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Docket Number:	18-IRP-01
Project Title:	Integrated Resource Plan
TN #:	227180-2
Document Title:	Hetch Hetchy Power IRP Filing
Description:	Hetch Hetchy Power Integrated Resource Plan Filing
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Organization:	San Francisco Public Utilities Commission
Submitter Role:	Public Agency
Submission Date:	2/27/2019 1:42:25 PM
Docketed Date:	2/27/2019

San Francisco Public Utilities Commission Hetch Hetchy Power Integrated Resource Plan Filing

Approved by the SFPUC Commission - November 13, 2018

By Resolution 18-0187

Submitted to the California Energy Commission on February 27, 2018



Services of the San Francisco Public Utilities Commission

October 2018

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1.0 Executive Summary

This is the Integrated Resource Plan Filing “IRP Filing” of Hetch Hetchy Power, the local publicly-owned electric utility (POU) operated by the San Francisco Public Utilities Commission (SFPUC), which is a department of the City and County of San Francisco.¹ The SFPUC is governed by a five-member commission (Commission), which adopted the final Integrated Resource Plan (IRP) and this IRP Filing at its November 13, 2018 meeting.

SB 350² requires all of California’s large publicly-owned utilities, including Hetch Hetchy Power,³ to: 1) prepare an Integrated Resources Plan (IRP); 2) have their governing body approve the IRP before December 31, 2018; and 3) submit the approved IRP to the California Energy Commission (CEC) before April 30, 2019. CEC Guidelines implementing SB350 require each POU to submit an “IRP Filing” that includes the IRP as well as supporting documentation that shows how each POU meets California’s environmental and policy goals and explains the methodologies used in developing the IRP.⁴

Hetch Hetchy Power worked with Black & Veatch Consultants to develop an IRP (Attachment A). The Commission reviewed the results at its July 25, 2017 meeting.⁵ The IRP analyzed how best to meet future energy demands while ensuring reliable service. The IRP forecasted Hetch Hetchy hydroelectric operations out to 2041 under three scenarios and a variety of sensitivity analyses.

The IRP ultimately focused on two scenarios for detailed evaluation:

- **Scenario 1 – Maintain Current Generation:** This scenario makes all necessary investment to maintain the current level of generation from the SFPUC’s Hetch Hetchy hydroelectric system through 2041 (hereinafter also called the **Baseline Scenario**); and
- **Scenario 3 – Deferring Moccasin Powerhouse:** This scenario would defer significant investments to the Moccasin Powerhouse and other water conveyance projects throughout the study period (2017-2041) to better align Hetch Hetchy generation with expected retail sales.

A “Scenario 2”, which would have delayed until years 11 to 25 of the IRP period some needed but currently unfunded Hetch Hetchy projects identified in the 10-year Capital Investment Plan (CIP) was not extensively analyzed after not being found cost-effective.

¹ The SFPUC also operates CleanPowerSF, San Francisco’s Community Choice Aggregation (CCA) program, and provides water and waste-water services.

² Statutes 2015, Ch. 547.

³ Under Public Utilities Code Section 9621(a), an IRP is required of all California’s POU’s with an annual load greater than 700,000 MWh/year (averaged over the last three years.) Hetch Hetchy Power’s three-year average is about 970,000 MWh.

⁴ CEC Publicly Owned Utility Integrated Resource Plan Submission and Review Guidelines (CEC-200-2018-004, October 2018), hereinafter referred to as “CEC Guidelines.”

⁵ CleanPowerSF, SFPUC’s community choice aggregator (CCA), must file an IRP with the CPUC pursuant to SB350. The SFPUC Commission approved CleanPowerSF’s IRP on July 24, 2018 by Resolution 18-0130. SFPUC submitted this IRP to CPUC on August 1, 2018.

The IRP concluded that it would be more cost-effective, over the 25-year planning horizon studied, for Hetch Hetchy Power to optimize its investments in the Hetch Hetchy system to better match retail sales, (Scenario 3) even taking into account significant efforts by Hetch Hetchy Power to increase the size of its retail load. The overall benefit, calculated on a net present value (NPV) basis, was \$78 million.⁶

The IRP, however, did not choose a preferred scenario. The IRP noted that its scope did not fully address the impact of any of the scenarios on the SFPUC's Water operations, qualitative factors related to any non-Power Enterprise issues, or to the overall economics of the SFPUC as a whole. The IRP concluded its results should be used as inputs to the SFPUC's broader organizational needs taking into account the interaction between the SFPUC's water and power operations.

SB 350 also requires that the IRP identify how California's load-serving entities (LSEs)⁷ plan to meet the state's environmental and policy goals, specifically California's efforts to reduce state-wide GHG emissions to forty percent (40%) below 1990 levels by 2030.

Hetch Hetchy Power is proud of its continuing environmental leadership. The IRP shows that Hetch Hetchy Power plans to:

- Serve all of its customer needs with 100% GHG-free electric energy;
- Exceed the GHG-reduction goals set for Hetch Hetchy Power by the California Air Resources Board (CARB);
- Meet its compliance obligation under California's Renewable Portfolio Standards (RPS) program; and
- Provide reliable electric service to meet its customer needs.

Chapter 3 of this IRP Filing identifies how Hetch Hetchy Power is meeting each of the policy goals identified in the CEC Guidelines.

In addition, the CEC requires each POU's IRP Filing to explain the methodologies used in the IRP. This will allow CEC to consolidate the IRP Filings into statewide totals. Chapter 4 of this IRP Filing addresses Hetch Hetchy Power's compliance with these requirements.

The IRP approved by the Commission on November 13, 2018 is identical to the IRP reviewed by the Commission in July 2017. This IRP Filing also addresses new issues identified in the CEC Guidelines that the IRP did not address and notes several areas where the initial forecasts of sales used in the IRP have been revised. SB350 requires that Hetch Hetchy Power adopt a process for updating its IRP at least once every five years. Hetch Hetchy Power will adopt an IRP at least once every five years, commit necessary resources to update the IRP, and have the Commission adopt the updated IRP. Hetch Hetchy Power staff regularly reviews load and generation forecasts, cost inputs, and other information that is key to the IRP as part of its ongoing utility business. Where there are

⁶ Scenario 1 had a cost (on a NPV basis) of \$1,069 million, compared to Scenario 3's cost (also on a NPV basis) of \$991 million.

