PASADENA WATER AND POWER

City of Pasadena
Department of Water and Power
Renewable Portfolio Standard
Procurement Plan

June 1, 2015

Pursuant to the Enforcement Program
Adopted by the City Council on July 22, 2013

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Executive Summary

This Procurement Plan describes the intended strategy of the Pasadena Water and Power department ("PWP") to comply with the California State-wide Renewable Portfolio Standard ("RPS") requirements of Senate Bill X1-2 ("SBX1-2") as detailed in the City's Program of Enforcement ("Enforcement Program") adopted by the Pasadena City Council on July 22, 2013. The Enforcement Program and this Procurement Plan incorporate the regulations established by the California Energy Commission ("CEC") regarding Public Utilities Code Section 399.30 (l), as such interpretations of the law are codified in the California Code of Regulations, Title 20, Division 2, Chapter 13, Sections 3200 through 3208, and in Title 20, Division 2, Chapter 2, Article 4, Section 1240. It is important to note that this Procurement Plan addresses not only California's State-wide RPS requirements, but Pasadena's own higher *voluntary* RPS goal, as established in the PWP Integrated Resource Plan.

Procurement Plan Highlights:

On March 05, 2012, the City Council approved PWP's updated Integrated Resource Plan, and reaffirmed the City's voluntary 40% RPS goal first established in 2009. The 40% goal exceeds the SBX1-2 target, as can be seen in Figure 1. The following are a few highlights of this Procurement Plan:

1. The RPS procurement quantity requirement for any given period under SBX1-2 is determined by multiplying total retail sales for the period by the applicable RPS percentage. The CEC Enforcement Procedures definition of "retail sales" has been clarified to mean:

   "*Sales of electricity by a POU*[1] *to end-use customers and their tenants, measured in MWh. This does not include energy consumption by a POU, electricity used by a POU for water pumping, or electricity produced for onsite consumption (self-generation)*" [emphasis added].

[1] Publicly-Owned Utility

2. PWP calculates its future RPS procurement quantity requirement as: (1) estimated PWP billed sales minus (2) PWP energy consumption and estimated PWP water pumping load. PWP's annual water pumping load is approximately 16,500 MWh.

3. Existing contracts for renewable energy resources are expected to supply approximately 340 GWh[2], or over 32% of projected retail sales, in 2020.

4. A new power purchase agreement was executed with Recurrent Energy through the Southern California Public Power Authority ("SCPPA") for the "Columbia Two" Solar Project, effective September 19, 2013. The project was subsequently sold by Recurrent Energy to Dominion Energy, and in December 2014 became the first utility-scale solar project in PWP's portfolio to achieve commercial operation. PWP purchases a 17.143% (approximately 2.6 MW) share of the 15 MW project.

5. A new power purchase agreement with First Solar for the 20 MW "Kingbird Solar" project was executed and made effective October 24, 2013. PWP is purchasing 100% of the output. The expected commercial operation date for this project is December 31, 2015.

6. The contracts for the Silverado projects, referenced in the previous Procurement Plan, were amended on March 10, 2014. Silverado is now known as SPower. The contracts with the two SPower limited liability project companies, through SCPPA, have been amended to accommodate delayed commercial operation dates ("COD") and relocation to another nearby site. The "Summer Solar" Project and "Antelope Big Sky Ranch" Solar Project are both expected to achieve commercial operation by June 30, 2016. PWP's share of the output of each 20 MW project is 32.5%, for a total of 13 MW (6.5 MW from each project). The delayed COD for each project is reflected in this procurement plan.

7. A new power purchase agreement through SCPPA was executed with the Los Angeles County Sanitation Districts for the output of the Puente Hills Landfill Gas-to-Energy Facility. Puente Hills is an existing project that will begin deliveries to SCPPA when its current contract with Southern California Edison expires. Deliveries will begin 1/1/2017 and continue for the remaining life of the facility, which is expected to be at least 14 years. PWP will receive 30% of the output or about 13 MW in the first year, with output declining as landfill gas production declines at the closed landfill.

8. PWP provided a 60 day notice of termination on the EDF biomethane contract on November 4, 2014 due to Seller (EDF) delivery default (failure to deliver the minimum contract volume). The biomethane from this contract was a relatively small contributor to the PWP RPS, producing approximately 4 GWh (.36% of

[2] GWh = gigawatt-hours, or one billion watt-hours.

retail load) in 2014 and 11 GWh (.99% of retail load) in 2013. Had it not been terminated, the contract would have run through May of 2021.

9. On October 21, 2014, Recurrent Energy provided notice to SCPPA that, due to circumstances unforeseen at the time of contracting and purportedly beyond the reasonable control of Seller (Recurrent Energy), the 20 MW Clearwater Solar project would no longer be developed or constructed, and Recurrent attempted to terminate the power purchase agreement. PWP is one of the SCPPA purchasers, with a 17.143% share (approximately 3.4 MW) of the project output. Recurrent does not have the contractual right to unilaterally terminate the contract, and SCPPA denied the request, electing instead to collect the full amount of delay liquidated damages allowed under the power purchase contract through the end of 2015. To date, SCPPA has collected liquidated damages of $1.8M, approximately one half of which was secured by a letter of credit posted by Recurrent. Delinquent, unpaid and unsecured damages continue to accrue. The expected COD for Clearwater was December 31, 2014.

10. The owner/operator of a third renewable project from which PWP purchases power through SCPPA has indicated its project is in significant financial distress and has requested a major re-pricing of the power purchase agreement. SCPPA, at the request of PWP and the other purchaser under the SCPPA agreement, has denied the request, and the Seller under this power purchase agreement may also default within the coming year. PWP is prepared to replace this volume of renewable energy (approximately 3% of retail load) if necessary.

11. PWP participates in SCPPA's regular Request for Proposals process for renewable energy offers, from which one or more additional renewable projects may be selected and contracts negotiated for additional renewable energy. The energy can be provided from intermittent resources, such as solar or wind, or base load resources, such as geothermal or landfill gas generation, or some combination. Flexibility, including the right to dispatch or curtail renewable generation or potentially incorporate energy storage at a later date, is becoming an increasingly valuable attribute when considering the portfolio "fit" of a renewable resource for PWP.

PWP is required to purchase a minimum amount of Category 1 (bundled) products and no more than a maximum amount of Category 3 (RECs) in each Compliance Period. The CEC has designated "grandfathered" resources to a Category 0. Pursuant to the City's revised Program of Enforcement, PWP may rely on Category 2, Category 3 or other low cost renewable energy in meeting the difference between the state mandated and the City's own voluntary targets in the City's Plan.

The California Energy Commission has developed Enforcement Procedures for the Renewables Portfolio Standard for Local Publicly Owned Electric Utilities[3], which

[3] California Energy Commission (CEC): "Enforcement Procedures For The Renewables Portfolio Standard For Local Publicly Owned Electric Utilities," Proposed Regulations Title 20, Division 2, Chapter 13, Sections 3200 – 3208, Title 20, Division 2, Chapter 2, Article 4, Section 1240; Dated June 2013 - CEC-300-2013-002-SD

specifies rules and procedures under SBX1-2. This Plan is consistent with the latest version of the CEC Enforcement Procedures and the City's own Enforcement Program.

Procurement Process

State law does not specify the actual procedure by which local publicly-owned utilities such as PWP must procure renewable energy. The Pasadena City Charter and Pasadena Municipal Code specify that, in general, most goods and services must be procured by competitive bidding or competitive selection. When PWP brings a renewable portfolio standard contract to the City Council for approval, it is usually with a request for a finding that the contract is exempt from competitive bidding/competitive selection requirements because the contract is for professional or unique services, an allowable exemption under City Charter Section 1002(H), or because it is contracted through PWP's joint powers agency, the Southern California Public Power Authority ("SCPPA"), another governmental entity, which is also an allowable exemption under City Charter Section 1002(F). Regardless of these exemptions, PWP's renewable energy procurement is generally in fact the result of competitive bidding and selection through SCPPA's open Renewable Energy Request for Proposal process. Even on the rare occasion when PWP has contracted directly with a renewable energy developer, rather than through SCPPA, the negotiated price has been comparable to prices received in the SCPPA RFP.

