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STAFF REPORT

Review of City of Glendale Water and Power 2024 Integrated Resource Plan

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California Energy Commission

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ABSTRACT

Senate Bill 350 (De León, Chapter 547, Statutes of 2015), (Public Utilities Code Section 9622) 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 energy procurement requirements.

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 City of Glendale Water and Power submitted its 2024 Integrated Resource Plan and supplemental information for review on April 29, 2024. The Glendale Water and Power Integrated Resource Plan filing includes compliance with the City of Glendale City Council's renewable energy targets, contingency reserves, and peak and energy forecasts of their preferred plan. This staff paper presents the results of the Energy Commission staff review of the *City of Glendale Water and Power 2024 Integrated Resource Plan*.

Keywords: Publicly owned utility, integrated resource plan, IRP, Glendale Water and Power, GWP, demand, resources, portfolio, generation, transmission, distribution, Renewables Portfolio Standard, forecast, energy efficiency, transportation electrification, demand response, greenhouse gas, GHG, emissions, system reliability

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EXECUTIVE SUMMARY

Senate Bill 350 (De León, Chapter 547, Statutes of 2015) requires publicly owned utilities meeting an electrical demand threshold to adopt an integrated resource plan that meets certain requirements, targets, and goals, including greenhouse gas emission reduction targets and renewable energy procurement requirements identified in Public Utilities Code Section 9621. The California Energy Commission 's *Publicly Owned Utility Integrated Resource Plan Submission and Review Guidelines* require the utilities to file an integrated resource plan with data and supporting information sufficient to demonstrate that they meet these requirements and the targets and planning goals. SB 350 also requires the California Energy Commission (CEC) to review the integrated resource plans for consistency with the requirements of Public Utilities Code Section 9621.

The City of Glendale Water and Power aims to pursue a resource portfolio that satisfies reliability while demonstrating compliance with the City of Glendale City Council's target of achieving 100 percent clean energy by 2035. The resource planning focuses on energy efficiency and distributed energy resources to reduce peak demand while meeting statutory and regulatory requirements for greenhouse gas emissions and Renewables Portfolio Standard requirements. To meet renewable energy mandates and greenhouse gas emission standards, the City of Glendale Water and Power is focusing on:

- **Scenarios analysis and contingency events**: Glendale Water and Power and the City of Glendale City Council selected Scenario 4: Carbon Free by 2035 With Local Resource Focus as the preferred portfolio. This scenario exceeds California's clean energy mandate and also meets the City of Glendale's 100 percent renewable target by 2035. The utility chose Scenario 1: California Policy for Clean by 2045, as the contingency scenario in case the resource mix of Scenario 4 compromises reliability because of the reliance on the development of hydrogen. Scenario 1 meets California's mandates for renewable energy and clean energy while keeping natural gas online after 2045 for system reliability.
- **Clean firm generation**: Long-duration energy storage and green hydrogen1 are zero-carbon resources added to the preferred portfolio. The Intermountain Power Plant is a coal plant in Delta, Utah. It is expected to transition to natural gas and eventually convert to hydrogen. It is expected to be the earliest implementation of hydrogen as a combustion fuel in Glendale's portfolio at 30 percent in 2025.
- **Transmission capacity constraints**: The planning reserve margin is 148 megawatts (MW) through 2026 and increases to 164 MW starting in 2027. This equates to an average of 47 percent from 2024 to 2030. This increase is because the

1 Green hydrogen is produced by using electricity generated by eligible renewable energy resources to split water into hydrogen and oxygen.

utility is in a constrained load pocket and the utility must ensure sufficient replacement power to handle the failure of the largest contingency on the local grid.

- **Market sales**: The preferred scenario is expected to have high costs due to building new hydrogen resources, possibly increasing rates. However, the resource is expected to have a high potential revenue due to projected high levels of excess generation, which could have a mitigating impact on rate increases.

In reviewing the *City of Glendale Water and Power 2024 Integrated Resource Plan* and determining consistency with the requirements of Public Utilities Code Section 9621, CEC staff relied on the four standardized reporting tables and narrative descriptions in the integrated resource plan filing, as well as analysis and verification of the materials submitted. Staff presents the following conclusions in accordance with the requirements:

- **Achieving greenhouse gas emissions targets and Renewables Portfolio Standard requirements**: The utility plans to meet the greenhouse gas emission reduction requirements by 2030 of Public Utilities Code Section 9621(b)(1), and the renewable energy procurement requirement of Public Utilities Code Section 9621(b)(2). Glendale Water and Power plans to procure geothermal, wind, and solar to meet these requirements through 2030.
- **Meeting planning goals**: The values reported in standardized forms, along with the analysis and discussion in the integrated resource plan filing, demonstrate the utility intends to meet planning goals related to retail rates, reliability, and transmission and distribution systems as set forth in Public Utilities Code Section 9621(b)(3). Glendale Water and Power evaluated and assessed six scenarios for reliability and compliance. The selected scenario as the preferred portfolio is Scenario 4 due to the ability to meet California mandates and achieve the City of Glendale City Council's renewable targets.
- **Considering peak needs**: The utility has considered the role of 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 hours that encompass the peak hour as set forth in PUC Section 9621(c). Glendale Water and Power plans for energy efficiency and distributed energy resources to help meet peak load. The selected scenario assumes 10 percent of households within the Glendale Water and Power territory will install rooftop solar by 2028, which is part of the Glendale's City Council's 100 percent Clean Energy by 2035 resolution.
- **Addressing resource procurement types**: The integrated resource plan filing addressed the procurement requirements for energy efficiency and demand response, energy storage, transportation electrification, portfolio diversification, and resource adequacy as set forth in PUC Section 9621(d). Glendale Water and Power's preferred portfolio allows it to meet the goals and mandates through 2030. Between 2030 and 2045, Scenario 4 includes the addition of long-duration energy storage and new hydrogen to meet clean energy and greenhouse gas emission reduction mandates.

CHAPTER 1:
Demand Forecast and Procurement

Introduction

Senate Bill 350 (De León, Chapter 547, Statutes of 2015) requires publicly owned utilities (POU) with an annual electrical demand exceeding 700 gigawatt-hours (GWh) to develop integrated resource plans (IRPs).[2] IRPs are electricity system planning documents that describe how utilities plan to meet their energy and capacity resource needs while achieving policy goals and mandates, meeting physical and operational constraints, and fulfilling other priorities such as reducing impacts on customer rates. SB 350 requires the governing board of a POU to adopt an IRP and a process for updating it at least once every five years starting no later than January 1, 2019.[3] The City of Glendale Water and Power (GWP) filed its initial IRP with the California Energy Commission (CEC) on July 29, 2019, and was deemed compliant by the CEC in November 2019. Its second IRP was filed April 29, 2024.

Further, PUC Section 9622 requires the CEC to review POU IRPs to ensure they achieve PUC Section 9621 provisions. If the CEC determines that an IRP is inconsistent with the requirements of PUC Section 9621, the CEC shall provide recommendations to correct the deficiencies. The CEC adopted the *Publicly Owned Utility Integrated Resource Plan Submission and Review Guidelines* to govern the submission of the POU's IRPs.[4]

This chapter outlines the CEC's review process and provides an overview of GWP and its IRP development process. In addition, the chapter addresses the guidelines requirements that POUs provide a demand forecast and a procurement plan as part of its IRP.

City of Glendale Water and Power

GWP is a not-for-profit, municipally owned utility that provides water and electricity for the City of Glendale. Glendale is in California's Los Angeles basin, north of Los Angeles, shown in Figure 1. GWP is a member of the Los Angeles Department of Water and Power (LADWP) balancing authority and the Southern California Public Power Authority (SCPPA). The SCPPA is a joint powers authority that provides joint planning, financing, construction, and operation of

2 Public Utilities Code Section 9621, https://codes.findlaw.com/ca/public-utilities-code/puc-sect-9621/.

3 Public Utilities Code Article 16 (commencing with Section 399.11) of Chapter 2.3 of Part 1 of Division 1, https://codes.findlaw.com/ca/public-utilities-code/puc-sect-399-11/.

4 McCollough, Brian and Melissa Jones. August 2022. *Publicly Owned Utility Integrated Resource Plan Submission and Review Guidelines*. California Energy Commission. Publication Number: CEC-200-2022-005-D, https://www.energy.ca.gov/publications/2022/publicly-owned-utility-integrated-resource-plan-submission-and-review-guidelines.

transmission and generation projects.[5] The utility's resource generation portfolio consists of local and remote resources that allow it to meet its retail load obligations. It provides electrical service to its customers as described below:

- GWP serves 90,000 electric and 34,500 water customers.
- GWP electric customers are split between residential and commercial with 76,929 residential and 13,140 commercial customers.6
- The peak load of 346 megawatts (MW) occurred in September 2017. GWP expects the peak to grow with building electrification and increased use of electric vehicles with an average annual growth rate of 1.7 percent from 2024 through 2030.

