



2020 PADILLA REPORT

Costs and Cost Savings for the RPS Program
(Public Utilities Code § 913.3)

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**California Public
Utilities Commission**

About this Report

The purpose of this annual Report is to comply with Public Utilities Code § 913.3. Each May 1, the California Public Utilities Commission is required to report to the Legislature the aggregated costs and cost savings of renewable energy expenditures and contracts for the previous year.

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Executive Summary

In compliance with Public Utilities Code § 913.3,¹ this report summarizes 2019 Renewables Portfolio Standard (RPS) program procurement cost data. In 2019, large investor-owned utilities (IOUs) and small and multi-jurisdictional utilities (SMJUs) forecast that they are to meet or exceed their RPS procurement obligations while community choice aggregators (CCAs) and electric service providers (ESPs) collectively forecast a procurement shortfall which the CCAs and ESPs plan to meet by conducting additional procurement.²³ However, CCAs increased their renewables generation and executed the majority of new RPS contracts in 2019.

The key conclusions from this report include the following:



- The large investor-owned utilities' total annual RPS procurement expenditures decreased from \$5.6 billion in 2018 to \$5.4 billion in 2019 while increasing total renewables generation slightly from 52,936 GWh to 53,244 GWh (resulting in a 2019 RPS percentage of retail load of 37%).⁴ This reflects the long-term trend in decreasing cost of renewable energy.
- For small and multi-jurisdictional utilities, total annual RPS procurement expenditures increased from \$10.7 million in 2018 to \$14.1 million in 2019 while total renewables generation decreased slightly from 334 GWh to 328 GWh (resulting in a 2019 RPS percentage of retail load of 25%).
- Community choice aggregators' total annual RPS procurement expenditures increased from \$555 million in 2018 to \$932 million in 2019 while renewables generation increased from 10,000 GWh in 2018 to 15,500 GWh in 2019 (resulting in a 2019 RPS percentage of retail load of 41%).
- Renewables generation under contract to electric service providers (ESPs) decreased from 2,500 GWh in 2018 to 1,500 GWh in 2019 (resulting in a 2019 RPS percentage of retail load of 27%), and total annual RPS procurement expenditures by ESPs decreased from \$83 million in 2018 to \$76 million in 2019.

¹ The full text of California Public Utilities Code (*hereinafter* Pub. Util. Code) § 913.3 can be found in Appendix D.

² See 2019 RPS Annual Report to the Legislature:

[https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy - Electricity and Natural Gas/2019%20RPS%20Annual%20Report.pdf](https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy_-_Electricity_and_Natural_Gas/2019%20RPS%20Annual%20Report.pdf)

³ This report addresses 2019 RPS expenditures and contract prices for Community Choice Aggregators (CCAs) and Electric Service Providers (ESPs) in 2019, but it does not address their RPS compliance. This report does not address Publicly Owned Utilities (POUs) as compliance for the POUs is determined by the California Energy Commission (CEC). See the CEC's RPS page:

<https://www.energy.ca.gov/programs-and-topics/programs/renewables-portfolio-standard>

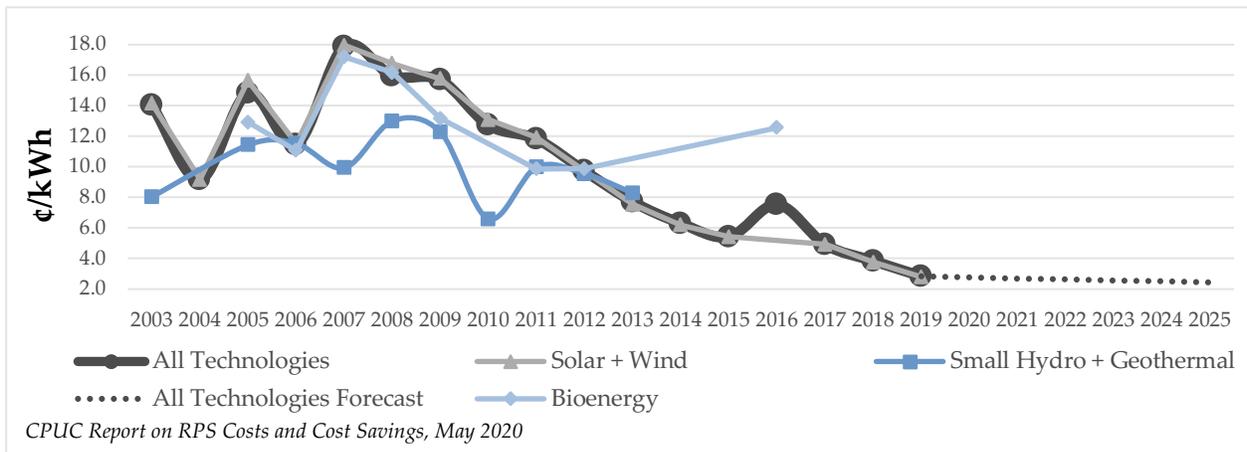
⁴ Large IOU procurement expenditures include payments for curtailment volumes which generally increases the unit price of energy reported. See California ISO's Managing Oversupply page for more information on curtailment:

<http://www.caiso.com/informed/Pages/ManagingOversupply.aspx>



- RPS expenditures as a percent of total generation costs are on par with non-renewables. For instance, 44.9% of the large investor-owned utilities' total generation was from RPS-eligible resources and expenditures on renewable generation was 42.4% of the large investor-owned utilities' total generation costs.
- The large investor-owned utilities' average procurement expenditure for all RPS contracts online decreased slightly from 10.57 cents per kilowatt-hour (¢/kWh) in 2018 to 10.23 ¢/kWh in 2019. In contrast, the average costs for non-RPS energy was 9.95 ¢/kWh. This represents a 0.28 ¢/kWh cost premium compared to their average non-RPS procurement expenditure.
- The average price of RPS contracts that were executed in 2019 was 2.82 ¢/kWh compared to 3.81 ¢/kWh in 2018.

Historical Trend of All Load Serving Entities' RPS Contract Costs by Technology and Year of Execution from 2003-2025 (Real Dollars)



Background

Senate Bill (SB) 836 (Padilla, 2011) requires the California Public Utilities Commission (CPUC) to report on the Renewables Portfolio Standard (RPS) program to the Legislature regarding “the costs of all electricity procurement contracts for eligible renewable energy resources, including unbundled renewable energy credits, and all costs for utility-owned generation approved by the CPUC.”⁵

The California RPS program was established in 2002 by Senate Bill (SB) 1078 (Sher, 2002) with the initial requirement that 20% of electricity retail sales must be served by renewable resources by 2017. The program was accelerated in 2006 under SB 107 (Simitian, 2006), which required that the 20% mandate be met by 2010. In April 2011, SB 2 (1X) (Simitian, 2011) codified a 33% RPS requirement to be achieved by 2020. In 2015, SB 350 (de León, 2015) mandated a 50% RPS by December 31, 2030. On September 10, 2018, SB 100 (de León, 2018) was signed into law, which further increased the RPS to 60% by December 31, 2030, with interim targets of 44% by December 31, 2024, and 52% by December 31, 2027 and requires all the state’s electricity to come from carbon-free resources by 2045.⁶

The 2019 RPS procurement cost figures in this report were compiled from all CPUC jurisdictional Load Serving Entities (LSEs): Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), and San Diego Gas & Electric Company (SDG&E); 3 SMJUs; 19 CCAs; and 14 ESPs.⁷

Because the Renewable Energy Credits (RECs) associated with generation can be applied in later years for RPS program compliance purposes, the cost of procuring renewable energy might occur in one year and the RECs associated with generation may be applied in a later year.⁸ Accordingly, the annual procurement costs for generation in this report may not correspond precisely with the LSEs’ RPS compliance cost for the same year.

