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STAFF PAPER

Review of San Francisco Public Utilities Commission Integrated Resource Plan Filing

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ABSTRACT

Senate Bill 350 (De León, Chapter 547, Statutes of 2015) (Public Utilities Code Section 9621) requires the California Energy Commission to review the integrated resource plans of identified publicly owned utilities to ensure they meet various requirements specified in the law, including greenhouse gas emission reduction targets and renewable mandates. Integrated resource plans are long-term planning documents that outline how publicly owned utilities will meet demand reliably and cost effectively while achieving state policy goals and mandates. The San Francisco Public Utilities Commission adopted its *Integrated Resource Plan Filing* and supplemental information on November 13, 2018, and submitted to the Energy Commission for review on February 27, 2019. This paper presents the results of the Energy Commission staff review of the San Francisco Public Utilities Commission integrated resource plan.

Keywords: Publicly owned utility, integrated resource plan, demand, resources, portfolio, generation, transmission, distribution, Renewables Portfolio Standard, forecast, energy efficiency, transportation electrification, demand response, greenhouse gas, GHG, emissions, system reliability, integration, local reliability, energy storage, distributed generation.

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EXECUTIVE SUMMARY

Public Utilities Code (PUC) Section 9621 requires publicly owned utilities meeting an electrical demand threshold to adopt an integrated resource plan (IRP) that meets certain requirements, targets, and goals, including greenhouse gas emission reduction targets and renewable energy procurement requirements. The California Energy Commission's *Publicly Owned Utility Integrated Resource Plan Submission and Review Guidelines* require the utilities to file an IRP with data and supporting information sufficient to demonstrate that they meet these requirements from 2018 to 2030. The Energy Commission reviews the IRPs for consistency with the requirements of PUC Section 9621.

The San Francisco Public Utilities Commission's (SFPUC) IRP filing serves as a roadmap for future investments in the Hetch Hetchy Power System to better match retail sales while accounting for load growth (that is, an increase in energy demand). The Hetch Hetchy Power System is a hydroelectric power system owned and operated by the SFPUC. The power system starts near Yosemite National Park and uses gravity-driven water to generate electricity from three hydro plans (Moccasin, Kirkwood, and Holm), and delivers that electricity to customers in the bay area. SFPUC plans to continue to serve its customers' energy needs with 100 percent greenhouse gas emission-free resources. The SFPUC's electricity portfolio over the planning horizon consists of mostly large and small hydroelectric plants, along with solar and biomass plants.

The SFPUC evaluated two scenarios. In the base case scenario, the utility assumed it would make the necessary investments to maintain the current level of generation from the Hetch Hetchy hydroelectric system through 2041. Another scenario deferred significant investments in the Moccasin Powerhouse (Moccasin) in Tuolumne County to better align generation from the SFPUC system with retail sales. The Moccasin powerhouse is a hydroelectric plant on Moccasin Creek, in Tuolumne County. The powerhouse includes the Moccasin dam, the hydroelectric plant, and related equipment. The Moccasin powerhouse is part of the Hetch Hetchy Power System. The SFPUC found the scenario that deferred investment in Moccasin the most cost-effective over the planning horizon. However, it did not designate this a preferred scenario, as the scope of its IRP did not fully address water operations and other nonpower issues. The SFPUC plans to use its IRP as an input to its broader organizational needs while considering interactions between its power and water operations.

In reviewing the SFPUC's IRP filing and determining consistency with PUC Section 9621, Energy Commission staff relied on the four standardized reporting tables and narrative descriptions in the IRP filing, as well as analysis and verification of the materials submitted. Staff presents the following conclusions in accordance with the requirements of PUC Section 9621:

- *Achieving Greenhouse Gas Emissions Targets and Renewables Portfolio Standard Requirements:* The values reported in the standardized tables, along with the

narrative in the IRP filing, demonstrate that SFPUC plans to meet the greenhouse-gas emission reduction requirements of PUC Section 9621(b)(1) and the renewable energy procurement requirement of PUC Section 9621(b)(2).

- *Meeting Planning Goals:* The values reported in the standardized tables, along with the analysis and discussion in the IRP filing, demonstrate that the SFPUC intends to meet planning goals related to retail rates, reliability, transmission and distribution systems, localized air pollution, and disadvantaged communities as set forth in PUC Section 9621(b)(3).
- *Considering Peak Needs:* The values reported in the standardized tables, along with analysis and narrative, demonstrate that the SFPUC has considered existing renewable generation, grid operational efficiencies, energy storage, and distributed resources (including energy efficiency) in helping ensure the utility's energy and reliability needs in the peak hour as set forth in PUC Section 9621(c).
- *Addressing Resource Procurement Types:* The filing includes values reported in the standardized tables and narrative that demonstrate that the SFPUC has addressed the potential development of energy efficiency and demand response programs and energy storage, the potential impact of increased use of electricity in the transportation sector, the technological and geographic diversity of supply resources in its portfolio, and its ability to meet demand obligations given any constraints on its transmission system and variation in the output of large-scale and rooftop solar generation as set forth in PUC Section 9621(d).

In addition to the IRP provisions, Senate Bill 350 (De León, Chapter 547, Statutes of 2015) requires the Energy Commission to establish statewide and utility-specific targets to achieve a statewide doubling of energy efficiency by 2030. The IRP is consistent with the PUC Section 9621 requirement in that energy efficiency and demand response are addressed. Staff observes that aggressive energy efficiency and demand response programs are needed for utilities and energy efficiency deliverers to meet the 2030 energy efficiency doubling targets and capture the benefits of demand response. As part of the *2019 Integrated Energy Policy Report*, the Energy Commission will report on progress in achieving the doubling targets, including those for the SFPUC, and update the targets, if necessary.

CHAPTER 1:
Background, Demand Forecast, and Procurement Plan

Introduction

California Public Utilities Code (PUC) Section 9621 requires publicly owned utilities (POUs) with an annual electrical demand exceeding 700 gigawatt hours (GWh) to develop integrated resource plans (IRPs). IRPs are electric system planning documents that describe how utilities plan to meet energy and capacity resource needs while achieving policy goals and mandates, meeting physical and operational constraints, and fulfilling other priorities such as reducing effects on customer rates. PUC Section 9621 requires the governing board of a POU to adopt an IRP and a process for updating it at least once every five years by January 1, 2019.

Further, PUC Section 9621 requires POUs meeting the size threshold to submit an IRP and updates to the California Energy Commission for review to determine consistency with the requirements of PUC Section 9621. If the Energy Commission determines an IRP is inconsistent with these requirements, the Energy Commission shall provide recommendations to correct the deficiencies. The Energy Commission adopted the *POU IRP Guidelines* to govern the submission of the POUs' IRPs.[1] PUC Section 9622 requires the Energy Commission to review POUs' IRPs to ensure they achieve the following PUC Section 9621 provisions (See **Attachment I**).[2]

This chapter outlines the Energy Commission's review process, provides an overview of San Francisco Public Utilities Commission's (SFPUC) and its IRP development process, and addresses the *Publicly Owned Utility Integrated Resource Plan Submission and Review Guidelines (POU IRP Guidelines)* requirements that POUs provide a demand forecast and a procurement plan.

Energy Commission Integrated Resource Plans Review Process

On February 27, 2019, the SFPUC submitted its *2017 Power Enterprise Integrated Resource Plan* (*2017 IRP*) and supporting documentation (IRP filing), to the Energy Commission for review.[3] Staff's review included two stages. First, staff performed a completeness review to ensure the IRP filing contained the POU board-adopted IRP, the four standardized tables, and supporting information needed for staff to conduct the

1 California Energy Commission. *Publicly Owned Utility Integrated Resource Plan Submission and Review Guidelines*. Revised Second Edition. October 2018, Publication Number CEC-200-2018-004-CMF. https://efiling.energy.ca.gov/GetDocument.aspx?tn=224889.

2 Public Utilities Code Article 16 (commencing with Section 399.11) Chapter 2.3, Part 1, Division 1.

3 Adopted on November 13, 2012, Resolution 12-0217. Available at https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=18-IRP-01.

review. Then staff conducted a detailed review to determine consistency with the requirements of PUC Section 9621.