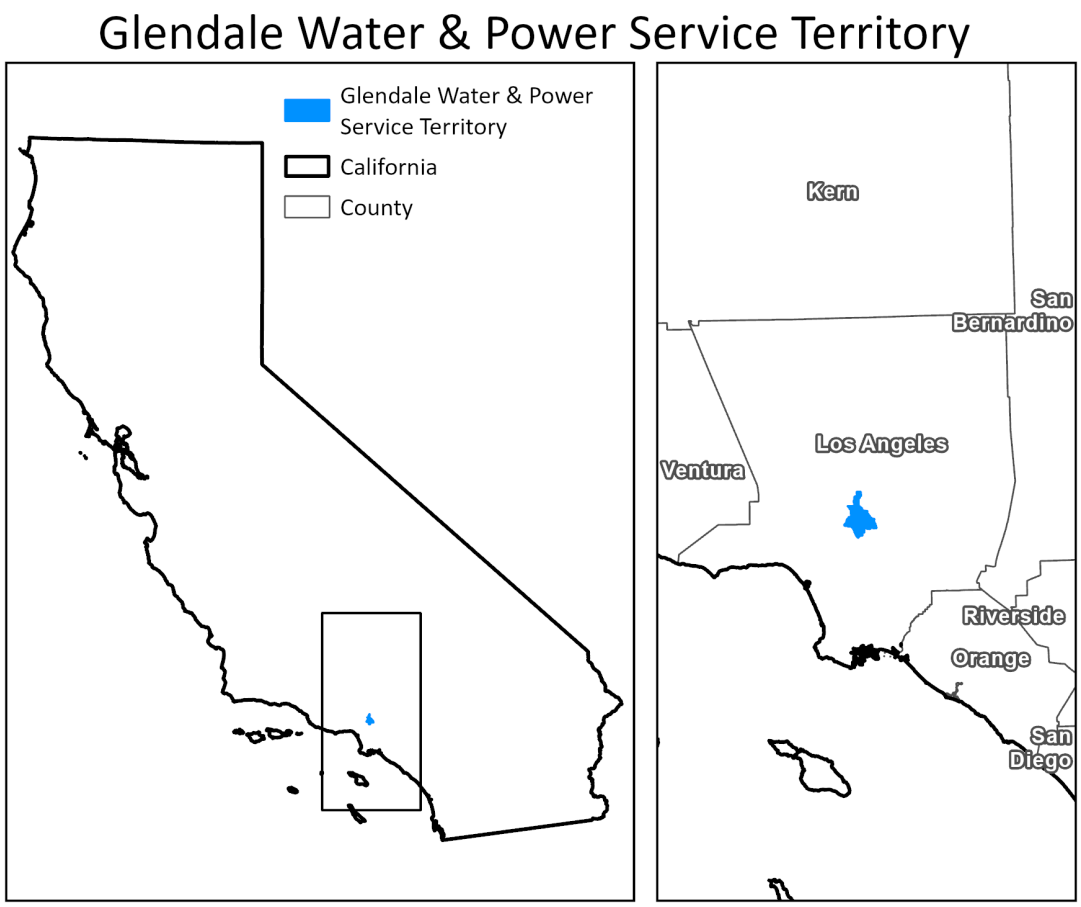
GWP resides in a *load pocket*[7] in the LADWP balancing authority. This load pocket restricts the amount of energy that the utility receives through its two transmission lines — the Pacific DC Intertie and the Southwest AC Intertie. Because of this limitation, GWP can plan to receive only a total of 200 MW of remote generation through both lines. About 17 percent of its load is covered by resources within Glendale's POU territory.

5 The City of Glendale Water and Power staff. April 2024. *The City of Glendale Water and Power 2024 Integrated Resource Plan*, p. 3-4. Available at https://efiling.energy.ca.gov/GetDocument.aspx?tn=256053&DocumentContentId=91820.

6 Ibid., p. 3-3.

7 A *load pocket* is a term meaning that access to remote generation resources is constrained by limited transmission capacity.

Figure 1: Map of City of Glendale Water & Power Service Territory



Source: California Energy Commission

GWP Planning Process

The development of the *City of Glendale Water and Power 2024 Integrated Resource Plan* was driven by the California mandates and City of Glendale City Council's 100 Percent Clean Energy by 2035 resolution.[8] GWP considered the following components in developing its IRP: reliability, just and reasonable rates, a diverse resource portfolio, efficiency, constraints, risk, environmental responsibility, and social responsibility.

The GWP IRP planning horizon encompassed 2024 through 2045. Within this planning horizon, GWP considered short-term and long-term time frames. The short-term time frame spans

8 The Glendale City Council Resolution 22-125 intends to achieve 100 percent of energy sales from clean resources by 2035, have at least 10 percent of GWP customers adopt solar and energy storage systems by 2027, and develop additional demand management measures.

The City of Glendale Water and Power staff. April 2024. *The City of Glendale Water and Power 2024 Integrated Resource Plan*, pp. J-1–J-7.

2024–2030, while the long-term timeframe covers 2031–2045. The focus of the short-term planning horizon was to identify common needs for meeting existing demand and evaluate conditions that affect planning. The goal of the short-term planning was to attain the state-mandated 60 percent Renewables Portfolio Standard requirement by 2030 and support the city council's goal of scaling customer rooftop solar plus storage installations. The long-term planning period focused on the state mandate of a 100 percent renewable and zero-carbon portfolio by 2045 and attaining the city council's resolution of advancing this goal by a decade to 2035.[9]

During its IRP process, GWP sought input two ways. The first approach involved holding a series of four town halls for the public at large and within the community. During these town halls, the utility sought to increase attendees' knowledge of GWP's system and planning constraints, gain community input in developing the IRP, and gather feedback

The second approach involved the creation of a 13-member Stakeholder Technical Advisory Group (STAG) that acted as a bridge between the IRP modeling team and the larger Glendale community. The STAG assisted GWP in developing portfolio scenarios that were modeled and analyzed for consideration as the preferred resource portfolio.[10] The STAG scenarios put greater emphasis on customer resources with a preference for local renewables and clean energy timelines exceeding California's 2045 zero-carbon requirement.

GWP and the STAG modeled six scenarios — the details of which are described under the "Resource Portfolio Evaluation" section. The city council selected Scenario 4: Carbon Free by 2035 with Local Resource Focus because it exceeds California's aggressive clean energy mandate while meeting the City of Glendale's 2035, 100 percent renewable energy target.[11]

Energy and Peak Demand Forecast, Method and Assumptions

The guidelines 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.[12] The guidelines also state that the POU must provide information on the method used in developing the demand forecast if a POU uses a forecast other than the CEC's adopted demand forecast.[13] The demand forecast and supporting information provided in the IRP present an adequate representation of future energy and peak demand that meets the guidelines requirements.

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9 Ibid., p. 2–3.

10 Ibid., p. 2–8.

11 Ibid., p. 1-2.

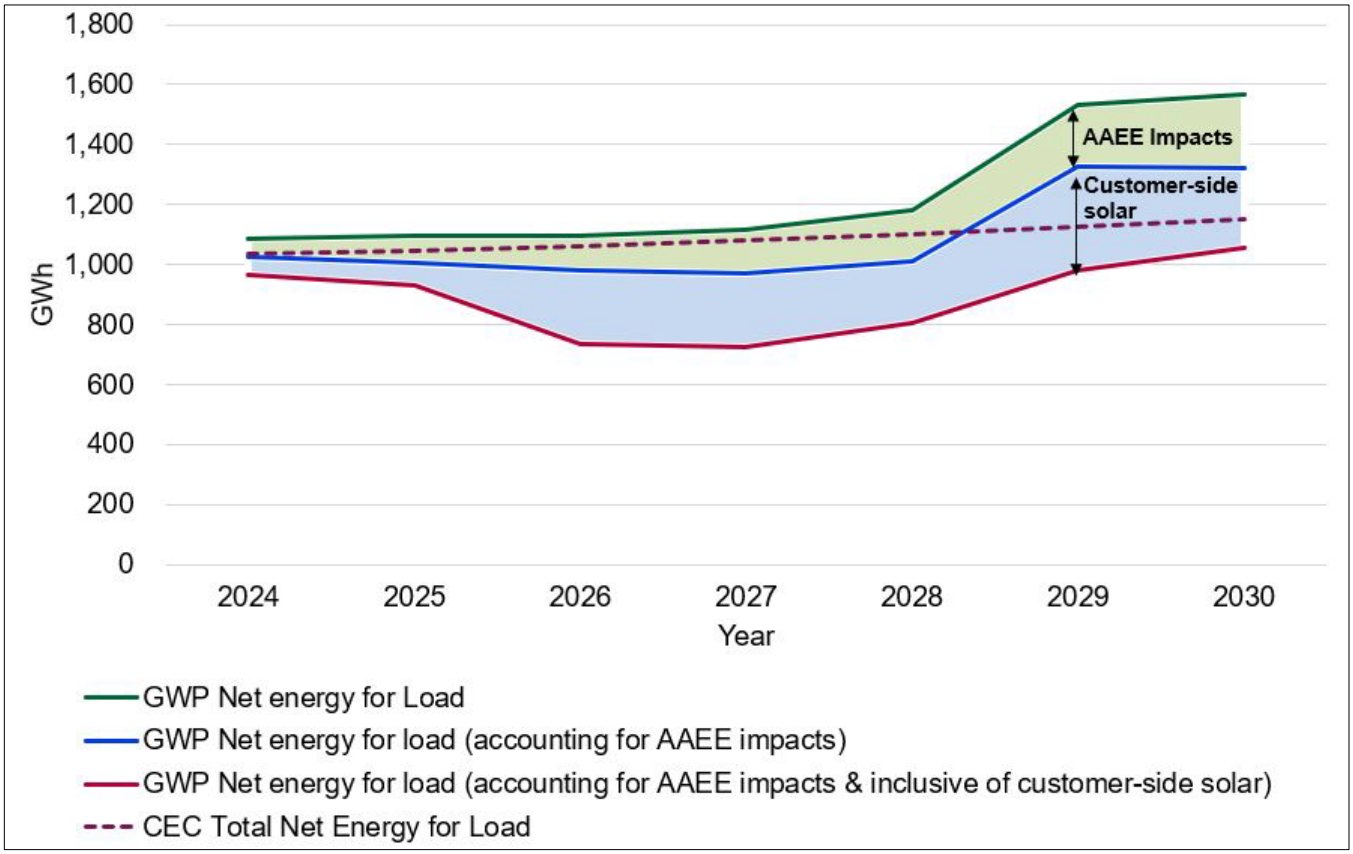
12 *POU IRP Guidelines*, Chapter 2, E., p 5–6.

13 Given the timing of these POU IRP submittals the adopted forecast vintage is the 2022 CED Update. *California Energy Demand Update, 2022–2035*.