⁵ Pub. Util. Code § 913.3(a). SB 697 (Hertzberg, 2015) changed the numbering of the Pub. Util. Code sections, and specifically changed § 910 to Pub. Util. Code § 913.3. None of the original reporting requirements that were required under Pub. Util. § 910 were modified by SB 697. SB 1222 (Hertzberg, 2016) modified the reporting date for this report among other minor changes.

⁶ See the CPUC’s RPS website for more information about RPS program requirements and legislative history: <http://www.cpuc.ca.gov/renewables/>.

⁷ See Appendix E for a list of California’s Active Load Serving Entities.

⁸ See Commission Decision (D.)12-06-038; D.17-06-026.

Renewables Program Costs

This section addresses the costs associated with renewable resource procurement in 2019, consistent with the requirements of § 913.3(a)(1)-(2) and (b).

Section 913.3(a)(1)

For power purchase contracts, the commission shall release costs in an aggregated form categorized according to the year the procurement transaction was approved by the commission, the eligible renewable energy resource type, including bundled renewable energy credits, the average executed contract price, and average actual recorded costs for each kilowatt-hour of production. Within each renewable energy resource type, the commission shall provide aggregated costs for different project size thresholds.

Section 913.3(a)(2)

For each utility-owned renewable generation project, the commission shall release the costs forecast by the electrical corporation at the time of initial approval and the actual recorded costs for each kilowatt-hour of production during the preceding calendar year.

Section 913.3(b)

The commission shall report all electrical corporation revenue requirement increases associated with meeting the renewables portfolio standard, as defined in § 399.12, including direct procurement costs for eligible renewable energy resources and renewable energy credits.

The 2019 costs and cost savings discussed in this section include:

- RPS Procurement Expenditures
- RPS Aggregated Contract Prices
- Comparison of RPS Procurement Expenditures with Revenue Requirements (for IOUs and SMJUs only)

RPS Procurement Expenditures

RPS procurement expenditures⁹ represent a load serving entity's (LSE) total expenditures on RPS-eligible energy in a given year. This value aggregates all LSE expenditures on delivering RPS-eligible procurement contracts and expenditures on RPS-eligible utility-owned generation (UOG). RPS procurement expenditures decreased again in 2019 and will continue to fall as the contracts of more costly generation expire and new contracts with lower contract pricing are executed.¹⁰

Large Investor-Owned Utility Procurement Expenditures for 2019

The CPUC compiled detailed information regarding RPS generation procured by the large IOUs in 2019. This summarized data can be found in Appendix B of this report. The data is expressed as weighted averages for RPS procurement expenditures in cents per kilowatt-hour (¢/kWh) categorized by IOU, technology, and size.¹¹

Table B-1 provides all procurement expenditure information for every large IOU RPS-eligible contract,¹² including UOG projects.¹³ This table breaks down the actual price for production in 2019 of UOG, which includes small hydroelectric and solar photovoltaic facilities.

Weighted Average Expenditures

Based on the compiled 2019 data, the weighted average RPS procurement expenditure was approximately 10.23 ¢/kWh across all RPS contracts, including REC-only contracts. This 2019 average is slightly lower than the 10.57 ¢/kWh average in 2018.

Figure 2 below illustrates the weighted average RPS procurement expenditure for bundled renewable energy in ¢/kWh for each of the large IOUs from 2003 through 2025. The changes in weighted average expenditures over time for each large IOU are similar, and the key factors driving the cost differences between the large IOUs are the resource mixes and contract vintages.

⁹ "Procurement Expenditures for 2019" includes costs for all procurement from online RPS eligible facilities that generated electricity in 2019. Additionally, "Procurement Expenditures for 2019" does not include costs from contracts that were approved by the CPUC in 2019 unless the contracted deliveries also began in 2019.

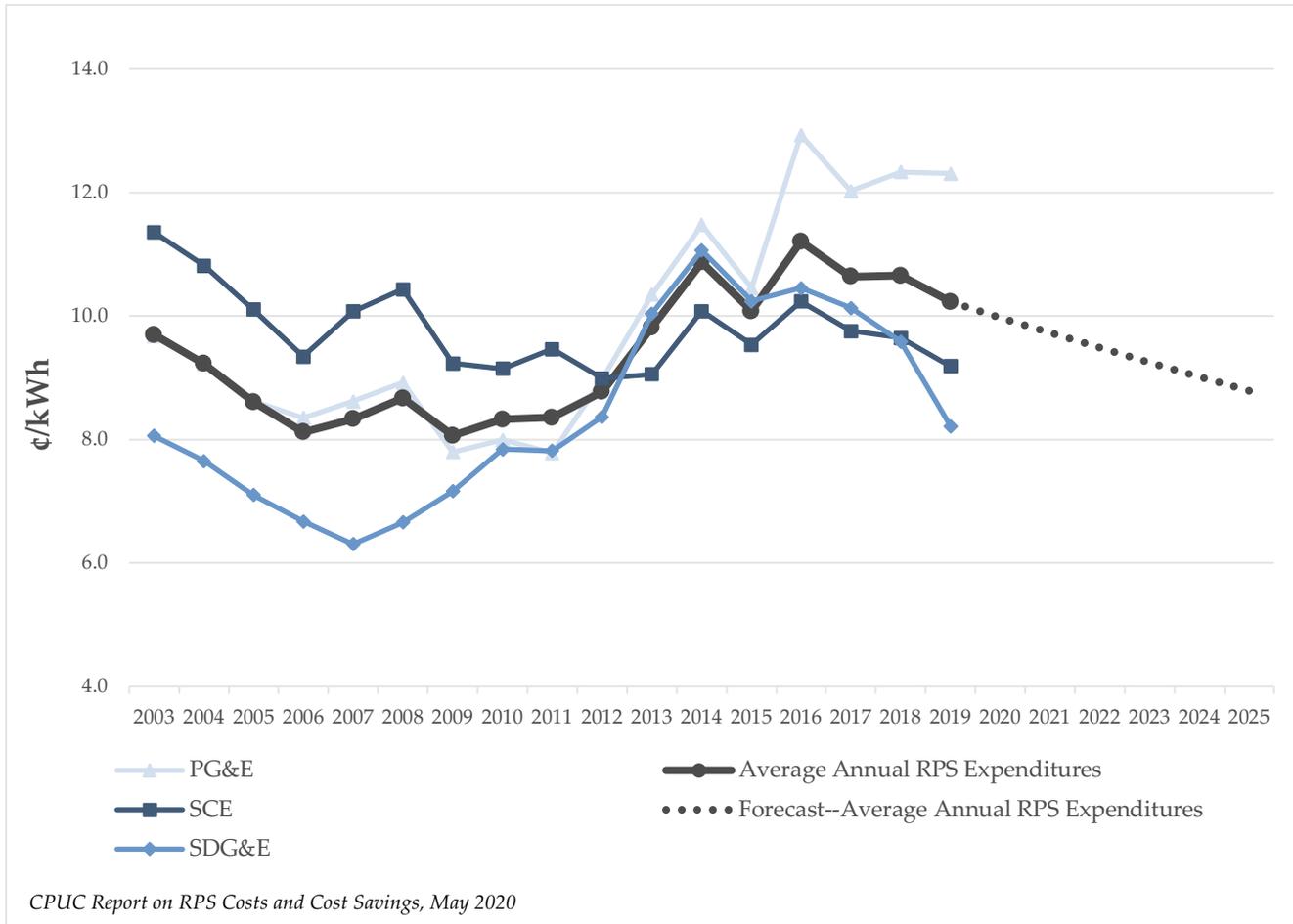
¹⁰ See also Lazard, Levelized Cost of Energy Analysis – Version 13.0 (November 2019) at 11 (Certain renewable energy generation technologies are already cost-competitive with conventional generation technologies; a key factor regarding the continued cost decline of renewable energy generation technologies is the ability of technological development and industry scale to continue lowering operating expenses and capital costs for renewable energy generation technology).

