THE RAPID GROWTH OF COMMUNITY CHOICE ENERGY AND ITS ACCELERATION OF RENEWABLE ENERGY

A CALIFORNIA CASE STUDY

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UCLA Luskin Center for Innovation

Acknowledgments

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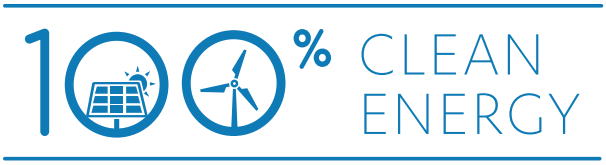
SUMMIT ON STATE & LOCAL PROGRESS TOWARD



Introduction

Customer choice in energy is spreading quickly. Eight U.S. states now allow cities and counties to purchase electricity on behalf of their communities — a procurement model called community choice aggregation.[1] These community choice aggregators (CCAs) enable cities and counties to tailor energy decisions to their communities' preferences. This frequently involves CCAs demanding larger amounts of renewable energy than is required by their state renewables portfolio standard (RPS).

This paper uses California as a case study to examine how CCAs are affecting levels of renewable energy at the local and state levels. When California legislators passed Assembly Bill 117 in 2002 to enable CCAs, they opened the door to more competition among retail electricity providers. Communities who were previously limited to consuming only the RPS-complaint energy provided by their investor-owned utility, were now free to express their demand for cleaner electricity.

Since 2010, 19 CCAs have launched in California, increasing their market share in the state from less than one percent to over ten percent.[2] More than 160 towns, cities, and counties have joined one of these 19 CCAs. Additional communities plan to join or form CCAs in the next few years.

All 19 CCAs in California have formed within a territory served by one of the three main investor-owned utilities in California: Pacific Gas and Electric (PG&E), Southern California Edison (SCE), and San Diego Gas & Electric (SDG&E). While CCAs procure energy, the investor-owned utility continues to provide transmission and other services.

Presented with the opportunity, 64 of the communities that joined a CCA now have 100% renewable or clean energy as their default energy product. The vast majority of ratepayers automatically enrolled in a CCA decide to remain with that CCA and its 100% renewable energy or clean energy product (i.e. the vast majority do not opt-out or opt-down). This allows us to conclude that these 64 communities have already met the transformational goal of a full transition to 100% clean energy. This is a significant finding. Only six other cities across the nation are also powered by 100% clean energy today.[3]

We evaluate how CCAs have affected California's RPS. We find that CCAs have had both direct and indirect effects that have led to increases in the clean energy sold in excess of the state's RPS goals. From 2011 to 2018, CCAs have directly procured 24 terawatt hours (TWh) of RPS-eligible electricity of which 11 TWh is voluntary or in excess of RPS compliance.

The formation of CCAs has also had an indirect effect on investor-owned utilities (IOUs), which has caused additional over compliance with RPS requirements in California. Historically, IOUs purchased enough renewables to be RPS compliant based on the customers they served. However, as customers departed from IOUs to CCAs, IOUs have been left holding contracts for more renewable energy than they need to be RPS compliant. We estimate that this indirect effect of CCA formation has left IOUs holding 13 TWh in excess of RPS requirements.

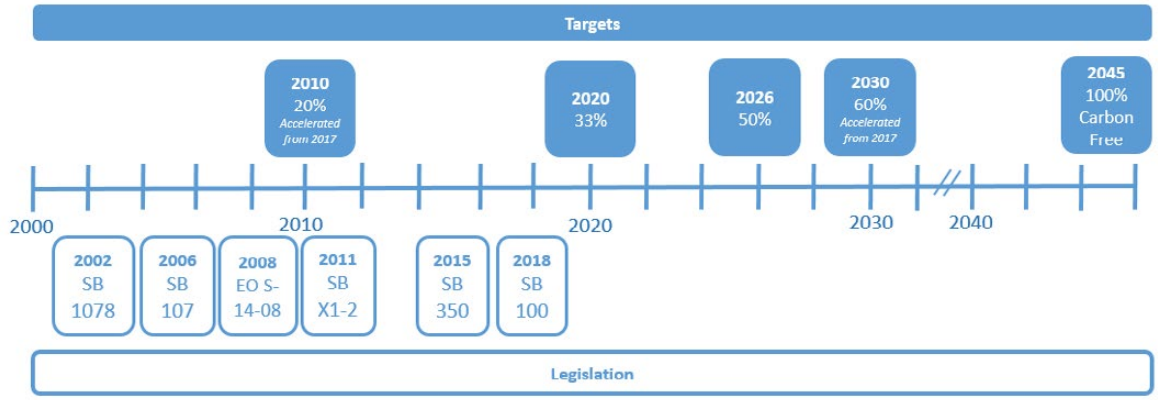
1. National Renewable Energy Laboratory and UCLA Luskin Center for Innovation (2019). Community Choice Aggregation: Challenges, Opportunities, and Impacts on Renewable Energy Markets.
2. UCLA Luskin Center for Innovation (2018). The Growth in Community Choice Aggregation: Impacts to California's Grid.
3. Sierra Club (2019). "100% Commitments in Cities, Counties, and States." https://www.sierraclub.org/ready-for-100/commitments

In this paper, we first give a brief overview of how California's RPS policy evolved over time. We then summarize the amount of RPS-eligible resources procured by CCAs and IOUs from 2011 to 2018. We estimate the direct and indirect effects that the emergence of CCAs had on RPS compliance by examining with- and without-CCA scenarios. We conclude with a discussion about what the next decade could look like in terms of CCA contributions to RPS over compliance, which will ultimately depend on state policy.