Plan Summary

The following tables and chart summarize the highlights of this plan:

Table 1
PWP's SBX1-2 Procurement Plan

Pasadena Water and Power

SBX1-2 State-Mandated 33% Procurement Plan (by Calendar Year)

	Compliance Period 1			Compliance Period 2			Compliance Period 3			
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh
Estimated PWP Retail Electric Sales (Load) - excludes PWP & water pumping load	1,123	1,125	1,094	1,110	1,120	1,105	1,089	1,073	1,058	1,044
SBX1-2 Mandatory RPS Procurement Requirement (%)	20%			20%	20%	25%	27%	29%	31%	33%
PWP SBX1-2 RPS Procurement Target w/Compliance Margin	22%			22%	22%	27%	29%	31%	33%	35%
SBX1-2 Mandatory RPS Requirement for PWP (GWh) plus compliance margin	735			244	247	298	316	333	349	365
PWP SBX1-2 RPS Already Met w/Current Contracts (GWh)	762			246	224	315	353	351	342	340
Future Purchases to Meet SBX1-2 Requirement w/Compliance Margin (GWh)	0			0	23	0	0	0	7	25
Portfolio Content Category 1 (GWh)	0			0	5	0	0	0	0	0
Portfolio Content Category 2 (GWh)	0			0	17	0	0	0	7	21
Portfolio Content Category 3 (GWh)	0			0	1	0	0	0	0	4
TOTAL PURCHASES FOR SBX1-2 plus compliance margin	762			246	247	315	353	351	349	365

2% *equals PWP Compliance Margin*

Pasadena Water and Power

SBX1-2 State-Mandated 33% Procurement Plan (by Calendar Year)

	Post 2020													
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh
Estimated PWP Retail Electric Sales (Load) - excludes PWP & water pumping load	1,041	1,037	1,034	1,030	1,028	1,025	1,022	1,018	1,015	1,012	1,009	1,005	1,003	1,001
SBX1-2 Mandatory RPS Procurement Requirement (%)	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%
PWP SBX1-2 RPS Procurement Target w/Compliance Margin	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%
SBX1-2 Mandatory RPS Requirement for PWP (GWh) plus compliance margin	365	363	362	361	360	359	358	356	355	354	353	352	351	351
PWP SBX1-2 RPS Already Met w/Current Contracts (GWh)	336	248	243	227	221	216	214	210	206	193	111	93	93	92
Future Purchases to Meet SBX1-2 Requirement w/Compliance Margin (GWh)	29	115	119	134	139	143	143	146	149	161	243	259	258	258
Portfolio Content Category 1 (GWh)	0	44	48	60	65	70	70	74	77	86	159	171	171	171
Portfolio Content Category 2 (GWh)	21	45	45	46	46	46	46	46	46	47	52	54	54	54
Portfolio Content Category 3 (GWh)	8	26	26	27	27	27	27	27	27	28	31	33	33	33
TOTAL PURCHASES FOR SBX1-2	365	363	362	361	360	359	358	356	355	354	353	352	351	351

2% *equals PWP Compliance Margin*

Table 2
PWP's Voluntary RPS Procurement Plan

Pasadena Water and Power

Pasadena Voluntary 40% RPS Procurement Plan (by Calendar Year)

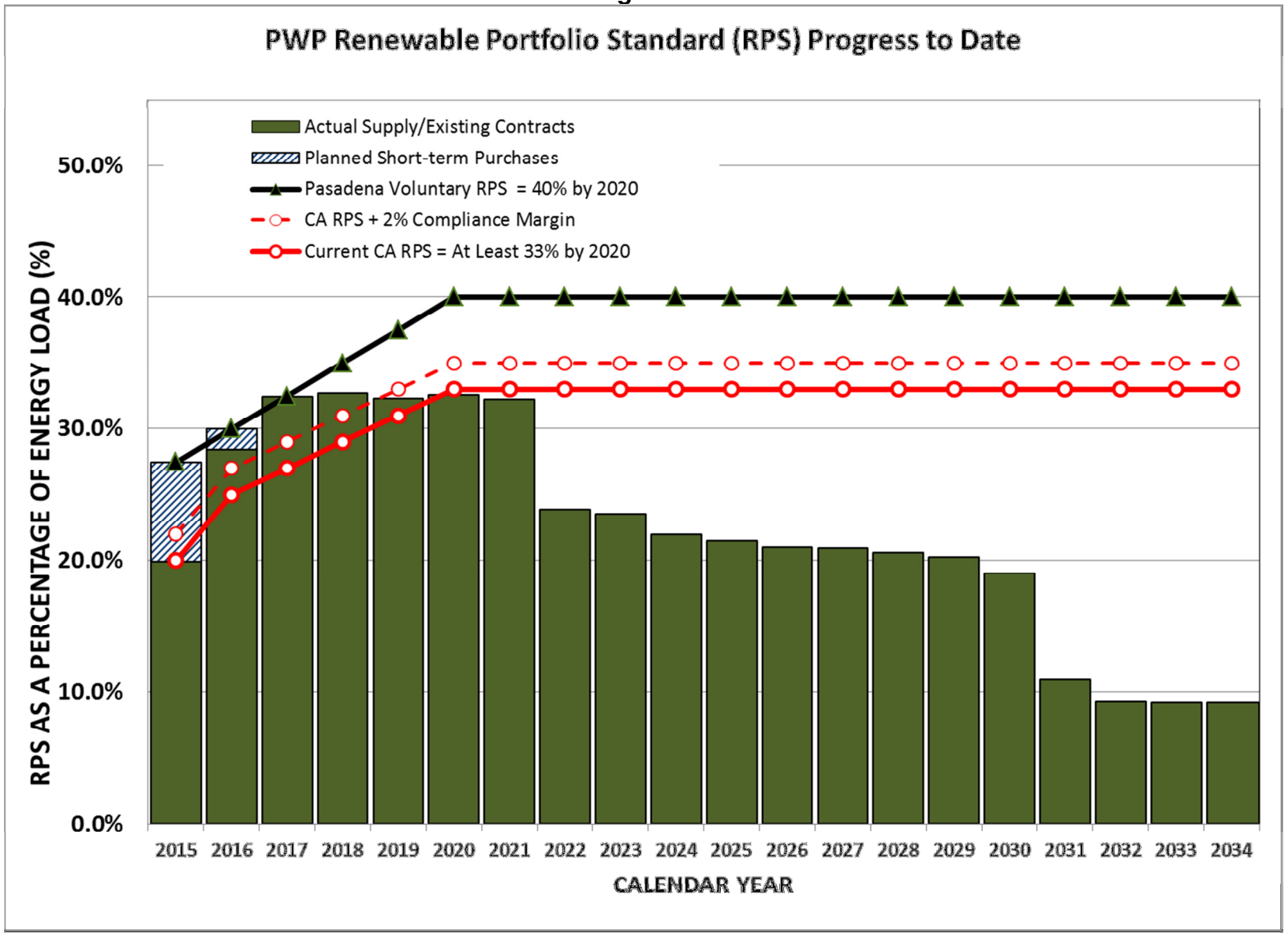
	Compliance Period 1			Compliance Period 2			Compliance Period 3			
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh
Estimated PWP Retail Electric Sales (Load) - excludes PWP & water pumping load	1,123	1,125	1,094	1,110	1,120	1,105	1,089	1,073	1,058	1,044
Procurement Plan to Meet PWP Voluntary RPS Target (%)	24.6%	24.8%	27.6%	26.0%	27.5%	30.0%	32.5%	35.0%	37.5%	40.0%
Pasadena Voluntary RPS Target (GWh)	281	283	306	293	313	336	359	381	403	424
PWP Voluntary RPS Already Met w/Current Contracts (GWh)	277	279	302	315	224	315	353	351	342	340
Required Future SBX1-2 Procurement (GWh)	0	0	0	0	23	0	0	0	7	25
Additional Future Purchases for PWP Voluntary RPS (GWh)	4	4	5	0	66	22	6	30	54	59
TOTAL PURCHASES FOR VOLUNTARY RPS	281	283	306	315	313	336	359	381	403	424

Pasadena Water and Power

Pasadena Voluntary 40% RPS Procurement Plan (by Calendar Year)

	Post 2020													
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh
Estimated PWP Retail Electric Sales (Load) - excludes PWP & water pumping load	1,041	1,037	1,034	1,030	1,028	1,025	1,022	1,018	1,015	1,012	1,009	1,005	1,003	1,001
Procurement Plan to Meet PWP Voluntary RPS Target (%)	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Pasadena Voluntary RPS Target (GWh)	423	422	420	419	418	417	416	414	413	412	410	409	408	407
PWP Voluntary RPS Already Met w/Current Contracts (GWh)	336	248	243	227	221	216	214	210	206	193	111	93	93	92
Required Future SBX1-2 Procurement (GWh)	29	115	119	134	139	143	143	146	149	161	243	259	258	258
Additional Future Purchases for PWP Voluntary RPS (GWh)	59	58	58	58	58	58	58	58	57	57	57	57	57	57
TOTAL PURCHASES FOR VOLUNTARY RPS	423	422	420	419	418	417	416	414	413	412	410	409	408	407

Figure 1


PWP Renewable Portfolio Standard (RPS) Progress to Date
Actual Supply/Existing Contracts
Planned Short-term Purchases
Pasadena Voluntary RPS = 40% by 2020
CA RPS + 2% Compliance Margin
Current CA RPS = At Least 33% by 2020
RPS AS A PERCENTAGE OF ENERGY LOAD (%)
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034
CALENDAR YEAR

Legislative Background

Since 2003, the City of Pasadena has enthusiastically pursued a course to set an example of environmental stewardship among other municipalities and organizations. PWP's first long term renewable energy contract was executed in 2003, preceding Senate Bill X1-2 by almost a decade. The City also established and actively maintains: (i) Urban Accords Goals, a general plan that emphasizes environmental protection, (ii) RPS goals beyond the State's requirements, (iii) Energy Efficiency/Demand Response programs for power customers, and (iv) A Master Plan and Strategic Planning Goals that maintain fiscal responsibility and stability, and improve, maintain, and enhance public facilities, infrastructure and sustainable conservation. These goals support and promote quality of life and the local economy.