¹¹ The cost of RPS procurement expenditures are weighted based on actual quantities of energy delivered.

¹² Table B-1 can be found in the attached Appendix B. Pursuant to the confidentiality rules in Public Utilities Code § 913.3(d) and D.06-06-066, some of the costs in Appendix B have been redacted.

¹³ At the inception of the three IOUs' solar photovoltaic programs (SPVP-UOG), the CPUC approved an average levelized cost of energy (LCOE) for each IOU. For PG&E's utility-owned generation (UOG) projects, the CPUC approved an average LCOE of \$0.25/kWh. (D.10-04-052 at 36.) For SCE's UOG projects, the CPUC approved an average LCOE of \$0.26/kWh. (D.09-06-049 at 31.) For SDG&E's UOG projects, the CPUC approved an average LCOE of \$0.24/kWh. (D.10-09-016 at 32.) See Appendix B for actual recorded costs. The UOG small hydroelectric facilities used for 2019 RPS generation began commercial operation primarily between 1900 and 1960.

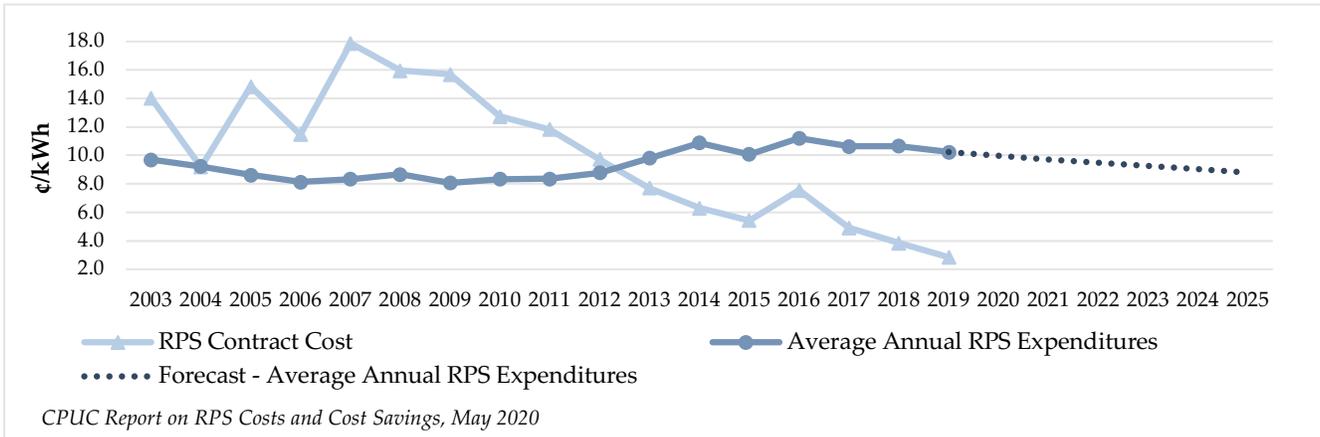
Figure 1: Weighted Average RPS Procurement Expenditures of Investor-Owned Utilities' Bundled Renewable Energy from 2003-2025 (Real Dollars)



As shown in Figure 1, initial average annual RPS expenditures were lower than current expenditures for the program. This is due to the fact that in 2003, at the beginning of the RPS program, the large IOUs' RPS resources consisted primarily of heavily depreciated wind and small hydroelectric facilities. Starting in 2010, new resources from contracts that were signed around 2007 finished construction and began coming online, which increased average RPS expenditures. Because it takes several years from when a contract is executed to when it delivers energy, and a large volume of contracts were signed between 2007 and 2010, there was a lag between the year of execution and the resulting increase in expenditures. This phenomenon is illustrated in Figure 2. Similarly, the lower cost contracts entered into recently will not be reflected as lower actual RPS expenditures until after those projects begin delivering energy.¹⁴

¹⁴ Historic contract price trends can be seen in Figures 2 and 3, which shows that executed contract prices peaked in 2007 and have been falling for RPS-eligible resources.

Figure 2: RPS Program Expenditures and Contract Costs from 2003-2025¹⁵ (Real Dollars)



To approximate the impact of decreasing contract prices on future expenditures, Figures 1 and 2 include a forecasted decline in average annual RPS expenditures at a rate of 2.5% per year between 2020 and 2025. The forecasted 2.5% drop in total RPS expenditures is significantly less than the historic 12.7% decrease in contract prices.¹⁶ This forecast was selected because the impact of falling contract prices in future years is dampened by the cumulative RPS expenditures, since each year’s newly generating contracts represent a relatively small part of the IOUs’ entire renewable portfolio.

Total Expenditures

The changes in total expenditures over time corresponds with the large IOUs’ increase in renewable procurement. The large IOUs’ total combined direct RPS procurement expenditures decreased from \$5.6 billion in 2018 to \$5.4 billion in 2019. IOUs’ renewable procurement increased slightly from 52,936 GWh to 53,244 GWh, or 40% to 37% of total generation procurement, from 2018 to 2019.¹⁷

Small and Multi-Jurisdictional Investor-Owned Utility Procurement Expenditures for 2019

In 2019, Liberty Utilities (Liberty), PacifiCorp, and Bear Valley Electric Service (BVES) spent approximately \$14.1 million on RPS procurement as shown in Table 1. The SMJUs’ RPS resources include biomass, geothermal, hydroelectric, solar photovoltaic, and wind.

Weighted Average Expenditures

In 2019, the weighted average RPS procurement expenditure for all Liberty contracts was 4.7 ¢/kWh, 4.4 ¢/kWh for PacifiCorp, and 0.9 ¢/kWh for BVES.¹⁸

¹⁵ All values in this report have been adjusted for inflation using the U.S. Bureau of Labor Statistics’ Producer Price Index (PPI) for the Electric Power Generation, Transmission, and Distribution Industry. This PPI was chosen as an effective method for capturing price movement specific to a given industry prior to retail level price changes.

¹⁶ See Figure 3 at 10.