Renewables Portfolio Standard: Policy Context

California's first renewables portfolio standard (RPS) was established in 2002. The state's targets have evolved since then. Various pieces of legislation have been passed over the last 16 years increasing and sometimes accelerating the target. Most recently, Senate Bill 100 (SB 100, de Leon) passed in 2018 set a target of 100% clean electricity[4] by 2045, in addition to accelerating interim targets. The next interim target is 33% renewable energy by 2020. All of the current RPS targets are summarized in Figure 1.

FIGURE 1. California's Current RPS Targets and Legislative History[5]



The RPS applies to all electricity providers in California, including investor-owned utilities (IOUs), publicly owned utilities (POUs), and CCAs. The RPS specifies what percentage of electricity sales is required to come from eligible renewable energy resources. Electricity generation facilities and contracts must meet certain requirements. RPS regulations specify percentage requirements for RPS-eligibility regarding (1) electricity generation source and (2) portfolio content category.

Eligible renewable resources include biomass, geothermal, small hydroelectric, solar, wind, and more.[6] Large hydroelectric[7] and nuclear electricity generation are considered clean electricity generation, but are not RPS-eligible in California.

4. Clean electricity includes both eligible renewable resources such as solar, wind, geothermal, small hydroelectric and biomass, as well as carbon-free electricity resources, which typically include large hydroelectric and nuclear.
5. Figure created by UCLA Luskin Center for Innovation. Legislation history and target information from the California Energy Commission (2019). "History of California's Renewable Energy Programs." https://ww2.energy.ca.gov/renewables/history.html
6. California Energy Commission (2017). Renewables Portfolio Standard Eligibility Ninth Edition (Revised) Commission Guidebook.
7. Hydroelectric facilities larger than 30 MW.

Renewable energy resources are classified into one of three portfolio content categories (PCC).[8] Electricity classified as PCC 3, sometimes referred to as unbundled renewable energy credit or more specifically REC 3, are renewable energy attributes that are purchased separate from the underlying electricity. This category of renewable energy has sometimes been criticized for not creating strong enough incentives for the supply of new additional renewable energy generation or for not stimulating in-state generation capacity.

How CCAs comply with RPS requirements has come under scrutiny, and questions have been raised about their reliance on REC 3 (aka unbundled RECs). However, current evidence does not support this critique. First, PCC 3 use is currently restricted to a maximum of 10% of required RPS sales.[9] Second, CCAs generally use less REC 3 over time (as shown in Appendix A3, which summaries annual REC 3 use as a percent of their load). Third, seven CCAs have never used any REC 3.

Moreover, none of the CCA cities and counties at 100% clean and renewable energy (see Appendix A-1) reported using energy in the REC 3 category in 2018. This allows us to conclude that CCAs do not rely disproportionately on unbundled renewable energy credits to comply with the RPS. See Appendix A-3 for a table detailing annual REC 3 use by CCA.

The State of California's Community Choice Aggregators

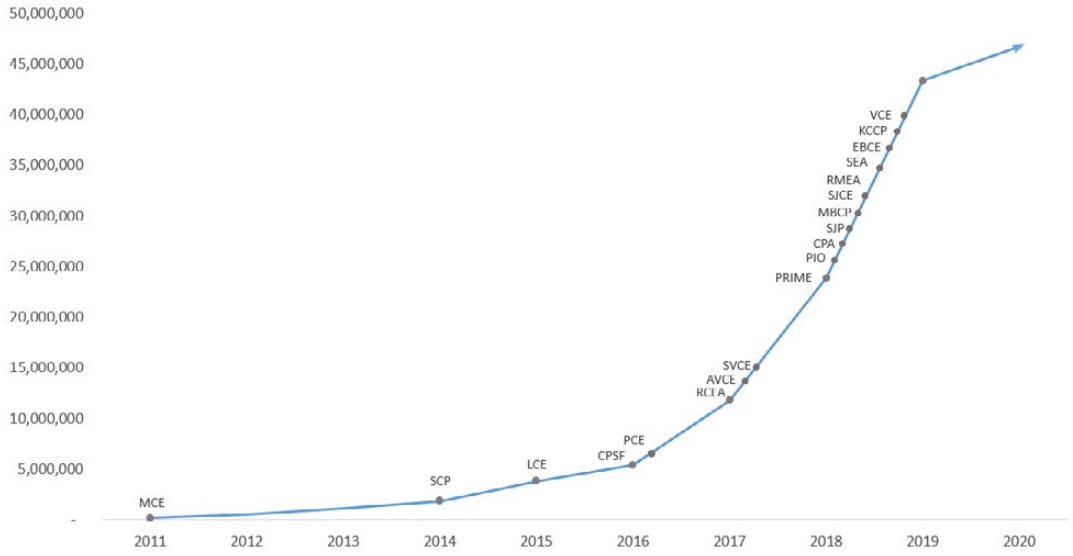
Currently 19 CCAs operate in California with more expected to launch in the coming years. These CCAs range in membership size from one to 31 member cities and counties, serving a total of over 160 communities across the state. Seven additional CCAs are expected to launch in 2020 and much of SDG&E's load is expected to depart for a CCA in 2021. Table 1 below lists all 19 of the CCAs in California. Figure 2 that follows shows how CCAs have grown over the past decade, serving more customers with more energy load.

