The Role of Community Choice Aggregators in Advancing Clean Energy Transitions:

LESSONS FROM CALIFORNIA

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Glossary

Bundled customer – a customer that receives all its electricity services (electricity generation, transmission, distribution) from a single entity, such as an investor-owned utility.

CalCCA – California Community Choice Association; the state's trade association for community choice aggregators.

Carbon-free – resources used for electricity generation that include renewable energy resources such as solar, wind, geothermal, small-scale hydroelectric, and biomass, but can also include resources that do not emit greenhouse gases when used, such as large hydroelectric and nuclear.

Community Choice Aggregator (CCA) – a local, public electricity provider that makes energy procurement decisions, while the affiliate investor-owned utility continues to provide transmission and distribution services. Usually a city, county, or group of cities and counties.

California Public Utilities Commission (CPUC) – the regulatory agency overseeing services in California including electric, telecommunications, water, railroad, and more.

California Independent System Operator (CAISO) – a nonprofit that is responsible for ensuring reliability of the electrical grid that covers much of California and for operating a wholesale electricity market for electricity providers.

Default electricity product – the electricity option that an electricity provider automatically enrolls a customer into if they do not actively choose another option. Electricity options differ by the type of energy resources used, such as solar or natural gas, as well as the rate charged.

Default electricity rate – the price per kilowatt hour that an electricity customer pays unless they actively choose to enroll in another option.

Electric service providers – a nonutility entity that offers electric service to customers within the service territory of an electric utility (as defined by California Public Utilities Code Section 394).

Gigawatt hour (GWh) – a unit of electricity consumption. Equal to 1,000 megawatt hours.

Investor-owned utility (IOU) – a private, for-profit electricity provider.

Kilowatt hour (kWh) – a unit of electricity that is equivalent to 1,000 watts in one hour.

Local energy programs – rebates, incentives, financing, and other mechanisms typically offered by electricity providers or nonprofit organizations that provide economic and/or environmental benefits to electricity customers. Common examples of such programs include incentives for rooftop solar, energy efficiency, or electric vehicle rebates.

Megawatt hour (MWh) – a unit of electricity consumption. Equal to 1,000 kilowatt hours.

Opt down – when a customer chooses to enroll in a lower-cost electricity option or an electricity option with a smaller proportion of carbon-free energy.

Opt in – when a customer chooses to enroll in a CCA program.

Opt out – when a customer chooses to leave a CCA program.

Opt up – when a customer chooses to enroll in a more expensive electricity option or an electricity option with greater amounts of carbon-free energy.

Power Charge Indifference Adjustment (PCIA) – a fee charged to customers who leave an investor-owned utility's electricity service, such as a community choice aggregator customer, per unit of electricity consumption.

Renewable energy – resources used for electricity generation that do not diminish with use and are naturally replenishing, such as solar, wind, geothermal, small-scale hydroelectric, and biomass.

Renewables Portfolio Standard (RPS) – a state policy that sets renewable energy targets for electricity providers.

Resource Adequacy (RA) – a state program administered by the California Public Utilities Commission that requires electricity providers, including community choice aggregators and investor-owned utilities, to submit regular reports demonstrating that they have procured sufficient capacity to maintain normal electrical grid operations.

Total electricity rate – the per-unit cost of electricity charged to a customer. The total electricity rate is the sum of the generation rate, delivery, and transmission rates and, for CCA customers, fees.

Unbundled customer – a customer that receives its electricity services (transmission, distribution and generation) from more than one entity. A customer who receives electricity service from a community choice aggregator is considered unbundled, as the community choice aggregator is responsible for that customer's electricity generation, while the investor-owned utility is responsible for that customer's electricity transmission and distribution.

Unbundled Renewable Energy Certificates (REC 3) – credits for units of renewable energy generation that are purchased separately from the underlying electricity, sometimes referred to as REC 3.

Executive Summary

Despite a lack of action at the federal level, the transition to carbon-free energy is becoming a reality across the United States. At the local level, community choice aggregators (CCAs) — which offer communities public control over their electricity purchasing decisions — are accelerating this transition. Through these electricity providers, member communities can choose how much renewable energy is offered to their residents and businesses.

In California, CCAs have become an effective tool at enabling local climate action. Across the state, 182 cities and counties have become members of one of the 23 CCAs. These CCAs have been effective at unlocking a market largely stifled by an investor-owned utility monopoly and have given an opportunity for cities and counties who want more renewable energy to do so.

CCAs have grown rapidly in California during the past decade. More than 30% of the state's population has a CCA option available to them, up from less than 1% in 2010. Since their emergence, CCAs in California have played an important role in accelerating the state's transition to zero-carbon electricity. The vast majority of CCAs procure more renewable energy than the investor-owned utilities they compete with. Furthermore, CCAs purchased twice as much renewable energy than required by the state from 2011 to 2019. By achieving California's carbon-free energy targets more quickly than mandated, the state benefits from a cumulatively larger reduction in greenhouse gas emissions each year. The success of CCAs in California demonstrates the power of promoting carbon-free energy at the grassroots, enabled by public, local choice in electricity supply. Given its success at achieving carbon-free energy goals under its relatively high requirements, California serves as a locally driven model for states considering legislation to enable CCAs — especially those with lower clean energy targets.

With six states considering CCA-enabling legislation, and with hundreds of cities and counties across the United States working toward a 100% carbon-free energy goal, CCAs can provide a valuable tool to accelerate the transition to carbon-free energy. This report uses California as a case study to examine three conditions that affect a CCA's ability to advance environmental goals.

First, we describe CCA customer characteristics and how those have evolved over time in order to understand which communities might likely form a CCA. We then look at CCA design features that help them maintain financial health in order to be successful entities that can sustain the support of environmental goals. Finally, we examine how policy and regulatory context affect a CCA's scope and authority to make carbon-free energy procurement decisions.

Key Findings

CCAs can be effective tools at supporting goals for carbon-free energy because they give communities control over their electricity decisions.

The primary way CCAs support environmental goals is through the purchase of carbon-free energy. In California, CCAs have accelerated the achievement of the state's energy goals by purchasing carbon-free electricity in excess of state requirements. One powerful tool for CCAs is their ability to choose how much carbon-free electricity is in the electricity product a customer receives by default. Fourteen CCA member communities chose 100% renewable energy as the default for all their customers. Over two-thirds of California CCA member communities — representing more than 6 million people — have a default electricity product with more than 90% carbon-free energy.

CCAs support innovative local energy programs that increase environmental and economic benefits in their communities.

As local, public entities, CCAs are well-positioned to reinvest net revenues in local energy programs, such as energy efficiency incentives or electric vehicle rebate and charging programs, that are tailored to the needs of their communities. These programs often reduce greenhouse gas emissions, reduce customers' energy bills, and support local jobs. CCAs have been innovative in their program designs, and have used them to respond to community needs like offering subsidies for rebuilding homes after wildfires, supporting the low-income members of their community, or providing financial assistance in response to the COVID-19 pandemic.

CCAs are most effective at supporting environmental goals in communities where the demand for carbon-free energy exceeds what is currently provided.

CCAs successfully serve a wide variety of communities. In California, the size and median income of a community are not predictors of success, suggesting that the CCA model can be replicable in a variety of communities across the nation. Many communities across the U.S. have set their own renewable energy goals that often outpace state-level targets, and CCAs can be effective tools to achieve this by enabling communities to purchase more carbon-free electricity.

CCAs must first be successful as a business to sustain the provision of environmental benefits to customers.

CCAs must gain and maintain a sufficient customer base to be financially viable. CCA legislative design features and business choices can support their success, specifically automatic customer enrollment with voluntary opt-out, collaborative models, and rate setting authority. Automatic enrollment and collaborative CCA models contribute to gaining a critical mass of customers. In California, cities and counties frequently join together to form multimember CCAs. We find evidence of an economies of scale benefit to collaboration. CCAs can retain customers by providing additional value compared to their competitors in the form of cheaper rates, greater amounts of renewable energy, and more attractive local energy programs (e.g., rooftop solar incentives, electric vehicle rebate programs, etc.). Among cost advantages associated with being not-for-profit, dramatic decreases in the cost of renewables has supported CCAs' ability to provide customers with the dual benefit of cheaper and cleaner energy. While most CCAs set rates just below their competitors, we find that a growing number of communities are willing to pay more for 100% renewable energy. The potential to provide additional value to customers is supported by CCAs' ability to set their own rates.

State policy and regulation play a critical role in the success of a CCA.

State policy can enable or hinder a CCA's ability to make decisions about their energy resources and local energy programs, as well as their competitiveness. We examine three California policies that affect CCAs' ability to support environmental goals. First, the renewables portfolio standard, which sets carbon-free energy targets for electricity providers, has been an important strategy to increase renewable energy in the state. One of its provisions requires a certain percentage of renewable energy contracts to last longer than 10 years. This is important for state planning purposes, but it may prevent CCAs from taking advantage of falling costs and innovations. These long-term contracts also have implications for ensuring that IOUs' remaining customers do not experience rate increases because of customers departing for CCAs. The fee charged to CCA customers to address this affects cost competitiveness. Second, a recent change to the state's resource adequacy program, which supports electricity reliability, has shifted some energy procurement decision-making ability away from CCAs. This may affect both the cost and cleanness of the energy resources used by CCAs.

Finally, we look at the investor-owned utility code of conduct relative to CCAs and how it supported the emergence of CCAs and helps enhance competition through information sharing. Policy plays an important role in supporting the continued success of CCAs.

CCAs in other states should consider local demand for carbon-free energy, designs that enable financial success, and the policy and regulatory context when adopting CCAs to support environmental goals.

Communities aiming to achieve carbon-free energy targets can look to successful CCA case studies as examples and examine the conditions under which they have been effective. When considering CCA formation, cities and counties should first evaluate local demand for carbon-free energy. As public agencies, CCAs can reflect their community's unique needs by soliciting community input in the formation, design, and operation of the CCA. Communities should then explore how to design their CCA to maximize its financial health by ensuring a sufficient customer base and by offering products and services like local energy programs with additional value to customers. Finally, emerging CCAs should determine how their state's unique policies, regulations, and electricity market affect a CCA's authority to make energy procurement decisions and ability to remain competitive. Electricity market considerations include considering the differing challenges that may face CCAs in states like California with regulated or partially regulated electricity markets versus states with deregulated or restructured electricity markets.

1. Introduction

Increasingly, communities across the United States are gaining control over decisions regarding the electricity they buy. One method to do so is through community choice aggregation (CCA), a policy tool that enables cities and counties to purchase electricity on behalf of their residents. Locally focused by design, a CCA makes electricity purchasing decisions to reflect its community's preferences. In practice, this means that CCAs frequently purchase electricity from cleaner electricity sources (i.e., those that emit fewer greenhouse gases) than those provided by alternative electricity providers.[1] This has been especially true for CCAs in California.

CCAs in California have accelerated the achievement of the state's carbon-free energy targets, both directly and indirectly. As other states explore the potential of CCAs to advance environmental goals, they can look to the lessons learned in California. In this report, we examine the features that have enabled CCAs' success, taking California as a case study. Our aim is to answer to what extent and under which conditions can CCAs help states advance environmental goals.

We first give an overview of existing CCAs across the U.S. and their contribution to renewable energy goals. We then examine three conditions that affect a CCA's ability to advance environmental goals: 1) customer characteristics, 2) CCA design features, and 3) policy and regulatory context. We conclude with a discussion of the considerations important for other communities considering forming a CCA.

1.1 Background: A National Overview of CCAs and Their Contribution to Renewable Energy

1.1.1 Emerging Interest in CCAs

CCAs allow local governments to make decisions about the type and location of electricity resources purchased on behalf of their residents, businesses, and municipal facilities. Currently, nine states have CCA-enabling legislation, with six more considering.[2] While CCAs vary significantly in size and electricity products offered, CCAs across all states have common features, including:

- **CCA creation and operation decisions are made by local elected officials, often at the city or county level.**
- **CCAs purchase electricity for customers, while investor-owned utilities (IOUs) continue to provide electricity transmission, distribution, metering, and billing services.**
- **When a CCA launches, a community's customers are automatically enrolled, but they can choose to opt out of its service and remain with the incumbent electricity provider.**

A community may choose to form or join a CCA for a number of reasons, including to take advantage of the following advantages of CCAs identified by the U.S. Environmental Protection Agency:[3]

- **Electricity rate reduction**
- **Shift to greener energy resources**
- **Ability to respond to local economic and environmental goals through control of electricity generation**
- **Expansion of consumer choice**
- **Support of local jobs and renewable energy development**

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1. O'Shaughnessy, E., Heeter, J., Gattaciecca, J., Sauer, J., Trumbull, K., & Chen, E. (2019). *Community Choice Aggregation: Challenges, Opportunities, and Impacts on Renewable Energy Markets* (NREL/TP-6A20-72195). Golden, CO: National Renewable Energy Laboratory.
2. Lean Energy U.S. (2020). "CCA by State." States with CCAs include California, Illinois, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Rhode Island, and Virginia. States "actively investigating" include Arizona, Colorado, Connecticut, Maryland, and Oregon. Washington is classified as a "Watch List/Potential" state.
3. U.S. Environmental Protection Agency (2020). "Community Choice Aggregation."

As inherently local, public entities, CCAs are designed with input from their communities, are operated with ongoing community input on decision-making, and as such, reflect the preferences of their communities. Since CCAs give local communities control over electricity procurement decisions, the primary way they reflect local preferences is through the electricity resources they choose. Most CCAs reflect local preferences for cheaper rates by choosing cheaper electricity resources. Some choose to reflect their community's preference for carbon-free electricity — 13% of CCAs across the U.S. procure voluntary green electricity.[4] This means that they buy more power from carbon-free resources than is required by their state's laws.

1.1.2 CCAs in California: Direct and Indirect Effects on Renewable Energy

In California, reflecting local preferences has meant that CCAs often focus on providing their communities with environmental benefits, such as carbon-free energy or energy programs that reduce greenhouse gas emissions. To date, CCAs in California have been a significant tool in advancing California's carbon-free energy goals. Their direct and indirect effects on renewable energy are driving the accelerated progress toward achieving the state's target for 100% carbon-free energy by 2045.[5] By doing so, they help to avoid greenhouse gas and air pollutant emissions by more rapidly reducing the need for fossil fuel electricity generation sources.

Providing customers with the choice in electricity product is the essence of CCAs. Beyond offering an alternative choice to the local IOU, 21 of California's 23 existing CCAs offer electricity customers multiple electricity products to choose from.[6] This typically includes 1) a "default" product, which is composed of a greater share of renewable energy than offered by the local IOU, and 2) a 100% renewable energy product.[7] Typically, electricity products with a greater share of renewable energy are more expensive than those with less. By offering customers multiple electricity products, CCAs can capture customers' different levels of willingness to pay for renewable energy.

