



RENEWABLES PORTFOLIO STANDARD



About this Report

The purpose of this annual report is to comply with Public Utilities Code Section 913.4. Each November, the CPUC is required to report to the Legislature on the progress of California's electrical corporations in complying with the Renewables Portfolio Standard (RPS) program.

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California's Renewables Portfolio Standard

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In compliance with Senate Bill (SB) 1222 (Hertzberg, 2016; as codified in Public Utilities Code Section 913.4¹), the California Public Utilities Commission (CPUC or Commission) reports to the Legislature each year on the progress of the RPS program. This report describes the progress of the State's electrical retail sellers in complying with the Renewables Portfolio Standard (RPS) Program and shows that:

- California's electrical corporations met the 25% RPS requirement for 2016, and in many cases, substantially exceeded this requirement.²
- The large investor-owned utilities (IOU) have executed renewable electricity contracts necessary to exceed 2020's 33% RPS requirement.
- The IOUs' aggregated forecast project they will meet the 2030 RPS requirement of 50% by 2020.
- Community Choice Aggregators (CCA) and the small and multi-jurisdictional utilities (SMJU) report compliance with current RPS requirements, and forecast that they will meet or exceed 2020's 33% RPS requirement.
- The RPS program has helped achieve large reductions in cost for renewable electricity: between 2008 and 2016, the price of utility scale solar contracts reported to the CPUC have gone down 77%, and between 2007 and 2015 reported prices of wind contracts have gone down 47%.³

¹ See Appendix B for full text of Public Utilities Code (PU Code) Section 913.4.

² Based on filings submitted to the CPUC by retail sellers, they are exceeding RPS requirements with the exception of a few filings by ESPs.

³ This does not reflect further wind contract price reductions in 2016 or 2017 because of limited new wind contracts reported to the CPUC during that time.

About the Annual RPS Report

Each November, the CPUC reports to the Legislature on the progress and compliance of California's electricity retailers in meeting RPS requirements. Specifically, this report complies with Public Utilities Code 913.4 sub-sections:

- (a) Progress on RPS procurement activities;
- (b) Details on RPS activities and implementation;
- (c) Projected ability to meet RPS under cost limitations;
- (d) Status of RPS plans, activities, procurement, and transmission;
- (e) Barriers and policy recommendations to achieving RPS; and
- (f) Efforts of electrical corporations related to workforce development, training, and diversity.

About the RPS Program

California's ambitious RPS program is jointly implemented and administered by the California Public Utilities Commission (CPUC) and the California Energy Commission (CEC). The RPS program requires the State's Investor-Owned Utilities (IOUs), Community Choice Aggregators (CCAs), Electric Service Providers (ESPs), and Publicly Owned Utilities (POUs) to procure 50 percent of their total electricity retail sales from eligible renewable energy resources by 2030.

The CPUC reviews and approves RPS Procurement Plans and Compliance Reports for the IOUs, CCAs, and ESPs. The CEC oversees RPS compliance for the POUs.⁴

RPS LEGISLATIVE HISTORY

California's RPS program was established in 2002 by Senate Bill (SB) 1078 (Sher) with the initial requirement that 20% of electricity retail sales be served by renewable resources. The program was accelerated in 2006 under SB 107 (Simitian), which required that the 20% mandate be met by 2010.

In April 2011, Governor Brown signed SB 2 (1X) (Simitian), which codified a higher RPS requirement of 33% to be achieved by December 31, 2020.

In 2015, the Governor signed into law SB 350 (De León), The Clean Energy and Pollution Reduction Act of 2015. SB 350 increased RPS requirements to 50% by December 31, 2030.

In addition, SB 350 includes interim RPS targets of 40% by December 31, 2024 and 45% by December 31, 2027, with three-year compliance periods continuing indefinitely thereafter. The 50% RPS requirement is a minimum.

Governor Brown also signed into law in 2015 SB 697 (Hertzberg), which adopted the Public Utilities Commission Accountability Act of 2015 and recasted some of the Commission's RPS reporting requirements.

⁴ This report covers only the entities that the CPUC regulates.

The purpose of increasing the level of renewables in the State's energy mix is to provide a range of benefits to Californians, including:

- Reducing greenhouse gas emissions and air pollution;
- Stabilizing electricity rates;
- Diversifying the energy generation portfolio;
- Meeting resource adequacy requirements; and
- Contributing to the reliable operation of the electrical grid.

California's electricity retail sellers, defined as any entity engaged in the retail sale of electricity to end-use customers located within the State, are required to comply with the RPS program. Within the CPUC's jurisdiction, the large IOUs served approximately 75% of the State's retail electricity load in 2016, while the SMJUs, CCAs, and ESPs collectively served the remaining 25%. The POUs serve approximately 20-25% of California's electric load, but are not retail sellers.

An electricity retailer operating in California is generally classified into one of four categories:

- **IOU:** A private enterprise that engages in the generation and distribution of electricity for sale in a regulated market. Customer rates for utilities are set and regulated by the CPUC through a public process that includes stakeholder participation.
- **SMJU:** An electric utility that has a customer base of 30,000, or fewer or that serves customers across multiple states.
- **CCA:** A local government agency that purchases and develops power on behalf of residents, businesses, and municipal facilities within a local jurisdiction.
- **ESP:** A non-utility entity that offers electric service to customers within the service territory of an electric utility.

California's Electricity Retailers

Large Investor-Owned Utilities (IOU)

Pacific Gas and Electric Company
Southern California Edison Company
San Diego Gas & Electric Company

Small and Multi-Jurisdictional Utilities (SMJU)

Bear Valley Electric Service
Liberty Utilities
PacifiCorp

Community Choice Aggregators (CCA)

Apple Valley Choice Energy
CleanPowerSF
Lancaster Choice Energy
Marin Clean Energy
Peninsula Clean Energy
Pico Rivera Municipal Energy
Redwood Coast Energy Authority
Silicon Valley Clean Energy
Sonoma Clean Power Authority

Electric Service Providers (ESP)

Direct access providers of electricity

How the RPS Program Works

The RPS program encourages investment in the development of new utility-scale renewable energy facilities to meet the electrical demands of the State of California. RPS is a market based program where compliance is determined by the quantity of Renewable Energy Credits (REC) acquired (1 REC = 1 megawatt hour (MWh)).

The CPUC's implementation of the RPS program complements the RPS program administered by the CEC, as well as supports California's climate change policies. The CPUC's compliance process is completed after the CEC verifies RPS-eligible procurement from renewable energy facilities.

The CPUC establishes program policy within its RPS rulemaking proceeding and implements legislation through its Commission decisions to ensure that electricity retailers comply with CPUC rules and State law.⁵

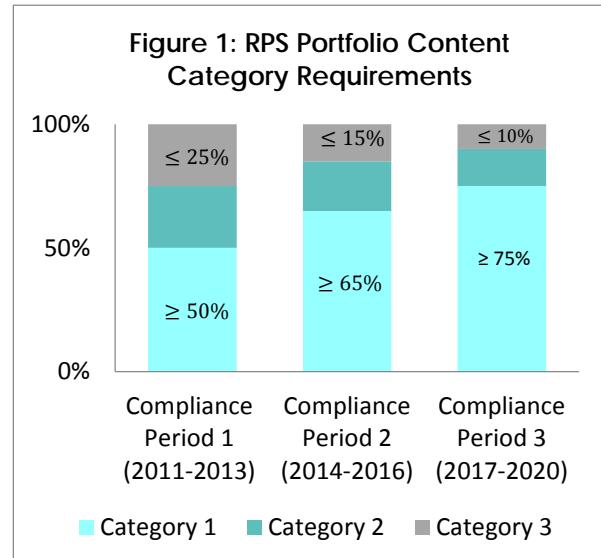
The CPUC's responsibilities in the implementation of the RPS program include:

- Setting policy through a public stakeholder process;
- Reviewing and approving each retail seller's RPS procurement plan;
- Reviewing IOU contracts for RPS-eligible energy; and
- Determining and enforcing compliance with procurement targets.

Portfolio Content Category Rules

California's RPS program defines all renewable procurement acquired from contracts executed after June 1, 2010 into one of three portfolio content categories (PCCs):

- **Category 1:** Bundled renewable energy credits (RECs) from facilities with a first point of interconnection within a California Balancing Authority (CBA), or facilities that schedule electricity into a CBA on an hourly or sub-hourly basis.
- **Category 2:** Procurement which bundles RECs with incremental electricity, and/or substitute energy, from outside a CBA. Generally, Category 2 RECs are generated from out-of-state renewable facilities and require a Substitute Energy Agreement that details the simultaneous purchase of energy and RECs from an RPS-eligible facility.
- **Category 3:** Unbundled RECs that do not include the physical delivery of the energy attached to the REC. Generally, Category 3 RECs are associated with the sale and purchase of the RECs themselves, not the energy.



⁵ The CPUC Rulemaking for the RPS program is currently R.15-02-020.

In addition to complying with RPS procurement requirements and PCC classifications, most retail sellers have specified requirements for the balance or mix of procurement from contracts that are executed after June 1, 2010. Specifically, these retail sellers must procure a minimum level of Category 1 RECs, which increases over the initial three multi-year compliance periods.⁶ There is a maximum limit on the amount of Category 3 procurement that may be used in each compliance period, which decreases over the same timeframe.

The PCC requirements are instrumental in determining a retail seller's compliance with the RPS program. Figure 1 depicts the portfolio category limits and how they adjust across compliance periods until 2020, at which point they remain at those limits for each successive compliance period.

Eligible renewable generation facilities may be located anywhere within the Western Electricity Coordinating Council (WECC) region.⁷ These facilities are permitted to sell RECs to California retail sellers of electricity to meet their RPS obligations, provided the facility meets all RPS eligibility criteria established by the CEC.

RPS Excess Procurement Rules

RECs that are not used to fulfill RPS obligations in one period may be “banked” and used in subsequent compliance periods. SB 2 (1X) (Simitian, 2011) established the ability for a retail seller to carry over procurement from one compliance period to another. The calculations for excess procurement rely on a combination of the PCC classification of the RECs and whether the RECs are associated with short-term or long-term contracts.

The Commission recently implemented SB 350, which changes the banking rules. Beginning in 2021-2024 compliance period, all excess PCC 1 RECs can be banked, regardless of whether they are associated with short- or long-term contracts; no PCC 2 or PCC 3 RECs can be banked.

⁶ See Public Utilities Code § 399.16(c) for additional information.

⁷ The WECC region extends from the Canadian provinces of Alberta and British Columbia to the northern part of Baja California, Mexico, and encompasses the 14 western U.S. states in between.

RPS Compliance Requirements

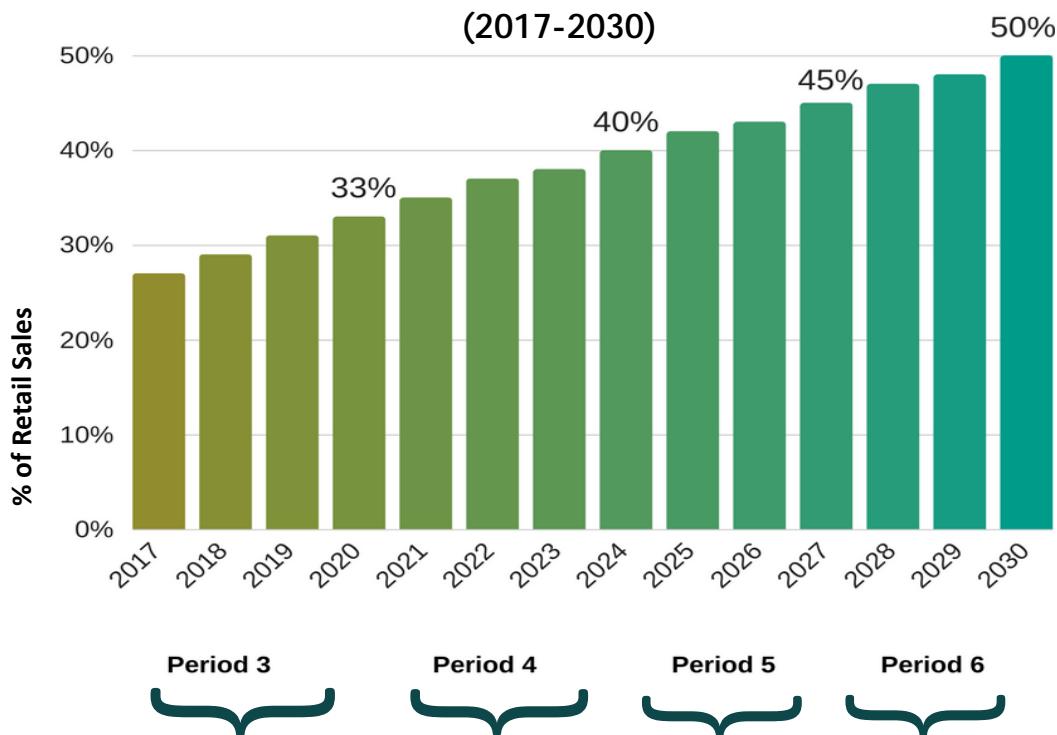
RPS compliance requirements are jointly administered, verified, and enforced by the CPUC and the CEC. Each August 1, retail sellers must submit annual Compliance Reports to the CPUC. The compliance verification process ensures that electricity retailers are on-track to meet a 50% RPS requirement by 2030, via interim compliance period targets.

How RPS Compliance Progress is Measured

The RPS program has six interim compliance periods leading up to 2030 for the purpose of monitoring electricity retail seller progress towards the 50% RPS mandate:

- ▶ **2013:** 20%
- ▶ **2016:** 25%
- ▶ **2020:** 33%
- ▶ **2024:** 40%
- ▶ **2027:** 45%
- ▶ **2030:** 50%

Figure 2: RPS Compliance Period Requirements



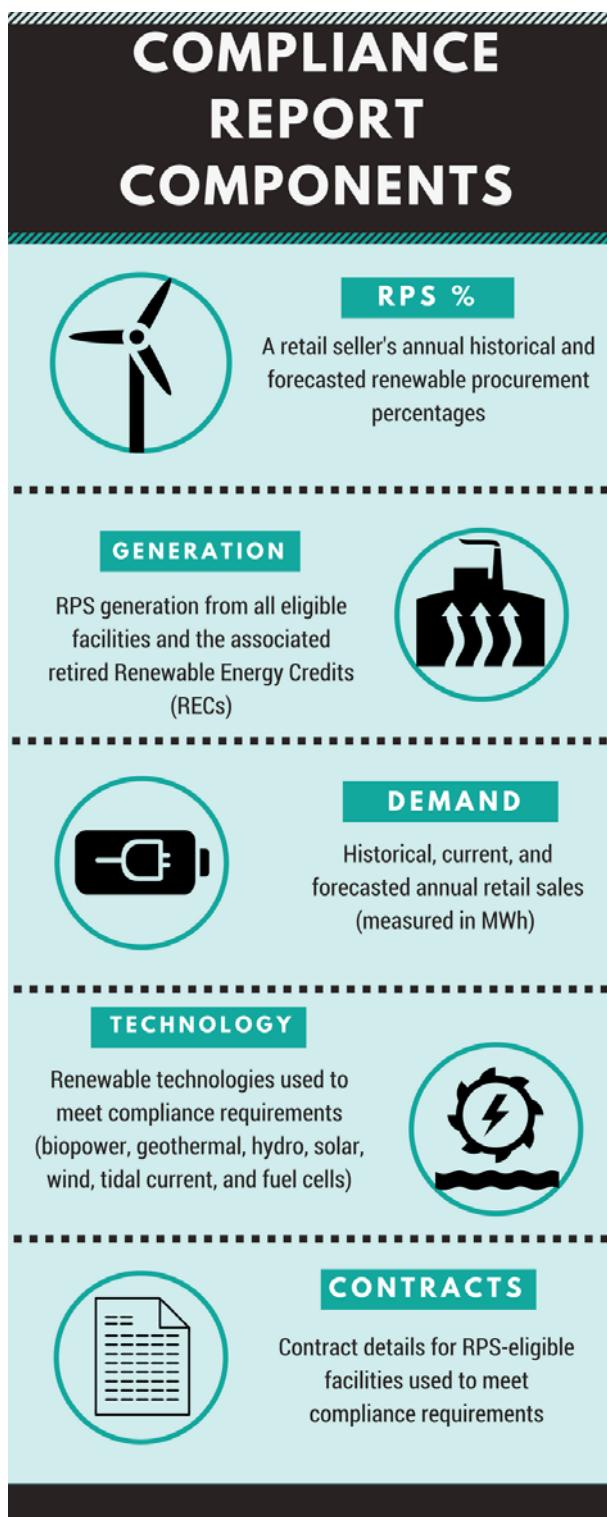
Each year, the CPUC evaluates the utilities' Procurement Plans to review their long-term RPS forecasts and planning mechanisms. The Plans provide information regarding current supplies, projects under development, and forecasted need for additional RPS procurement.