In 2003, the Pasadena City Council adopted its first RPS of 20% renewable energy by the year 2020. In anticipation of the State Legislature adopting a new, higher 33% RPS goal, the City of Pasadena adopted a 40% RPS on March 16, 2009. In 2011, PWP updated the Electric Integrated Resource Plan and found that the basic principles, policies, and assumptions of 2009 only needed minor adjustments including a realignment and reduction in the interim goals leading up to the City's voluntary 40% in 2020 RPS goal in recognition of the slow economic recovery. On March 05, 2012, the City Council approved PWP's updated Integrated Resource Plan and reaffirmed the 40% RPS goal first established in 2009. PWP is in the process of again updating its Integrated Resource Plan for 2015.

In 2011, SBX1-2, also known as the Renewable Energy Resources Act, was enacted and required all load serving entities in the State to serve 33% of retail sales load with renewable energy by the year 2020. SBX1-2 includes very specific requirements about the types of renewable resources which may be counted toward meeting the new RPS goal, and includes a timetable of interim goals by which the target must be attained. Additionally, SBX1-2 empowered the California Energy Commission ("CEC") to regulate Publicly Owned Utilities' RPS efforts to meet the 33% by 2020 RPS goal, enforceable through penalties levied by the California Air Resources Board as emissions violations under the Health and Safety Code. In addition to regulating the Publicly Owned Utilities, the CEC has been tasked with clarifying any issues that were left un- or under-defined in SBX1-2. As clarifications and revisions are adopted, the CEC publishes updates to the Renewables Portfolio Standard Eligibility and Overall Program Guidebooks. The CEC has adopted its RPS Eligibility Guidebook[4], under which this Plan was developed. The CEC also developed its Enforcement Procedures for The Renewables Portfolio Standard for Local Publicly Owned Electric Utilities. The Enforcement Procedures specify rules and procedures for enforcement of the RPS by the CEC with respect to Publicly Owned Utilities, and provides the targets for each Compliance Period and Category of renewable energy procurement.

[4] California Energy Commission: "Renewables Portfolio Standard Eligibility Seventh Edition Commission Guidebook," April 2013; CEC-300-2013-005-ED7-CMF

The following categories of the renewable resources should be used to meet the statutory RPS procurement targets:

(i) **Portfolio Content Category Zero** ("**Category 0**"): Resources procured prior to June 1, 2010 are "grandfathered" and will "count in full" (i.e., be subtracted from the total RPS requirement without being classified into any of the other three Categories). The Total RPS requirement, minus the grandfathered Category 0 resources that count in full will result in a "Net" RPS requirement, against which the other Category percentages apply ("Net Procurement Requirement").

(ii) **Portfolio Content Category One** ("**Category 1**"): Eligible renewable energy resource electricity that meets the requirement of "in-state," or "out-of-state" resources scheduling power directly to a California balancing authority in accordance with Public Utilities Code section 399.16(b)(1);

(iii) **Portfolio Content Category Two** ("**Category 2**"): Resources that may be delivered at times or locations other than when the energy is actually produced, in accordance with Public Utilities Code Section 399.16(b)(2); and,

(iv) **Portfolio Content Category Three** ("**Category 3**"): Eligible renewable energy resource electricity products or any fraction of the electricity generated, including unbundled renewable energy credits that do not qualify under the criteria of Category 1 or 2, in accordance with Public Utilities Code Section 399.16(b)(3).

The "Net Procurement Requirement" shall be defined as the total RPS requirement minus the grandfathered Category 0 resources, which shall count in full. PWP shall assign eligible renewable energy resource electricity products to the appropriate Category consistent with Grandfathering provisions in Section F of the Enforcement Program and the CEC Enforcement Procedures, Section 3204.

Under the CEC's Enforcement Procedures, all publicly owned utilities must show an increasing annual renewable energy procurement to demonstrate reasonable progress towards reaching the mandated 33% RPS target by calendar year 2020. PWP must procure a minimum quantity of electricity products from eligible renewable energy resources, including renewable energy credits, as a specified percentage of total retail sales to achieve the following targets.

(i) **Compliance Period One** (January 1, 2011 through December 31, 2013): 20% Total RPS as an average for the period; not less than 50 percent of eligible renewable energy resources procured toward Net Procurement Requirement on or after June 1, 2010 shall be Category 1, and not more than 25 percent of the Net Procurement Requirement shall be Category 3. The

remaining amount needed to meet the Net Procurement Requirement can be fulfilled by procuring Category 2[5] renewable energy resources;

(ii) **Compliance Period Two** (January 1, 2014 through December 31, 2016): 20% Total RPS by 2014 and 2015, and 25% Total RPS by December 31, 2016; not less than 65 percent of eligible renewable energy resources procured toward the Net Procurement Requirement on or after June 1, 2010 shall be Category 1, and not more than 15 percent shall be Category 3. The remaining amount needed to meet the Net Procurement Requirement can be fulfilled by procuring Category 2[6] renewable energy resources; and,

(iii) **Compliance Period Three** (January 1, 2017 through December 31, 2020): 27% Total RPS by 2017, 29% Total RPS by 2018, 31% Total RPS by 2019, 33% Total RPS by 2020, and 33% Total RPS each year thereafter. From January 1, 2017, not less than 75 percent of eligible renewable energy resources procured toward the Net Procurement Requirement on or after June 1, 2010 shall be Category 1, and not more than 10 percent toward the Net Procurement Requirement shall be Category 3. The remaining amount needed to meet the Net Procurement Requirement can be fulfilled by procuring Category 2[7] renewable energy resources.

RPS Compliance Penalties

To estimate the potential maximum penalty amount PWP could be subject to for RPS non-compliance, PWP has used the following formula: Procurement Quantity Requirement * 0.5 * $50/REC. For example, if PWP estimates its Retail Sales to be 1,100 GWh, and the State RPS target for the year is 20%, PWP must procure 220 GWh of renewable energy. Its compliance penalty would be capped at $5.5 million (222,000 MWh x 0.5 x $50/MWh = $5.5 million).

CARB is tasked with determining and assessing penalties for publicly-owned utilities which are "comparable to those adopted by the [California Public Utilities] commission for noncompliance by retail sellers." The penalty for RPS procurement deficits applicable to investor-owned utilities and other retail sellers under the jurisdiction of the CPUC is currently $50 for each renewable energy credit of the deficiency in meeting the procurement quantity requirement, or the shortfall in meeting the portfolio balance requirement. The limit on the total amount of penalties to be paid in one compliance period for any CPUC jurisdictional seller other than the 3 large investor-owned utilities (SCE, PG&E and SDG&E) is the lesser of (i) 50% of the procurement quantity requirement ("PQR") of the retail seller for that compliance period (in renewable energy credits ("REC"), multiplied by the penalty amount of

[5] Where procurement of Category 2 or 3 is allowed, a higher Category may be substituted (i.e., Category 2 for Category 3, or Category 1 for Category 2 or Category 3).
[6] Where procurement of Category 2 or 3 is allowed, a higher Category may be substituted (i.e., Category 2 for Category 3, or Category 1 for Category 2 or Category 3).
[7] Where procurement of Category 2 or 3 is allowed, a higher Category may be substituted (i.e., Category 2 for Category 3, or Category 1 for Category 2 or Category 3).

$50/REC (i.e., PQR (in REC) * 0.5 * $50/REC), or (ii) the amount of $75 million for the first compliance period (2011-2013); $75 million for the second compliance period (2014-2016); $100 million for the third compliance period (2017-2020); and $25 million for each annual compliance period beginning in 2021. The cap for the IOUs is (ii) above. It is important to note that this benchmark provides an estimate only. The comparability standard does not necessarily mean that the CARB and CPUC penalties must be identical.

The following table summarizes the renewable energy procurement requirements under the CEC Enforcement Procedures and Pasadena's own Enforcement Program.