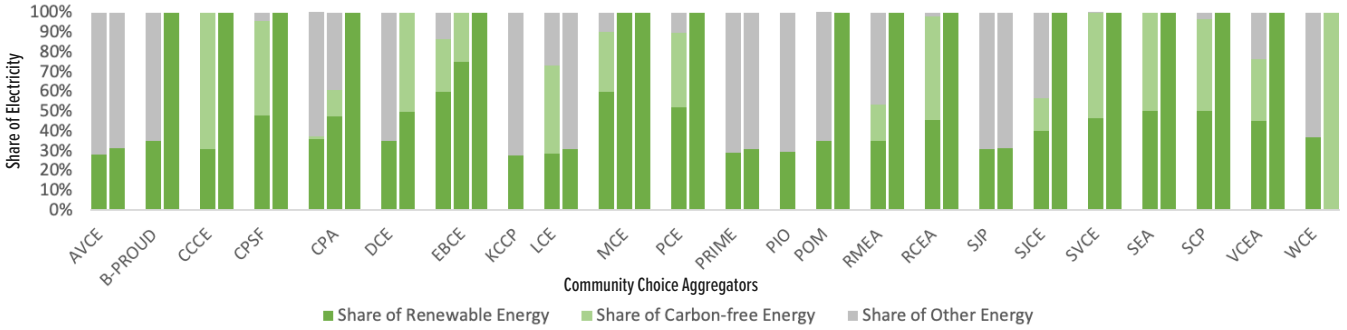
Some CCAs are shifting from a focus on offering customers an electricity product with a greater share of renewable energy to an electricity product with a greater share of carbon-free energy. Carbon-free energy resources include renewable energy resources such as solar, wind, geothermal, small-scale hydroelectric, and biomass, but can also include large hydroelectric and nuclear. Although large hydroelectric generation is not considered renewable, its inclusion can further offset the use of fossil fuel electricity generation, and therefore avoid greenhouse gas emissions and contribute to meeting environmental goals. Figure 1 shows each of the different electricity products a CCA customer can choose among and its share of different energy sources. CCAs offer their customers between one and three different electricity products to choose among. Each bar represents one electricity product. The share of renewable energy in each product is shown in dark green, the share of additional carbon-free energy is shown in light green, and the share of other energy resources is shown in gray.

Renewable energy refers to resources used for electricity generation that do not diminish with use and are naturally replenishing, such as solar, wind, geothermal, small-scale hydroelectric, and biomass.

Carbon-free energy includes renewable energy resources, but can also include resources that do not emit greenhouse gases when used, such as large hydroelectric and nuclear.

4. O'Shaughnessy, E., Heeter, J., Gattaciecca, J., Sauer, J., Trumbull, K., & Chen, E. (2019). *Community Choice Aggregation: Challenges, Opportunities, and Impacts on Renewable Energy Markets* (NREL/TP-6A20-72195). Golden, CO: National Renewable Energy Laboratory
5. Trumbull, K., DeShazo, J., Gattaciecca, J., Callahan, C., & Einstein, M. (2019). The Rapid Growth in Community Choice Energy and Its Acceleration of Renewable Energy: A California Case Study. UCLA Luskin Center for Innovation.
6. See Appendix A for a complete list of CCAs in California, their launch date, and number of member cities and counties.
7. See Appendix B for a complete list of CCA member cities and counties and the share of renewable and clean energy in their default electricity product.

Figure 1. CCA Electricity Products



Source: Figure created by UCLA Luskin Center for Innovation. Data from California Energy Commission (2020). "Power Source Disclosure Program."
Figure note: CCA name acronym key can be found in Appendix A.

A community's ability to choose the default electricity product for its customers has been especially powerful at supporting carbon-free electricity goals. Increasingly, cities and counties that are members of a CCA are enrolling their customers by default into electricity products with 100% renewable energy. These 100% renewable electricity products are typically lower cost than the IOU's 100% renewable energy option, but more expensive than the IOU's default option. Currently, 14 California cities and counties default enroll customers into a 100% renewable energy product, and an additional 38 default enroll customers into a 100% carbon-free energy product. **Despite the higher price for the 100% renewable option, these communities have not seen significantly more customers choosing to switch to a lower-cost product (opt down) or out of the CCA (opt out).**

Common CCA Customer Electricity Service Enrollment Options

Opt up – enroll in a more expensive electricity option or an electricity option with greater amounts of clean energy

Opt down – enroll in a lower-cost electricity option or an electricity option with less amounts of clean energy

Opt out – choose to leave a CCA program

Opt in – enroll back into a CCA program

The emergence of CCAs has required incumbent IOUs to be more competitive. An unexpected side effect of CCAs is that their emergence is also contributing to the IOUs' electricity supply becoming increasingly carbon-free in California. Incumbent IOUs have been left with long-term renewable energy contracts that were procured on behalf of customers who have since departed for CCAs. This means they have more renewable energy than is required for fewer customers. This is in part due to California's regulatory environment, the implications of which are described in more detail in Section 4: Policy and Regulatory Considerations.

Cities and counties can choose how much renewable energy is in the default electricity product, thus enabling communities to switch their entire population to a 100% renewable or carbon-free electricity.

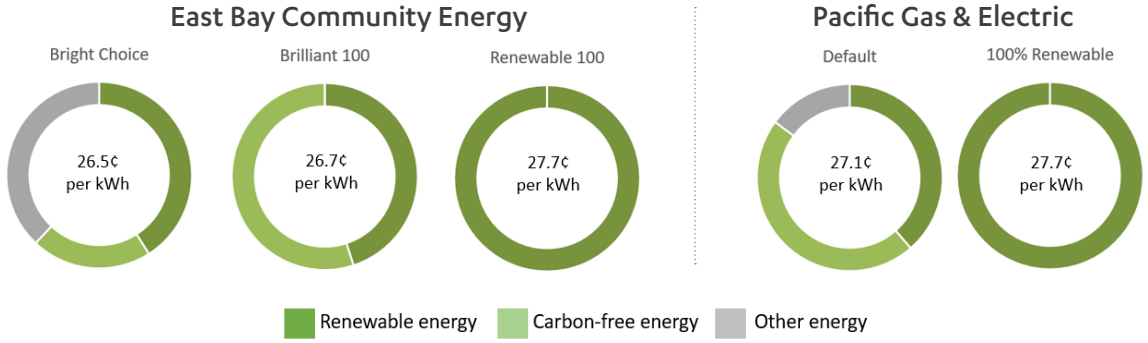
CCAs can also support environmental goals by funding local energy programs. CCAs often reinvest their revenues in local energy programs (described further in Section 3: CCA Design Features That Support Environmental Goals). For example, most CCAs offer energy efficiency and rooftop solar programs, and multiple CCAs offer electric vehicle rebates and other programs that aim to reduce greenhouse gas emissions and/or customers' electricity bills. In addition to environmental benefits, these programs also often yield other benefits for the customers, community, and the CCA, including increasing bill savings, supporting local jobs, building resiliency, and responding to unique community needs.

The next three sections explore the demographic, CCA design, and policy and regulatory conditions that have enabled California CCAs to be an effective tool to support environmental goals.

Example City: Albany

Albany is a member city of East Bay Community Energy, a CCA in Northern California. Albany has selected the "Brilliant 100," which has 100% clean energy, as the default product for its customers. A customer living in Albany can choose to:

- Opt up to the "Renewable 100" product
- Opt down to the "Bright Choice" product
- Opt out and return to the affiliate IOU, Pacific Gas & Electric



Note: Customers who opt out to the IOU also have the choice to opt up to the IOU's 50% and 100% renewable options. This figure is based on the "PG&E – EBCE Joint Rate Comparisons" as of May 2020. A rate is not provided for the 50% renewable option for PG&E and therefore it was excluded from this figure.

2. Customer Characteristics and Local Demand for Carbon-Free Energy

A wide variety of electricity customers across the U.S. support carbon-free electricity, as evidenced by national public opinion polls, academic studies on willingness to pay for carbon-free electricity, and the growing number of 100% carbon-free energy commitments at the city and county level. As CCAs provide local communities with an opportunity to choose their electricity resources, they can be an effective tool to meet local demand for carbon-free energy. In this section, we first examine customer support for carbon-free energy. We then dive deeper into the demographics of the communities served by CCAs in California and how those relate to preferences for carbon-free energy. This section explores the commonalities among communities that have formed CCAs.

2.1 Local Demand for Carbon-Free Energy Is Found Across the U.S.

We find evidence of a large, unmet demand for carbon-free energy across the United States — that is, communities want more carbon-free energy than they are currently offered. First, public opinion toward carbon-free energy is highly favorable across geographies and political ideology. Pew Research Center found "83% of conservative Republicans favor more solar panel farms; so, too, do virtually all liberal Democrats (97%)" and found similar support for wind.[8] Second, there is some evidence in academic literature that customers are willing to pay more for renewable energy. Several studies have found that customers are willing to pay a premium for an electricity provider with specific services such as a local presence, local charitable contributions, and greater shares carbon-free and renewable energy.[9,10,11] Third, local demand for carbon-free energy is outpacing legislative action at the state and federal level; cities and counties are setting more ambitious carbon-free energy targets than policies at these higher levels. Across 37 states, 204 cities and counties — representing a population of over 110 million people — have 100% carbon-free energy commitments.[12]

One-third of the population of the United States lives in a region with a 100% carbon-free energy commitment.

CCAs could be one tool for these communities to meet this large carbon-free energy demand, as they are designed to reflect local preferences for carbon-free energy. A 2019 UCLA Luskin Center for Innovation report found that all cities that have achieved 100% carbon-free energy have control over their electricity supply through their electricity provider.[13] In California, 64 of the 66 100% carbon-free communities are members of a CCA.[14,15] This report noted that "these local and state-level commitments exist in all regions of the U.S. and many have bipartisan support."[16] Empowering communities to have control over decisions concerning their electricity generation sources is proving to be good for the environment.

8. Pew Research Center (2016). "2. Public opinion on renewables and other energy sources."
9. Although the willingness to pay did not necessarily increase proportionally with greater charitable contributions or higher renewable energy content.
10. Goett, A. A., Hudson, K., & Train, K. E. Customers' Choice Among Retail Energy Suppliers: The Willingness-to-Pay for Service Attributes. The Energy Journal 21, no. 4.
11. Kaenzig, J., Heinzle, S., Wustenhagen, R. (2013). *Whatever the customer wants, the customer gets? Exploring the gap between consumer preferences and default electricity products in Germany*. Energy Policy 53.
12. Trumbull, K., Callahan, C. Goldmuntz, S. & Einstein, M. (2019). *Progress Toward 100% Clean Energy in Cities & States Across the U.S.* UCLA Luskin Center for Innovation.
13. Ibid.
14. The other two cities with 100% clean energy procure their electricity from publicly owned utilities, a type of electricity provider in which the electricity generation, transmission, and generation are all owned and operated publicly, often municipally.
15. Trumbull, K., Callahan, C., Goldmuntz, S. & Einstein, M. (2019). *Progress Toward 100% Clean Energy in Cities & States Across the U.S.* UCLA Luskin Center for Innovation.
16. Ibid.

2.2 Demographic Analysis of California CCAs

In this section, we first examine the residential customer characteristics of California CCAs and how these traits have changed over time. We describe how the demographics of communities served by CCAs have diversified as the number of CCAs has grown and, subsequently, the number of member cities and counties. We find that California CCAs represent a variety of communities with different sizes, median incomes, and political affiliation. This has become increasingly true as CCAs have expanded across the state over the last decade.

We then look at the relationship between the demographics of CCA member communities and their electricity preferences. We compare CCA member community median income and political affiliation to their chosen default electricity product and default electricity rate. We find that the income and size of member communities are not strongly correlated with the default amount of carbon-free energy chosen by the community. Political affiliation is a stronger indicator of electricity preference. These findings suggest that the CCA model can be successful in a variety of communities with differing sizes and incomes and could therefore be replicable in many places. However, the CCA model may be more effective at supporting environmental goals where local communities support carbon-free energy, and especially have a willingness to pay for it.

CCA customers are enrolled automatically into a default electricity product – unless they actively choose another option. Electricity options differ by the type of energy resources used, such as solar or natural gas, as well as the rate charged. The price per kilowatt hour that an electricity customer pays is the electricity rate.

2.2.1 Population

The 23 operational CCAs in California currently serve 165 member cities and 17 member counties, for a total of 182 member communities. CCAs range in size from one to 34 member communities. Commonly, a city or county joins a CCA when it launches; however, 34 jurisdictions joined an existing CCA after it began operation. An additional 16 communities are expected to form new CCAs in 2021.

In 2020, almost a third of the state's population has choice in their electricity provider. This has grown from 1% of the population in 2010 and is expected to grow to 41% in 2021, with multiple CCAs expected to launch in the San Diego area and elsewhere across the state. Table 1 summarizes how the number of CCAs and the total population of their member communities has increased over time.

CCAs have grown rapidly in California during the past decade. More than 30% of the state's population has a CCA option, up from less than 1% in 2010.

CCA member communities vary in size, and the diversity in their size has increased over time. In 2020, the smallest community served by a CCA is Trinidad, a member of Redwood Coast Energy Authority, with a population of 340. The largest community is Unincorporated Los Angeles County, a Clean Power Alliance member, with a population of more than 1 million. The median size of a member community has increased over time; in 2020 the median population of a CCA member community is more than 36,000. Table 2 shows how the range in median population of member communities has grown over time.

Table 1. Number of CCAs and Population of Their Member Communities Over Time[17]

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021 (Projected)
Number of CCAs	1	1	1	1	2	3	5	9	17	19	23	26+
Number of Member Cities and Counties	12	12	12	13	22	30	59	82	137	169	182	198+
Population With a CCA Option	263,886	263,886	263,886	374,853	762,501	1,149,032	3,018,448	3,983,771	7,477,048	11,457,003	12,233,789	15,743,188+
Share of California Population With a CCA Option	1%	1%	1%	1%	2%	3%	8%	10%	19%	29%	31%	41%+

Table 2. Range in Population of CCA Member Communities Over Time[18]

	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021
min	2,135	2,135	448	448	448	340	340	340	340	340
median	11,195	12,351	10,715	13,982	25,575	27,215	30,601	34,504	36,139	36,884
max	69,255	110,967	178,488	178,488	883,963	883,963	883,963	1,057,162	1,057,162	1,419,845

2.2.2 Income

Diversity in the median household income of CCA member communities has also increased over time. Only one CCA existed in 2010, with a median income of $106,192. In 2020, the median income was $74,512 and ranged from $30,000 to $250,001. The extent of incomes among member communities has also increased greatly. Table 3 shows how the median income and range in median income of member communities has changed over time.

Table 3. Range in Income of CCA Member Communities Over Time[19]

	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021
min	$75,668	$54,857	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000
median	$106,192	$100,681	$79,026	$76,139	$81,955	$81,431	$74,748	$76,609	$74,512	$71,554
max	$186,477	$186,477	$186,477	$186,477	$250,001	$250,001	$250,001	$250,001	$250,001	$250,001

CCA member communities support renewable and carbon-free energy across median income levels. The 14 member communities that enroll by default into the 100% renewable energy product have a range of median incomes from $56,025 (West Hollywood, a member of Clean Power Alliance) to $212,222 (Piedmont, a member of East Bay Community Energy). We found that there is a trend, as higher-income communities tend to choose default electricity products with greater

Fourteen communities have a default electricity product with 100% renewable energy, and an additional 38 communities have a default electricity product with 100% carbon-free energy.

[17] U.S. Census Bureau. City and Town Population Totals: 2010-2019. Table Subcounty Resident Population Estimates: April 1, 2010 to July 1, 2019 (SUB-EST2019).
[18] Ibid.
[19] U.S. Census Bureau. American Community Survey, 2010-2014 American Community Survey 5-Year Estimates, Table B19013.

amounts of renewable energy; for every $10,000 increase in the median income of a community, the default electricity product has 1.2 percentage points more renewable energy, on average.[20]

An even greater variety of communities support 100% carbon-free energy (renewable energy plus hydroelectricity). The median income range for the 54 communities with a 100% carbon-free energy default product is from $34,659 to $224,271. More than two-thirds of existing CCA member communities – 128 cities and counties representing a population of 6.2 million – have a default product with over 90% carbon-free energy in their default product. These communities' median incomes range from $30,000 to $250,001. Higher-income communities also tend to choose default electricity products with greater amounts of carbon-free energy; for every $10,000 increase in the median income of a community, the default electricity product has 0.9 percentage points more carbon-free energy, on average.[21]

128 CCA member cities and counties in California– representing a population of 6.2 million – have a default electricity product with more than 90% carbon-free electricity.