The CEC's California Energy Demand Update (CEDU) 2022 report for the mid-demand additional achievable energy efficiency energy and peak load forecasts served as a baseline for GWP's modeling process. The CEDU projection was modified to include anticipated large load additions in 2027 and 2028 that were not included in the CEDU 2022 forecast. These forecasts along with power price and natural gas forecasts, carbon costs, energy efficiency (EE) savings, and distributed energy resources (DERs) forecasts were input to PowerSIMM's modeling and analysis software, which employs a stochastic construct.

GWP's forecast of energy requirements is 1,058 GWh in 2030, which is comparable to the CEC's forecast of 1,153 GWh. However, from 2025 to 2029, GWP's total net energy for load is significantly lower than the CEC's forecast after accounting for impacts from energy efficiency and customer-side solar. GWP's net energy for load follows a similar trend to the CEC's forecast until 2028, when it sharply increases due to expected load growth from new customers in Glendale's territory. Figure 2 shows GWP's net energy for load and the effects of additional achievable EE and customer-side solar. The large load additions that GWP anticipates are offset by these load reductions, resulting in negative load growth through 2027, before energy demand increases.

Figure 2: Comparison of GWP's Total Net Energy for Load

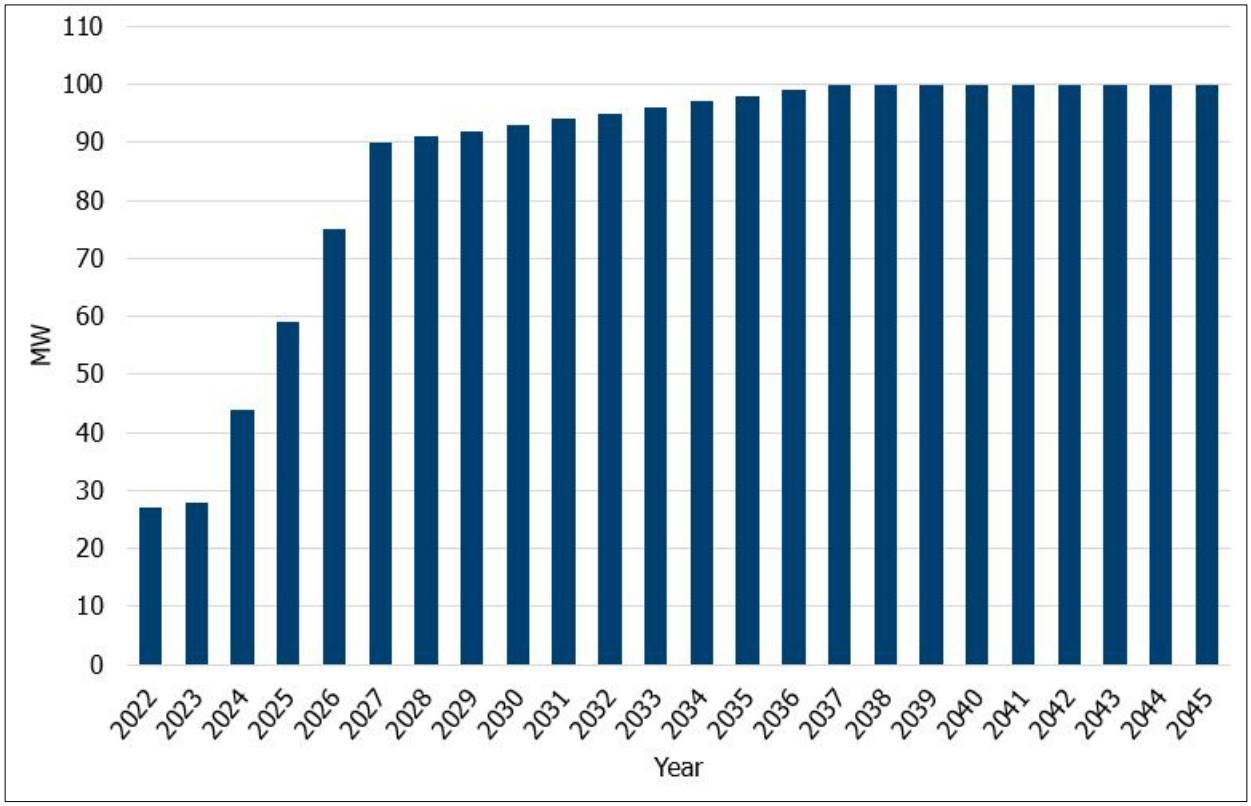


Source: CEC analysis of GWP's 2024 IRP

The selected scenario, Scenario 4, assumes 10 percent of GWP households will install rooftop solar by 2028, which is reflected in the large decrease in net energy for load. GWP's 2024 IRP

shows the forecasted growth in customer-sited solar photovoltaic (PV) installations shown in Figure 3. GWP's solar PV DER forecast projects 10 percent of its customers to install rooftop solar PV plus storage systems by 2027. This goal is part of the Glendale City Council's resolution to have at least 10 percent of GWP customers adopt solar and energy storage systems by 2027. The total of 27 MW of generation in 2022 will increase to a total of 100 MW in 2045 for its preferred portfolio.

Figure 3: GWP's Customer-Sited Solar PV Installations — Forecast of Cumulative Capacity



Source: The City of Glendale Water and Power 2024 IRP

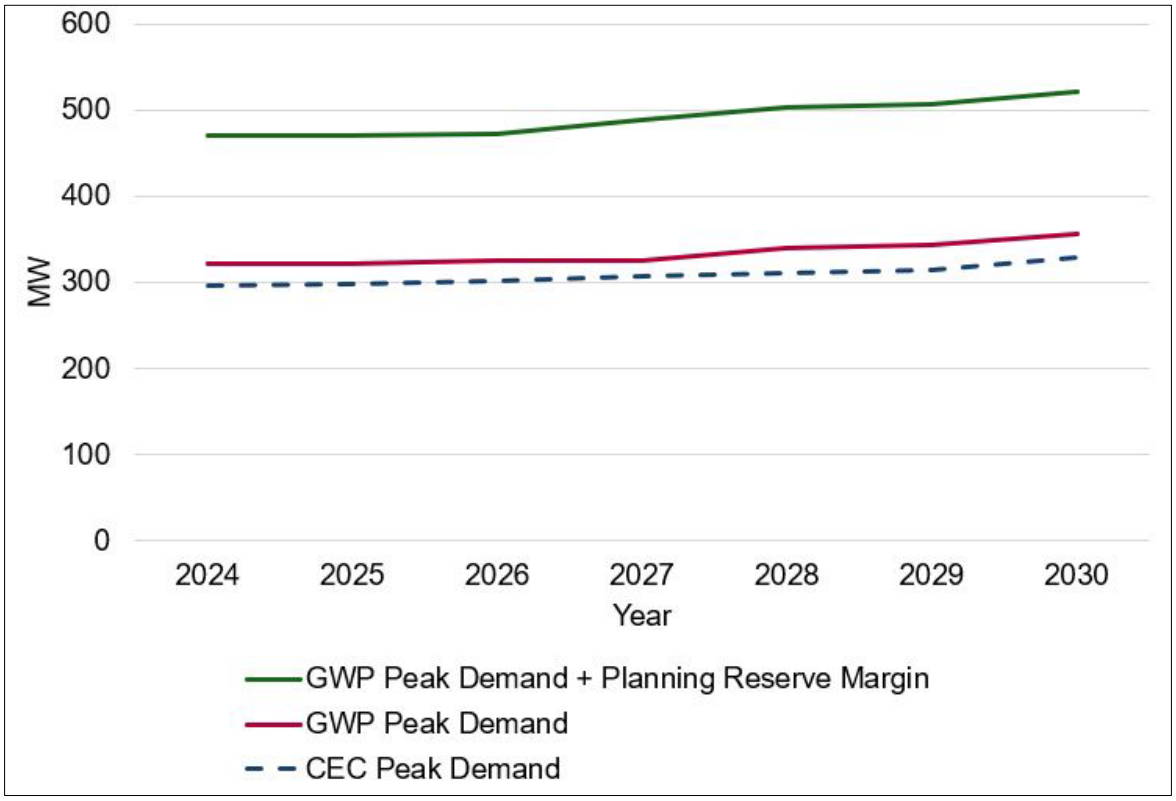
Peak demand is determined by the largest amount of power that customers are using at one time and tends to occur in the summer evenings. GWP's solar resources tend to provide energy during the afternoon, and its wind resources provide energy in the early morning hours. During the summer months, solar generation shifts the net load[14] peak from late afternoon to early evening while providing a small decrease in the total peak.

As solar penetration increases, the net load peak will correspond to the loss of solar generation and be largely unchanged by further solar penetration regardless of being utility-

14 *Net load* is the remaining load after nondispatchable resources (such as renewable energy) have been accounted for.

scale or distributed. Increases in energy efficiency reduce energy consumption through EE customer programs that focus on smart thermostats, lighting, refrigeration, and air conditioning. Although these programs reduce energy consumption, the impact does not have as large of an effect on peak load because of high demand that occurs when people return from work and make use of home appliances.[15]

Figure 4: Comparison of GWP's Peak Demand



Source: CEC analysis of GWP's 2024 IRP

Figure 4 shows GWP's estimated peak demand and planning reserve margin, as well as the CEC's peak demand forecast for GWP.[16] GWP forecasts only a slight increase in peak demand from 2024 through 2030. GWP's forecasted 1-in-2 peak demand projects 356 MW in 2030. The CEC California Energy Demand 2023–2040 Forecast — Planning Forecast 1-in-2 Net Electricity Peak Demand projects a 328 MW peak demand for GWP, which is roughly 7.9 percent lower than GWP's forecast. From 2024 to 2030, GWP's peak demand follows a trend comparable to the CEC forecasted peak demand. The planning reserve margin (PRM) adds an additional 148

15 *Peak load* or *peak demand* is the maximum amount of power necessary to supply customers.

16 The City of Glendale Water and Power staff. The City of Glendale Water and Power 2024 Integrated Resource Plan, p. 6-5.