⁷ A LSE is an entity that provides electric energy to retail customers.

significant changes to key assumptions, Hetch Hetchy Power will evaluate whether an earlier IRP update is required.

Finally, the IRP is only a plan. As Hetch Hetchy Power moves from the planning stage to approving projects, Hetch Hetchy Power will ensure the projects undergo the appropriate environmental review.

2.0 Hetch Hetchy Power's IRP Process and Results

2.1 Hetch Hetchy Power

Hetch Hetchy Power's customer base for electric energy primarily consists of city government agencies and tenants on city property (including the Port of San Francisco and San Francisco International Airport). Hetch Hetchy Power also serves some retail customers including those at the Treasure Island and Hunters Point redevelopment projects.

Hetch Hetchy Power receives its energy from three powerhouses located along the Hetch Hetchy system (Holm, Kirkwood, and Moccasin) with a combined capacity of 381 MW, 4 MW of small-scale hydroelectric generation at Moccasin Low-head, along with 8 MW of in-city solar, and 2 MW from a biomass facility located at the SFPUC's Southeast Wastewater Treatment Plant. Hetch Hetchy Power's annual generation from these sources is forecasted to be 1,585,000 MWh/year assuming average hydrologic conditions⁸ while Hetch Hetchy Power's retail sales in 2017 were 965,302 MWh. Surplus Hetch Hetchy Power generation is sold to the Modesto and Turlock Irrigation Districts (MID and TID), the California Independent System Operator's (CAISO) wholesale energy markets, CleanPowerSF, and others.

2.2 Hetch Hetchy Power's IRP Process

Integrated Resource Planning is a formal process undertaken by a utility to determine future resource requirements necessary for meeting forecasted annual peak and energy demand, with an adequate reserve to provide for system reliability and integrity. IRP's are also used to assess the ability of a utility to meet its environmental and policy goals.

In 2016, the SFPUC began developing its IRP for its Hetch Hetchy Power operations. Six working groups, comprised of SFPUC staff and Black & Veatch consultants, developed inputs and parameters for the IRP process in the areas of Cost Allocation, Generation, Transmission, Market Pricing, Load, and Policy. The results from these working groups were incorporated into Black & Veatch's production cost model, PLEXOS, which then modeled Hetch Hetchy Power's electric system to determine the optimal mix of resources needed to meet Hetch Hetchy Power's demands under a variety of conditions. Validation of the methodology and execution of the model runs was accomplished through comparison of results with internal peer groups, manual spot checks, and discussions with SFPUC staff to verify the results. Modifications of modeling approaches and scenarios were performed as appropriate to ensure that the models adequately reflect the current state of SFPUC system operations and likely future operations scenarios.

⁸ As modeled in the IRP, Hetch Hetchy average generation is 1,575,000 MWh/year. Local solar and biomass projects provide approximately an additional 10,000 MWh.

The result of this process was Hetch Hetchy Power's 2017 IRP presented to the Commission for its review, on July 25, 2017. (Attachment A). Since this presentation, staff supplemented the IRP to address issues identified in the CEC Guidelines that were not addressed in the IRP. In addition, staff identified where some of the forecasts used in the IRP should be revised based on updated information.⁹

2.3 Hetch Hetchy Power's IRP Results

The IRP examined three different scenarios for operations of SFPUC's three hydroelectric facilities.

- **Scenario 1 – Maintain Current Generation** from the SFPUC's Hetch Hetchy hydroelectric system by making all necessary investment to maintain the current level of generation through 2041 (hereinafter also called the **Baseline Scenario**);
- **Scenario 2 – Delay Some Projects** by limiting investments in the Hetch Hetchy hydroelectric system only to projects already funded in the SFPUC's 10-year Capital Investment Plan (CIP), with unfunded needs delayed until Years 11 to 25 of the analysis.
- **Scenario 3 – Deferring Moccasin Powerhouse** and water conveyance projects throughout the study period to better align Hetch Hetchy generation with expected retail sales.

The IRP ultimately focused on Scenarios 1 and 3 after preliminary analysis concluded that Scenario 2 was uneconomical compared to Scenarios 1 and 3. The scenarios reflect current SFPUC water-first operations regarding the scheduling of Hetch Hetchy generation.¹⁰

The IRP concluded that it would be more cost-effective, over the 25-year planning horizon considered in the IRP, for Hetch Hetchy Power to optimize its investments in the Hetch Hetchy Power system to better match retail sales, even after accounting for significant efforts by Hetch Hetchy Power to increase the size of its retail load. The overall benefit, calculated on a net present value (NPV) basis, was \$78 million.¹¹ The largest difference between the cases comes from Hetch Hetchy capital costs (costs required for continued powerhouse operations) and the amount of market sales/purchases.

⁹ This includes Sections 3.5 (Electric Transportation), 3.7 (Ability to Meet Peak Demand), 3.9.2 (Local Distribution), and 3.10 (Effect on Disadvantaged Communities). The IRP filing also notes, but does not change within the IRP, that subsequent forecasts of retail sales have been revised, and that potential increases in retail sales for electric transportation were not included in the IRP. These revisions will be addressed in updates to the IRP as needed.

¹⁰ IRP Plan, p. 5-3.

¹¹ Scenario 1 had a cost (on a NPV basis) of \$1,069 million, compared to Scenario 3's cost (also on a NPV basis) of \$991 million.

In addition to the three scenarios, sensitivity analyses were performed to determine the impact of the following:

- **Addition of Renewable Resources:** 50 MW of renewable energy were added to the Hetch Hetchy Power system as part of deferring investment in the Moccasin Powerhouse;
- **Meteorological Uncertainty:** Wet and dry hydro years (using the year 2025 as a study point) were evaluated;
- **Market Price Uncertainty:** Primarily changes in wholesale energy prices; and
- **Increased Load Growth:** An additional 300 MW of load growth by 2040.

The IRP, however, did not choose a preferred scenario. As the IRP stated, the most critical input to the IRP's modeling results were the assumptions used for the capital and operating costs for each of the hydroelectric generation units. The IRP also noted that its scope did not fully address the impact of any of the scenarios on Water operations, qualitative factors related to any non-Power Enterprise issues, or to the overall economics of the SFPUC as a whole. The IRP concluded that Hetch Hetchy Power's IRP results should be considered and used as inputs to the SFPUC's broader organizational needs taking into account the interaction between the SFPUC's water and power operations.