Figure 2 shows the relationship between the median income of CCA member communities and the share of renewable (green points) and carbon-free (blue points) energy resources in their default electricity product. Each point represents a CCA member community.

Figure 2. Member Community Median Income and Default Electricity Product Share of Renewable (Left) and Carbon-Free (Right) Resources

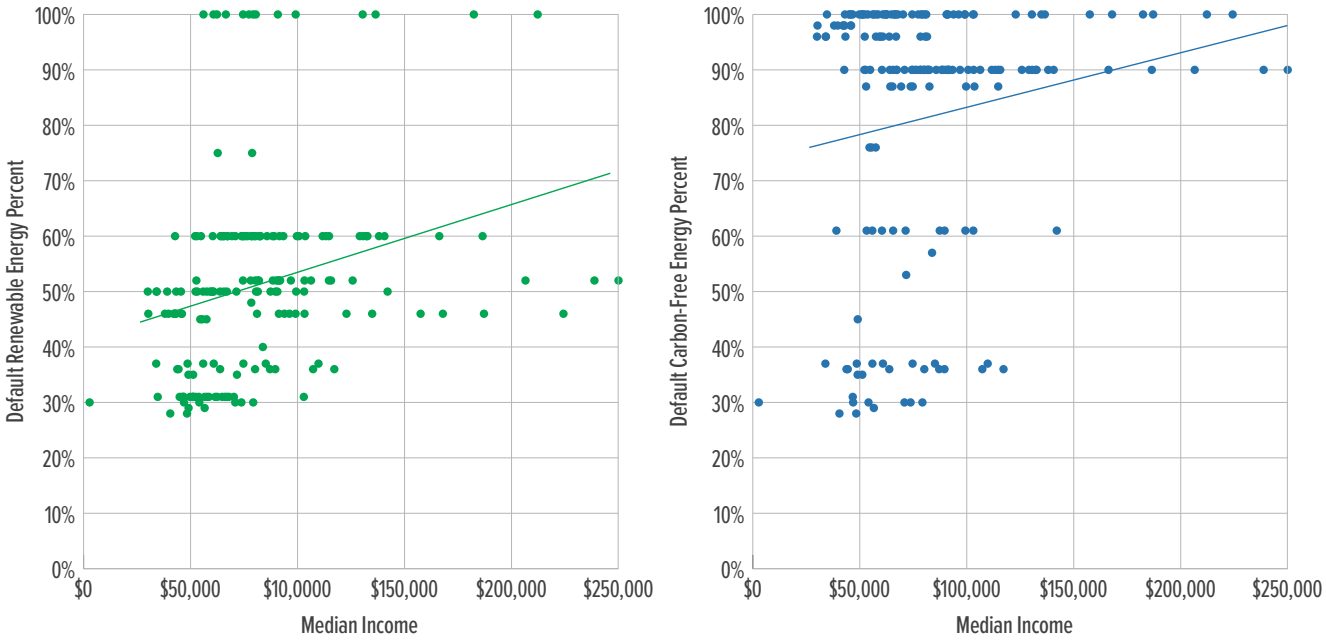
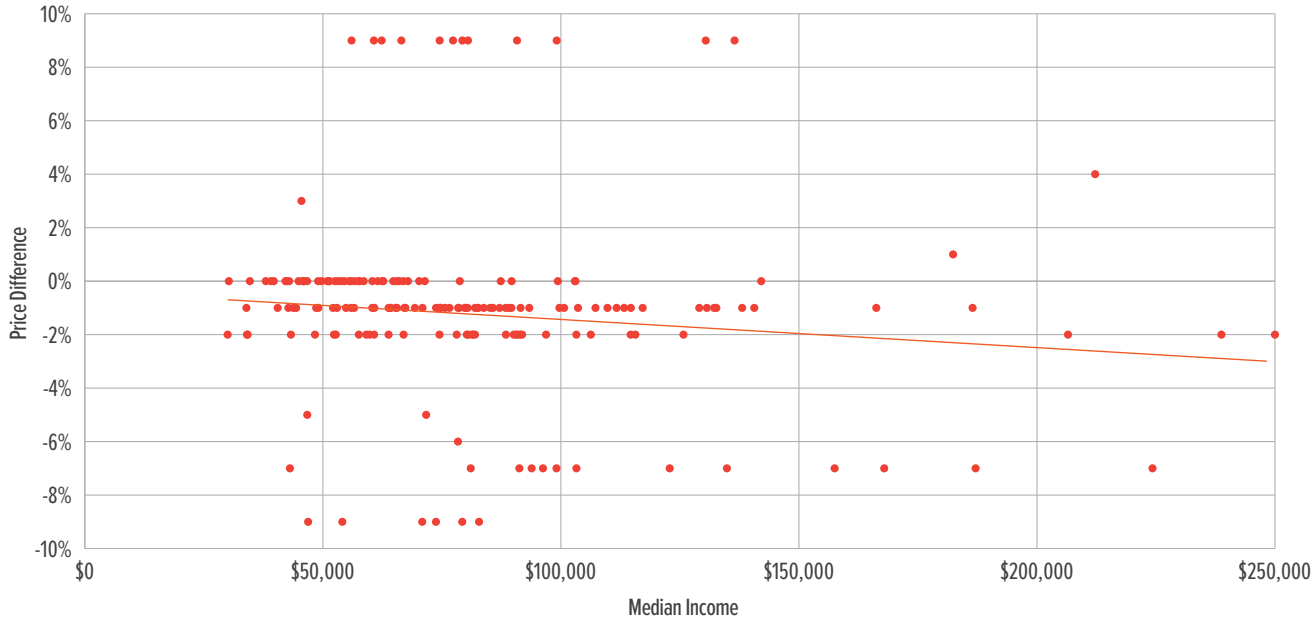


Figure 3 shows the relationship between a CCA member community's median income and the price difference compared to its affiliate IOU; i.e., the alternative electricity provider a CCA's customers can choose. There is a slight trend: the rate becomes cheaper as the median income of a member community increases. However, this is not statistically significant.

20. Statistically significant at the 0.05 level.
21. Statistically significant at the 0.05 level.

Figure 3. Member Community Median Income and Rate Price Difference (%) Compared to Affiliate IOU



Source: Figure created by UCLA Luskin Center for Innovation. Median income data from U.S. Census Bureau. Rate data from each Joint Rate Comparison for each CCA and their affiliate IOU. All rates are accurate as of time of analysis in April 2020.

2.2.3 Political Affiliation

Diversity in political affiliation among CCA member communities has also increased over time. The range has become wider, and the median has moved closer to actual shares of registered voters in the state. In 2020, CCA member communities have between 18% and 69% registered Democrats, with a median of 48%, and between 3% and 56% registered Republicans, with a median of 20%. For comparison, in 2020, 45.3% of all voters in California registered as Democrats and 23.9% registered as Republicans.[22] Table 4 summarizes how the range and median share of registered Democrats and Republicans has changed as the number of new CCA member communities has grown over time. Figure 4 illustrates this increasing diversity.

Table 4. Range in Political Affiliation of CCA Member Communities Over Time

	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021
Democrat										
min	43%	43%	43%	39%	35%	27%	22%	22%	18%	18%
median	57%	57%	55%	54%	52%	50%	49%	49%	48%	47%
max	67%	67%	67%	67%	67%	67%	69%	69%	69%	69%
Republican										
min	6%	6%	6%	6%	6%	6%	3%	3%	3%	3%
median	14%	13%	15%	16%	16%	17%	18%	18%	19%	20%
max	26%	26%	26%	29%	30%	42%	48%	48%	56%	56%

[22] California Secretary of State (2020). "15-Day Report of Registration: February 18, 2020, for the March 3, 2020, Presidential Primary Election."

Political affiliation is a stronger predictor of default carbon-free and renewable energy share, as well as default rate, than income. Communities with a greater share of registered Democrats tended toward having a default product with higher amounts of renewable and carbon-free energy (Figure 4), while the opposite was true for communities with a greater share of registered Republican voters (Figure 5). However, highly Republican communities still had default products with large shares of renewable and carbon-free energy.

For every 10-percentage-point increase in the share of registered Democrats, the default share of renewable energy increases by 4.9 percentage points and the default share of carbon-free energy increases by 10.6 percentage points when controlling for median income, on average. For every 10-point increase in the share of registered Republicans, the default share of renewable energy decreases by 4.2 percentage points and the default share of carbon-free energy decreases by 10.6 percentage points when controlling for median income, on average.

Figure 4. Share of Registered Democrat Voters to Default Renewable (Left) and Carbon-Free Energy Share (Right)

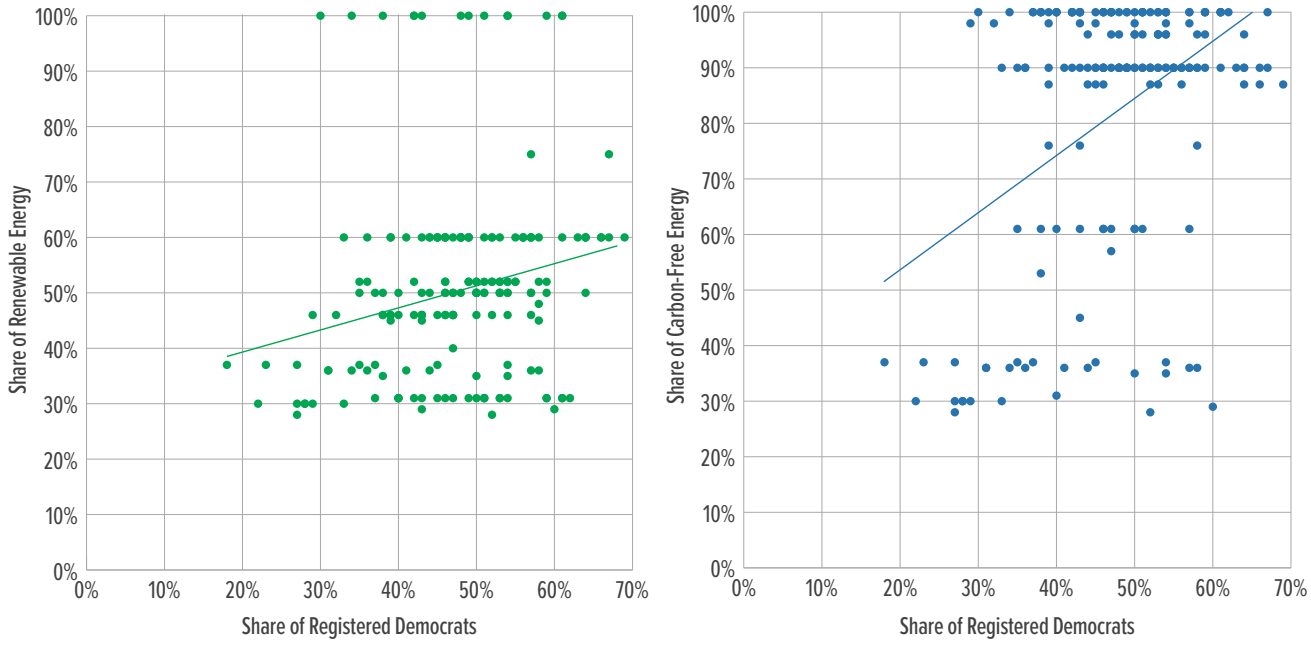
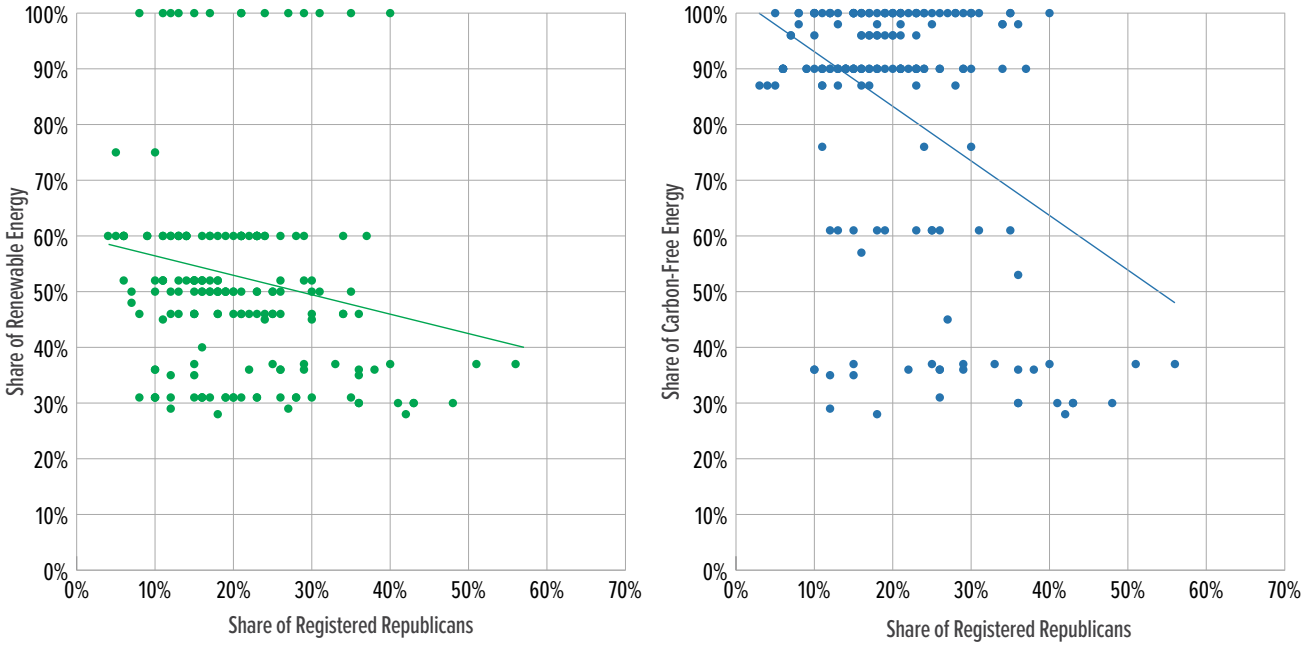


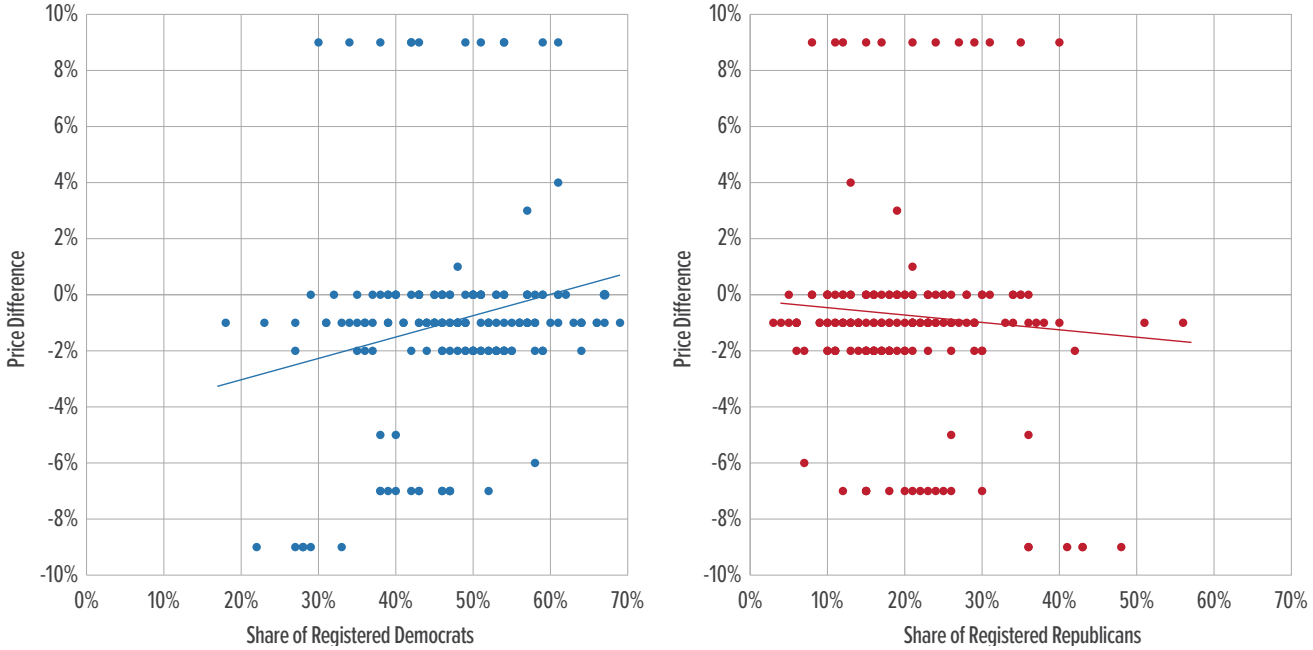
Figure 5. Member Communities' Share of Registered Republican Voters and Their Default Renewable (Left) and Carbon-Free (Right) Energy Share



Next, we compare the political affiliation of CCA member communities to the price difference relative to their affiliate IOU. We find a slight relationship between political affiliation and default electricity rate, illustrated in Figure 6. Communities with higher shares of Republican voters tend to offer default electricity products with lower-cost rates compared to the affiliate IOU, while the opposite is true for communities with higher shares of Democratic voters.[23] This does not necessarily mean that the more Republican communities are always lower cost than the affiliate IOU and Democratic communities are more expensive. Rather, generally the more Republican a community is, the larger its rate discount relative to the IOU, and the more Democrat, the smaller the rate discount.