¹⁷ CPUC, “California’s Renewables Portfolio Standard Annual Report”, at 6 (November 2019): [https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy - Electricity and Natural Gas/2019%20RPS%20Annual%20Report.pdf](https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy_-_Electricity_and_Natural_Gas/2019%20RPS%20Annual%20Report.pdf).

¹⁸ BVES’s 2019 procurement expenditure data includes strictly REC-only contracts; therefore, it is not comparable to the other utilities’ 2019 expenditures as they procured significant quantities of contracts that include the cost of acquiring RECs, capacity, and energy.

Total Expenditures

For 2019, Liberty, PacifiCorp, and BVES had a total combined RPS procurement expenditure of \$14.1 million compared to \$10.7 million in 2018. The SMJUs' total renewable procurement decreased by approximately 6 GWh from 2018 to 2019 and their average RPS procurement percentage decreased from 26% to 25%.¹⁹

Table 1: Small and Multi-Jurisdictional Investor-Owned Utilities' Total RPS Expenditures in 2019

	Liberty	PacifiCorp	Bear Valley Electric Service
Total (millions)	\$7.8	\$6.3	\$0.4

Community Choice Aggregator and Electric Service Provider Procurement Expenditures for 2019

In 2019, there were 19 operating CCAs and 12 ESPs that procured RPS-eligible energy. The CCAs' and ESPs' RPS resources include bioenergy, geothermal, small hydroelectric, solar photovoltaic, wind, and unbundled RECs. Table 2 provides a summary of RPS procurement between 2018 and 2019 for CCAs and ESPs. The CCAs' total expenditures increased in 2019 primarily due to the launch of eight new CCAs in 2018, expansions of existing CCAs, and additional CCA phasing in of customers, which ramped up CCA procurement to meet the RPS requirements in 2019.²⁰ Meanwhile, ESPs' total expenditures and total procurement decreased from 2018 to 2019.²¹

¹⁹ *Supra* note 15 at 7.

²⁰ For information regarding CCAs' forecasted RPS compliance, see CCAs' average actual and forecasted RPS percentages in the 2019 RPS Annual Report to the Legislature at 8.

²¹ For information regarding ESPs' forecasted RPS compliance, see ESPs' average actual and forecasted RPS percentages in the 2019 RPS Annual Report to the Legislature at 11.

Table 2: Comparison of Community Choice Aggregator and Electric Service Provider RPS Procurement and Procurement Expenditures between 2018 and 2019

	Year	Community Choice Aggregators	Electric Service Providers
Weighted Average Expenditures (¢/kWh) ²²	2018	5.1	3.3
	2019	6.0	5.1
Total Expenditures (millions) ^{23 24}	2018	\$555	\$83
	2019	\$932	\$76
Total Renewable Procurement (GWh)	2018	5,500	2,500
	2019	15,500	1,500
Average RPS Procurement ^{25 26}	2018	46%	29%
	2019	41%	27%

²² For CCAs, the weighted average procurement expenditures in 2019 was 5.1 ¢/kWh and varied based on IOU territory: CCAs in PG&E’s territory spent 7.2 ¢/kWh, SCE’s territory spent 4.4 ¢/kWh, and SDG&E’s territory spent 5.1 ¢/kWh.

²³ This number is derived from forecasted CCA procurement cost data submitted with the 2019 RPS Procurement Plans.

²⁴ This number is derived from forecasted ESP procurement cost data submitted with 2019 RPS Procurement Plans.

²⁵ See Table 4 in the 2019 RPS Annual Report to the Legislature.

²⁶ See Table 6 in the 2019 RPS Annual Report to the Legislature.

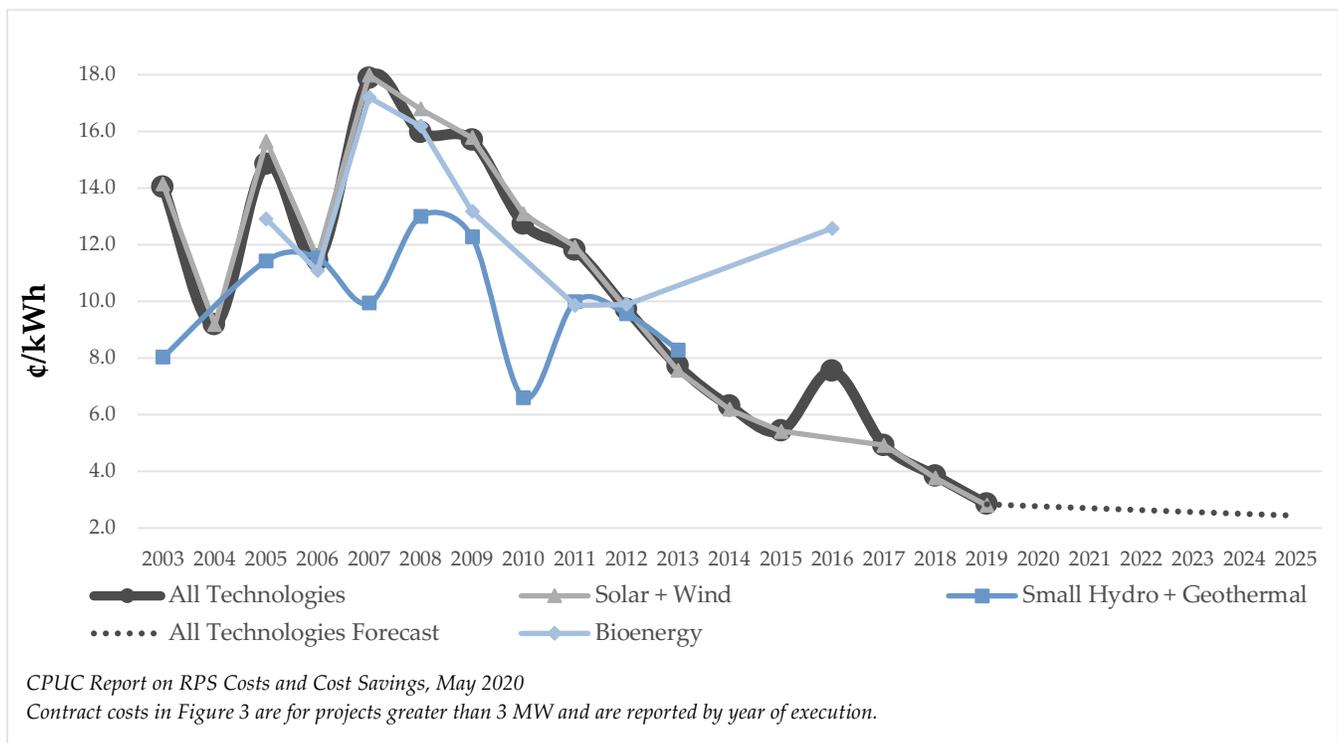
RPS Aggregated Contract Prices

The CPUC examined prices for contracts executed in 2018 and 2019 by the IOUs, CCAs, and ESPs.²⁷ Moreover, the CPUC also reviewed RPS contracts executed by the IOUs between 2003 and 2017 to show historic contract cost trends.²⁸

RPS Contract Prices for Resources Greater than 3 MW

Figure 3 below shows that RPS contract prices, in real dollars, consistently dropped between 2007 and 2019 for the “all technologies” group. The annual contract price for all technologies decreased an average of 12.7% during that time. The downward trend in contract prices can be attributed to falling prices for wind and solar technologies, which together make up 87.4% of the large IOUs’ collective RPS generating capacity. To remove non-representational trends, contracts with a nameplate capacity of less than 3 MW and those reported as net cost instead of total contract price were not included in Figure 3.²⁹

Figure 1: Historical Trend of All Load Serving Entities’ RPS Contract Costs by Technology and Year of Execution from 2003-2025 (Real Dollars)³⁰



²⁷ 2019 Contract price data for CCAs and ESPs were obtained through LSEs’ annual RPS Compliance Reports, however, some pricing details were redacted by LSEs. 2018 Contract price data for CCAs and ESPs was obtained through a data request stemming from the *Power Charge Indifference Adjustment (PCIA)* proceeding. 2003-2019 Contract data was reported by the IOUs through CPUC’s RPS Executed Projects Database, which contains self-reported information by the IOUs on their RPS contracts.