3.0 Achievement of California's Energy Policy Goals

A major purpose of SB350's IRP planning requirements is to identify how California's LSEs, including POUs are meeting California's various energy goals and requirements. Hetch Hetchy Power's compliance with each of the policy requirements identified in SB350, and the accompanying CEC Guidelines are described below.

3.1 Achievement of California's GHG Reduction Goals¹²

Hetch Hetchy Power will continue to provide 100% zero-GHG renewable energy to its customers throughout the 2030 planning period under both Scenarios 1 and 3.

A fundamental purpose of SB350's IRP planning requirement is to ensure that each LSE meets the GHG reduction targets established by CARB. In order to achieve California's GHG reduction goals set by California's Global Warming Solutions Act of 2006 CARB must identify measures to reduce California's overall GHG emissions 40% from 1990 levels by 2030.¹³ In its 2017 Scoping Plan Update, CARB identified GHG reduction targets for each sector of the economy as well as suggested measures to achieve these reductions.

¹² Public Utilities Code Section 9621 (b)(1) and CEC Guidelines, Chapter 3, Section H, p.13.

¹³ AB32 set a goal for California to reduce GHG emissions to 20% below 1990 levels by 2020 and established a process for CARB to develop regulations and identify other programs to achieve this goal. SB32 builds off of this process and sets a new goal of a 40% reduction from 1990 levels by 2030.

For California’s electric sector, the CPUC recommended a GHG target of 42 million metric tons (MMT) by 2030. CARB adopted a target range of 30 to 53 MMT, a 51% to 72% reduction from 1990 GHG emission levels for the electric sector of 108 MMT.¹⁴ CARB assigned an individual target to each LSE. Hetch Hetchy Power’s share of this GHG target for 2030 is 12,000 to 22,000 tons, which is a mid-point of 0.041% of the statewide total.

**HETCH HETCHY POWER ’S FORECASTED 2030 GHG EMISSIONS
COMPARED TO CARB’S ADOPTED 2030 TARGETS¹⁵**

	METRIC TONS (MT)/Year
IRP Forecast	0
CARB 2030 GHG Target (low-end of range)	12,000
CARB 2030 GHG Target (high-end of range)	22,000

Hetch Hetchy Power plans to retain its zero-GHG emissions profile from now through 2030. The IRP concluded environmental performance under either the Baseline Scenario 1, or the alternative Scenario 3 is similar, because no fossil-fueled GHG-emitting resources are used in either scenario.¹⁶

3.2 Achievement of Hetch Hetchy Power’s RPS Compliance Obligations¹⁷

Hetch Hetchy Power will continue to meet its RPS compliance obligations by providing 100% of its retail electricity demands from its Hetch Hetchy hydroelectric generation and RPS-eligible energy products.

Under the requirements of Public Utilities Code Section 399.30(j), Hetch Hetchy Power must meet 100 percent of its retail sales with either qualifying Hetch Hetchy hydroelectric generation¹⁸ or RPS eligible resources provided it meets more than 67% of its electricity demands from its qualifying Hetch Hetchy generation.¹⁹ For market power purchases, the SFPUC may use renewable energy

¹⁴ CARB “Staff Report: Senate Bill 350 Integrated Resource Planning Electricity Sector Greenhouse Gas Planning Targets”, July 2018, p. 23 approved by CARB at its July 26, 2018 Board meeting.

¹⁵ CEC Guidelines, Appendix E, p. E-1 reproducing CARB’s adopted targets developed from their staff paper “Senate Bill 350 Integrated Resource Planning Electricity Sector Greenhouse Gas Planning Targets.”

¹⁶ Even under Scenario 3, where investments in the Moccasin Powerhouse are deferred, remaining Hetch Hetchy generation is sufficient through 2030. The IRP Plan also proposed procuring renewable resources for any future resource needs, such as under the high-load growth sensitivity scenario.

¹⁷ Public Utilities Code Section 9621(b) and CEC Guidelines, Ch.2, Section F, 2, pp. 6-8.

¹⁸ “Qualifying hydroelectric generation” includes all of the generation from the Holm, Kirkwood, and Moccasin Powerhouses other than the Moccasin low-head (LH) generating unit which is RPS-eligible under Public Resources Code 25741.

¹⁹ The calculation of Hetch Hetchy Power meeting more than 67% of its electric demand from its qualifying hydroelectric generation is determined at the start of each multi-year compliance period set by the CEC based on the average of the previous twenty years of Hetch Hetchy qualifying hydro generation, Once eligibility is

credits (RECs) to meet its compliance obligation if needed. Generation from the Kirkwood Powerhouse can be counted as either qualifying Hetch Hetchy generation or RPS-eligible generation. Therefore, surplus Kirkwood generation is a PCC1 (bundled)²⁰ REC that can be carried forward for use in future years for Hetch Hetchy Power's RPS compliance.²¹ Surplus RECs from the SFPUC's other RPS-eligible solar and biomass resources may also be carried over for future use or sold to others.

Given the above resources and requirements, Hetch Hetchy Power will continue to meet its RPS compliance obligations while continuing to provide 100% GHG-free power. The IRP forecasted that Hetch Hetchy Power's need for RECs is minimal between now and 2030.²²

3.3 Achievement of Hetch Hetchy Power's Energy Efficiency and Demand Response Targets²³

Hetch Hetchy Power has an annual budget of approximately \$3.5 million for the development of distributed energy resources (DER) projects at locations throughout San Francisco including implementation of energy efficiency programs and rooftop solar.²⁴ Since the inception of these programs, they have resulted in energy efficiency savings of over 50,000 MWh of electricity (about 5% of current demand) and 2 million therms of natural gas use each year. 3.2 MW of roof-top solar has also been installed.²⁵

Both scenarios of the IRP accounted for these energy efficiency and renewable energy programs and reflected them in the net load growth assumptions of 0.5% per year.²⁶ This estimate is consistent with estimates of achievable energy efficiency developed in Hetch Hetchy Power's report to the CEC required under Public Utilities Code Section 9505(b).²⁷

Hetch Hetchy Power currently has no demand response programs.²⁸

established, it remains in effect until the start of the subsequent compliance period when Hetch Hetchy Power must re-qualify.