Table 3: Renewable Resource Categories and RPS Requirements

Pasadena Water & Power CEC-Compliant Procurement Plan Requirements by Calendar Year										
	Compliance Period 1			Compliance Period 2			Compliance Period 3			
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020+
SBX1-2 RPS Mandatory Procurement Requirement (% of Retail Load) [1]	20%			20%	20%	25%	27%	29%	31%	33%
Category 0:	No constraint									
Category 1 Minimum:	≥50% of Net Procurement Requirement			≥65% of Net Procurement Requirement			≥75% of Net Procurement Requirement			
Category 2: Maximum [2]**:**	≤50% of Net Procurement Requirement			≤35% of Net Procurement Requirement			≤25% of Net Procurement Requirement			
Category 3 Maximum:	≤25% of Net Procurement Requirement			≤15% of Net Procurement Requirement			≤10% of Net Procurement Requirement			

[1] As imposed by the CEC Guidebook, and CEC Enforcement Procedures. SBX1-2 does not include specific interim targets in Compliance Period 3, just an obligation to make "reasonable progress."
[2] The Category 2 constraint is not specified by law, but is derived logically as the residual given the Category 1 and 3 constraints.

Details of the above requirements can be found in the CEC's Enforcement Procedures for Local Publicly Owned Utilities.

Procurement Plan

Background – Supply vs. Load

This Plan follows the renewable energy procurement guidelines recommended by the PWP Integrated Resource Plan Update which was in effect and/or being developed by PWP, on the date this Plan was proposed. The Integrated Resource Plan is designed to strike a balance between environmental regulatory compliance and system reliability while maintaining stable and minimal retail electric rates. The Integrated Resource Plan projects that PWP's retail sales load will remain relatively flat or grow at a rate less than 1% due initially to the weak economic recovery and increasing implementation of demand response and energy efficiency programs going into the future, as shown in Figure 2. PWP's load forecast recognizes that most load growth will incorporate

statewide building and appliance efficiency standards. As older, less efficient buildings are replaced with newer, more efficient ones, it is believed that a growing population can be served with less energy. The energy efficiency, demand-side management, and demand response referenced below and in PWP's integrated resource plan does not include that achieved in response to state-wide building and appliance efficiency standards, for example, but only the incremental amount achieved in response to PWP sponsored programs and incentives.

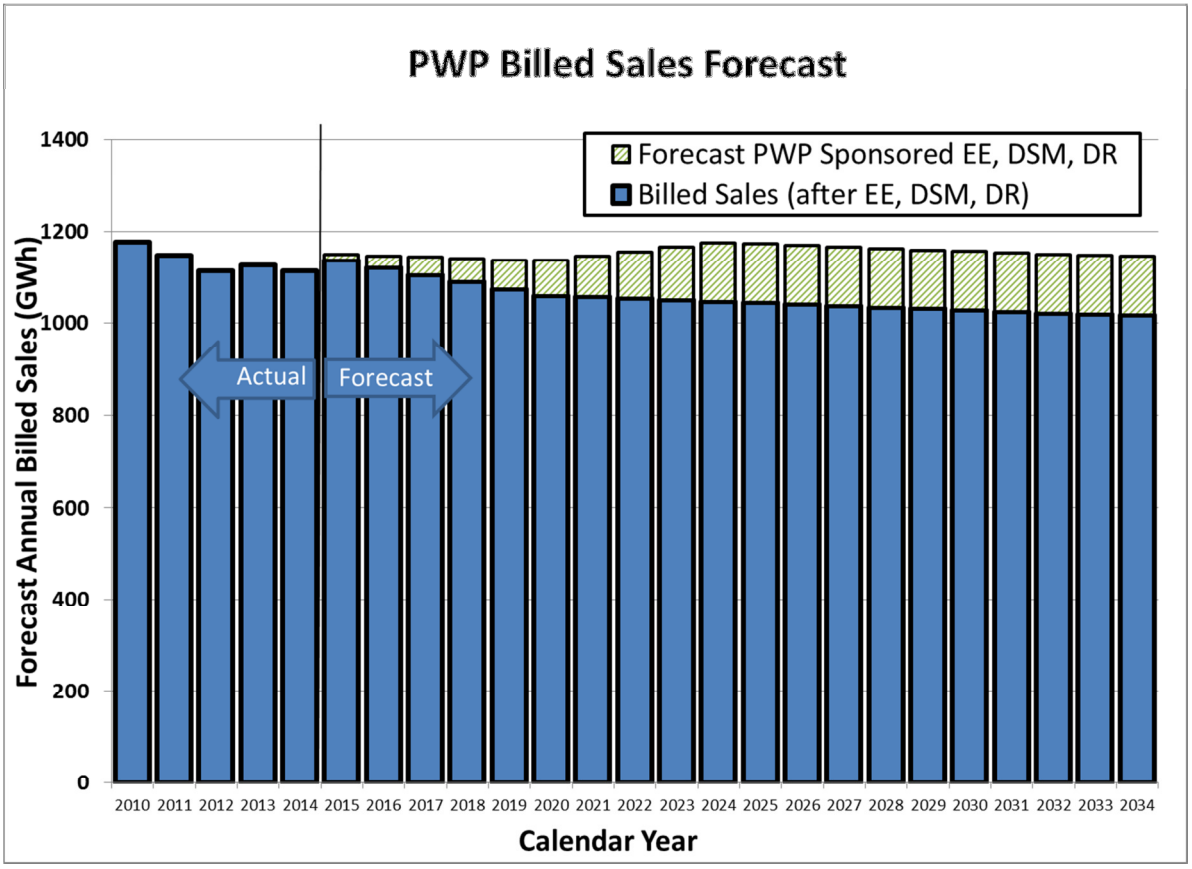


Figure 2
Load Projection

Having weathered three major energy crises since 1970, PWP's first priority has always been to maintain system resource reliability. Unlike California's investor-owned utilities, publicly-owned utilities like PWP did not sell all of their generation prior to the energy crisis. As a result, PWP can generally be considered fully resourced as shown in Figure 3. The shift in policy, both internally and globally, towards environmental stewardship has put PWP in an position of being required to procure additional resources to meet the State requirement of up to 33% of retail sales with renewable resources that may be in excess of the City's net retail load after existing resources are taken into consideration. Some of PWP's existing resources have substantial fixed and/or low variable costs, and some emit zero carbon (e.g., Hoover Dam and Palo Verde Nuclear). Although a sizeable portion of additional renewable energy can be accommodated through tighter management of current long term resource contracts and reductions in

short term energy purchases, some of the new renewable resources are still in excess of the City's needs. The Intermountain Power Project coal contract will terminate in the year 2027 and the shortfall in capacity and energy can be fulfilled with additional renewable energy resources, to some extent, but additional natural gas-fired resources are also expected to be needed for reliability to balance the additional renewables. PWP will have increased obligations to meet flexible resource adequacy requirements to support fluctuating loads and intermittent renewable generation in the future.

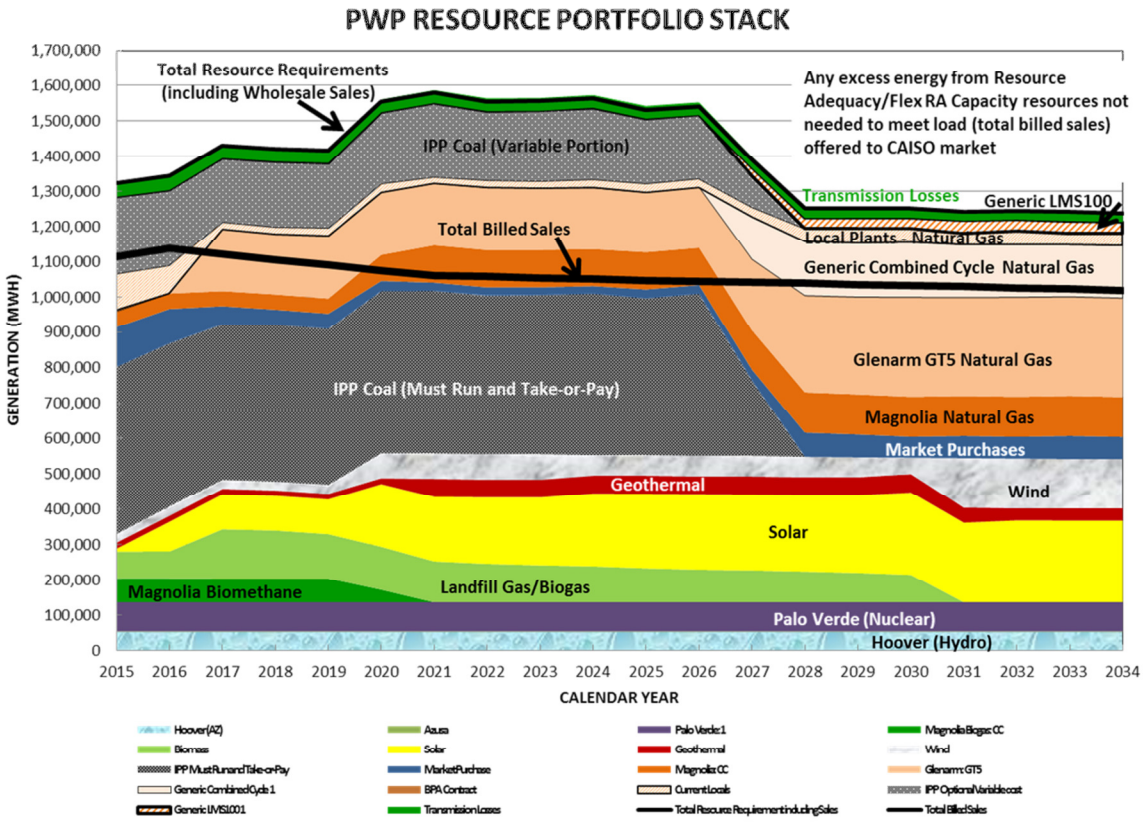


Figure 3
Projected Portfolio of Long Term Contracts and Generation

Category 0

Under the CEC's procurement requirements, grandfathered renewable resources fall under a "Category 0." Renewable resources categorized under Category 0 "count in full" towards fulfilling the RPS goals set in SBX1-2, and are subtracted from the total RPS requirement prior to splitting out the allocation to the other three Categories defined in SBX1-2. Only renewable resources procured after June 01, 2010 to fill the difference between the grandfathered resources and the remaining RPS goals (the remaining obligation herein referred to as the "Net Procurement Requirement") count towards meeting the specific Category 1 through 3 requirements.