MW capacity need until 2026. Starting in 2027, the PRM increases to 164 MW. Details on the PRM are in the "System Reliability" section.[17]

Resource Procurement Plan

The guidelines require that POUs report the mix of resources they plan to use to meet demand through 2030.[18] POUs are also required to provide an IRP with data and supporting information sufficient to demonstrate that the POUs' plan to meet the various targets and goals. CEC staff has determined that the *GWP 2024 IRP* filing meets these requirements. The following is a discussion of the utility's existing resources, procurement strategy, portfolio analysis underlying resource selections, and resources in 2030 identified in the standardized reporting tables.

Existing Resources

GWP relies on a combination of local and remote generation resources to meet retail load obligations. Table 1 shows a list of GWP's generation resources.[19]

Table 1: GWP Generation Resource Portfolio

Electric Facilities	Fuel Type	Location	Contracted Capacity (MW)
Grayson Unit 9	Natural Gas	California (Glendale)	48.0
Magnolia	Natural Gas	California	47.0
Intermountain Power Project	Coal	Utah	39.0
High Winds	Wind	California	9.0
Pebble Springs	Wind	Oregon	20.0
Pleasant Valley	Wind	Wyoming	10.0
Townsite	Solar	Arizona	50.0
Star Peak	Geothermal	Nevada	12.5
Whitegrass No. 1	Geothermal	Nevada	3.0
Tieton Hydro	Small hydro	Washington	6.8
Hoover	Large hydro	Arizona-Nevada	33.0
Palo Verde	Nuclear	Arizona	11.0

Source: CEC, Energy Assessments Division, Based on GWP 2024 IRP filing

GWP relies on Grayson Unit 9 and Magnolia natural gas units to provide dependable in-basin capacity and energy. Grayson Power Plant Unit 9 is a city-owned, city-sited, natural gas-fired,

17 Ibid., p. 9-7.

18 POU IRP Guidelines, Chapter 2.F., p. 6.

19 The City of Glendale Water and Power staff. *The City of Glendale Water and Power 2024 Integrated Resource Plan*, p. 3-6.

simple-cycle plant and will be a critical resource that will remain in operation while other units are offline for an upgrade. That is to say that Grayson Unit 9 is excluded from the Grayson Repowering Project, which includes Units 1–8 and is discussed in more detail in the "Procurement Strategy" section of this report. This ensures the preservation of the unit throughout and after the entire power plant upgrade. The Magnolia Power Plant is a 310 MW combined-cycle, natural gas-fired generating plant with a nominally rated net capacity of 242 MW. It is on Burbank Water and Power's generation station complex. GWP has a 30-year contract with SCPPA for 16.53 percent of Magnolia's generated energy, which amounts to 40 MW of baseload generation. GWP operates the unit in a duct-firing mode, which provides an additional 8 MW of capacity.[20]

This is followed by the Intermountain Power Project (IPP), a coal unit that is the third highest-producing unit. IPP is a coal-fired plant in Delta, Utah, 134 miles south of Salt Lake City. It is operated under the supervision of LADWP. GWP and other Southern California utilities are participants to a "take or pay" power sales contract with IPP through June 15, 2027. The facility has a nameplate rating of 1,800 MW with 39 MW of the IPP coal resource going to GWP.[21]

In addition to thermal plants, GWP's portfolio of resources contains a variety of renewable resources, including wind, solar, and geothermal. GWP has a power purchase agreement (PPA) for a 9 MW share of the 145.8 MW High Winds wind facility in Solano County, California. The utility also has a contract with SCPPA for the purchase of 20 MW of renewable energy from the Pebble Springs Wind Generation Facility, located in Gilliam County, Oregon. GWP receives solar energy from the Townsite Solar Plant through a PPA and geothermal energy from Star Peak Geothermal and Whitegrass No. 1, located in Imlay, Nevada and Yerington, Nevada, respectively. Star Peak Geothermal has a total nameplate capacity of 14 MW, while Whitegrass No. 1 is a 4 MW binary-cycle power plant. GWP has a contract with SCPPA for a 100 percent share of Star Peak and Whitegrass No. 1.

GWP also has contracts for hydroelectric and nuclear power. Tieton Hydropower Project has a nameplate capacity of 13.6 MW and is in Yakima County, Washington. GWP has half ownership of Tieton through a SCPPA power sales agreement, resulting in 6.8 MW of capacity received. Hoover Dam Power Plant is at the Arizona-Nevada border and can produce 2,080 MW of capacity, of which GWP has a contract to receive 33 MW. Palo Verde Nuclear Generating Station is the only provider of nuclear energy to GWP. Located in Arizona, the plant is the largest nuclear generating plant in the United States. Since 2009, the total capacity of the plant has been 4,238 MW. SCPPA's share of the unit is 230 MW, with GWP receiving 4.4 percent or 11 MW of this.

In 2022, GWP's energy mix consisted of 32.8 percent natural gas, 3.4 percent coal, 11.2 percent nuclear, 13.5 percent large hydroelectric, and 3.9 percent unspecified resources. In

20 Ibid., p. 3-7.

21 Ibid., p. 3-8.

total, eligible renewable energy sources supplied 35.2 percent of GWP's electricity to its retail customers. The share of renewable resources supplying energy for GWP are further broken down as follows: solar supplied 15.6 percent, wind supplied 7.5 percent, biomass supplied 4.6 percent, geothermal supplied 3.8 percent, and eligible hydro supplied 3.6 percent.

Resource Portfolio Evaluation

GWP considered six portfolio scenarios in its IRP modeling for meeting forecasted load that included testing various resource mixes, assessing the viability of these mixes, and planning a timeline for capacity expansion. The modeling in the IRP relied on stochastic models for capacity expansion and production cost. GWP analyzed portfolio outputs from the capacity expansion models for resource adequacy. The portfolios were analyzed in a production cost model to determine production costs, emissions, and market interactions, among other outputs. Modeling GWP's system with different scenarios demonstrated the effects on total system costs, reliability, emissions, and resource operations. The scenarios modeled provided a range of futures where GWP transitions to a cleaner energy generation mix over different periods.

The scenarios addressed key market and industry-side trends and conditions, supply and demand possibilities, and energy price forecasts. Other factors addressed include peak demand and energy forecasts, greenhouse gas (GHG) emission reduction targets, renewable and clean energy integration, energy efficiency measures, DR, battery energy storage systems (BESS), electric vehicle (EV) penetration, building electrification, and transmission and distribution constraints. GWP and the STAG chose to model the following six portfolio scenarios.[22]

- **Scenario 1: California Policy for Clean by 2045**. Assumes GWP will meet the California mandates for renewable energy and clean energy while continuing to develop renewable resources remotely and adding distributed solar PV and energy storage.
- **Scenario 2: Zero-Carbon Emissions by 2035**. Meets the city council's target of fully clean by 2035 with the replacement of natural gas or conversion of this fuel source to a clean fuel source. Renewable resources are aggressively procured.
- **Scenario 3: Clean by 2045 With REC Purchases for Offsets**. Procures resources to come within 10 percent of the Renewables Portfolio Standard (RPS) requirement and fills the remaining gap with renewable energy credit purchases. There is a strong focus on local resources, especially distributed solar and storage. This scenario is evaluated as a least-cost path to fulfilling renewable energy and zero-carbon energy requirements.
- **Scenario 4: Carbon Free by 2035 With Local Resource Focus**. Meets the city council target of fully clean energy by 2035, and natural gas generation transitions to

22 Ibid., p. 1-8.

green hydrogen in 2035. Renewables are aggressively procured, and rooftop solar increases significantly along with distributed batteries at homes.

- **Scenario 5: Zero-Carbon Emissions by 2042**. In 2042, all natural gas resources transition to green hydrogen fuel. There is increased renewable procurement in the near term and midterm while transitioning away from natural gas.
- **Scenario 6: Zero-Carbon Emissions by 2040**. Increased procurements of renewables and storage along with a full transition of natural gas to green hydrogen leads to a carbon-free portfolio by 2040.

Scenarios 2, 4, and 5 had high resource costs because of these scenarios having hydrogen buildouts, which is discussed more under the "Retail Rates" section.[23] Ultimately, the city council chose Scenario 4 as the preferred portfolio. In addition to exceeding California's aggressive clean energy mandate and meeting the City of Glendale's 2035, 100 percent renewable target, it also presents the most aggressive path for meeting renewable and zero-carbon generation requirements. It relies on the rapid implementation of hydrogen before significant diversification of the resource mix. Scenario 4 is also based on the assumption that DER installations and demand response (DR) adoption will significantly increase in the short-term horizon due to more aggressive marketing of rooftop solar and DR for GWP customers. It also assumes 10 percent of single-family homes will have rooftop solar by 2028 and projects the DR contribution to grow from 3 MW of capacity to 7 MW by 2026.

GWP has uncertainty in the availability of the selected firm clean technologies such as hydrogen in Scenario 4. Scenario 4 assumes that natural gas capacity retires fully by 2035 and is then replaced by hydrogen to provide reliability for the City of Glendale. However, the utility recommends Scenario 1 as the contingency scenario in case the resource mix specified in Scenario 4 compromises the reliability of GWP's energy system.[24] The STAG vote also leaned to Scenario 1 as the preferred scenario. Hydrogen implementation remains the biggest risk and barrier to success with Scenario 4 due to possible delays in technological progress and new infrastructure needs for this resource.

CEC staff agrees that it is prudent to have a contingency plan in case the needed hydrogen infrastructure is not available by 2025. Additional resources in the Scenario 4 portfolio include geothermal, wind, solar PV, and energy storage while keeping the natural gas units on-line until 2035.

Procurement Strategy

To meet retail load obligations, GWP relies on owned and contracted thermal, renewable, and zero-carbon resources, as well as spot market purchases. In the short term planning horizon up to 2030, GWP plans to focus on increasing the penetration of DERs from customer-sited

23 Ibid., pp. 11-14.

24 Ibid., pp. 2-3.

solar PV and energy storage. There will also be a focus on energy efficiency savings initiatives including DR and other demand-side management measures.