Progress towards the RPS mandate is measured in several ways, including through the analysis of detailed RPS Procurement Plans and Compliance Reports. These documents determine the compliance status of each retail seller in achieving the statewide mandate.

Retail sellers are required to submit annual Compliance Reports to the CPUC that contain historical and forecasted details about their annual renewable procurement. The CPUC evaluates these reports to ensure progress is being made towards the interim targets.

The CPUC works closely with the CEC to ensure that the utilities meet their RPS requirements. Compliance evaluations and official determinations by the CPUC can only take place after the CEC verifies a retail seller's annual REC claims.

The CEC receives reports from energy retailers generated by the Western Renewable Energy Generation Information System (WREGIS) describing the amount of renewable electricity generated by every eligible facility.⁸ The CEC analyzes WREGIS reports to determine: eligibility of the facility, the quantity of RECs created from each RPS-eligible facility, and retail sellers' RPS procurement claim to ensure each REC claimed is eligible for compliance with the RPS and is only counted once.



⁸ The Western Renewable Energy Generation Information System (WREGIS) is an independent renewable energy tracking system for the region covered by the Western Electricity Coordinating Council (WECC).

Once the CEC has verified the number of RPS eligible RECs, a retail seller can use those RECs to meet their compliance obligations, and those RECs are retired. The CPUC is responsible for reviewing how a retail seller's RPS procurement is classified into PCCs. However, the CPUC can only enforce compliance at the conclusion of the multi-year Compliance Periods.



This chapter uses historical data through December 31, 2016 from the Compliance Reports and the Procurement Plans from the large IOUs, SMJUs, CCAs, and ESPs to illustrate the state of the RPS program. The data presented in this chapter is used by the CPUC to evaluate aspects of RPS procurement, including:

- Procurement progress towards the 50% RPS mandate;
- Current renewable procurement status;
- Renewable portfolio and technology mix;
- Installed renewable capacity; and
- RPS contracting activities.

Large IOUs: Well-positioned to Meet RPS Requirements

All electricity retail sellers were required to serve 25% of their load with RPS-eligible resources by December 31, 2016, as an interim target between compliance periods. The large IOUs surpassed this requirement, as illustrated in Table 1.⁹

Table 1: Actual RPS Procurement Percentages Towards Meeting the 25% Requirement in 2016	
PG&E	32.9%
SCE	28.2%
SDG&E	43.2%

Data source: IOU Annual RPS Compliance Filings, August 2017

Table 1 shows that the large IOUs have individually met the 25% target. The IOUs may choose to apply eligible renewable electricity procured in 2016 that is in excess of the RPS requirement to meet their RPS requirements in future compliance periods, or they may sell RECs associated with the excess procurement to third parties.¹⁰

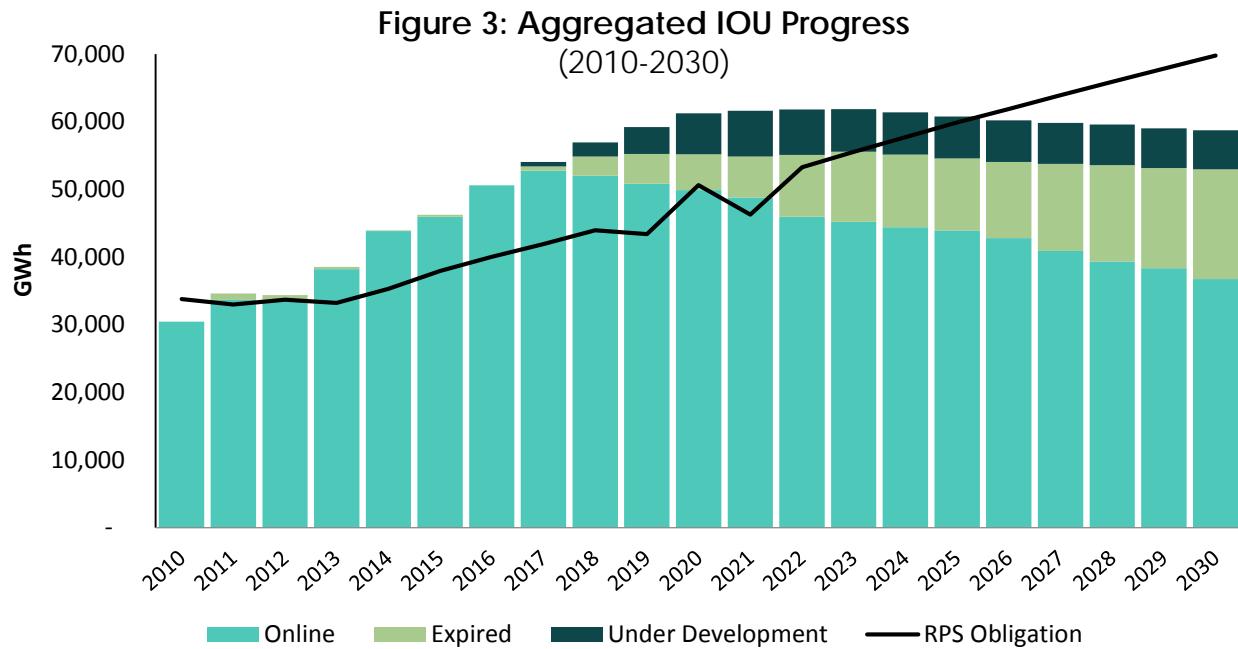
As further described in Chapter 3 under “Excess Procurement,” a variety of market conditions have caused the IOUs to be procured beyond their minimum RPS requirements, including the need to hedge against initial program experience with project failure and/or increasing departing load to CCAs.

⁹ Based on their annual RPS Procurement Plans, as well as Compliance Reports filed with the CPUC in August 2017, the three large IOUs are well-positioned to meet their procurement targets for the 50% RPS mandate by 2030 using excess procurement through the banking provisions described in Chapter 1.

¹⁰ The three large IOUs forecast having excess procurement for the next five years and are positioned to exceed their RPS obligations (see Table 2).

Figure 3 uses the most current annual data to illustrate the actual and forecasted progress the large IOUs have made toward meeting the 50% RPS mandate on a risk-adjusted basis.¹¹ The graph shows a forecasted surplus of renewable generation through 2020 and a deficit beginning in 2022.¹² ¹³ As reported in their Procurement Plans and Compliance Reports, the IOUs forecast that they will meet the 33% RPS requirement by 2020 (see Table 2).¹⁴

The IOUs forecast that they can meet their RPS requirements by using banked RECs. Given the IOUs have significant excess eligible RPS procurement, they chose not to conduct annual RPS solicitations in 2016 or 2017, nor do they plan to undertake solicitations in 2018 (as described further in Chapter 3).¹⁵



¹¹ The data used to create Figure 3 was taken from the IOUs' 2017 Annual RPS Procurement Plans. Generation forecasts from projects "under development" are risk adjusted to account for a certain degree of project failure. Failure rate assumptions are provided by the IOUs in their renewable net short calculation provided with their Draft Annual RPS Procurement Plan that were submitted in July 2017.

¹² Projects that are currently "Under Development" are expected to decrease beginning in 2023 out to 2030 because the project developers and IOUs focus their efforts on the nearer term.

¹³ The "Expired" field represents the amount of generation associated with facilities that no longer have a PPA with one of the IOUs. Although this generation is not under contract, there is a possibility that one of the IOUs will re-contract with these facilities.

¹⁴ The RPS obligation decreases from 2020 to 2021 due to the varying Compliance Period timeframe (from three years to four years in a Period).

¹⁵ The IOUs' excess procurement is based on the current forecast of bundled electricity load and additional CCA departures will result in increased amounts of excess.

Table 2 below depicts the large IOUs' actual RPS procurement and forecasted procurement, and shows that the IOUs forecast that they will meet or exceed their 2020 RPS compliance period requirements, and meet the 2030 50% RPS requirement by 2020. The data is aggregated to provide a statewide view of progress and anticipated compliance.¹⁶

Table 2: Average Large IOUs' RPS Procurement Percentages for PG&E, SCE, and SDG&E in 2016										
	Actuals						Forecasted			
	Compliance Period 1			Compliance Period 2			Compliance Period 3			
	20% Requirement			25% Requirement			33% Requirement			
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	20%	20%	23%	28%	30%	35%	38%	42%	47%	50%

Data source: IOU RPS Compliance Reports, August 2017¹⁷

SMJUs: Demonstrate Need to Procure within the Next Five Years

The SMJUs project that they will meet the current RPS targets for Compliance Period 2 (2014-2016), but have indicated they will need to procure additional resources to meet the post-2020 compliance targets. Table 3 data show an average of two SMJUs' procurement percentages (Liberty and BVES), and does not reflect the procurement of the individual utilities. Both Liberty Utilities and Bear Valley Electric Service (BVES) included their forecasted RPS procurement percentages in their 2017 RPS Procurement Plan and compliance filings.¹⁸

Table 3: Average SMJUs' RPS Procurement Percentages BVES and Liberty in 2016										
	Actuals						Forecasted			
	Compliance Period 1			Compliance Period 2			Compliance Period 3			
	20% Requirement			25% Requirement			33% Requirement			
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	20%	21%	22%	29%	25%	27%	28%	29%	32%	33%

Data source: SMJU RPS Compliance Reports, August 2017

¹⁶ Each retail seller must file its annual RPS Procurement Plan and Compliance Report. Renewable procurement data is not automatically confidential but may be claimed as such through a formal filing. In the formal confidentiality filing, the retail seller must justify why the information should be treated as confidential by the CPUC. Generally, historical data should be public and individual contracts may be confidential for 3 years from the date that energy deliveries begin. Additionally, retail sellers are allowed to redact forecast information three years forward. See the CPUC's Decision on Confidentiality (D.06-06-066) for more information: http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/57772.PDF.

¹⁷ Note: The forward-looking data (2017-2020) of each IOU is treated as confidential information per D.06-06-066.

¹⁸ PacifiCorp data is not included in Table 3 due to confidentiality rules, as its confidential information could be derived due to public data available from Liberty and BVES.

CCAs: Demonstrate Need to Procure within the Next Five Years

RPS Compliance Reports submitted by Marin Clean Energy (MCE), Sonoma Clean Power (SCP), Lancaster Choice Energy (LCE), Peninsula Clean Energy (PCE) and CleanPowerSF indicate the CCAs have met the current RPS targets. However, their preliminary compliance reports indicate they will need to procure renewable resources to meet the 50% RPS target by 2030. Table 4 provides an average of these CCA's reported procurement percentages.

Table 4: Average CCA RPS Procurement Percentages for MCE, SCP, LCE, PCE, and CPSF in 2016										
	Actuals						Forecasted			
	Compliance Period 1			Compliance Period 2			Compliance Period 3			
	20% Requirement			25% Requirement			33% Requirement			
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	28%	29%	30%	48%	39%	47%	46%	38%	38%	30%

Data source: CCA RPS Compliance Reports, August 2017

The information provided above is based on the various operational statuses of the CCAs. From 2011 to 2013, Marin Clean Energy was the only CCA in operation. In 2014, Sonoma Clean Power started serving load, and Lancaster choice started serving load in 2015. Accordingly, the CPUC has collected robust data on the CCAs with the longest operational history, given that the other six certified CCAs have only recently begun serving customers. All certified CCAs, have begun executing contracts for new renewable energy projects that will come online within the next five years.

ESPs: Procurement Assessment Unknown Due to Lack of Long-term Forecasting

ESPs are non-utility electricity service providers which currently serve approximately 13% of California's electricity load. Though California's ESPs are required to file both Compliance Reports and Procurement Plans, they do not provide long-term forecasts on their renewable procurement. The forecasted renewable procurement percentages are not a required element of the Compliance Reports and most ESPs do not forecast beyond the current reporting year. Therefore, the CPUC is unable to provide data on the long-term RPS outlook of the ESPs.

The Status of Current Renewable Portfolios

To provide a more detailed view of the status of RPS portfolios, this section describes a variety of perspectives for retail sellers with available information, including renewable resource mix, installed renewable capacity, and contracting activities. Among the retail sellers in California:

- The large IOUs have the most diverse renewable energy portfolio mix;
- The CCAs have a moderately diverse renewable energy portfolio mix; and
- SMJUs have the least diverse portfolio mixes.

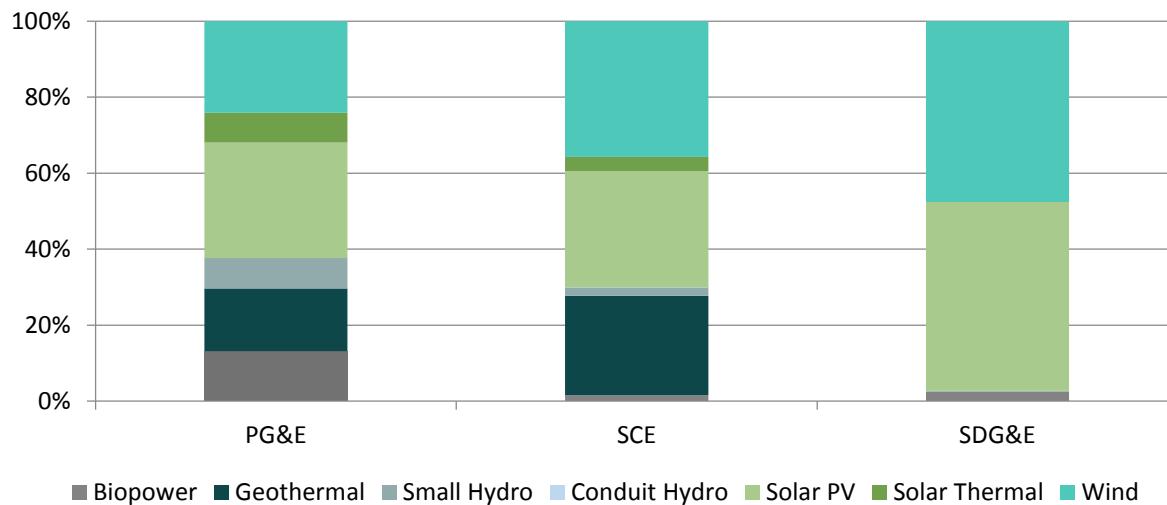
The large IOUs and CCAs have contracted with developers for new renewable facilities to add more capacity to reach the 50% RPS mandate. The SMJUs have been less active in contracting for renewables, but have secured the contracts needed to achieve the RPS requirements.

