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STAFF PAPER

Review of Vernon Public Utilities 2018 Integrated Resource Plan

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ABSTRACT

Senate Bill 350 (De León, Chapter 547, Statutes of 2015, Public Utilities Code Section 9621) requires the California Energy Commission to review the integrated resource plans of identified publicly owned utilities to ensure they meet various requirements specified in the law, including greenhouse gas emission reduction targets and renewable 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. Vernon Public Utilities submitted its *2018 Integrated Resource Plan* and supplemental information, which the City of Vernon adopted on November 20, 2018, to the Energy Commission for review on January 10, 2019. This staff paper presents the results of the Energy Commission staff review of the Vernon Public Utilities integrated resource plan.

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

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EXECUTIVE SUMMARY

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

The Vernon Public Utilities (Vernon) IRP serves as a framework for the utility's transition away from carbon resources, such as natural gas, to clean renewable resources such as wind, geothermal, biogas, small hydroelectric (hydro), and solar. The utility's long-term strategy is to identify the optimal resource procurement strategy at the bulk-power-system level. This strategy encourages distributed energy resource growth, promotes a highly reliable distribution system, and fosters customer engagement. With the expiration of its existing contract with the Malburg Generation Station in 2028, Vernon is considering local baseload alternatives to reduce its reliance on natural gas.

Vernon evaluated various scenarios and identified four of its most cost-effective and best performing resource portfolios. Among those four Vernon chose the preferred portfolio because it represents a diversified, least-cost resource plan that satisfies its system reliability, compliance with renewable procurement requirements, and reduction of greenhouse gas emissions. This portfolio increases reliance on renewable energy, primarily solar resources, along with lesser amounts of wind, geothermal, and battery energy storage systems, while decreasing reliance on natural gas resources. The preferred portfolio will achieve a 62 percent Renewables Portfolio Standard and a 71 percent carbon-free power supply, resulting in 201,661 metric tons of greenhouse gas emissions in 2030.

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

- *Achieving Greenhouse Gas Emissions Targets and Renewables Portfolio Standard Requirements:* The values reported in the standardized tables, along with the narrative in the IRP filing, demonstrate that the utility plans to meet the greenhouse gas emission reduction requirements of PUC Section 9621(b)(1) and the renewable energy procurement requirements of PUC Section 9621(b)(2).

- *Meeting Planning Goals:* The values reported in the standardized tables, along with the analysis and discussion in the IRP filing, demonstrate the utility intends to meet planning goals related to retail rates, reliability, transmission and distribution systems, localized air pollution, and disadvantaged communities as set forth in PUC Section 9621(b)(3).
- *Considering Peak Needs*: The values reported in the standardized tables, along with analysis and narrative, demonstrate that the utility has considered existing renewable generation, grid operational efficiencies, energy storage, and distributed resources (including energy efficiency) in helping ensure the utility's energy and reliability needs in the peak hours as set forth in PUC Section 9621(c).
- *Addressing Resource Procurement Types:* The filing includes values reported in the standardized tables and narrative that demonstrate the utility has 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).

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

CHAPTER 1: Background, Demand Forecast, and Procurement

Introduction

California Public Utilities Code (PUC) Section 9621 requires publicly owned utilities (POUs) with an annual electrical demand exceeding 700 gigawatt-hours (GWh) to develop integrated resource plans (IRPs). IRPs are 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 effects on customer rates. PUC Section 9621 requires the governing board of a POU to adopt an IRP and a process for updating it at least once every five years by January 1, 2019.[1]

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

This chapter outlines the Energy Commission's review process and provides an overview of Vernon Public Utilities (Vernon) and its IRP development process. In addition, the chapter addresses the IRP guidelines requirements that POUs provide a demand forecast and procurement plan as part of their IRP.

Energy Commission IRP Review Process

On January 10, 2019, Vernon submitted its IRP and supporting documentation, as outlined in the guidelines,[3] for the Energy Commission's review. Staff's review includes two stages. First, staff performed a completeness review to ensure the IRP filing contained the POU board-adopted IRP, the four standardized tables, and supporting

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

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

3 The *POU IRP Guidelines* define an *IRP filing* to include the IRP adopted by the governing board, along with standardized tables and other supporting information required to review the IRP for consistency with SB 350.

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

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

Staff relied on internal subject matter experts to review technical sections of the IRP filing including energy and peak demand forecast projections for renewable resource additions and whether they achieved Renewables Portfolio Standard (RPS) requirements, energy efficiency savings projections and programs, and plans for transportation electrification.

Overview of Vernon Public Utilities

Vernon is a vertically integrated, city-owned, not-for-profit utility that provides electric, water, gas, and fiber optic services in Los Angeles County, as described below:

- Vernon delivers more than 1 million megawatt-hours (MWh) of energy annually to nearly 2,000 commercial and industrial customers and has a peak load of 184 MW.
- Vernon is composed primarily of industrial areas, with 99 percent of Vernon's demand and energy sales serving small and large commercial and industrial loads.
- Vernon's load peaks typically between 12:00 p.m. and 2:00 p.m., which generally correlates when solar generation peaks.

Vernon's Planning Process

The development of Vernon's IRP focused on four components: bulk power systems, distributed energy resources, customer engagement, and distribution systems. Although Vernon's board of directors is ultimately responsible for developing and adopting an IRP, public input played an important role. During the IRP process, Vernon conducted a customer survey and held four stakeholder events to collect customer input. In September 2018, Vernon presented results from the IRP to stakeholders and posted the presentation on the city's website for public comment. Vernon reports that customer feedback showed that the primary concerns from customers was to maintain affordable rates and system reliability. The Vernon City Council adopted its IRP on November 2018.[4]

4 Vernon Public Utilities 2018. *2018 Integrated Resources Plan.* City of Vernon. https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=18-IRP-01.

Demand Forecast

The *POU IRP Guidelines* (Chapter 2.E.1) identify the need for a forecast of energy and peak demand to determine whether a POU's IRP is consistent with the requirements of PUC Section 9621.[5] Under the *POU IRP Guidelines* (Chapter 2.E.2), the POU must provide information on the method used in developing the demand forecast if the POU uses a forecast other than the Energy Commission's adopted demand forecast.[6] The demand forecast and supporting information provided were determined to present an adequate estimation of future energy and peak demand that meets the *POU IRP Guidelines* requirements.

Energy and Peak Forecast, Methodology, and Assumptions

Vernon forecasted a peak demand of 210 MW and 1,304 GWh of energy to be served in 2030. The utility anticipated that electric vehicle (EV) load is to increase from 1.4 GWh in 2018 to 8.9 GWh in 2030. Vernon forecasts that an incremental 0.5 MW of energy efficiency savings per year, yielding 3 GWh annually, can be achieved. Additional demand from large customers is expected to add 24 MW and 147 GWh of energy in Vernon's service territory by 2020. Through its distributed generation solar program, Vernon plans to install an additional 12 MW to its existing 3.5 MW of distributed solar by 2030.

Vernon used regression-based econometric models to forecast its expected system peak and energy demand.[7] [8] The models were developed with historical monthly data from 2000 through 2017. Variables in the models included heating-degree days, cooling-degree days, real industrial production, and manufacturing employment.[9] Vernon adjusted the forecast to account for customer load additions, estimated customer-side solar photovoltaic (PV) installations, expected EV energy demand, and impacts from energy efficiency and demand-side management.