Currently, GWP's sole coal resource is IPP. GWP is a partner in the IPP Repowering Project, which is converting the plant to burn natural gas and eventually convert to burning green hydrogen. IPP will repower to an 840 MW natural gas-fired facility with GWP retaining 4.166 percent share of this project, amounting to 35 MW. The IPP Repowering Project also had plans to fuel the plant with 30 percent hydrogen starting in July 2025, reaching 100 percent by 2045, the status of which seems to be delayed.

GWP is also a partner in the following upcoming generation projects:[25]

- The Grayson Repowering Project was originally proposed to repower 262 MW of Grayson Units 1–8. The project has since been adjusted to three internal combustion engine (ICE) units with a total capacity of 54 MW and a 75 MW (300 megawatt-hours [MWh]) BESS component. GWP's goal is for this system to come on-line in July 2026.
- The Biogas Renewable Generation Project is to be constructed at Glendale's existing Scholl Canyon Landfill site. The project is underway and expected to come on-line in summer 2025 with GWP receiving 11 MW of capacity.
- The Eland 1 Solar and Storage project anticipated commercial operation date was in 2024. In 2020, GWP exercised an option to increase the BESS of the project to 150 MW, which would increase its share from 12.5 MW to 18.75 MW of the BESS. In August 2021, the Glendale City Council approved the execution of a firm point-to-point transmission service agreement with the City of Los Angeles under LADWP's Open Access Transmission Tariff to provide 25 MW of capacity to transmit Eland 1 Solar and Storage energy to Glendale.

The assumptions in the selected scenario, Scenario 4, include plans to implement strategies and programs that will boost DR integration and participation in addition to distributed solar from the residents of Glendale. Currently, GWP has fewer than 3 percent of single-family homes with rooftop solar; Scenario 4 projects this value to grow to 10 percent by 2028. DR is assumed to reduce demand by 10 MW by the end of 2027 with this increasing 5 percent annually after 2027.[26]

The model assumes increased transmission availability via the Southwest AC Intertie line starting in 2028. This increased transmission availability allows GWP to import new geothermal starting in 2029 and 2030 and new solar starting in 2030. GWP also increased its procurement of northwest wind and New Mexico wind starting in 2028. In 2030, energy storage is expected

25 Ibid., pp. 3-13.

26 Ibid., pp. 3-13.

to provide a significant amount of capacity to GWP with long-duration energy storage (LDES)[27] coming on-line.

Scenario 4 has Grayson Unit 9, Magnolia, and the ICE units all retiring in 2035. Starting in 2025 and increasing in 2036, hydrogen generation comes on-line to replace this in-basin natural gas generation. This was expected to start with the IPP transition to 30 percent hydrogen in 2025. For the hydrogen additions occurring after 2035, some utilities in Southern California are considering developing a hydrogen pipeline called the Angeles Link, which GWP would be able to leverage toward meeting their goals. However, there are hurdles with infrastructure in getting hydrogen to Glendale. After 2035, no fossil fuel remains in the portfolio with geothermal, wind, and solar providing the majority of the energy for GWP in the long term up to 2045.

27 100-hour storage.

CHAPTER 2:
Review for Consistency with PUC Section 9621 Requirements

This chapter summarizes the main elements of the *GWP 2024 IRP* and provides CEC staff's findings regarding the consistency with PUC Section 9621 requirements, as well as the guidelines. These findings include whether the utility meets GHG emission reduction targets and RPS energy procurement requirements, as well as planning goals for retail rates, reliability, transmission and distribution systems, net load, and disadvantaged communities. In addition, the IRP must address procurement of energy efficiency and demand response, energy storage, transportation electrification and portfolio diversification.

Greenhouse Gas Emission Reduction Targets

POUs are required to meet the GHG targets established by the California Air Resources Board (CARB), in coordination with the CEC and California Public Utilities Commission (CPUC).[28] The initial GHG targets set by CARB reflect the electricity sector's percentage in achieving the economywide GHG emission reductions of 40 percent from 1990 levels by 2030.

The 2030 electricity sector GHG planning target range was brought into alignment with CARB's *2022 Scoping Plan for Achieving Carbon Neutrality* (*2023 CARB Update*) adopted in September 2023.[29] This electricity sector GHG planning target range of 30 million–38 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) retains the lower bound of 30 $MMTCO_2e$ from CARB's 2020 Update but reduces the upper bound from the 53 $MMTCO_2e$ to 38 $MMTCO_2e$.[30]

The GWP preferred plan using Scenario 4: Carbon Free by 2034 With Local Resource Focus allows them to achieve the established GHG emission target range of 30–38 $MMTCO_2e$ published in the *2023 CARB Update*. GWP's preferred portfolio results comply with the requirement of PUC Section 9621(b)(1). CEC staff reviewed the GHG emissions associated with GWP's portfolio of resources in 2030, as identified in its IRP and standardized reporting tables, and independently assessed the emission factors associated with various resources in GWP's portfolio to ensure consistency with other data available.

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28 Public Utilities Code Section 9621(b)(1), https://codes.findlaw.com/ca/public-utilities-code/puc-sect-9621/.

29 CARB. September 2023. *Senate Bill 350 Integrated Resource Planning Electricity Sector Greenhouse Gas Planning Targets: 2023 Update*, https://ww2.arb.ca.gov/sites/default/files/2023-09/sb350-final-report-2023.pdf.

CARB. December 2022. *2022 Scoping Plan for Achieving Carbon Neutrality*, https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents.

30 CARB. March 2021. *Senate Bill 350 Integrated Resource Planning Electricity Sector Greenhouse Gas Planning Targets: 2020 Update*. https://ww2.arb.ca.gov/sites/default/files/2021-04/sb350-final-report-2020.pdf.

Table 2 shows the GHG emissions from GWP's preferred resource portfolio. Most GHG emissions in 2025 and 2030 are from the Magnolia natural gas unit. The IPP coal unit stops emitting emissions from coal by the end of 2025 because of the planned natural gas-hydrogen fuel transition. The replacement of the IPP coal plant with a plant that runs on a blend of natural gas and hydrogen will reduce GWP carbon emissions by 50 percent.

The utility-specific 2023 CARB Update target for GWP is 119,000–151,000 $MTCO_2e$. GWP has a larger amount of spot market sales than spot market purchases, which results in negative net spot market purchases from 2025 through 2030. This results in negative total emissions in 2028 through 2030. If spot market sales are not considered, then GWP plans for its 2030 emissions to fall slightly below its utility-specific *2023 CARB Update* target at 137,187 $MTCO_2e$. If spot market sales are considered, then GWP's preferred portfolio results in -101,853 $MTCO_2e$ in 2030, which falls below its utility-specific 2023 CARB Update target and is consistent with the requirement of PUC Section 9621(b)(1). Out of all six scenarios modeled, Scenario 4 had the lowest cumulative carbon emissions.[31]

31 The City of Glendale Water and Power staff. *The City of Glendale Water and Power 2024 Integrated Resource Plan*, p. 11-14.

Table 2: Greenhouse Gas Emissions From GWP Resource Portfolio

	Fuel Type	GHG Intensity (MT CO2e/MWh)	Total Emissions (MT CO2e) 2025	Total Emissions (MT CO2e) 2030
Magnolia	Natural Gas	0.4681	75,338	60,350
Grayson Unit 9	Natural Gas	0.6243	14,019	226
Internal Combustion Units	Natural Gas	0.4871	NA	390
IPP	Coal	1.2540	52,753	NA
IPP	Natural Gas	0.4899	26,685	51,225
MCSG/Skylar (not RPS eligible)	Unspecified/ System Power	0.4280	24,995	24,995
Total Portfolio emissions	**NA**	**NA**	193,791	137,187
Spot Market Purchases	System	0.428	33,075	39,566
Spot Market Sales	System	0.428	60,692	278,606
Net Spot market purchases (sales)	System	0.428	(27,617)	(239,040)
Adjusted Portfolio emissions	**NA**	**NA**	**166,174**	**0***

Source: CEC, Energy Assessments Division, Based on *GWP 2024 IRP* filing

Renewables Portfolio Standard Planning Requirements

PUC Section 9621(b)(2), as established by SB 350, requires that POU IRPs ensure procurement of at least 50 percent renewable energy resources by 2030, consistent with Article 16 (commencing with Section 399.11) of Chapter 2.3. In 2018, Senate Bill 100 (De León, Chapter 312, Statutes of 2018) increased the RPS requirement for 2030 from 50 to 60 percent by 2030.[32] CEC staff reviewed the renewable procurement table, the discussion in the IRP filing, and the renewable procurement plan submitted. The CEC staff finds that GWP's plans are consistent with the RPS procurement requirements and all interim compliance periods, as well as the requirements of PUC Section 9621(b)(2).

GWP's preferred plan is Scenario 4, which is expected to exceed renewable portfolio standards through aggressive procurement of utility-scale geothermal, wind, and solar by 2030. The current resource mix indicates that GWP needs to begin procuring additional renewables in 2027 to continue meeting the RPS compliance requirements for 2030. The preferred portfolio adds geothermal and wind starting in 2027; additional solar is added in 2030. GWP anticipates

32 Public Resources Code Section 399.11(a).

that RPS-eligible renewables will account for at least 60 percent of retail sales in 2030, which will exceed the RPS target.[33]

Retail Rates

SB 350 (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, minimizing impacts to ratepayer bills, as required in PUC Section 454.52 (a)(1)(C)–(D). CEC staff reviewed the analysis and information GWP presented in its IRP filing on the rate and bill impacts from different resource portfolios they evaluated. Staff finds that the *GWP 2024 IRP* is consistent with the rates discussion, as required in PUC Section 9621(b)(3).

