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STAFF REPORT

Review of City of Redding Electric Utility 2024 Integrated Resource Plan

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Alyssa Tavares
Primary Author

Elise Ersoy
Program and Project Supervisor
Reliability & Emergency Unit

Liz Gill
Branch Manager
Reliability Analysis Branch

Aleecia Gutierrez
Director
Energy Assessments Division

Drew Bohan
Executive Director

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California Energy Commission

Brian McCollough

Usman Muhammad

Ingrid Neumann

Charles Smith

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 Redding Electric Utility submitted its 2024 *Integrated Resource Plan* and supplemental information for review on November 29, 2023. The City of Redding Electric Utility 2024 Integrated Resource Plan filing includes portfolio modeling, load forecasting, and reliability analysis along with a review of zero-carbon scenarios by key stakeholders. This staff report presents the results of the California Energy Commission staff review of the *City of Redding Electric Utility 2024 Integrated Resource Plan*.

Keywords: Publicly owned utility, integrated resource plan, City of Redding Electric Utility, 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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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

Senate Bill 350 (De León, Chapter 547, Statutes of 2015) requires publicly owned utilities with an annual electrical demand threshold to adopt an integrated resource plan. This plan must meet certain requirements, targets, and goals, including greenhouse gas emission reduction targets and renewable energy procurement requirements set forth in Public Utilities Code (PUC) Section 9621. SB 350 also requires the California Energy Commission (CEC) to review whether the integrated resource plan meets the SB 350 requirements. This report summarizes CEC's review of the *City of Redding Electric Utility 2024 Integrated Resource Plan*.

The City of Redding Electric Utility aims to pursue a preferred plan that can maintain affordability and reliability. The resource planning process focuses on decarbonization strategies while also meeting statutory and regulatory requirements for reliability, greenhouse gas emissions, Renewable Portfolio Standard requirements, energy efficiency, and affordability. To meet renewable energy mandates and greenhouse gas emission standards, the *City of Redding Electric Utility 2024 Integrated Resource Plan* focuses on the following.

- **Zero-Carbon Scenarios**: Two zero-carbon scenarios were analyzed in addition to the current portfolio to determine the preferred plan. Future utilization of the utility's main power source, the Redding Power Plant, and the addition of clean energy resources were assessed. Complete retirement of the Redding Power Plant was evaluated but deemed to be more expensive than limited use of the resource for meeting reliability mandates.
- **Natural gas generation repurposing**: The continued dispatch of Redding Power Plant with carbon allowances to meet peak loads was prioritized.
- **Proven clean technologies**: the *City of Redding Electric Utility 2024 Integrated Resource Plan* considers the use of carbon-free technologies including solar, wind, and battery storage while assessing the potential impacts of a more diversified clean resource portfolio.
- **Financial impact and options**: The utility evaluated the cost-effectiveness of different scenarios that would meet renewable energy mandates and greenhouse gas emission standards while maintaining reasonable rates.

In reviewing the *City of Redding Electric Utility 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:* By 2030, the utility plans to meet the greenhouse gas emission reduction requirements of Public Utilities Code Section 9621(b)(1), and the renewable energy procurement requirement of Public Utilities Code Section 9621(b)(2). A wind facility; renewable power purchase agreements, including those with an Index+ structure; and

banked Renewable Portfolio Standard-eligible credits allow Redding Electric Utility to meet these requirements through 2030.

- *Meeting Planning Goals:* The utility intends to meet planning goals related to retail rates, reliability, transmission and distribution systems as set forth in Public Utilities Code Section 9621(b)(3). Two zero-carbon scenarios in addition to the current portfolio were evaluated. A stakeholder group selected the Net-Zero Carbon 2045 scenario, because the retail rates are only marginally higher than the current portfolio, while also allowing for system reliability and continued maintenance of Redding's transmission and distribution systems.
- *Considering Peak Needs:* The utility considered the role of existing renewable generation, grid operational efficiencies, energy storage, and distributed resources including energy efficiency, in helping to ensure the utility's energy and reliability needs are met during peak hours as set forth in PUC Section 9621(c). The summer peak load is approximately three times the magnitude of the base load. However, historical data indicates that the peak customer demand has decreased from 2018 to 2020 with a slight uptick from 2021 to 2022. Their peak demand is projected to increase from 2023 to 2045 due to the inclusion of an electrification forecast.
- *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). Redding Electric Utility's current resource portfolio allows it to meet the goals and mandates through 2030. Between 2030 and 2045, the preferred plan includes the addition of solar and batteries 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).[1] 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.[2] Redding Electric Utility (REU) filed its initial IRP with the CEC on April 11, 2019, and was deemed compliant by the CEC in August of 2019.

PUC Section 9622 requires the California Energy Commission (CEC) to review POU IRPs to ensure they achieve PUC Section 9621 provisions. If the CEC determines 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 (Guidelines*) to govern the submission of the POU's IRPs.[3]

This chapter outlines the CEC's review process and provides an overview of REU 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 Redding Electric Utility

REU is the utility for the City of Redding and the surrounding rural area. The City of Redding experiences hot summers and mild winters with an annual precipitation of 3.42 inches. REU is a vertically integrated, community-owned, not-for-profit utility that provides electricity to the City of Redding and surrounding areas as described below.

