Bay Area compared to the national average (this added 15% to local costs compared to the national average). For reference in Q4 2015, average national costs for solar project (according to the 2015 GTM Solar Market Insight Report) were slightly below $1.50/W for Utility systems, near $2.10/W for Non-Residential systems, and at $3.50/W for Residential systems. Each subsequent year was forecasted to decrease in total costs by 5% per year for all sectors. The average mix of systems by sector was assumed to be 20% residential, 70% commercial, and 10% utility by installed capacity.

System Yield: Average annual solar system productivity was estimated at 1,615 kWh/kW and was used to calculate the equivalent solar capacity in the local region based on clean energy purchasing requirements. The NREL PVWATTS calculator was used with typical system design inputs for the region to generate the annual yield.

System Components: Assumptions for local purchasing of equipment included 100% local for electrical components, 50% local for mounting systems, and 20% local for modules & inverters. These were not assumed to be manufactured locally, but purchased from local vendors. Any local manufacturing would increase the total economic impact and job creation estimates.

Taxes: Sales taxes were included at local rates, but no property taxes were included assuming that the solar systems would be exempt. These tax revenues go directly back to the local jurisdictions where projects are installed.

Financing: Projects would be financed using 50% debt, which impacts total economic activity and project costs.

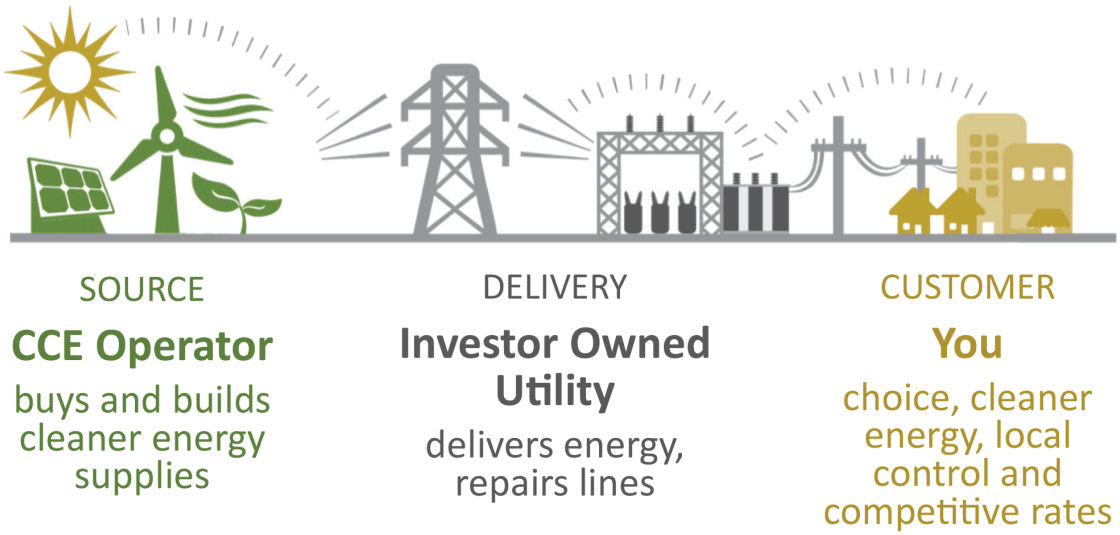
O&M Costs: These were estimated at $14/kW/year on average based on typical project costs, and were used to calculate ongoing job creation and economic activity over a solar project's lifetime of at least 20 years.

Appendix: Background on Community Choice Energy

What is Community Choice?

Community Choice Energy (CCE) programs, legally called Community Choice Aggregation (CCA), are local programs that buy and can generate electricity for residents and businesses. CCE's statutory authority includes rate-setting, owned-asset development, energy efficiency program implementation, purchasing decisions, and program design. The incumbent investor-owned utility (IOU) continues to provide transmission, distribution, and maintenance services, and handles the metering and the billing for CCE customers. In California, Assembly Bill 117 (2002) empowers local governments to aggregate the electricity ratepayers in their jurisdictions. Senate Bill 790 (2011) provides a code of conduct that requires the distribution utility to cooperate with the Community Choice program. Seven states currently have Community Choice laws including California.

CCE allows local control of the revenue stream and selection of electricity providers in communities that have traditionally been controlled by regulated monopolies. Community Choice allows a locally appointed board (usually comprised of elected officials) to direct the expenditure of millions of dollars of an existing revenue stream in any given jurisdiction. Currently most communities have limited ability to influence decision-making about electricity rates and policies. Community Choice brings that decision-making closer to home in a public arena accessible to businesses and residents.