Staff compared Vernon's energy and peak demand forecast to the Energy Commission's *2018 Demand Forecast Update* report. Similar to Vernon, the Energy Commission developed their forecast models based on econometric specifications relating historical electricity consumption data as a function of economic and demographic variables. Staff adjusted for policy-based drivers such as additional achievable energy efficiency (AAEE) and additional achievable solar PV (AAPV).[10]

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

6 The most recently adopted demand forecast is for the *2018 Integrated Energy Policy Forecast Update*. https://www.energy.ca.gov/2018_energypolicy/documents/

7 Vernon used system-level peak and energy forecasts to project future load, rather than using customer class-level forecasts like those from the Energy Commission.

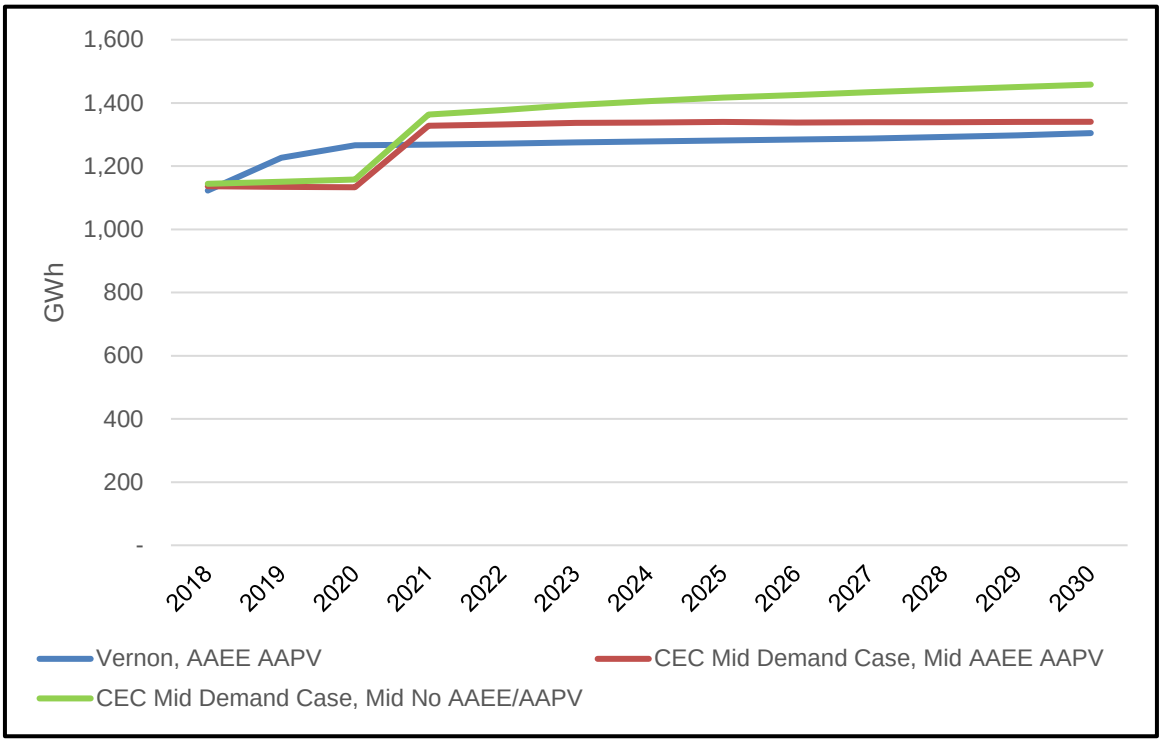
8 A regression-based analysis is a set of statistical processes for estimating the relationships among variables.

9 Degree days are defined as the number of degrees by which the average daily temperature is higher than 60˚F (cooling degree days) or lower than 60˚F (heating degree days).

10 Terms and definitions can be found on page 24 and Appendix A.

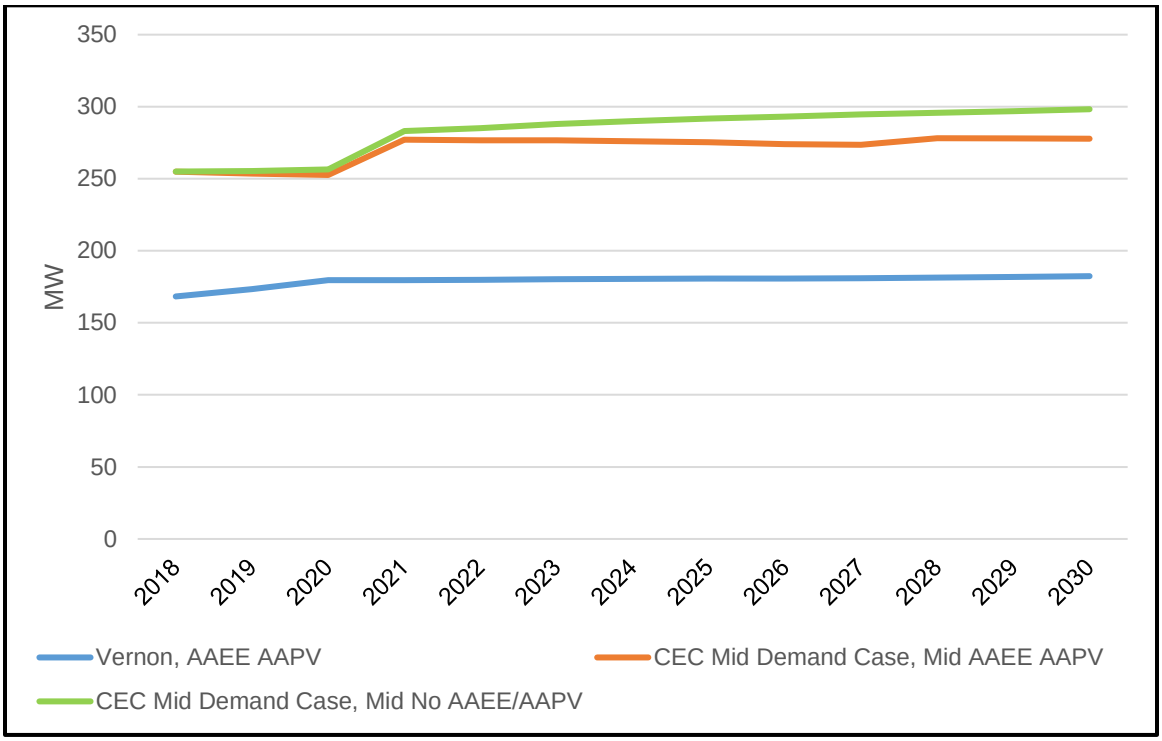
Figure 1 and **Figure 2** show a comparison of Vernon's energy and peak demand forecasts of retail sales to those developed by the Energy Commission. The green line has no adjustments for energy efficiency savings or mandated installation of solar PV systems in commercial and industrial plants. The red line accounts for future energy efficiency savings and reduction in electricity sales due to PV installations in commercial and industrial plants.

Figure 1: Vernon and Energy Commission Energy Demand Forecasts 2018–2030 (GWh)



Source: California Energy Commission staff, Energy Assessments Division

Figure 2: Vernon and Energy Commission Peak Forecasts 2018–2030 (MW)



Source: California Energy Commission staff, Energy Assessments Division

As shown in **Figure 1**, Vernon forecasts retail sales to increase 1.3 percent annually to 1,250 GWh in 2030. Forecasts through 2020 are higher than the Energy Commission's forecast as Vernon anticipates large customer load additions in this period. By 2021, Vernon's forecast follows the trend line of the Energy Commission's demand forecast.