- REU began providing electric services to its customers in 1921. Currently, the average annual load is approximately 745 GWh, making it the smallest utility in California required to complete an IRP.
- REU has approximately 45,000 customers in and near Redding and within a service area of 61 square miles.

1 Public Utilities Code Section 9621

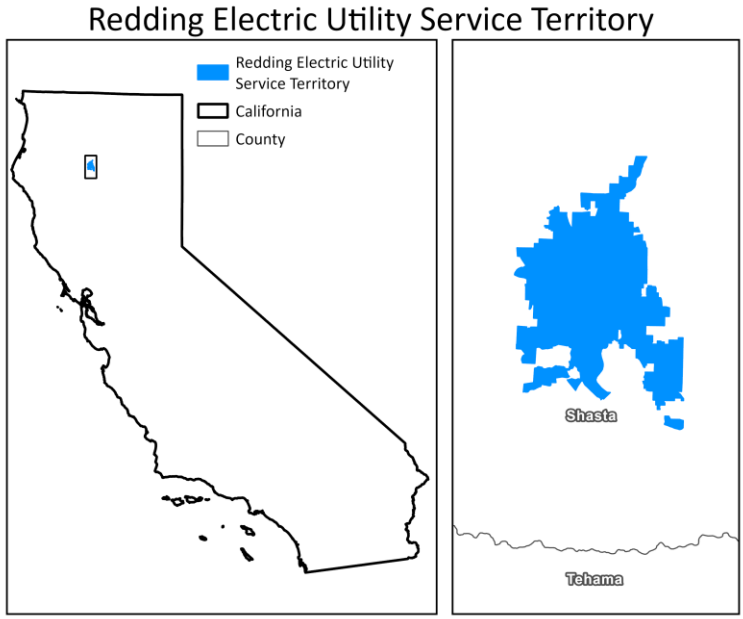
2 Public Utilities Code Article 16 (commencing with Section 399.11) of Chapter 2.3 of Part 1 of Division 1.

3 CEC. October 2018. *Publicly Owned Utility Integrated Resource Plan Submission and Review Guidelines - Revised Second Edition (Chapter 2.E.1).*
https://efiling.energy.ca.gov/GetDocument.aspx?tn=224889&DocumentContentId=55481.

- The Council governing REU consists of five elected members with staggered 4-year terms.[4]

Their generation facilities include a natural gas power plant and a hydroelectric generating plant. REU also supplements their energy needs through contractual purchases of energy, transmission, and gas. The electricity demand shows strong seasonal trends where peak requirements are driven by air conditioning use in the summer months. Minimal energy use normally occurs during the spring and fall. Energy sales showed a declining trend from 2018 to 2020 but increased in the years 2021 and 2022.

Figure 1: Map of Redding Electric Utility Service Territory



Source: California Energy Commission

REU Planning Process

The development of the *City of Redding Electric Utility 2024 Integrated Resource Plan* involved a comprehensive and inclusive process to update its IRP for 2024. The initial IRP developed by REU in 2019 provided the foundation for this process, which involved a series of studies, assessments, modeling, and stakeholder input. The stakeholder group formed by REU consists of representatives from customer advocacy organizations, environmental groups, regulatory agencies, and community organizations. This group was responsible for reviewing scenarios and results and providing feedback to REU.

The stakeholder group carefully conducted a review of results from a Net-Zero Carbon 2024 Scenario and a 100% Zero-Carbon 2045 scenario against an assessment of their current portfolio. In a workshop held on March 23, 2023, REU selected the Net-Zero Carbon 2045

4 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, page 1, 47. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

scenario as the preferred plan due to the stakeholders' assessment that this particular scenario provided a balance between environmental sustainability, energy affordability, and the organization's operational capabilities necessary for maintaining reliability. In addition, to ensure that the community supported the stakeholder's group recommendations, REU conducted a public survey to gather feedback on the proposed 2045 Net-Zero Carbon plan. The results of the survey indicated that the community agreed with the 2045 Net-Zero Carbon plan.[5]

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.[6]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.[7] 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.

The REU electricity demand generally exhibits seasonal trends with the summer peak load being roughly three times the magnitude of the base load. Historical data indicate that peak customer demand and distribution system peak demand have been trending lower in recent years. For example, combined peak customer demand, observed from 2018 to 2022, indicates that the peak for this period was 241 megawatts (MW) in 2018. This is significantly lower than the historical distribution system peak demand of 253 MW in 2006.

REU developed load forecasting and forecasting of load impacts from building and transportation electrification. The load forecast approach considered weather, economic metrics, future growth of electric vehicles (EVs), solar installations, and energy efficiency (EE). The peak demand forecast included the development of a statistical correlation for each year from 1980 through 2022 with the temperature at which annual peak demand conditions occurred. Thus, the 50th percentile and 90th percentile temperature formed the basis for the "1-in-2 year" and "1-in-10 year" cases respectively.