²⁸ See *id.*

²⁹ Projects with a capacity of 3 MW or less made up roughly 2% of all of the IOUs’ contracted RPS capacity, and removing these figures eliminated non-representative trends from the data. As a result of this size exclusion, feed-in-tariff projects were not considered in the analysis above. In California, feed-in-tariff programs provide projects with a capacity of 3 MW or less capacity a predetermined price (\$/MWh) to encourage market transformation for projects at these sizes. Additionally, contracts identified as REC only payments were excluded as these values are not comparable to all in energy, capacity, and REC contract prices.

³⁰ See Appendix C for bioenergy and small hydro contracts signed in 2019 with capacity below 3 MW.

The average contract price for the “all technologies” group spiked in 2016 as a result of mandated biomass procurement.³¹

The CPUC used LSEs’ annual RPS Compliance Report to obtain 2019 contract price data to identify 10 unit specific/contingent contracts with nameplate capacities greater than 3 MW. These ten contracts were signed by CCAs. No contract price data was reported in IOUs’ and ESPs’ annual compliance filings for projects greater than 3 MW.^{32 33} The average price of contracts executed in 2019 was 2.82 ¢/kWh compared to 3.81 ¢/kWh in 2018.³⁴ Wind and solar accounted for nine of the contracts executed in 2019 while small hydro accounted for one contract. Following the historical trend shown in Figure 3, contract prices for RPS resources are anticipated to decline further.³⁵

RPS Contract Prices for Resources Less than 3 MW

Bioenergy Market Adjusting Tariff (BioMAT) Contracts

RPS resources with a nameplate capacity of 3 MW or less are not included in Figure 3. Accordingly, BioMAT contracts signed in 2019 were not included. BioMAT is a Feed-in-Tariff program that uses a standard contract and a market-based mechanism to arrive at the offered program contract price, which deviates slightly from the solicitation process for contracts included in Figure 3. The goal of the BioMAT program is to promote a competitive market using a simple procurement mechanism for entrants to the bioenergy market. BioMAT allocates procurement to the discrete bioenergy categories of Biogas, Agriculture, and Sustainable Forest Management. Table 2 shows the weighted average BioMAT contract price and capacity procured in 2019 by the three IOUs.

Table 3: Large Investor-Owned Utilities' 2019 BioMAT Procurement Summary

BioMAT Category	Procured Capacity (MW)	¢/kWh
Biogas	3	12.8
Dairy/Agriculture	11.1	18.8
Sustainable Forest Management	3	20.0

³¹ High Hazard Zone (HHZ) biomass contracts were signed as a part of the state’s response to Governor Brown’s October 30, 2015, Emergency Proclamation and SB 859 (2016) intended to protect public safety and property from dead or dying trees and wildfires. Governor Edmund G. Brown Jr., *Proclamation of a State of Emergency* (October 30, 2015) https://www.gov.ca.gov/wp-content/uploads/2017/09/10.30.15_Tree_Mortality_State_of_Emergency.pdf.

³² Pursuant to D.12-06-039, all retail sellers are subject to the jurisdiction of the CPUC and must submit an Annual RPS Compliance Report each year on August 1. More information on the RPS compliance and reporting process available at: <https://www.cpuc.ca.gov/RPSComplianceReporting/>. The 10 RPS contracts that included contract price data submitted in LSEs’ Annual RPS Compliance Reports are not representative of all RPS contracts executed in 2019 as many contracts were submitted without contract pricing. For a summary of recently executed RPS projects see “Contracted Renewable Capacity” in the 2019 RPS Annual Report at 15 through 18.

³³ The average price of contracts calculation excludes storage capacity prices for generator-plus-battery contracts.

³⁴ In real dollars, the average price of contracts executed in 2018 was 3.84 ¢/kWh.

³⁵ See also Lazard, *Levelized Cost of Energy Analysis – Version 13.0* (November 2019) at 7, 8 (The levelized price for solar dropped 22%-17% in the last three years to unsubsidized prices in 2019 of \$36-\$44/MWh and wind dropped 7%-10% in the last three years to unsubsidized prices of \$28-\$54/MWh; sensitivity analysis utilizes national data and includes U.S. federal tax incentives and other monetary benefits resulting from the Tax Cuts and Jobs Act of 2017).

Comparison of RPS Procurement Expenditures to IOU Revenue Requirements

Large Investor-Owned Utilities

Table 4 compares RPS procurement expenditures to revenue requirements for the large IOUs. Specifically, the table shows the percentage of RPS procurement compared to total procurement for these IOUs' generation portfolios, as well as the RPS procurement costs as a portion of total revenue requirement. Additionally, Table 4 shows the large IOUs' RPS generation percentages for 2019.

Table 4 also shows that in 2019, RPS procurement expenditures on average were less than 19% of the IOUs' total revenue requirements. Compared to the total generation revenue requirements, the RPS expenditures make up a significantly smaller portion of the total revenue requirements, since total revenue requirements contain many large line items such as transmission expenditures, reliability costs, administrative, and capital expenses.

Table 4: Comparison of Large Investor-Owned Utilities' RPS Procurement to Revenue Requirements in 2019^{36 37}

Investor-Owned Utility	RPS Generation	RPS Procurement Expenditures (billions)	Total Generation Revenue Requirement (billions)	RPS Procurement Expenditures to Total Generation Revenue Requirement (%)	Total Revenue Requirement (billions)	RPS Procurement Expenditures to Total Revenue Requirement (%)
PG&E	30%	\$2.52	\$5.25	48%	\$13.26	19%
SCE	42%	\$2.24	\$5.91	38%	\$11.17	20%
SDG&E	40%	\$0.69	\$1.68	41%	\$4.21	16%

³⁶ Revenue requirement numbers have been taken from the CPUC's "California Electric and Gas Utility Cost Report" pursuant to Public Utilities Code § 913, April 2020.

³⁷ RPS generation percentages are calculated using LSEs' 2019 RPS Compliance Reports and procurement data collected from individual IOUs.

As the large IOUs are required to procure higher percentages of RPS-eligible energy, they are procuring less non-RPS-eligible energy for their electric portfolios. Calculating the increase in revenue requirement as a result of increased RPS procurement is difficult to calculate, particularly as RPS expenditures are largely in-line with non-RPS expenditures on a kilowatt-hour (kWh) basis. However, considering that RPS energy is replacing fossil fuel energy, one approximation is to compare the average cost of RPS energy to non-RPS energy, which is explored in the next section.