²⁰ Portfolio Content Category 1 (PCC 1) is renewable energy that is procured at the same time as the REC (hence bundled) from an in-state California resource or resource that can directly deliver the renewable energy to California.

²¹ The SFPUC can also sell up to 100,000 RECs from its Kirkwood Powerhouse generation to others over the life of the asset.

²² The IRP did not model the ability of Hetch Hetchy Power to carry-forward surplus RECs generated in one-year for use in future years (subject to some restrictions) which could eliminate the need for Hetch Hetchy Power to purchase any RECs over the IRP planning horizon.

²³ Public Utilities Code Section 9621(b)(1) and CEC Guidelines, Ch.2, Section F. 3, pp. 8-9.

²⁴ IRP, p. 3-5.

²⁵ IRP, p. 3-5.

²⁶ IRP, p. 4-18.

²⁷ This section requires Hetch Hetchy Power to annually report to the CEC its energy efficiency activities by March 15th of each year. Hetch Hetchy Power coordinates its filing with the California Municipal Utilities Association (CMUA) which files a single report (Energy Efficiency in California's Public Power Sector, 11th Edition 2017) to the CEC covering all of California's POU's.

²⁸ CEC Guidelines, Ch.2, Section F, 3.c., p. 9.

3.4 Review of Hetch Hetchy Power’s Electric Storage Efforts²⁹

AB2514, California’s energy storage law required California’s LSEs to evaluate the potential to procure viable and cost-effective energy storage systems.³⁰ AB2514 required the governing boards of a local POU to set appropriate procurement targets for electric storage, if any, by October 1, 2014 and provide an update by October 1, 2017. Hetch Hetchy Power examined the viability and cost-effectiveness of electric storage in 2014 and 2017.³¹ Both reports determined that electric storage was not cost-effective for the SFPUC, primarily because the Hetch Hetchy Power system provides many of the same benefits of storage such as load-shifting, ancillary services, and flexible ramping.³² The IRP reconfirmed this conclusion.³³

However, the SFPUC continues to explore the use of storage and is developing small-scale energy storage demonstration projects in San Francisco for local system resiliency efforts.

3.5 Review of Hetch Hetchy Power’s Electric Transportation Efforts³⁴

As the CEC Guidelines states: “Transportation electrification is an important strategy for meeting the state’s long-term GHG emission reduction goals” because transportation represents about 40% of California GHG emissions.³⁵

Hetch Hetchy Power provides 100% renewable and GHG-free electric energy to San Francisco’s Municipal Transportation Agency (SFMTA), commonly known as Muni. Muni operates the nation’s largest fleet of electric public transit including approximately 300 electric trolley buses, 200 light-rail vehicles (LRVs) and 40 cable cars. Muni’s electric transportation related energy usage is approximately 90,000 MWh/year.³⁶ Subsequent to the completion of the IRP in 2017, in April 2018 SFMTA committed to electrifying the remainder of its bus vehicle fleet (approximately 500 buses) by 2035.³⁷ A future IRP update will address the impact of this commitment on Hetch Hetchy Power energy demands

Hetch Hetchy Power also provides electric energy for several other uses CARB classified as transportation, including on-shore power for some ships docked at the Port of San Francisco that would otherwise be powered by the ship’s diesel generators.³⁸ In addition, Hetch Hetchy Power serves Electric Vehicle (EV) charging stations located at City-owned parking facilities and municipal buildings that use approximately 600 MWh/year.³⁹

²⁹ Public Utilities Code Section 9621(b)(3) and CEC Guidelines, Ch. 2, Section F.4., p. 9.

³⁰ Public Utilities Code Section 2835 *et seq.*

³¹ As required by AB2514, in 2014 the SFPUC sent an initial energy storage report to the CEC, “Analysis and Recommendations Regarding Energy Storage Procurement Policy” which was approved by Commission Resolution 14-0147. On September 23, 2017 the SFPUC sent to the CEC its “Update on Power Enterprise’s Electric Storage Activities as Required by Resolution 14-0147.”

³² IRP, p. 4-19.

³³ IRP, p. 4-18.

³⁴ Public Utilities Code Section 9621(b)(3) and CEC Guidelines, Ch. 2, Section F.5., p. 9-10.

³⁵ CEC Guidelines, pp. 9-10.

³⁶ Hetch Hetchy Power is exploring the use of a green tariff offering for transportation-related energy usage.

³⁷ This corresponds to a recent proposal by CARB to electrify all of California’s public transit bus fleets by 2035.

³⁸ CARB Low Carbon Fuel Standards (LCFS).

³⁹ Hetch Hetchy Power also has two residential customers on its EV charging rate (REV-1).

As part of a high Distributed Energy Resource (DER) sensitivity scenario modeled in the IRP, the addition of 1,200 City electric fleet vehicles would add 8,000 MWh/year of additional electric usage. This would be an increase in retail sales of less than 1% and could be met by existing Hetch Hetchy Power resources without the need for any incremental procurement to meet this need.⁴⁰

3.6 Meeting Hetch Hetchy Power’s System and Local Reliability Needs⁴¹

Hetch Hetchy Power possesses significantly more generation than it has demand. Currently, it has 380 megawatts (MW) of generation capacity for a system with a peak load of roughly 150 MW. Hetch Hetchy Power sells most of the excess generation during the spring hydro runoff period.

Resource adequacy (RA) plays an important role in the California market in terms of maintaining system reliability. The RA program is designed to meet reliability requirements by requiring load-serving entities (LSEs), including POU, to procure significant capacity to meet the following three requirements.

3.6.1 System Resource Adequacy

Overall, Hetch Hetchy Power must meet a system level RA requirement of 15 percent above its expected peak demand.⁴² The system RA requirement ensures that the California electric system has sufficient capacity to meet peak demand.

System RA capacity can be located anywhere on the electric system as long as it can meet deliverability requirements to serve the monthly peak load. Hetch Hetchy Power has significant excess capacity (307 MW)⁴³ relative to its 2017 RA obligation of 166 MW (144 MW peak demand + 15% reserve margin). This excess capacity would accommodate a significant increase in Hetch Hetchy Power demand over the 2017-2030 IRP planning horizon.