The forecasted peak demand given by this modeling framework indicates 226.6 MW in 2030 for REU. By contrast, the CEC's California Energy Demand 2023-2040 Forecast – Planning Forecast 1-in-2 Net Electricity Peak Demand, projects a 232 MW peak demand for REU. This discrepancy could be attributed to the method of weather normalization utilized within the models.

The CEC's forecast of energy requirements for REU is 877 GWh, which is higher than the IRP forecast of approximately 753 GWh. The difference could likely be due to the way electrification is calculated and incorporated into the different models. On average, REU

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5 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 8. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

6 *POU IRP Guidelines*, Chapter 2, E., Pp 5-6

7 Given the timing of these POU IRP submittals the adopted forecast vintage is the 2022 CED Update.

forecasts energy requirements to be approximately 15 percent lower throughout the forecast period than the CEC Forecast.[8]

Resource Procurement Plan

The *Guidelines* require that POUs report the mix of resources they plan to use to meet demand through 2030.[9] 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. Staff has determined that REU's IRP filing meets these requirements. The following is a discussion of the utility's existing resources, procurement strategy, the portfolio analysis underlying resource selections, and the resources in 2030 identified in the standardized reporting tables.

Existing Resources

REU owns and operates the Redding Power Plant, a natural gas-fired power plant consisting of combined-cycle and simple-cycle generators. It is the primary local generation resource, with a total station nameplate capacity of 183.1 MW and provided 426,918 GWh in the year 2022. It is the utility's primary resource and the single largest source of greenhouse gas (GHG) emissions in its portfolio. In addition, the City of Redding owns and operates a 3.5 MW hydroelectric generating plant located at the U.S. Bureau of Reclamation Whiskeytown Dam. Since the project's completion in 1986, the Whiskeytown facility has generated about 26 GWh annually.

In addition to its two generating facilities described above, REU supplements its energy needs through contractual purchases. REU has power purchase agreements (PPA) for approximately 70 MW of eligible wind generation from the Big Horn Wind Project in Klickitat County, Washington, and for approximately 8 percent of the Central Valley Project hydro generation resources marketed by the Western Area Power Administration (WAPA).[10] The Central Valley Project is a series of federal hydroelectric facilities in Northern California operated by the U.S. Bureau of Reclamation. The delivery of the purchased power from the WAPA is made at the Keswick Dam Switchyard and the Airport Substation. The Keswick Dam Switchyard is located approximately 0.5 miles from the City of Redding, and the Airport Substation is located in the southeastern part of the service territory.

REU also has long-term and short-term PPA's with an Index+ contract structure for eligible renewable energy purchases. Index+ contracts are written to buy electricity at the market

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8 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 6, pp. 82 – 83. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

9 POU IRP Guidelines, Chapter 2.F., P. 6.

10 Energy made available for delivery under its agreement with Western Area Power Administration is on a pay-and-take basis and is subject to the annual hydrology of the Central Valley Project. Therefore, deliveries are highly dependent on the hydrologic conditions of Northern California and vary year to year. In 2021, REU received 153 GWh of energy due to the below-average rainfall in Northern California that year. In 2022, critically dry drought conditions remained, which resulted in REU only receiving 69 GWh of energy.

price plus an additional amount for other attributes which include renewable energy credits (RECs). In 2021, REU executed a short-term, one-year contract for 100,000 megawatt-hour (MWh) of renewable energy. Beginning in 2025, a long-term Index+ contract will start delivering 125,000 MWh and a short-term contract will deliver 50,000 MWh.[11] Index+ contracts are estimated to provide 24 percent of REU's net energy for load in 2025.

The power requirements of REU's customers use the following electric resources: generation supply resources, renewable energy resources, contractual power purchases, transmission assets, and natural gas supply facilities. In the year 2022, Redding Power Plant supplied 60 percent and Whiskeytown Dam supplied 4 percent of the total energy. For the PPAs, the WAPA base resource supplied 9 percent and the Big Horn Wind Project supplied 23 percent of the total energy. Market power purchases supplied 21 percent and market power sales amounted to 16 percent of total energy.[12]

Resource Portfolio Selection & Evaluation

REU considered three scenarios for meeting the state's clean energy mandates up to 2045 and contracted with Ascend Analytics for portfolio modeling. The scenarios evaluated include: a Current Portfolio, a Net-Zero Carbon 2045, and a 100% Zero Carbon 2045.

The Current Portfolio has no constraints or additional resources added. While this scenario is positioned to meet Renewables Portfolio Standard (RPS) compliance through 2030, it is expected to fall short after 2031. The Current Portfolio is not expected to meet the requirements of the Clean Energy, Jobs, and Affordability Act of 2022 (SB 1020, Laird) which requires electricity to be 90 percent carbon-free by the end of 2035, and 95 percent carbon-free by the end of 2040.