In developing retail rates, GWP evaluates a cost-of-service process that consists of developing the revenue requirement, functionalizing costs, classifying costs, and allocating costs. Rate design follows the completion of the cost-of-service process, and rates are based on cost-of-service results. GWP seeks to meet certain objectives and best practices when proposing or recommending rate structures. Keeping rates equitable among customer classes and individuals within classes is an important consideration.

The utility also designs rates to encourage the most efficient use of the utility's system while taking into consideration competitive concerns, conservation, and GWP's and the city council's policies. The electric rates have a "base rate" that includes a customer charge, energy charge, and a demand charge (if applicable). They also have pass-through adjustment rates that include an energy cost adjustment charge, regulatory adjustment charge, and a revenue decoupling charge. When evaluating affordable and reliable electric service for its customers, GWP makes an overall evaluation of the availability of financial resources for covering the cost of providing service and funds for capital improvements.

Maintaining affordable electric rates is a key consideration for GWP. Since rates are a culmination of a cost-of-service study, GWP assessed the operating and new resource costs for each of the six scenarios. GWP's preferred scenario, Scenario 4, does not have the total lowest cost but is the lowest cost scenario that achieved the goal of 100 percent clean energy by 2035. Scenario 1, California Policy for Clean by 2045, is the lowest cost scenario with an average cost of $93.97 per MWh from 2024 to 2045.

Scenario 4 has an average cost of $130.39 per MWh, a difference of $36.42 per MWh. However, the high cost of Scenario 4 assumes that the large amount of excess energy generated from hydrogen resources in this scenario is sold on the spot market, which offsets the higher cost, moderating rate impacts.[34] Scenario 4 falls in the middle range among the six

33 The City of Glendale Water and Power staff. *The City of Glendale Water and Power 2024 Integrated Resource Plan*, p. 10-12.

34 Ibid., pp. 11-15.

modeled scenarios for potential net cost that include market revenues, estimated at $1.811 billion. (For reference, Scenario 1 has the lowest net cost of $1.510 billion.)

System and Local Reliability

SB 350 requires filing POUs to adopt an IRP that ensures system and local reliability and addresses resource adequacy requirements.[35] CEC staff reviewed the *GWP 2024 IRP* filing capacity reporting table and discussion and finds that GWP has planned for sufficient resources to maintain a reliable electric system. In addition, GWP's selected portfolio of resources contains sufficient capacity to meet anticipated resource adequacy requirements in 2030. Staff finds that this IRP is consistent with the SB 350 reliability requirements in PUC Section 9621(b)(3) and resource adequacy requirements in PUC Section 9621(d)(1)(E).

System Reliability

GWP analyzed loss of load hours[36] to evaluate reliability. The utility found that the base portfolio reliability risk drops in 2026 with the additions of the Eland, Scholl Canyon, the ICE units, and BESS but rises with growing demand in the following years. In 2035, GWP estimates that it will need about 40 MW to 60 MW of additional capacity to maintain an acceptable risk of load loss.

The utility resides in a load pocket, meaning access to remote generation resources is constrained by limited transmission capacity. Its location in a transmission load pocket bottleneck not only imposes a capacity limit on the amount of energy that GWP is able to receive, but also carries a reliability risk. An outage on either intertie comprises a full 50 percent of all available transmission capacity.

The PRM addresses contingency events and grid reliability. Planning reserves ensure that, if an N-1 condition is not restored within 60 minutes, GWP has the reserves needed to cover an N-1-1 contingency. To maintain reliable operations in any condition, GWP uses an N-1-1 reliability target to effectively handle contingencies.[37] The N-1 contingency refers to the event in which GWP's largest resource, the Pacific DC Intertie, experiences a failure, and the Southwest AC Intertie is the only transmission line available. During an N-1-1 contingency event, GWP would lose access to the Pacific DC Intertie line and the Southern Transmission System[38] because these are the two largest contingencies on the GWP system. GWP also

35 Public Utilities Code Section 9621(b)(3), https://codes.findlaw.com/ca/public-utilities-code/puc-sect-9621/.

36 The total duration of increments when the loss of load is expected to occur, specified in hours using the peak value for each hour.

37 An initial unexpected loss of a single system component (such as a generator, transmission line, circuit breaker, switch, or other electrical element), followed by system adjustments, followed by the loss of another single system component.

38 The City of Glendale Water and Power staff. *The City of Glendale Water and Power 2024 Integrated Resource Plan*, p. 9-6.

needs to have sufficient contingency reserves, or replacement power, in the event of failure of the largest contingency on the local grid.

The largest contingency in GWP's portfolio is the 100 MW Pacific DC Intertie, and the second largest contingency is the 48 MW of capacity from either Grayson Unit 9 or Magnolia. Therefore, GWP must maintain 148 MW of contingency reserve capacity. This will increase to 164 MW in 2027 because the Southern Transmission System becomes the second largest contingency. To meet this reserve capacity, GWP's IRP emphasizes the use of local resources, including behind-the-meter solar PV, BESS, demand-side management, renewables, and thermal resources.

Local Capacity Needs

In 2035, the peak load is projected to be 416 MW. During an N-1-1 event, GWP can rely only on 113 MW from the Southwest AC Intertie transmission line. Therefore, GWP needs local resources to replace the lost transmission capacity. With Scenario 4, Grayson Unit 9, Magnolia and the ICE units retire in 2035. This retirement will result in a shortfall of 177 MW. To meet the N-1-1 operating requirement, GWP will need to add resources by 2035 with additional local supply or resources such as demand resources, hydrogen, energy storage, and DR.[39]

GWP assumes that the need for local firm dispatchable clean capacity will be satisfied with hydrogen fuel. The utility understands that hydrogen presents a risk with Scenario 4 because hydrogen becomes the largest firm generation source in 2035 and onward. There are infrastructure challenges if GWP were to pursue onsite generation of hydrogen as there is no guarantee that adequate water will be available to produce the amount needed for GWP. In addition, technological progress is also required for hydrogen to come to fruition.

Flexible Capacity Needs

GWP explored options for clean, firm, and dispatchable generation that would fulfill the flexible capacity needs of Scenario 4. These options include green hydrogen, carbon capture and sequestration, renewable natural gas, and small modular reactors. Many of these technologies are not yet commercially available. LDES provides dispatchable capacity by shifting generation over many hours but has a low efficiency rate, and installation requires large amounts of land. Green hydrogen is considered the most likely and most cost-effective although it still requires infrastructure and technical advancement. In Scenario 4, hydrogen generation replaces natural gas generation as the primary source of firm dispatchable generation in Glendale in 2035.

Transmission and Distribution Systems

PUC Section 9621(b)(3) requires filing POUs to adopt an IRP that achieves the goal of strengthening the diversity, sustainability, and resilience of the bulk transmission and distribution systems and local communities, as further specified in PUC Section 454.52(a)(1)(G). CEC staff determined that the *GWP 2024 IRP* filing adequately plans to

39 Ibid., pp. 11-10.

maintain and enhance its transmission and distribution systems. Staff finds that GWP is planning for enough transmission to deliver resources adequately to its service area to meet the requirement as discussed below. The CEC staff also finds that GWP conducted sufficient planning to address the adequacy of its distribution system. As such, staff finds that the *GWP 2024 IRP* is consistent with the transmission and distribution requirements set forth above.

Transmission System

GWP's interconnection with other utilities is through two stations: the Air Way Receiving Station and the Western Receiving Station. The Air Way interconnection receives power from the Pacific Northwest, the Desert Southwest regions, and the LADWP system. The Western Receiving Station receives power from the Magnolia Power Plant. The following transmission resources feed into the Air Way and Western Receiving stations:[40]

- **Pacific Northwest Transmission System (Pacific DC Intertie)**: A 500 kilovolt (kV) high-voltage direct-current line that transmits power from the Pacific Northwest to California. GWP has about 119 MW of capacity in the north-to-south direction and 38 MW of capacity in the south-to-north direction.
- **The Southern Transmission System (STS)**: A 500 kV high-voltage direct-current transmission line that transmits power from IPP to California. The utility's current share is about 55 MW, which will increase to 127 MW in 2027.
- **The Northern Transmission System**: An alternating-current (AC) system where GWP receives up to 21 MW from IPP to Utah and up to 3 MW from IPP to the Gonder Switching Station in Nevada.
- **Mead-Phoenix Transmission Line Project**: This line consists of a 256-mile-long 500 kV AC transmission line from the Westwing Substation in Arizona to the Marketplace Substation with an interconnection to the Mead Substation in Nevada. GWP receives a share of 41 MW on the line.
- **Mead-Adelanto Transmission Line Project**: A 500 kV AC transmission line that extends from the Mead Substation in Nevada through the Marketplace Substation to the Adelanto Switching Station near Adelanto (San Bernardino County). GWP's share of the Mead-Marketplace segment is 112 MW and 97 MW on the Marketplace-Adelanto segment.

There is also a Burbank-Glendale interconnection that is used primarily to deliver Magnolia energy to GWP. In addition to this interconnection, GWP has the following contracts with LADWP:[41]

- **Hoover/Mead-Air Way**: 33 MW of bidirectional firm transmission rights.
- **Adelanto-Air Way**: 55 MW of bidirectional firm transmission rights.

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40 Ibid., p. 9-2.

41 Ibid., p. 9-3.

- **McCullough-Victorville Line 2**: 26 MW of bidirectional firm transmission rights.
- **Victorville-Air Way**: 26 MW of bidirectional firm transmission rights.
- **Sylmar-Air Way**: 50 MW of bidirectional firm transmission rights.
- **1968 Interchange Agreement**: Up to a maximum of 100 MW of bidirectional firm transmission rights.
- **Eland Transmission Service Agreement**: 25 MW of bidirectional firm transmission rights.

As mentioned under the "System Reliability" section, GWP resides in a load pocket. The downstream of the Pacific DC Intertie is rated at 150 MW from the Sylmar-Airway and 1968 IA contracts with LADWP. However, GWP's actual usable capacity on the Pacific DC Intertie is only 100 MW. Though the Southwest AC path has a total capacity of 112 MW, it is generally derated to 100 MW during the hottest days of the year. Therefore, the total available firm transmission capacity for imports is limited to about 200 MW total.