3.6.2 Local Resource Adequacy

The RA program also has a local RA requirement that requires a certain amount of capacity be located within a transmission constrained zone such as the San Francisco Greater Bay Area.⁴⁴ The local RA requirement also factors in operating contingencies such as the loss of generation or transmission lines that would impact the local area.

CAISO assigns Hetch Hetchy Power’s local RA requirements based on Hetch Hetchy Power’s proportionate share of the Local RA needs of the Greater Bay Area. The local RA requirements are

⁴⁰ IRP, p 4-18.

⁴¹ Public Utilities Code Sections 9621(b)(3) and 454(a)(1)(e); CEC Guidelines. Ch. 2, Section I, p. 13.

⁴² Peak demand is calculated based on an average peak demand, also known as a 1-in-2 peak or 50/50 load forecast, meaning that there is a 50% chance forecasted peak demand would be higher, and a 50% chance that peak demand would be lower than the adopted figure.

⁴³ This figure is lower than the total 380 MW capacity of the Hetch Hetchy hydroelectric system because it is based on the amount of dependable capacity, (Net Qualifying Capacity or NQC) by the CAISO. This figure drops to 277 MW from 2028 through 2030 when the Kirkwood Powerhouse Unit #3 is removed from service for refurbishment.

⁴⁴ Capacity requirements in the local capacity zones are higher because planning requirements are based on a 1-in-10 peak load rather than on a 1-in-2 peak load.

currently 68 MW, which is expected to grow proportionately with growth in Hetch Hetchy Power’s retail sales to 83 MW by 2030.

HETCH HETCHY POWER FORECASTED LOCAL CAPACITY REQUIREMENT

(in MW)

2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
68	69	70	71	72	73	75	76	77	79	80	81	82	83

Hetch Hetchy Power does not have any resources that meet this Local RA requirement. Hetch Hetchy Power will purchase these resources from third-parties as necessary to meet its Local RA requirement.

3.6.3 Flexible Resource Adequacy

As California adds more wind and solar resources to the electric grid to meet California’s RPS, additional flexible capacity may be needed to meet fluctuations in wind and solar generation and maintain the reliability of the grid. This obligation, called the Flexibility Resource Adequacy Capacity (FRAC) formula⁴⁵ requires Hetch Hetchy Power to have a sufficient amount of flexible capacity to meet this obligation. The IRP concluded that Hetch Hetchy Power did not need to procure additional reserves to meet this requirement, considering its existing generation portfolio and the local RA that Hetch Hetchy Power will already be procuring.

3.7 Ability to Meet Peak Demand⁴⁶

Subsequent to the completion of the IRP in 2017, California enacted Senate Bill (SB)338⁴⁷ which requires an LSE “to consider how existing renewable generation, grid operational efficiencies, energy storage, and distributed generation resources, including energy efficiency, will meet energy and reliability needs during the hours of net-peak demand.”⁴⁸

The purpose of this study is to help LSEs identify how to minimize their use of fossil-fueled energy resources during times of peak demand. While California’s RPS requirements mandate that an increasing portion of California’s energy needs come from renewable resources, this requirement does not necessarily ensure that new renewable resources coming on line are matching the load profile of California’s electric grid, particularly given the variability of such renewable resources as wind and solar.

This is not a problem for Hetch Hetchy Power whose resource mix contains a minimal amount of variable renewable energy resources. Solar represents less than 1% of generation. Additionally, the remaining 99% of Hetch Hetchy Power generation is already zero-GHG renewable hydroelectric energy.

⁴⁵ FRAC is calculated on a monthly basis using the maximum change in the 1-minute net load data over a 3-hour period plus 3.5 percent of the peak load for the CAISO system. LSEs are then allocated a share of the total FRAC requirement based upon their contribution from load and renewables.

⁴⁶ Public Utilities Code Section 9621(c) and CEC Guidelines, Ch. 2, Section G.3., pp.11-12.

⁴⁷ *Stats. 2017, Ch. 389, Sec. 1.5.* (SB 338) Effective January 1, 2018.

⁴⁸ Net peak demand is defined as total demand minus the portion of demand met by variable renewable energy resources which in Hetch Hetchy Power’s case is generation from its solar energy resources.

3.8 Effect of the IRP on Retail Rates⁴⁹

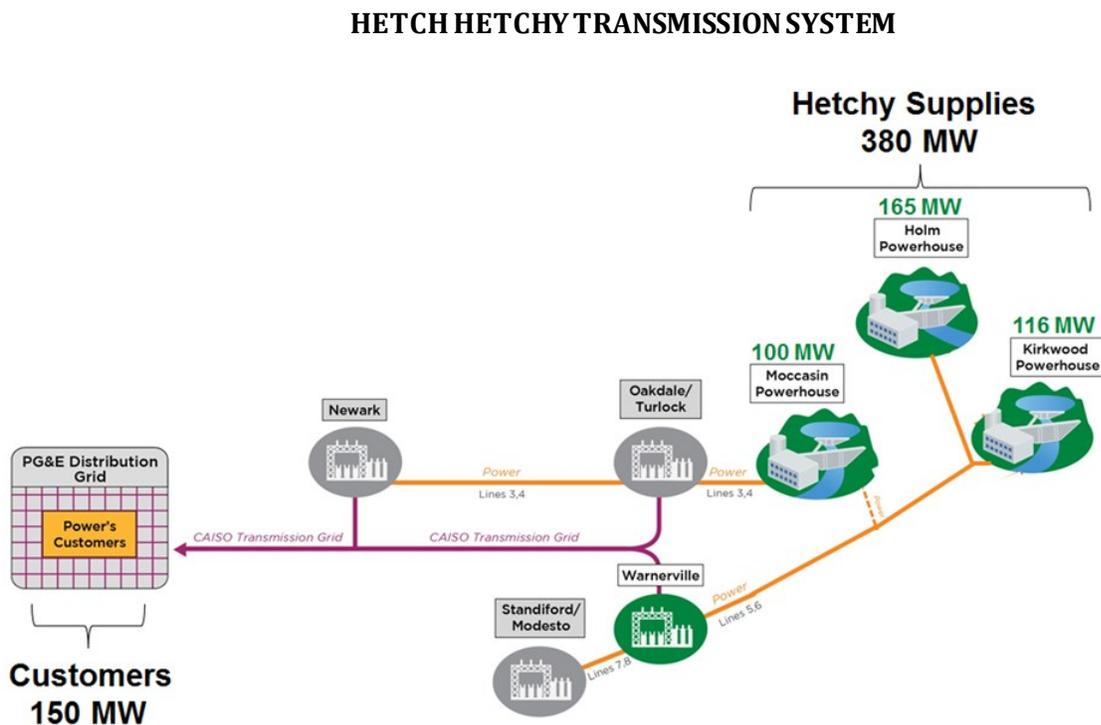
The CEC Guidelines recognize that it is the statutory authority of the POU governing board to set rates. The CEC Guidelines require Hetch Hetchy Power to include in its IRP Filing any “report or study on rate impacts under the IRP scenario, if that report or study was considered as part of its IRP planning process.”⁵⁰ Hetch Hetchy Power’s IRP did not consider such a study or report in its IRP process.