Table 4
Long Term Renewable Electric Energy Contracts
Executed Prior to June 1, 2010
(Category 0)

Counterparty	Project	Technology	State	Contract Number	Date Signed	Term
Azusa Hydro	Azusa Hydro	Small Hydro	CA	Deed of Trust	Apr 16, 1905	Life of facility
Iberdrola Renewables	Solano Wind Project	Wind	CA	18242	Aug 15, 2003	20 years
Ormat	Heber South	Geothermal	CA	18802	Jun 23, 2005	25 years
Fortistar	West Covina LLC - Unit 1	LFGTE	CA	19237	Nov 20, 2006	10 years
Fortistar	West Covina LLC - Unit 2	LFGTE	CA	19238	Nov 20, 2006	10 years
Fortistar	Tulare Energy LLC	LFGTE	CA	19239	Nov 20, 2006	10 years
Ameresco	Chiquita Landfill	LFGTE	CA	18405	Mar 16, 2004	20 years
UPC Wind I	Milford I Wind	Wind	Utah	19488	Oct 01, 2007	20 years
Glendale Landfill	Scholl Canyon Landfill	LFGTE	CA	15609	May 05, 2010	1 year

** Landfill Gas to Energy*

Biomethane

The CEC has made substantive changes to the RPS rules regarding biomethane eligibility. In particular, a facility using biomethane delivered through a common carrier pipeline is subject to different requirements based on the date of the biomethane procurement contract. A “new biomethane procurement contract” includes a biomethane procurement contract executed on or after March 29, 2012, an amendment executed on or after March 29, 2012 to an existing biomethane procurement contract, or a biomethane procurement contract or contract amendment executed before March 29, 2012, but reported to the Energy Commission on or after March 29, 2012. New biomethane contracts are subject to different requirements than existing contracts, e.g., (a) demonstrating that the capture and injection of biomethane into a common carrier pipeline directly results in specific environmental benefits to California, (b) specific delivery requirements, which could be met by the generation facility being within California, receiving biomethane from a biomethane production site that injects biomethane into a common carrier pipeline that physically flows within California, and (c) each segment of the pipeline(s) along the delivery path must physically flow from the initial injection point toward the receipt point at the facility at least 50 percent of the time on an annual basis, as determined by the Energy Commission.

Table 5
Biomethane Agreements Executed Between June 1, 2010 and March 29, 2012

Counterparty	Project	Technology	State	Contract Number	Date Signed	Term
EDF Trading North Americ	Dos Rios	Biomethane Gas	TX	20655	May 26, 2011	10 years
Shell Q3 2011	La Rosita and High Desert	LFGTE	CA	15609	Jun 29, 2011	3 months
Sequent	Meadow Branch	Biomethane Gas	TN	20706	Jul 22, 2011	10 years
WMRE of Ohio-American,	Long Term	Biomethane Gas	OH	20707	Aug 15, 2011	10 years
WMRE of Ohio-American,	Short Term	Biomethane Gas	OH	20707	Sep 29, 2011	4 months

Compliance Strategy

PWP starts with a projected load forecast based on historical actual load, extrapolating future loads and projecting estimated energy efficiency savings and PWP's energy consumption including water pumping load. The PWP RPS Procurement Requirement is calculated by multiplying the net retail load forecast for each year (in GWh[8]) by the required annual RPS percentage for that year to come up with the amount of renewable energy (in GWh) required by year (the annual "RPS Total Procurement Requirement").

*To be conservative, PWP will generally target a procurement amount that includes a reasonable **compliance margin**, currently two percent higher than the calculated minimum RPS Procurement Requirement, to protect against deviations in forecasted load and variable renewable resource performance. This extra two percent is included in the SBX1-2 procurement tables.*

Next we subtract from the annual RPS Total Procurement Requirement, by Category and Compliance Period, the amount of energy that has already been procured by PWP. First are the existing, grandfathered contracts in Category 0. The resulting number is the RPS "Net Procurement Requirement."

Category 1

Category 1 renewables are "bundled" to include the energy and renewable attributes, delivered together at the time and generally, the location that they are produced (unless a different delivery point is agreed upon). The majority of PWP's contracts that were not grandfathered into Category 0 are Category 1 resources. PWP believes that its existing long-term biogas contracts, listed above in Table 5, continue to meet the criteria for Category 1 under the CEC regulations, e.g.:

- The contracts were executed after June 1, 2010;
- The electricity product is associated with generation from an eligible renewable energy resource that met the CEC's RPS eligibility requirements (rules) that were in effect when the original procurement contract or ownership agreement was executed by PWP;
- The associated RECs will be retired within 36 months of the date the electricity product is generated;
- The source(s) and the amount of biomethane under the biomethane procurement contract were reported to the Energy Commission before March 29, 2012 in connection with the application for RPS certification or precertification of the designated electrical generation facility.[9]

[8] GWh = Gigawatt-hours = one billion watt-hours

[9] See CEC "Renewables Portfolio Standard Eligibility Seventh Edition Commission Guidebook," April 2013, CEC-300-2013-005-ED7-CMF, Section IIC – Eligibility – Biomethane (pg. 10)

Category 2

The total amount of energy PWP is obligated to procure in any particular compliance period includes a minimum amount of Category 1 purchases, and a maximum amount of Category 2 purchases. The residual can be either Category 1 or Category 2. An example of a Category 2 resource could be a wind farm in the Pacific Northwest that produces energy on an as-available basis into the Bonneville Power Administration Balancing Area, which then schedules a fixed amount of firm energy to a buyer in the CAISO Balancing Area. The buyer receives energy that has been "firmed" by BPA, and is delivered at a time and delivery point that is not necessarily the same as that of the renewable resource. However, the renewable attributes associated with the energy produced by that resources are tied to the actual metered energy from the resource, so the Renewable Energy Certificates, or "RECs" that the buyers receives, will be limited to the amount the resource actually produces. To the extent they are available, Category 2 RECs are typically less expensive to procure (on a $/MWh basis) than Category 1. To date, PWP has secured approximately 92 GWh of Category 2 renewables.

Category 3

In addition to long term contracts, the 2012 Integrated Resource Plan Update also recommends that PWP purchase short term Renewable Energy Credits ("RECs") as needed to meet the State's RPS requirements as well as the City's voluntary RPS goals. REC purchases are shown in Table 6. RECs fall into Category 3.

Table 6
REC Purchases
Category 3

Counterparty	RECs (MWh)[10]	Vintage (Term)
Grey K Renewable Energy Ltd.	40,000	CY 2011
Lakeview Green Energy	22,426	CY 2011
Falls Creek H.P., L.P.	14,914	CY 2011
Falls Creek H.P., L.P.	15,045	CY 2012
Farmers Irrigation District, Hood River	16,683	CY 2012
Central Oregon Irrigation District	23,272	CY 2012
EDF Trading North America, LLC	7,000	CY 2013
Falls Creek H.P., L.P.	6,072	CY 2012
Avista Corp.	66,000	CY 2014
Avista Corp.	11,500	CY 2014
Avista Corp.	6,750	CY 2014

[10] MWh = Megawatt-hour = one million watt-hours

Balanced Portfolio

After determining the amount of energy already procured in each year and in each Category or bucket, PWP must determine the amount of RPS Procurement still required in each Category and year. This requires a calculation of the RPS procurement constraints reflected in Table 3: Category 1 Minimums and Category 3 Maximums (percentages multiplied by Net Procurement Requirement), and a comparison of annual energy procurement against these constraints to determine if future compliance will require additional purchases of Category 1 resources, or will limit purchases of Category 3 resources. The final calculation for SBX1-2 compliance is the net short evaluation: If the sum of existing contracts is less than the total required RPS Net Procurement Requirement energy for the year, the difference is the amount that must be procured, and allocated to the Categories according to the constraints.