Renewable Technology Mix

Large IOUs

Since the inception of the RPS program in 2002, the large IOUs have continuously added new renewable technologies to their portfolios in order to satisfy their RPS procurement requirements. The large IOUs contract with a wide range of renewable technologies. Figure 4 shows that as of December 2016, the IOUs have procured diverse renewable energy resources such as wind, solar thermal, solar photovoltaic (PV), geothermal, biopower, and hydroelectric facilities to meet the requirements of the RPS program.¹⁹

Figure 4: IOU Renewable Portfolio Mixes in 2016



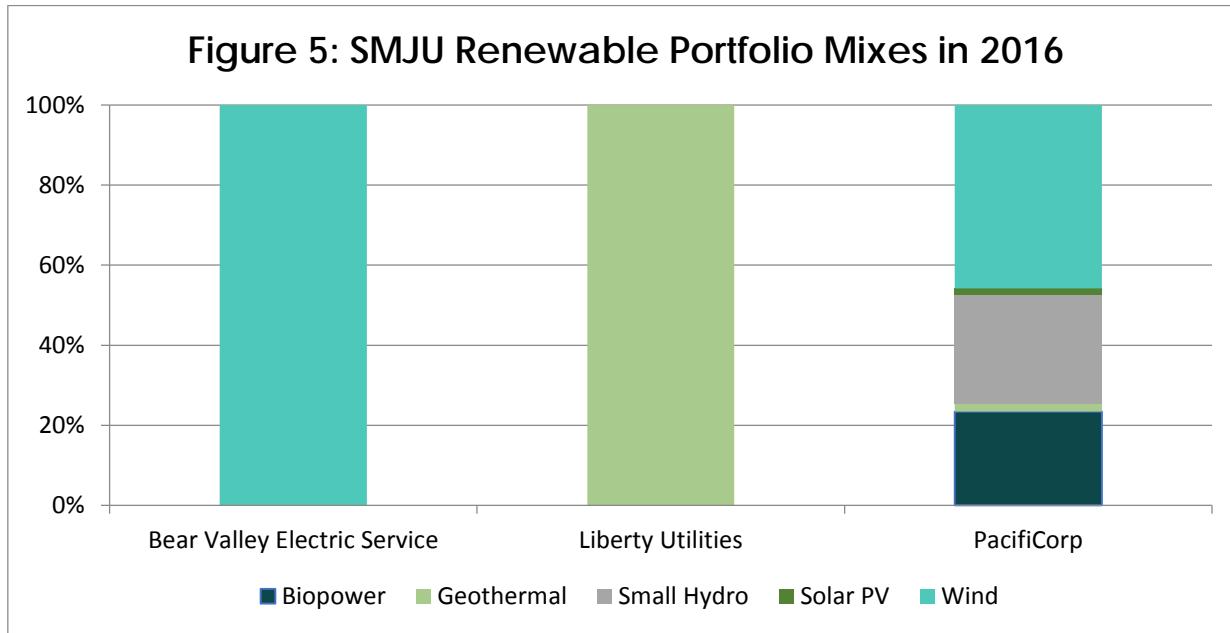
Data Source: IOU Annual Compliance Reports, submitted August 2017

¹⁹ Approximately 1% of SCE's renewable portfolio is comprised of Conduit Hydroelectric technology. The technology category of "Biopower" consists of biomass, biogas, biodiesel, landfill gas, and municipal solid waste.

SMJUs

With the exception of PacifiCorp, the renewable portfolio mixes of California's SMJUs are not as diverse as those of the large IOUs or the CCAs. As Figure 5 shows, Bear Valley Electric Service and Liberty Utilities, respectively, procured one technology each - wind and geothermal - to meet their RPS requirements.

In 2016, PacifiCorp had five technologies in its renewable energy portfolio, with the majority comprised of wind (44%) and biopower (23%).



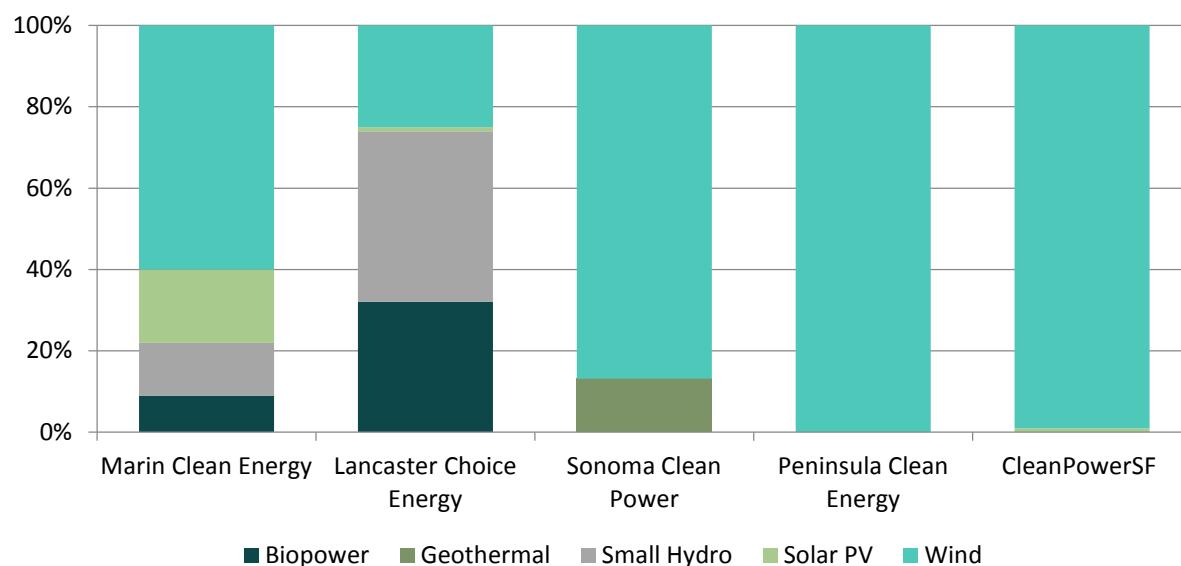
Data Source: SMJUs' Annual Compliance Reports, submitted August 2017

CCAs

Figure 6 illustrates the renewable energy portfolio mixes of the five CCAs that operated in California in 2016. Marin Clean Energy (MCE), Lancaster Choice Energy (LCE), and Sonoma Clean Power (SCP) have been in operation for six, three, and two years, respectively, and have more diverse resource mixes than Peninsula Clean Energy (PCE) and CleanPowerSF. Both PCE and CleanPowerSF began delivering energy in 2016.

In 2016, wind energy resources comprised the majority of MCE, SCP, PCE and CleanPowerSF's renewable portfolios at 60%, 86%, 100%, and 99%, respectively. The majority of LCE's portfolio (74%) consisted of small hydroelectric and biopower facilities.

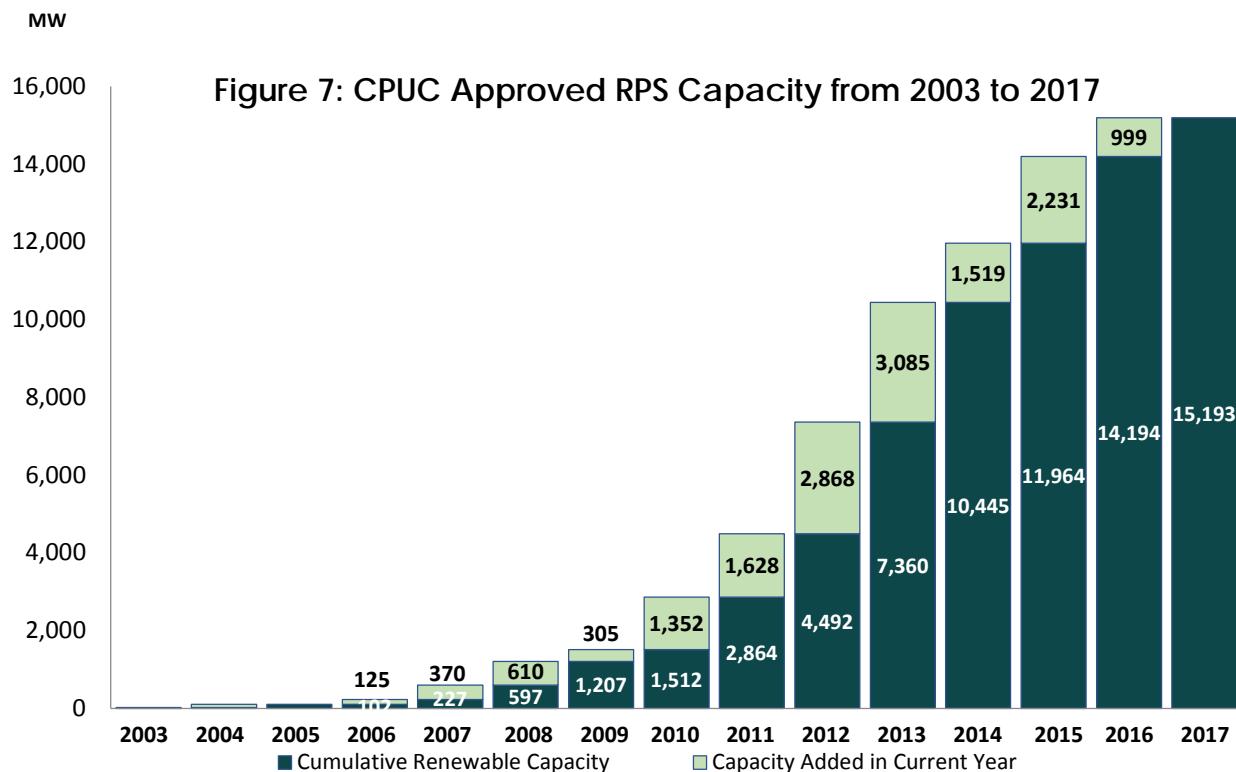
Figure 6: CCA Renewable Portfolio Mixes in 2016



Data Source: CCA Annual Compliance Reports, submitted August 2017

Installed Renewable Capacity

Since 2003, the three large IOUs have installed 15,193 MW of renewable capacity under the RPS program. As of October 2017, 344 MW of new renewable capacity came online. An additional 453 MW of renewable capacity is forecasted to achieve commercial operation in the next two years. The approved RPS capacity described in Figure 7 below includes both in-state and out-of-state facilities, with the majority of the facilities being in-state and solar PV being California's largest in-state renewable resource.



Data source: IOU Project Update Submissions to the CPUC's RPS Contract Database (October 2017)

2016 Renewable Contracting Activities

In 2016, the IOUs collectively executed five BioRAM contracts, three Request for Offer (RFO) contracts, fourteen ReMAT contracts, and four Qualifying Facilities (QF) contracts for a total of 209 MW of new RPS capacity. Table 5 below shows that PG&E executed twelve contracts, six of which were ReMAT contracts. PG&E signed six other contracts, half of which were from RFOs and half that were from QFs. Similarly, SCE executed twelve contracts where eight of them were under the ReMAT program, three were BioRAM, and one was a QF contract. SDG&E signed two contracts, both of which were to fulfill their BioRAM program requirement.²⁰

Table 5: Number of Large IOU RPS Contracts Approved by the CPUC in 2016

	PG&E		SCE		SDG&E		Totals	
Procurement Program	Contracts	MW	Contracts	MW	Contracts	MW	Contracts	MW
BioRAM (Biomass)	0	0	3	67	2	48	5	115
ReMAT	6	6	8	15	0	0	14	21
RFO	3	65	0	0	0	0	3	65
QF CHP	3	7	0	0	0	0	3	7
QF Standard Contract	0	0	1	1	0	0	1	1
Totals	12	72	12	83	2	48	26	209

Data source: IOU Project Update Submissions to the CPUC's RPS Contract Database (October 2017)

2016 Power Purchase Agreement Diversity

While the table above illustrates that BioRAM had the most RPS-eligible MWs procured, the table below shows that ReMAT had the largest proportion of executed contracts based on number of contracts. Table 6 shows that the majority (54%) of the IOUs' executed contracts were from the ReMAT program. In addition, the data show that the smallest percentage (12%) of the RPS contracts originated through RFOs.

Table 6: Percentage of IOU RPS Contracts (2016)

RPS Program	# of Contracts
ReMAT	54%
BioRAM	19%
QF Contracts	15%
RFO/Solicitation	12%

²⁰ Table 5 illustrates data from the large IOUs, but there were also other RPS contracts signed by the SMJUs, CCAs, and ESPs. Per [D.12-06-038](#), the CPUC collects monthly data from the large IOUs on: RPS projects, including contract details, project development status, technology type, location, capacity, financing status, construction start date, commercial online date, regulatory status, and interconnection details.



Chapter 3 uses data through October 2017 to provide an overview of 2017 RPS activities, describing implementation of the large IOUs' RPS procurement and status:

- Renewable procurement
- Implementation of RPS Legislation
- RPS Compliance and Enforcement

In addition, Chapter 3 describes the 2017 Draft RPS Procurement Plans for the large IOUs, SMJUs, and the CCAs that were submitted in July 2017. Once approved, these Plans will provide guidance for 2018 RPS activities, and beyond.

While the Commission assures that RPS Procurement Plans for the CCAs and ESPs meet required planning criteria, the CPUC has limited jurisdiction over their procurement activities.

2017 RPS Procurement Activities of the Large IOUs

As demonstrated in Chapter 2, the large IOUs are currently long on procurement and are anticipated to meet their 2030 RPS requirements by 2020. Accordingly, the IOUs chose not to hold annual RPS solicitations in 2017.

However, the IOUs were required to procure renewable energy through other RPS programs in order to meet RPS and various other State policy goals. These programs include:

- Renewable Auction Mechanism (RAM)
- Bioenergy Renewable Auction Mechanism (BioRAM)
- Renewable Market Adjusting Tariff (ReMAT)
- Bioenergy Market Adjusting Tariff (BioMAT)

Renewable Auction Mechanism (RAM)

The Renewable Auction Mechanism (RAM) is a simplified, market-based mechanism for renewable distributed generation projects. RAM allows the IOUs to competitively procure RPS-eligible generation via a streamlined procurement process, allowing bidders to set their own price, use a standard contract, and allow IOUs to submit projects to the CPUC through an expedited regulatory review process.

RAM is designed to facilitate quick and simple transactions for projects that meet minimum criteria. Since the inception of the RAM program, the IOUs have held seven auctions, and procured a total of 1,332.5 MW.

The Commission views the RAM program as a targeted and cost-effective means to reduce greenhouse gas emissions, consistent with its integrated resource planning strategies. The initial purpose of the RAM program was to create a simplified market-based procurement process for smaller (<20 MW) RPS generation projects. Subsequently, the size restriction was removed to provide greater flexibility for RAM projects. The IOUs may use their annual RPS Procurement Plan to propose any additional RAM solicitation.

2017 RAM Procurement

Each of the IOUs approached RAM in various ways in 2017:

- **SCE**: did not hold any RAM solicitations given that it met its RAM obligations in 2016.
- **SDG&E**: is expected to meet its RAM obligation through its recent RAM 7 solicitation.
- **PG&E**: executed three contracts and is expected to launch a RAM solicitation by the end of 2017.

RAM Status in 2017

Table 7 below shows that the IOUs are required to procure a balance of 245 MW for the RAM program. SCE has exceeded their RAM requirements, while PG&E and SDG&E are in the process of holding solicitations to meet their remaining requirements.²¹

Table 7: IOU RAM Procurement Status (2017)				
RAM Mandated Capacity (MW)	PG&E	SCE	SDG&E	Total
Total RAM Procurement Targets	653	756	165	1,574
RAM Capacity Contracted	515	789	58	1,333
Capacity Remaining	138	0.0	107.0	245

Data Source: IOU Draft RPS Procurement Plans, July 2017

Bioenergy Renewable Auction Mechanism (BioRAM)

2017 BioRAM Procurement

The BioRAM program used the RAM process to implement the Governor's October 2015 Emergency Order on Tree Mortality, as well as addressed emergency strategies in SB 859. BioRAM requires the large IOUs to procure 146 MWs of bioenergy from forest fuel in High Hazard Zones (HHZ) from dead and dying trees, in order to aid in mitigating the threat of wildfires.