3.9 Transmission and Distribution Systems⁵¹

3.9.1 Bulk Transmission

Electricity generated by the Hetch Hetchy system is transmitted through SFPUC-owned and operated transmission lines, consisting of approximately 110 miles of 115 kilovolt (kV) and 50 miles of 230 kV transmission lines and four substations.

Approximately 75 percent of Hetch Hetchy’s generating capacity is connected to its 230 kV system via the Intake switchyard and Warnerville Substation. The remaining 25 percent of the generating capacity is normally connected to another 115 kV subsystem at the Moccasin Switchyard, which interconnects with PG&E’s Newark Substation via two 115 kV lines. An overview of Hetch Hetchy Power’s transmission topology is shown below:



⁴⁹ Public Utilities Code Sections 9621(b)(3) and 454(a)(1)(C) & (D); CEC Guidelines. Ch. 2, Section I, p. 13.

⁵⁰ CEC Guidelines, p. 13.

⁵¹ Public Utilities Code Sections 9621(b)(3) and 454(a)(1)(F); CEC Guidelines Ch. 2, Section G.3., p.13.

Black & Veatch modeled Hetch Hetchy Power's transmission system as part of the IRP planning process. The IRP concluded that Hetch Hetchy Power's transmission system faces minimal transmission congestion/constraints to serve Hetch Hetchy Power load because of the high load carrying capacity of Hetch Hetchy Power's transmission lines.

Hetch Hetchy Power's transmission facilities connect into the CAISO operated transmission system and PG&E's distribution system to deliver power to most Hetch Hetchy Power customers located in San Francisco and the Peninsula. San Francisco has worked closely with PG&E and CAISO to improve the resiliency of this transmission system. San Francisco advocated for extensive upgrades to the transmission system serving San Francisco, including the TransBay Cable project that allowed for the retirement of the in-city Hunters Point and Potrero power plants.⁵² In addition, SFPUC actively participates in CAISO studies such as the CAISO Extreme Events Study that identified further upgrades to San Francisco's transmission system to ensure that reliable service can be maintained even under extreme events such as earthquakes. These upgrades included a third 230 kV line connecting into PG&E's Embarcadero Substation to further improve reliability to the Downtown area (already completed) and a new Egbert Substation (currently under CPUC review)⁵³ to improve the reliability of PG&E's transmission lines running up the Peninsula to serve San Francisco.

3.9.2 Local Distribution

PG&E's distribution system serves almost all of Hetch Hetchy Power's current electric demand under a FERC-regulated Wholesale Distribution Tariff (WDT). The SFPUC participates in proceedings before the CPUC and FERC affecting PG&E's rates and services to help ensure that not only Hetch Hetchy Power customers but also all of San Francisco's residences and businesses receive reliable and reasonably priced service.⁵⁴

Hetch Hetchy Power operates local distribution facilities that serve the Hunters Point and Treasure Island redevelopment projects.

As these projects are built out, Hetch Hetchy Power will provide and manage the necessary utility infrastructure. Hetch Hetchy Power is also in the process of developing its Bay Corridor Transmission and Distribution (BCTD) Project that would install a back-bone distribution system along the Eastern portion of San Francisco allowing for Hetch Hetchy Power to directly serve customers rather than relying on PG&E's distribution system.

⁵² SFPUC 2011 Electricity Resource Plan Update, adopted by the Board of Supervisors in Resolution 349-11, p. 22.

⁵³ Egbert Switching Station Project Certificate of Public Convenience and Necessity (A.17-12-021).

⁵⁴ SFPUC 2011 Electricity Resource Plan Update, adopted by the Board of Supervisors in Resolution 349-11, p. 80.

3.10 Effect of Hetch Hetchy Power on Localized Air Pollutants and Disadvantaged Communities⁵⁵

Hetch Hetchy Power's generation from its Hetch Hetchy powerhouses is GHG-free and creates no localized air pollution. In most years Hetch Hetchy Power sells a significant portion of this GHG-free energy to others, which helps reduce GHG emissions and other pollutants that would otherwise be generated from fossil-fueled power plants.⁵⁶ Hetch Hetchy Power has estimated that since the creation of the Power Content Label in 1998, Hetch Hetchy Power has provided over 3 million MWh of zero-GHG energy to California's wholesale energy market.

The City and County of San Francisco successfully collaborated with state energy planning agencies such as the CAISO to close down San Francisco's two large in-city pollution-emitting power plants located in the Hunters Point and Potrero areas of San Francisco. With the closure of these plants in 2006 and 2011 there are no large-scale fossil-fueled power plants located within San Francisco, and substantial clean-up and redevelopment of these areas is underway or being planned.

The SFPUC has identified twelve census districts within San Francisco that are classified as disadvantaged communities with a CalEnviroScreen score with a 76th to 100th percentile ranking or lacking an overall score but with a pollution burden score in the top 5%. Seven of these are in the Hunters Point area of San Francisco, four are around the Moscone Center/South of Market Street (SoMa)/Civic Center area and the twelfth is located on Treasure Island. Hetch Hetchy Power is the electric utility for both the Hunters Point and Treasure Island redevelopment projects and delivers GHG-free electricity to those customers.

Hetch Hetchy Power owns the Southeast Cogeneration Plant (2.0 MW) located in the Bayview/Hunters Point area of San Francisco. This plant takes methane generated as a by-product of the SFPUC's processing of sewage waste and uses it as a fuel to generate electric power. Although this results in the emission of carbon dioxide (CO₂), a GHG, it prevents the release of methane into the environment. Methane has approximately 30 times the effect on GHG emissions as CO₂. This results in a significant net reduction in overall GHG emissions.⁵⁷

In combusting methane and converting it to electric energy, the Southeast Cogeneration Plant does create localized (non-GHG) emissions, primarily Nitrogen Oxide (NO_x).