On February 27, 2019, the Energy Commission posted the SFPUC's IRP filing on its website for public comments and accepted comments for 30 days. On March 7, 2019, the Energy Commission notified the SFPUC that its IRP filing was complete. The Energy Commission did not receive public comments related to the consistency of the IRP with PUC Section 9621.

Staff assessed and analyzed the data in the standardized tables and narrative provided, conducted informal discussions with SFPUC staff, and verified data and information as needed. Staff considered the data supporting the assertions in the IRP in assessing whether the IRP filing is consistent with the requirements of PUC Section 9621.

Energy Commission staff also relied on staff subject matter experts to review sections of the IRP filing including SFPUC energy and peak demand forecasts, projections for renewable resource additions, and possible achievements of RPS requirements, energy efficiency savings projections and programs, and plans for transportation electrification.

Overview of San Francisco Public Utilities Commission

The SFPUC owns and operates a not-for-profit electric and water utility in San Francisco County, as described below.

- Since 1918, San Francisco has been delivering greenhouse gas (GHG)-free hydroelectric (hydro) resources to its streetlights, transportation, schools, city hall, the zoo, and other civic institutions and private facilities.
- The SFPUC delivers more than 950,000 megawatt-hours (MWh) to almost 240 residents and more than 3,000 businesses and government agencies.
- Residential customers constitute only 7 percent of total customer meters and consume less than 1 percent of the total load.
- The SFPUC has a forecasted (2019) peak demand of 149 MW.
- The SFPUC generates more than 1.5 million MWh of GHG-free energy from more than 380 megawatts (MW) of generation capacity.
- Surplus generation is sold to other public utilities and into California Independent System Operator (California ISO) spot markets.
- The SFPUC identified 12 census districts in San Francisco that are classified as disadvantaged communities, according to the CalEnviroScreen tool.[4] Most of these are in the Hunters Point and the South of Market areas.

4 See https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30.

- The SFPUC's five-member commission has ultimate decision-making authority for the Hetch Hetchy Power System.

San Francisco Public Utilities Code Planning Process

The SFPUC used six working groups and consultants to develop the inputs and assumptions used in its production cost modeling for the IRP. The utility used its production cost model to determine the ideal mix of resources to meets its energy demand under a variety of future conditions. To validate its model assumptions and inputs, the SFPUC compared its modeling results with internal peer groups and staff. Through checking model results, the SFPUC conducted internal peer groups and staff discussions to validate model results and made modifications based on staff input and expected future operations. SFPUC staff supplemented the IRP to address requirements of Senate Bill 350 (De León, Chapter 547, Statutes of 2015) and the Energy Commission POU IRP guidelines before adoption. SB 350 requires that filing POUs adopt and submit an IRP with a planning horizon to at least 2030. The planning period for the SFPUC IRP goes to 2041, although staff reviewed only the 2019 to 2030 planning horizon for consistency with SB 350 requirements.

Demand Forecast

The *POU IRP Guidelines* (Chapter 2.E.1) identify the need for a forecast of energy and peak demand to determine whether a POU's IRP is consistent with the requirements of PUC Section 9621.[5] In addition, under the guidelines (Chapter 2.E.2), the POU must provide information on the method used in developing the demand forecast, if a POU chooses to use a forecast other than the Energy Commission's adopted demand forecast.6 Staff reviewed the demand forecast and supporting information provided in the IRP filing and determines that it meets the POU IRP Guidelines requirements set forth above. San Francisco's energy and peak demand are discussed below; data submitted in the form of standardized tables requested by staff can be found in Appendix B.

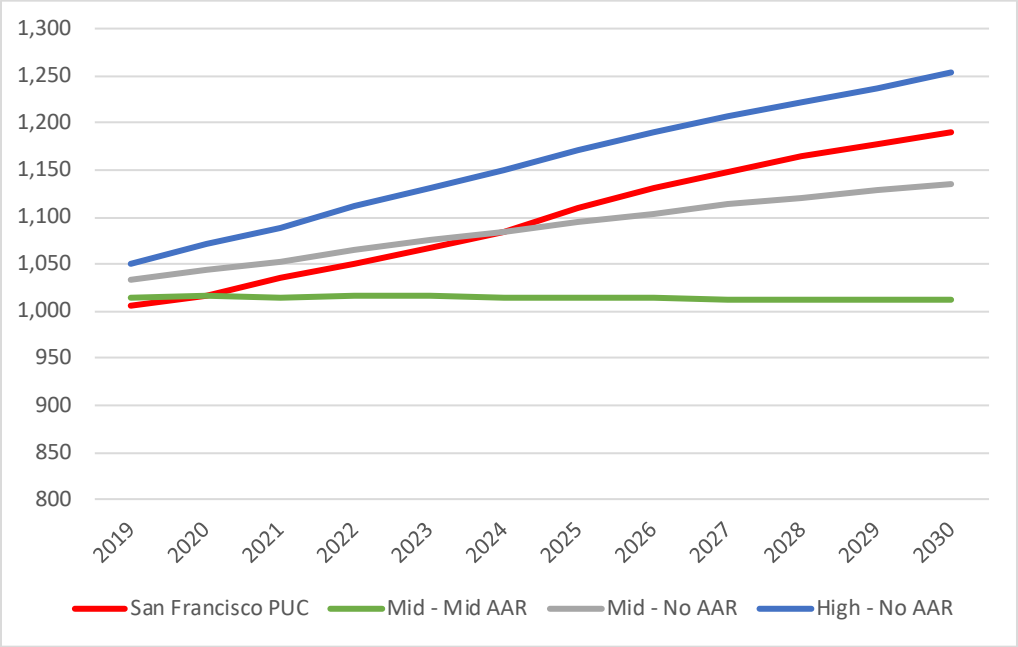
Energy Forecast, Method and Assumptions

Figure 1 compares the SFPUC's 2017 IRP baseline energy demand forecast for 2019 to 2030 to forecasts adopted by the Energy Commission as part of the *2017 Integrated Energy Policy Report* (*IEPR*).

5 *POU IRP Guidelines, 2018* Chapter 2, Section E, pp 5-6.

6 The forecast was adopted as part of the *2017 Integrated Energy Policy Report*. Kavalec, Chris, Asish Gautam, Mike Jaske, Lynn Marshall, Nahid Movassagh, and Ravinderpal Vaid. 2018. *California Energy Demand 2018 — 2030 Revised Forecast*. California Energy Commission, Electricity Assessments Division. Publication Number: CEC-200-2018-002-CMF. It is available at http://www.energy.ca.gov/2017_energypolicy/documents/#demand.

Figure 1: SFPUC and Energy Commission Energy Forecasts 2019-2030 (GWh)



Source: California Energy Commission staff, Energy Assessments Division. "AAR" represents "additional achievable (energy efficiency and distributed photovoltaic) resources."[7]

The SFPUC projected annual growth over 2019 to 2030 of slightly more than 1.5 percent, while the Energy Commission's "mid demand, mid additional achievable resources" forecast shows no growth.[8] The annual growth rate projected by the SFPUC is comparable to the Energy Commission's "high demand, no additional achievable resources" scenario of 1.6 percent.

The Energy Commission's forecasts of the SFPUC's energy demand growth, because of its small size (less than a 200-MW peak demand), are based on a growth rate for the Pacific Gas and Electric (PG&E) planning area, which is driven largely by assumptions regarding demographics and the economy. Most of the SFPUC retail sales are to municipal departments, whose demand is less influenced by changes in economic conditions and demographics than are residential, commercial, and industrial consumption. Consequently, the utility used information from the city's long-term capital planning process to forecast demand growth arising from "new" municipal customers; capita investments on the part of the city that increase its energy needs are not correlated with the economic and demographic factors that drive residential, commercial, and industrial demand.

7 See Appendix A: Definitions.

8 These resources are distributed photovoltaics expected to be developed because of building standards that require them on new residential construction after January 1, 2020, and the energy savings associated with energy efficiency programs and measures that have yet to be funded but can be reasonably expected to be implemented.

The utility assumed a 0.5 percent annual growth rate for retail sales to existing municipal customers based on historical trends.