In early 2017, the Commission approved the final BioRAM contracts, fulfilling the State's emergency orders on Tree Mortality that require the IOUs to procure their proportional share of bioenergy from High Hazard Zone (HHZ) forest fuel. In February and April 2017, respectively, the CPUC approved PG&E's executed biomass contracts with the Burney and Wheelabrator facilities, totaling 43 MWs and completing the required BioRAM procurement.²²

²¹ Although PG&E and SDG&E filed requests to eliminate their remaining RAM procurement obligations, the CPUC denied the requests.

²² SCE and SDG&E executed their required BioRAM contracts in 2016.

2017 BioRAM Status

Table 8 outlines the IOUs' BioRAM contracts that comply with the State's emergency orders. The Governor's Emergency Order resulted in the CPUC's implementation of BioRAM 1 procurement. SB 859 resulted in the CPUC's implementation of BioRAM 2 procurement.

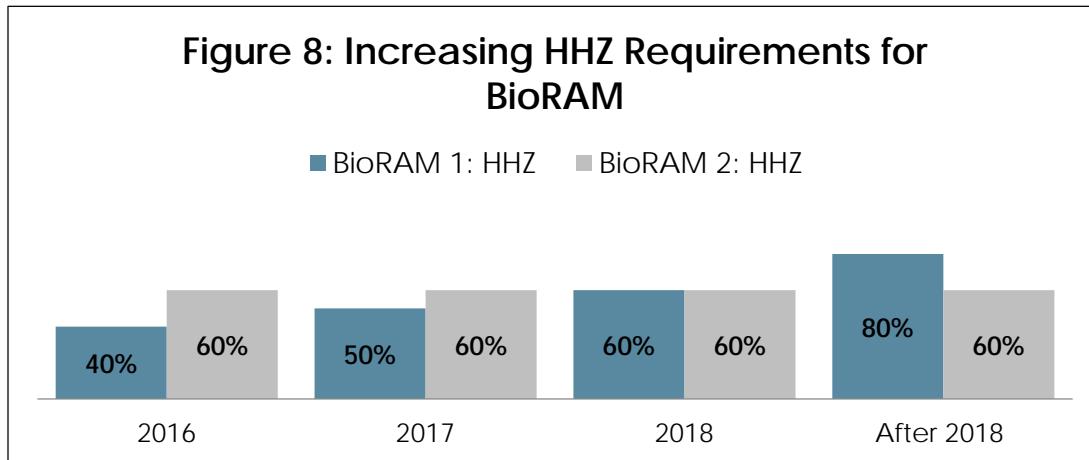
Table 8: Overview of IOU BioRAM Contracts (All 5-year Terms)				
IOU	Facility	Location	BioRAM Procurement (MW)	BioRAM Phase
PG&E	Burney	Burney	29	BioRAM 1
PG&E	Wheelabrator Shasta	Anderson	34	BioRAM 2
SCE	Rio Bravo Fresno	Fresno	24	BioRAM 1
SCE	Rio Bravo Rocklin	Lincoln	24	BioRAM 1
SCE	Ultrapower Chinese Station	Jamestown	18	BioRAM 1
SDG&E	Honey Lake Power Company / Greenleaf	Lassen	24	BioRAM 1
TOTAL			153	

Data Source: CPUC analysis of approved contracts, 2017

High Hazard Zone (HHZ) Fuel Requirements for BioRAM:

As figure 8 illustrates, BioRAM contracts are required to achieve assigned HHZ forest fuel usage targets:

- **BioRAM 1 (Governor's Emergency Order):** Starts at 40% and increases to 80% beyond 2018.
- **BioRAM 2 (SB 859):** At least 60% HHZ, with 80% from sustainable forest.



Data Source: Commission Resolutions E-4770 and E-4805

Tracking High Hazard Zone Forest Fuel Requirements for BioRAM:

The IOUs collect quarterly data from the biomass facilities in order to track the amount of bioenergy that is being produced from HHZ forest fuel in the BioRAM contracts. The HHZ requirement is based on an annual calendar year measurement. Table 9 shows the amount of HHZ fuel used in 2017 as part of BioRAM contracts. This data reflects bioenergy from the two facilities currently operating that have collected data, Chinese Station and Honey Lake Power. The Burney facility commenced operation at the end of October 2017. The other three contracted BioRAM projects have not yet commenced delivery.

**Table 9: High Hazard Zone (HHZ) Forest Fuel Usage
in 2017 from BioRAM 1 Contracts**
(Aggregated Statewide)

Total HHZ Used (BDT)	Average % of Total Biomass Fuel from HHZ Fuel
56,951	41.45%

Note: BDT = Bone Dry Tons, which is approximately 1:1 equivalent with MWh

Data Source: CPUC Aggregated Data from IOUs, available as of 10/2/17 - Aggregated due to confidentiality rules

The IOUs are currently in the process of devising their fuel verification processes for BioRAM programs. Verification programs will examine the self-reported data from biomass facilities, and ensure that they are meeting their assigned HHZ fuel requirements on an annual basis, at the end of each calendar year.

BioRAM Non-Bypassable Charge Proceeding

SB 859 directed that the costs from BioRAM procurement be allocated to all customers, including CCAs and ESPs, given that all customers benefit from preventing wildfires. In 2017, the CPUC began the process to establish the mechanism to allocate costs from these programs to customers.

Feed-in Tariff (FIT) Programs

A Feed-in Tariff (FIT) program is a policy mechanism designed to accelerate investment in small, distributed renewable energy technologies. The goal of Feed-in Tariff programs is to offer long-term contracts and price certainty that aid in financing renewable energy investments. The RPS program has two FIT programs:

- Renewable Market Adjusting Tariff (ReMAT)
- Bioenergy Market Adjusting Tariff (BioMAT)

Both programs have capacity procurement mandates established by the Legislature, which are generally allocated to each IOU based on their proportionate share of statewide load served.

Renewable Market Adjusting Tariff (ReMAT)

The ReMAT is a large IOU program that provides market-based adjusting prices for small RPS-eligible facilities (generating up to 3 MW) to sell renewable electricity to utilities under standard terms and conditions.

The ReMAT program was established by SB 32 (Negrete McLeod, 2009) and SB 2 (1x) (Simitian, 2011) and commenced in 2013 offering a fixed-price standard contract to export electricity to California's three large IOUs. The ReMAT program replaced California's original FIT program established by AB 1969 (Yee, 2006) in order to expand the program and increase eligible project size from a maximum of 1.5 MW to up to 3 MW. Recently, AB 1979 modified the program to increase the maximum project capacity to 4 MWs for conduit hydroelectric facilities, if they deliver no more than 3 MW.

2017 ReMAT Procurement

In 2017, PG&E procured six ReMAT contracts totaling 6.2 MWs. One of these was a new solar PV project, and the remaining five are existing small hydropower projects. SCE procured three new solar PV projects, totaling 9 MWs. SDG&E did not procure any new ReMAT projects.

ReMAT Program Status

SCE has recently reached the procurement level where, under the program rules, its ReMAT program could be suspended at the end of 2019. SDG&E has suspended its program and therefore SDG&E did not procure any new ReMAT projects. PG&E has the largest amount of capacity remaining at 122 MW.

The IOUs have collectively procured 255.7 MW out of their total 493.6 MW ReMAT requirement. As of the September 2017 program period, the IOUs have procured these proportions of their assigned ReMAT capacity mandate:

- PG&E: 44%
- SCE: 60%
- SDG&E: 47%

IMPLEMENTATION OF AB 1979

In August 2017, the CPUC implemented AB 1979 (Bigelow, 2016) with decision D.17-08-021.

This decision creates ReMAT eligibility for a conduit hydroelectric generation facility of up to 4 MW in capacity, if the facility:

- was operational as of January 1, 1990;
- complies with CPUC and other interconnection rules; and
- delivers no more than 3 MW to the grid at any time.

As a result of AB 1979, conduit hydropower facilities that originally intended to only provide municipal water are now able to leverage their power generating capability.

Table 10 below provides an overview of the progress that each IOU has made toward their ReMAT capacity mandate from the program's inception in 2013 to present. The ReMAT program has a total of 238 MW of capacity remaining.

Table 10: ReMAT Mandated Allocations Per Large IOU (MW)				
	PG&E	SCE	SDG&E	Totals
Total ReMAT Procurement Requirement	219	226	49	494
ReMAT Capacity Contracted	97	136	23	256
Capacity Remaining	122	90	26	238

Data source: CPUC RPS Contract Database, September 2017

Bioenergy Market Adjusting Tariff (BioMAT)

The Bioenergy Market Adjusting Tariff (BioMAT) is a Feed-in-Tariff program created by SB 1122 (Rubio, 2012), which added an additional 250 MW of RPS-eligible procurement for small-scale bioenergy projects up to 3 MW. Modeled after the ReMAT program using a fixed-price standard contract, BioMAT allocates procurement to the distinct bioenergy areas of Biogas, Agriculture, and Forest.

The goal of the BioMAT program is to promote a competitive market with a simple procurement mechanism for bioenergy developer entrants.

2017 BioMAT Procurement

Biogas Category: The Biogas category yielded contracts at the program starting price of \$127.72/MWh. Since that time, four biogas contracts have been executed for a total of 7.4 MW, with each IOU having at least one biogas contract. Three biogas contracts were signed in 2017, totaling to 5.85 MW. These contracts were executed at the program price of \$127.72/MWh and are expected to come online in mid-2019.

IMPLEMENTATION OF AB 1923

On August 28, 2017, the CPUC issued a decision (D.17-08-021) implementing a portion of AB 1923 (Wood, 2016), which expanded the eligibility of market participants by allowing a biomass facility of up to 5 MW in nameplate capacity to participate in BioMAT if it:

- complies with CPUC and other interconnection rules; and
- delivers no more than 3 MW to the grid at any time.

In October 2017, the CPUC issued a Ruling to implement the remaining portion of AB 1923. This phase will update BioMAT rules so that BioMAT projects can connect to the existing transmission system in order to increase developer opportunities, increase system efficiencies, and reduce interconnection costs.

Agriculture Category:

This category consists of the Dairy and Other Agriculture sub-queues. From August 1 – September 30, 2017, dairy digester developers accepted a price of \$187.72/MWh, totaling 3 MWs. This program period queue did not meet the price adjustment trigger. Accordingly, the price will remain at \$187.72/MWh during the October 1 – November 31, 2017 program period.

Forest Category:

For the October 1, 2017 program period, forest biomass developers accepted a price of \$199.72/MWh, totaling 5 MWs. Given the number of developers in the queue, the price in this category will remain at \$199.72/MWh for a second period. When the bid price remains at this level for two consecutive periods (November 1, 2017), it will trigger a CPUC Energy Division investigation pursuant to program rules adopted in [D.14-12-081](#).

BioMAT Program Status

The BioMAT program launched in February 2016 and has resulted in few contracts, as developers appear challenged by various high costs to entry. Given there are few interested parties in the program queues, the market price has only adjusted upward in the Agriculture and Forest categories, and remained stagnant in the Biogas category.

Table 11: Assigned BioMAT Targets and MWs Achieved

BioMAT Category	BioMAT MW Allocation	MW Contracted
Biogas	110	7.4
Dairy/Agriculture	90	3.0*
Forest	50	5.0*
Total	250	15.4

Data source: CPUC RPS Contract Database, 2017

*Contracts are not yet executed

RPS Program Compliance and Enforcement

In 2017, the CPUC implemented and administered RPS Compliance Rules for California's retail sellers of electricity subject to CPUC jurisdiction, which include the large IOUs, SMJUs, CCAs, and ESPs. In August 2017, these entities were required to submit annual Compliance Reports describing their progress towards the State's 50% RPS mandate. The CPUC has begun reviewing retail sellers' 2016 compliance reports.²³

RPS Program Enforcement Process

The CPUC is responsible for establishing RPS enforcement procedures for retail sellers of electricity and imposing penalties for non-compliance with the RPS program.

In 2017, the CPUC began to revise the existing RPS enforcement framework to comply with SB 350. The Commission expects to issue a decision in 2018 implementing SB 350 mandated changes to the RPS enforcement process. The upcoming decision will be the third decision in a series of SB 350 implementation decisions. It will include the process by which retailers may seek a waiver of some, or all, of their RPS obligations, as well as a "schedule of penalties," as directed by SB 350.

Once notice is given to retail sellers who are deemed non-compliant with their RPS procurement obligations for a compliance period, current statute allows them to request a waiver for the penalty if they can demonstrate any of the following conditions:

- Inadequate transmission capacity;
- Delays caused by permitting or interconnection issues;
- Unanticipated curtailment of eligible renewable resources; or
- Unanticipated increase in retail sales due to transportation electrification.

CHANGES TO THE RPS PROGRAM MANDATED BY SB 350

WAIVER CONDITIONS

SB 350 added conditions that could justify a waiver of a retail seller's RPS requirements, which include:

- Unanticipated curtailment of eligible RPS resources, if the waiver would not cause an increase in GHG emissions; or
- Unanticipated increase in retail sales due to transportation electrification (Pub. Util. Code § 399.15).

In future compliance periods, parties may assert these additional justifications for a waiver request, which will be ruled upon within the RPS proceeding.

LONG-TERM CONTRACTING REQUIREMENTS

Beginning in 2021, SB 350 requires retail sellers to demonstrate that 65% of their procurement comes from long-term contracts. A long-term contract is defined as a contract lasting 10 or more years.

EXCESS PROCUREMENT

The CPUC determined that, beginning in the 2021-2024 Compliance Period, only Category 1 RECs can be banked. Category 1 RECs primarily include renewable generation that has a first point of interconnection in California and can be banked whether procured with short or long-term contracts.

²³ See Chapter 2 for an overview of progress for RPS goals.

2017 Draft RPS Procurement Plans

California's Renewable Portfolio Standard (RPS) program, requires that electricity retail sellers file annual RPS Plans to assist the CPUC, stakeholders, and California in monitoring renewable procurement to ensure that the State is on-track to meet its renewable energy goals. The RPS Plans provide the CPUC with an overview of the status of RPS procurement and generally describe both the need for additional renewable resources and the actions proposed to achieve those resources.

IMPLEMENTATION OF RPS PROCUREMENT REVISIONS MANDATED BY SB 350

In June 2017, the Commission implemented revised RPS compliance requirements established in SB 350 (D.17-06-026), requiring new standards commencing in the 2021-2024 Compliance Period:

- Retail sellers must demonstrate that 65% of their procurement comes from long-term contracts; and
- Portfolio Content Category (PCC) 1 RECs can be banked, in order to be used or sold in the future. PCC 1 RECs include renewable generation that has a first point of interconnection in California and can be the result of either short or long-term contracts.

These updates to RPS procurement criteria promote the development of new renewable resources that will be used to both increase eligible renewable facilities in the State and reduce greenhouse gas emissions.

Accordingly, each year, the CPUC approves RPS Procurement Plans for the large IOUs and SMJUs. While the CPUC also requires CCAs and ESPs to submit RPS Plans, the CPUC has limited oversight of such procurement activities as solicitations, offer evaluations, and contract approvals. The CPUC's role is to review the Plans of the CCAs and ESPs to ensure that they comply with the CPUC's RPS Plan requirements.

This section provides an overview of key issues presented in the 2017 RPS Draft Procurement Plans by the large IOUs, SMJUs, CCAs, and ESPs.

CPUC RPS Plan Guidelines

The CPUC issues guidance each year, prior to the retail sellers submitting their annual RPS Procurement Plans. In May 2017, the CPUC issued a Ruling with a detailed list of criteria that the utilities must address in their 2017 RPS Plans. These Plans must address the 14 point criteria listed on the table below.

In its decision [D.16-12-044](#), the Commission established key criteria for guiding the development of RPS Procurement Plans.