TABLE 1. Existing Community Choice Aggregators in California

FULL NAME	ACRONYM	FULL NAME	ACRONYM
Apple Valley Choice Energy	AVCE	Pico Rivera Municipal Energy	PRIME
Clean Power Alliance	CPA	Redwood Coast Energy Authority	RCEA
Clean Power San Francisco	CPSF	Rancho Mirage Energy Authority	RMEA
East Bay Community Energy	EBCE	Sonoma Clean Power	SCP
King City Community Power	KCCP	Solana Energy Alliance	SEA
Lancaster Choice Energy	LCE	San Jose Clean Energy	SJCE
Monterey Bay Community Power	MBCP	San Jacinto Power	SJP
Marin Clean Energy	MCE	Silicon Valley Clean Energy	SVCE
Peninsula Clean Energy	PCE	Valley Choice Energy Authority	VCEA
Pioneer Community Energy	PIO		

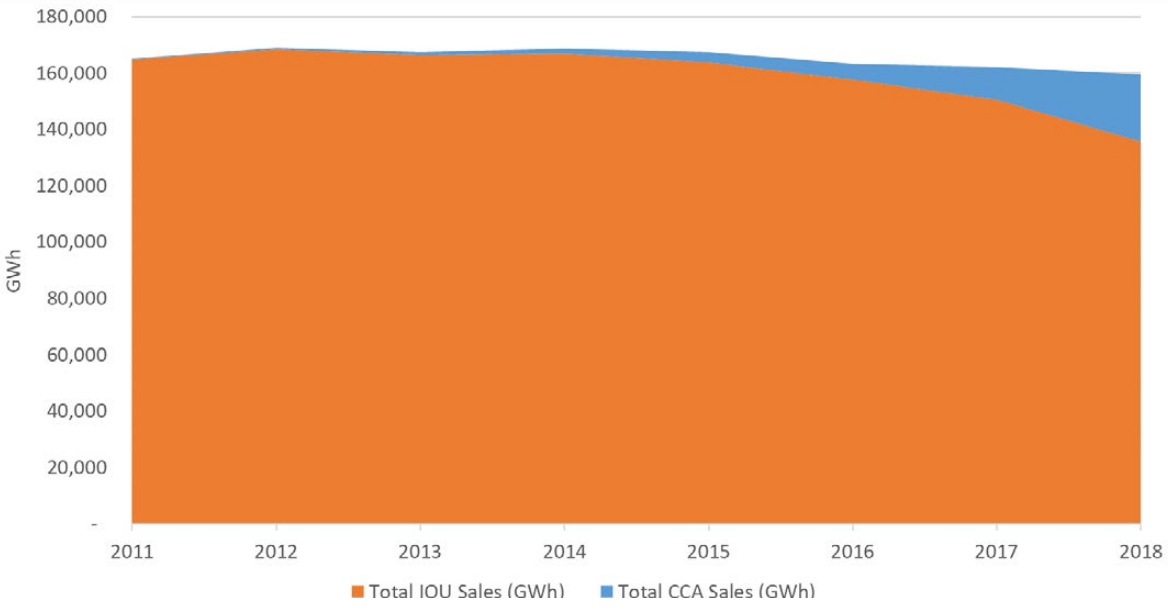
8. RPS-eligible does not necessarily mean the delivered electricity is greenhouse gas (GHG) free, and not all GHG-free electricity is RPS-eligible. Some RPS-eligible resources, like geothermal, have associated GHG emissions. Large hydroelectric and nuclear are often considered 'carbon-free', although they are not RPS-eligible. Pending standardization of the GHG accounting methodology in California may affect the associated emission factors of various energy generation resources. Depending on its location and the GHG accounting methodology, some clean and/or RPS-eligible electricity generation sources are associated with an emission factor.
9. California Public Utilities Commission (2018). 2018 California Renewables Portfolio Standard Annual Report.

FIGURE 2. CCA's Energy Load Growth over Time (MWh)[10]



CCAs can only launch within IOU territory, so publicly owned utilities (POU) and other load serving entity load is unaffected by CCA launches. As more CCAs launch, the demand load served by IOUs decreases, as shown in Figure 2. When a CCA launches, all customers in those communities are automatically enrolled in the CCA, per the enabling legislation. However, CCA customers may choose to opt out of the CCA and return to the incumbent utility. CCA opt out rates have so far typically remained well below the 10 percent level, meaning the vast majority of ratepayers remain with the CCA.

FIGURE 3. Actual IOU and CCA Load (GWh)



10. CCA load from the California Public Utilities Commission 2018 RPS Compliance Reports.

CCAs enable communities to purchase electricity on behalf of their residents and businesses. CCAs can choose what types of generation resources are used to meet their customers' needs. This policy tool has created an opportunity for local governments to successfully advance clean energy goals, enabling those with 100 percent renewables targets to achieve them today.

While different CCAs have different preferences for clean energy, a supermajority procure at least 70% of their electricity from renewables and large-scale hydro. There are another four CCAs that procure less or the same amount of renewables as their incumbent IOU currently, although all but one still exceed renewables requirements.