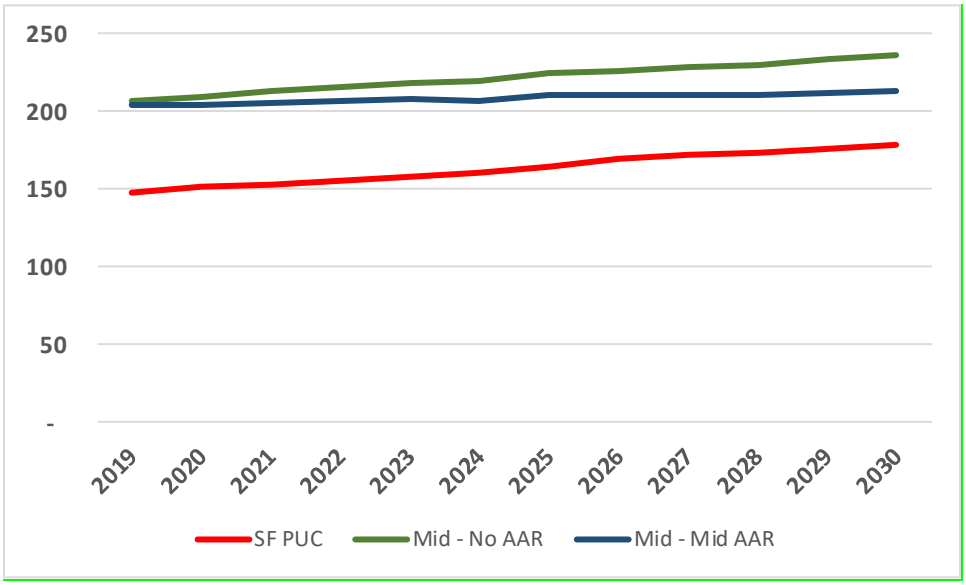
The remaining growth was projected to result from the SFPUC's efforts to acquire new retail customers. At the time the SFPUC IRP was adopted, the utility anticipated increasing its retail sales of surplus energy rather than selling to wholesale buyers. This component of load growth was not included in the Energy Commission's lower demand forecast.

More recent SFPUC forecasts, prepared subsequent to this IRP, assume lower goals for retail sales, which will be reflected in future updates to this IRP. Given the utility's substantial surplus of energy and capacity in the near and long term, these changes are not expected to have a substantial impact on resource procurement over the first five or more years of the planning horizon. Accordingly, the forecast used in the IRP filing is consistent with the *POU IRP Guidelines* requirements.

Peak Forecast, Method, and Assumptions

A comparison of the peak demand forecast in the IRP filing to the *2017 IEPR* forecasts is in **Figure 2.**

Figure 2: SFPUC and Energy Commission Peak Forecasts 2019-2030 (GWh)



Source: California Energy Commission staff, Energy Assessments Division

The Energy Commission estimate is well above that of the SFPUC and will be reassessed in the next IEPR forecasting cycle.

Resource Procurement Plan

The *POU IRP Guidelines* require that POUs report the mix of resources they plan to use to meet demand from 2019 to 2030.[9] The POUs are also required to provide an IRP with data and supporting information sufficient to demonstrate that the POU meets targets and goals. Staff has determined that the SFPUC's IRP filing meets these requirements. The following is a discussion of the utility's existing resources, the portfolio analysis underlying resource selections, and the resources in 2030 identified in the standardized tables.

Existing Resources

The utility has more than enough generation and capacity to meet its needs and is a net seller of power. The SFPUC's portfolio of existing resources includes three hydroelectric powerhouses totaling 381 MW of nameplate capacity and 307 MW peak dependable capacity. These include Moccasin (100 MW), Kirkwood (116 MW), and Holm (165 MW) power projects. Costs per MWh are significantly higher for Moccasin,[10] roughly $110/MWh, than for the other two facilities, which are less than $40/MWh. Surplus hydro generation that is not needed to meet load is sold to other load-serving entities or into the California ISO market.[11]

The SFPUC's resource portfolio also has municipal solar arrays totaling 8 MW procured under 25-year contracts, the largest of which is the 5 MW Sunset River Solar Project.[12] The utility also has biogas generation plants totaling 3 MW at the Oceanside and Southeast Wastewater Treatment Plants.

Resource Portfolio Evaluation and Procurement Strategy

The SFPUC's hydro facilities provide enough energy to meet retail demand, as well as system and flexible resource adequacy requirements, through 2030. Because the amount of RPS-eligible energy needed to meet the mandate is far less than the amount procured, the IRP focused on options for investment in existing resources. Three options were evaluated:

- Scenario 1: All investment necessary to keep the current level of hydro generation through 2030 and beyond.
- Scenario 2: Deferral of several capital improvement projects until after 2030, reducing output from the Holm and Moccasin facilities beginning in 2019.
- Scenario 3: Deferral of capital improvement projects at Holm as in Scenario 2 (with the associated decline in output from the facility), and deferral of projects

9 *POU IRP Guidelines*, Chapter 2.F., p. 6.

10 Moccasin costs more to operate as it is older than the other two hydro plants and requires more capital investments.

11 San Francisco notes that while this is relatively economic for two of its facilities, power from the Moccasin Powerhouse is generally uneconomic for market sales.

12 For a complete list of SFPUC solar facilities, see https://sfwater.org/index.aspx?page=403.

at Moccasin needed to continue operation, resulting in the shuttering of the power plant in 2020.

Scenario 2 was eliminated from consideration before sensitivity tests that considered different load levels and hydro availability were conducted on the remaining two scenarios. The deferral of capital maintenance in Scenario 2 reduced the amount of low-cost generation from the Holm facility without a sufficient compensating reduction in costs and was less desirable than Scenario 1. Scenario 3 was found to be the lower cost of the two remaining scenarios under the baseline assumptions. Scenario 3 also resulted in a closer alignment of generation and load over the planning horizon, substantially reducing market sales. Continued generation from the Moccasin plant results in surplus beyond the SFPUC's needs, at a cost above expected prices in the wholesale market.

To test the robustness of these conclusions for Scenarios 1 and 3, the SFPUC conducted sensitivity analysis, including for higher load growth, market price uncertainty, renewable additions, and meteorological uncertainty. The higher-than-expected load growth may leave the utility short of energy in Scenario 3, exposing it to more market price risk. However, this situation can be cost-effectively addressed, if necessary, with the addition of a renewable energy resource. The higher-than-expected market prices make Scenario 1 more attractive as it yields more surplus generation that must be sold, but Scenario 3 remains preferred at the highest prices modeled. Lower-than-expected market prices increase the savings associated with Scenario 3.

The SFPUC found that Scenario 3 was preferred on several qualitative factors. Substantial investment in Moccasin would result in:

- Significant long-term debt on a potentially uneconomic asset, leaving little capital to invest in more economic assets.
- An excess of supply relative to demand.
- Almost complete reliance on large hydro facilities with limited ability to diversify the portfolio and substantial exposure to risk associated with water conditions.

The merits of Scenario 3 and resulting resource portfolio notwithstanding, the SFPUC submitted standardized tables that reflect the resource portfolio associated with Scenario 1 in which Moccasin continues to operate without the need for renewable resource additions to lower potential market price risk.[13] This was done as Scenario 1 "corresponds to the 'baseline scenario' of existing [utility] policy."[14]

Table 1 presents SFPUC's projected sources of energy for 2019, 2025, and 2030. The energy values for other years can be found in **Appendix B;** the generation values

13 All tables and appendices in this document that present energy, capacity, RPS compliance, and GHG emissions projections reflect Scenario 1.

14 IRP filing, p. 20.

represent normal water years, in which available energy far exceeds net energy for load requirements.[15]

Table 1: Energy Resources by Type 2019, 2025, and 2030 (MWh)

		2019	2025	2030
Total Net Energy for Load		**998,000**	**1,097,000**	**1,184,000**
Non-RPS	Holm hydro facility	654,267	700,329	700,329
	Moccasin hydro facility	371,326	370,230	370,230
	Kirkwood hydro facility[1]	339,010	339,515	294,795
	WAPA hydro contract	20,802	20,802	20,802
RPS Resources	Kirkwood hydro facility	226,007	226,343	196,530
	SE Wastewater Cogen	2,141	2,141	2,141
	Existing small Solar	8,389	8,389	8,389
	Generic small solar	0	2,000	4,000
Total Energy Procured		**1,621,941**	**1,669,748**	**1,597,215**
Surplus/Shortfall		623,941	572,748	413215

Source: California Energy Commission, Energy Assessments Division, based on SFPUC IRP filing.