RPS Procurement Plan Guidance	
Criteria	Description
1. Assessment of RPS Portfolio Supplies and Demand	The supply assessment details the retail seller's RPS portfolio and technology mix and the percentage of power served with renewable resources. The demand assessment focuses on retail sales and annual procurement need.
2. Project Development Status Update	Update of development of RPS-eligible resources currently under contract. These resources may be either in development, under construction, or online.
3. Potential Compliance Delays	Rationale for potential delays in achieving compliance with the RPS program. These reasons could include various obstacles for project developers such as securing project financing or interconnecting projects to the electricity grid.
4. Risk Assessment	Evaluation of risks associated with retail sales, generation, project failure, curtailment events, and project delays.
5. Quantitative Information	Quantitative information, such as retail sales forecasts, renewable net short calculations, annual procurement percentages and forecasts, failure percentages, expired contracts, and RECs generated from online and terminated projects.
6. "Minimum Margin" of Procurement	Analysis of information on minimum margin of procurement, defined as the minimum amount of renewables needed to address anticipated project failure or delay.
7. Bid Solicitation Proposals, Including Least-Cost Best-Fit Methodologies	Detail bid selection protocol for procuring additional RPS resources, which includes Least-Cost Best-Fit methodologies used to evaluate new projects.
8. Workforce Development	Details required from project developers to assess how much employment growth would happen during the construction and operation of a new project.
9. Disadvantaged Communities (DACs)	Detail questions for project developers about how the project will impact disadvantaged communities, including the location of the project in proximity to DACs and how the proposed facility will provide benefits to adjacent DACs.
10. Consideration of Price Adjustment Mechanisms	Include perspective on price-adjustment mechanisms in contracts and evaluate what impacts they will have on ratepayers.
11. Curtailment Frequency, Costs, and Forecasting	Detail curtailment activities (e.g., economic curtailment) and how curtailment has affected RPS planning and compliance.
12. Expiring Contracts	Detailed information on expiring RPS contracts.
13. Cost Quantification	Annual summary of actual and forecasted RPS procurement costs and generation by technology type.
14. Safety Considerations	Information on RPS contract provisions related to safety of a facility's operations, construction, and decommissioning, including general operation safety procedures, annual capacity and reliability testing, best industry practices, performance testing, and reporting requirements for all safety related incidents that occur onsite.

Large IOU RPS Plans

On or before July 21, 2017, the IOUs submitted their Draft 2017 RPS Plans to the CPUC. The following sections describe key issues addressed by the IOUs in their RPS Plans. See Chapter 6 for more information on challenges the utilities face in implementing their RPS Plans.

IOU Procurement Assessment

The large IOUs all show long RPS positions and are forecasted to have significant REC bank balances going forward, and as a result are expected to exceed their 2030 RPS targets. A long RPS position means a retail seller procures more energy from RPS-eligible resources than is required under the RPS procurement rules. Accordingly, none of the IOUs propose to hold general RPS solicitations in 2018.

Because of PG&E's long position in meeting RPS goals, in 2017 it held a REC sales solicitation and contracted to sell over 2 million MWh of energy and RECs to 3 Phases Renewables Inc., Direct Energy Business Marketing, LLC, EDF Trading North America, LLC, Exelon Generation Company, LLC, and Peninsula Clean Energy Authority. In 2018, all three IOUs propose additional REC sales in response to their long RPS positions.

Curtailment

The IOUs' RPS Plans describe curtailment as a possible risk to meeting their RPS obligations because the resources might not generate as much RPS-eligible energy as originally forecasted. Curtailment occurs when there is an oversupply of generation or congestion on the grid. The IOUs are preparing for this risk by forecasting expected renewable curtailment in the future, holding long RPS positions, and (since 2011) including economic curtailment terms in executed or amended contracts.

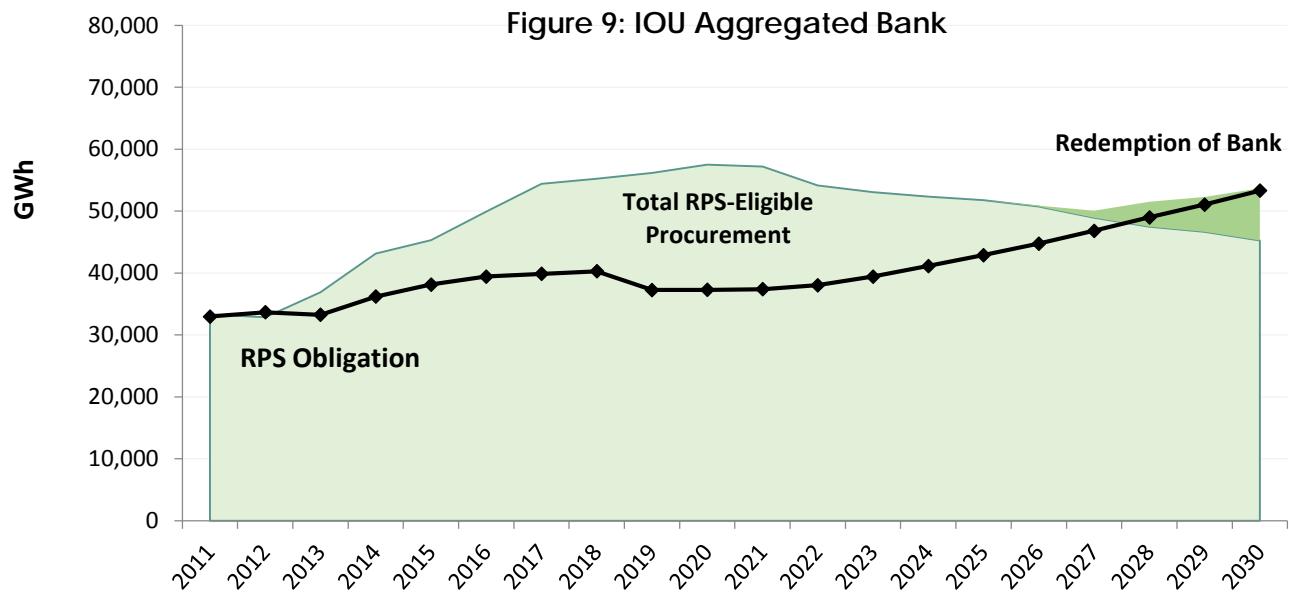
The addition of economic curtailment terms to RPS contracts allows the IOUs to respond to CAISO price signals. The benefits of economic curtailment include both avoided costs and cost savings. Day-ahead curtailments avoid costs of paying negative market prices, which require schedulers or generators to pay to generate. Real-time curtailments capture market opportunity costs (i.e., IOUs get paid to curtail).

Excess Procurement

Initially, the IOUs procured more renewables than necessary in order to hedge against potential RPS shortfalls due to high project failure rates. In addition, excess procurement resulted from market conditions such as the 2008 recession, successful energy efficiency strategies, and renewable energy deployment that benefitted from federal tax incentives. More recently, load migration from IOUs to CCAs has served to further increase the IOUs' long RPS positions.

As described in Chapter 1, retail sellers may bank excess RPS to meet future requirements. The IOUs are forecasted to accumulate significant banks going forward, and therefore, the IOUs have forecasted no need for incremental procurement of RPS-eligible resources until after 2030.

Figure 9 below shows the IOUs' potential aggregate bank accumulation and use of their bank. Bank balance forecasts by individual IOUs are confidential. Accordingly, this data has been aggregated in order to present a statewide view showing that the IOUs are on-track to meet their RPS obligations. In addition, Figure 9 shows the IOUs exhibiting a need for incremental RPS-eligible resources beginning in 2027, and how that need could be met through application of the bank through 2030.



Data source: CPUC's Integrated Resource Planning Modeling Results, E3 Modeling, 2017

Least-Cost Best-Fit Methodology

In order to ensure that the IOUs procure cost-effective resources that most closely match the need of each IOU's portfolio,²⁴ the Commission adopted criteria for the ranking and selection of Least-Cost Best-Fit (LCBF) renewable resources on a total cost basis.

Accordingly, each IOU in its RPS Plan must propose a LCBF methodology that meets the requirements articulated by the Commission and describes how renewable energy offers will be valued and evaluated, using both quantitative and qualitative criteria.

- **Quantitative Valuations:** May include criteria such as energy cost, congestion cost, locational preference, and transmission costs.
- **Qualitative Valuations:** May include criteria of resource diversity and benefits to disadvantaged communities.

The Commission then approves the LCBF methodologies through the RPS Plans, and the IOUs apply their methodologies to bids within the RPS solicitations. The Commission has given the IOUs substantial flexibility to develop their own individual LCBF methodologies, provided that a transparent rationale is offered to the CPUC and stakeholders.

The draft 2017 RPS Plans contained minimal revisions to the IOUs' LCBF methodologies because the IOUs do not propose to hold annual RPS solicitations in 2018. PG&E and SDG&E submitted revised time-of-delivery factors and SCE proposed to use an Effective Load Carrying Capacity ("ELCC") methodology to calculate Resource Adequacy benefits.

In the past several years, both the Commission and parties to the RPS proceeding have noted a need to revisit the LCBF methodologies. Chapter 4 provides more details on plans for LCBF reform.

Disadvantaged Communities

SB 2 (1X) (Simitian, 2011) requires the IOUs to take environmental justice considerations into account by giving preference to RPS bids that provide environmental or economic benefits to disadvantaged communities (DACs).

In their RPS Procurement Plans, the IOUs propose to collect information from bidders concerning a proposed project's expected benefits for DACs. The information collected from the project bidder is focused on the economic and environmental effects of a new project or facility on DACs. This qualitative information will then be taken into consideration in the LCBF evaluation of RPS bids.

²⁴ As required by Public Utilities Code 399.13(a).

SMJU RPS Plans

As described in Chapter 1, SMJUs are utilities with fewer than 30,000 customers. The SMJUs include PacifiCorp, Liberty Utilities, and Bear Valley Electric Service (BVES). SMJUs are subject to Pub. Util. Code §§ 399.17 and 399.18, and must meet a smaller subset of the RPS Plan requirements (e.g., they are not required to submit information on expiring contracts).

Further, the RPS procurement requirements allow these retail sellers to meet their procurement obligations without regard to the RPS portfolio content category limitations (PCC). Therefore, new procurement for these SMJUs has consisted of unbundled PCC 3 RECs.

Bear Valley Electric Service

BVES submitted its Draft RPS Plan on July 20, 2017. Currently, a 2013 REC-only contract with Avangrid Renewables, LLC fully satisfies BVES's RPS requirements. BVES stated in its RPS Plan that it is seeking to procure cost-effective bundled RECs to ensure ongoing, long-term RPS compliance. BVES is currently engaged in a Request for Proposals (RFP) for approximately 3 MW of RPS-eligible generation.

Liberty Utilities

Liberty submitted its Draft 2017 RPS Plan on July 21, 2017. Liberty currently serves its load through a combination of utility-owned resources and has a power purchase agreement for PCC 3 RECs with Sierra Pacific Power Company/NV Energy. In 2017, Liberty's 50 MW Luning Solar Project went online. Liberty has also requested CPUC approval to acquire the Turquoise Solar Project to displace additional RPS-eligible energy NV Energy would have provided.

PacifiCorp

PacifiCorp is a multi-jurisdictional utility for RPS purposes. PacifiCorp is permitted to use an Integrated Resource Plan (IRP) prepared for regulatory agencies in other states to satisfy its annual California RPS Procurement Plan requirement so long as the IRP complies with the requirements specified in Pub. Util. Code § 399.17(d). PacifiCorp prepares its IRP on a biennial schedule, filing its plan with the Commission in odd numbered years. It files a supplement to this plan in even numbered years. PacifiCorp filed its 2017 IRP with the Commission on April 4, 2017, and its "on-year" supplement to its 2017 IRP on May 4, 2017. Consequently, PacifiCorp did not file a comprehensive supplement this year.

Community Choice Aggregator (CCA) RPS Plans

CCAs must submit annual RPS Plans to the CPUC and meet the same RPS compliance requirements as investor-owned utilities. On or before July 21, 2017, the CPUC received Draft RPS Plans from all CCAs currently registered with the CPUC. As indicated in their RPS Plans, four of the nine CCAs (Apple Valley, Pico Rivera, Redwood Coast, and Silicon Valley) have begun to serve electricity load in late 2017.

CCA Procurement

The 2017 CCA RPS Procurement Plans forecast that all of the operational CCAs are projected to meet or exceed RPS procurement obligations over the long-term planning horizon (ten or more years). Table 12 below shows that the forecasted 2017 RPS positions of all CCAs in operation vary between a position of 26% and 67%. When the new long-term contracting requirement goes into effect in 2021, it is anticipated that drastic fluctuations in RPS positions will be reduced from year to year, as facilities come online and stay contracted for longer periods of time.

Table 12: Annual RPS Position of CCAs (%)					
Online Date	CCA	Actuals	Forecasted		
		2016	2017	2018	
2010	Marin Clean Energy	55%	67%	54%	
2014	Sonoma Clean Power	36%	43%	46%	
2015	Lancaster Choice Energy	39%	26%	26%	
2016	Peninsula Clean Energy	59%	51%	29%	
2016	CleanPowerSF	45%	44%	32%	
2017	Apple Valley Choice	No Data	32%	30%	
2017	Pico Rivera	No Data	50%	25%	
2017	Redwood Coast	No Data	33%	16%	
2017	Silicon Valley	No Data	50%	42%	

Data Source: RPS Procurement Plans and Compliance Reports (2017)

CCA Renewable Development

In 2016-2017, Marin Clean Energy (MCE), Lancaster Choice Energy (LCE), and Sonoma Clean Power (SCP) executed contracts which allowed 10 new in-state renewable projects to be financed, built, and brought online. The technologies of these new renewable projects include solar, wind, and biogas. All new projects have long-term contracts ranging from 12 to 25 years in length and will be located in California.

As of September 2017, these three CCAs have a large portion of their renewable generation located in California, with an average of 71% of facilities being located in-state. The generation located in California primarily includes wind, solar, biomass, and geothermal, as well as small and large hydroelectric facilities. MCE has the highest amount of in-state RPS generation with roughly 87% of its total coming from California facilities. SCP and LCE procure approximately 70% and 55%, respectively, of their RPS generation from in-state facilities.

The CCAs of MCE, LCE, SCP, and Peninsula Clean Energy have a total of nine new facilities under contract, which are set to become operational in 2018-2021. As Table 13 shows, the nine new facilities will be comprised of wind and solar projects, totaling 768 MW of new capacity.

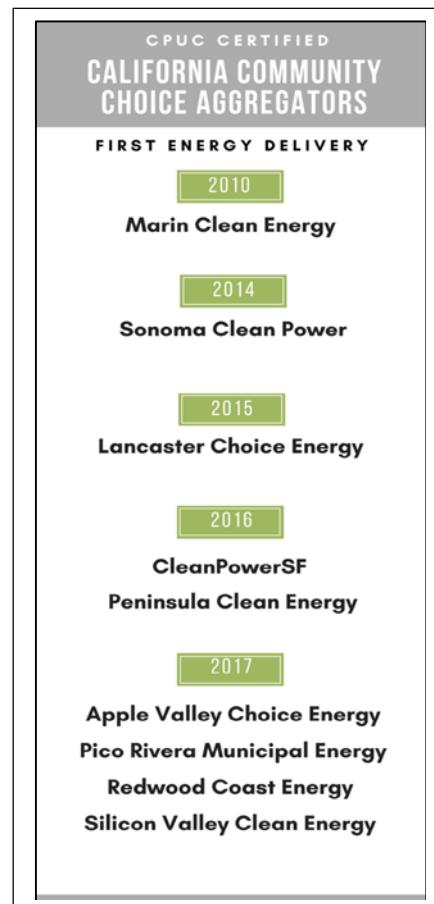


Table 13: New Renewables Projects with CCA Contracts
Online Date: 2018-2021

Technology Type	# of Projects	# of MW
Solar (Power Purchase Agreement)	6	555
Wind (Power Purchase Agreement)	3	213
TOTAL	9	768

Data source: CCA RPS Procurement Plans, 2017

Apple Valley Choice, Pico Rivera, and Redwood Coast Energy have only entered into contracts with facilities that are already in commercial operation. Silicon Valley Clean Energy has entered into one utility-scale contract for a solar facility set to come online in early 2018.