The SFPUC as part of a \$938 million rebuilding of the Southeast Wastewater Treatment Plant,⁵⁸ will replace this cogeneration plant with a larger 5.2 MW plant forecast to come on-line in 2023.⁵⁹ This plant will meet the Best Available Control Technology (BACT) requirements set by the Bay Area Air Quality Management District (BAAQMD). The Environmental Impact Report prepared for the total project (including the cogeneration plant) concluded that the project would not exceed any of the

⁵⁵ Public Utilities Code Sections 9621(b)(3) and 454.52(1)(H) and CEC Guidelines, Ch. 2, Section K, pp. 14-16. AB1110 recognizes the GHG-reducing effect of Hetch Hetchy Power sales of surplus zero-GHG hydroelectric generation to the California electric grid and credits these reductions to Hetch Hetchy Power as part of its GHG-reporting obligation under AB1110.

⁵⁷ The CEC classifies these types of plants as having zero-GHG emissions under the CEC's GHG Emissions Performance Standards (SB1368) requirements.

⁵⁸ Resolution 18-0042.

⁵⁹ Although this new plant will come on-line in 2023, there will be a testing and phase-in period that could extend to 2025 where both the existing and new plants will be available. However, the total amount of fuel (methane) to power the plants does not change.

significance thresholds for criteria air pollutants and its overall effect would be less than significant.⁶⁰ An Environmental Justice Analysis for the project evaluated 33 indicators of environmental justice and developed a community benefits package to address these indicators.⁶¹

Hetch Hetchy Power seeks to meet and exceed the goals set by the SFPUC's Environmental Justice policy.⁶² Among its programs, Hetch Hetchy Power offers a low-income ratepayer assistance program that provides a 30% discount from the applicable residential rate.⁶³ 12% of Hetch Hetchy Power's residential customers (73 out of 609) utilize this rate schedule.

Hetch Hetchy Power offers a program called GoSolarSF which provides incentives for Hetch Hetchy Power customers (as well as CleanPowerSF customers) to install roof-top solar.⁶⁴ GoSolarSF offers a base incentive of \$300/kW of installed solar capacity (up to 4.0 kW) but provides additional incentives for customers located in environmental justice communities⁶⁵ (\$100/kW), low-income customers (\$2,000/kW) and customers utilizing approved installers (\$250/kW) who commit to utilize local labor where possible. Differing incentive levels are available for SASH⁶⁶ units. The program also offers virtual net metering for multi-unit buildings.⁶⁷

Since the start of the program in FY2008-09 GoSolarSF has provided \$10.67 million in incentives to 1,041 low-income solar installations to install 1.9 Mw of rooftop solar. An additional \$0.73 million of incentives have been provided to 157 low-income SASH applications to install 0.36 Mw of rooftop solar.⁶⁸

⁶⁰ Biosolids Digester Facilities Project, Draft EIR, May 2017, p. 4.8.54.

⁶¹ Environmental Justice Analysis for Bayview Hunters Point: Biosolids Digester Facilities Project and Community Benefits Program.

⁶² In Resolution 09-0170, adopted October 13, 2009, the SFPUC "affirms and commits to the goals of environmental justice to prevent, mitigate, and lessen disproportionate environmental impacts of its activities on communities in all SFPUC service areas and to insure that public benefits are shared across all communities."

⁶³ Hetch Hetchy Power Rate Schedule R-2.

⁶⁴ GoSolar SF incentives initially were available to all San Francisco residents and businesses, even those served by PG&E, in addition to Hetch Hetchy Power customers.

⁶⁵ "Environmental Justice or CalHome Loan' Supplemental Incentives are available to all applicants located in San Francisco's environmental justice zip codes (94124 or 94107), including Low-Income SASH, and to property owners enrolled in the CalHome loan program under the California Department of Housing and Community Development." GoSolarSF Program Handbook FY18-19, p. 10.

⁶⁶ The Single-family Affordable Solar Homes (SASH) program is part of the California Solar Initiative (CSI) that provides solar incentives on qualifying affordable single-family housing. The incentives are provided by ratepayer dollars collected by California's investor-owned utilities (such as PG&E). The GoSolarSF incentive is adjusted to reflect the SASH incentives a GoSolarSF participant receives.

⁶⁷ Full details on program eligibility are available from the GoSolarSF Program Handbook FY18-19. <https://sfwater.org/modules/showdocument.aspx?documentid=7461>

⁶⁸ All figures are as of October 1, 2018.

4.0 Hetch Hetchy Power Compliance with CEC Guidelines

The CEC Guidelines require each LSE's IRP Filing to explain the methodologies used in the IRP's preparation. The following sections address how Hetch Hetchy Power's IRP meets these CEC Guidelines.

4.1 Supply Assumptions

The IRP assumes the continued operation of all units of the Hetch Hetchy generation through 2030, other than Kirkwood Powerhouse Unit #3 which is taken off-line for refurbishment/rebuilding starting in 2028. As these units constitute 99% of Hetch Hetchy Power's annual generation, Hetch Hetchy Power's other solar and biomass generation were not directly modeled in the IRP but are included in the Supporting Tables.

4.2 Demand Forecasts⁶⁹

The IRP Filing must describe the demand forecasting methodology and assumptions used. The CEC recommends using the *California Energy Demand Forecast* developed annually as part of its Integrated Energy Policy Report (IEPR).⁷⁰

Hetch Hetchy Power developed a demand forecast for use in its IRP consisting of two different components:

- Hetch Hetchy Power's existing customer base; and
- New customer opportunities such as the build-out of the Hunters Point and Treasure Island communities and increasing sales of GHG-free energy to other retail customers.

For Hetch Hetchy Power's existing customer base, the IRP forecast minimal retail sales load growth of a half of one percent (0.5%) per year based on historical patterns.⁷¹ Forecasts prepared subsequent to the IRP, predict zero to minimal load growth. The range of both forecasts is consistent with the CEC's own forecasts that estimate retail sales growth from 0% to 0.8% per year.⁷²

The second component of Hetch Hetchy Power's load forecast represents Hetch Hetchy Power's intention to increase its revenues by expanding its retail sales beyond its existing customer base,

⁶⁹ CEC Guidelines, Ch. 2, Section E, p. 5.