[1] Generation from the Kirkwood facility may be treated as qualifying large hydro generation or as RPS-eligible. The values reflect SFPUC's allocation in their IRP filing.

Table 2 shows the SFPUC's projected capacity needs for 2019, 2025, and 2030. The capacity values for other years can be found in **Appendix B**. Despite growth in peak demand, the hydro system provides substantial excess capacity over the entire planning period.

15 For the IRP flings, a load-serving entity's net energy for load is the total amount of energy that it must generate or purchase to meet its retail load obligations. It includes retail consumption and transmission, distribution, storage, and other losses but excludes energy needed to meet wholesale sales obligations.

Table 2: Capacity Resources for 2019, 2025, and 2030 (MW)

		2019	2025	2030
Peak Demand		147	163	177
Planning Reserve Margin		22	24	27
Peak Procurement Requirement		169	187	204
Non-RPS	Holm hydro facility	133	133	133
	Moccasin hydro facility	81	81	81
	WAPA hydro contract	3	3	3
RPS Resources	Kirkwood hydro facility	93	93	64
	Sunset solar facility	1	1	1
Total Capacity Procured		311	311	282
Surplus/Shortfall		142	124	78

Source: California Energy Commission, Energy Assessments Division, based on SFPUC IRP filing

CHAPTER 2:
Review for Consistency with Public Resources Code Section 9621

This chapter summarizes the main elements of the SFPUC's IRP and provides findings regarding the consistency of the IRP filing with PUC Section 9621 requirements, as well as the *POU IRP Guidelines*. These findings include whether the utility meets GHG reduction targets and RPS mandates, as well as planning goals for retail rates, reliability, its transmission and distribution systems, net load, and disadvantaged communities. In addition, the IRP must address procurement of energy efficiency, demand response, energy storage, transportation electrification, and portfolio diversification.

Greenhouse Gas Emission Reduction Targets

POUs are required to meet GHG targets established by the California Air Resource Board (CARB), in coordination with the Energy Commission and the California Public Utilities Commission (CPUC).[16] These GHG targets reflect the electricity sector's contribution to achieving economy-wide GHG emission reductions of 40 percent from 1990 levels by 2030. The target range established for SFPUC by CARB for 2030 is 12 to 22 thousand metric tons (MT CO2e) (a metric ton is 2,204.6 pounds while a ton, or short ton, is 2,000 pounds of carbon dioxide equivalent).

From 2019 to 2030, assuming average water years, the SFPUC's three large hydro plants will produce 1,560 GWh to 1,590 GWh of zero-carbon energy compared to a substantially lower net energy for load requirement of 998 GWh in 2019 to 1,184 GWh in 2030.

The only resource in the SFPUC's portfolio that contains GHG emissions is a very small purchase of system power from the Western Area Power Administration (WAPA),[17] projected to be 10,365 MWh/year. At an emissions intensity of 0.428 mt/MWh, this yields a total of 4.4 MT CO_2e, well below the target range of 12 to 22 MT CO_2e established by CARB. For portfolio emissions accounting, however, Assembly Bill 1110 allows the SFPUC to offset these emissions with zero-emission large hydro and RPS-eligible energy generated in excess of its retail sales.[18] As the size of this surplus is

16 Public Utilities Code Section 9621(b)(1).

17 WAPA is a federally-owned entity that markets and delivers hydroelectric power and related services to more than 700 customers across the western states. The hydropower that WAPA markets comes from hydroelectric federal dams owned by the Bureau of Reclamation, United States Army Corps of Engineers, and the International Boundary and Water Commission.

18 AB 1110 (Ting, Chapter 656, Statutes of 2016).

larger than the system power purchase, GHG emissions for the utility are zero. Given the above, the SFPUC meets the requirement of PUC Section 9621(b)(1).

Renewables Portfolio Standard Planning Requirements

PUC Section 9621(b)(2) requires that filing POUs submit an IRP that indicates how the utility plans to meet Renewables Portfolio Standard (RPS) procurement requirements through 2030.[19,20] The SFPUC, under to Section 399.30(j) of the Public Utilities Code, has minimal RPS-eligible energy procurement requirements as its utility-owned large hydroelectric generation far exceeds annual retail demand by utility customers.

PUC Section 399.30(j) establishes alternative RPS procurement requirements for a POU in a city and county that receives greater than 67 percent of its electricity sources from qualifying in-state owned hydroelectric generators. If a POU satisfies these criteria, its RPS procurement target is set at the lesser of:

- The portion of its electricity demand not satisfied by its own qualifying hydroelectric generation.
- The RPS soft target corresponding to that year.[21]

As described in the Energy Commission's *Enforcement Procedures for the Renewables Portfolio Standard for Local Publicly Owned Electric Utilities*, a POU that meets these criteria has its procurement target determined on an annual, rather than compliance period, basis and is exempt from the RPS portfolio balance requirements. The SFPUC qualified for the alternative procurement requirements during the 2011–2013 and 2014–2016 compliance periods and expects to qualify through 2030.

Based on projected retail sales, allowed exclusions, and RPS-eligible generation from its hydroelectric portfolio, under normal water conditions, SFPUC procurement far exceeds its RPS obligations, as can be seen in **Table 3**. However, the utility notes that during drought years, it may need to rely on banked excess generation from eligible renewable energy resources from prior compliance periods to meet its RPS procurement target.[22]

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19 This requires that the utility procure RPS-eligible energy (or apply banked Renewable Energy Credits) in an amount equal to an average of specified percentages of retail sales for compliance periods 2021–2024, 2025–2027, and 2028-2030.

20 Senate Bill 100 (de León, Chapter 312, Statutes of 2018) increased the RPS percentage for each compliance period, culminating in 60 percent by 2030. Many filing POUs had undertaken or committed to an analysis of the lower RPS when SB 100 was chaptered in September 2018; their IRPs due on or before April 30, 2019, are not required to assess what is necessary to meet the higher one.

21 Compliance with the RPS program is determined on a compliance period basis, except for a POU that meets the requirements in PUC Section 399.30 (j). Each year within a multiyear compliance period contains a soft target percentage that is applied to that year's retail sales to determine that year's contribution to the compliance period's total RPS requirement. For example, the soft targets for the 2017-2020 compliance period are equal to 27 percent, 29 percent, 31 percent, and 33 percent, respectively, of a POU's retail sales.

22 Kirkwood Powerhouse generation may all be counted as qualifying hydro in drought years (no eligible renewable available), but under normal hydrological conditions, CCSF expects that 40 percent of Kirkwood generation will be available as RPS-eligible.

As such, SFPUC's IRP plans to meet its RPS procurement target in 2030 and all interim compliance periods, and is consistent with the requirements of PUC Section 9621(b)(2).

Table 3: RPS Requirements and Projected Procurement (MWh)

Compliance Period	Required Procurement	RPS-eligible Generation[23]
2017-2020	63,635	703,840
2021-2024	41,745	951,492
2025-2027	31,309	716,619
2028-2030	31,309	633,180

Source: SFPUC IRP filing, **Attachment C**

Retail Rates

PUC Section 9621(b)(3) requires POUs to develop IRPs that enhance each POU's ability to fulfill its obligation to serve its customers at just and reasonable rates and minimize impact in ratepayer bills.[24] In its IRP, the SFPUC assessed the net present value of three investment scenarios, identifying least-cost scenarios that would result in the lowest rates. It did not submit a report on a study of rate impacts as part of its IRP filing, as these were not performed or used as part of the IRP process.[25] Nevertheless, because the IRP minimizes retail rates, it is consistent with requirements of PUC Section 9621(b)(2).