In 2019, the large IOUs' average cost of renewable energy was 10.23 ¢/kWh and the average cost of non-RPS energy was 9.95 ¢/kWh. Therefore, the RPS program on average likely contributed approximately 0.28 ¢/kWh procured to obtain program benefits.³⁸

Small and Multi-Jurisdictional Investor-Owned Utilities

2019 revenue requirement information for Liberty, BVES, and PacifiCorp is currently confidential pursuant to CPUC confidentiality rules.³⁹ Consequently, the CPUC is not able to publicly release an analysis of SMJU costs compared to their revenue requirements for 2019.

³⁸ The RPS cost premium compared to non-RPS energy on a kilowatt-hour basis is represented by the following equation:
 $10.23 \text{ ¢/kWh (RPS Energy)} - 9.95 \text{ ¢/kWh (Non-RPS Energy)} = 0.28 \text{ ¢/kWh}$.

³⁹ See D.06-06-066 for confidentiality rules related to revenue requirements.

Renewables Program Cost Savings

This section addresses the cost savings associated with procuring renewable resources in 2019, consistent with the requirements of § 913.3(c).

Section 913.3(c)

The commission shall report all cost savings experienced, or costs avoided, by electrical corporations as a result of meeting the renewables portfolio standard.

It is difficult to quantify the cost savings, or avoided costs, associated with the RPS program because this would require assessing to what extent the RPS program deferred construction of alternative generation facilities and the theoretical cost of those alternative resources. The CPUC also cannot estimate the impacts that increased renewables and the resulting reduction of natural gas demand has had on the cost of natural gas in California. Further, non-RPS resource costs, such as Resource Adequacy, are based on the preexisting supply of facilities and capacity need that are not tethered to the same market considerations as RPS contracts. This is also indicated in the previous section's assessment of RPS expenditures as part of utilities' revenue requirements, in which the variables that inform the cost savings analysis are imperfect because they are not narrowly tailored to capture the benefits and costs of the RPS program.

Consequently, there is no perfect counterfactual to assess the RPS program's cost savings. For the purposes of this report, the utilities' 2019 RPS procurement costs are compared to non-RPS procurement costs, since in the absence of RPS procurement, non-RPS resources would still be procured.

Large Investor-Owned Utilities' Cost Savings

In 2019, the large IOUs' average annual RPS procurement expenditure represented a 0.28 ¢/kWh cost premium compared to their average non-RPS procurement expenditure.⁴⁰ More specifically, PG&E and SCE paid a premium for RPS energy—compared to non-RPS energy—of 1.90 ¢/kWh and 0.15 ¢/kWh, respectively. On the other hand, SDG&E experienced a cost savings of 4.93 ¢/kWh. The variance in non-RPS-eligible expenditures is likely related to the increase in Resource Adequacy contracts from 2018 to 2019 and high local-area Resource Adequacy costs in SDG&E's service area.⁴¹ As a stated goal of the RPS program, RPS resources promote stable retail rates for electric service by providing a steady hedge against the volatile traditional resource costs because their long-term contracts provide consistent expenditures year-to-year.⁴²

Table 5: Large Investor-Owned Utilities' 2019 Average Non-RPS Eligible Procurement Expenditure (¢/kWh)

Method	PG&E	SCE	SDG&E	Average
2019 Non-RPS	10.41	9.04	13.15	9.95
2019 RPS	12.31	9.19	8.22	10.23

Based on total volumes of RPS and non-RPS eligible procurement expenditures, the large IOUs realized the following cost savings (positive figures) or premiums (negative figures):

Table 6: Large Investor-Owned Utilities' 2019 RPS Cost Savings: Non-RPS Eligible Comparison⁴³

	Cost Savings Compared to 2019 Average Non-RPS Expenditure (millions)
PG&E	(\$388)
SCE	(\$35)
SDG&E	\$416
Cost savings are displayed as positive figures while cost premiums are displayed as negative figures.	

⁴⁰ *Supra*, note 39 at 13.

⁴¹ CPUC, *The 2018 Resource Adequacy Report* at 28, 33 (August 2019).

⁴² See Public Utilities Code § 399.11.

⁴³ Cost savings or premiums are calculated by multiplying each IOU's average 2019 non-RPS eligible expenditure (Table 5) by its total volume of RPS procurement in 2019 then subtracting that value from the IOUs' 2019 RPS procurement expenditure (Table 4).

Small and Multi-Jurisdictional Investor-Owned Utilities' Cost Savings

In 2019, the RPS procurement expenditure for SMJUs represented a 1.1 ¢/kWh cost savings compared to their average non-RPS-eligible expenditure. The cost savings for RPS energy compared to non-RPS energy for PacifiCorp was 1.0 ¢/kWh, while Liberty experienced a cost premium for RPS energy of 0.8 ¢/kWh. BVES' cost savings cannot be calculated because BVES's RPS procurement consisted solely of REC-only products. BVES RPS expenditures are therefore not comparable to their non-RPS expenditures, which include additional costs for obtaining energy and capacity benefits.

Table 7: Small and Multi-Jurisdictional Investor-Owned Utilities' 2019 Average Non-RPS Eligible Procurement Expenditure (¢/kWh)

Method	Liberty	PacifiCorp	Bear Valley Electric Service	Average
2019 Non-RPS	4.7	5.4	7.6	5.4
2019 RPS	5.5	4.4	0.9	4.3 ⁴⁴

Based on total volumes of RPS generation procured and non-RPS eligible procurement expenditures, the large SMJUs realized the following cost savings (positive figures) or premiums (negative figures):

Table 8: Small and Multi-Jurisdictional Investor-Owned Utilities' 2019 RPS Cost Savings: Non-RPS Eligible Comparison⁴⁵

	Cost Savings Compared to 2019 Average Non-RPS Expenditure (millions)
Liberty	(\$111)
PacifiCorp	\$141
Bear Valley Electric Service	N/A
Cost savings are displayed as positive figures while cost premiums are displayed as negative figures.	

⁴⁴ The SMJUs' 2019 average RPS procurement expenditure calculation includes BVES' RPS procurement expenditures consisting solely of REC-only products.

⁴⁵ Cost savings or premiums are calculated by multiplying each SMJU's average 2019 non-RPS eligible expenditure (Table 7) by its total volume of RPS procurement in 2019 then subtracting that value from the SMJUs' 2019 RPS procurement expenditure (Table 1).