The Net-Zero Carbon 2045 scenario assumes that REU's natural gas power plant will continue operating to maintain system reliability while also achieving net-zero carbon through the use of California cap-and-trade carbon allowances.

The 100% Zero Carbon 2045 scenario assumes that REU will not continue operating their natural gas power plant and therefore, will not generate any carbon emissions. Both the Net-Zero Carbon 2045 and 100% Zero Carbon 2045 scenarios are expected to exceed RPS requirements for all years. In addition, they are also expected to comply with SB 1020 carbon-free targets beginning in 2035.

There are key differences among these scenarios that should be highlighted. For reliability, the Current Portfolio scenario indicates that reliability targets, which are Loss of Load Hours (LOLH), will be exceeded until 2038. With the Net-Zero Carbon 2045 scenario, the Redding Power Plant is expected to provide reliable capacity while the modeled 8-hour battery storage

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11 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 1, pp. 5 and Ch. 5, pp. 47 – 57. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

12 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 5, pp. 48. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

will provide incremental reliability support as REU's load grows. In the 100% Zero Carbon 2045 scenario, the reliability analysis indicates that a 15 percent reserve margin is not sufficient to meet the LOLH planning targets.[13]

The 100% Zero Carbon 2045 scenario presents the highest portfolio cost due to an escalation of costs after 2040. This rise in costs is due to the need to secure substantial additional resources to replace Redding Power Plant while maintaining grid reliability and compliance of the zero-carbon mandate. The other two scenarios are similar in costs. The reason for the similarity in costs between the Current Portfolio and the Net-Zero Carbon 2045 scenarios is due to the solar and storage resources having similar resource costs.

REU worked with the stakeholder group, which unanimously selected the Net-Zero Carbon 2045 scenario as the preferred plan for the 2024 IRP. This scenario was selected due to its ability to maintain reliability as well as affordability while allowing REU to meet SB 1020 carbon-free targets beginning in 2035. In addition, the preferred plan recommends procuring 340 MW of solar generation and 55 MW of 8-hour battery storage to the 2045 planning horizon for capacity and reliability.[14]

Procurement Strategy

The diversified renewable portfolio for REU is currently comprised of the following: owned and long-term contracts of hydroelectric resources, wind power long-term contracts, and long-term and short-term renewable energy contracts. Since the 2019 IRP cycle, updated clean energy mandates led the Redding City Council to approve modifications to their RPS Enforcement Program and Procurement Plan. The preferred plan in the REU 2019 IRP included an addition of 10 MW of local solar generation that was originally scheduled to begin operation in 2026 and a wind project in 2034. However, new regulatory requirements and updated clean energy mandates (since 2019) have rendered the plan non-compliant in this IRP cycle. To address this shortfall until future renewable projects are developed, REU executed a short-term one-year contract for 100,000 MWh of solar and wind energy.

In addition, REU is focusing procurement on two main areas:

- Renewable energy purchase for a 60 MW solar project beginning in 2026. The need for this was first identified in the 2019 IRP preferred plan. REU held a competitive solicitation though the IRP filing did not identify which project was chosen.
- Two Index+ projects to deliver long-term and short-term in-state resources and RECs from 2025 to 2034. The Index+ structure allows renewable energy to be bundled with RECs.[15]

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13 The Loss-of-Load Hours (LOLH) is the average hours in a year that there may be a loss of load.

14 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 8. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

15 Redding Electric Utility staff. November 2023.City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 5, pp. 57. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

The adjustments to the procurement strategy include larger eligible renewable project PPAs and earlier procurement target dates. REU's preferred planning scenario, Net-Zero Carbon 2045, allows for the continued dispatch of Redding Power Plant by using carbon allowances through the cap-and-trade program, with the plant running primarily to serve peak load.[16] In addition, 340 MW of solar generation and 55 MW of 8-hour battery storage is added incrementally to the portfolio throughout the 2045 planning horizon.

16 California's cap-and-trade greenhouse gas program implements a cap, or limit, on the total amount of greenhouse gas emissions allowed from certain sectors of the economy such as power plants. Allowances are held equal to their emissions where a portion of these allowances are auctioned by the state. Entities can buy and sell allowances as needed to comply with the cap.

CHAPTER 2:
Review for Consistency with PUC Section 9621 Requirements

This chapter summarizes the main elements of the *IRP* and provides 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 EE and demand response, energy storage, transportation electrification and portfolio diversification.

Greenhouse Gas Emission Reduction Targets

POUs are required to meet the GHG emission targets established by the California Air Resources Board (CARB), in coordination with the CEC and California Public Utilities Commission.[17] 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.[18,19] This electricity sector GHG planning target range of 30–38 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 $MMTCO_2e$.[20]

REU's preferred plan using the Net-Zero Carbon 2045 scenario will allow them to fall under the 2023 CARB Update target of 30-38 $MMTCO_2e$. CEC staff reviewed the GHG emissions associated with REU's preferred plan portfolio of resources in 2030 and independently assessed the emission factors associated with various resources in REU's portfolio to ensure consistency with other data available.