System and Local Reliability

SB 350 requires filing POUs to adopt an IRP that ensures system and local reliability and addresses resource adequacy requirements.[26] Energy Commission staff reviewed the IRP, and the capacity reporting table and discussion find that the SFPUC has planned for sufficient resources to maintain a reliable electric system. The Commission's selected portfolio of resources contains sufficient capacity to meet anticipated resource adequacy requirements in 2030. Staff finds that the IRP is consistent with the reliability requirements in PUC Section 9621(b)(3) and resource adequacy requirements in PUC Section 9621(d)(1)(E), as discussed below.

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23 Assumes average hydro conditions in each year of the compliance period and may overstate actual value.

24 POUs are required to meet the goals specified in subparagraph (C) to (H), inclusive, of paragraph (1) subdivision (a) of Section 454.52.

25 If a local governing board considered a report or study of rate impacts under the IRP scenario, the *POU IRP Guidelines* require the POU to submit them.

26 PUC Section 9621(b)(3). *Resource adequacy requirements* are the amounts of capacity (in MW) that a utility or other load-serving entity in the California ISO area must have under its control through ownership or contract to demonstrate to the California ISO that it can meet its service obligations at the time of the system peak. There are requirements for three types of capacity (system, local, and flexible), which may be each met with generation capacity or demand response programs. For more information, see https://www.cpuc.ca.gov/ra/

System Reliability

Ensuring system reliability requires that the SFPUC plan for sufficient dependable peak capacity to meet a 15 percent reserve margin. The utility's three hydro generators, with a total nameplate capacity of 381 MW, provide 307 MW of peak dependable capacity.[27] This value will decrease to 277 MW from 2028 to 2030 when a unit at the Kirkwood hydro plant is removed from service for refurbishment.

The SFPUC's base forecast shows an increase in peak demand from 147 MW in 2019 to 177 MW in 2030 (an annual growth rate of 1.7 percent). With the addition of a 15 percent reserve margin, net energy for load is expected to increase from 169 MW in 2019 to 204 MW in 2030. The utility has sufficient hydro resources to meet its peak capacity needs, with substantial headroom for peak demand growth should it exceed the base forecast. Accordingly, staff finds that the IRP is consistent with the system reliability requirements in PUC Section 9621(b)(3).

Local Capacity Needs

The SFPUC's local resource adequacy needs are determined by the California independent System Operator (California ISO) based on the utility's share of the local needs of the Greater Bay Area Local Reliability Area.[28] The current requirement is for 68 MW of capacity in the local area. The SFPUC estimates this requirement will rise, proportionate to growth in its retail sales, to 83 MW in 2030. The SFPUC does not own or have a long-term contract with any generation resources in the Greater Bay Area Local Reliability Area. It plans to procure these resources from third parties, including PG&E, as necessary to meet its local resource adequacy requirements.

Contracts for local resource adequacy capacity are generally not available more than two to three years into the future. The California ISO is responsible for ensuring that sufficient resources to meet aggregate, or collective, capacity needs in the local reliability areas are available. Mechanisms are also in place to ensure that local capacity resources cannot exercise market power. Accordingly, the SFPUC's plan to procure local resource adequacy capacity is consistent with the reliability requirements in PUC Section 9621(b)(3) and resource adequacy requirements in PUC Section 9621(d)(1)(E).

Flexible Capacity Needs

The SFPUC's flexible resource adequacy requirements are determined on a monthly basis by the California ISO. They are based on the maximum change in load over a three-hour period, plus 3.5 percent of peak load for the California ISO system, and the utility's

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27 The SFPUC uses a generation resource's net qualifying capacity (NQC) as its peak dependable capacity, which is a California ISO-determined value that indicates the resource's estimated contribution to meeting resource adequacy requirements. This capacity measures the number of megawatts available to meet any utility requirements, after taking into account deliverability constraints.

28 One of the ten local reliability areas defined by the California ISO, characterized by insufficient transmission capacity into the area under high demand conditions, thus requiring that threshold amounts of local generation be available to produce electricity on a moment's notice.

contribution to this change, which is a function of its load and the variable-energy resources in its portfolio.

The SFPUC has a forecasted peak load (base case) of 147 MW to 177 MW through 2030. Its hydro resources provide 307 MW of flexible resource adequacy (RA) capacity through 2028 and 277 MW during 2029-2030. While the shuttering of the Moccasin plant would reduce the portfolio's flexible capacity, the remaining hydro resources and local RA capacity would jointly provide enough flexible capacity to meet projected needs. Accordingly, the SFPUC's plan meets flexible RA capacity needs and is consistent with the reliability requirements in PUC Section 9621(b)(3) and resource adequacy requirements in PUC Section 9621(d)(1)(E).

Transmission and Distribution Systems

PUC Section 9621(b)(3) also requires filing POUs to adopt an IRP that ensures that the POU achieves the goal of strengthening the diversity, sustainability, and resilience of the bulk transmission and distribution systems and local communities. Staff finds that the SFPUC's IRP filing adequately addresses the utility's transmission and distribution planning needs as required by PUC Section 9621(b)(3).

Transmission System

Energy from the SFPUC's hydro resources is delivered to load over utility-owned and -operated 115 kilovolt (kV) and 230 kV lines and four substations. The transfer capacity of these lines is sufficient to relieve transmission congestion. The SFPUC works closely with PG&E and the California ISO to ensure the adequacy and reliability of its transmission system. The 53-mile, underwater Trans Bay Cable, which provides 400 MW of transfer capacity between San Francisco and the East Bay, improved the resiliency of the transmission system and allowed for the retirement of local natural gas-fired generation (the Hunters Point and Potrero power plants), allowing more electricity to serve the area. A new 230 kV line into the Embarcadero substation improved reliability in the downtown area, and a new substation under consideration by the CPUC is designed to improve the reliability of energy transmission northward on the San Francisco Peninsula.

Distribution System

The SFPUC's electricity demand is served largely by PG&E's distribution system under a FERC-regulated wholesale distribution tariff. The SFPUC operates local distribution facilities that serve the Hunters Point and Treasure Island redevelopment projects and is developing its Bay Corridor Transmission and Distribution Project, which would install a backbone distribution system in eastern San Francisco, allowing the utility to serve customers directly rather than rely on PG&E's distribution system. In addition, the utility participates in FERC and CPUC proceedings that affect PG&E's rates and services.

Disadvantaged Communities and Localized Air Pollutants

PUC Section 9621(b)(3) requires POUs to minimize localized air pollutants and GHG emissions with early priority on disadvantaged communities. Staff finds that SFPUC's IRP filing addresses the needs of disadvantaged communities. Staff also finds that the SFPUC has made efforts to address these issues in selecting resources it plans to include in its portfolio, consistent with the requirement above.

The SFPUC identified 12 census districts within San Francisco that have a CalEnviroScreen score in the highest quartile and are classified as disadvantaged communities: seven are in the Hunters Point area, four in the Moscone Center/South of Market area, and the last is on Treasure Island. With the closure of the fossil-fueled Hunters Point and Potrero plants in 2010–2011, each of these areas is served entirely by the utility's zero-carbon generation resources. While the least-cost scenario identified by the utility may, in the absence of adding renewable resources to the portfolio and under low water or high-load-growth conditions, or both, result in increased purchases of wholesale energy from spot or short-term markets, the energy purchased would not be produced by fossil plants in the utility's service territory.

The SFPUC owns the 2 MW Southeast Cogeneration Plant in the Bayview/Hunters Point area, which captures methane produced in sewage processing and uses it to generate electricity. The captured methane has a far greater impact on GHG emissions than the resulting CO_2 emissions from combustion.[29] In 2023, the utility intends to replace the plant with a new 5.2 MW facility that will meet best available control technology requirements established by the Bay Area Air Quality Management District, and whose criteria air pollutant levels and overall environmental impact will be "less than significant."[30]

According to the IRP filing, the SFPUC "seeks to meet and exceed the goals set by the SFPUC 2009 Environmental Justice policy." It provides low-income ratepayer assistance with a 30 percent discount on rates to 12 percent of its residential customers, as well as higher incentives for distributed solar installation to customers in disadvantaged communities, low-income customers, and those using installers committed to employing local labor.

Net Energy Demand in Peak Hours

PUC Section 9621(c) requires POUs to consider existing renewable generation, grid operation efficiency, energy storage, distributed energy resources, and energy reduction measures (such as energy efficiency and demand response) to reduce the need for new or additional gas-fired generation, distribution, and transmission resources. The

29 The Energy Commission classifies these plants as having zero GHG emissions under the agency's GHG Emissions Performance Standards. This project does result in NOx emissions.