In **Figure 2**, Vernon forecasts a significantly lower peak demand in each year, by about 70 MW, compared to the Energy Commission. Vernon's forecasts ranges from 199 MW in 2019 to 210 MW in 2030, while the Energy Commission's forecast ranges from 255 MW in 2019 to 278 MW in 2030 (AAEE/AAPV). Differences between the models specifications, data, and assumptions can make it difficult to compare the long-term demand forecasts developed by Vernon to the Energy Commission's forecasts.

Overall, Vernon's daily and seasonal load profile is relatively flat with a slight peak during the midday hours between 12:00 and 2:00 p.m., which correlates with peak solar generation. Vernon's predominantly industrial and commercial customer mix also contributes to its relatively high load factor of 70 percent.[11] Unlike other utilities with more residential customers, Vernon does not have the spike in residential electricity

11 A load factor is the ratio of the average energy demand to the peak energy demand. A constant load factor implies that energy demand and peak demand are growing (or declining) at the same rate.

demand that typically occurs between the peak hours of 5:00 p.m. and 9:00 p.m. This load pattern makes the "duck curve" less pronounced for Vernon's system.[12]

Resource Procurement Plan

The *POU IRP Guidelines* require that POUs report the mix of resources they plan to use to meet demand from 2018 to 2030.[13] The POUs are also required to provide an IRP with data and supporting information sufficient to demonstrate that the POUs plan to meet targets and goals. Staff has determined that Vernon's IRP filing meets the 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 forms.

Existing Resources

Vernon's current resource mix includes natural gas, nuclear, hydroelectric, landfill gas, and solar PV resources. In the 1980s, Vernon obtained ownership of a natural gas-fired power plant, the H. Gonzales Generating Station (11.5 MW), in Vernon. The utility also entered into long-term contracts for output from the Palo Verde Nuclear Station (11 MW) and the Hoover Dam Hydroelectric Power Plant (12 MW).

In 2005, Vernon obtained a contract for the Malburg Generation Station (Malburg), a 134 MW natural gas power plant within the city. Malburg is the primary source of reliable baseload generation for Vernon and is the largest source of greenhouse gas (GHG) emissions for the utility. Vernon's contract with Malburg is expected to expire after 2028 and is the only existing contracted resource Vernon does not expect to renew.

In 2017, Vernon and several Southern California Public Power Authority (SCPPA) members contracted with three renewable resources: the Astoria II Solar Photovoltaic Facility, the Antelope DSR 1 Solar Project, and the Puente Hills Landfill Gas-to-Energy Facility.

In 2018, Malburg provided almost two-thirds of Vernon's annual energy needs, producing about 719 GWh of energy. Vernon's remaining energy requirements were met by renewables (17 percent), nuclear (8 percent), large hydroelectric (2 percent), and spot-market energy purchases (6 percent). Vernon has already procured enough renewables to comply with the existing RPS requirements in the 2017-2020 compliance period.

12 The *duck curve* is a graph of power production over a day that shows the timing imbalance between peak demand and renewable energy production.

13 *POU IRP Guidelines*, Chapter 2.F., P. 6.

Procurement Strategy

Vernon's long-term planning strategy is to procure a diversified portfolio of resources that comply with Senate Bill 100 (De León, Chapter 312, Statutes of 2018) RPS requirements, reduce GHG emissions, and increase flexibility with shorter-term resources. **Table 1** summarizes the amount of energy from the different resources in Vernon's portfolio in 2019, 2025, and 2030. **Table 2** summarizes the capacity resources Vernon will rely upon to meet peak demand and reliability requirements in those same years. **Appendix B** includes a table identifying the energy and capacity for resources for all years (**Table B-1** and **Table B-2)**.

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

		2019	2025	2030
Total Net Energy for Load		**1,226,039**	**1,281,168**	**1,304,423**
Non-RPS Resources	Natural Gas	753,388	688,940	0
	Large Hydro	20,728	20,728	20,728
	Nuclear	9,420	94,200	94,200
	Battery Storage	0	0	0
	Spot Purchases	181,618	103,959	471,170
	Spot Sales	(8,922)	(171,021)	(20,189)
RPS Resources	Biofuels	61,320	46,512	34,651
	Geothermal	0	0	148,920
	Solar PV	123,707	418,850	475,943
	Wind	0	79,000	79,000
	Short-Term RPS Contracts	0	0	0
Total Energy Procured		**1,226,039**	**1,281,168**	**1,304,423**
Surplus/Shortfall		**0**	**0**	**0**

Source: California Energy Commission, Energy Assessments Division, Based on Vernon 2018 IRP filing

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

		2019	2025	2030
Peak Demand		**173.3**	**180.7**	**183.3**
Planning Reserve Margin		**26**	**27.1**	**27.5**
Peak Procurement Requirement		**199.3**	**207.8**	**210.8**
Non-RPS Resources	Natural Gas	144	144	10
	Large Hydro	17	17	17
	Nuclear	11	11	11
	Planned System Capacity Contract(s)	0	20	70
RPS Resources	Biofuels	7.8	5.3	4
	Geothermal	0	0	20
	Small Hydro	0	3	20
	Solar PV	18	47.6	46.4
	Wind	0	7.2	7.2
Total Capacity Procured		**197.8**	**196**	**57.9**
Surplus/Shortfall		**-1.6**	**-11.8**	**-152.9**

Source: California Energy Commission, Energy Assessments Division, Based on Vernon 2018 IRP filing

Resource Portfolio Evaluation

Vernon developed various resource portfolios using a production-cost model to determine the least-cost portfolio.[14] Vernon identified the top four portfolios based on cost that represented different combinations of resources designed to meet GHG emission targets, RPS, and resource adequacy. Vernon developed resource plans for a 20-year horizon but focused on the best performing portfolios over the 2018-2030 time frame. The portfolios are as follows:

- Portfolio 1 includes solar, wind, geothermal, and battery storage.
- Portfolio 2 does not include any battery storage.
- Portfolio 3 does not include any wind resources.
- Portfolio 4 includes 50 MW of battery storage in 2030.

Vernon determined that relative to all four portfolios, Portfolio 1 was the preferred portfolio due to having the lowest cost while achieving the same level of sustainability and reliability metrics. This portfolio includes primarily solar resources, along with lesser amounts of wind, geothermal, battery energy storage, and market resource adequacy.

To determine the amount of resources needed to meet peak demand, Vernon compared its annual forecasted peak demand with its annual peak capacity resources. The analysis highlighted that the utility will be short of capacity by 2029 when Malburg's contact expires. To maintain reliability after 2028, Vernon requires baseload generation within its local service territory. Resource options include recontracting or acquiring Malburg, procuring another local existing natural gas plant, or acquiring energy storage technology.

The preferred portfolio sets Vernon on a path to attain the long-term 100 percent carbon-free goal. Renewable energy procurement will increase Vernon's renewable resources from 31 percent in 2018 to 56 percent in 2030. As renewable energy increases, reliance on natural gas will decline from 59 percent in 2018 to 35 percent in 2030.

Vernon's Portfolio Costs

A primary concern for Vernon's customers is maintaining low electricity costs. In Vernon's production-cost modeling, the utility can buy and sell power on an economic basis through its transmission interconnection.[15] Staff identified that Vernon's preferred portfolio is based on an assumed price for its forecasted transmission costs. If the cost

14 Vernon used production cost modeling software from its primary contractor, ABB Ltd.

15 The California ISO tariff defines four congestion transmission zones: North of Path 15 (NP15), South of Path 15 (SP15), Humboldt, and San Francisco. Zones may consist of a transmission line or a group of transmission lines. SP15 is the interconnection used by Vernon, where congestion typically occurs.

of a new generic resource is less than the cost to import energy through its transmission interconnection, then those resources are added to its portfolio.