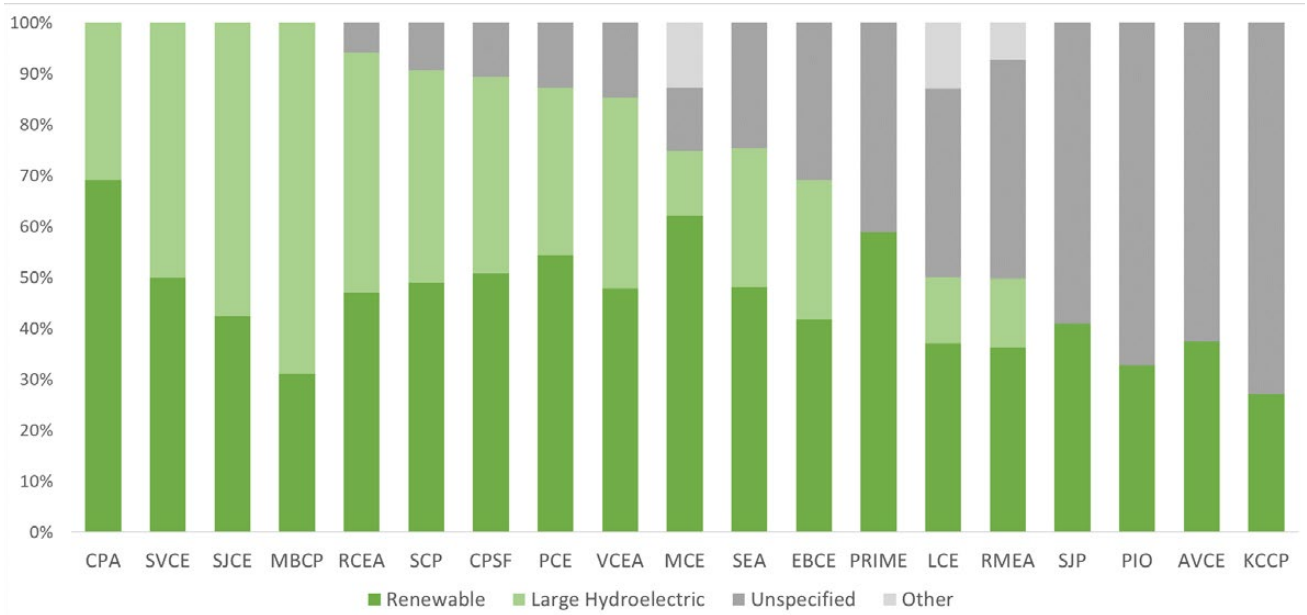
Most CCAs offer multiple electricity products for their customers to choose among, often including the option to purchase 100% renewable energy. For example, Clean Power Alliance, a CCA in Southern California, offers customers to choose between a 36% renewable, 50% renewable, or 100% renewable option. Member cities and counties can also choose into which product to 'default' enroll their customers. Individual CCA customers can choose to opt down to an electricity service option with lower amounts of renewable energy or opt up to an electricity service option with higher amounts of renewable energy.

Of the 160 CCA member communities, 11 of them enroll their customers by default into the 100% renewable product as of 2019. Four of the 19 CCAs (CPA, SVCE, SJCE, and MBCP) procured 100% clean energy in 2018 for all of their member communities." In total, 64 towns, cities, and counties in California that are members of CCAs are now 100% clean or 100% renewable, out of sixty-six 100% communities in the state. (See Appendix A1.)

These 100% clean cities are not necessarily compliant with California's renewables portfolio standard, SB 100 (2018). This bill requires that electricity providers sell a minimum of 60% renewable energy, with the remainder from carbon free electricity resources. There are other requirements pertaining to contract length and location of resources, as previously described. Currently, 26 cities and counties procure sufficient renewable and clean energy to be SB 100 compliant.

Figure 4 on the following page shows the share of each type of electricity generation resource used by CCAs in 2018.

FIGURE 4. CCAs' Power Content in 2018[11]



How Much More Renewable Energy Has Been Consumed Because of CCAs?

Assessing the impact of CCAs on California's renewable energy consumption requires examining two distinct effects. The first effect is the amount of renewable energy that CCAs have delivered in excess of RPS mandates between 2011 and 2018. As we discuss below, this direct impact is relatively straightforward to calculate.

The second effect is the amount of renewable energy that IOUs delivered in excess of the RPS goals that can be attributed to the presence of the CCAs. There are two reasons that the emergence of CCAs might have increased the amount of renewable energy delivered by IOUs. First, when a CCA launches within an IOU territory, all of the customers within that geographic area automatically move to the CCA. However, IOUs had signed long-term renewable energy contracts prior to CCA load departure, anticipating that they would need to provide those customers with a RPS-compliant level of renewable energy. Therefore, after a CCA forms, IOUs are left holding more renewable energy contracts than they need for RPS-compliance because they now have a smaller customer base. We attempt to estimate this indirect effect below using a conservative approach.