Why is CCE Important? Benefits to Communities and to Modernizing the Grid

There are now four operational CCEs in California and several more in the final stages of development. (Please see the chart on page 24.) The opt-out rate for those customers wishing to remain with the incumbent IOU has been decreasing, and most recently is below 6%. In these CCE authorities, electricity rates are all competitive with the IOUs' and are typically 2 to 3% lower than the IOUs' rates even after a recent increase in the exit fee imposed by CPUC. The renewable portion of portfolios range from 36% at Sonoma Clean Power (SCP) and Lancaster Choice Energy to 50% at Marin Clean Energy (MCE). In contrast, California's three large IOUs, Pacific Gas & Electric, Southern California Edison, and San Diego Gas & Electric provide an average of 27.6% renewable energy to their customers.[23] All of the existing CCAs also offer a 100% renewable energy product to their customers as well, usually at a small premium on their bill.

Another area that CCEs have provided service to their customers is in developing local renewable energy programs. They do this in several ways. First, they offer enhanced net metering programs that give solar customers more value than they receive from the IOUs for the surplus renewable power they generate. They also have Feed in Tariff programs that pay a premium for solar installations up to about a megawatt that feed power back into the grid. Finally, both Marin Clean Energy and Sonoma Clean Power are investing in larger local projects. MCE has contracted for a 10.5 MW project in the City of Richmond, and SCP has contracted for a 12.5 MW "floatovoltaic" project in partnership with the Sonoma County Water Agency, where photovoltaic panels are used to cover a wastewater treatment ponds. MCE also has a program called "Local Sol" where customers who are willing to pay a premium (14.2¢ per kWh) support the development and operation of a solar project currently under construction in Novato.

Another benefit to local communities is the retention of capital in the community. In the case of Sonoma Clean Power, since its launch, it has increased spending in Sonoma County from 3% by PG&E, to over 25% by SCP, equal to about $35 million today. And local spending likely will increase over time. This demonstrates that although it is important to offer competitive rates at launch, the decision-making control over millions of dollars over time – the products, projects, and programs the agency is able to develop –is another significant consideration that decision makers need to factor in when choosing how much power to develop locally.

There are additional values to both the local distribution grid and customers from developing distributed energy resources (DER). In a recent paper "A Pathway to the Distributed Grid," SolarCity identifies twelve categories of avoided costs from DER deployment.[24] One of the ways that DER provides savings is deferring expansion or upgrades of the transmission and distribution system to meet peak loads. The Clean Coalition reports that transmission-related costs are about 4 cents/kWh with Transmission Access Charges (TAC) alone being three-quarters of that on a 20-

[23] California Public Utility Commission, California Renewables Portfolio Standard http://www.cpuc.ca.gov/RPS_Homepage/
[24] "A Pathway to the Distributed Grid," SolarCity Grid Engineering http://www.solarcity.com/sites/default/files/SolarCity_Distributed_Grid-021016.pdf

year levelized basis and line and congestion losses comprising the remainder. With a modest reform of the Transmission Access Charges, which the California Independent System Operator is currently considering, increased DER development could save customers up to $26 billion of dollars in avoided costs over a 20-year period.[25] If we are to modernize our energy grid, improving service quality and reliability, decision makers need to be aware of these advantages to local resource deployment, which are not currently taken into consideration.

Growth of Community Choice Energy in California

As the table below suggests, if all the communities considering Community Choice programs had operational Community Choice programs by 2020, were combined with existing and currently planned CCEs, less the approximately 25 percent of Californians already served by Municipal Utility Districts (ineligible for Community Choice), then about 60 percent of eligible Californians would be able to select Community Choice[26]

Growth in CCEs is expected to significantly reduce California's greenhouse gas emissions while building the clean energy economy. As these CCE programs invest in local resources and clean technologies such as energy storage and electric vehicle charging infrastructure, they will help move California toward a more decentralized power system.

[25] *The Clean Coalition's opening comments in the California Independent System Operator Energy Storage and Distributed Energy Resources Phase 2 Stakeholder Initiative April 18, 2016. http://www.clean-coalition.org/regulatory-filings/caiso-transmission-access-charges-tac-comments-in-esder-phase-2/*
[26] *"Community Choice Energy: A California transformation in one decade," Ann Hancock, http://climateprotection.org/community-choice-energy-california-transformation-one-decade/*

Date service began/will begin	Program	Population of area served/to be served
2010	Marin Clean Energy (MCE)	261,000
2014	Sonoma Clean Power	488,000
2013–2015	MCE adds Richmond, Benicia, El Cerrito, San Pablo, Napa Co. (unincorporated)	220,000
2015	Lancaster Choice Energy	161,000
2016	CleanPowerSF	852,000
2016	Peninsula Clean Energy	759,000
~2017	MCE adds interested entities from Napa and Contra Costa Counties	428,000
2017	Silicon Valley Clean Energy	600,000
~2017	San Jose	1,016,000
~2017	Alameda County and cities	1,535,000
~2017	Davis and parts of Yolo County	120,000
TBD	LA County & cities	5,800,000
TBD	Monterey, Santa Cruz, San Benito Counties	750,000
TBD	Santa Barbara, San Luis Obispo, Ventura Counties	1,500,000
TBD	San Diego County and cities	3,263,000
Total population of communities with/launching/exploring CCA		17,753,000
California population (38,800,000) - 25% served by MUDs		29,100,000
Total percent eligible population to potentially be served by CCA by 2020		**60%**