RPS Plan Implementation Schedule

The Commission anticipates issuing a decision on the Draft 2017 RPS Procurement Plans by the end of 2017. The decision will either approve the utilities' proposed RPS Plans or order them to make modifications. Once the CPUC approves the RPS Procurement Plans, the IOUs can commence implementation. The Commission will initiate the next cycle of RPS Plans in the first half of 2018.

Summary of Accomplishments

November 2016	<ul style="list-style-type: none"> ▪ BioRAM Contracts Executed / Approved ▪ PG&E contracted a 1.6 MW municipal bioenergy project under the BioMAT program
December 2016	<ul style="list-style-type: none"> ▪ CPUC approves 2016 RPS Procurement Plans ▪ CPUC adopts D.16-12-040 implementing SB 350's new RPS requirements and compliance periods
January 2017	<ul style="list-style-type: none"> ▪ PG&E contracted 1.4 MW of existing small hydro under the ReMAT Program
February 2017	<ul style="list-style-type: none"> ▪ CPUC approves PG&E BioRAM contract for Burney ▪ IOUs begin offering monthly BioMAT contracts for forest biomass projects
March 2017	<ul style="list-style-type: none"> ▪ PG&E contracted a 0.6 MW existing small hydro project under the ReMAT Program
April 2017	<ul style="list-style-type: none"> ▪ CPUC approves PG&E BioRAM contract for Wheelabrator Shasta
May 2017	<ul style="list-style-type: none"> ▪ CPUC issued RPS Plan Assigned Commissioner/Administrative Law Judge Ruling providing guidance for 2017 RPS Procurement Plans and proposal for RAM procurement ▪ PG&E contracted a 3 MW solar PV project under the ReMAT Program
June 2017	<ul style="list-style-type: none"> ▪ CPUC approves SCE RPS contract for 125 MW Maverick Solar project (Resolution E-4851) ▪ CPUC holds Pre-Hearing Conference on Tree Mortality Non-bypassable Charge ▪ PG&E contracted a 0.85 MW Municipal BioMAT project ▪ PG&E contracted a 0.3 MW existing small hydro project under the ReMAT Program
July 2017	<ul style="list-style-type: none"> ▪ CPUC adopts D.17-06-026 implementing SB 350 ▪ IOUs, CCAs, and ESPs submitted their RPS Procurement Plans to the CPUC ▪ SCE contracted a 2 MW Municipal BioMAT project ▪ PG&E contracted a 1 MW existing small hydro project under the ReMAT Program
August 2017	<ul style="list-style-type: none"> ▪ IOUs, CCAs, and ESPs submitted their RPS Compliance Reports to Energy Division ▪ CPUC issued D.17-08-021 implementing AB 1979 with revisions to ReMAT ▪ CPUC issued D.17-08-021 implementing AB 1923 expanding eligibility for BioMAT participants ▪ SDG&E contracted a 3 MW project for Municipal BioMAT
September 2017	<ul style="list-style-type: none"> ▪ Biomass facility took price for PG&E Dairy BioMAT contract for a total of 3 MW
October 2017	<ul style="list-style-type: none"> ▪ CPUC issued a Staff Proposal via Ruling to implement AB 1923's provision to interconnect to existing transmission ▪ Biomass facility took price for PG&E Forest BioMAT contract for a total of 5 MW
November 2017	<ul style="list-style-type: none"> ▪ CPUC anticipates issuing a proposed decision on 2017 RPS Procurement Plans
December 2017	<ul style="list-style-type: none"> ▪ SDG&E Expected to Announce Results of RAM ▪ PG&E expected to launch RAM solicitation ▪ CPUC anticipates a final decision on 2017 RPS Procurement Plans



Public Utilities Code 913.4 directs the CPUC to provide information on RPS planning related to cost limitation, implementation, and transmission development. The CPUC utilizes analytical and policy tools to plan for the most cost-effective renewable energy and then implements evaluation processes to measure RPS success. Building off of 2017 RPS efforts, in the coming year, the CPUC will continue to refine and improve policy tools and quantitative methodologies that promote the State's clean energy goals.

Program Planning & Coordination

The CPUC coordinates with its sister State agencies on an ongoing basis to promote and implement consistent statewide RPS policies that benefit all Californians. The CPUC works with the California Energy Commission, California Air Resources Board, California Independent System Operator, and CAL FIRE on such issues and projects as:

- Integrated Resource Planning
- Statewide RPS Compliance and Enforcement
- The Tree Mortality Task Force and its Bioenergy Working Group
- California Renewable Marine Energy Working Group
- Transmission Planning

Statewide RPS Coordination

State agency coordination is at the core of the RPS program, and the CPUC works to align the parallel planning processes of other agencies to improve the program and achieve the State's greenhouse gas emissions reduction goals.

Compliance and Enforcement

The CPUC will continue to coordinate closely with the CEC to ensure a consistent policy approach for RPS compliance and enforcement. CPUC determinations on RPS compliance will rely on the verification report issued by the CEC. The CPUC will utilize the CEC's compliance verification report to inform its future RPS-related compliance decisions.

Tree Mortality and Bioenergy Issues

The CPUC will continue to participate in regular, ongoing forums that address the State's emergency status due to more than a hundred million dead and dying trees in California since 2010. The CPUC is an active participant in the Governor's Tree Mortality Task Force.²⁵ In addition, RPS staff participates in monthly meetings of the Bioenergy Working Group. The CPUC also engages in other related forums on this topic, such as the Little Hoover Commission.

The issue of tree mortality intersects with the RPS programs of BioMAT and BioRAM. To ensure that these programs address the State's policy goals, CPUC staff will continue to work with other stakeholders to address such issues as program costs, interconnection barriers, and program evaluation.

Marine Renewable Energy

The CPUC is a member of the California Marine Renewable Energy Working Group, which is led by the Ocean Protection Council. The Council seeks to promote regulatory consistency and to improve scientific data that can find common ground for emerging technologies and planning for siting marine renewables. The CPUC's role is to offer insight into the RPS procurement process and the Commission's procedures. The CPUC anticipates working with the Council in the coming year, as the State considers marine renewable energy as a resource.

²⁵ See <http://www.fire.ca.gov/treetaskforce/> for more information.

Ongoing CPUC Planning Efforts for RPS

CPUC staff coordinate internally to ensure that program policy and planning efforts are consistent and cost-effective in providing benefits to ratepayers.

Integrated Resource Planning (IRP)

SB 350 (De León, 2015) requires the CPUC to adopt an IRP process that aims to move away from siloed planning and procurement toward a framework that optimizes potential resource solutions across all applicable retail sellers in order to achieve GHG emissions reductions at the least cost.

On September 19, 2017, CPUC staff released a Proposed Reference System Plan. This Plan identifies a diverse and balanced portfolio of resources capable of ensuring a reliable electricity supply that provides optimal integration of cost-effective renewable energy. By statute, the portfolio must rely upon zero carbon-emitting resources to the maximum extent reasonable and be designed to achieve statewide greenhouse gas emissions limits. The CPUC anticipates issuing a proposed decision by the end of 2017 that will adopt both an IRP process and a Reference System Plan.

Parameters of the Reference System Plan

Staff has proposed that retail sellers should file an IRP by mid-2018 that fits within the parameters set by the Proposed Reference System Plan and ensures that the retail seller will:

- Contribute towards GHG emissions reduction targets for the electricity sector;
- Procure at least 50 percent eligible renewable energy resources by December 31, 2030;
- Enable each IOU to fulfill its obligation to serve its customers at just and reasonable rates;
- Minimize impacts on ratepayers' bills;
- Ensure system and local reliability;
- Strengthen the diversity, sustainability, and resilience of the bulk transmission and distribution systems, and local communities;
- Enhance distributed systems and demand-side energy management; and
- Minimize localized air pollutants and other GHG emissions, with early priority for disadvantaged communities.

CPUC staff propose to analyze and aggregate the retail sellers' IRPs so that the Commission can issue a Preferred System Plan by the end of 2018.

The Reference and Preferred System Plans could inform the RPS procurement targets. Details of how the IRP process will interact with the RPS proceeding are currently being discussed within both proceedings.

Reforms to RPS Least-Cost Best-Fit Methodology

A key part of integrated resource planning is an accurate comparison of resource costs through a Least-Cost Best-Fit (LCBF) methodology. Currently, the utilities implement their own CPUC-approved LCBF methodologies to evaluate bids. This process informs how IOUs select RPS resources that will provide the most value to ratepayers.

Key Issues for LCBF Reform

In order to increase transparency and improve the usefulness of LCBF, the Commission has indicated that several specific issues related to the utilities' LCBF methodologies would be reformed. The specific issues related to the utilities' LCBF methodologies will be addressed in the LCBF reform activity, including:

- Time-of-delivery factors;
- Portfolio optimization;
- Greenhouse gas emissions;
- Disadvantaged communities; and
- Consistency with the RESOLVE modeling tool.²⁶

Consequently, the CPUC has developed a set of proposed objectives and a draft work plan for LCBF reform activity that will continue into 2018.

LCBF Reform Objectives

The objectives of LCBF reform recommended by CPUC staff propose to:

1. Ensure compliance with statutory requirements, particularly SB 2 (1X) (Simitian, 2011) and SB 350 (De León, 2015);
2. Improve market efficiency by increasing transparency and consistency of LCBF;
3. Evaluate methodologies used for bid evaluation across utilities and CPUC proceedings; and
4. Lay a foundation for interaction between RPS program and integrated resource planning (IRP).

The CPUC is currently engaging with stakeholders through workshops and formal comments. A CPUC decision on LCBF reform is expected in 2018 in the RPS docket.

²⁶ RESOLVE is an optimal investment and operational model designed to inform long-term planning questions with regards to renewables integration in systems with high penetration levels of renewable energy. The model is formulated as a linear optimization problem that can solve for the optimal investments in renewable resources, energy storage technologies, new gas plants, and gas plant retrofits subject to an annual constraint on delivered renewable energy that reflects the constraints of the RPS policy, greenhouse gas emissions and maintaining resource adequacy and reliability. For more information see: http://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/UtilitiesIndustries/Energy/EnergyPrograms/ElectPowerProcurementGeneration/LTPP/2017/RESOLVE_CPUC_IRP_Inputs_Assumptions_2017-05-15.pdf

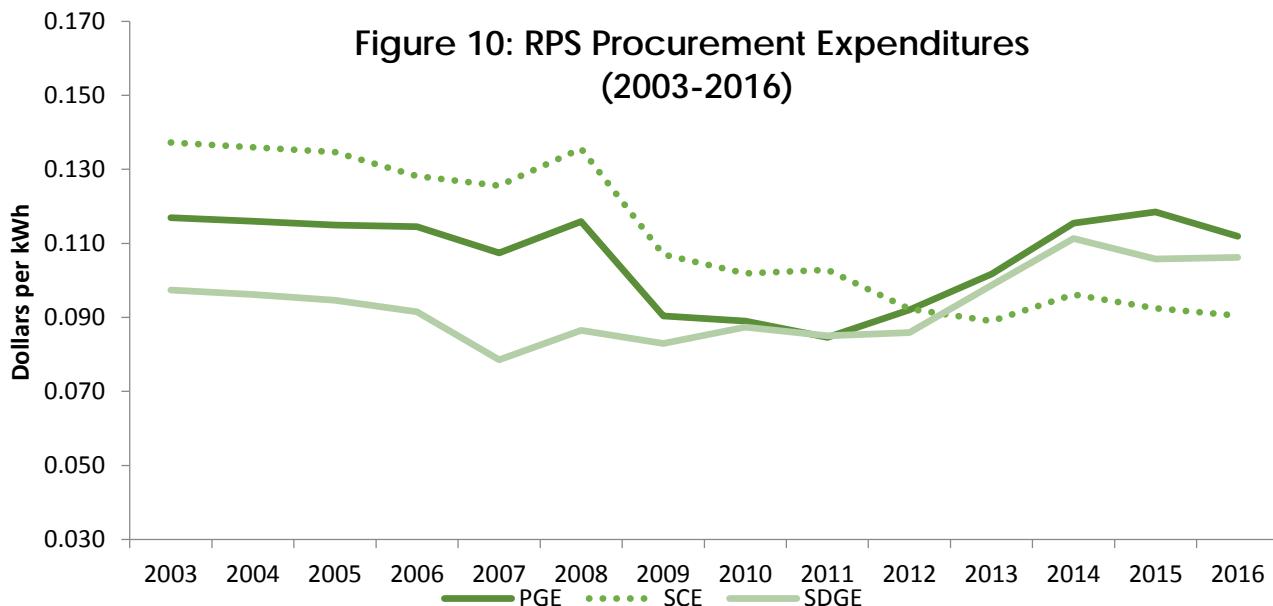
Cost Limitation Projections

To understand the impact that RPS costs will have on ratepayers, the CPUC sets cost-effectiveness policies and collects various price data to understand cost trends. The IOUs use competitive procurement mechanisms and a LCBF evaluation methodology, described above, to ensure procurement of renewable resources that provide the most value in their RPS Procurement Plans. Although the CPUC has not previously established cost limitations for RPS procurement, it is using the IRP as a way to identify the most cost-effective resources to inform future procurement activities.

RPS Procurement Expenditures

Figure 10 illustrates the annual weighted average RPS procurement expenditures for bundled renewable energy in real dollars (prices adjusted for inflation) per kilowatt hour (\$/kWh) for each of the large IOUs. The key factor driving the cost differences between the three utilities is the resource mix of RPS resources within an IOU's portfolio and the year the RPS contracts were executed. The RPS contracts that were executed from 2003 to 2008 were more expensive than contracts signed in later years. As the RPS program has expanded, procurement expenditures have expanded in parallel.

In 2018, ratepayers should experience minimal additional rate impacts given that the IOUs do not plan to hold procurement solicitations, and may realize savings from the IOUs' proposed REC sales.



2017 Renewable Contract Prices

The CPUC tracks the cost of renewables to understand the impact on ratepayers. California's investment in renewables has increased over time and, therefore, the price of solar PV and wind contracts have been decreasing significantly. This section focuses on solar and wind trends given that they are the primary resources used to meet RPS requirements in the State.²⁷

As demonstrated in Chapter 2, California's RPS requirements have contributed to increased investment in renewable resources. Relative to other renewable technologies, the utility-scale solar and wind market has expanded rapidly and the prices have decreased significantly in the last decade. The consistent decrease in the average prices of solar PV projects are reflected in the sharp decrease in IOU contract prices observed from 2008 to 2016. Similarly, the decrease in the cost of developing wind projects can be observed through the decline in the average prices of wind contracts from 2007 to 2015.

Solar PV: IOU Contract Prices Decreased 77% from 2010 to 2016

Table 14 shows the percent change in the prices of solar contracts from 2008, 2010, and 2016. The prices of solar PV declined significantly from 2008 to 2016. The prices of utility-scale solar contracts have decreased roughly 77 percent from 2010 to 2016, from an average of \$127.55/MWh to an average of \$29.17/MWh.

Table 14: Average Contract Prices for Utility-Scale Solar PV Projects (> 20 MW)		
Year	Average Price (\$/MWh)	% Change
2008	135.90	
2010	127.55	-6%
2016	29.17	-77%

Data Source: RPS Contract Database Submissions, October 2017

²⁷ See <http://www.caiso.com/informed/Pages/CleanGrid/default.aspx> for more information on California's renewables breakdown.