[23] This relationship between price difference and political affiliation is statistically significant for the share of registered Democrat voters but not for registered Republican voters.

Figure 6. Default Rate Compared to Affiliate IOU by Political Affiliation



Source: Figure created by UCLA Luskin Center for Innovation. Voter registration data from California Secretary of State. Rate data from each Joint Rate Comparison for each CCA and their affiliate IOU. All rates are accurate as of time of analysis in April 2020.

While we found a trend between greater shares of registered Republican voters and less renewable and carbon-free energy, it is possible that this is simply reflecting these communities' preference for lower-cost rates. These findings do not necessarily mean that more conservative communities do not support renewable energy, but rather that cost savings is more important. Two recent Yale studies found that there is bipartisan support for renewable energy;[24] however, registered Republicans had less of a willingness to pay more for renewable energy.[25] This does not mean that a preference for lower-cost energy is prohibitive to supporting carbon-free energy. Yale researchers note, "Public willingness to pay more for renewable energy is likely to become less relevant in coming years, because the costs of generating electricity from renewable energy sources have been rapidly declining."[26]

[24] Leiserowitz, A., Maibach, E., Rosenthal, S., Kotcher, J., Gustafson, A., Bergquist, P., Ballew, M., & Goldberg, M. (2018). Energy in the American Mind, December 2018. Yale University and George Mason University. New Haven, CT: Yale Program on Climate Change Communication. DOI: 10.17605/OSF.IO/BDQ25

[25] Gustafson, A., Goldberg, M., Rosenthal, S., Kotcher, J., Maibach, E., & Leiserowitz, A. (2019). *Who is willing to pay more for renewable energy?* Yale University and George Mason University. New Haven, CT: Yale Program on Climate Change Communication.

[26] Ibid.

3. CCA Design Features That Support Environmental Goals

As electricity providers, CCAs support environmental goals in two ways. The first and most significant is by choosing electricity generation sources and purchasing carbon-free energy. Second, depending on their financial ability, CCAs invest in local energy programs, such as energy efficiency or electric vehicle rebate programs, that often result in additional greenhouse gas reductions. Offering these programs is not required, but many California CCAs choose to reinvest revenues to bring additional financial and environmental benefits to the communities they serve.

To support these environmental goals, CCAs must first be financially solvent. To do so, a CCA must gain a sufficient customer base and then retain those customers by staying competitive with their affiliate IOU. In this section, we examine the design features of CCAs that enable them to succeed in these ways.

We first focus on two designs of California CCAs that support their ability to ensure a sufficient customer base: 1) within single jurisdictions by legislative design and 2) among multiple jurisdictions joined as a result of a practical business decision. Per the state's CCA-enabling legislation, customers are automatically enrolled in a CCA but can voluntarily opt out. In this section, we discuss why this automatic enrollment is essential to gaining sufficient customers within a jurisdiction. These jurisdictions can join together to increase their customer bases, which can increase the economies of scale benefits, as we will present here. Both design features support gaining customers, which in turn supports CCAs' financial health, enabling them to provide environmental benefits.

Then, CCAs must maintain this customer base by remaining competitive with the affiliate IOU. CCAs can do this by providing additional value to customers by offering a combination of: 1) lower-cost electricity, 2) cleaner energy, and 3) more attractive local energy programs. The primary design feature that supports CCAs' ability to offer this additional value is their rate-setting authority. That is, CCAs are able to set the electricity rate for their customers. In this section, we compare CCA rates to those of their affiliate IOU. We find that although most rates are set just below those of the IOU, some communities are willing to pay higher rates for even greater amounts of carbon-free energy. We discuss how rate-setting authority, as well as external market factors, have helped CCAs keep costs low. Furthermore, CCAs can choose to set a rate so that they can reinvest net revenues into local energy programs. These local energy programs not only provide benefits for CCA customers but can also provide financial benefits to the administering CCA. By remaining a more attractive option than the IOU, CCAs can continue to remain financially solvent and therefore continue to provide environmental benefits.

3.1 Ensuring a Robust Customer Base

Ensuring a robust customer base is the foundation for the financial stability that facilitates a CCA's successful provision of environmental benefits. In this section, we examine two CCA design features that enable them to gain customers:

- **Automatic enrollment with voluntary opt-out**
- **Collaboration with other cities and counties and other CCAs**

3.1.1 Automatic Enrollment With Voluntary Opt Out: Maximizing Customer Aggregation

A common trait across CCAs is their "opt out" feature. Stipulated in the enabling legislation,[27] this means that all customers within the city or county's geographical territory are automatically enrolled in a CCA when it launches. While sometimes controversial, this

[27] California Assembly Bill 117 (2002). "Under community choice aggregation, customer participation may not require a positive written declaration, but all customers shall be informed of their right to opt out of the community choice aggregation program. If no negative declaration is made by a customer, that customer shall be served through the community choice aggregation program."

mechanism is critical for CCA success, as it enables CCAs to gain and maintain a critical mass of customers necessary for successful operation.[28] In California, CCA's opt-out rates have remained low, with retention averaging above 95%.[29]

As identified in the previous section, the local demand for greener electricity is the foremost condition for CCAs to be successful in supporting the state's carbon-free energy goals. However, behavioral economics research has found that customers often favor default options,[30] which means that even if they prefer cleaner energy, the active effort required to switch to a cleaner electricity product poses a barrier to customers. Automatic enrollment removes this barrier and makes it easy for customers with a desire for cleaner energy to have access to it, without needing to make any effort.

3.1.2 Multimember and Collaborative CCAs: Increasing Economies of Scale

Multimember CCAs

Multimember CCAs are common in California.[31] Of the 23 operational CCAs in California, 11 have more than one member city or county; 170 of the 182 communities who are members of a CCA are members of a multimember CCA. This is somewhat unique to California CCAs. Only a few of the 750 CCAs in other states have more than one member.[32] One of the many reasons for a community to ally forces in exchange for giving up partial decision-making authority is the economies of scale advantage. By including more member communities, CCAs can increase their electricity sales. There is evidence that the larger the CCA, the lower the costs per electricity sale. Keeping costs low further supports maintaining customers, as discussed in section 3.2, Remaining Competitive by Keeping Costs Low to Offer Carbon-free Energy and Local Programs.

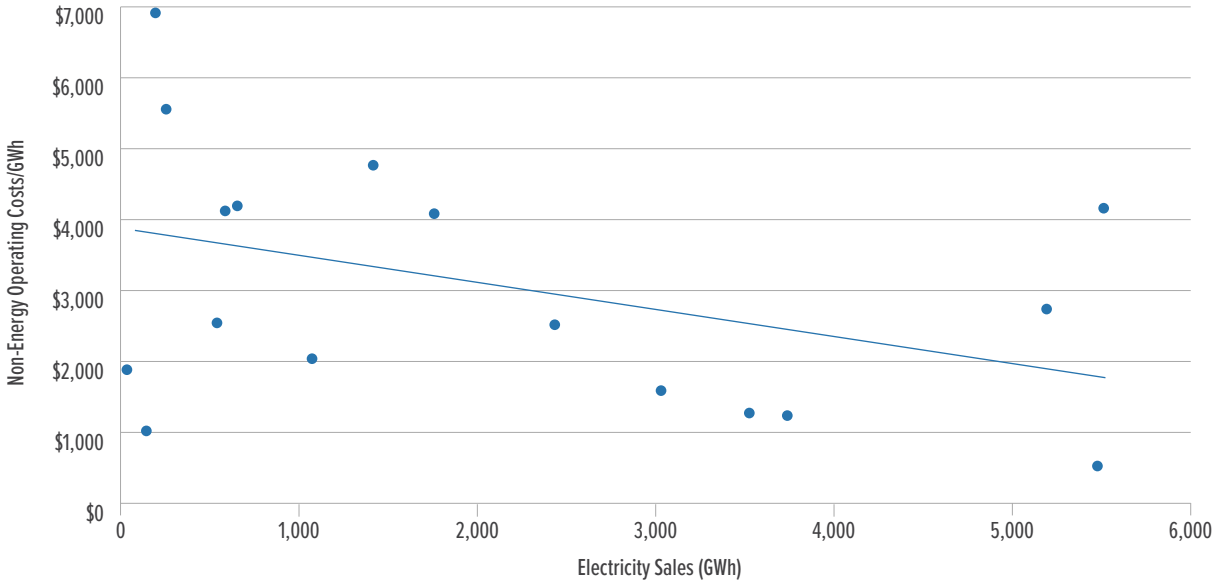
Using publicly available CCA financial statements, we conduct an economies of scale analysis. We first look at economies of scale in non-energy operating costs. Electricity sale revenues primarily cover energy procurement costs. Non-energy operating costs are more minimal and do not proportionally increase or decrease with the number of customers. These non-energy operating costs consist mostly of general and administrative expenses, personnel, and other overhead expenses.[33] We find that for every increase in a CCA's size by 1,000 gigawatt (GWh) in electricity sales, a CCA's non-energy operating costs per GWh decrease by $451 on average when controlling for the year a CCA launched.[34] Figure 7 illustrates this relationship between CCA size in terms of electricity sales and non-energy operating costs per GWh of electricity sales.

A kilowatt hour (kWh) is a unit of electricity that is equivalent to 1,000 watts in one hour. A megawatt hour (MWh) is equal to 1,000 kilowatt hours, and a gigawatt hour (GWh) is equal to 1,000 megawatt hours. The average American home consumes almost 1 MWh of electricity per month.

Source: EIA (2020). "How much electricity does an American home use?"

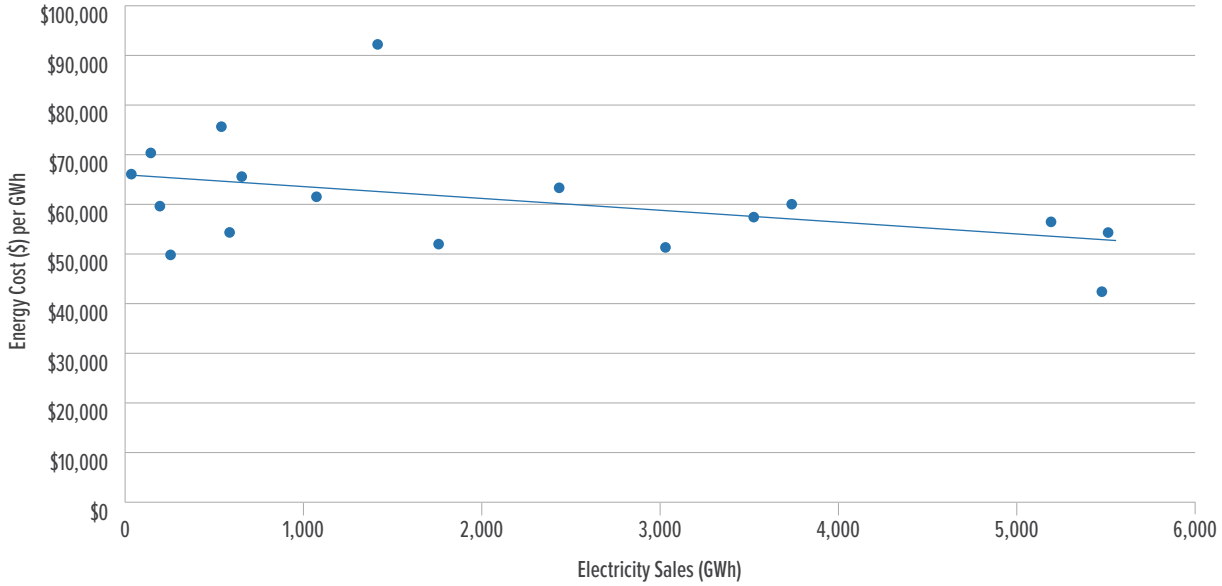
28. O'Shaughnessy, E., Heeter, J., Gattaciecca, J., Sauer, J., Trumbull, K., & Chen, E. (2019). *Community Choice Aggregation: Challenges, Opportunities, and Impacts on Renewable Energy Markets* (NREL/TP-6A20-72195). Golden, CO: National Renewable Energy Laboratory.
29. Ibid.
30. Tversky, A., and D. Kahneman. 1991. "Loss Aversion in Riskless Choice: A Reference-Dependent Model." The Quarterly Journal of Economics 106(4):1039–1061.
31. These multimember CCAs are known as "Joint Powers Authorities." This is a legal structure in which "assets and liabilities of the CCA program remain separate from those of the county or city general funds." DeShazo, J., Gattaciecca, J., & Trumbull, K. (2017). *The Promises and Challenges of Community Choice Aggregation in California*. UCLA Luskin Center for Innovation.
32. O'Shaughnessy, E., Heeter, J., Gattaciecca, J., Sauer, J., Trumbull, K., & Chen, E. (2019). *Community Choice Aggregation: Challenges, Opportunities, and Impacts on Renewable Energy Markets* (NREL/TP-6A20-72195). Golden, CO: National Renewable Energy Laboratory.
33. Other non-energy operating costs typically include professional services, legal, regulatory efforts, marketing and promotions, customer service, and other utility or California Independent System Operator (CAISO) fees.
34. Statistically significant at the 0.05 level.

Figure 7. CCA Non-Energy Operating Costs ($) per GWh by CCA Size (Electricity Sales)



We next examine evidence of economies of scale in energy costs, which make up the majority of a CCA's expenses. These costs generally scale as a CCA grows. Furthermore, energy costs are also influenced by the amount, type, length, and date of the contracts signed with renewable energy generation facilities for electricity. However, we do see evidence of economies of scale in CCA energy costs. While not statistically significant, for every increase in a CCA's size by 1,000 GWh in electricity sales, a CCA's energy costs per GWh decrease by $2,839 on average, when controlling for the year a CCA launched.[35] This means that the greater a CCA's electricity sales, the lower its per-unit energy costs. This is illustrated in Figure 8.