Appendices

Appendix A: California Public Utilities Commission RPS Activities and Milestones

California Public Utilities Commission RPS Activities and Milestones in 2019	
January	<ul style="list-style-type: none"> CPUC issued Draft Resolution E-4977 amending BioRAM contracts consistent with SB 901
February	<ul style="list-style-type: none"> CPUC issued a final decision on the 2018 RPS Procurement Plans SDG&E executed a BioMAT contract for a total capacity of 3.0 MW
March	<ul style="list-style-type: none"> PG&E issued two solicitations to sell short-term RECs, one from its general RPS portfolio and the other related to tree mortality contracts CPUC issued Resolution E-4995 amending BioMAT, GTSR, and AB 1613 contracts so that PG&E can continue those programs during bankruptcy. PG&E filed for bankruptcy on January 29, 2019
April	<ul style="list-style-type: none"> Five new CCAs filed 2018 RPS Procurement Plans Assigned Commission and Assigned Administrative Law Judge's Ruling issued identifying issues and schedule of review for 2019 RPS Procurement Plans
May	<ul style="list-style-type: none"> CPUC issued the 2019 Padilla Report on Costs and Cost Savings for the RPS Program to the Legislature, pursuant to Public Utilities Code § 913.3 CPUC adopted Resolution E-4996 approving 400 GWh energy plus RECs sale from SDG&E to Clean Power Alliance of Southern California Joint IOUs submitted Informational-Only Time-of-Delivery (TOD) Proposal pursuant to D.18-02-003 PG&E executes BioMAT contracts for a total capacity of 8.4 MW
June	<ul style="list-style-type: none"> IOUs, CCAs, and ESPs submitted Draft 2019 RPS Procurement Plans
July	<ul style="list-style-type: none"> PG&E executed BioMAT contracts for a total capacity of 4.0 MW Energy Division held a workshop to discuss BioMAT program review CPUC approved PG&E's REC sales agreements with 12 counterparties for 5,495 GWh of energy plus RECs
August	<ul style="list-style-type: none"> CPUC adopted D.19-08-007 enforcing RPS program rules by imposing fines on two entities for non-compliance with Compliance Period 1 (2011-2013) program requirements IOUs, CCAs, and ESPs submitted annual RPS Compliance Reports PG&E filed Advice Letter 5607-E to amend three solar PV PPAs in advance of seeking to assume the PPAs in its bankruptcy proceeding
September	<ul style="list-style-type: none"> CPUC adopted D.19-09-043 establishing a standardized methodology for calculating Effective Load Carrying Capability for the three large IOUs CPUC adopts D.19-09-007 accepting new CCAs' 2018 RPS Plans
October	<ul style="list-style-type: none"> SCE executed a BioMAT contract for a total capacity of 2.7 MW Energy Division issued compliance determination letters to all IOUs, CCAs, and ESPs operating in RPS Compliance Period 2 (2014-2016) PG&E filed Advice Letter 5658-E to amend one solar PV PPA and one energy storage agreement in advance of seeking to assume the contracts in its bankruptcy proceeding
November	<ul style="list-style-type: none"> CPUC issued the Annual RPS Report to the Legislature: https://www.cpuc.ca.gov/RPS_Reports_Data/
December	<ul style="list-style-type: none"> CPUC adopted D.19-12-042 approving and modifying the 2019 RPS Procurement Plans CPUC issued D.19-12-004 granting a PFM to modify BioMAT's definition of the "Other Agriculture" fuel resource category CPUC issued Resolution E-5049 approving PG&E amendments to solar and energy storage procurement agreements

Appendix B: RPS Procurement Expenditures per Senate Bill 836 (Public Utilities Code § 913.3)

Overview of Tables

Table B-1 and B-2 show, for each large IOU, the weighted average time-of-delivery (TOD) adjusted RPS procurement expenditures for 2019. Per the confidentiality requirements in Public Utilities Code § 913.3, some of the data within this report is redacted in order to protect market sensitive information. RPS procurement expenditures are largely driven by a large volume of contracts signed between 2007 and 2010 at higher prices.⁴⁶ Recent RPS contracts executed at lower prices are not fully reflected in the weighted average RPS procurement expenditures below as there is a lag between when the lower cost contracts are executed and when RPS procurement expenditures will decline in real dollars.

In addition:

- The “Average RPS Procurement Expenditures” represent the total weighted average payments made to renewable generators for 2019.
- Procurement expenditures represent weighted averages by capacity procured on a per kilowatt-hour basis. All figures are in 2019 dollars.

⁴⁶ See historical trend of RPS contract costs in Figure 3.

**Table B-1. Weighted Average RPS Procurement Expenditures
(All Projects – Including REC-only transactions) for 2019 (¢/kWh)**

	PG&E	SCE	SDG&E	Total
Biogas				
0-3 MW	15.3	10.1	10.7	12.7
+3-20 MW	12.2	6.8	5.4	10.2
Biogas Total	13.1	8.6	9.7	11.1
Biomass				
+3-20 MW	11.0	Only 1 Contract		10.6
+20-50 MW	11.8	10.3	Only 1 Contract	11.3
+50-200 MW	9.1			9.1
Biomass Total	11.2	10.3	Only 1 Contract	11.1
Geothermal				
+3-20 MW	8.9	5.6		7.8
+20-50 MW		6.3		6.3
+50-200 MW		8.4		8.4
+200 MW	8.3	6.8		7.6
Geothermal Total	8.4	7.0	0.0	7.5
Small Hydro				
0-3 MW	8.2	7.5	27.7	8.5
+3-20 MW	7.6	7.8		7.7
+20-50 MW	6.6			6.6
Small Hydro Total	7.0	7.7	27.7	7.3
Solar Photovoltaic				
0-3 MW	12.5	12.6	12.2	12.6
+3-20 MW	10.5	8.5	10.2	9.5
+20-50 MW	10.5	8.3	10.8	9.5
+50-200 MW	11.9	7.2	12.1	10.5
+200 MW	16.1	12.4	12.0	13.9
Solar Photovoltaic Total	13.5	10.2	11.9	11.8
Solar Thermal				
+50-200 MW	16.5	15.9		16.2
+200 MW	20.7			20.7
Solar Thermal Total	19.4	15.9	0.0	18.5
Wind				
0-3 MW	5.4	7.8		7.8
+3-20 MW	6.5	5.7	8.2	6.4
+20-50 MW	10.1	8.3		8.6
+50-200 MW	8.1	9.5	6.5	8.5
+200 MW		8.3	10.4	8.7
Wind Total	8.1	9.0	7.4	8.5
UOG Small Hydro				
0-3 MW	80.5	3.3		22.8
+3-20 MW	20.9	0.9		15.5
+20-50 MW	26.5	0.3		10.9
UOG Small Hydro Total	23.8	1.2	0.0	15.2
UOG Solar Photovoltaic				
0-3 MW	46.6	0.9	0.1	0.2
+3-20 MW	24.4	1.0	21.3	17.0
+20-50 MW	22.2			22.2
UOG Solar Photovoltaic Total	23.1	1.0	0.2	4.0
Average of All Resources	12.3	9.2	8.2	10.2