Wind: IOU Contract Prices Decreased 47% from 2010 to 2015

Table 15 shows the percent change in the prices of wind contracts from 2007, 2010, and 2015. The data show that the average prices of utility-scale wind contracts have decreased approximately 47 percent in the last decade from an average of \$96.72/MWh in 2010 to \$50.99/MWh in 2015.²⁸

Table 15: Average Contract Prices for Utility-Scale Wind Projects (> 20 MW)		
Year	Average Price (\$/MWh)	% Change
2007	97.11	
2010	96.72	-0.4%
2015	50.99	-47%

Data Source: RPS Contract Database Submissions, October 2017

Transmission Development Supporting RPS Implementation

The CPUC works with other State agencies and organizations in the planning of transmission, necessary to support the delivery of renewable energy to California homes and businesses. Transmission planning can take several years from the initial Transmission Planning Process with the Energy Commission and the CAISO to the CPUC's role in required environmental review.

The CPUC is responsible for ensuring that transmission-related projects comply with the California Environmental Quality Act (CEQA). CPUC staff perform detailed CEQA analysis to identify and mitigate environmental impacts from large-scale utility projects and to identify alternatives to the projects.

Suncrest Dynamic Reactive Power Support Project

The CPUC is in the process of evaluating NextEra Energy Transmission West's (NEET) application to construct an upgrade to Suncrest Substation. The proposed project is purported to support increased renewable generation in Southern California. CAISO selected NEET West through a competitive solicitation after finding that the *Suncrest Dynamic Reactive Power Support Project* met stringent bid requirements to address forecasted increases in renewable generating capacity in the Imperial Valley, due to the retirement of the San Onofre Nuclear Generating Station (SONGS).

As part of its 2013-2014 transmission planning process, CAISO determined that the proposed project was needed to address voltage stability issues on the grid. Voltage stability refers to the ability of power systems to maintain a steady voltage, which is necessary to ensure that the system provides continuous, reliable power to all users.

²⁸ This does not reflect any further reductions in wind contract prices in 2016 or 2017 because the IOUs did not execute wind contracts in those years.

The CPUC's Draft Environmental Impact Report was circulated in November 2016. Formal Proceeding testimony for the project was held in July 2017, with project hearings held in August. A draft of the Final Environmental Impact Report is due before the end of 2017, with a final CPUC Suncrest decision on the proposed project expected in 2018.



California's climate policies and robust RPS program are impacting the demand for an educated and qualified "clean tech" workforce. This chapter describes RPS workforce development activities of the large IOUs and SMJUs, consistent with Public Utilities Code 913.4(f). This statute requires the CPUC to report on the efforts of California's electrical corporations related to workforce development, training, and diversity.

Overview of RPS Workforce

Chapter 5 provides details on efforts of the large IOUs and SMJUs related to:

- Current RPS workforce;
- Diversity of current staff;
- Strategies used to recruit a diverse staff and develop RPS and other clean energy staff of the future; and
- Training IOUs provide for their current workforce.

The CPUC gathered information on the above topics directly from each of the IOUs.

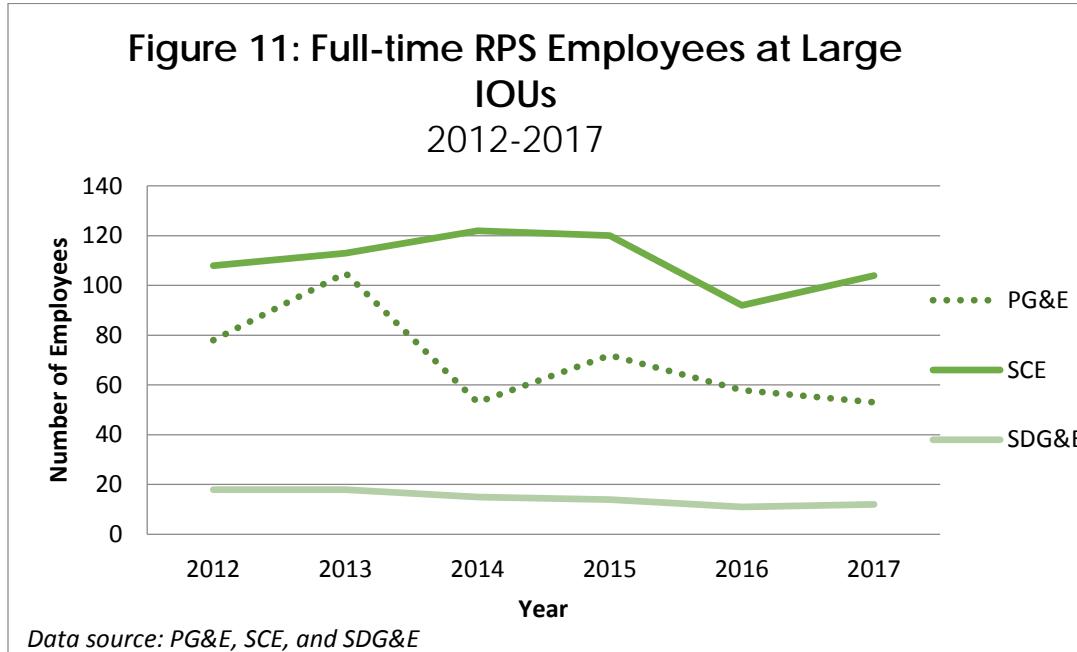
This chapter first describes the workforce development of the large IOUs and is followed by information on the SMJUs.

Large IOU Workforce Development

The large IOUs report having a significant focus on offering equal employment opportunities with respect to the recruitment, hiring, and professional development practices associated with the implementation of the RPS program.

Current IOU RPS Workforce

Figure 11 below provides an overview of the number of full-time PG&E, SCE, and SDG&E employees who have worked on RPS-related issues from 2012-2017. This graph illustrates how the IOUs' RPS staffs have changed over the past five years.²⁹



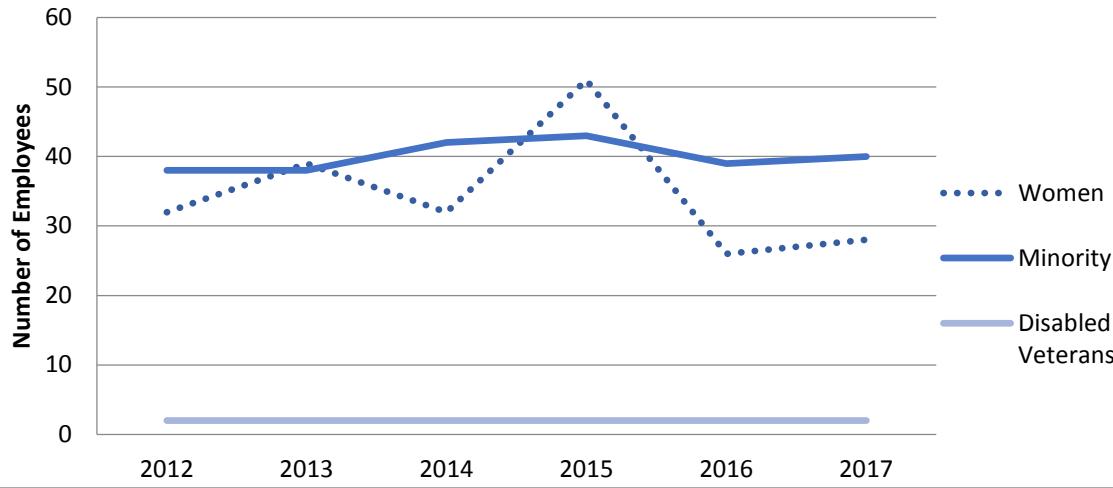
IOU Current RPS Workforce Diversity

The large IOUs have reported having company-wide diversity goals to build a workforce that reflects the diversity of the State of California. Common diversity efforts across the IOUs include providing equal employment opportunity in all aspects of their employment practices and hiring more women, minority, and disabled veterans for the purposes of implementing the RPS program.³⁰

²⁹ This time series data is current as of August 2017 and includes employment data from January 2012 through July 2017.

³⁰ PG&E, SCE, and SDG&E do not track if their employees identify as Lesbian, Gay, Bisexual, and Transgender (LGBT). While the three large IOUs do not collect data on LGBT employees, they do have supplier diversity requirements as set out in General Order 156 and are required to submit an annual Supplier Diversity Report.

Figure 12: Women, Minority, and Disabled Veteran Employees at Large IOUs (Aggregated)
2012-2017



In 2017, all three large IOUs reported working with organizations focused on professional development for women, minority, and disabled veterans. They were also compliant with General Order 156³¹ requirements on supplier diversity. Figure 12 illustrates aggregated data on the number of Women, Minorities, and Disabled Veterans who are full time employees at the three large IOUs who work on the RPS program.

Pacific Gas and Electric Company (PG&E):

Table 16 shows the number of PG&E's RPS employees that are women, minority, and disabled veterans compared with total RPS staff. In 2016, 74% of PG&E's RPS staff was comprised of women, minorities, or disabled veterans.

Table 16: Number of Women, Minority, and Disabled Veteran RPS Employees from 2012-2017 (PG&E)

PG&E	RPS Employees (Full Time)					
	2012	2013	2014	2015	2016	2017
Women	32	39	20	36	13	14
Minority	38	37	35	32	28	29
Disabled Veterans	2	2	2	2	2	2
Total RPS Staff	78	105	53	72	58	53

³¹ General Order 156 refers to the rules governing the development of programs to increase participation of women, minority, disabled veterans and LGBT business enterprises in procurement contracts from IOUs as required by Public Utilities Code Sections 8281-8286.

Southern California Edison (SCE):

SCE reported that 73% of the company's RPS employees are either women or minorities. Table 17 below shows the number of SCE's RPS employees that are women, minority, or disabled veterans. In 2016, 75% of SCE's total RPS staff was comprised of women, minorities, or disabled veterans.

Table 17: Number of Women, Minority, and Disabled Veteran RPS Employees from 2012-2017 (SCE)						
SCE	RPS Employees (Full Time)					
	2012	2013	2014	2015	2016	2017
WMDV³²	71	73	81	84	69	76
Women	No Data				29	31
Minority	No Data				40	45
Total RPS Staff	108	113	122	120	92	104

San Diego Gas & Electric Company (SDG&E):

Table 18 illustrates the number of SDG&E's RPS employees that are women, minority, or disabled veterans.

Table 18: Number of Women, Minority, and Disabled Veteran RPS Employees from 2012-2017 (SDG&E)						
SDG&E	RPS Employees (Full Time)					
	2012	2013	2014	2015	2016	2017
Women	No Data	No Data	12	15	13	14
Minority	No Data	No Data	7	11	11	11
Disabled Veterans	No Data					
Total RPS Staff³³	18	18	15	14	11	12

³² Women Minority and Disabled Veterans (WMDV) were tracked as one data point by SCE until 2016. Disabled veterans are not being tracked as separate data points.

³³ The value displayed for the total number of RPS staff is based on the percentage of time employees actually spend working on RPS issues (a range of 0 to 100%), while the WMDV information is calculated based on whether or not the employee is a woman, minority, or disabled veteran.

SDG&E reported having one RPS contract in 2017 with a minority owned business enterprise. SDG&E uses a qualitative component when evaluating contracts to determine which projects are the best fits for SDG&E's portfolio. This qualitative component includes the Diverse Business Enterprise (DBE) status of a project and SDG&E has reported strongly encouraging DBEs, including women-owned, minority-owned, disabled veteran owned or LGBT owned business enterprises to participate in its renewable power related Request for Offer solicitations.

Recruiting Strategies

Recruiting efforts at each of the IOUs tend to utilize both broad outreach, as well as strategies targeted to a diverse community. In addition, the utilities also offer programs that can act as training and recruitment of future employees, including long-term efforts within California's school systems.

PG&E

General Outreach:

As part of its broader recruiting efforts, PG&E frequently utilizes online job boards and reaches out to prospective candidates through websites such as LinkedIn, Getting Hired, and Direct Employers.

Diverse Employee Recruitment:

PG&E works with groups such as the Society of Women Engineers, National Society of Black engineers, Society of Hispanic Professional Engineers, and specific university programs to encourage a diverse candidate pool. Open positions at PG&E are frequently posted on electronic job boards targeted to diverse recruitment, such as GIJobs.com, Out and Equal Workplace Advocates, and Hero 2 Hired. However, PG&E has not reported a formal company policy outlining the strategies for increasing the amount of women, minority, disabled veterans, and LGBT employees working on the RPS program.

University Outreach:

PG&E has a "University Programs" team primarily focused on recruitment activities on California college campuses such as UC San Diego, UC Davis, UC Merced, Cal Poly San Luis Obispo, Sacramento State, and Chico State. The University Programs team targets recent college graduates who have studied engineering, finance, business, information technology, and environmental science.

Special Programs:

PG&E administers a separate recruitment and training program called PowerPathway that consists of a partnership with community colleges throughout PG&E's service territory. The PowerPathway program has two separate arms – the Affinity Program and PG&E's Signature Program.

- **Affinity Program:** PG&E provides input on certificate and degree curriculums, introduces college staff to PG&E subject matter experts, and arranges for PG&E sponsored guest speakers to give in-class presentations.
- **Signature Program:** Entails assisting community college professors through providing input on curriculum and technical training coursework, as well as providing up to three years of career coaching for program graduates.

From 2012 through June 2017, the PowerPathway Signature Program has mentored 575 program graduates. Of those graduates, 46% of the graduates were placed into full time positions at PG&E and 34% of graduates went on to pursue industry-related careers. PG&E is developing a new PowerPathway Skilled Trades internship program that aims to recruit, train, and produce new qualified professionals for the future utility workforce.

K-12 Outreach & Education:

In addition to working with university and community colleges, PG&E has a K-12 program to expose a younger generation to careers in sustainability.

SCE

General Outreach:

As a part of their targeted recruitment efforts for clean energy professionals, SCE recruits through online job sites such as LinkedIn, Direct Employers, and Glassdoor. With regards to college recruitment, SCE has reported robust recruitment efforts and outreach strategies targeted at students pursuing undergraduate degrees in engineering, accounting, finance, information technology and cyber security.

SCE leverages social media, including hosting a YouTube channel where they post videos for the public on a variety of topics including the electricity grid of the 21st century, updates on renewable energy project developments, and grid reliability.

University Outreach:

SCE actively recruits and employs interns from four California State Universities, five University of California schools, and the University of Southern California. SCE has also created a rotational development program for MBA students and partners with the East Los Angeles Skills Center to help prepare interested students for energy careers. In 2016, SCE employed 59 interns from California Polytechnic University Pomona, where 15 of those interns went on to become full time employees after graduation.

SDG&E

General Outreach:

SDG&E's recruitment and workforce development efforts center on targeting students primarily from universities in California and Nevada who are studying accounting, finance, engineering, and information technology. SDG&E reports that it uses LinkedIn to advertise job vacancies and participation on group pages to recruit qualified candidates for open positions.

Diverse Employee Recruitment:

SDG&E places a large emphasis on college recruiting and recruitment from diverse professional development organizations including the Society of Women Engineers, National Society of Black Engineers, and the Society of Mexican-American Engineers. As a part of its workforce development and recruitment efforts, SDG&E partners with universities that have a high minority student population such as Howard University, San Diego State University, California Polytechnic University Pomona, and the University of Nevada/Las Vegas. On the recruitment marketing and social media front, SDG&E leverages social media websites focused on professionals in energy with diverse backgrounds such as Women Working in Utilities, American Association of Blacks in Energy, and Hispanics in Energy.

University Outreach:

In 2017, SDG&E began a new paid internship program with UC San Diego and Southwestern College designed to prepare students for clean energy careers with career pathways such as Solar Design and Energy Storage.