Figure 8. CCA Energy Costs ($) per GWh by CCA Size (Electricity Sales)



35. Statistically significant at the 0.1 level.

Cross-CCA Collaboration

In addition to cities and counties collaborating to form CCAs, California is also seeing cross-CCA collaboration to achieve economies of scale in power procurement costs. Recently, two multimember northern California CCAs, Silicon Valley Clean Energy and Central Coast Community Energy, signed two joint power purchasing agreements. The two contracts represent a combined 210 megawatts of electricity from geothermal resources and solar plus battery storage.[36]

The California CCA Trade Association

Another way CCAs collaborate with each other is through CalCCA, California's CCA trade association. Twenty five of the 26 existing and soon-to-launch CCAs are members of this association, which provides "education, technical guidance, and regulatory and legislative advocacy."[37]

3.2 Remaining Competitive by Keeping Costs Low to Offer Carbon-Free Energy and Local Programs

In this section, we examine how CCAs can use their rate-setting authority to provide additional value to customers, which can support retaining those customers. CCAs can provide additional value by offering customers 1) lower-cost electricity, 2) cleaner energy, and 3) more attractive local energy programs. CCAs can aim to set rates low enough to provide cleaner energy at lower rates, but high enough to have sufficient revenues for local energy programs, such as rooftop solar or battery energy storage incentives.

3.2.1 Rate-Setting Authority: The Ability to Flexibly Offer Competitive Products to Customers

Despite being partially regulated by the California Public Utilities Commission (CPUC), CCAs are principally governed by their boards of directors composed of elected officials. This board has rate-setting authority. Consequently, they can set the rates for electricity as they choose and implement innovative programs without the CPUC's approval, unlike IOUs. This provides CCAs with the ability to remain competitive in order to retain customers.

As described in the introduction to this section, CCAs are responsible for energy procurement, while IOUs continue to provide transmission and delivery services. This means CCAs have control only over setting the generation rate component of a customer's bill, which covers costs associated with energy procurement for electricity generation. The other components of a customer's bill (transmission and delivery, and other fees) are set by the IOU with approval from the CPUC. The sum of these components forms a customer's total electricity bill, which is charged per unit of electricity. By having control over the generation rate, CCAs can choose if and how much of a discount to offer compared to the incumbent IOU. Table 5 compares which entity is responsible for setting each bill component for CCA and IOU customers.

Table 5. Entity Responsible for Setting Each Bill Component for CCA and IOU Customers

Customer Bill Component	CCA Customer	IOU Customer
Generation Rate	CCA	IOU*
Delivery and Transmission Rate	IOU*	IOU*
Fees**	CPUC	N/A

* With CPUC approval

** Fees include the power charge indifference adjustment (PCIA), which is an exit fee charged to CCA customers, and are set based on a CPUC methodology. This is described more in section 4.1.1, Long-term Contracting Requirements: Implications for Competition.

CCAs have some constraints on the extent of the discount they choose to offer. First, they need to set the rate sufficiently high to recover energy and non-energy operating costs. The energy resources a CCA chooses to procure can therefore affect how low they are able to set the rate. For example, the International Renewable Energy Agency found that in 2019, large

36. Silicon Valley Clean Energy (2020). "MBCP and SVCE Sign Contracts for 210 MW of Geothermal and Solar Energy in California."
37. CalCCCA (2020). "About CalCCA."

photovoltaic solar generation cost 6.8 cents per kilowatt hour, while onshore wind generation cost 5.3 cents per kilowatt hour.[38] Second, CCA customers are charged fees, including an "exit fee." This means that in order to provide a discount compared to the IOU's total electricity rate, a CCA's generation rate plus fees must be lower than the IOU's generation rate. These fees are described more in section 4.1.1, Long-term Contracting Requirements: Implications for Competition. Third, CCAs need to set the generation rate sufficiently high to develop reserves or to fund local energy programs. This is discussed more in section 3.2.2, Ensuring Sufficient Funds to Offer Local Energy Programs.

Innovative Rate Setting Examples by CCAs

Another benefit to having rate-setting authority is that CCAs can be innovative. For example, the CCA in Los Angeles and Ventura counties, Clean Power Alliance, chooses to offer low-income customers 100% renewable energy at the same price at which they were previously paying for electricity with lower amounts of renewable energy through the incumbent IOU (including with their low-income customer discount). Low-income customers in California have access to a number of rate assistance programs that offer discounts on electricity bills, and those customers retain those discounts when they join CCAs.[39]

Another example of innovative rate setting was seen at Central Coast Community Energy, a CCA on the central coast. For its first few years of operation, it matched its rates to the IOU. Customers could choose between receiving a biannual rebate or reinvesting their rebate in supporting the development of local renewable energy or local energy programs.[40] What this means is that customers saw no change in their monthly electricity bill rate; however, they could choose to receive a lump-sum discount or to invest in supporting additional environmental efforts. Similarly, MCE, the oldest California CCA, offers a "Local Sol" rate, which allows customers to directly support the development of solar projects in the community. This rate is locked in for the length of the solar contract, so customers are protected from future rate increases.[41]

Silicon Valley Clean Energy, which serves 13 communities in Santa Clara County, plans to develop a commercial and industrial Clean Power Offerings program in which large commercial and industrial customers could have an additional electricity product option that balances their desire for specific types of cleaner energy and cheaper rates.[42]

CCA and IOU Default Rate Comparison

CCAs' ability to provide lower-cost rates than their competing electricity provider is an important source of additional value for many customers, and supports ratepayers' willingness to remain with the CCA. In California, CCAs have historically remained both lower cost and cleaner than their IOU, with few exceptions. However, this does not necessarily mean that a CCA must always be the cheaper option. Increasingly, CCA member communities are opting for a more expensive default product with an even greater share of renewable energy, providing proof of a willingness to pay for cleaner energy. The resulting effect on residential customers' electricity bills is not substantial – typically only $5 to $10 extra a month. Still, these communities highlight that the additional value cleaner energy brings to customers can sometimes be greater than cheaper rates.

California CCAs are not required to offer greater amounts of renewable energy than their affiliate IOU or more than one electricity product. For example, King City Community Energy, a single-city CCA in Monterey County, and Pioneer Community Energy, a CCA serving multiple communities in Placer County,

38. IRENA (2020). *Renewable Power Generation Costs in 2019*. International Renewable Energy Agency.
39. Clean Power Exchange (2020). "Community Choice Energy Programs: Existing and Prospective."
40. Monterey Bay Community Power (2018). "Your New Electricity Provider."
41. MCE (2020). "Local Sol 100% Locally-Produced Solar Energy."
42. Silicon Valley Clean Energy (2019). "Silicon Valley Clean Energy Authority Board of Directors Meeting Agenda Packet."

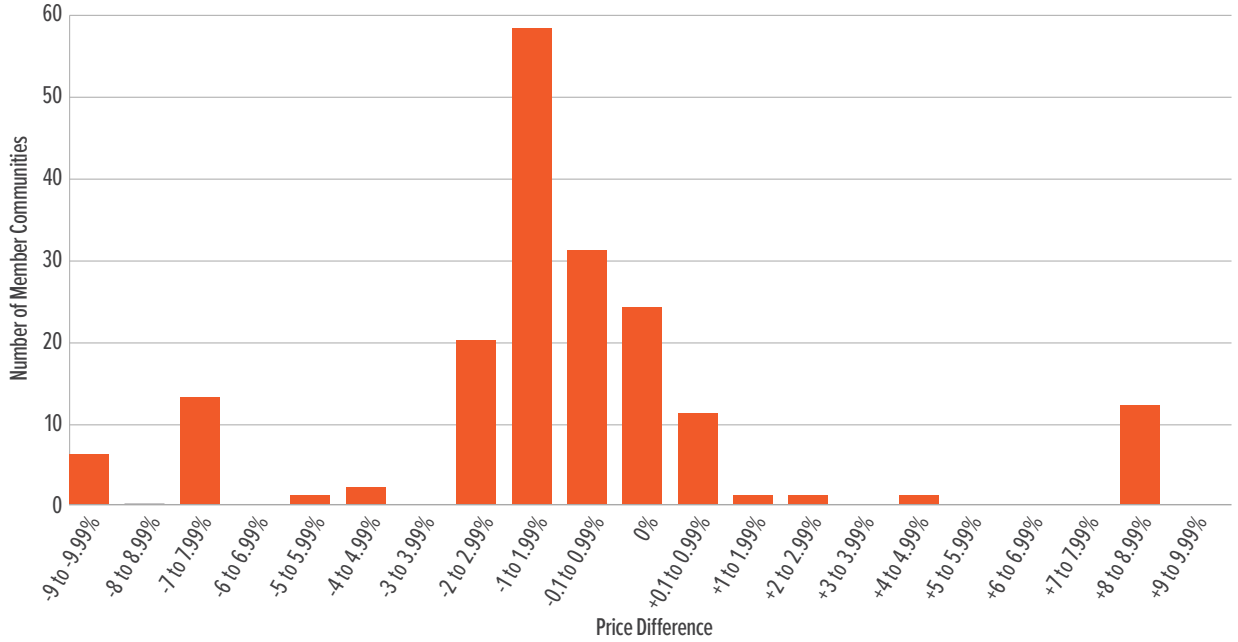
each offer only one electricity product. While they provide less renewable energy than their affiliate IOU, these products offer bill savings of 1% and 9% to their customers, respectively.[43,44] Although these CCAs may be reflecting their communities' preference for electricity bill savings, the risk to this strategy is that they are competing with the affiliate IOU exclusively on price. With no additional value to the electricity product beyond price, these CCAs may face higher numbers of customers opting out if their rates become comparatively more expensive. Products with greater amounts of renewable energy may have additional marketing value for customers who are willing to pay for a cleaner product.

Through our analysis, we compare the rate of CCA member communities' default electricity product to the rate of their affiliated IOU's default electricity product. The default electricity rate is the total price per kilowatt hour that an electricity customer pays unless they actively choose to enroll in another option. We find that most CCA rates are set just below the rates of the IOU; however, some communities are willing to pay higher prices for even greater amounts of clean energy. This is because some CCA member communities choose to automatically enroll their customers into their electricity with the most renewable energy, which is often slightly more expensive than the IOUs' default electricity product. While not always the default electricity product, as of the time of this analysis, all CCAs' cheapest option is currently cheaper than their local IOU's. Similarly, when comparing electricity products with similar amounts of renewable energy between CCAs and IOUs, CCAs' electricity product is typically lower cost (i.e., a CCA's 100% renewable option is lower cost than the IOU's 100% renewable option). We describe additional reasons, beyond CCA rate-setting authority, that explain these rate differences in the next section.

The majority of CCA member communities choose to offer a default rate that is lower cost than their affiliate IOU's default rate, as of publication of this report. Of 182 CCA member communities, 131, or 73%, choose to offer a lower rate. This discount ranges from 0.004% to 9.1%. About 13% of CCA member communities have a default rate that is the same as the affiliate IOU (24 out of 182). Eleven communities have a default rate that is only slightly higher (0.1%) than their affiliate IOU. These communities with slightly higher rates are all members of the Clean Power Alliance, and have a default electricity product with 50% renewable energy, 15 percentage points more than the default product offered by their affiliate IOU, Southern California Edison, in 2019.[45] Only 8% of CCA member communities (15 out of 182) have a default rate 1.5% to 8.6% more expensive than the affiliate IOU. This is because the majority of these communities have chosen the 100% renewable energy product as their default.[46] Figure 9 shows the distribution of CCA member communities' default rate compared to the affiliate IOU's default rate.

43. Pacific Gas & Electric and Pioneer Community Energy (2020). "PG&E – Pioneer Joint Rate Comparisons."
44. Pacific Gas & Electric and King City Community Power (2020). "PG&E – King City Community Power Joint Rate Comparisons."
45. California Energy Commission (2020). "Power Source Disclosure Program."
46. Twelve of the 13 communities with a more expensive default rate have a 100% renewable energy default electricity product. The remaining community is Palm Springs, which has a default electricity product with 50% renewable energy, for a total of 100% clean energy.

Figure 9. CCA Default Rate Price Difference Compared to IOU



Source: Figure created by UCLA Luskin Center for Innovation. Data from each Joint Rate Comparison for each CCA and their affiliate IOU. All rates are accurate as of time of analysis in April 2020.

Relative Cost Advantage

CCAs can provide cleaner electricity at a lower rate than IOUs for number of reasons, despite being smaller and therefore having less of an economies of scale advantage. First, the price of renewable energy has dropped rapidly over the last few decades,[47] enabling CCAs to purchase it at a lower price. IOUs bought long-term renewable energy contracts prior to the launch of CCAs, when renewable energy was more expensive. However, CCA customers do pay fees to the IOU for some of the costs associated with these long-term renewable energy contracts. While CCA rates tend to be more stable, these fees have historically been volatile, which can make it challenging for CCAs to provide cost competitive energy.[48] This is discussed further in section 4.1.1, Long-Term Contracting Requirements: Implications for Competition.

CCAs have a number of cost advantages over IOUs that support their ability to provider cleaner electricity at lower rates.

Second, as not-for-profit entities, CCAs have no shareholders and less overhead. Some note that this also gives them the advantage of cheaper financing.[49,50] Third, CCAs have an active market incentive to bargain harder to keep costs low. IOUs can pass through costs to customers with CPUC approval, so they have less of an incentive to keep costs low. Finally, many CCAs choose to invest a portion of net revenues into rate stabilization funds. These factors combine to create a cost advantage for CCAs in California that allows them to procure higher amounts of renewable energy while remaining competitive.

The use of unbundled renewable energy certificates can also affect an electricity provider's power supply costs, but are not used frequently by California CCAs. Unbundled renewable energy certificates (RECs) are a

47. IRENA (2020). *Renewable Power Generation Costs in 2019*. International Renewable Energy Agency.
48. DeShazo, J., Gattaciecca, J., & Trumbull, K. (2017). *The Promises and Challenges of Community Choice Aggregation in California*. UCLA Luskin Center for Innovation.
49. Chaset, N. (2019). Myth of the Month: How Can CCA Rates Be Lower than Investor Owned Utilities? Retrieved from East Bay Community Energy 2020.
50. DeShazo, J., Gattaciecca, J., & Trumbull, K. (2017). *The Promises and Challenges of Community Choice Aggregation in California*. UCLA Luskin Center for Innovation.

"credit" for a unit of renewable energy generation that is purchased separately from the underlying electricity. Their use has been critiqued as entities typically still need to purchase electricity from dirtier generation resources, since the unbundled RECs do not come coupled with actual electricity. In California, there are limits on an electricity provider's use of unbundled RECs. California CCAs generally use fewer unbundled RECs over time, and seven CCAs have never used any unbundled RECs.[51]

3.2.2 Ensuring Sufficient Funds to Offer Local Energy Programs

The third primary way CCAs can provide additional value to customers is through offering local energy programs that support both environmental goals and customer retention, an important factor for a CCA's financial health.

CCAs have invested in a number of such innovative local energy programs. These typically provide financial and/or environmental benefits to customers and the community. They include rooftop solar and battery energy storage incentives, electrification, energy efficiency incentives, electric vehicle rebates, education, and more. Given CCAs' local nature, they are well-positioned to provide programs that reflect the unique preferences and needs of their communities. For example, MCE has a Low Income Families & Tenants (LIFT) Program that provides energy and water efficiency assessments and rebates to low-income renters and owners of multifamily housing.[52]

CCAs have also used local energy programs to respond to natural disasters and crises in their communities. For example, customers in two Northern California CCAs (MCE and Sonoma Clean Power) were directly impacted by destructive wildfires in 2017 and 2019. These CCAs created Advanced Energy Rebuild, programs that offered incentives to include energy efficient technologies and renewable energy when rebuilding homes destroyed by wildfires.[53,54]

CCAs can design and deploy innovative initiatives and community-centered programs that provide financial and environmental benefits and can respond to communities' needs in times of crisis.