Distribution System

GWP's local electric system consists of 520 miles of 4 kV and 12 kV distribution lines and 58 miles of 34.5 kV and 69 kV subtransmission lines.[42] The utility also conducts a maintenance and capital improvement program to continually reinforce, enhance, and replace substations, transmission, and distribution infrastructure. GWP replaced 4.1 miles of aged underground high-voltage cable, replaced 85 deteriorated power poles, and replaced and installed 82 distribution transformers. GWP also completed the engineering plan for a distribution project to install 600 feet of substructures and one distribution vault by converting overhead lines to underground lines. This undergrounding will expand its electrical system and improve system reliability. To reduce the risk of outages caused by trees, GWP also trimmed 15,229 trees at the end of the 2022 fiscal year.

GWP staff also worked on a 4 kV to 12 kV reconstruction project. For this project, GWP staff constructed and rebuilt 16 power poles and 1,568 feet of overhead conductors for a 12 kV operation. They also constructed and rebuilt three power poles and 800 feet of overhead conductors for another 12 kV operation and replaced 10 distribution transformers. GWP staff upgraded streetlighting by either converting streetlights to light-emitting diodes for improvement of energy efficacy or replacing streetlight conduits to improve streetlighting system reliability.

The utility also made improvements to substations, communication systems, and system protection areas. GWP installed four real-time automation controllers at four substations and event notification software to collect and organize relay events during outages or system disturbances. The staff upgraded Columbus feeders #5, #6, #7, and #8 protective

42 Ibid., p. 9-8.

overcurrent relays from electromechanical to microprocessor-based type. They also repaired transformers and completed the inspection of 22 transformers at various substations.

Disadvantaged Communities and Localized Air Pollutants

GWP is making efforts to minimize localized air pollutants and GHG emissions. CEC staff reviewed the *GWP 2024 IRP* filing to determine the extent to which it minimizes local air pollutants with a priority placed on disadvantaged communities. The utility offers the following resources for disadvantaged communities: bill discounts, community solar, and programs promoting energy efficiency, DR, and transportation electrification.

GWP provides discounts on bills for low-income customers. The Senior Care Program provided bill discounts of $17.50 per month to eligible low-income seniors aged 62 or older and customers 55 and older with permanent disabilities. This program began in 1999 but closed to new applicants in 2009. It was replaced by the Glendale Care Program, but it still exists for customers enrolled before 2009.

The Glendale Care Program offers eligible low-income customers a monthly $17.50 discount off their utility bill. Bill discounts based on the estimated electric consumption of medical equipment are also offered through the Guardian Program. It provides monthly discounts to customers with household members using life-saving medical equipment or suffering from afflictions related to medical equipment. Lastly, the Helping Hand Program provides up to $150 in bill deposit or bill payment assistance for low-income customers once every two years.[43]

About 35 percent of the population in GWP's service territory lives in pollution-burdened and vulnerable communities.[44] One approach that the utility is taking to reduce this burden is by exploring how to implement community solar.[45] GWP has identified five locations within the Glendale that could potentially support roughly 3 MW of solar PV.

The utility is also designing a new program that aims to evaluate the efficiency of low-income customers' homes, install energy- and water-saving devices, and give recommendations regarding additional energy and water measures that customers can implement. These activities occur at no cost to the customer. This program helps lower electric bills while reducing overall system demands, benefiting all utility customers.

GWP also plans to expand public EV charging station infrastructure and EV residential and commercial utility programs. The utility seeks to directly benefit disadvantaged communities by

43 Ibid., p. 8-13.

44 Based on the California Environmental Protection Agency's California Communities Environmental Health Screening Tool (CalEnviroScreen 3.0).

45 *Community solar* is a local power plant whose electricity is shared by more than one customer, allowing members the opportunity to share the benefits of solar power even if they cannot or prefer not to install solar panels on their property.

exploring options to install EV charging stations along areas identified at the highest pollution burden.

Net Energy Demand in Peak Hours

Senate Bill 338 (Skinner, Chapter 389, Statutes of 2017) 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 and distribution and transmission resources (PUC Section 9621[c]). The *GWP 2024 IRP* includes a discussion of how it considers preferred resources to meet peak demand when selecting resources for its portfolio. GWP's preferred plan is consistent with this requirement.

GWP plans to make extensive use of its DR programs, existing renewable resources, energy storage, and grid operation efficiency to meet reliability. The utility expects its residential and commercial DR program and behavioral DR program to be an important resource in meeting electricity demand. GWP also sends email and website notifications and press releases asking its customers to conserve energy as part of its DR efforts. In addition, the following existing renewable generation plants are expected to help meet peak demand: High Winds, Pebble Springs, Townsite, Star Peak, Whitegrass No. 1, and Tieton. These plants provide wind, solar, geothermal, and eligible hydro. Hoover Dam and Palo Verde are existing zero-carbon resources that GWP expects to use.[46]

The Eland 1 Solar and Storage Project began operation in August 2025, and the Scholl Canyon Biogas Project is expected to go online in 2026. GWP is also taking measures to ensure grid operation efficiency by updating its Electric Services Master Plan, which is a plan that ensures that GWP's distribution system maintains a high level of reliability and increased capacity for the projected increase in peak load. This plan contains projects for upgrading substations, upgrading distribution voltages, replacing existing communication systems, and upgrading and repowering the distribution infrastructure.[47]

Additional Procurement Goals

SB 350 (PUC Section 9621[d][1]) requires filing POUs to address procurement of energy efficiency and demand response, energy storage, transportation electrification, and a diversified portfolio, which are discussed in the next section. The resource adequacy provisions of this code section are discussed in the system reliability section above.

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46 The City of Glendale Water and Power staff. *The City of Glendale Water and Power 2024 Integrated Resource Plan*, p. 10-11.

47 Ibid., p. 12-5.

Energy Efficiency and Demand Response Resources

CEC staff finds that the *GWP 2024 IRP* is consistent with the requirement in PUC Section 9621(d)(1)(A) as it includes a discussion of energy efficiency and demand response programs it plans to implement and quantifies the amount of energy efficiency savings it plans to achieve.

GWP submitted four documents to the docket (Docket No. 18-IRP-01, Glendale 2024 IRP, TN#256053) that demonstrate its commitment to reduce carbon emissions as it integrates EE and DR in its forecasting. The utility offers EE programs for its residential, commercial, and industrial customers. Since 1999, GWP has invested more than $57.7 million on EE programs and has saved more than 286,000 MWh. These programs are listed below.[48]

- Commercial EE programs: Business Energy Upgrade Program, Business Energy Solutions, Commercial Energy Efficiency Program, In School Energy & Water Conservation Education, and Peak Savings Program
- Residential EE programs: Smart Home Rebates, Smart Home Energy and Water Saving Upgrade Program, Online Marketplace, High Bill Alerts, Weekly Energy Updates, and In-Home Display and Thermostat Program
- Industrial EE program: Conservation Voltage Reduction

For 2023, GWP spent about $3.3 million on EE programs and saved 23,811 MWh. GWP is a member of the California Municipal Utilities Association, which developed a study[49] that identified achievable and cost-effective efficiency savings and established targets from 2022 to 2031. The EE program target for the next 10 years (2022 to 2031) is set at 179,779 MWh, which results in an average annual target of 1.86 percent of total projected energy sales. The utility is making extensive progress and is projected to meet the EE doubling goal set forth within SB 350.

GWP also has DR programs for meeting electricity demand and maintaining reliability. The utility launched a residential and commercial DR program in 2021. The residential DR portion focuses on installing smart thermostats in single- and multifamily homes with a goal of delivering 6 MW of capacity to GWP by the end of 2024. The commercial DR portion engages large and medium commercial and industrial customers in manual and automated load reduction during peak events with the goal of delivering 4 MW capacity to GWP by the end of 2024. At the time of the writing of the IRP, the total expected goal for the residential and commercial DR program of 10 MW was not expected to be achieved by the end of 2024; this program was instead expected to deliver around 4.5 MW.

48 Ibid., p. 8-4.

49 California Municipal Utilities Association. 2021. *2020 Energy Efficiency Potential Forecast*. https://www.cmua.org/files/CMUA%202020%20EE%20Potential%20Forecast.pdf.

GWP also plans to relaunch a residential behavior DR program to give customers personalized, low-cost recommendations for saving energy on peak days. This program targets about 40,000 residential GWP customers to receive electronic, interactive voice response, and paper communications. Communication is intended to encourage customers to adjust their energy consumption during periods of peak energy demand. The utility is investing in EE and DR, and it is working toward incorporating EE and DR in its planning.

Energy Storage

CEC staff finds that the *GWP 2024 IRP* is consistent with the requirement in PUC Section 9621(d)(1)(B) to address procurement of energy storage as it discussed the potential role of energy storage on its system. Assembly Bill 2514 (Skinner, Chapter 469, Statutes of 2010) also requires POUs to evaluate the potential of energy storage systems as a resource and establish procurement targets, if appropriate.

Town hall attendees and STAG members expressed an interest in incorporating storage in GWP's resource portfolio. In the IRP modeling process, GWP included commercially available 4-hour, 8-hour, and LDES as options for clean energy in the scenario analysis. LDES technologies currently in development include iron-air, vanadium flow, and liquid-air chemistries.[50] With Scenario 4 as the selected portfolio, GWP expects energy storage to assist with managing renewable generation, provide needed capacity, and make efficient use of transmission capacity.

The two BESS projects in its procurement plan will support this in the short-term: the Grayson Repowering Project BESS component at 75 MW and the Eland 1 Solar and Storage Project at 25 MW. Scenario 4 also assumes the transition of natural gas generation to green hydrogen in 2035 will be supplemented with LDES. Over the long-term horizon beyond 2030, the projected resource mix shows that LDES will become the largest provider of energy at 180 MW of capacity in 2035 and 250 MW in 2045.[51] The resulting capacity buildout relies on short- and long-duration storage to manage the growth of renewables in the GWP system.