In addition to balancing between Categories and Compliance Periods, PWP must consider the right mix of resources to fit PWP's portfolio and load as it evaluates RPS proposals. This means determining whether to select base-load projects, such as geothermal and landfill gas, or variable/peaking projects such as wind and solar. It also means weighing the right mix of contract terms (long vs. short) and counterparties to diversify and spread the risk of contract expiration and potential contract failure to ensure the best product and value for our ratepayers.

Because PWP is a relatively small municipal utility, it solicits most of its long-term renewable resources through open Requests for Proposals conducted by its joint powers authority, SCPPA[11]. This allows PWP (and other SCPPA members) to purchase the output of portions of multiple diverse projects and gain economies of scale, rather than limit the projects that each would be capable of participating in due to the comparatively small demand of most of the individual utilities. PWP anticipates dividing its outstanding RPS procurement between base-load and peaking renewable resources, and seeking some long- and some mid-term contract lengths. In this case, PWP defines long-term as most likely fifteen to twenty years or longer, and mid-term as five to ten years. PWP may also procure some RECs and/or Category 2 products with shorter tenures. These last products may be tied to market indices, whereas the other products are typically fixed-priced.

PWP's Voluntary Integrated Resource Plan RPS Strategy

Above and beyond the mandatory RPS Procurement amount required under SBX1-2, PWP's target of 40% by 2020 dictates the additional procurement of renewables. This incremental amount does not need to be in any particular Category. PWP looks for opportunities to procure incremental renewable resources that are economical, reliable,

[11] SCPPA = Southern California Public Power Authority, which includes the cities of Anaheim, Azusa, Banning, Burbank, Cerritos, Colton, Glendale, Los Angeles Dept. of Water & Power, Pasadena, Riverside, Vernon, and the Imperial Irrigation District.

and a good fit for its portfolio of resources. PWP tends to favor resources that, all else being equal, are located within the State of California and CAISO SP15[12].

Summary of Procurement Plan

Table 7 displays PWP's Procurement Plan for meeting the SBX1-2 goals, assuming the resource designations (Categories) required under the CEC Enforcement Procedures. Table 8 displays PWP's plan for procuring incremental renewable resources to meet the City's voluntary RPS goal. These tables include the grandfathered (Category 0) resources listed in Table 4, the additional existing contracts listed in Table 5 (Category 1) and the short term REC purchases shown in Table 6 (Category 3).

[12] SP15 is the California Independent System Operator's South of Path 15 zone, where resources that are deliverable to Pasadena load, with the least congestion and losses, and the highest probability of providing local area reliability capacity, are most likely to be located. Assuming price parity, such resources would be the most valuable to PWP.

Table 7 – PWP's SBX1-2 Procurement Plan

Pasadena Water and Power
SBX1-2 Mandatory RPS Procurement Plan (by Calendar Year)

2% *equals PWP Compliance Margin*	Compliance Period 1			Compliance Period 2			Compliance Period 3				Post 2020													
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh
Estimated PWP Electric Sales (Load) (GWh)	1,140.3	1,140.1	1,110.4	1,126.1	1137.0	1121.1	1105.4	1090.0	1074.7	1060.2	1058.0	1054.0	1051.0	1047.0	1045.0	1042.0	1039.0	1035.0	1032.0	1029.0	1026.0	1022.0	1020.0	1018.0
Estimated PWP Water Load (GWh)	17.1	15.5	16.9	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
Estimated PWP Electric Sales subtract Water Load (GWh)	1,123.1	1,124.6	1,093.5	1,109.6	1,120.5	1,104.6	1,088.9	1,073.4	1,058.2	1,043.7	1,041.5	1,037.5	1,034.5	1,030.5	1,028.5	1,025.5	1,022.5	1,018.5	1,015.5	1,012.5	1,009.5	1,005.5	1,003.5	1,001.5
SBX1-2 Mandatory RPS Procurement Requirement (%)	20%			20%	20%	25%	27%	29%	31%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%
SBX1-2 Mandatory RPS Requirement for PWP (GWh)	668.3			221.9	224.1	276.2	294.0	311.3	328.0	344.4	343.7	342.4	341.4	340.1	339.4	338.4	337.4	336.1	335.1	334.1	333.1	331.8	331.1	330.5
Procurement Plan to Meet SBX1-2 RPS Target + PWP Compliance Margin (%)	22%			22%	22%	27%	29%	31%	33%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%
Procurement Plan to Meet SBX1-2 RPS Target + PWP Compliance Margin (GWh)	735.1			244.1	246.5	298.2	315.8	332.8	349.2	365.3	364.5	363.1	362.1	360.7	360.0	358.9	357.9	356.5	355.4	354.4	353.3	351.9	351.2	350.5
PWP SBX1-2 RPS Already Met w/Current Contracts (% of Load)	22.6%			22.2%	19.9%	28%	32.4%	32.7%	32.3%	32.6%	32.2%	23.9%	23.5%	22.0%	21.5%	21.0%	21.0%	20.6%	20.3%	19.1%	11.0%	9.3%	9.3%	9.2%
PWP SBX1-2 RPS Already Met w/Current Contracts (GWh)	762.1			246.4	223.5	314.5	353.2	351.3	341.9	339.9	335.8	247.9	243.4	226.8	221.1	215.8	214.4	210.0	206.2	193.3	110.7	93.4	92.9	92.4
Portfolio Content Category 0 (GWh)	413.8			116.6	118.5	120.7	78.3	78.3	78.3	78.5	78.3	78.3	78.3	65.4	65.4	65.4	65.4	65.4	65.4	55.4	18.4	2.0	2.0	2.0
Portfolio Content Category 1 (GWh)	284.7			87.3	78.0	155.8	274.9	273.0	263.6	261.5	257.5	169.5	165.1	161.4	155.7	150.4	149.0	144.6	140.8	137.8	92.3	91.4	90.9	90.4
Portfolio Content Category 2 (GWh)	0.0			26.8	27.0	38.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portfolio Content Category 3 (GWh)	63.6			15.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RPS Contracts Under Negotiation (GWh)	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portfolio Content Category 1 (GWh)	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portfolio Content Category 2 (GWh)	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portfolio Content Category 3 (GWh)	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Future SBX1-2 Minimum Purchase Requirements (GWh)	0.0			0.0	23.0	0.0	0.0	0.0	7.3	25.4	28.7	115.3	118.6	133.8	138.9	143.1	143.5	146.4	149.2	161.1	242.6	258.5	258.3	258.1
Portfolio Content Category 1 (GWh)	0.0			0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0	44.1	47.7	60.0	65.2	69.7	70.4	73.7	76.7	86.4	158.9	171.1	171.0	171.0
Portfolio Content Category 2 (GWh)	0.0			0.0	17.2	0.0	0.0	0.0	7.3	20.9	20.8	44.8	44.6	46.3	46.2	46.1	45.9	45.7	45.5	46.9	52.3	54.5	54.4	54.3
Portfolio Content Category 3 (GWh)	0.0			0.0	0.6	0.0	0.0	0.0	0.0	4.5	7.9	26.4	26.3	27.5	27.4	27.3	27.2	27.1	27.0	27.9	31.5	33.0	32.9	32.8
Total SBX1-2 RPS Procurement GWh	762.1			246.4	246.5	314.5	353.2	351.3	349.2	365.3	364.5	363.1	362.1	360.7	360.0	358.9	357.9	356.5	355.4	354.4	353.3	351.9	351.2	350.5
Portfolio Content Category 0 (GWh)	413.8			116.6	118.5	120.7	78.3	78.3	78.3	78.5	78.3	78.3	78.3	65.4	65.4	65.4	65.4	65.4	65.4	55.4	18.4	2.0	2.0	2.0
Portfolio Content Category 1 (GWh)	284.7			87.3	83.2	155.8	274.9	273.0	263.6	261.5	257.5	213.6	212.8	221.4	220.9	220.1	219.3	218.3	217.5	224.2	251.2	262.4	261.9	261.4
Portfolio Content Category 2 (GWh)	0.0			26.8	44.2	38.0	0.0	0.0	7.3	20.9	20.8	44.8	44.6	46.3	46.2	46.1	45.9	45.7	45.5	46.9	52.3	54.5	54.4	54.3
Portfolio Content Category 3 (GWh)	63.6			15.8	0.6	0.0	0.0	0.0	0.0	4.5	7.9	26.4	26.3	27.5	27.4	27.3	27.2	27.1	27.0	27.9	31.5	33.0	32.9	32.8
SBX1-2 RPS Procurement Limits																								
Portfolio Content Category 1 Minimum + PWPCompliance Margin (GWh) ≥	160.7			82.9	83.2	115.4	178.1	190.8	203.2	215.1	214.6	213.6	212.8	221.4	220.9	220.1	219.3	218.3	217.5	224.2	251.2	262.4	261.9	261.4
Portfolio Content Category 3 Maximum (GWh) ≤	63.6			15.8	15.8	23.3	21.6	23.3	25.0	26.6	26.5	26.4	26.3	27.5	27.4	27.3	27.2	27.1	27.0	27.9	31.5	33.0	32.9	32.8
Anticipated Portfolio Content Category 1 Overprocurement Margin (GWh)	124.0			4.4	0.0	40.4	96.8	82.2	60.4	46.3	42.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anticipated Portfolio Content Category 1 Overprocurement Margin (%)	77.2%			5.3%	0.0%	35.0%	54.3%	43.1%	29.7%	21.5%	19.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Table 8 – PWP's Voluntary RPS Procurement Plan