The cost of procuring renewables will increase power supply costs from about $100 million in 2018 to $135 million in 2028 (a growth rate of 0.86 percent per year), based on 2017 real dollars. Supply costs are expected to go down with the expiration of Malburg by 2028. Power supply cost represents only one component of the utility cost of service that determines the overall retail rate. The retail rate also includes bond payments, reserve requirements, electric system capital improvement costs, operating and maintenance costs, administrative costs, and general expenses. In addition, the power supply cost forecast is based on the real rate of change and does not account for inflation. Vernon is working on a cost-of-service study that will be used to forecast future retail rates. The power supply costs derived from this IRP will be used as one of the components in the study to determine retail rate effects of the IRP.

Risk Analysis

Vernon presented a review of potential areas of risk that may affect its IRP in future years. They include:

- Regulatory Changes – Legislative bills that mandate specific renewable resource procurement may affect Vernon's implementation of the IRP. Vernon recognizes that SB 100 will require it to comply with the 100 percent carbon-free mandate.
- Technology Advancements – Vernon recognizes that early adoption of new resource technologies such as lithium-ion battery storage may be overtaken by yet newer categories of technology, such as flow batteries. As such, Vernon's preferred portfolio takes a gradual phasing in approach to energy storage to reduce the risk associated with early adoption.
- Natural Gas Prices – Vernon's IRP recognizes that renewable energy procurement is the primary goal of its IRP, even if long-term natural gas prices remain low.[16] Limitations on GHG emissions eliminate resource strategies that increase reliance on natural-gas fired generation.
- Local Generation - The Malburg power plant is an important resource in Vernon's preferred portfolio as it provides reliability under various contingencies. Vernon's current plan, once the Malburg contract expires in 2028, is to procure 20 MW of geothermal and market purchases. However, Vernon is also considering reconfiguring Malburg to provide additional flexibility post 2028, along with also considering replacing the plant with energy storage as a viable resource option.

16 Energy Commission staff reviewed Vernon's projected natural gas prices and found they are in line with the Energy Commission's and the U.S. Energy Information Administration's (U.S. EIA) forecasts.

CHAPTER 2:
Review of Vernon Public Utilities Integrated Resource Plan

This chapter summarizes the main elements of Vernon's IRP and provides staff's findings regarding the consistency of the IRP filing with PUC Section 9621 requirements, as well as the *POU IRP Guidelines*. These include whether the utility meets GHG 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 GHG targets established by the California Air Resources Board, in coordination with the Energy Commission and the California Public Utilities Commission.[17] These GHG targets reflect the electricity sector's percentage in achieving the economywide GHG emission reductions of 40 percent from 1990 levels by 2030. Energy Commission staff reviewed the GHG emissions associated with Vernon's portfolio of resources in 2030, as identified in its IRP and standardized reporting tables. Staff independently assessed the emission factors associated with various resources in Vernon's portfolio to ensure consistency with other data available to staff.

Based on this review, staff finds that Vernon plans to achieve the GHG emission target range established by the California Air Resources Board of 149 to 263 metric tons of carbon dioxide equivalent (MT CO_2e). Vernon's resource portfolio is in the middle of the GHG range, at roughly 201 MT CO_2e, which is consistent with the requirement of PUC Section 9621(b) (1). Vernon estimated its GHG emissions by multiplying a resource-specific emission intensity by the total generation from each power plant and spot market purchase for the planning horizon. **Table 3** shows GHG emissions for Vernon's portfolio of resources in 2019, 2025, and 2030. **Appendix B** includes **Table B-3** identifying the emission intensities and total emissions for individual resources for all years.

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

Table 3: Greenhouse Gas Emissions From Vernon's Resources Portfolio

	Fuel Type	GHG Intensity (MT CO_2e/MWh)	Total Emissions (MT CO_2e)		
			2019	2025	2030
H Gonzales 1 & 2	Natural gas	0.428	0	0	0
Malburg Combined Cycle	Natural gas	0.426	319	294	0
Spot Market Purchases	System	0.428	78	44	202
Spot Market Sales	System	0.428	(4)	(73)	(9)
Total Portfolio Emissions	**NA**	**NA**	**393**	**265**	**193**

Source: California Energy Commission, Energy Assessments Division, based on Vernon 2018 IRP filing

Renewables Portfolio Standard Planning Requirements

PUC Section 9621(b) (2) requires that POU IRPs ensure procurement of at least 50 percent renewable energy resources under the Renewables Portfolio Standard by 2030 consistent with Article 16 (commencing with Section 399.11), Chapter 2.3.[18] Staff reviewed the renewable procurement standardized reporting table, the discussion in the IRP filing, and the renewable procurement plan submitted. Staff finds that Vernon's plans are consistent with the RPS procurement requirements in 2030 and all interim compliance periods and are consistent with requirements of PUC Section 9621(b)(2).

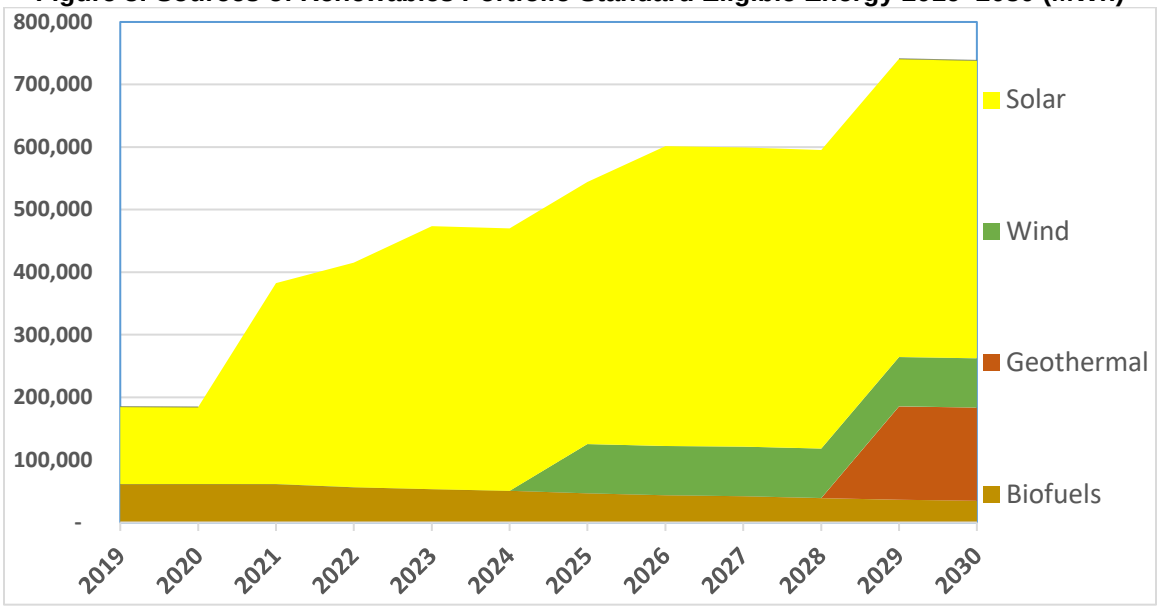
Vernon plans to exceed the current RPS requirements of PUC Section 96251(b) (2) by acquiring RPS-eligible resources to meet 60 percent of retail sales by 2030. Achieving the 60 percent RPS target will require Vernon to procure an annual average 38 GWh of renewable energy from 2019 to 2030. Vernon will meet its RPS requirements through a combination of existing renewables contracts, planned new renewable resources, proposed contracts for renewable energy, and renewable energy credits. Vernon plans to rely mainly on solar to meet its additional RPS requirements while incorporating biomass, wind, and geothermal resources. Vernon is not planning to renew its contract with the Malburg natural gas plant at the end of 2028, which it uses as a baseload and intermediate resource. Vernon's preferred portfolio includes a geothermal baseload resource added in 2029, along with solar and energy storage, as partial replacements for Malburg.