Another reason that CCAs might induce IOUs to increase the amount of renewable energy delivered is to defensively deter the formation of the CCAs within their service territory. IOUs may have increased their renewable energy content ex ante, in part to convince prospective CCAs customers that they did not need to form a CCA in order to consume higher amounts of renewable energy. The evidence that we will present

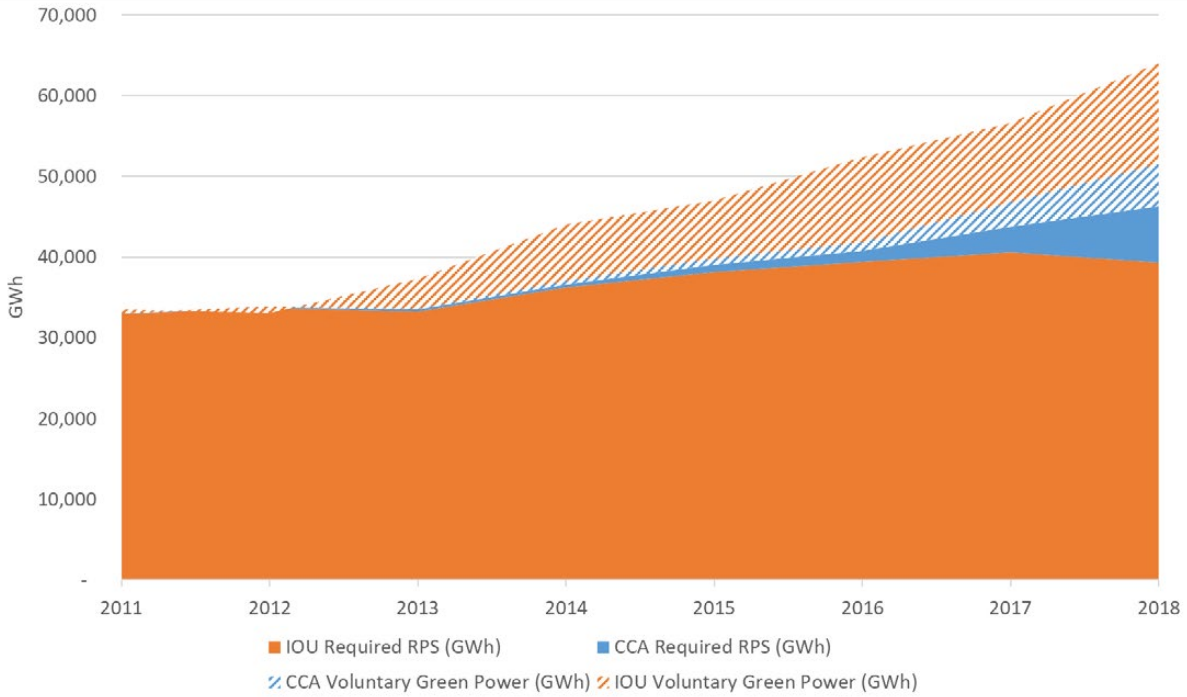
11. California Energy Commission (2018). Power Source Disclosure Program. Power content represents a weighted average of all of each CCA's electricity products.

shows IOUs over complying with the RPS mandates in advance of CCA formation. However, we will not attribute this early over compliance to anticipated CCA formation. We do this because there could be other reasons for this early over compliance beyond CCA formation. The CPUC notes, "A variety of market conditions have caused the IOUs to have procured beyond their minimum RPS requirements. These market conditions include the initial need to hedge against early program experience with project failure, the current climate of increasing departing load to CCAs, and the increase in behind-the-meter solar generation."[12]

Direct Effects of CCAs on Renewables

In this section, we describe the direct impact of CCAs on renewable energy consumption, by calculating how much renewable energy these CCAs delivered in excess of their RPS mandate. Graphically, this is shown in Figure 5, which describes the gigawatt hours (GWh) of renewable energy procured by both IOUs and CCAs since 2011. The solid orange (IOU) and blue (CCA) sections show the required renewable energy procured. The dashed orange (IOU) and blue (CCA) sections represent the amount of renewable electricity procured in excess of what was required by the RPS. We calculate that CCAs procured 24 TWh of RPS eligible electricity, although they were only required to deliver 13.1 TWh. CCAs delivered 11 TWh or 84% more renewable energy than is required by the RPS over this period.

FIGURE 5. Mandatory and Voluntary Renewable Energy Procurement by IOUs and CCAs (GWh)[13]



12. California Public Utilities Commission (2018). California Renewables Portfolio Standard Annual Report.
13. Source: Figure created by UCLA Luskin Center for Innovation. Data from the California Public Utilities Commission (CPUC) 2018 Annual RPS Compliance Reports.