In 2020, some CCAs created financial assistance programs in response to the COVID-19 pandemic. To directly alleviate some of the financial stress brought on by the pandemic, CCAs including Clean Power Alliance,[55] Peninsula Clean Energy,[56] and Silicon Valley Clean Energy,[57] offered bill credits to low-income customers. Some CCAs, including East Bay Community Energy,[58] Sonoma Clean Power,[59] and Valley Clean Energy,[60] have donated money to food banks, and more.

Table 6 summarizes local energy programs offered by each California CCA at the time of publication of this report, as summarized by CalCCA. Light green squares indicate that the program is under development; dark green squares indicate that the program is currently being offered. CCAs may vary in the number and type of programs for a variety of reasons. For example, CCAs tend to offer more programs as they mature. CCAs that have recently launched may have fewer available revenues or capacity to administer such programs. Other reasons include differing local preference in program type and avoiding duplication of IOU programs available to CCA customers.

51. Trumbull, K., DeShazo, J., Gattaciecca, J., Callahan, C., & Einstein, M. (2019). *The Rapid Growth in Community Choice Energy and its Acceleration of Renewable Energy: A California Case Study*. UCLA Luskin Center for Innovation.
52. MCE (2020). "Energy Savings for Multifamily Properties."
53. MCE (2020). "Advanced Energy Rebuild Napa."
54. Sonoma Clean Power (2020). "Providing you with $17,500 to rebuild an efficient, sustainable home."
55. Clean Power Alliance (2020). "COVID-19 Resources."
56. Daily Journal staff report. (2020, March 31). Peninsula Clean Energy grants $100 credit to enrollees. The Daily Journal.
57. Silicon Valley Clean Energy (2020). "COVID-19 Response."
58. East Bay Community Energy (2020.) "Our Response to COVID-19."
59. CalCCA (2020). "CCAs and COVID-19."
60. Valley Clean Energy (2020). "VCE donates to Yolo Food Bank."

Table 6. Local Energy Programs Offered by California Community Choice Aggregators[61]

■ Program offered ■ Program under development

	Community Choice Aggregator																		
	AVCE	CCCE	CPA	CPSF	EBCE	KCCP	LCE	MCE	PCE	PIO	PRIME	RMEA	RCEA	SJP	SJCE	SVCE	SEA	SCP	VCE
Solar Programs																			
Feed-In Tariff		■		■				●					●					●	
Low-income Solar Incentives		●	■	●	●	●		●	■		●								
Net Energy Metering	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Solar Incentives												●	●						
Solar Referral Service			●													●			
Demand Response, Electrification, and Energy Efficiency Programs																			
Customer Load Shifting			●	●				●								■		●	
Building Electrification		●			■			●	■				●			●		●	■
Demand Response		●	●	●				■	■							■		●	●
Energy Efficiency				■			●	●		■			●			■		●	●
Energy Efficiency Data Sharing					●														
Low-income and Multifamily Energy Efficiency		●						●	■		●		●						
Transportation Programs																			
EV Bus Program		●		●			●		●									●	
EV Incentives (vehicles and/or charging)		●					●	●	●				●		■	●		●	■
EV Load Shifting								●								■		●	
Resiliency Programs																			
Advanced Energy Rebuild								●										●	
Microgrid Development		●					●			■			●						
Solar+Storage Offerings			■		●			●	●		■		●			●		●	
Battery Storage Incentives								●								■		●	
Rates																			
Battery Storage Rate				■	■			●								●		■	
Budget Billing				■			●												
Customer C&I Clean Power Offerings																●			
Dividend Program		●																	●
EV Rate		●	●	●	●		●	●	●	●	●		●		●	●	●	●	●
On-Bill Repayment				■				●										■	
TOU Rates	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Education, Outreach, Advocacy, and Other Programs																			
Advancing Reach Codes		●			●				●							●		●	
Citizen Sourcing			●				●						●						
COVID-19 Relief		●	●	●	●		●		●							●			●
Education, Outreach, and/or Innovation Grants			●		●				●	■						●		●	
Energy Education in Local Schools				■					●						●			●	
Emissions Inventory Support for Member Agencies		●														●			
Workforce Education and Training								●								●		●	

Table note: CCA name acronym key is found in Appendix A.

[61] CalCCA (2020). "CCA Programs."

CCAs primarily fund local energy programs through their revenues. As public entities, CCAs are not-for-profit, so they reinvest any net revenues from electricity sales back into the community. CCA spending on these programs varies. In exercising their rate-setting authority, CCAs can set rates sufficiently high to have more net revenues to reinvest in these programs but must balance that with the goal of keeping rates competitive with the affiliate IOU.

Investment in local energy programs is influenced in part by a California state proposition. It has been interpreted to apply to how CCA revenues can be spent. A report by Gridworks notes, "CCAs may be constrained from providing certain cross-subsidies by the provisions of Proposition 26, which does not apply to IOUs."[62] One CCA feasibility study notes, "It is widely held that Proposition 26 (2010) prohibits the use of these reserves for any non-CCA related activity. The accumulated reserves and new program accruals present the new CCA with a large amount of funding and numerous opportunities going forward."[63]

However, CCAs are not limited to using net margins from revenues to support local energy programs. For example, as part of their energy procurement, CCAs can invest directly in local electricity generation resources, such as solar or biomass facilities within their communities. Investing in local energy generation is additionally an effective way to support local jobs. CCAs can also leverage their position as a local, public entity to establish public-private partnerships to fund local energy programs.

Benefits of Local Energy Programs to CCAs

Beyond providing customers with financial and environmental benefits, local energy programs benefit the administering CCA. As noted above, local energy programs can help a CCA retain customers. For example, most CCAs offer their customers higher rooftop solar incentives through their net energy metering program. This perk could persuade a customer to remain with the CCA.

Local energy programs provide another marketing advantage to CCAs, in addition to the power sources in their electricity product. These programs can be another way CCAs can differentiate themselves from IOUs. Per Senate Bill 100 (2018), all electricity providers in California will supply 100% carbon-free energy by 2045. While CCAs can still differentiate by their choice in electricity resources (i.e., some customers have a preference for solar power over nuclear, or locally generated power versus out-of-state), CCAs can also compete on their provision of attractive local energy programs to help them retain customers.

62. GridWorks (2018). "Community Choice Aggregation and California's Clean Energy Future." Report.
63. Coachella Valley Association of Governments Technical Advisory Committee (2016). "Community Choice Aggregation: Business Plan/Feasibility Study Update." Staff report.

4. Policy and Regulatory Considerations

To understand how CCAs can advance environmental goals, we must also recognize the broader policy context in which they operate. CCAs must comply with state policies, which can support or inhibit CCAs' ability to purchase carbon-free energy for customers and provide local energy programs. In this section, we examine three California policies and their implications for CCAs:

- **Renewables portfolio standard**
- **Resource adequacy**
- **IOU Code of Conduct**

These policies affect CCAs' ability to procure carbon-free energy in a variety of ways. The state's renewables portfolio standard (RPS) has been a key policy to support renewable energy. CCAs have been a significant driver in accelerating the policy's goals. However, the RPS contract length requirements have implications for CCAs' resource procurement decisions and their ability to remain cost competitive. Similarly, a recent change to resource adequacy regulations poses limitations on some CCA energy procurement authority. Finally, a discussion of the IOU Code of Conduct and its importance in addressing threats to CCAs' market entry is included. These policies and their implications for how CCAs can advance environmental goals are discussed in this section.

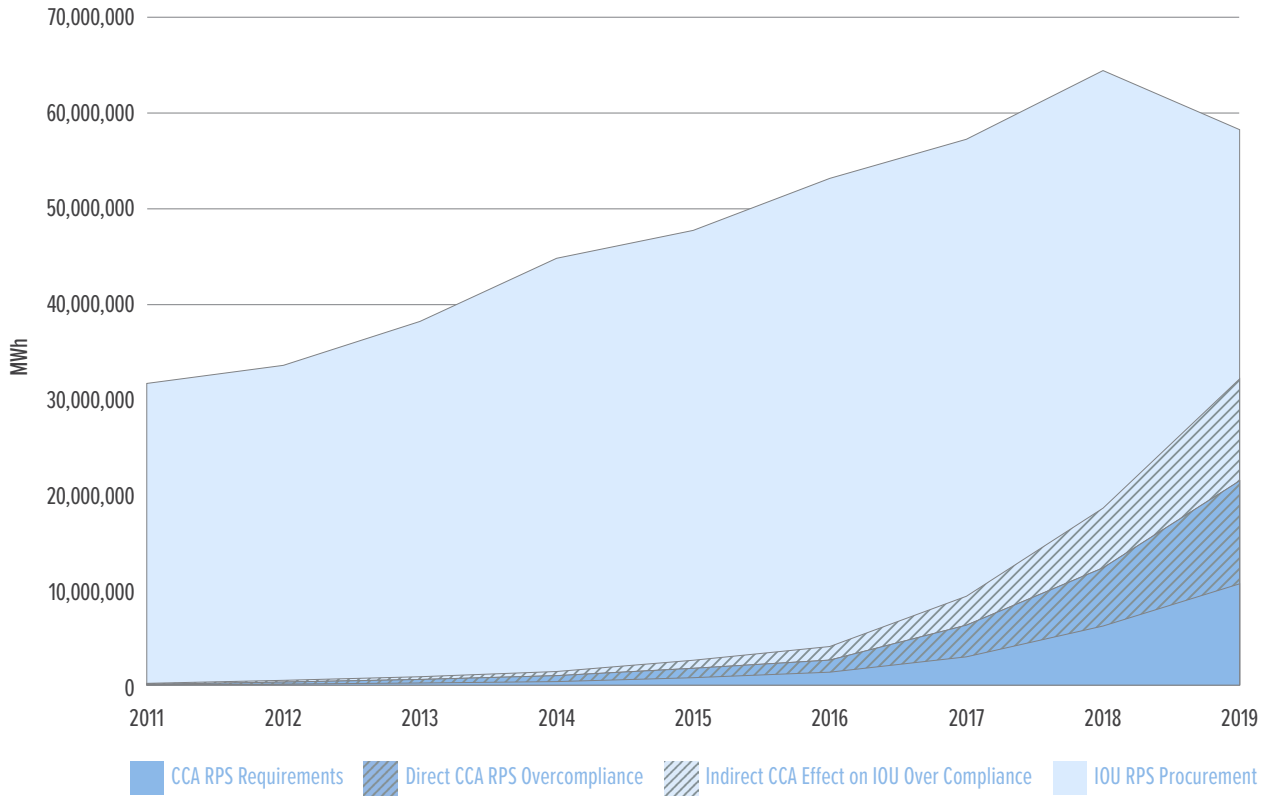
The energy policy landscape in California is rapidly evolving, and this section is not intended to be comprehensive of all policies that affect CCAs and other electricity providers. However, this discussion covers recent issues that affect CCAs and how California has handled them to date. While these policies were established to support certain energy policy goals, it is important to consider how state policies create disadvantages or unintended consequences for CCAs' ability to meet environmental goals.

4.1 Renewables Portfolio Standard: Long-Term Contracts and Their Implications

Arguably the most important piece of legislation related to providing customers with carbon-free energy is the renewables portfolio standard (RPS). California's RPS specifies the percentage of electricity sales required to come from certain eligible energy resources and applies to all electricity providers in California, including IOUs, publicly owned utilities, electric service providers, and CCAs. RPS has been key to increasing renewable energy; however, some communities have deemed its "one-size-fits-all" performance standard insufficiently ambitious. CCAs are effective tools in those instances when community demand for renewable energy exceeds the RPS requirements, as they allow communities to choose more renewable energy.

California currently has a target of 100% carbon-free energy by 2045, as well as interim targets, established by Senate Bill 100 (2018). Some critics have argued that this requirement for all utilities to procure 100% carbon-free energy renders CCAs, and their ability to make energy procurement decisions, unnecessary. However, CCAs can support a state's carbon-free energy goals in multiple ways. Beyond offering customer choice, competition, and innovative local energy programs, CCAs make decisions based on community preferences about the type and location of the resources used to meet the 100% carbon-free energy goal. For example, some communities may prefer locally generated renewable energy rather than out-of-state electricity, or for geothermal generation over solar and battery energy storage. More important, CCAs' ability and willingness to procure more carbon-free energy than required helps accelerate achievement of state goals. Critics of CCAs miss a key benefit they provide: By accelerating compliance with carbon-free energy goals; they help states achieve 100% carbon-free energy sooner and thereby avoid more greenhouse gas and air pollutant emissions. By achieving the RPS

Figure 10. Estimated Total Direct and Indirect Effect of CCAs on Renewable Energy Procurement Beyond Requirements



more quickly, the state benefits from a cumulatively larger reduction in greenhouse gas emissions each year.

CCAs are not only directly accelerating the achievement of California's RPS target but they also indirectly have helped IOUs accelerate achievement of their RPS goals as well. CCAs' combined direct and indirect contribution has accelerated achievement of state renewable energy goals by 46 million megawatt hours in the past decade.[64] CCAs' direct effect is simply procuring more renewable energy. **From 2011 to 2019, CCAs purchased 23.5 million megawatt hours of renewable energy in excess of state requirements, 204% of the state's requirement.**[65] At the same time, CCAs' indirect effect was that IOUs overcomplied with the RPS by 22.5 million megawatt hours.[66] Incumbent IOUs have been left with long-term renewable energy contracts procured on behalf of customers that have since departed for CCAs. This means they have more renewable energy than is required for fewer customers.

CCAs purchased more than twice as much renewable energy than required by California from 2011 to 2019.

These effects are illustrated in Figure 10, which shows the gigawatt hours (GWh) of renewable energy procured by both IOUs and CCAs since 2011. The solid light blue (IOU) and dark blue (CCA) sections illustrate the required renewable energy procured. The dashed dark blue section represents the amount of renewable electricity CCAs procured in excess of RPS requirements — their direct effect on renewable energy procurement.

64. Trumbull, K., DeShazo, J., Gattaciecca, J., Callahan, C., & Einstein, M. (2019). *The Rapid Growth in Community Choice Energy and Its Acceleration of Renewable Energy: A California Case Study*. UCLA Luskin Center for Innovation.
65. Ibid.
66. Ibid.

The dashed light blue section shows the amount of renewable energy procured by IOUs that now exceeds RPS requirements as a result of customer departure for CCAs. This is the indirect effect of CCAs. This analysis includes only renewable energy and does not include CCAs' contributions to carbon-free energy (large hydroelectric generation), which further accelerates achievement of the state's 100% carbon-free energy target.

In 2019, CCAs had a weighted average of 50% renewable energy for a total of 80% carbon-free energy. Partially as a result of the emergence of CCAs, IOUs had a weighted average of 33% renewable energy for a total of 64% carbon-free energy.[67] Pacific Gas & Electric (PG&E), an IOU in Northern California, had 29% renewable energy for a total of 100% carbon-free energy in 2019. PG&E's electricity sales decreased by more than half since the emergence of CCAs in 2011. Southern California Edison (SCE), an IOU in Southern California, had 35% renewable energy for a total of 50% carbon-free energy. San Diego Gas & Electric (SDG&E), the third main IOU in California covering the San Diego region, had 30% renewable energy, and no additional large hydroelectric or nuclear electricity generation.

4.1.1 Long-term Contracting Requirements: Implications for Competition

A noteworthy component of California's RPS is the long-term contracting requirement. The previous iteration of the RPS, SB 350 (2015), requires that at least 65% of energy contracts used to meet RPS requirements must be for 10 years or longer.[68] This requirement has implications for CCA competitiveness and, subsequently, their ability to provide carbon-free energy to their customers competitively.