**Table B-2. Weighted Average RPS Procurement Expenditures
(Bundled Energy Only) for 2019 (¢/kWh)**

	PG&E	SCE	SDG&E	Total
Biogas				
0-3 MW	15.3	10.1	10.7	12.7
+3-20 MW	12.2	6.8	5.4	10.2
Biogas Total	13.1	8.6	9.7	11.1
Biomass				
+3-20 MW	11.0	Only 1 Contract		10.6
+20-50 MW	11.8	10.3	Only 1 Contract	11.3
+50-200 MW	9.1			9.1
Biomass Total	11.2	10.3	Only 1 Contract	11.1
Geothermal				
+3-20 MW	8.9	5.6		7.8
+20-50 MW		6.3		6.3
+50-200 MW		8.4		8.4
+200 MW	8.3	6.8		7.6
Geothermal Total	8.4	7.0	0.0	7.5
Small Hydro				
0-3 MW	8.2	7.5	27.7	8.5
+3-20 MW	7.6	7.8		7.7
+20-50 MW	6.6			6.6
Small Hydro Total	7.0	7.7	27.7	7.3
Solar Photovoltaic				
0-3 MW	12.5	12.6	12.2	12.6
+3-20 MW	10.5	8.5	10.2	9.5
+20-50 MW	10.5	8.3	10.8	9.5
+50-200 MW	11.9	7.2	12.1	10.5
+200 MW	16.1	12.4	12.0	13.9
Solar Photovoltaic Total	13.5	10.2	11.9	11.8
Solar Thermal				
+50-200 MW	16.5	15.9		16.2
+200 MW	20.7			20.7
Solar Thermal Total	19.4	15.9	0.0	18.5
Wind				
0-3 MW	5.4	7.8		7.8
+3-20 MW	6.5	5.7	8.2	6.4
+20-50 MW	10.1	8.3		8.6
+50-200 MW	8.1	9.5	7.7	8.7
+200 MW		8.3	10.4	8.7
Wind Total	8.1	9.0	8.3	8.7
UOG Small Hydro				
0-3 MW	80.5	3.3		22.8
+3-20 MW	20.9	0.9		15.5
+20-50 MW	26.5	0.3		10.9
UOG Small Hydro Total	23.8	1.2	0.0	15.2
UOG Solar Photovoltaic				
0-3 MW	46.6	0.9	0.1	0.2
+3-20 MW	24.4	1.0	21.3	17.0
+20-50 MW	22.2			22.2
UOG Solar Photovoltaic Total	23.1	1.0	0.2	4.0
Average of All Resources	12.3	9.2	8.6	10.3

Appendix C: Contract Price Data per Senate Bill 836 (Public Utilities Code § 913.3)

Overview of Contract Price Data

Table C-1 shows the weighted average time-of-delivery (TOD) adjusted contract price for all of the large IOUs' RPS contracts approved by the CPUC in 2019. Per the confidentiality requirements in Public Utilities Code § 913.3, some of the data within this appendix could be redacted:

- Contract prices were to be redacted if a) the power purchase agreement (PPA) is not already public on the CPUC's website per the CPUC's confidentiality rules, and b) there were fewer than three facilities in each category. If there was only one facility in a category and its PPA is publicly available on the CPUC's website, then the price information for that facility is reported. In addition, the following contracts are public and reported: all qualifying facility (QF) contracts that do not require CPUC approval, feed-in tariff contracts, contracts with municipal governments, affiliate entities, and utility-owned generation (UOG) costs.
- Weighted average contract prices represent contract prices weighted by capacity procured on a per kilowatt-hour basis. All figures are in 2019 dollars.
- All contract price figures have been adjusted by TOD factors since generators are paid based on the time that the facility delivers electricity, according to each IOU's TOD factors. For example, IOU TOD factors place a premium on generation that occurs during peak demand hours. Therefore, generators that provide electricity during peak hours when electricity is more valuable receive a higher payment for electricity during that time period based on the TOD adjustment.

Table C-1. Weighted Average TOD-Adjusted Price of All Renewable Energy Contracts Approved for 2019 (¢/kWh)

	PG&E	SCE	SDG&E	Total
Biogas				
0-3 MW	15.08	5.57	5.23	10.88
Biogas Total	15.08	5.57	5.23	10.88
Biomass				
0-3 MW	8.98			8.98
Biomass Total	8.98			8.98
Small Hydro				
0-3 MW			Only 1 Contract	Only 1 Contract
Small Hydro Total			Only 1 Contract	Only 1 Contract
Solar Photovoltaic				
0-3 MW		Only 1 Contract		Only 1 Contract
Solar Photovoltaic Total		Only 1 Contract		Only 1 Contract
Weighted Average of All Resources	13.54	Only 2 Contracts	Only 2 Contracts	10.04

Text of Public Utilities Code § 913.3(a)–(d)

913.3. (a) Notwithstanding subdivision (g) of § 454.5 and § 583, no later than May 1 of each year, the commission shall release to the Legislature for the preceding calendar year the costs of all electricity procurement contracts for eligible renewable energy resources, including unbundled renewable energy credits, and all costs for utility-owned generation approved by the commission.

(1) For power purchase contracts, the commission shall release costs in an aggregated form categorized according to the year the procurement transaction was approved by the commission, the eligible renewable energy resource type, including bundled renewable energy credits, the average executed contract price, and average actual recorded costs for each kilowatt-hour of production. Within each renewable energy resource type, the commission shall provide aggregated costs for different project size thresholds.

(2) For each utility-owned renewable generation project, the commission shall release the costs forecast by the electrical corporation at the time of initial approval and the actual recorded costs for each kilowatt-hour of production during the preceding calendar year.

(b) The commission shall report all electrical corporation revenue requirement increases associated with meeting the renewables portfolio standard, as defined in § 399.12, including direct procurement costs for eligible renewable energy resources and renewable energy credits.

(c) The commission shall report all cost savings experienced, or costs avoided, by electrical corporations as a result of meeting the renewables portfolio standard.

(d) This section does not require the release of the terms of any individual electricity procurement contracts for eligible renewable energy resources, including unbundled renewable energy credits, approved by the commission. The commission shall aggregate data to the extent required to ensure protection of the confidentiality of individual contract costs even if this aggregation requires grouping contracts of different energy resource type. The commission shall not be required to release the data in any year when there are fewer than three contracts approved.

Appendix E: California's Active Load Serving Entities

Investor- Owned Utilities (IOUs)	Small and Multi-Jurisdictional Utilities (SMJUs)	Community Choice Aggregators (CCAs)	Electric Service Providers (ESPs)
<ul style="list-style-type: none"> • Pacific Gas and Electric Company (PG&E) • Southern California Edison (SCE) • San Diego Gas & Electric (SDG&E) 	<ul style="list-style-type: none"> • Bear Valley Electric Service (BVES) • Liberty Utilities (formerly CalPeco Electric) • PacifiCorp 	<ul style="list-style-type: none"> • Apple Valley Choice Energy (AVCE) • Clean Power Alliance (CPA) • CleanPowerSF (CPSF) • East Bay Community Energy (EBCE) • King City Community Power (KCCCP) • Lancaster Choice Energy (LCE) • Marin Clean Energy (MCE) • Monterey Bay Community Power (MBCE) • Peninsula Clean Energy (PCE) • Pico Rivera Innovative Municipal Energy (PRIME) • Pioneer Community Energy (Pioneer) • Rancho Mirage Energy Authority (RMEA) • Redwood Coast Energy Authority (RCEA) • San Jacinto Power (SJP) • San Jose Clean Energy (SJCE) • Silicon Valley Clean Energy (SVCE) • Solana Energy Alliance (SEA) • Sonoma Clean Power (SCP) • Valley Clean Energy Alliance (VCEA) 	<ul style="list-style-type: none"> • 3 Phases Renewables • Agera Energy • American PowerNet • Calpine Energy Solutions (CES) • Calpine Power America • Commercial Energy of CA • Constellation New Energy • Direct Energy Business • EDF Industrial Power Services • Just Energy Solutions • Pilot Power Group • Shell Energy North America (SENA) • Tiger Natural Gas • UC Regents