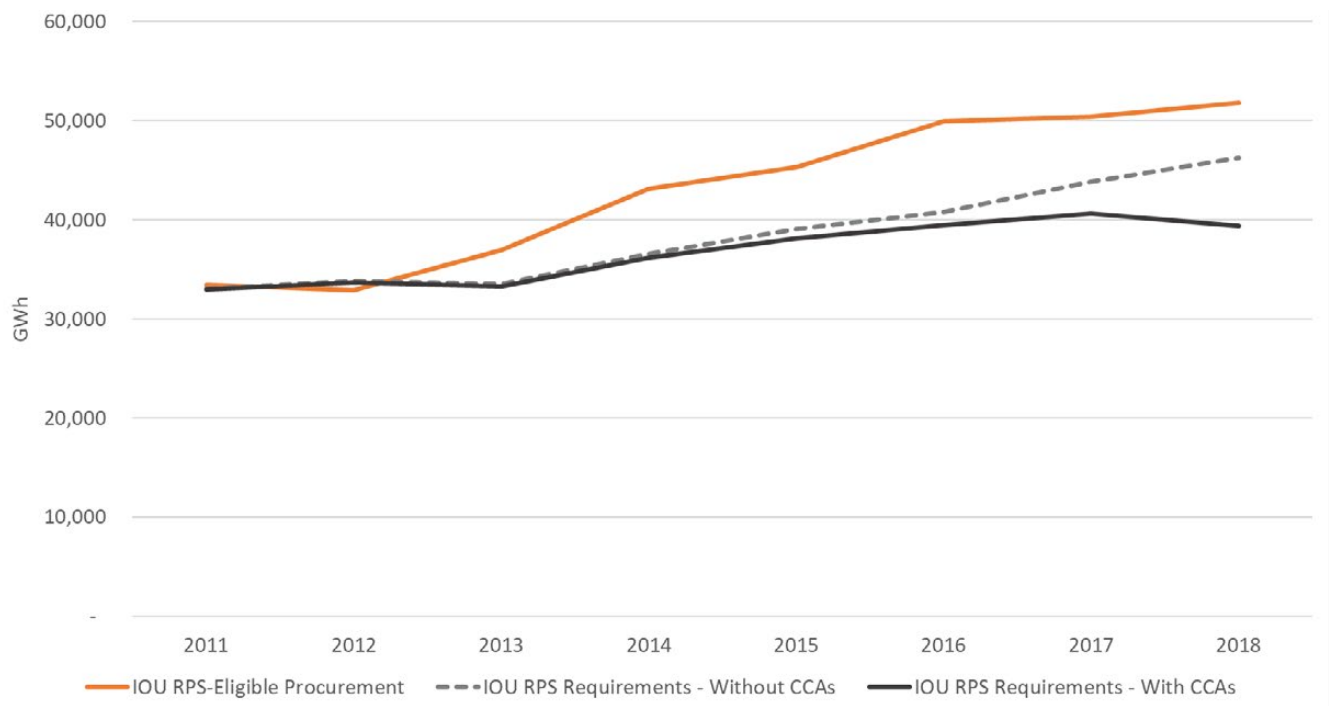
Indirect Effects of CCAs on Renewables

From Figure 5 we see that between 2011 to 2018, the IOUs procured 344 TWh of RPS eligible electricity while per the RPS they needed to deliver 293.7 TWh. This is 50.2 TWh or 17% more renewable energy than is required by the RPS over that period. However, as we noted above, we cannot attribute all of this IOU over compliance to the emergence of CCAs. Based on our method described below we will attribute 13.1 TWh or 26% of this 50.2 TWh to the emergence of CCAs from 2011 to 2018.

Estimation Methodology

Due to load departure to CCAs, IOUs have a lower RPS compliance requirement and therefore greater RPS over compliance. Conceptually, our analysis compares IOUs' current RPS-compliant energy requirement with that same requirement under a counterfactual scenario in which CCAs had never formed. To estimate this, we add departed CCA total load back to IOU total load to estimate a counterfactual load and the associated counterfactual RPS compliance requirements. This is shown in Figure 6. IOUs' actual RPS-eligible procurement is shown in Figure 6 as the orange line. The solid grey line shows the current RPS requirement given that CCA customers have been departing from IOUs since 2011, leaving IOUs needing less renewable energy to comply with the RPS. The dashed grey line shows the counterfactual scenario in which CCAs had never emerged, meaning IOUs would have had higher renewable energy requirements. We attribute the difference between these two scenarios to the emergence of the CCAs over this period. IOUs would have over complied by 37.1 TWh absent the emergence of CCAs from 2011 to 2018.

FIGURE 6. Comparison of IOU RPS Requirements with and without CCAs



We acknowledge that this is a short-run estimate based upon the explicit assumption that IOUs cannot adjust the RPS portfolio holdings in a meaningful way over our period of evaluation (2011-2018). Our estimates for 2011 to 2018 rely upon the California Public Utilities Commission's 2018 RPS Compliance Reports. Given the large differences in number and size of CCAs in each IOUs' territory, we conduct this analysis by IOU service territory.