18 PUC Section 9621(b) requires the governing boards of POUs to adopt an IRP on or before January 1, 2019, while PUC Section 9621(b) (3) requires the IRP ensure procurement of at least 50 percent eligible renewable resources by 2030. SB 100 (De León, Chapter 312, Statutes of 2018) increases the RPS requirement for 2030 from 50 to 60 percent. However, since the POUs were required to adopt their IRPs before SB 100 went into effect, the POU was only required to plan for the 50 percent RPS target in their IRP. Future POU IRPs will need to meet RPS requirements in effect when these updates are filed.

Figure 3 shows the increase in renewable generation from 2019 to 2030. Vernon expects to meet the following RPS targets over the planning period:

- 33 percent by 2020
- 44 percent by 2024
- 52 percent by 2027
- 60 percent by 2030

Figure 3: Sources of Renewables Portfolio Standard Eligible Energy 2019–2030 (MWh)



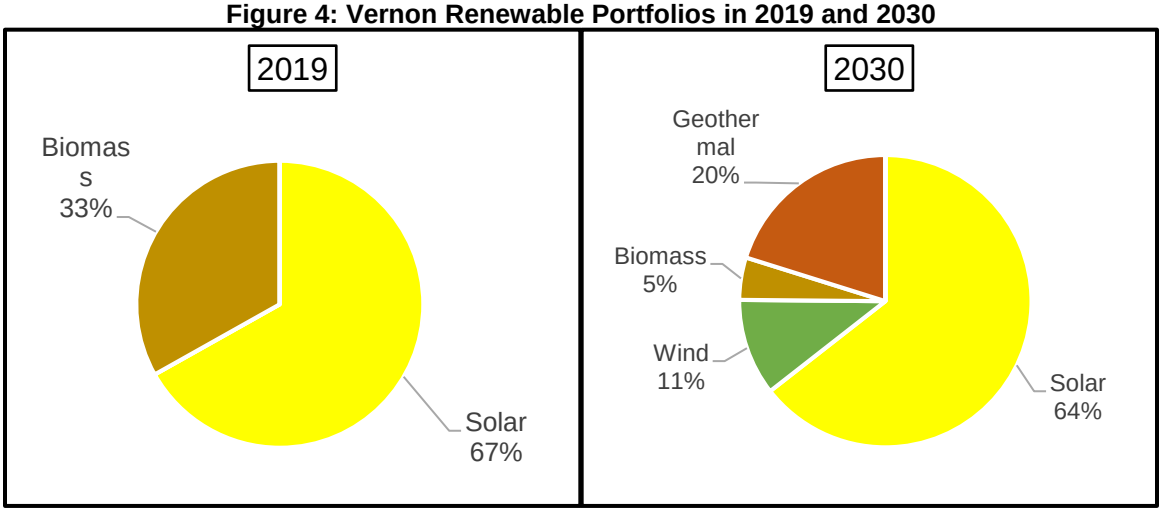
Source: California Energy Commission, Energy Assessments Division, based on Vernon 2018 IRP filing

Vernon reports that it has already procured enough RPS eligible renewables, through existing commitments, to comply with California's RPS compliance period of 2017-2020. Vernon expects to meet about 24 percent of its renewable energy requirement in 2030 with existing resources, including:

- Puente Hills Landfill Gas, a landfill gas facility supplying more than 4 percent of total renewable energy supply.
- Antelope DSR 1 Solar Project, a solar PV facility supplying nearly 9 percent of total renewable energy supply.
- Astoria II Solar Photovoltaic Facility, a solar PV facility that provides nearly 11 percent of total renewable energy supply.

Vernon expects to meet the remainder of its renewable energy needs in 2030 with variable-energy resources through longer-term contracts either through a solicitation conducted solely by Vernon or in collaboration with SCPPA members. Vernon's preferred portfolio calls for 105 MW total cumulative solar by 2030. The preferred portfolio also includes 27 MW of wind, 20 MW of geothermal, and 20 MW of energy storage by 2030. **Figure 4** shows the mix of renewable resources for 2019 and 2030.

Figure 4: Vernon Renewable Portfolios in 2019 and 2030



Source: California Energy Commission, Energy Assessments Division, based on Vernon Public Utilities 2018 Integrated Resource Plan filing

Retail Rates

PUC Section 9621(b)(3) requires POUs to develop IRPs that enhance each POU's ability to fulfill its obligation to serve its customers at just and reasonable rates, and minimize impacts on ratepayer bills. Staff reviewed the analysis and information Vernon presented on rate and bill impacts from resource portfolios it evaluated. Staff finds that Vernon's IRP is consistent with PUC Section 9621(b) (3).

Customer surveys conducted by Vernon indicated that low rates and reliable power were a primary concern for most of its customers. The preferred portfolio identifies the lowest-cost, bulk power supply portfolio. Vernon used estimates of power supply costs as an indicator of the effect of renewable procurement costs on its customers' electric bills. Vernon estimates the power supply costs under its preferred portfolio to increase at a rate of 0.9 percent annually between 2018 and 2028. Vernon expects these costs to decrease in 2029 when its contract for Malburg expires. Vernon's retail rates include other variables such as bond payments, reserve requirements, electric system capital improvement costs, operating and maintenance costs, and administrative and general expenses. The power supply costs derived from this IRP are one of the major components considered in a planned cost-of-service study Vernon will use to determine the full effects of the preferred portfolio.

System and Local Reliability

Senate Bill 350 (De León, Chapter 547, Statutes of 2015) requires filing POUs to adopt an IRP that ensures system and local reliability and addresses resource adequacy requirements.[19] Energy Commission staff reviewed Vernon's capacity reporting table and discussion and finds Vernon has planned for sufficient resources to maintain a

19 Public Utilities Code Section 9621(b) (3).

reliable electric system. Vernon's selected portfolio of resources contains sufficient capacity to meet anticipated resource adequacy requirements in 2030. Staff finds that the IRP is consistent with the reliability requirements in PUC Section 9621(b) (3) and resource adequacy requirements in PUC Section 9621(d) (1) (E).

Vernon's distribution system and generation resources are within the California Independent System Operator (California ISO) balancing authority area. Access to the California ISO transmission grid is required for delivery of market energy purchases to support the Vernon electric system load. As a participating transmission owner (PTO) in the California ISO markets, Vernon turned over to the California ISO the operating and power scheduling rights under its transmission contracts. As such, the California ISO is responsible for evaluating long-term infrastructure needs for reliability during its annual Transmission Planning Process. Under state and federal mandates, Vernon is required to hold sufficient generation capacity to ensure uninterrupted service to retail loads under a variety of conditions and meet reliability and resource adequacy requirements of the California ISO. As discussed below, the California ISO has defined three types of resource adequacy: system, local, and flexible.

System Reliability and Resource Adequacy

To ensure reliability, electric utilities must prudently plan for and procure adequate resources to meet their planning reserve margin, peak demand, and operating reserve requirements. Vernon must demonstrate that it has sufficient system resources, also referred to as *verified qualifying system capacity*, which can be made available to the California ISO to meet Vernon's monthly coincident peak demand along with a 15 percent planning reserve margin. Vernon's system reliability would most likely be compromised under a double contingency situation without local generation. To ensure that Vernon maintains the target reliability level, it estimated a system capacity need for each year in the planning horizon.