30 *Biosolids Digester Facilities Project, Draft EIR*, May 2017, p. 4.8.54.

SFPUC's peak energy needs are entirely met by its hydro under normal hydro conditions, and solar resources, so there was no need to consider additions to the portfolio that would reduce reliance on fossil-fueled generation to meet peak demand. As a result, the utility's IRP is consistent with PUC Section 9621(c).

Additional Procurement Goals

PUC Section 9621(d)(1) requires filing POUs to address resource adequacy and procurement of energy efficiency and demand response, energy storage, transportation electrification, and portfolio diversification. The resource adequacy provisions of this code section are discussed in **System Reliability** (pages 15-17); the remainder are discussed below.

Energy Efficiency and Demand Response Resources

Staff finds that the SFPUC's IRP filing is consistent with the requirement in PUC Section 9621(d)(1)(A). The SFPUC has an annual budget of about $3.5 million for developing distributed resources and implementing energy efficiency programs.[31] Since the inception of these programs, annual energy efficiency savings have grown to 50,000 MWh (5 percent of annual demand) and 2 million therms of natural gas each year.

According to the SFPUC, these savings are embedded in the load growth estimates in the IRP and "are consistent with the estimates of achievable energy efficiency developed in the SFPUC's report to the Energy Commission required under Public Utilities Code Section 9505(b).[32] The reported annual savings, rounded to the nearest GWh, are presented in **Table 4** and are roughly the same as the SB 350 cumulative 2030 energy efficiency doubling targets.

The SFPUC does not fund demand response programs. The cost-effectiveness of event-triggered demand response programs is limited by the existence of surplus capacity in the portfolio. Although the utility does not fund demand response programs, it has energy efficiency and conservation programs for its municipal customers. Some of these projects include HVAC and lighting retrofits at the San Francisco Civic Center and lighting retrofits at the city's Fine Arts Museums.

Energy Storage

The SFPUC IRP filing states that energy storage continues to be a resource that is not cost-effective for the reasons mentioned.[33] This statement satisfies the requirement in PUC Section 9621(d)(1)(B) to address the procurement of energy storage.

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31 IRP filing. p. 11.

32 IRP filing, p. 11. This report is part of *Energy Efficiency in California's Public Power Sector 11th* Edition, which can be found at https://efiling.energy.ca.gov/GetDocument.aspx?tn=217680. See Appendix A of the report.

33 IRP filing, pp. 11–12.

In September 2014, under Assembly Bill 2514 (Skinner, Chapter 469, Statutes of 2010), the SFPUC produced an evaluation of the potential to procure cost-effective energy storage resources for its portfolio at the end of 2016 and 2021 (*2014 Energy Storage Report*).

Table 4: SFPUC Additional Achievable Energy Efficiency Estimates (GWh)

Year	AAEE (GWh)
2018	10
2019	13
2020	16
2021	19
2022	22
2023	25
2024	27
2025	29
2026	31
2027	33
2028	35
2029	37
2030	39

Source: California Energy Commission, Energy Assessments Division

This report concluded that energy storage resources were not cost-effective, in large part because the utility already has sufficient ancillary service and ramping capability[34] from its hydro resources. Furthermore, the SFPUC has very little variable energy generation (wind and solar), which reduces the need for these services. In March 2017, the report was updated and submitted to the Energy Commission;[35] the update reaffirmed that energy storage was not cost-effective.

Transportation Electrification

Staff finds that the SFPUC's IRP filing adequately addresses transportation electrification and meets the requirement of PUC Section 9621(d)(1)(C). A significant share of the SFPUC's load is transportation-related:

34 *Ancillary services* include regulation and spinning and non-spinning reserve, which are the ability of power plants in a portfolio to rapidly change output in amounts ranging from less than one MW up to 3 to 4 percent of demand to reliably and cost-effectively respond to sudden changes in output from solar and wind generators (due to changes in cloud cover, for example). Ramping refers to the ability of power plants to change output in larger amounts over one to three hours to respond to larger changes in wind and solar output (as the sun sets, for example).

35 The *Update on Power Enterprise's Electric Storage Activities as Required by Resolution 14-0147* can be found at https://www.energy.ca.gov/assessments/ab2514_energy_storage.html (under the link San Francisco AB 2514 Filing).

- The San Francisco Municipal Transportation Agency's (SFMTA)[36] transportation-related energy usage is 80,000 MWh/year, roughly 8 percent of the utility's load.
- The utility provides onshore electrical power for ships docked at the Port of San Francisco, displacing onboard diesel generation.
- It serves EV charging stations located at city-owned parking structures and municipal buildings, providing nearly 600 MWh/year.

The SFPUC is considering offering a green tariff for all transportation-related energy usage.[37] However, as only 1 percent of SFPUC's load is residential, it has limited ability to provide effective incentives for light-duty electric vehicle electrification.[38] The SFMTA plans to fully electrify the remainder of its bus fleet (nearly 500 buses) by 2035, which will be examined in future IRPs.

Portfolio Diversification

PUC Section 9621(d)(1)(D) requires that filing POUs address the procurement of a diversified portfolio of resources, consisting of short-term and long-term electricity, electricity-related, and demand response products. Staff finds that the SFPUC's IRP filing adequately addresses portfolio diversification and meets the requirement of PUC Section 9621(d)(1)(D).

The SFPUC is in a unique position in that its utility-owned generation far exceeds its needs and all but eliminates the need for short-term resources, RPS-eligible generation, and event-triggered demand response programs. The sole capacity need is for local resource adequacy, which can be provided only by dispatchable generation and is available only under short-term contract (for example, from one quarter to two or three years).

In comparing Scenarios 1 and 3 in its IRP filing, the SFPUC considered the benefits of portfolio diversification by replacing generation from Moccasin with generation from other sources, should it prove necessary, because of below-average hydro conditions or higher-than-expected load. The utility concluded that the closure of Moccasin reduced capital investment risk by providing "the flexibility to invest in only the most economic assets, while adapting to market conditions," providing supply diversity and "the flexibility to choose greater diversity to meet future load obligations economically," and load and operational flexibility, allowing the utility to "purchase new assets if needed."[39]

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36 The SFMTA, commonly known as "Muni," operates the nation's largest fleet of electric public transit, including 300 trolley buses, 200 light rail vehicles, and 40 cable cars.

37 IRP filing, p. 12 (footnote).

38 The IRP filing notes that there are only two residential customers on its EV charging rate. Footnote, p. 12.

39 *2017 IRP*, p. 1-11.

ACRONYMS

Acronym	Term
AAEE	Additional achievable energy efficiency
AAPV	Additional achievable photovoltaic
Barriers Study	Low-Income Barriers Study, Part A: *Overcoming Barriers to Energy Efficiency and Renewables for Low-Income Customers and Small Business Contracting Opportunities in Disadvantaged Communities*
California ISO	California Independent System Operator
CARB	California Air Resources Board
CO_2e	Carbon dioxide equivalent
CPUC	California Public Utilities Commission
CRAT	Capacity Resource Accounting Table
EBT	Energy Balance Table
GEAT	GHG Emissions Accounting Table
GHG	Greenhouse gas
IRP	Integrated resource plan
mt	Metric ton
MW	Megawatt
MT	Thousand metric tons
MWh	Megawatt-hour
PG&E	Pacific Gas and Electric
POU	Publicly owned utility
PUC	Public Utilities Code
RPS	Renewables Portfolio Standard
RPT	Renewable Procurement Table
SB 350	Senate Bill 350 (De León, Chapter 547, Statutes of 2015)

APPENDIX A: DEFINITIONS

Additional achievable energy efficiency (AAEE): Energy efficiency savings not yet considered committed but deemed likely to occur, including impacts from future updates of building codes and appliance standards and utility efficiency programs expected to be implemented.

Additional achievable photovoltaic (AAPV): Distributed PV developed as a result of the requirement in the California Building Standards that new residential construction include solar PV as of January 1, 2020.