In 2030, REU's preferred plan portfolio results in roughly 60,000 $MTCO_2e$, which falls within the 2023 CARB updated target of 57,000 – 72,000 $MTCO_2e$ and is consistent with the requirement of PUC Section 9621(b)(1). As seen in Table 1, the majority of GHG emissions are from REU's Redding Power Plant. Using the CEC and CARB accounting, REU plans that its 2030

17 PUC Section 9621(b)(1).

18 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.

19 CARB. *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.

20 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.

emissions will fall within CARB's target if spot market sales are assumed to be accounted for at the default system power GHG intensity. Table 1 also shows GHG emissions for REU's preferred plan portfolio of resources in 2022, 2025, and 2030.

Table 1: Greenhouse Gas Emissions from REU Resource Portfolio

Power Source	Fuel Type	GHG Intensity (MT CO2e/MWh)	Total Emissions (MT CO2e) 2022	Total Emissions (MT CO2e) 2025	Total Emissions (MT CO2e) 2030
Redding Power Plant	Natural Gas	0.428	147,000	113,000	114,000
Western – Large Hydro	Large Hydroelectric	0	0	0	0
Whiskeytown	Small Hydroelectric	0	0	0	0
Big Horn	Wind	0	0	0	0
Western – Small Hydro	Small Hydroelectric	0	0	0	0
Index+ Renewable PPA - Solar	Solar PV	0	0	0	0
Index+ Renewable PPA - Wind	Wind	0	0	0	0
Net Spot market purchases (sales)	System	0.428	36,000	-65,000	-54,000
Total Portfolio emissions	**NA**	**NA**	**183,000**	**48,000**	**60,000**

Source: CEC, Energy Assessments Division, Based on REU 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, SB 100 (de León, Chapter 312, Statutes of 2018) increased the RPS requirement for 2030 from 50 to 60 percent by 2030.[21] Staff reviewed the renewable procurement table, the discussion in the IRP filing, and the renewable procurement plan submitted. Staff finds that REU'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).

REU's current portfolio is expected to meet renewable portfolio standards through 2030. 340 MW of solar photovoltaic (PV) and 55 MW of 8-hour battery storage were chosen for the preferred plan starting in 2031 when the Big Horn Wind contract is due to expire. REU anticipates that RPS-eligible renewables will account for at least 60 percent of retail sales in 2030, which will meet the RPS target.

21 Public Resources Code Section 399.11(a).

Retail Rates

PUC Section 9621(b)(3) requires POUs to develop IRPs that enhance each POU's ability to fulfill its obligation to serve its customers at just and reasonable rates, minimizing impacts to ratepayer bills. Staff reviewed the analysis and information REU presented in its IRP filing on the rate and bill impacts from different resource portfolios they evaluated. Staff finds the IRP consistent with the rates discussion, as required in PUC Section 9621(b)(3).

REU performed extensive economic analysis to meet the goals and objectives of the IRP. For the Net-Zero Carbon 2045 scenario that is REU's preferred plan, the current retail rates of $0.17/kilowatt-hour (kWh) are expected to increase by $0.057/kWh in 2023 and increase by $0.087/kWh in 2045. To keep rates affordable for REU customers, REU acknowledges that it is essential to keep power supply costs as low as possible as these costs make up roughly 34 percent of their annual budget. In addition, REU implements a net-metering rate for customers with solar PV where excess generation is credited at the electric utility's energy cost instead of the retail rate.[22]

System and Local Reliability

SB 350 requires filing POUs to adopt an IRP that ensures system and local reliability and addresses resource adequacy requirements.[23] Staff reviewed the IRP filing capacity reporting table and discussion and finds that REU has planned for sufficient resources to maintain a reliable electric system. In addition, REU's preferred portfolio of resources contains sufficient capacity to meet anticipated resource adequacy requirements in 2030. Staff finds this IRP is consistent with the reliability requirements in PUC Section 9621(b)(3) and resource adequacy requirements in PUC Section 9621(d)(1)(E).

System Reliability

REU is a customer of the WAPA and a member of the Balancing Authority of Northern California. While the Balancing Authority of Northern California operates the transmission system, monitors power lines, and coordinates operations, REU matches customer usage and resources. In addition, REU is a member of the Transmission Agency of Northern California and has 8.41 percent of the California-Oregon Transmission Project (COTP) transfer capability. Power from sources outside the service territory are delivered to the Airport and Keswick 230/115 kilovolt (kV) substations.

REU used modeling tools to determine the LOLH for each of the scenarios. Analysis of the selected Net-Zero Carbon 2045 scenario indicates that Redding Power Plant will provide reliable capacity support, and batteries added to the system will meet planning reserve margin constraints and reduce LOLH to zero.