Signing long-term contracts is not necessarily a bad thing; on the contrary, it supports the construction of new renewable energy facilities that help fulfill California's renewable energy, climate, and reliability goals. However, this requirement affects CCA competitiveness in two ways. First, it inhibits the ability of electricity providers to take advantage of rapidly decreasing costs in renewables, as well as other future innovations in technology. Second, it increases the costs of customers switching between electricity providers.

Renewable energy costs have fallen rapidly, especially over the last decade. A recent report by the International Renewable Energy Agency found that from 2010 to 2019, solar photovoltaic costs decreased 82%, onshore wind costs decreased 39%, and offshore wind costs 29%.[69] Being locked into long-term contracts limits CCAs' ability to purchase lower-cost carbon-free electricity generation as costs decrease, thereby restraining CCAs' efforts to keep rates low for customers.

Another important implication of these long-term contracts relates to a key component of the CCA authorizing legislation: maintaining customer indifference.[70] This means that customers who remain with the IOU, particularly those who do not have a CCA option, are not financially affected by the customers who leave the IOU for the CCA. Because IOUs signed long-term contracts on behalf of customers who have since departed for CCAs, IOUs are left holding excess energy that is frequently more expensive than the cost of energy today. As described in the previous section, this means that with the same amount of renewable energy for fewer customers, an IOU's per-customer share of renewable energy is increasing. However, IOUs still bear the costs of those long-term contracts, which were intended to be shared by all the customers they had at the time the contract was signed.

67. California Energy Commission (2020). "2019 Power Source Disclosure."
68. California Senate Bill 350 (2015). "Clean Energy and Pollution Reduction Act of 2015."
69. IRENA (2020). *Renewable Power Generation Costs in 2019*. International Renewable Energy Agency.
70. California Assembly Bill 117 (2002). "The bill would require a community choice aggregator to file an implementation plan with the Public Utilities Commission in order for the commission to determine a cost-recovery mechanism to be imposed on the community choice aggregator to prevent a shifting of costs to an electrical corporation's bundled customers."

IOUs therefore recover these costs from departing customers in the form of "exit fees." These fees are charged to ensure that IOUs' remaining customers do not experience rate increases as a result of departing customers. California's solution to this challenge was the Power Charge Indifference Adjustment (PCIA). The fee is charged to CCA customers as a function of their electricity consumption. The calculation of the per-unit cost of the PCIA has been contentious, and numerous California Public Utilities Commission (CPUC) rulemakings have been opened to revise it. Both the historical volatility and the projected increase in PCIA price provide challenges for CCAs in setting competitive rates.

Although IOUs can make up for lost costs with exit fees, there is currently no mechanism for CCAs to recover costs from their departing customers. When CCAs were relatively new, the CPUC expressed concerns regarding the lack of long-term power purchasing contracts in CCAs' portfolio, citing planning and reliability matters. But CCAs are now signing long-term contracts, too. For example, the oldest CCA, MCE, met 57% of its required renewable energy procurement with long-term contracts last year.[71]

Considering a future with both more competition and more long-term renewable energy contracts raises questions that regulators and legislators need to address: How will electricity providers deal with increasing stranded costs as a result of customers moving between providers? Do current policies and regulations support or inhibit competition, innovation, and choice? Would local control over electricity policy better support renewable energy goals? Or would state-level or centralized decision-making and planning better mitigate challenges caused by long-term contracting requirements?

Regulators and legislators need to balance multiple goals: carbon-free energy, reliability, and competition. These goals are certainly not mutually exclusive. Supporting competition is not anti-renewable. In fact, competition as a result of the emergence of CCAs has greatly supported renewable energy goals. And long-term contracts do not necessarily inhibit competition. However, policy alignment is critical to ensure that California's electricity sector goals do not contradict each other and that ratepayers subsequently do not bear the burden of misaligned policies.

4.2 Resource Adequacy: Changing Regulation Affects CCA Control Over Resources

Currently, there are a few critical changes occurring to the CPUC's resource adequacy (RA) program that are consequential for CCA programs. Implemented after the energy crisis in the early 2000s, RA is the state's effort to ensure that there is sufficient capacity to maintain normal electrical grid operations. Under the program, some electricity providers, including CCAs and IOUs, submit regular reports demonstrating that they have procured sufficient capacity through contracts. Changes to California's energy landscape — notably the increasing dominance of renewable energy products, the growing diversity of electricity providers, and the expanding complexities of ensuring reliability in disparate localities throughout the state — are pushing the CPUC to make changes to its RA program that uniquely impact CCAs and their authority to make decisions about their energy resources.

Most recently, the CPUC approved the central buyer decision, which is geared at addressing reliability concerns.[72] The decision makes the state's two largest IOUs[73] the central procurement entities for CCAs within their service territories. Currently, 22 of the 23 operational CCAs in the state are within these two IOUs' service territories. These IOUs will be responsible for local RA, one of the three types of required RA.

71. California Public Utilities Commission (2020). 2019 RPS Compliance Reports.
72. California Public Utilities Commission (2020). "Rulemaking.17-09-020. Decision on Central Procurement of the Resource Adequacy Program."
73. Pacific Gas & Electric and Southern California Edison

While controversial, the CPUC contends that this will help maintain reliability and minimize the need for the California Independent System Operator (CAISO) to procure out-of-market energy products due to local deficiencies.[74]

The state's CCAs contend that, in conferring this responsibility on the IOUs, the CPUC is infringing on their role in making energy procurement decisions on behalf of their customers. Importantly, while the decision does set a cap on local RA prices, IOUs procuring resources on behalf of CCA customers do not have the same incentives as CCAs do procuring on behalf of their own customers. First, this could behold CCAs to financial and resource decisions made by incumbent IOUs — decisions that may not reflect the preferences of CCA customers.

Second, requiring IOUs to procure on behalf of CCA customers may negate a CCA's local autonomy in choosing which resources from which to supply RA. CCAs contend that by having IOUs make RA procurement decisions on behalf of the CCA customers, localities lose their ability to choose to invest in resources for RA, such as battery energy storage. While the proposed decision is explicit in requiring that procurement decisions must consider other state policies, including reducing greenhouse gas emissions, IOUs may choose to not prioritize carbon-free energy at the same standard that CCAs typically do. For example, the IOU may decide to procure natural gas RA, even as an intermediary resource, on behalf of the CCA, in direct conflict with a CCA's goals for a greenhouse gas-free energy resource portfolio.

4.3 IOU Code of Conduct Relative to CCAs

One of the critical protections for CCAs is the IOU code of conduct relative to CCAs, established by SB 790 (2011). The bill required that the CPUC develop a code of conduct that would govern how incumbent IOUs would interact with newly formed CCAs. At its core, it was intended to ensure that CCAs were able to compete with other electricity providers on a "fair and equal basis."[75] More directly, it prohibits the IOUs from actively marketing against emerging and existing CCAs. Within the approved decision, the CPUC specifically notes that incumbent IOUs cannot use ratepayer funds to lobby against CCAs. Instead, if IOUs want to market against these programs, they are required to form an independent marketing division, funded from shareholder revenues. Given that CCAs have taken on a significant portion of IOUs' retail electricity sales, it is hardly surprising that these agencies have been vocal in their criticism of this. However, the code of conduct has been essential at ensuring CCAs had a chance at market entry, thus enabling these entities to exist and provide their customers with carbon-free energy.

From a governance perspective, the code of conduct has been seen as necessary to ensure that CCAs are able to launch without undue lobbying against their efforts. When SB 790 was passed, legislators were concerned that local governments might be susceptible to intense IOU lobbying. Their concern was that locally elected officials would be less likely to support efforts to implement a CCA if the existing utility vociferously pushed back against the move. Given the relative power that utilities have, legislators were keen to ensure that these utilities did not steamroll local efforts.

Furthermore, the code of conduct includes an area of common collaboration to guarantee that the state's ratepayers can make educated decisions about their choices for energy providers. In some instances, there has been an effort to advance information sharing. CCAs, for example, have a series of required pre-enrollment mailings, which let customers know that their service will be transferred to CCAs unless they decide to opt out. Yearly, CCAs and IOUs collaborate to send out joint rate comparisons, establishing the

[74] Separately, the CAISO has being working to modify its own processes related to RA, including its own RA program through its RA enhancement process. For more information, please visit http://www.caiso.com/StakeholderProcesses/

[75] California State Legislature (2011). SB-790 Electricity: community choice aggregation.

cost differential for different rate classes. This has a direct benefit for the state's ratepayers, who stand to gain from obtaining factually correct information from both the CCAs and the IOUs. Below is a sample joint rate comparison for residential service for East Bay Community Energy, a Northern California CCA, and Pacific Gas & Electric, its affiliated IOU, which is indicative of the transparency-focused projects that the IOU code of conduct envisioned.

Table 7. Example Joint Rate Comparison for a CCA and IOU (Residential Rate)[76]

Residential E-1	PG&E	PG&E Solar Choice (100% Renewable)	EBCE Bright Choice	EBCE Brilliant 100 (100% Carbon-free)	EBCE Renewable 100 (100% Renewable)
Generation Rate ($/kWh)	$0.11778	$0.09436	$0.08537	$0.08713	$0.09713
PG&E Delivery Rate ($/kWh)	$0.14407	$0.14407	$0.14407	$0.14407	$0.14407
PG&E PCIA/FF ($/kWh)	N/A	$0.02979	$0.03045	$0.03045	$0.03045
Total Electricity Cost ($/kWh)	$0.26185	$0.26822	$0.25989	$0.26165	$0.27165
Average Monthly Bill ($)	**$94.00**	**$96.29**	**$93.30**	**$93.93**	**$97.52**

Monthly usage: 359 kWh

76. Pacific Gas & Electric and East Bay Community Energy (2020). "PG&E – EBCE Joint Rate Comparisons."

5. Maximizing the Environmental Benefits of CCAs in Other States

Giving communities control over their electricity procurement decisions could help them achieve their environmental goals. As demonstrated in California, CCAs can dramatically increase carbon-free energy provision. Their willingness to push beyond state minimum requirements for carbon-free energy can drive large and rapid greenhouse gas emissions reductions, while bringing other benefits to their communities such as tailored local energy programs, economic benefits, and more choice.

As communities in other states explore tools to meet their environmental goals, many may consider CCAs as a solution. While each state faces a unique electricity market and political context, the lessons learned from California's demographics, CCA design features, and policy and regulation can inform how CCAs can help these states advance their carbon-free energy goals. We conclude with a discussion of these considerations for emerging CCAs in other states.

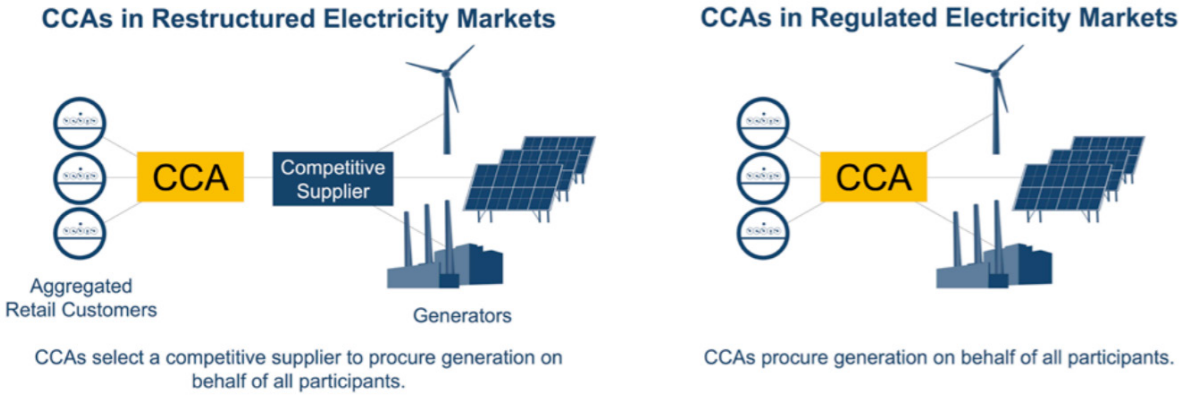
5.1 Considering the Unique State Policy, Regulatory, and Electricity Market Context

Each state has its own energy policies and market dynamics, which has important impacts on carbon-free energy procurement. To fully maximize the carbon-free energy benefits, emerging CCAs should consider the electricity market and regulatory features that enable CCAs to purchase carbon-free energy and provide it to customers competitively.

One important consideration is whether the CCA is operating in a regulated or restructured electricity market. CCA customers in restructured states often have the choice between the CCA and a number of other competitive suppliers or the local utility. CCA customers in regulated states typically have only the choice between the CCA and the IOU. One major difference between CCAs in different electricity markets is how they procure electricity on behalf of their customers. CCAs should therefore consider how the differences between regulated and restructured electricity markets may play a role in energy procurement decisions. CCAs in restructured markets sign contracts with competitive suppliers, who then are responsible for purchasing electricity. CCAs in deregulated states sign contracts directly for electricity generation. Figure 11 visualizes this difference.

> **A regulated electricity market is "where utilities provide all electricity generation services." A restructured electricity market is "where nonutility entities can compete with utilities to provide electricity generation services."**
>
> Source: National Renewable Energy Laboratory, 2019

Figure 11. Differences Between CCAs in Restructured Versus Regulated Electricity Markets



Source: National Renewable Energy Laboratory (2019).

Regulated states and restructured states may face different challenges when implementing and operating CCAs. For example, CCAs in restructured states may have additional challenges to procuring local renewable energy. A National Renewable Energy Laboratory report found that "in restructured markets, CCAs procure electricity through competitive suppliers, and thus must work through their suppliers to procure local renewable energy."[77]

CCAs can be enabled in both regulated and deregulated states but face different regulatory and market conditions.

Similarly, states should consider the extent to which policies inhibit or support a CCA's ability to make energy procurement decisions. Some states, like New York, have already started working to identify key policies that affect CCAs.[78] For other states, especially states exploring passing CCA-enabling legislation, how their unique policy context could affect CCAs provides an opportunity for future research. The primary strength of CCAs related to the environment is its ability to purchase carbon-free energy and invest in local energy programs, including local renewable generation. Addressing these regulatory barriers to enable CCAs to purchase clean energy, invest in carbon-free energy resources, and invest in local energy programs that benefit local communities can help improve the ability of CCAs to maximize environmental benefits in other states.

Some states may already have policy and regulatory structures in place to support procurement of carbon-free electricity, although some existing policies have opportunities for revision to better support CCAs. Several policies that support the purchase of carbon-free energy, such as RPS and long-term contracting requirements, come with important implications for competition. In regulated electricity markets specifically, policies often may attempt to ensure that remaining customers do not bear the costs of departing customers.

States looking to pass CCA-enabling legislation in regulated electricity markets can also consider policies like California's IOU Code of Conduct, which supports market entry for new CCAs, as well as encourages competition across the electricity market by providing customers with information on their electricity choices.

5.2 Considering the Importance of CCA Financial Health

When pursuing environmental goals, those looking to develop CCAs should not forget the importance of maintaining financial health. Emerging CCAs should carefully consider how to gain sufficient customer base through their business designs in order to increase economies of scale benefits. A key way to support this, which is common across CCA-enabling legislation, is the automatic customer enrollment feature. Multicommunity collaboration in forming a CCA, as well as multi-CCA collaboration, can lead to additional economic benefits.

A key way CCAs provide their customers with additional value are through their innovative local energy programs. These innovative programs require rate setting authority or other funding mechanisms. CCAs in some states, like New York, do not currently have this rate setting authority.