Vernon projects a capacity need of 211 MW in 2030, about 12 MW higher than in 2019. With a predominantly industrial customer mix, Vernon's electric system has an annual average load factor of more than 70 percent. Vernon will have surplus capacity of 59 MW over most of the planning period.[20] In 2029, the amount of surplus capacity will diminish with the expiration of the Malburg contract. Vernon is able to meet its resource adequacy requirements primarily through its existing and contracted power resources. It also has sufficient available transmission capacity capable to import 100 percent of its actual peak load.

20 A *load factor* is the ratio of the average energy demand to the peak energy demand. A *constant load factor* means that energy demand and peak demand are growing (or declining) at the same rate.

Local Capacity Needs

Vernon's service territory is located the California ISO's Los Angeles Basin Reliability Area. The utility estimates a 75 MW local resource adequacy obligation throughout the planning period. This need is met largely by the Malburg and H. Gonzales natural gas plants.

Similar to its system capacity, Vernon will have excess local resource adequacy resources until the expiration of the Malburg contract in 2028, which provides 134 MW of peak dependable capacity. To ensure sufficient capacity is met, Vernon has identified a generic natural gas-fired resource as a placeholder for the reprocurement of either Malburg or another natural gas-fired unit in the Greater Los Angeles Area.

Flexible Capacity Needs

The California ISO establishes requirements for flexible resources adequacy based on the California ISO's 2018 flexible resource adequacy analysis. Vernon estimates a future flexible resource adequacy need between 30 MW to 46 MW.[21] Vernon plans to use its gas-fired plants, Malburg with 78 MW and H. Gonzales with 10 MW of eligible flexible capacity, to meet future flexible capacity needs until 2028, when the Malburg contract expires. The introduction of energy storage may help address some of the ramping and overgeneration concerns associated with increasing amount of solar.

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. Energy Commission staff determined that Vernon's IRP adequately plans to maintain and enhance its transmission and distribution systems. Staff finds Vernon has planned for enough transmission to deliver resources to its service area to meet the requirement discussed below. Staff also finds that the utility conducts planning to address the adequacy of its distribution system. As such, staff finds the IRP is consistent with the transmission and distribution requirements set forth above.

Transmission System

As discussed, the California ISO operates Vernon's transmission resources and is responsible for ensuring bulk transmission system reliability. Vernon has several transmission contracts that deliver out-of-state power resources, including generation from Palo Verde and Hoover, as well as wholesale market purchases, to its system loads. Vernon's transmission contract rights include:

21 Vernon assumed that the addition of each 100 MW increment of solar would require an additional 60 MW of flexible capacity.

- 81 MW from Victorville-Lugo Midpoint 500 kilovolt (kV) line interconnecting to the Los Angeles Department of Water and Power Victorville Substation to the Southern California Edison (SCE) Lugo Substation
- 11 MW from Lugo Midpoint–Laguna Bell 500 kV line interconnecting to the SCE Lugo substation to the Vernon Laguna Bell substation
- 26 MW from Mead-Laguna Bell 230 kV line interconnecting to the SCE Mead substation to the Vernon Laguna Bell substation

Distribution System

Vernon's distribution system is connected to the bulk transmission grid through five 66 kV lines; has distribution circuits at 7 kV, 16 kV, and 66 kV; and has five distribution substations and three dedicated customer substations. Vernon has a unique distribution system due to its load profile: a small geographical service area combined with a dense load, resulting in short distribution circuits with multiple circuits on single pole. This attribute creates challenges for electric system operation and protection compared to circuits that are more spread out.

Vernon developed a distribution system action plan to maintain and upgrade its electric system. The action plan includes:

- Replacing and upgrading aging distribution infrastructure.
- Implementing new distribution system automation with intelligent line switches that can be operated remotely.
- Completing voltage conversions at substations.
- Upgrading line conductors and transformers.

As part of developing its action plan, Vernon conducted an impact study on distributed generation, examining the effects of solar PV facilities, wind generators, and diesel- and natural gas-fueled facilities on its distribution system. Vernon incorporated the results of the impact study into a seven-year capital improvement plan. The plan addresses repairing, upgrading, and automating its aging distribution infrastructure.

Capital improvements undertaken to date include replacement of 650 wood power poles, 30 oil-filled substation circuit breakers, and numerous underground substation cables. Other improvements included replacement of electromechanical relays with solid-state relays within the distribution system.

Going forward, the action plan calls for the construction of a new substation, as well as replacing more than 2,000 high-pressure sodium streetlights with light-emitting diodes (LEDs). The upgraded streetlights will result in a 200 kilowatt (kW) reduction in net load.

Disadvantaged Communities and Localized Air Pollutants

PUC Section 9621(b) (3) requires POUs to minimize localized air pollutants and GHG emissions with early priority on disadvantaged communities. Energy Commission staff reviewed Vernon's IRP filing to determine the extent to which it is minimizing local air pollutants with a priority placed on disadvantaged communities. Staff finds that Vernon has made efforts to address these issues in selecting the resources to include in its portfolio consistent with the requirement.

Vernon used the most current version of the California Environmental Protection Agency's California Communities Environmental Health Screening Tool to identify disadvantage communities in its territory. Vernon, four miles southeast of downtown Los Angeles, did not find any disadvantaged communities within its service area but acknowledges it borders others outside and is considering them. The action plans to develop Vernon's distributed energy resources will lower its GHG emissions. This plan includes increasing Vernon's distributed solar generation and performing energy efficiency upgrades to city-owned facilities and its distribution equipment. Vernon's actions plans will also implement demand-response programs, incorporate energy storage, and develop its electric vehicle-charging infrastructure. Details of the actions plans are discussed in the additional procurement goals section.

Net-Energy Demand in Peak Hours

PUC Section 9621(c) requires POUs to consider existing renewable generation, grid operation efficiencies, 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. Vernon's IRP discusses how these factors contribute to meeting net demand in peak hours, This plan is consistent with the requirement that filing POUs address how they can meet peak-hour demand with renewable and other preferred resources.

Vernon's resource plan faces the challenge of shifting its reliance from natural gas to a renewable resource by 2028 when Malburg's contract expires. Because Vernon's customers are primarily commercial and industrial, its peak demand spikes early in the day between 12 p.m. and 2 p.m., when there is ample solar generation. To achieve long-term sustainability goals, Vernon will need to procure a mix of renewables, which will be predominantly solar. By 2030, Vernon's resource plan includes roughly 78 MW of renewable generation from generic additions and long-term contracts and has a system peak demand around 180 MW. Procuring solar resources can cause oversupply issues at high penetration levels and will create a need for addition flexible capacity that can ramp up quickly. Energy storage resources will help address some of the concern, but for the foreseeable future, natural gas resources will likely be needed to support the integration of anticipated solar into the grid.

Additional Procurement Goals

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 on page 15.

Energy Efficiency and Demand-Response Resources

Staff finds that Vernon's 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. The standardized tables submitted by Vernon show the energy efficiency programs would reduce demand by 50 GWh in 2030, which is slightly higher than the targets set by the Energy Commission under SB 350. **Table 4** shows the cumulative electricity savings targets.