Assumption: A statement made about the future for a given load forecast, or demand-side or supply-side energy resource, that should be used for procurement and transmission modeling.

Behind-the-meter resources: Generation and storage located at the customer site. More generally, it can refer to any device located at the customer site that affects the consumption of grid-provided energy (appliance control systems, for example)

Bundled renewable energy credit: A renewable energy credit from an eligible renewable energy resource that is procured as part of the same contract or ownership agreement with the underlying energy from that resource.

Committed energy efficiency: Energy efficiency savings estimated to occur from utility and public agency programs, codes, standards, legislation, and ordinances having final authorization, firm funding, and a design that can be readily translated into evaluable characteristics.

Demand forecast: A forecast of electricity demand served by the electric grid, measured by peak demand and energy consumption. Factors that determine load forecast include economics, demographics, behind-the-meter resources, and retail rates.

Excess balance: Any amount of RPS-eligible renewable energy credits that a utility holds at the end of a compliance period that may be used to meet its compliance obligation in the next compliance period. Excess balance can include excess procurement, historic carryover, or purchased RECs that have not been retired.

Filing POU: A local publicly owned electric utility with an annual electrical demand exceeding 700 gigawatt-hours, as determined on a three-year average commencing January 1, 2013.

Integrated resource plan (IRP): A plan adopted by the governing board of a POU under PUC Section 9621.

IRP filing: An IRP adopted by the filing POU's governing board that is submitted electronically to the Energy Commission, along with the standardized tables and supporting information, by the filing POU or authorized representative.

Net-peak demand: The highest hourly electricity demand in the utility area, when excluding demand met by variable renewable generation resources directly connected to a California balancing authority. Net-peak demand is calculated by taking the highest hourly demand (peak demand) and subtracting the electricity produced by variable renewable resources meeting that demand.

Noncoincident peak demand: The noncoincident peak is the largest amount of power a POU must generate or procure in any hour. Compare this to coincident peak demand, which is the amount of power the POU must generate or procure in the hour in which system-wide demand is greatest. Noncoincident peak demand is referred to as *peak demand* throughout these guidelines.

Plug-in electric vehicle (EV): A vehicle that uses one or more electric motors for propulsion. Electric vehicles include battery-electric and plug-in hybrid vehicles.

Renewable energy credit (REC): A certificate of proof, as defined in PUC Section 399.12(h), associated with the generation of electricity from an eligible renewable energy resource. RECs are certificates that represent the environmental attributes or "greenness" of renewable electricity production.

Renewable Portfolio Standard (RPS): A regulation that requires a minimum procurement of energy from eligible renewable energy, such as wind, solar, biomass, and geothermal.

Renewables Portfolio Standard Portfolio Balance Requirements: The minimum and maximum limits on certain types of bundled and unbundled RECs that may counted toward California's Renewables Portfolio Standard.

Retail sales: Electricity consumption after accounting for behind-the-meter onsite generation including storage charge and discharge. It indicates the net energy delivered through the meter to the customer and excludes any generation or procurement in satisfaction of wholesale commitments (for example, bilateral contracts with utilities and sales into spot markets).

Scenario: A set of assumptions about future conditions used in power system modeling performed to support generation or transmission planning.

Sensitivity: A technique that determines how scenario analysis changes when an assumption is varied with all other scenario assumptions unchanged.

Standardized tables: The four tables that are required to be submitted with the IRP filing submitted to the Energy Commission. These tables include information and data necessary to help staff determine if the IRP is consistent with PUC Section 9621. The four standardized tables are Capacity Resource Accounting Table (CRAT), Energy

Balance Table (EBT), Renewable Procurement Table (RPT), and Greenhouse Gas Emissions Accounting Table (GEAT).

Supporting information: Analyses, studies, data, and work papers, or other material (on which inputs, assumptions, or conclusions are based) that the POU used or relied upon in creating the IRP (such as market conditions current at the time of the analyses, energy infrastructure, state policies and laws, and needs of the filing POU) but are not included in the IRP itself; and additional information required by these guidelines. Supporting Information may also include the inputs and assumptions that are based on the analyses, studies, data, work papers, and other material.

Unbundled renewable energy credit: A renewable energy credit from an eligible renewable energy resource that is not procured as part of the same contract or ownership agreement with the underlying energy from that eligible renewable energy resource; this includes RECs that were originally procured as a bundled product but were subsequently resold separately from the underlying energy.

APPENDIX B
Summary Tables

Table B-1: Energy Resources, All Years (MWh)

		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total Net Energy for Load		**998,000**	**1,012,000**	**1,021,000**	**1,043,000**	**1,059,000**	**1,076,000**	**1,097,000**	**1,121,000**	**1,140,000**	**1,156,000**	**1,171,000**	**1,184,000**
Resource													
Non-RPS	Holm hydro facility	654,267	654,267	700,329	700,329	700,329	700,329	700,329	700,329	700,329	700,329	700,329	700,329
Non-RPS	Moccasin hydro facility	371,326	375,571	370,230	370,230	370,230	370,230	370,230	370,230	370,230	370,230	370,230	370,230
Non-RPS	Kirkwood hydro facility[1]	339,010	339,010	339,515	339,515	339,515	339,515	339,515	339,515	339,515	294,795	294,795	294,795
Non-RPS	WAPA hydro contract	20,802	20,802	20,802	20,802	20,802	20,802	20,802	20,802	20,802	20,802	20,802	20,802
RPS	Kirkwood hydro facility	226,007	226,007	226,343	226,343	226,343	226,343	226,343	226,343	226,343	196,530	196,530	196,530
RPS	SE Wastewater Cogen	2,141	2,141	2,141	2,141	2,141	2,141	2,141	2,141	2,141	2,141	2,141	2,141
RPS	Existing small Solar	8,389	8,389	8,389	8,389	8,389	8,389	8,389	8,389	8,389	8,389	8,389	8,389
RPS	Generic small solar adds[2]	0	0	0	0	2,000	2,000	2,000	2,000	2,000	4,000	4,000	4,000
Total Energy		**1,621,941**	**1,626,186**	**1,667,748**	**1,667,748**	**1,669,748**	**1,669,748**	**1,669,748**	**1,669,748**	**1,669,748**	**1,597,215**	**1,597,215**	**1,597,215**
Surplus/Shortfall		**623,941**	**614,186**	**646,748**	**624,748**	**610,748**	**593,748**	**572,748**	**548,748**	**529,748**	**441,215**	**426,215**	**413,215**

Source: California Energy Commission, Energy Assessments Division, based on SFPUC IRP filing

[1] Generation from the Kirkwood facility may be treated as qualifying large hydro generation or as RPS-eligible. The values reflect SFPUC's allocation in their IRP filing.

[2] Small solar additions are projected to occur evenly over time; they are added to the portfolio in this table when incremental additions total 1 MW in capacity.

Table B-2: Capacity Resources, All Years (MW)

		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Peak Demand		**147**	**150**	**152**	**155**	**157**	**160**	**163**	**167**	**171**	**173**	**175**	**177**
Planning Reserve Margin		**22**	**23**	**23**	**23**	**24**	**24**	**24**	**25**	**26**	**26**	**26**	**27**
Firm Sales Obligations		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Peak Procurement Requirement		**169**	**173**	**175**	**178**	**181**	**184**	**187**	**192**	**197**	**199**	**201**	**204**
Resource													
Non-RPS	Holm hydro facility	133	133	133	133	133	133	133	133	133	133	133	133
Non-RPS	Moccasin hydro facility	81	81	81	81	81	81	81	81	81	81	81	81
Non-RPS	WAPA hydro contract	3	3	3	3	3	3	3	3	3	3	3	3
RPS	Kirkwood hydro facility	93	93	93	93	93	93	93	93	93	64	64	64
RPS	Sunset solar facility	1	1	1	1	1	1	1	1	1	1	1	1
Total Capacity Procured		**311**	**311**	**311**	**311**	**311**	**311**	**311**	**311**	**311**	**282**	**282**	**282**
Surplus		**142**	**139**	**136**	**133**	**130**	**127**	**124**	**119**	**114**	**83**	**81**	**78**

Source: California Energy Commission, Energy Assessments Division, Based on SFPUC IRP filing

ATTACHMENT I
Public Utilities Code for SB 350

PUBLIC UTILITIES CODE - PUC

DIVISION 4.9. RESTRUCTURING OF PUBLICLY OWNED ELECTRIC UTILITIES IN CONNECTION WITH THE RESTRUCTURING OF THE ELECTRICAL SERVICES INDUSTRY [9600 - 9622]

(Division 4.9 added by Stats. 1996, Ch. 854, Sec. 12.)