K-12 Outreach & Education:

SDG&E offers a workforce education and training program for K-12 students interested in green energy, science, technology, engineering and mathematics (STEM) careers. From September 2016 through August 2017, approximately 10,000 K-12 students have completed the program.

SMJU Workforce Development

Given the smaller size of their RPS staffs, the three SMJUs (Bear Valley Electric Service, Liberty Utilities, PacifiCorp) have significantly fewer resources dedicated to RPS workforce development. For example, on average, the SMJUs employ between one to three full-time RPS employees.

Bear Valley Electric Service (BVES)

BVES has not engaged in college recruitment efforts or offered scholarships to students within their service territory. Bear Valley Electric Service does not conduct internal training courses but RPS employees are encouraged to attend training and workshops elsewhere in the State.

Liberty Utilities

Out of the three SMJUs, Liberty Utilities is the only utility to engage in recruitment efforts with local high schools and universities. During the summer of 2017, Liberty attended a career fair at the University of Nevada, Reno and recruited two student engineers for positions after graduation. Liberty also posts job opportunities on career fair web portals at local universities. Liberty Utilities offers scholarships to graduating high school students within the service territory and offers one community college scholarship. With regards to RPS-focused training, Liberty Utilities conducted one training course on the RPS program and greenhouse gas emission reduction strategies for five employees from 2016-2017.

Liberty stated that it is an equal opportunity employer and is committed to ensuring an equal and diverse workforce to implement the RPS program. In 2017, Liberty reported hiring two additional employees to implement the RPS program, both of which are minority recruits.

PacifiCorp

PacifiCorp has not engaged in college recruitment efforts or offered scholarships to students within their service territory. PacifiCorp employs one person to work on RPS related issues throughout all states served by PacifiCorp and does not conduct internal training for that employee.

Given that PacifiCorp employs one employee who oversees the RPS program in all states served by PacifiCorp, no specific diversity statistics were provided.



Public Utilities Code 913.4 requires the CPUC to identify barriers to achieving the RPS, and to propose recommendations to address those barriers. Chapter 6 examines at a high level RPS program challenges and describes actions the CPUC is taking to address these issues, as well as offers recommendations for future actions. The challenges addressed in this chapter include the areas of RPS procurement, ratepayer impacts, and the individual RPS programs of ReMAT and BioMAT.

Challenge 1: Uncertainty in IOU Load Forecasts

Issue: It is difficult to forecast future IOU load, given increasing departing load to CCAs. Current CPUC estimates suggest that over 1 million IOU ratepayers will be served by CCAs for their generation needs by the end of 2017. Forecasting scenarios suggest that some IOUs could lose 60 to 90 percent of their current demand in the next 8 to 10 years. This number is expected to grow quickly. As additional CCAs are formed, the CPUC will oversee a significantly smaller percentage of renewable procurement in the State, as the CPUC has limited jurisdiction over the procurement activities of CCA or ESP providers. If the IOUs lose such large portions of their customer demand, the result will be that the CPUC will not have the authority to monitor most renewable energy procurement activities in as much detail, as it has traditionally done for RPS. This may cause challenges in the IRP process due to the CPUC's lack of market visibility with regards to CCA and ESP procurement activities.

Recommendation: The CPUC should continue to closely monitor procurement activities of all the retail sellers to the extent possible. The CPUC forecast models for the IRP process will be used to develop optimum portfolios to meet California's GHG goals. This process is continuing and will ultimately lead to procurement authorizations for the IOUs and IRP plans for IOUs, CCAs, and ESFs. The IRP proceeding and the RPS planning process should work together to achieve California's GHG and renewable goals.

Challenge 2: Increased Amounts of Renewables have Resulted in Increased Incidents of Curtailment

Issue: Curtailment of renewable generation has increased in recent years as more solar has been added to the grid. The initial finding of the CPUC's IRP modeling is that curtailment is a cost-effective strategy for integrating more renewable capacity, rather than investing in other integration options such as transmission upgrades or energy storage. While curtailment does not appear to be a barrier to achieving current RPS requirements, there is a need to fully understand the causes of curtailment and ways to reduce its frequency.

In most other parts of the country, wholesale markets continue to report negligible levels of curtailment. The addition of significant wind capacity in Texas and the Midwest has caused increased congestion and curtailment in those regions. To address the issue, the Electric Reliability Council of Texas (ERCOT) has expanded its transmission grid and adopted market rules to facilitate economic curtailment, and the Midcontinent Independent System Operator (MISO) has promoted economic curtailment.

Recommendation: The State should rely upon the CPUC's IRP process to balance the increased procurement of renewables with the risk of curtailment. Initial modeling results in the IRP proceeding indicate that buying additional solar and economically curtailing renewable resources in the limited hours of the year when they are not needed is a cost-effective strategy to integrating more renewables into the grid and displacing natural gas generation. Further, recent data suggests that curtailment is not a significant risk. While the CAISO has seen the number of pricing intervals with negative prices increase over the last several years, the clearing prices are becoming less negative. In other words, the frequency of negative pricing events has increased, but the magnitude of each curtailment event has lessened. This indicates that the CAISO has generally been able to balance supply and demand using economic signals.

Challenge 3: Stranded Costs Resulting from Increased Departing Load Could Fall to IOU Customers

Issue: As described above, there is significant departing load from the increasing formation of CCAs. As a result, there is a significantly smaller ratebase of customers over which to allocate energy costs. Policies established now, but implemented after the load has departed could result in stranded costs and rate shock for remaining bundled IOU customers. Parties are challenging the current mechanisms in place to prevent IOU ratepayers from paying for stranded assets. This is illustrated in current proceedings such as BioRAM to address Tree Mortality, and in the more global proceeding for the Power Charge Indifference Adjustment (PCIA).

Recommendation: The CPUC has open proceedings to develop workable solutions to these challenges. Any new procurement strategies should consider the impact of policies on ratepayers in the context of weighing all costs and benefits to ratepayers. In addition, the IRP process proposes to take a system wide view at the combined planning and procurement of IOUs, CCAs, and ESP providers, which should provide a roadmap to not only reach GHG goals, but also to achieve cost-effective procurement recommendations.

Challenge 4: The ReMAT Program Has Experienced Significant Project Terminations and Uneven Market Interest

Issue: As explained in the report, the IOUs do not need to execute any additional ReMAT contracts to achieve the RPS. It is worth noting that the ReMAT program has resulted in large percentages of terminated capacity since the program commenced in 2013. The proportion of capacity terminated by the IOUs has been:

- PG&E = 48%
- SCE = 30%
- SDG&E = 56%

These termination percentages are higher than the termination levels seen for large-scale (>20 MW) projects. It is not clear why there are such varying results and whether such terminations are related to developer experience, project viability, interconnection, permitting challenges, and/or lack of financing for small projects.

Additionally, there has been uneven interest among the three product categories:

- As-Available Peaking;
- As-Available Non-Peaking; and
- Baseload.

For the As-Available Peaking category, 12.1 MWs are currently under contract, whereas there is only 1 MW for the Baseload category. As a result of the uneven interest, the allocated As-Available Peaking MWs may be fully contracted while significant capacity remains in the other categories.

A challenge of the ReMAT Baseload category, or reason for lack of market interest, may be the overlap with the BioMAT program. Some of the projects that could be eligible for the ReMAT Baseload category could also be eligible for BioMAT, which currently has a higher offered price.

While the program initially saw regular adjustments in price and execution of contracts, activity has slowed down. For example, PG&E's offered price for As-Available Peaking category has not changed over the last 24 months. SDG&E has suspended its ReMAT program. SCE has recently reached the procurement level in As Available Peaking where, it could soon suspend its entire ReMAT program by the end of 2019.

Recommendation: The Commission plans to review these program challenges, as well as recent market observations, within the scope of the RPS proceeding in order to obtain stakeholder input. In reviewing the issues and stakeholder input, the CPUC should consider possible program modifications that could address these concerns.

Challenge 5: The BioMAT Program Appears to Have Limited Market Interest

Issue: As previously noted, the IOUs do not need to execute any additional BioMAT contracts to achieve the RPS. The original objective of the BioMAT program was to create a simple procurement mechanism for new bioenergy developer entrants of up to 3 MWs. BioMAT is comprised of three categories of bioenergy (Biogas, Dairy/Other Agriculture, and Forest Biomass) for which SB 1122 (2012, Rubio) allocated a total of 250 MWs. In the three categories, there has been little activity:

- **Biogas:** There was market activity at the initial price of \$127/MWh, but the category price has since remained stagnant, with a total of 7.4 MWs of executed contracts.
- **Dairy and Other Agriculture:** There was no initial market activity, but the price of \$187.72/MWh was taken in the period from August 1, 2017 program period, for a total of 3 MWs.
- **Forest:** There was no initial market activity, but the price of \$199.72/MWh was taken in the period from October 1, 2017 period for a total of 5 MWs.

Only 15.4 MW have been subscribed out of the total 250 MW allocated since the program's initial offering in February 2016. While each category has its respective barriers, key challenges appear to be related to the high costs associated with equipment and interconnection.

Recommendation: In its 2014 decision implementing the BioMAT program, the Commission established ratepayer protections to investigate the BioMAT program if the program price were to reach \$197/MWh for more than two program periods. The Forest category reached this threshold on November 1, 2017. The Director of Energy Division now also has the discretion to suspend the awarding of BioMAT contracts. Accordingly, the CPUC should seek stakeholder input to identify potential ways to simplify and improve the program, address barriers to increased participation, and evaluate potential program cost limitations.

APPENDIX A

Glossary of Acronyms and Terms

BioMAT: The Bioenergy Market Adjusting Tariff is a feed-in tariff program for bioenergy renewable generators less than 3 MW in size.

BioRAM: The Bioenergy Renewable Auction Mechanism (BioRAM) program implements the Governor's October 2015 Emergency Order on Tree Mortality, as well as SB 859, and mandates utilities to procure bioenergy from forest fuel from High Hazard Zones (HHZ) to mitigate the threat of wildfires.

CBA – California Balancing Authority: A balancing authority is charged with maintaining the safe and reliable transportation of electricity on the power grid and ensures transparent access to the transmission network and market transactions.

CCA - Community Choice Aggregator: CCAs are local government agencies that purchase and may develop power on behalf of residents, businesses, and municipal facilities within a local or sub-regional area. As of November 1, 2017, there are 9 operational CCAs in California.

Electrical Corporation: An electrical corporation includes every corporation or person owning, controlling, operating, or managing any electric plant for compensation within California, except where electricity is generated on or distributed by the producer through private property solely for its own use (not for transmission to others).

ESP - Electric Service Provider: An ESP is an entity that offers electrical service to customers within the service territory of an electrical corporation and includes the unregulated affiliates and subsidiaries of an electrical corporation.

GTSR - Green Tariff Shared Renewables: The GTSR Program is intended to expand access to all eligible renewable energy resources to ratepayers who are unable to access the benefits of onsite generation and create a mechanism where customers can meet their electricity needs with renewables. The GTSR program is designed to allow PG&E, SCE, and SDG&E customers to receive 50% - 100% of their electricity demand from solar generation.

IRP - Integrated Resource Plan: A planning mechanism to consider all of the CPUC's electric procurement policies and programs to ensure California has a safe, reliable, and cost-effective electricity supply. It will implement an integrated resource planning process that will ensure that retail sellers meet targets that allow the electricity sector to contribute to California's economy-wide greenhouse gas emissions reductions goals.

IOU - Investor-Owned Utility: IOUs are privately owned electricity and natural gas providers and are regulated by the California Public Utilities Commission (CPUC). Pacific Gas and Electric, San Diego Gas

and Electric, and Southern California Edison comprise approximately three quarters of the retail electricity supply in California.³⁴

LCBF - Least-Cost Best-Fit: A process that provides criteria for the rank ordering and selection of least-cost and best-fit eligible renewable energy resources to comply with California's Renewables Portfolio Standard program obligations on a total cost and best fit basis.³⁵

LSE - Load Serving Entity: All entities that serve electricity to customers including IOUs, CCAs, and ESPs.

PPA – Power Purchase Agreement: The contractual agreement under which the financial and technical aspects of renewable energy generation projects are agreed upon between power sellers and retail sellers.

RAM - Renewable Auction Mechanism: The RAM program is a procurement program the IOUs may use to procure RPS generation and to satisfy authorized procurement needs or legislative mandates. RAM streamlines the procurement process for developers, utilities, and regulators by 1) allowing project bidders to set their own price, 2) providing a simple standard contract for each utility, and 3) allowing all contracts to be submitted to the CPUC through an expedited regulatory review process.

REC - Renewable Energy Credit: RECs play an important role in driving the deployment of renewable energy in California and achieving the goals of Renewables Portfolio Standard (RPS). A REC confers to its holder a claim on the renewable attributes of one unit of energy (MWh) generated from a renewable resource. A REC consists of the renewable and environmental attributes associated with the production of electricity from a renewable source. RECs are "created" by a renewable generator simultaneous to the production of electricity and can subsequently be sold separately from the underlying energy.

ReMAT – Renewable Market Adjusting Tariff: ReMAT is a feed-in tariff program for small renewable generators up to 3 MW in size.

RPS - Renewables Portfolio Standard: Established in 2002 under Senate Bill 1078, accelerated in 2006 under Senate Bill 107, expanded in 2011 under Senate Bill 2, and enhanced further in 2015 with Senate Bill 350 California's RPS is one of the most ambitious renewable energy standards in the country. The RPS program requires investor-owned utilities (IOUs), electric service providers, and community choice aggregators to increase procurement from eligible energy resources to 50% of total procurement by 2030.

Retail Sellers: All entities that sell electricity to customers, including IOUs, CCAs and ESPs. A Publicly Owned Utility does not meet the definition of a retail seller and is regulated by the CEC.

³⁴ For information on the differences between Publicly-Owned Utilities and Investor-Owned Utilities, please visit the California Energy Commission's website: http://www.energy.ca.gov/pou_reporting/background/difference_pou_iou.html

³⁵ For more information on the LCBF methodology see Public Utilities Code 399.13(A).

APPENDIX B

Public Utilities Code Section 913.4

In order to evaluate the progress of the state's electrical corporations in complying with the California Renewables Portfolio Standard Program (Article 16 (commencing with Section 399.11) of Chapter 2.3), the commission shall report to the Legislature no later than November 1 of each year on all of the following:

- (a) The progress and status of procurement activities by each retail seller pursuant to the California Renewables Portfolio Standard Program.
- (b) For each electrical corporation, an implementation schedule to achieve the renewables portfolio standard procurement requirements, including all substantive actions that have been taken or will be taken to achieve the program procurement requirements.
- (c) The projected ability of each electrical corporation to meet the renewables portfolio standard procurement requirements under the cost limitations in subdivisions (c) and (d) of Section 399.15 and any recommendations for revisions of those cost limitations.
- (d) Any renewable energy procurement plan approved by the commission pursuant to Section 399.13, schedule, and status report for all substantive procurement, transmission development, and other activities that the commission has approved to be undertaken by an electrical corporation to achieve the procurement requirements of the renewables portfolio standard.
- (e) Any barriers to, and policy recommendations for, achieving the renewables portfolio standard pursuant to the California Renewables Portfolio Standard Program.
- (f) The efforts each electrical corporation is taking to recruit and train employees to ensure an adequately trained and available workforce, including the number of new employees hired by the electrical corporation for purposes of implementing the requirements of Article 16 (commencing with Section 399.11) of Chapter 2.3, the goals adopted by the electrical corporation for increasing women, minority, and disabled veterans trained or hired for purposes of implementing the requirements of Article 16 (commencing with Section 399.11) of Chapter 2.3, and, to the extent information is available, the number of new employees hired and the number of women, minority, and disabled veterans trained or hired by persons or corporations owning or operating eligible renewable energy resources under contract with an electrical corporation. This subdivision does not provide the commission with authority to engage in, regulate, or expand its authority to include, workforce recruitment or training.