Table 4: Vernon's Additional Achievable Energy Efficiency Estimates (GWh)

	AAEE (GWh)	SB 350 targets (GWh)
2018	13.7	15
2019	16.7	18
2020	19.8	21
2021	22.9	25
2022	25.9	29
2023	29.0	32
2024	32.1	35
2025	35.1	38
2026	38.2	41
2027	41.3	44
2028	44.3	46
2029	47.4	48
2030	50.5	

Source: Vernon IPR filing Supplementation Information received on January 10, 2019

Vernon has initiated energy efficiency programs that include incentives to encourage customers to implement energy-efficient technologies. The programs also include energy audits and customer education on more efficient uses of electricity. These

programs include replacement of inefficient compressors and the use of heat conversion and refrigeration control technology to conserve energy.

In 2017, Vernon realized 3 GWh of energy efficiency savings. Vernon has set a goal to achieve 6 GWh of savings by implementing the following energy efficiency action plans.

- Continue to educate customers on energy efficiency
- Perform energy-efficient upgrades of city-owned facilities
- Upgrade the distribution system with energy-efficient equipment

Energy Storage

Staff finds that Vernon's 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 their system. Assembly Bill 2514 (Skinner, Chapter 469, Statutes of 2010) requires POUs to evaluate the potential of energy storage systems as a resource and establish procurement targets. Vernon's AB 2514 analysis has set a reliable procurement target of 20 MW of cumulative battery energy storage from 2023 to 2029.

Staff finds that Vernon's 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. AB 2514 requires POUs to evaluate the potential of energy storage systems as a resource and to establish procurement targets. Vernon has an energy procurement target of 20 MW of cumulative battery energy storage from 2023 to 2029.

With Vernon's increased procurement of solar resources, the utility is looking into energy storage to help meet ramping needs. In looking at the possible replacement of natural gas resources with battery storage, Vernon performed a sensitivity analysis with storage costs decreasing faster than expected. The utility found that replacing Malburg's gas generation with energy storage might be a feasible resource option.

Vernon is concerned about being the early adopter of new technology until it becomes commercially available and the cost stabilizes. For example, Vernon notes that lithium ion-based battery technology appears to be the dominant energy storage resource considered today. In the future, a competing technology such as flow batteries could experience manufacturing breakthroughs and overtake lithium-ion technology. To reduce technology risk, Vernon's preferred portfolio includes a gradual phasing in of energy storage from 1 MW in 2023 to 5 MW in 2028, with a larger acquisition of 15 MW in 2029. Over the planning horizon, Vernon will have the flexibility to evaluate other energy storage-related resources in addition to lithium ion and take advantage of any technology breakthroughs or declines in costs.

Transportation Electrification

Staff finds that Vernon's IRP is consistent with the requirement of PUC Section 9621(d) (1) (C) as it addresses transportation electrification, primarily through increasing the availability of charging infrastructure. Vernon's IRP states that high electric vehicle adoption levels will be difficult to obtain due to its demographics and customer profile. GHG impacts could be significant because of Vernon's limited distributed solar generation. The utility notes it has limited infrastructure in place to support light-duty electric vehicles. Cost of heavy-duty vehicles for Vernon's business owners also must come down before electric vehicles can become a viable option. Vernon indicates that the utility intends to increase transportation electrification in light-duty and heavy-duty vehicles. The utility plans to increase electric vehicle use with a goal of adding 1.7 MW of load to the system by 2030.

Vernon is taking several actions to promote transportation electrification in its service area including:

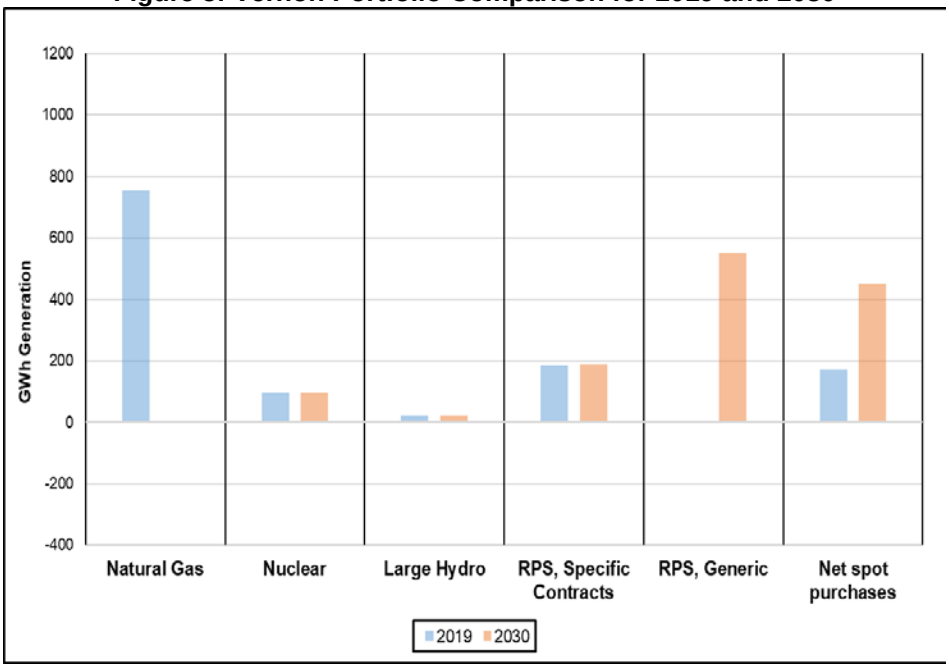
- Exploring collaborating with customers and car dealerships to install and maintain electric vehicles charging stations at customer-owned facilities.
- Evaluating increasing city-owned electric vehicles.
- Coordinating with local air quality agencies on programs and initiatives to promote electric vehicles.

Portfolio Diversification

PUC Section 9621(d) (1) (D) requires that POUs address procurement of a diversified portfolio of resources consisting of short- and long-term electricity, electricity-related, and demand-response products. Based on staff's review of Vernon's existing resources, its portfolio analysis and the selection of resource additions in its IRP, staff concludes that Vernon has fulfilled this requirement.

Figure 5 shows a comparison of the energy mix by resource in Vernon's preferred portfolio in 2019 and 2030.

Figure 5: Vernon Portfolio Comparison for 2019 and 2030



Source: California Energy Commission, Energy Assessments Division, Based on Vernon 2018 IRP filing Energy Balance Table

By 2030, Vernon has shifted away from natural gas to a portfolio emphasizing renewable resources and spot market purchases. This portfolio represents a balanced and diversified portfolio that meets Vernon's objectives of RPS compliance, reduction of GHG emissions, low cost, and system reliability.

ACRONYMS

Acronym	Term
AAEE	Additional achievable energy efficiency
AAPV	Additional achievable photovoltaic
Barriers Study	Low-Income Barriers Study, Part A: *Overcoming Barriers to Energy Efficiency and Renewables for Low-Income Customers and Small Business Contracting Opportunities in Disadvantaged Communities*
CARB	California Air Resources Board
California ISO	California Independent System Operator
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CPUC	California Public Utilities Commission
CRAT	Capacity Resource Accounting Table
EBT	Energy Balance Table
GEAT	GHG Emissions Accounting Table
GHG	Greenhouse gas
IEPR	*Integrated Energy Policy Report*
IRP	Integrated resource plan
LD PEV	Light-duty plug-in electric vehicle
mt	Metric ton
MW	Megawatt
MWh	Megawatt-hour
POU	Publicly owned utility
PRC	Public Resources Code
PUC	Public Utilities Code
RPS	Renewables Portfolio Standard
RPT	RPS Procurement Table
SB 350	Senate Bill 350 (De León, Chapter 547, Statutes of 2015)
VPU	Vernon Public Utilities

APPENDIX A: DEFINITIONS

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

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

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

Bundled renewable energy credit: An electricity product that, when procured by the POU claiming the electricity product to satisfy its RPS procurement requirements, includes both the electricity and the associated renewable energy credits from an eligible renewable energy resource. For example, if the POU claiming an electricity product owns the associated eligible renewable energy resource, then all electricity products, including those associated with electricity consumed onsite, may be considered bundled electricity products.