⁷⁰ The CEC prepares this report every two years, updated annually, and seeks to provide a comprehensive overview of California's energy needs, trends, and policy issues.

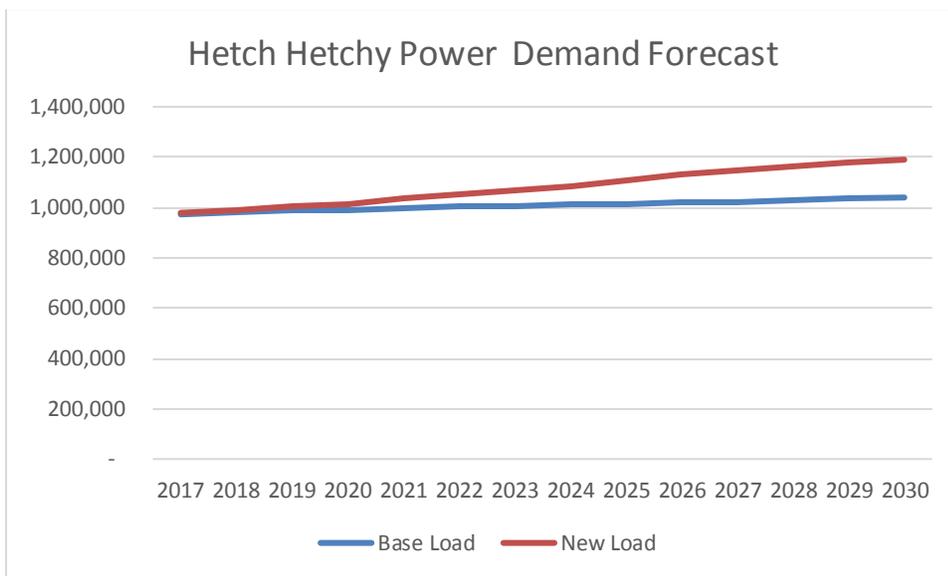
⁷¹ Hetch Hetchy Power has detailed knowledge of its customer's demands because most of Hetch Hetchy Power's existing retail sales are to other municipal departments. This information comes from interactions with the departments and the City's long-term capital planning process. Additionally, municipal load is much less subject to fluctuations due to economic conditions. Thus, Hetch Hetchy Power has not needed to rely on extensive econometric models forecasting economic and other trends to determine its demand forecast.

⁷² CEC Mid-Demand Baseline and High-Demand forecasts for Hetch Hetchy Power from the CEC's California Energy Demand Forecast.

thus allowing it to sell more of its excess energy supplies to retail, rather than wholesale customers. This component was not reflected in the CEC’s demand forecast.

The ability of Hetch Hetchy Power to identify and acquire these new retail customers will change in future years because it is contingent upon such factors as the build-out of new developments and identifying new customer opportunities.

The chart below shows forecasted sales for Hetch Hetchy Power’s existing customer base (the lower line). The upper line shows Hetch Hetchy Power’s forecasted retail sales if it successfully achieves its goals of acquiring new retail customers previously not served by Hetch Hetchy Power.



Newer forecasts, prepared subsequent to the completion of the IRP, assume lower goals for new retail sales. Updates to the IRP will reflect these revised forecasts.

4.3 Planning Horizon

A fundamental purpose of the IRP Filing is to identify how the POU will meet its SB350 2030 GHG targets. The CEC Guidelines specify that the minimum planning horizon for a POU’s IRP filing cover through at least 2030 and encourages but does not require POU’s to address the post-2030 period. Hetch Hetchy Power’s IRP goes out to 2041.

4.4 Multiple Scenarios

The IRP detailed two scenarios. For the IRP Filing, Hetchy Power reports results from Scenario 1 because these results correspond to the “baseline scenario” of existing policy. The Scenario 3 results are similar but are not reported in the tables. These results can be found in the IRP, attachment A.

4.5 Supporting Tables⁷³

The CEC Guidelines require POUs to complete and submit four standardized tables as part of their IRP Filing. These tables are:

- Capacity Resource Accounting Table (CRAT) that demonstrates annual peak capacity needs and how the POU expects to meet these needs between now and 2030;
- Energy Balance Table (EBT) that provides estimates of annual retail sales and net energy for load (in MWh) through 2030;
- Greenhouse Gas Emissions Accounting Table (GEAT) which shows the POU's projected annual GHG emissions attributed to each generation resource in the POU's portfolio; and
- RPS Procurement Table (RPT) that identifies the renewable energy and REC procurement and retirement in each RPS compliance period through the planning horizon.

These tables are provided in Attachment B. Inputs to these tables are from the "baseline" scenario 1 of the IRP. The RPS Procurement Table reflects Hetch Hetchy Power's alternative RPS compliance obligation (as described in Ch. 3.2 above).⁷⁴

Hetch Hetchy Power's IRP was developed on a fiscal year basis. For purposes of the supporting tables, sales and demand figures were converted into calendar years using a weighted-average.⁷⁵

Submission of these tables also meets the requirements that Hetch Hetchy Power "must address procurement for a diversified procurement portfolio . . . This requirement can be met by providing the standardized tables and other filing requirements included in the guidelines."⁷⁶

Hetch Hetchy Power must also include its current adopted RPS procurement plan as Supporting Information in its IRP Filing.⁷⁷ Hetch Hetchy Power includes its current RPS Procurement Plan as adopted by the Commission⁷⁸ as Attachment C.

⁷³ CEC Guidelines, Appendix B.

⁷⁴ Public Utilities Code Sections 399.30(j) and CEC Guidelines, Appendix B, p. B-15.

⁷⁵ For example, 2019 sales are weighted 50% from fiscal year (FY) 2018-2019 sales and 50% from FY2019-2020 sales.

⁷⁶ CEC Guidelines, Ch.2, Section F.1, p. 6.

⁷⁷ CEC Guidelines, Ch. 2, Section 2.F.c., p. 7.

⁷⁸ The Commission adopted Hetch Hetchy Power's RPS Procurement Plan on November 13, 2012 by Resolution 12-0217.