Pasadena Water and Power
Pasadena Voluntary RPS Procurement Plan (by Calendar Year)

	Compliance Period 1			Compliance Period 2			Compliance Period 3				Post 2020													
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh
Estimated PWP Electric Sales (Load) (GWh)	1,140.3	1,140.1	1,110.4	1,126.1	1,137.0	1,121.1	1,105.4	1,090.0	1,074.7	1,060.2	1,058.0	1,054.0	1,051.0	1,047.0	1,045.0	1,042.0	1,039.0	1,035.0	1,032.0	1,029.0	1,026.0	1,022.0	1,020.0	1,018.0
Estimated PWP Water Load (GWh)	17.1	15.5	16.9	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
Estimated PWP Electric Sales minus Water Load (GWh)	1,123.1	1,124.6	1,093.5	1,109.6	1,120.5	1,104.6	1,088.9	1,073.4	1,058.2	1,043.7	1,041.5	1,037.5	1,034.5	1,030.5	1,028.5	1,025.5	1,022.5	1,018.5	1,015.5	1,012.5	1,009.5	1,005.5	1,003.5	1,001.5
Procurement Plan to Meet SBX1-2 RPS Target + PWP Compliance Margin (%)	22%			22%	28%	28%	29%	31%	33%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%
Procurement Plan to Meet SBX1-2 RPS Target + PWP Compliance Margin (GWh)	735.1			244.1	308.1	303.8	315.8	332.8	349.2	365.3	364.5	363.1	362.1	360.7	360.0	358.9	357.9	356.5	355.4	354.4	353.3	351.9	351.2	350.5
Procurement Plan to Meet PWP Voluntary RPS Target (%)	24.6%	24.8%	27.6%	26.0%	27.5%	30.0%	32.5%	35.0%	37.5%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Pasadena Voluntary RPS Target (GWh)	281.0	282.5	306.2	292.8	312.7	336.3	359.3	381.5	403.0	424.1	423.2	421.6	420.4	418.8	418.0	416.8	415.6	414.0	412.8	411.6	410.4	408.8	408.0	407.2
PWP Voluntary RPS Already Met w/Current Contracts (% of Load)	24.3%	24.4%	27.2%	28.0%	19.7%	28.1%	31.9%	32.2%	31.8%	32.1%	31.7%	23.5%	23.2%	21.7%	21.2%	20.7%	20.6%	20.3%	20.0%	18.8%	10.8%	9.1%	9.1%	9.1%
PWP Voluntary RPS Already Met w/Current Contracts (GWh)	276.8	278.7	301.5	314.9	223.5	314.5	353.2	351.3	341.9	339.9	335.8	247.9	243.4	226.8	221.1	215.8	214.4	210.0	206.2	193.3	110.7	93.4	92.9	92.4
Required Future SBX1-2 Procurement (GWh)	0.0	0.0	0.0	0.0	23.0	0.0	0.0	0.0	7.3	25.4	28.7	115.3	118.6	133.8	138.9	143.1	143.5	146.4	149.2	161.1	242.6	258.5	258.3	258.1
Additional Future Purchases for PWP Voluntary RPS (GWh)	4.2	3.8	4.7	0.0	66.2	21.8	6.1	30.1	53.8	58.8	58.7	58.5	58.3	58.1	58.0	57.9	57.7	57.5	57.4	57.2	57.1	56.9	56.8	56.7
Total PWP Voluntary RPS Procurement (GWh)	281.0	282.5	306.2	314.9	312.7	336.3	359.3	381.5	403.0	424.1	423.2	421.6	420.4	418.8	418.0	416.8	415.6	414.0	412.8	411.6	410.4	408.8	408.0	407.2
Total PWP Voluntary RPS Procurement (%)	24.6%	24.8%	27.6%	28.0%	27.5%	30.0%	32.5%	35.0%	37.5%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%

Table 9 – PWP RPS Procurement Plan by Resource Type

Pasadena Water and Power Procurement Plan (by Calendar Year)	Compliance Period 1			Compliance Period 2			Compliance Period 3				Post 2020													
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh
Hydro	8.1	4.5	0.0	0.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Wind	24.0	25.7	22.3	22.6	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	10.0	10.0	10.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0	0.0
Solar	0.0	0.4	0.9	1.1	8.3	83.8	99.1	98.6	98.1	97.8	97.2	96.7	96.2	95.8	95.2	94.8	94.3	93.8	93.3	92.8	92.3	91.4	90.9	90.4
Geothermal	16.9	19.1	30.4	13.7	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	0.0	0.0	0.0
Landfill Gas	117.1	79.1	84.8	80.3	79.3	79.4	139.2	136.2	125.6	122.1	117.2	109.9	106.0	102.7	97.5	92.7	91.8	87.9	84.6	82.1	0.0	0.0	0.0	0.0
Biomethane	18.3	74.9	94.7	70.7	69.7	72.1	73.5	75.2	76.8	78.7	80.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RECs	77.3	55.0	26.2	84.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	15.0	20.0	42.3	42.3	27.0	38.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	276.8	278.7	301.5	314.9	223.5	314.5	353.2	351.3	341.9	339.9	335.8	247.9	243.4	226.8	221.1	215.8	214.4	210.0	206.2	193.3	110.7	93.4	92.9	92.4

Pasadena Water and Power Procurement Plan (by Calendar Year)	Compliance Period 1			Compliance Period 2			Compliance Period 3				Post 2020													
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Hydro	2.9%	1.6%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.8%	0.8%	0.9%	0.9%	0.9%	0.9%	1.0%	1.0%	1.0%	1.8%	2.1%	2.2%	2.2%
Wind	8.7%	9.2%	7.4%	7.2%	10.2%	7.3%	6.5%	6.5%	6.7%	6.7%	6.8%	9.2%	9.4%	4.4%	4.5%	4.6%	4.7%	4.8%	4.8%	0.0%	0.0%	0.0%	0.0%	0.0%
Solar	0.0%	0.2%	0.3%	0.3%	3.7%	26.6%	28.1%	28.1%	28.7%	28.8%	28.9%	39.0%	39.5%	42.2%	43.1%	43.9%	44.0%	44.7%	45.2%	48.0%	83.4%	97.9%	97.8%	97.8%
Geothermal	6.1%	6.8%	10.1%	4.3%	7.3%	5.2%	4.6%	4.7%	4.8%	4.8%	4.9%	6.6%	6.7%	7.2%	7.4%	7.6%	7.6%	7.8%	7.9%	8.5%	14.8%	0.0%	0.0%	0.0%
Landfill Gas	42.3%	28.4%	28.1%	25.5%	35.5%	25.2%	39.4%	38.8%	36.7%	35.9%	34.9%	44.3%	43.5%	45.3%	44.1%	42.9%	42.8%	41.8%	41.0%	42.5%	0.0%	0.0%	0.0%	0.0%
Biomethane	6.6%	26.9%	31.4%	22.4%	31.2%	22.9%	20.8%	21.4%	22.5%	23.2%	23.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
RECs	27.9%	19.7%	8.7%	26.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	5.4%	7.2%	14.0%	13.4%	12.1%	12.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 10 – PWP RPS Contract Details