Transportation Electrification

CEC staff finds that the *GWP 2024 IRP* is consistent with the requirements of PUC Section 9621(b)(4) and (d)(1)(C) as it addresses transportation electrification, projects for light-duty electric vehicle growth, and includes details of the utility's rate design, incentives, rebates to encourage transportation electrification, and customer education efforts.

The number of EVs has grown substantially, and GWP has made efforts to improve infrastructure to promote this growth. The utility's current strategy for installation of EV charging stations has been to pinpoint areas in Glendale where there are no EV charging stations in the immediate area. GWP has recently installed seven publicly accessible EV

50 Ibid., p. 11-4.

51 Ibid., p. 12-7.

charging stations and identified four sites for 18 more. The utility plans to support the purchase and installation of about 50 publicly accessible EV charging stations through the end of the 2025 fiscal year.[52] GWP plans to install at least 30 new publicly accessible EV chargers per year. In addition, the utility purchased a stand-alone, transportable, solar-powered EV charger that can charge EVs completely off-grid. This autonomous EV charging station can be used as a power source during emergencies where other electricity sources are unavailable.

GWP also offers several EV incentives and programs for customer outreach. The utility has a program that offers rebates of up to $599 for residential customers who install a new Level 2 EV charging station. Customers can receive an additional $800 for upgrading their electrical panel to install the charging station. Commercial or multifamily building customers can also receive an additional $3,000 rebate per charger for publicly accessible direct current fast chargers. The Off-Peak EV Charging Incentive program provides a monthly incentive of $12 to EV drivers who set their vehicles to charge during off-peak hours, helping reduce peak load.[53]

GWP also hosts several Electric Vehicle Ride & Drive Events every year to promote the adoption of EVs. These events provide a peer-to-peer, experiential learning environment for prospective EV buyers. In addition, GWP sponsors the purchase of an electric bookmobile for the city's Library Arts and Culture Department. An EV customer awareness website provides information on new and used EVs, incentives, home charging options, EV dealers, and a public charging station map.

Portfolio Diversification

PUC Section 9621(d)(1)(D) requires that POUs address the procurement of a diversified portfolio of resources consisting of short-term and long-term electricity, electricity-related, and demand response products. Based on staff's review of the *GWP 2024 IRP*, GWP's standardized tables and Scenario 4, Carbon Free by 2035 With Local Resource Focus, indicate that the utility has addressed this requirement. GWP's current portfolio is split evenly between renewable and conventional, as well as variable and firm resources. The existing mix of resources consists of wind, solar, geothermal, biogas, hydroelectric, natural gas combustion, and BESS. The Scenario 4 buildout adds hydrogen and LDES capacity at 45 percent and 50 percent, respectively, in 2035. The portfolio of resources was planned and developed to meet renewable and zero-carbon generation goals to generate energy that can be dispatched so customer demand can be met.

52 Ibid., p. 8-16.

53 The Off-Peak EV Charging Incentive program monthly incentive increased from $8 to $12 per EV on July 1, 2023. https://www.bringyourowncharger.com/gwp-home.

APPENDIX A: Abbreviations

Acronym	Term
BESS	Battery energy storage system
CARB	California Air Resources Board
CEC	California Energy Commission
CPUC	California Public Utilities Commission
DERs	Distributed energy resources
DR	Demand response
EE	Energy efficiency
EV	Electric vehicle
GHG	Greenhouse gas
GW	Gigawatt
GWh	Gigawatt-HOUR
GWP	City of Glendale Water and Power
ICE	Internal combustion engine
IRP	Integrated resource plan
kV	Kilovolt
LADWP	Los Angeles Department of Water and Power
LDES	Long-duration energy storage
MMTCO2e	Million metric tons of carbon dioxide equivalent
MTCO2e	Metric tons of carbon dioxide equivalent
MW	Megawatt
MWh	Megawatt-hour
POU	Publicly owned utility
PPA	Power purchase agreement
PRM	Planning reserve margin
PUC	Public Utilities Code
PV	Photovoltaic (solar)

Acronym	Term
RPS	Renewables Portfolio Standard
SB	Senate Bill
SB 350	Senate Bill 350 (De León, Chapter 547, Statutes of 2015)
SCPPA	Southern California Public Power Authority
STAG	Stakeholder Technical Advisory Group
STS	Southern Transmission System

APPENDIX B: Glossary

Term	Definition
Battery energy storage system (BESS)	Rechargeable batteries that store energy that can be discharged when needed. Types include lithium-ion, lead-acid, flow batteries, and flywheels. Common capacities include 4-hour, 8-hour, and 10-hour batteries, designating the length of time the battery can discharge energy.
California Air Resources Board (CARB)	The "clean air agency" in California government. CARB's main goals include attaining and maintaining healthy air quality, protecting the public from exposure to toxic air contaminants, and providing innovative approaches for complying with air pollution rules and regulations.
California Energy Commission (CEC)	The state agency established by the Warren-Alquist State Energy Resources Conservation and Development Act in 1974 (Public Resources Code, Sections 25000 et seq.) responsible for energy policy. The Energy Commission's seven major areas of responsibilities are: • Forecasting statewide energy demand. • Licensing of power plants and transmission lines sufficient to meet those needs. • Promoting energy conservation and efficiency measures. • Promoting the development of renewable energy. • Promoting the transition to clean transportation fuels. • Investing in energy innovation. • Planning for and supporting the state's response to energy emergencies. Funding for the Commission's activities comes from the Energy Resources Program Account, Federal Petroleum Violation Escrow Account, and other sources.
Demand	The rate at which electricity is used at any one given time (or averaged over any designated interval of time). Demand is measured in kilowatts (kW) or megawatts (MW). Load is considered synonymous with demand.

Term	Definition
Demand response (DR)	An electricity tariff or program established to motivate changes in electric use by end-use customers, designed to induce lower electricity use typically at times of high market prices or when grid reliability is jeopardized.
Dispatchable generation	A generation source that is controlled by a system operator or dispatcher who can increase or decrease the amount of power from that source as the system requirements change.
Distributed energy resource (DER)	Any resource (such as solar and wind power, energy efficiency, demand response, fuel cells, energy storage, electric vehicles, and building electrification) on the distribution system that produces electricity.
Electric vehicle (EV)	A vehicle that uses one or more electric motors for propulsion.
End-use customer	A person who purchases and directly uses a product or service.
Energy efficiency (EE)	Practice or programs designed to reduce the amount of energy required to provide the same level and quality of output.
Gigawatt-hour (GWh)	A unit of electric energy equal to 1 billion watt-hours, 1 million kilowatt-hours, or 1,000 megawatt-hours.
Greenhouse gas (GHG)	A gas that contributes to the greenhouse effect by absorbing infrared radiation, including carbon dioxide, methane, and fluorocarbons.
Green hydrogen	Hydrogen produced by using electricity generated by eligible renewable energy resources to split water into hydrogen and oxygen.
Internal combustion engine (ICE)	A heat engine that combines fuel with an oxidizer (usually air) in a combustion chamber that creates pressure and mechanical force to generate electricity.
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 electronically submitted to the Energy Commission, along with the standardized tables and supporting Information, by the filing POU or authorized representative.
Level 2	A public EV battery charger designed to fully charge an empty battery in eight hours or less.
Load pocket	A term meaning that access to remote generation resources is constrained by limited transmission capacity.
Long-duration energy storage (LDES)	A battery energy storage system that holds energy for at least 10 hours, but generally for days or weeks.
Loss of load hours (LOLH)	The total duration of increments when the loss of load is expected to occur, specified in hours using the peak value for each hour.
Megawatt (MW)	A unit of power, capacity, or demand equal to 1 million watts or 1,000 kilowatts. Generating capacities of power plants and system demand are typically expressed in megawatts.

Term	Definition
Megawatt-hour (MWh)	A unit of electric energy equal to one million watt-hours or one thousand kilowatt-hours, used to specify the amount of energy consumed by customers over time.
N-1 contingency	The unexpected loss (failure or outage) of a single system component (such as a generator, transmission line, circuit breaker, switch, or other electrical element) and can include multiple electrical elements if they are linked so that failures occur simultaneously at the loss of a single component.
N-1-1 contingency	An initial unexpected loss of a single system component (such as a generator, transmission line, circuit breaker, switch, or other electrical element), followed by system adjustments, followed by the loss of another single system component.
N-2 contingency	The unexpected simultaneous loss of two major system components (such as a generator or a transmission line).
Net load	The remaining load after non-dispatchable resources (such as renewable energy) have been accounted for.
Peak load/peak demand	The maximum amount of power necessary to supply customers.
Planning reserve margin (PRM)	The percent of unused available capability above projected annual peak demand to meet expected demand and maintain adequacy of supply. Planning reserve margin is designed to measure the amount of generation capacity available to meet expected demand in a planning horizon.
Public Utilities Code (PUC)	The set of laws that regulates public utilities in California, including natural gas, telecommunications, private energy producers, and municipal utility districts.
Reliability	The degree of performance of the elements of the bulk electric system that results in electricity being delivered to customers within accepted standards and in the amount desired. Reliability can be measured by the frequency, duration, and magnitude of adverse effects on the electric supply.
Renewable Energy Credit	Tradable commodities that represent proof that 1 MWh of electricity was generated from an eligible renewable source.
Renewables Portfolio Standard (RPS)	The program that, by law, requires all California-sanctioned electric utilities to increase the production and procurement of energy from renewable energy resources.
Southern California Public Power Authority (SCPPA)	A joint powers agency composed of 11 publicly owned utilities and one irrigation district in Southern California.

Term	Definition
Small modular reactor (SMR)	Advanced nuclear fission reactors capable of generating up to 300 MW that can be built in one location, then shipped, commissioned, and operated at a separate site.