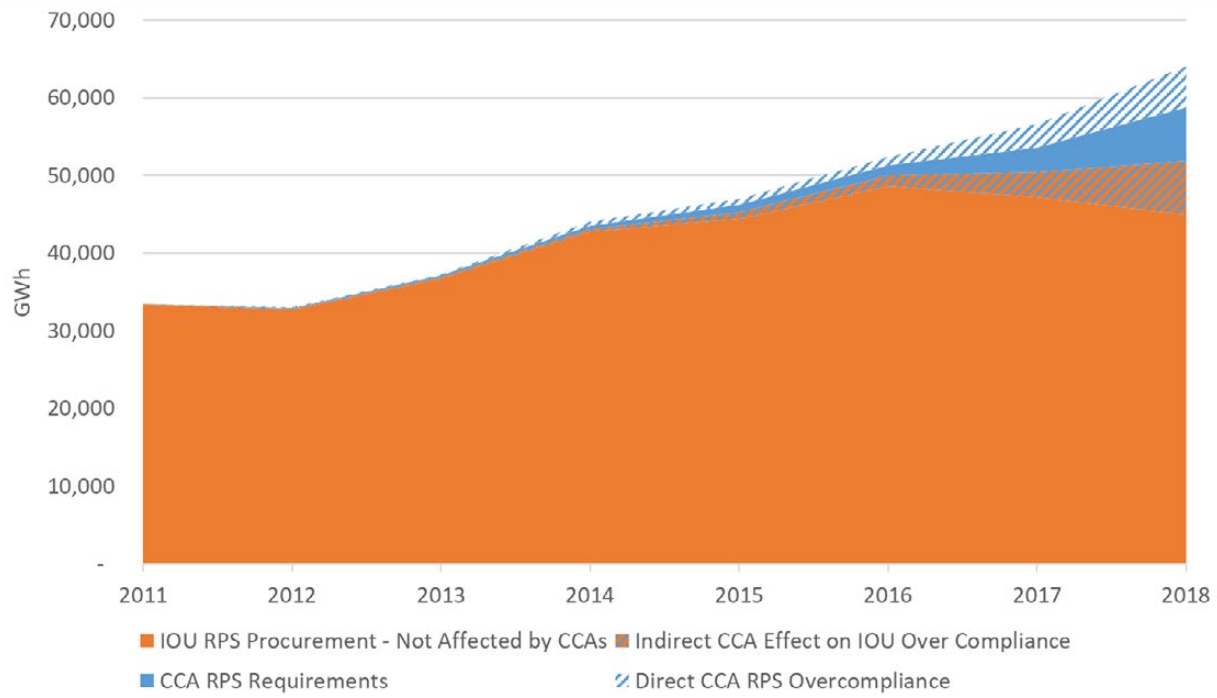
Estimating Total Impacts of CCAs on Renewable Energy Consumption

This analysis finds evidence that CCAs have supported California's renewable energy goals and helped to meet those targets in advance. From 2011 to 2018, CCAs' direct RPS over compliance is 11 TWh and their indirect effect on RPS over compliance is 13.1 TWh.

CCAs total effect on RPS over compliance is the sum of their direct and indirect effects which equals 24.1 TWh for 2011 through 2018. In addition to the over compliance attributable to CCAs' indirect effect, IOUs over complied by 37.1 TWh.

Figure 7 below illustrates these findings. CCAs' required RPS-eligible procurement is shown in the solid blue and their direct effect on RPS over compliance is shown in the blue and white striped section. CCAs' indirect effect on IOU RPS over compliance is equal to the MWh needed to meet RPS requirements for departed CCA load. This indirect effect that CCAs had on greening IOUs' portfolio is shown in the striped blue and orange in the figures below. This electricity was directly procured by IOUs, but is now additional IOU RPS over compliance as a result of CCAs. The orange sections on the figures represent the remainder of actual IOU direct RPS-eligible procurement. See Appendix B for our analysis conducted at the IOU level.

FIGURE 7. Estimated Total Direct and Indirect Effect of CCAs



Where have these trends left California compliance with its 2018 RPS goals? The CPUC estimates that IOUs had a weighted average of 40% RPS-eligible electricity in their portfolio in 2018. In contrast, CCAs had a weighted average of 47% RPS-eligible electricity,[14] 22 percentage points more than what was required in 2018. IOU and CCA combined over procurement was 17.8 TWh in 2018 alone.

Conclusion

This paper finds that CCAs have contributed to the acceleration of meeting state renewable energy targets for both IOUs and CCAs over the past decade. However, the future contributions of CCAs to renewable portfolio standard over compliance are more uncertain and will depend on state RPS and CCA policies. First, much will depend on whether CCAs continue to grow their market share and continue to demand levels of renewable energy in excess of RPS requirements. There is a possibility that the early CCA adopters were more focused on the goal of surpassing RPS requirements than will be later-adopters. Several newer CCAs have focused more on maximizing the amount of carbon free electricity in their electricity portfolio, which is not always RPS-eligible, rather than exceeding state renewables requirements. Additionally, new policy changes regarding greenhouse gas accounting may affect CCA contribution to RPS. Proposed accounting methods may affect which resources may be considered carbon free, which may affect procurement decisions.

Second, in the long run we expect IOUs to reduce current per-customer renewable energy holdings, bringing them closer to RPS requirements. IOUs may sell off excess contracts, especially as an increasing amount of IOU load departs for CCAs. A current proceeding at the California Public Utilities Commission is considering how IOUs can reduce the excess renewable energy contracts in their portfolio.[15] If this occurs, IOU over compliance will decline. Potentially, those excess contracts could be purchased by CCAs, but shifting their ownership would not accelerate achieving RPS targets. IOUs may not have an incentive to keep the above-required levels of renewables in their portfolio without the state accelerating RPS compliance dates.