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22 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 6, pp. 74, Ch. 8, pp. 119 – 120. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

23 Public Utilities Code section 9621(b)(3).

REU plans to meet electricity demand by following federal, state, and North American Electric Reliability Corporation requirements and standards for reliability and operations. REU expects to meet 1-in-2 peak load conditions, plus a 15 percent planning reserve margin.[24]

Local Capacity Needs

REU, along with Sacramento Municipal Utility District developed a Transmission System Assessment to assess the resilience and capabilities of its transmission and distribution system under the Net-Zero Carbon 2045 scenario and preferred plan. The assessment consists of several power system analyses, such as steady state, voltage stability, and dynamic stability. Two studies were conducted to evaluate the resilience of its transmission system with decommissioning of the primary local generation resource - Redding Power Plant.

The first study evaluated whether it is feasible to meet projected peak demand without generation from the Redding Power Plant. Since REU's current contract is set to expire in 2032, it is assumed that Redding Power Plant will be taken out of service that same year and REU will utilize imported energy to meet demand. The 1-in-10-year load forecast is utilized for 2032 as well. With these constraints, the study determined that REU would not be able to serve its 2032 forecasted load if Redding Power Plant is taken out of service.

The second study evaluated how REU would serve its load without on-system generation if demand exceeds the forecasted demand. The study found that system reinforcements would need to include looping lines into other substations for voltage support, re-rating lines to mitigate thermal overload, and adding a second line for voltage support.[25]

Flexible Capacity Needs

REU states that one of the most economical and proven clean energy technologies is solar PV, which is a cost-effective and intermittent resource. The preferred plan indicates that solar PV paired with 8-hour battery storage can be utilized to maintain system reliability and capacity planning constraints. Reliability analysis showed the addition of incremental battery storage would provide reliability support as load grows.

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). Staff determined that the IRP filing adequately plans to maintain and enhance its transmission and distribution systems. Staff finds that REU has planned for enough transmission to adequately deliver resources to its service area to meet the requirement as discussed below. Staff also finds that REU conducted sufficient planning to address the

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24 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 7, pp. 95 – 97, Ch. 8, pp. 105 - 106. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

25 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 6, pp. 80 - 82. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

adequacy of its distribution system. As such, staff finds the IRP is consistent with the transmission and distribution requirements set forth above.

The current transmission and distribution system of REU consists of a service area of approximately 61 square miles. There are approximately 72 miles of 115 kV transmission and 740 miles of 12 kV distribution as well as 11 transmission/distribution substations and one generation step-up substation.

Transmission System

REU's system is interconnected to the California transmission grid through two substation facilities owned and operated by WAPA. The Airport substation 230 kV facilities are owned and maintained by WAPA while REU owns the Keswick 115 kV facilities.

In August 1995, REU signed a 40-year transmission agreement with WAPA. The contract consists of two long-term firm, and one short-term firm, COTP transmission service agreements. In 1995, REU purchased 1.59 percent ownership interest in the COTP. Under the Transmission Agency of Northern California and as a direct COTP owner, REU gets 140 MW of firm transmission capability. In addition, the COTP operates on a coordinated basis with the Pacific AC Intertie, which is a two-line system connecting California utilities with other utilities in the Pacific Northwest.

Additionally, the WAPA service contract includes the Tesla-Midway Service, another long-term transmission service agreement. The City of Redding's share of the Tesla-Midway Service is 31 MW of firm bi-directional transmission capacity, which provides value related to the delivery of California Independent System Operator renewables.[26]

Distribution System

A large portion of the City of Redding's electric infrastructure was constructed from the 1950's through the 1980's to serve loads with 12.47 kV, 3-wire overhead service. Since then, the infrastructure has been periodically expanded, updated, and modernized.

In 2022, REU achieved a service availability index of 99.997 percent with the average customer experiencing only 16.9 minutes without power for the year. REU continues to evaluate its distribution systems and make appropriate adjustments to improve and optimize the distribution network. REU's Electric Distribution Capital Expenditure Plan approves and funds the projects for improvements. REU is considering the following modifications to the distribution network:

- Replacement of aging underground cables. This is estimated to complete by the end of 2027.
- Upgrading aging circuit breakers and circuit switchers at substations. This is estimated to complete by the end of 2025.

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26 Redding Electric Utility staff. November 2023.City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 5, pp. 57 – 62. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

- Strengthening the physical security of substations. This is estimated to complete by the end of 2025.
- Conducting line capacity upgrades and Volt-Var Optimization for voltage support. This is estimated to complete by the end of 2027.
- Designing and constructing a new 115/12kV substation in Stillwater Business Park. This is estimated to complete by the end of 2028.
- Installing reclosers at Tier 2 or Tier 3 boundaries as part of the fire mitigation plan. This is estimated to complete by the end of 2027.

In addition, REU is examining software options and alternative initiatives that enhance communication systems fundamental to incorporating more investments in demand-side energy management.[27]

Disadvantaged Communities and Localized Air Pollutants

REU is making efforts to minimize localized air pollutants and GHG emissions. Staff reviewed the IRP filing to determine the extent to which it minimizes local air pollutants with a priority placed on disadvantaged communities.