Additionally, emerging CCAs should consider how they will offer additional value to their customers, especially by providing cheaper and cleaner electricity, and local energy programs that reflect local preferences. This can help a CCA retain customers. The dramatic price reductions seen in renewable energy contribute to emerging CCAs' ability to provide their customers with both cheaper and cleaner energy. As states consider CCA-enabling legislation, they can look to best practices in CCA design from other states to ensure that their CCAs can support the purchase of carbon-free energy and other environmental goals.

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77. O'Shaughnessy, E., Heeter, J., Gattaciecca, J., Sauer, J., Trumbull, K., & Chen, E. (2019). Community Choice Aggregation: Challenges, Opportunities, and Impacts on Renewable Energy Markets (NREL/TP-6A20-72195). Golden, CO: National Renewable Energy Laboratory.

78. Community Choice Aggregation Subgroup of the Voluntary Investment in Other Market Development Working Group for the Clean Energy Advisory Council Steering Committee (2018). Community Choice Aggregation Policy Recommendations Report.

5.3 Considering the Demand for Carbon-free Energy

The success of CCAs in California demonstrates the power of promoting carbon-free energy at the grassroots, enabled by public, local choice in electricity supply. Given widespread and increasing support for carbon-free energy, CCAs have great potential to accelerate the adoption of carbon-free electricity across the country. A recent National Renewable Energy Laboratory Report estimated that CCA expansion has the potential to increase carbon-free energy consumption by 25 to 62 million MWh.[79] Achieving this will require initiative on behalf of local communities across the country. CCAs' ability to empower communities to choose their electricity supply paired with the willingness of these communities to purchase carbon-free electricity in excess of state requirements makes this widespread increase in carbon-free electricity a feasible possibility.

Paired with the willingness of communities to purchase carbon-free electricity, CCAs' ability to empower communities to make choices about their electricity supply creates the potential to accelerate the adoption of carbon-free electricity across the country.

As discussed in Section 2, CCAs have been implemented across a wide variety of customer demographics in California, suggesting that the CCA model can be replicable across many locations with different socioeconomic factors. However, some demographics, especially political affiliation, can indicate a community's preference for greater shares of carbon-free energy and willingness to pay for that carbon-free energy. Given the dramatic decreases in renewable energy prices, this will likely be less of a concern moving forward. At a local level, regions can be heterogeneous in their political affiliation and carbon-free energy preferences, so a state's RPS target or average political leaning are not necessarily indicators of community-level carbon-free energy demand. Often, local interest in carbon-free energy can surpass demand at the state level.

These communities with unmet local demand for renewable energy most effectively use the CCA model to support environmental goals. Many communities identify CCAs as a tool to meet 100% carbon-free energy goals. For example, Ann Arbor, Michigan, recently identified that the lack of a CCA option inhibited its ability to meet its climate goals.[80] Communities' local policies, such as 100% carbon-free energy commitments, can be a key indicator for carbon-free energy demand, and therefore for CCA feasibility. As seen in California, the ability to choose the default electricity product for customers is a key feature of this. CCA member communities can choose 100% carbon-free electricity for their customers.

Finally, the local and public nature of CCAs positions them to provide local energy programs that respond to the needs and preferences of the community. Examples include energy efficiency incentives, electric vehicle rebates, and investment in local renewable generation. As seen in California, CCAs can also be responsive to unique community environmental challenges, like wildfires, or increases to customer financial challenges, like the COVID-19 pandemic. These local energy programs can bring additional environmental benefits, as well as economic and other benefits.

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79. O'Shaughnessy, E., Heeter, J., Gattaciecca, J., Sauer, J., Trumbull, K., & Chen, E. (2019). *Community Choice Aggregation: Challenges, Opportunities, and Impacts on Renewable Energy Markets* (NREL/TP-6A20-72195). Golden, CO: National Renewable Energy Laboratory.
80. Stanton, R. (2020). "State law a hurdle for Ann Arbor's 100% renewable energy plan." *M Live*.

Appendix A: California CCAs

CCA	Acronym	Launch Date	Number of Member Cities and Counties
Apple Valley Choice Energy	AVCE	April 2017	1
Baldwin Park Resident Owned Utility District	B-PROUD	October 2020	1
Butte Choice Energy	BCE	Planned March 2021	2
Central Coast Community Energy	CCCE	March 2018	26
CleanPowerSF	CPSF	May 2016	1
Clean Energy Alliance	CEA	Planned May 2021	3
Clean Power Alliance	CPA	February 2019	31
Desert Community Energy	DCE	April 2020	1
East Bay Community Energy	EBCE	June 2018	12
King City Community Power	KCCP	July 2018	1
Lancaster Choice Energy	LCE	May 2015	1
MCE	MCE	May 2010	34
Peninsula Clean Energy	PCE	October 2016	21
Pico Rivera Innovative Municipal Energy	PRIME	September 2017	1
Pioneer Community Energy	PIO	February 2018	6
Pomona Choice Energy	POM	October 2020	1
Rancho Mirage Energy Authority	RMEA	May 2018	1
Redwood Coast Energy Authority	RCEA	May 2017	8
San Diego Community Power	SDCP	Planned March 2021	5
San Jacinto Power	SJP	April 2018	1
San Jose Clean Energy	SJCE	February 2019	1
Silicon Valley Clean Energy	SVCE	April 2017	13
Solana Energy Alliance	SEA	June 2018	1
Sonoma Clean Power	SCP	May 2014	13
Valley Clean Energy	VCE	June 2018	3
Western Community Energy	WCE	April 2020	7

Appendix B: CCA Communities' Default Products

City/County	CCA	Default Renewable Energy Percent	Default Clean Energy Percent
Apple Valley	Apple Valley Choice Energy	28%	28%
Baldwin Park	Baldwin Park Resident Owned Utility District	35%	35%
Capitola	Central Coast Community Energy	31%	100%
Carmel	Central Coast Community Energy	31%	100%
Gonzales	Central Coast Community Energy	31%	100%
Greenfield	Central Coast Community Energy	31%	100%
Hollister	Central Coast Community Energy	31%	100%
Marina	Central Coast Community Energy	31%	100%
Monterey	Central Coast Community Energy	31%	100%
Morro Bay	Central Coast Community Energy	31%	100%
Pacific Grove	Central Coast Community Energy	31%	100%
Salinas	Central Coast Community Energy	31%	100%
San Juan Bautista	Central Coast Community Energy	31%	100%
San Luis Obispo	Central Coast Community Energy	31%	100%
Sand City	Central Coast Community Energy	31%	100%
Santa Cruz	Central Coast Community Energy	31%	100%
Scotts Valley	Central Coast Community Energy	31%	100%
Seaside	Central Coast Community Energy	31%	100%
Soledad	Central Coast Community Energy	31%	100%
Unincorporated Monterey County	Central Coast Community Energy	31%	100%
Unincorporated San Benito County	Central Coast Community Energy	31%	100%
Unincorporated Santa Cruz County	Central Coast Community Energy	31%	100%
Watsonville	Central Coast Community Energy	31%	100%
Agoura Hills	Clean Power Alliance	36%	36%
Alhambra	Clean Power Alliance	50%	61%
Arcadia	Clean Power Alliance	36%	36%
Beverly Hills	Clean Power Alliance	50%	61%
Calabasas	Clean Power Alliance	36%	36%
Camarillo	Clean Power Alliance	36%	36%
Carson	Clean Power Alliance	50%	61%
Claremont	Clean Power Alliance	50%	61%
Culver City	Clean Power Alliance	100%	100%
Downey	Clean Power Alliance	50%	61%
Hawaiian Gardens	Clean Power Alliance	50%	61%
Hawthorne	Clean Power Alliance	36%	36%
Malibu	Clean Power Alliance	100%	100%
Manhattan Beach	Clean Power Alliance	50%	61%

City/County	CCA	Default Renewable Energy Percent	Default Clean Energy Percent
Moorpark	Clean Power Alliance	50%	61%
Ojai	Clean Power Alliance	100%	100%
Oxnard	Clean Power Alliance	100%	100%
Paramount	Clean Power Alliance	36%	36%
Redondo Beach	Clean Power Alliance	50%	61%
Rolling Hills Estates	Clean Power Alliance	100%	100%
San Buenaventura	Clean Power Alliance	100%	100%
Santa Monica	Clean Power Alliance	100%	100%
Sierra Madre	Clean Power Alliance	100%	100%
Simi Valley	Clean Power Alliance	36%	36%
South Pasadena	Clean Power Alliance	100%	100%
Temple City	Clean Power Alliance	36%	36%
Thousand Oaks	Clean Power Alliance	100%	100%
Unincorporated Los Angeles County	Clean Power Alliance	50%	61%
Unincorporated Ventura County	Clean Power Alliance	100%	100%
West Hollywood	Clean Power Alliance	100%	100%
Whittier	Clean Power Alliance	50%	61%
San Francisco	CleanPowerSF	48%	96%
Palm Springs	Desert Community Energy	50%	100%
Albany	East Bay Community Energy	75%	100%
Berkeley	East Bay Community Energy	60%	87%
Dublin	East Bay Community Energy	60%	87%
Emeryville	East Bay Community Energy	60%	87%
Fremont	East Bay Community Energy	60%	87%
Hayward	East Bay Community Energy	75%	100%
Livermore	East Bay Community Energy	60%	87%
Oakland	East Bay Community Energy	60%	87%
Piedmont	East Bay Community Energy	100%	100%
San Leandro	East Bay Community Energy	60%	87%
Tracy	East Bay Community Energy	60%	87%
Unincorporated Alameda County	East Bay Community Energy	60%	87%
Union City	East Bay Community Energy	60%	87%
King City	King City Community Power	28%	28%
Lancaster	Lancaster Choice Energy	29%	45%
American Canyon	MCE	60%	90%
Belvedere	MCE	60%	90%
Benicia	MCE	60%	90%
Calistoga	MCE	60%	90%
Concord	MCE	60%	90%

City/County	CCA	Default Renewable Energy Percent	Default Clean Energy Percent
Corte Madera	MCE	60%	90%
Danville	MCE	60%	90%
El Cerrito	MCE	60%	90%
Fairfax	MCE	60%	90%
Lafayette	MCE	60%	90%
Larkspur	MCE	60%	90%
Martinez	MCE	60%	90%
Mill Valley	MCE	60%	90%
Moraga	MCE	60%	90%
Napa	MCE	60%	90%
Novato	MCE	60%	90%
Oakley	MCE	60%	90%
Pinole	MCE	60%	90%
Pittsburg	MCE	60%	90%
Richmond	MCE	60%	90%
Ross	MCE	60%	90%
San Anselmo	MCE	60%	90%
San Pablo	MCE	60%	90%
San Rafael	MCE	60%	90%
San Ramon	MCE	60%	90%
Sausalito	MCE	60%	90%
St. Helena	MCE	60%	90%
Tiburon	MCE	60%	90%
Unincorporated Contra Costa County	MCE	60%	90%
Unincorporated Marin County	MCE	60%	90%
Unincorporated Napa County	MCE	60%	90%
Unincorporated Solano County	MCE	60%	90%
Walnut Creek	MCE	60%	90%
Yountville	MCE	60%	90%
Atherton	Peninsula Clean Energy	52%	90%
Belmont	Peninsula Clean Energy	52%	90%
Brisbane	Peninsula Clean Energy	52%	90%
Burlingame	Peninsula Clean Energy	52%	90%
Colma	Peninsula Clean Energy	52%	90%
Daly City	Peninsula Clean Energy	52%	90%
East Palo Alto	Peninsula Clean Energy	52%	90%
Foster City	Peninsula Clean Energy	52%	90%
Half Moon Bay	Peninsula Clean Energy	52%	90%

City/County	CCA	Default Renewable Energy Percent	Default Clean Energy Percent
Hillsborough	Peninsula Clean Energy	52%	90%
Menlo Park	Peninsula Clean Energy	52%	90%
Millbrae	Peninsula Clean Energy	52%	90%
Pacifica	Peninsula Clean Energy	52%	90%
Portola Valley	Peninsula Clean Energy	100%	100%
Redwood City	Peninsula Clean Energy	52%	90%
San Bruno	Peninsula Clean Energy	52%	90%
San Carlos	Peninsula Clean Energy	52%	90%
San Mateo	Peninsula Clean Energy	52%	90%
South San Francisco	Peninsula Clean Energy	52%	90%
Unincorporated San Mateo County	Peninsula Clean Energy	52%	90%
Woodside	Peninsula Clean Energy	52%	90%
Pico Rivera	Pico Rivera Innovative Municipal Energy	29%	29%
Auburn	Pioneer Community Energy	30%	30%
Colfax	Pioneer Community Energy	30%	30%
Lincoln	Pioneer Community Energy	30%	30%
Loomis	Pioneer Community Energy	30%	30%
Rocklin	Pioneer Community Energy	30%	30%
Unincorporated Placer County	Pioneer Community Energy	30%	30%
Pomona	Pomona Choice Energy	35%	35%
Rancho Mirage	Rancho Mirage Energy Authority	35%	53%
Arcata	Redwood Coast Energy Authority	46%	98%
Blue Lake	Redwood Coast Energy Authority	46%	98%
Eureka	Redwood Coast Energy Authority	46%	98%
Ferndale	Redwood Coast Energy Authority	46%	98%
Fortuna	Redwood Coast Energy Authority	46%	98%
Rio Dell	Redwood Coast Energy Authority	46%	98%
Trinidad	Redwood Coast Energy Authority	46%	98%
Unincorporated Humboldt County	Redwood Coast Energy Authority	46%	98%
San Jacinto	San Jacinto Power	31%	31%
San Jose	San Jose Clean Energy	40%	57%
Campbell	Silicon Valley Clean Energy	46%	100%
Cupertino	Silicon Valley Clean Energy	46%	100%
Gilroy	Silicon Valley Clean Energy	46%	100%
Los Altos	Silicon Valley Clean Energy	46%	100%
Los Altos Hills	Silicon Valley Clean Energy	46%	100%
Los Gatos	Silicon Valley Clean Energy	46%	100%
Milpitas	Silicon Valley Clean Energy	46%	100%
Monte Sereno	Silicon Valley Clean Energy	46%	100%

City/County	CCA	Default Renewable Energy Percent	Default Clean Energy Percent
Morgan Hill	Silicon Valley Clean Energy	46%	100%
Mountain View	Silicon Valley Clean Energy	46%	100%
Saratoga	Silicon Valley Clean Energy	46%	100%
Sunnyvale	Silicon Valley Clean Energy	46%	100%
Unincorporated Santa Clara County	Silicon Valley Clean Energy	46%	100%
Solana Beach	Solana Energy Alliance	50%	100%
Cloverdale	Sonoma Clean Power	50%	96%
Cotati	Sonoma Clean Power	50%	96%
Fort Bragg	Sonoma Clean Power	50%	96%
Petaluma	Sonoma Clean Power	50%	96%
Point Arena	Sonoma Clean Power	50%	96%
Rohnert Park	Sonoma Clean Power	50%	96%
Santa Rosa	Sonoma Clean Power	50%	96%
Sebastopol	Sonoma Clean Power	50%	96%
Sonoma	Sonoma Clean Power	50%	96%
Town of Windsor	Sonoma Clean Power	50%	96%
Unincorporated Mendocino County	Sonoma Clean Power	50%	96%
Unincorporated Sonoma County	Sonoma Clean Power	50%	96%
Willits	Sonoma Clean Power	50%	96%
Davis	Valley Clean Energy	45%	76%
Unincorporated Yolo County	Valley Clean Energy	45%	76%
Woodland	Valley Clean Energy	45%	76%
Canyon Lake	Western Community Energy	37%	37%
Eastvale	Western Community Energy	37%	37%
Hemet	Western Community Energy	37%	37%
Jurupa Valley	Western Community Energy	37%	37%
Norco	Western Community Energy	37%	37%
Perris	Western Community Energy	37%	37%
Wildomar	Western Community Energy	37%	37%

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