14. California Public Utilities Commission (2018). "2018 California Renewables Portfolio Standard Annual Report."
15. California Public Utilities Commission. PCIA Rulemaking Number R. 17-06-026

Appendix A. 100% Clean and Renewable Energy Cities and Counties

TABLE A1. 100% Renewable and 100% Clean Energy Cities and Counties

100% RENEWABLE COMMUNITIES*	100% CLEAN ENERGY COMMUNITIES**	
Culver City	Agoura Hills	Monterey
Ojai	Alhambra	Moorpark
Oxnard	Arcadia	Morgan Hill
Portola Valley	Beverly Hills	Mountain View
Rolling Hills Estates	Calabasas	Pacific Grove
Santa Monica	Camarillo	Palo Alto
South Pasadena	Campbell	Paramount
Thousand Oaks	Capitola	Redondo Beach
Trinity County (parts served by Trinity PUD)	Carmel	Salinas
Unincorporated Ventura County	Carson	San Juan Bautista
Ventura City	Claremont	Sand City
West Hollywood	Cupertino	Santa Cruz
	Downey	Saratoga
	Gilroy	Scotts Valley
	Gonzales	Seaside
	Greenfield	Sierra Madre
	Hawaiian Gardens	Simi Valley
	Hawthorne	Soledad
	Hollister	Sunnyvale
	Los Altos	Temple City
	Los Altos Hills	Unincorporated Los Angeles County
	Los Gatos	Unincorporated Monterey County
	Malibu	Unincorporated San Benito County
	Manhattan Beach	Unincorporated Santa Clara County
	Marina	Unincorporated Santa Cruz
	Milpitas	Watsonville
	Monte Sereno	Whittier

Table note: cities and counties listed above are members of one of the following electricity providers: Clean Power Alliance (CCA); Silicon Valley Clean Energy (CCA); Peninsula Clean Energy (CCA); Monterey Bay Community Power (CCA); City of Palo Alto Utilities (publicly owned utility); or Trinity Public Utilities District (publicly owned utility).

*Renewable resources include biomass and biowaste, geothermal, small hydroelectric, solar, and wind.

** Carbon free electricity includes the aforementioned renewable resources, as well as large hydroelectric.

Not all of the 100% carbon free cities are compliant with SB 100, which requires a minimum of 60% renewables.

TABLE A2. 100% Clean Energy Communities with At Least 60% Renewables

Alhambra	Portola Valley
Beverly Hills	Redondo Beach
Carson	Rolling Hills Estates
Claremont	Santa Monica
Culver City	Sierra Madre
Downey	Simi Valley
Hawaiian Gardens	South Pasadena
Malibu	Thousand Oaks
Manhattan Beach	Trinity County (parts served by Trinity PUD)
Moorpark	Unincorporated Ventura County
Ojai	Ventura City
Oxnard	West Hollywood
Palo Alto	Whittier

Table A3 shows annual REC 3 use by CCAs. CCAs are ordered by launch date, starting with the oldest. Seven CCAs, that have not ever used REC 3, are not included in this table.

TABLE A3. Annual REC 3 Use by Community Choice Aggregators in California

CCA	2011	2012	2013	2014	2015	2016	2017	2018
MCE	0%	4%	9%	28%	14%	3%	3%	1%
SCP	-	-	-	11%	4%	-6%	0%	0%
LCE	-	-	-	-	19%	15%	12%	11%
AVCE	-	-	-	-	-	-	6%	11%
PRIME	-	-	-	-	-	-	36%	33%
SVCE	-	-	-	-	-	-	4%	0%
SJP	-	-	-	-	-	-	-	13%
RMEA	-	-	-	-	-	-	-	12%
PIO	-	-	-	-	-	-	-	3%
SJCE	-	-	-	-	-	-	-	0%
EBCE	-	-	-	-	-	-	-	2%
KCCP	-	-	-	-	-	-	-	3%

Appendix B. Analysis of CCA Effects Conducted at the IOU Level

CCA and IOU RPS procurement and over procurement is summarized in the table below.

TABLE B1. Summary of IOU and CCA RPS Procurement 2011 to 2018

	TOTAL RPS-ELIGIBLE PROCUREMENT (TWH)	REQUIRED RPS PROCUREMENT (TWH)	TOTAL RPS OVER PROCUREMENT (TWH)	OVER PROCUREMENT ATTRIBUTABLE TO CCAS (TWH)	TOTAL EFFECT ON RPS OVER PROCUREMENT (TWH)
PG&E	149.6	126.2	23.4	12.1	11.3
CCAs in PG&E Territory	22.4	12.1	10.4	12.1	22.4
SCE	152.4	137.9	14.5	1	13.5
CCAs in SCE Territory	1.76	1	0.6	1	1.6
SDG&E	42	29.7	12.3	0.01	12.29
CCAs in SDG&E Territory	.018	.011	.007	0.01	0.018
All IOUs	**344**	**293.8**	**50.2**	**13.1**	**37.1**
All CCAs	**24.1**	**13.1**	**11**	**13.1**	**24.1**

Effects of CCAs in PG&E Territory

From 2011 to 2018, CCAs' direct RPS over compliance is 10.4 TWh of RPS-eligible electricity as in PG&E territory. CCAs' indirect effect on PG&E RPS over compliance is 12.1 TWh over the same period.

Effects of CCAs in SCE Territory

From 2011 to 2018, CCAs' direct RPS over compliance is 0.6 TWh of RPS-eligible electricity in SCE territory. CCAs' indirect effect on SCE RPS over compliance 1 TWh over the same period.

Effects of CCAs in SDG&E Territory

From 2011 to 2018, CCAs' direct RPS over compliance is 0.007 TWh of RPS-eligible electricity in SDG&E territory. CCAs' indirect effect on SDG&E RPS over compliance is 0.01 TWh over the same period.

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