Although the City of Redding is not an officially designated disadvantaged community, several census tracts within the City of Redding are designated low-income according to California Climate Investments Priority Populations map. REU designs and develops programs to support electrification efforts for the low-income community by promoting alternative mobility options for purchasing electric vehicles and electric bikes. The programs provide point-of-sale discounts off the purchase or lease of a new or used qualifying electric vehicle or electric bike from participating retailers.

REU retired a low-income weatherization program which provided EE and limited electrification upgrades at no cost to low-income customers. In its place, REU began orchestrating plans for educating and assisting low-income customers through programs supporting electrification efforts. In addition, they expect to focus on coordinating with local agencies and leveraging existing programs such as their Income-Qualified EV and e-Bike Vouchers.[28]

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 EE and demand response) to reduce the need for new or additional gas-fired generation, and distribution and transmission resources (PUC Section 9621(c)). The IRP includes a discussion of how it considers preferred resources to

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27 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 5, pp. 63 – 66. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

28 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 4, pp. 45 – 46. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

meet peak demand when selecting resources for its portfolio. REU's preferred plan is consistent with the requirement set forth above.

REU recognizes the importance of a diverse and balanced portfolio and plans to meet its net energy demand in peak hours with such a portfolio. In addition, they have taken into consideration EE and energy storage. In 2020, REU launched the City's Energy Efficiency Economic Response Program in response to the COVID-19 pandemic. This program provides EE and GHG reducing measures to the City of Redding's facilities to help offset utility costs. In addition, an EE program was launched to upgrade the City of Redding's streetlights with LED fixtures. REU also evaluated battery storage as an available resource when analyzing their model. These efforts, along with a relatively flat peak demand up to 2030, contribute to REU's ability to maintain sufficient existing and near-term capacity resources to meet its projected energy requirements through 2030. With significant transmission line capacity, REU plans to use minimal spot market purchases to make up the difference to meet its energy needs.[29]

Additional Procurement Goals

PUC Section 9621(d)(1) requires filing POUs to address procurement of EE 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.

Energy Efficiency and Demand Response Resources

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

REU submitted three documents with their IRP which demonstrate their commitment to reduce carbon emissions as they integrate EE and demand response (DR) opportunities in their forecasting process.

In 2021, REU performed a cost-effectiveness analysis as part of a Demand-Side Management IRP, the conclusions of which are summarized here. Future EE potential was identified to be substantially lower than originally projected in 2017.[30] Building electrification and transportation electrification were identified as programs to assist in decarbonization and the path towards meeting EE goals.[31] REU's previous EE program portfolio included the following: residential EE deemed rebates, commercial EE deemed rebates, commercial custom rebates, commercial lighting rebates, low-income EE and electrification programs, and shade trees. These programs ended on May 1, 2022, after which, the first suite of building electrification

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29 Redding Electric Utility staff. November 2023.City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 4, pp. 35 – 36. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

30 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 4, pp. 32. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

31 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 4, pp. 32, 35. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

programs were launched. REU calculates building electrification efficiency savings by converting natural gas savings to an electricity-equivalent and subtracting the electricity consumption.[32] REU remains on track to hit their POU target for the 2030 SB 350 EE Doubling Goal.[33]

REU states their DR efforts are currently limited to the collaborative Demand Side Grid Support program with the CEC. REU does not currently offer time-of-use rates, as doing so would require additional investment, but would be necessary to incentivize the shifting of demand. However, REU is exploring utility-side DR to complement the Demand Side Grid Support program and will continue to regularly evaluate opportunities to support DR for their customer base.

Collectively, REU is on track to meet the EE goal set forth within SB 350 and supporting the doubling of statewide EE savings. REU has demonstrated throughout their IRP they are working to actively incorporate EE and demand response into their planning process.

Energy Storage

CEC staff finds that the 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.

REU evaluated and adopted energy storage procurement targets in alignment with PUC Sections 2835-2839. This assessment resulted in expanding thermal energy storage installation to commercial customers from 2012 to 2020. Since then, thermal energy storage systems have reached the end of their useful life and are in the process of being decommissioned. In addition, REU met its 2020 behind-the-meter energy storage target of 3.6 MW in 2020. No additional behind-the-meter storage is included in the load forecast.

REU's current portfolio meets capacity and RPS requirements through 2030. The utility continues to evaluate energy storage procurement opportunities as a supply-side resource to reduce system peaks. The Net-Zero Carbon 2045 scenario estimates 55 MW of additional 8-hour battery storage should be added to REU's system in the 2031 to 2045 planning horizon.[34]

Transportation Electrification

32 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 4, pp. 36. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

33 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 4, pp. 37. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

34 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 1, pp. 9, Ch. 4, pp. 35. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

CEC staff finds that the IRP is consistent with the requirements of PUC Section 9621(d)(1)(C) and PUC Section 9621 (b)(4) as the IRP addresses transportation electrification, projecting 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 City of Redding has actively promoted and advanced transportation electrification. A dedicated online EV hub was created to provide customer EV education and outreach. This online hub includes cost calculators, shopping assistance, rebate and incentive programs, charging locators, and contact information. In addition, educational materials are provided to customers at various events throughout the year.