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

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

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

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

Integrated resource plan (IRP): A plan adopted by the governing board of a POU pursuant to 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.

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

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

Plug-in electric vehicle (EV): A vehicle that uses one or more electric motors for propulsion. Electric vehicles include but are not limited to, battery-electric and plug-in hybrid vehicles.

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

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

Retail sales: Electricity consumption after accounting for behind-the-meter onsite generation including storage charge and discharge. It indicates the net energy delivered through the meter to the end-use customer, and thus excludes any generation or procurement in satisfaction of firm wholesale commitments (e.g., firm and spot market sales).

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

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

Standardized tables: The four tables that are required with the IRP Filing submitted to the Energy Commission. These tables include information and data necessary to help staff determine if the IRP is consistent with PUC Section 9621. The four standardized tables are Capacity Resource Accounting Table (CRAT), Energy Balance Table (EBT), Renewable Procurement Table (RPT), and Greenhouse Gas Emissions Accounting Table (GEAT).

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

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

APPENDIX B: STANDARDIZED REPORTING TABLES

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

		Technology	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total Net Energy for Load			**1,226,039**	**1,265,994**	**1,268,035**	**1,271,107**	**1,275,011**	**1,278,384**	**1,281,168**	**1,283,913**	**1,287,636**	**1,292,171**	**1,296,889**	**1,304,423**
Non-RPS Resources	Malburg Generating Station	natural gas	**753,388**	**759,080**	**716,285**	**707,779**	**703,736**	**702,774**	**688,940**	**685,575**	**681,193**	**680,788**		
	H Gonzales 1 & 2	natural gas	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Palo Verde Nuclear	nuclear	**94,200**	**94,464**	**94,200**	**94,200**	**94,200**	**94,464**	**94,200**	**94,200**	**94,200**	**94,464**	**94,200**	**94,200**
	Boulder Canyon (Hoover)	large hydro	**20,728**	**20,728**	**20,728**	**20,728**	**20,728**	**20,728**	**20,728**	**20,728**	**20,728**	**20,728**	**20,728**	**20,728**
	New Energy Storage	battery storage					**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Market/Malburg	N/A	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Spot Purchases	N/A	**181,618**	**214,218**	**129,131**	**132,074**	**132,904**	**138,725**	**103,959**	**110,046**	**119,172**	**124,508**	**462,356**	**471,170**
	Spot Sales	N/A	**-8,922**	**-7,071**	**-75,101**	**-98,964**	**-150,021**	**-148,415**	**-171,021**	**-228,186**	**-227,025**	**-223,881**	**-21,544**	**-20,189**
RPS resources	Antelope DSR Solar PV	solar PV	**70,291**	**69,940**	**69,590**	**69,242**	**68,896**	**68,552**	**68,209**	**67,868**	**67,528**	**67,191**	**66,855**	**66,520**
	Astoria Solar PV	solar PV	53,416	53,148	52,883	91,000	90,545	90,092	89,642	89,193	88,747	88,304	87,862	87,423
	New Solar PV 1	solar PV			**199,000**	**199,000**	**261,000**	**261,000**	**261,000**	**322,000**	**322,000**	**322,000**	**322,000**	**322,000**
	New In-State Wind 1	wind							**79,000**	**79,000**	**79,000**	**79,000**	**79,000**	**79,000**
	Puente Hills Landfill	biomass	**61,320**	**61,488**	**61,320**	**56,046**	**53,023**	**50,465**	**46,512**	**43,488**	**42,093**	**39,070**	**36,512**	**34,651**
	New Geothermal 1	geothermal											**148,920**	**148,920**
Total Energy			**1,226,039**	**1,265,994**	**1,268,035**	**1,271,107**	**1,275,011**	**1,278,384**	**1,281,168**	**1,283,913**	**1,287,636**	**1,292,171**	**1,296,889**	**1,304,423**
Surplus/Shortfall			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Source: California Energy Commission, Energy Assessments Division, Based on Vernon 2019 IRP filing Energy Balance Table

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

		Technology	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Peak Demand			173	180	180	180	180	180	181	181	181	182	182	183
Planning Reserve Margin			26	27	27	27	27	27	27	27	27	27	27	28
Peak Procurement Requirement			**199**	**206**	**207**	**207**	**207**	**207**	**208**	**208**	**209**	**209**	**210**	**211**
Non-RPS Resources	Malburg Combined Cycle	natural gas	134	134	134	134	134	134	134	134	134	134		
	H Gonzales 1 & 2	natural gas	10	10	10	10	10	10	10	10	10	10	10	10
	Palo Verde Nuclear	nuclear	11	11	11	11	11	11	11	11	11	11	11	11
	Boulder Canyon (Hoover)	large hydro	17	17	17	17	17	17	17	17	17	17	17	17
	New Energy Storage	battery storage					1	2	3	4	5	5	20	20
	Market/Malburg	N/A				10	20	20	20	30	30	30	70	70
RPS resources	Antelope DSR Solar PV	solar PV	10	10	10	9	9	9	9	8	8	8	8	7
	Astoria Solar PV	solar PV	8	8	8	11	11	11	10	10	10	9	9	9
	New Solar PV 1	solar PV			25	24	31	30	29	35	34	33	32	30
	New In-State Wind 1	wind							7	7	7	7	7	7
	Puente Hills Landfill	biomass	8	7	7	6	6	6	5	5	5	4	4	4
	New Geothermal 1	geothermal											20	20
Total Capacity Procured			**199**	**198**	**197**	**196**	**199**	**198**	**197**	**196**	**195**	**194**	**193**	**59**
Surplus/Shortfall			**(2)**	**(10)**	**(10)**	**(8)**	**(9)**	**(11)**	**(12)**	**(13)**	**(14)**	**(16)**	**(151)**	**(153)**

Source: California Energy Commission, Energy Assessments Division, Based on Vernon 2019 IRP filing Capacity Resource Accounting Table

Table B-3: GHG Emissions from Vernon's Resource Portfolio, All Years

	Fuel Type	GHG Intensity (MT CO_2e/ MWh)	Total Emissions (MMT CO_2e)											
			2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Malburg Combined Cycle	natural gas	0.426	0.321	0.321	0.303	0.300	0.299	0.299	0.294	0.293	0.292	0.292	0.000	0.000
H Gonzales 1 & 2	natural gas	0.428	0	0	0	0	0	0	0	0	0	0	0	0
Spot market / Short-term Purchases	system	0.428	0.074	0.089	0.023	0.014	(0.007)	(0.004)	(0.029)	(0.051)	(0.046)	(0.043)	0.189	0.193
Portfolio Emissions	portfolio	N/A	0.393	0.410	0.326	0.314	0.291	0.295	0.265	0.243	0.246	0.249	0.189	0.193

Source: California Energy Commission, Energy Assessments Division, Based on Vernon 2019 IRP filing Greenhouse Gas Emissions Accounting Table

ATTACHMENT 1

Public Utilities Code - PUC

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

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

9621.

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

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

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

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

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

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

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

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

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

(C) Transportation electrification.

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

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

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

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

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

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

Public Utilities Code - PUC

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

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

PART 1. PUBLIC UTILITIES ACT [201 - 2120]

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

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

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

ARTICLE 1. Rates [451 - 467]

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

454.52.

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

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

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

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

(D) Minimize impacts on ratepayers' bills.

(E) Ensure system and local reliability.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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