Pasadena Water and Power Procurement Plan (by Calendar Year)	Compliance Period 1			Compliance Period 2			Compliance Period 3				Post 2020													
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh
Portfolio Content Category 0 - Grandfathered																								
Executed Energy Contracts																								
Azusa Hydro	8.1	4.5	0.0	0.00	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Iberdrola High Winds	14.2	14.0	13.7	12.28	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9											
Minnesota Methane LFG	46.8	42.4	44.0	43.76	42.2	42.2																		
Ormat Heber South Geothermal	16.9	16.1	15.2	13.69	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4			
Milford Wind Phase 1	9.7	11.6	8.6	10.36	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0					
Short Term Contracts(Glendale LFG)	34.8																							
Chiquita Canyon LFG (Ameresco)	35.6	36.7	40.8	36.50	37.1	37.2	37.1	37.1	37.1	37.2	37.1	37.1	37.1	37.1	37.1	37.1	37.1	37.1	37.1	37.1				
Subtotal:	166.2	125.4	122.2	116.6	118.5	120.7	78.3	78.3	78.3	78.5	78.3	78.3	78.3	65.4	65.4	65.4	65.4	65.4	65.4	55.4	18.4	2.0	2.0	2.0
Percentage of Load:	14.8%	11.1%	11.2%	10.5%	10.6%	10.9%	7.2%	7.3%	7.4%	7.5%	7.5%	7.5%	7.6%	6.3%	6.4%	6.4%	6.4%	6.4%	6.4%	5.5%	1.8%	0.2%	0.2%	0.2%
Portfolio Content Category 1																								
Windsor Reservoir Solar		0.4	0.9	0.84	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			
Biomethane (GWh equivalent)																								
EDF	7.7	13.0	11.1	4.01																				
Sequent	0.5	22.3	19.1	26.66	28.8	31.1	32.6	34.3	35.9	37.7	39.2													
Waste Management	10.1	39.6	33.9	40.00	40.9	41.0	40.9	40.9	40.9	41.0	40.9													
SPower Solar Projects																								
Antelope Big Sky Ranch						8.0	15.9	15.8	15.7	15.7	15.5	15.5	15.4	15.4	15.2	15.2	15.1	15.0	15.0	14.9	14.8	14.7	14.7	14.6
Summer Solar						8.0	15.9	15.8	15.7	15.7	15.5	15.5	15.4	15.4	15.2	15.2	15.1	15.0	15.0	14.9	14.8	14.7	14.7	14.6
First Solar Kingbird A						59.5	59.2	58.9	58.6	58.3	58.0	57.7	57.4	57.1	56.8	56.5	56.2	55.9	55.6	55.3	55.0	54.7	54.4	54.1
Dominion Columbia 2 Solar				0.26	7.8	7.8	7.7	7.7	7.6	7.6	7.6	7.5	7.5	7.5	7.4	7.4	7.4	7.3	7.3	7.2	7.2	7.2	7.1	7.1
Puente Hills LFG							102.2	99.2	88.6	85.0	80.1	72.9	68.9	65.6	60.5	55.6	54.7	50.8	47.5	45.0				
Short Term Purchases																								
Shell	15.0																							
Glendale Ormat		3.0	15.2																					
EDF		20.0	42.3																					
Magnolia Anaheim			30.6																					
Tenaska				5.50																				
Silicon Valley Power Contract Admin				10.00																				
Under negotiation																								
Future Electric Energy																								
Subtotal:	33.3	98.3	153.1	87.3	78.0	155.8	274.9	273.0	263.6	261.5	257.5	169.5	165.1	161.4	155.7	150.4	149.0	144.6	140.8	137.8	92.3	91.4	90.9	90.4
Percentage of Load:	3.0%	8.7%	14.0%	7.9%	7.0%	14.1%	25.2%	25.4%	24.9%	25.1%	24.7%	16.3%	16.0%	15.7%	15.1%	14.7%	14.6%	14.2%	13.9%	13.6%	9.1%	9.1%	9.1%	9.0%
Percentage to SBX1-2 Procurement:	13.5%	39.7%	63.6%	35.8%	25.3%	51.3%	87.0%	82.0%	75.5%	71.6%	70.6%	46.7%	45.6%	44.8%	43.2%	41.9%	41.6%	40.6%	39.6%	38.9%	26.1%	26.0%	25.9%	25.8%
Portfolio Content Category 2																								
Iberdrola				26.75	27.0	38.0																		
Under negotiation																								
Future Purchases																								
Subtotal:	0.0	0.0	0.0	26.8	27.0	38.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Percentage of Load:	0.0%	0.0%	0.0%	2.4%	2.4%	3.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Percentage to SBX1-2 Procurement:	0.0%	0.0%	0.0%	11.0%	8.8%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Portfolio Content Category 3																								
RECs and/or TRECs																								
Grey K Rec	40.0																							
LW RECS	22.4																							
FC RECS	14.9	15.0	5.0																					
Farmers Irrigation District, Hood River		16.7	1.1																					
Central Oregon Irrigation District		23.3																						
EDF RECs			20.1																					
Avista				84.25																				
Under negotiation																								
Future Purchases																								
Subtotal:	77.3	55.0	26.2	84.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Percentage of Load (adjusted for Category 0):	6.9%	4.9%	2.4%	7.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Percentage to SBX1-2 Procurement:	31.3%	22.2%	10.9%	34.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

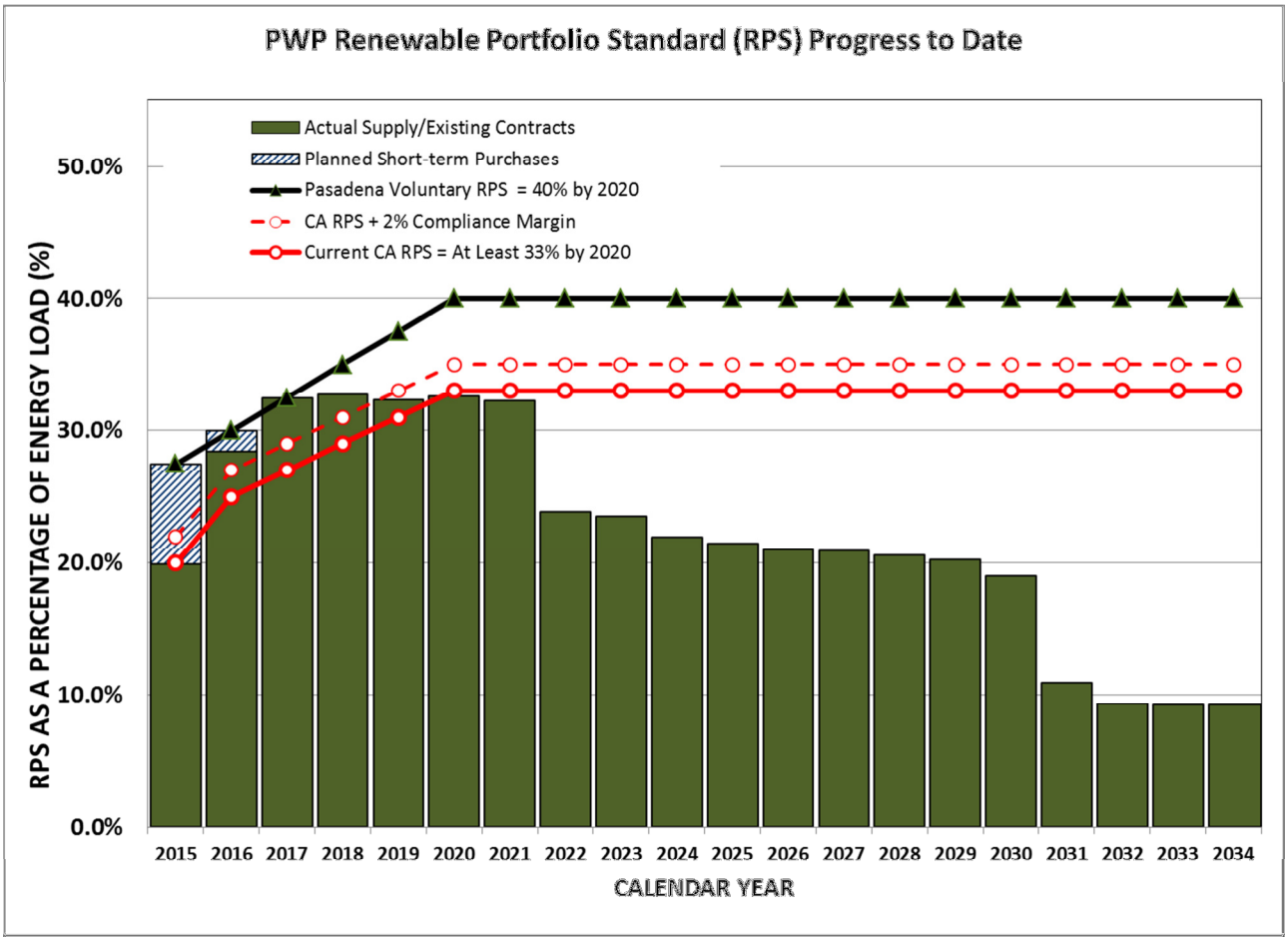


Figure 4
Projected RPS Procurement

Procurement Plan Limitations and Relief

Section G of the City's Program of Enforcement recognizes that situations beyond PWP's control may arise and prevent PWP from fulfilling the goals of SBX1-2 in a timely, economic, and/or socially responsible manner, or at all. However, this Plan meets the four criteria of Section G, as listed below:

1. Adequate transmission is available to comply with this Plan;
2. System reliability is maintained;
3. Incorporates PWP's best efforts to procure adequate supplies of renewable energy; and
4. Retail electric rates meet PWP's revenue requirements and are equal to, or below, rates approved by the City Council.

This Plan does not include a recommendation for cost limitations at this time. Should conditions change such that any of these criteria cannot be met, staff will return to the City Council with an adjusted Procurement Plan for consideration.