In 2017, the City of Redding's council approved the first transportation electrification program. The following incentives were provided to customers: residential EV vouchers, eBike vouchers, commercial direct current fast charger rebates, commercial demand fee credits, and public charging. REU is also in the process of evaluating the potential for a new customer class focused on EV charging rates. Rates will be categorized by customer, demand, and energy-related costs for each customer class. There are currently no plans to offer managed EV charging.[35]

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 preferred portfolio, REU's standardized tables and Net-Zero Carbon 2045 scenario indicate that the utility has addressed this requirement. REU's preferred plan features a diversified mix of resources that includes wind, solar, hydroelectric, natural gas combustion, and battery storage. This mix of resources was identified for their preferred plan after modeling and reliability analyses. In addition, REU evaluated a diverse portfolio sensitivity scenario to limit a single technology type to 100 MW of nameplate capacity so that more diverse resources could be selected. The selected resource additions include solar, wind, and geothermal. In practice, it is likely that REU would allow solar or wind to exceed 100 MW due to their lower costs.

35 Redding Electric Utility staff. November 2023. City of Redding Electric Utility 2024 Integrated Resource Plan, Ch. 4, pp 37-41. https://efiling.energy.ca.gov/GetDocument.aspx?tn=253368&DocumentContentId=88585.

APPENDIX A: Abbreviations

Acronym	Term
CARB	California Air Resources Board
CEC	California Energy Commission
COTP	California-Oregon Transmission Project
DR	Demand Response
EE	Energy Efficiency
EV	Electric vehicle
GHG	Greenhouse gas
GWh	Gigawatt-hours
IRP	Integrated resource plan
kV	Kilovolt
kWh	Kilowatt-hour
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
PUC	Public Utilities Code
PV	Photovoltaic (solar)
REC	Renewable Energy Credit
REU	City of Redding Electric Utility
RPS	Renewables Portfolio Standard
SB	Senate Bill
SB 1020	Senate Bill 1020 (Laird, Chapter 361, Statutes of 2022)
SB 350	Senate Bill 350 (De León, Chapter 547, Statutes of 2015)
WAPA	Western Area Power Administration

APPENDIX B:
Glossary

Term	Definition
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.

Term	Definition
Demand forecast	A forecast of electricity demand served by the electric grid, measured by peak demand and energy consumption. Some factors that determine load forecast include economics, demographics, behind-the-meter resources, and retail rates.
Demand response	Providing wholesale and retail electricity customers with the ability to choose to respond to time-based prices and other incentives by reducing or shifting electricity use, particularly during peak demand periods, so that changes in customer demand become a viable option for addressing pricing, system operations and reliability, infrastructure planning, operation and deferral, and other issues.
Distributed energy resources	Small-scale power generation technologies (typically in the range of 3 to 10,000 kilowatts) located close to where electricity is used (for example, a home or business) to provide an alternative to or an enhancement of the traditional electric power system.
Greenhouse gas (GHG)	Any gas that absorbs infra-red radiation in the atmosphere. Greenhouse gases include water vapor, carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), halogenated fluorocarbons (HCFCs) , ozone (O3), perfluorinated carbons (PFCs), and hydrofluorocarbons (HFCs).
Index+	A contract structure where energy with attributes such as a Renewable Energy Credit is purchased at a price based on a market index plus an additional fixed amount for the attribute. The attribute is assigned to the purchaser and the energy is settled in an energy market at its index price.
Integrated resource plan (IRP)	A plan adopted by the governing board of a POU under PUC Section 9621.

Term	Definition
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.
Plug-in electric vehicle (EV)	A vehicle that uses one or more electric motors for propulsion. Electric vehicles include battery-electric and plug-in hybrid vehicles.
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.
Renewable Energy Credit (REC)	Renewable Energy Credit (1 MWh renewable energy = 1 REC) is a tradable, non-tangible energy commodity representing proof that 1 megawatt-hour (MWh) of electricity was generated from an eligible renewable energy resource
Renewable Portfolio Standard (RPS)	A regulation that requires a minimum procurement of energy from renewable resources, such as wind, solar, biomass, and geothermal.
Renewable Portfolio Standard (RPS) Eligible	Consistent with the California Code of Regulations, Title 20, Section 3201 (k), means an electrical generating facility that the Energy Commission has determined meets the definition of a "renewable electrical generation facility" in Section 399.12 (e) of the Public Utilities Code, including a facility satisfying the criteria of Section 399.12.5 of the Public Utilities Code, and has certified as an RPS-certified facility.

Term	Definition
Senate Bill 1020 (Laird, Chapter 361, Statutes of 2022) (SB 1020)	This bill revised state policy to require eligible renewable energy resources and zero-carbon resources supply 90 percent of all retail sales of electricity to California end-use customers by December 31, 2035, 95 percent of all retail sales of electricity to California end-use customers by December 31, 2040, 100 percent of all retail sales of electricity to California end-use customers by December 31, 2045, and 100 percent of electricity procured to serve all state agencies by December 31, 2035, as specified