9621.

(a) This section shall apply to a local publicly owned electric utility with an annual electrical demand exceeding 700 gigawatt hours, as determined on a three-year average commencing January 1, 2013.

(b) On or before January 1, 2019, the governing board of a local publicly owned electric utility shall adopt an integrated resource plan and a process for updating the plan at least once every five years to ensure the utility achieves all of the following:

(1) Meets the greenhouse gas emissions reduction targets established by the State Air Resources Board, in coordination with the commission and the Energy Commission, for the electricity sector and each local publicly owned electric utility that reflect the electricity sector's percentage in achieving the economy-wide greenhouse gas emissions reductions of 40 percent from 1990 levels by 2030.

(2) Ensures procurement of at least 50 percent eligible renewable energy resources by 2030 consistent with Article 16 (commencing with Section 399.11) of Chapter 2.3 of Part 1 of Division 1.

(3) Meets the goals specified in subparagraphs (D) to (H), inclusive, of paragraph (1) of subdivision (a) of Section 454.52, and the goal specified in subparagraph (C) of paragraph (1) of subdivision (a) of Section 454.52, as that goal is applicable to each local publicly owned electric utility. A local publicly owned electric utility shall not, solely by reason of this paragraph, be subject to requirements otherwise imposed on electrical corporations.

(c) In furtherance of the requirements of subdivision (b), the governing board of a local publicly owned electric utility shall consider the role of existing renewable generation, grid operational efficiencies, energy storage, and distributed energy resources, including energy efficiency, in helping to ensure each utility meets energy needs and reliability needs in hours to encompass the hour of peak demand of electricity, excluding demand met by variable renewable generation directly connected to a California balancing authority, as defined in Section 399.12, while reducing the need for new electricity generation resources and new transmission resources in achieving the state's energy goals at the least cost to ratepayers.

(d)(1) The integrated resource plan shall address procurement for the following:

(A) Energy efficiency and demand response resources pursuant to Section 9615.

(B) Energy storage requirements pursuant to Chapter 7.7 (commencing with Section 2835) of Part 2 of Division 1.

(C) Transportation electrification.

(D) A diversified procurement portfolio consisting of both short-term and long-term electricity, electricity-related, and demand response products.

(E) The resource adequacy requirements established pursuant to Section 9620.

(2)(A) The governing board of the local publicly owned electric utility may authorize all source procurement that includes various resource types, including demand-side resources, supply side resources, and resources that may be either demand-side resources or supply side resources, to ensure that the local publicly owned electric utility procures the optimum resource mix that meets the objectives of subdivision (b).

(B) The governing board may authorize procurement of resource types that will reduce overall greenhouse gas emissions from the electricity sector and meet the other goals specified in subdivision (b), but due to the nature of the technology or fuel source may not compete favorably in price against other resources over the time period of the integrated resource plan.

(e) A local publicly owned electric utility shall satisfy the notice and public disclosure requirements of subdivision (f) of Section 399.30 with respect to any integrated resource plan or plan update it considers.

(Amended by Stats. 2017, Ch. 389, Sec. 2. (SB 338) Effective January 1, 2018.)

PUBLIC UTILITIES CODE - PUC

DIVISION 1. REGULATION OF PUBLIC UTILITIES [201 - 3260]

(Division 1 enacted by Stats. 1951, Ch. 764.)

PART 1. PUBLIC UTILITIES ACT [201 - 2120]

(Part 1 enacted by Stats. 1951, Ch. 764.)

CHAPTER 3. Rights and Obligations of Public Utilities [451 - 651]

(Chapter 3 enacted by Stats. 1951, Ch. 764.)

ARTICLE 1. Rates [451 - 467]

(Article 1 enacted by Stats. 1951, Ch. 764.)

454.52.

(a)(1) Beginning in 2017, and to be updated regularly thereafter, the commission shall adopt a process for each load-serving entity, as defined in Section 380, to file an integrated resource plan, and a schedule for periodic updates to the plan, to ensure that load-serving entities do the following:

(A) Meet the greenhouse gas emissions reduction targets established by the State Air Resources Board, in coordination with the commission and the Energy Commission, for the electricity sector and each load-serving entity that reflect the electricity sector's percentage in achieving the economy-wide greenhouse gas emissions reductions of 40 percent from 1990 levels by 2030.

(B) Procure at least 50 percent eligible renewable energy resources by December 31, 2030, consistent with Article 16 (commencing with Section 399.11) of Chapter 2.3.

(C) Enable each electrical corporation to fulfill its obligation to serve its customers at just and reasonable rates.

(D) Minimize impacts on ratepayers' bills.

(E) Ensure system and local reliability.

(F) Strengthen the diversity, sustainability, and resilience of the bulk transmission and distribution systems, and local communities.

(G) Enhance distribution systems and demand-side energy management.

(H) Minimize localized air pollutants and other greenhouse gas emissions, with early priority on disadvantaged communities identified pursuant to Section 39711 of the Health and Safety Code.

(2)(A) The commission may authorize all source procurement for electrical corporations that includes various resource types including demand-side resources, supply side resources, and resources that may be either demand-side resources or supply side

resources, taking into account the differing electrical corporations' geographic service areas, to ensure that each load-serving entity meets the goals set forth in paragraph (1).

(B) The commission may approve procurement of resource types that will reduce overall greenhouse gas emissions from the electricity sector and meet the other goals specified in paragraph (1), but due to the nature of the technology or fuel source may not compete favorably in price against other resources over the time period of the integrated resource plan.

(3) In furtherance of the requirements of paragraph (1), the commission shall consider the role of existing renewable generation, grid operational efficiencies, energy storage, and distributed energy resources, including energy efficiency, in helping to ensure each load-serving entity meets energy needs and reliability needs in hours to encompass the hour of peak demand of electricity, excluding demand met by variable renewable generation directly connected to a California balancing authority, as defined in Section 399.12, while reducing the need for new electricity generation resources and new transmission resources in achieving the state's energy goals at the least cost to ratepayers.

(b)(1) Each load-serving entity shall prepare and file an integrated resource plan consistent with paragraph (2) of subdivision (a) on a time schedule directed by the commission and subject to commission review.

(2) Each electrical corporation's plan shall follow the provisions of Section 454.5.

(3) The plan of a community choice aggregator shall be submitted to its governing board for approval and provided to the commission for certification, consistent with paragraph (5) of subdivision (a) of Section 366.2, and shall achieve the following:

(A) Economic, reliability, environmental, security, and other benefits and performance characteristics that are consistent with the goals set forth in paragraph (1) of subdivision (a).

(B) A diversified procurement portfolio consisting of both short-term and long-term electricity and electricity-related and demand reduction products.

(C) The resource adequacy requirements established pursuant to Section 380.

(4) The plan of an electric service provider shall achieve the goals set forth in paragraph (1) of subdivision (a) through a diversified portfolio consisting of both short-term and long-term electricity, electricity-related, and demand reduction products.

(c) To the extent that additional procurement is authorized for the electrical corporation in the integrated resource plan or the procurement process authorized pursuant to Section 454.5, the commission shall ensure that the costs are allocated in a fair and equitable manner to all customers consistent with Section 454.51, that there is no cost shifting among customers of load-serving entities, and that community choice aggregators may self-provide renewable integration resources consistent with Section 454.51.

(d) To eliminate redundancy and increase efficiency, the process adopted pursuant to subdivision (a) shall incorporate, and not duplicate, any other planning processes of the commission.

(e) This section applies to an electrical cooperative, as defined in Section 2776, only if the electrical cooperative has an annual electrical demand exceeding 700 gigawatt hours, as determined based on a three-year average commencing with January 1, 2013.

(Amended by Stats. 2018, Ch. 92, Sec. 174. (SB 1289) Effective January 1, 2019.)