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STAFF PAPER

Review of Modesto Irrigation District 2019 Integrated Resource Plan Filing

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ABSTRACT

Senate Bill 350 (De León, Chapter 547, Statutes of 2015, Public Utilities Code Section 9621) requires the California Energy Commission to review the integrated resource plans of identified publicly owned utilities to ensure they meet various requirements specified in the law, including greenhouse gas emission reduction targets and renewable 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. Modesto Irrigation District submitted its *2019 Integrated Resource Plan* and supplemental information, which the Modesto Irrigation District Board of Directors adopted on December 4, 2018, to the Energy Commission for review March 5, 2019. This staff paper presents the results of the Energy Commission staff review of the Modesto Irrigation District 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 primary focus of Modesto Irrigation District's (Modesto's) IRP is to achieve a safe and reliable electric grid that maintains low and stable rates while meeting greenhouse gas targets and renewable procurement requirements. Modesto relies on a diverse, balanced energy resource mix to meet customer demand. Modesto's recent actions to divest from coal-fired generation have greatly reduced the greenhouse gas emissions from its electricity resource portfolio. In addition, Modesto has taken significant early action that will ensure it meets renewable procurement requirements with existing resources through 2024. While Modesto's IRP meets the 50 percent renewables by 2030 target, as required under PUC Section 9621, Modesto adopted a Renewables Portfolio Standard Procurement Plan in late 2018 to meet 60 percent renewables by 2030.

Modesto used production cost modeling to evaluate alternative supply portfolios. The resources Modesto considered included utility-owned generation, renewable resources (both within and outside the state), and market purchases. The utility's selected resource portfolio in 2030 includes a large increase in solar photovoltaic (PV) generation, accounting for about 30 percent of its supplies. Wind resources dip as contracts expire in the later years of the forecast, declining from almost 19 percent in 2019 to about 13 percent in 2030. Natural gas generation accounts for about 20 percent of Modesto's supplies in 2030, while spot market purchases make up about 16 percent of its portfolio. The remainder of the portfolio is composed of large and small hydroelectric and biofuels.

In reviewing the Modesto 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 filing, as well as analysis and verification of the materials submitted. Staff presents the following conclusions in accordance with the requirements of PUC Section 9621:

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

- *Meeting Planning Goals:* The values reported in standardized forms, 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 forms, along with analysis and narrative discussion, demonstrate the utility has considered the role of existing renewable generation, grid operational efficiencies, energy storage, and distributed resources (including energy efficiency) in helping ensure the utility's energy and reliability needs in the hours that encompass the peak hour as set forth in PUC Section 9621(c).
- *Addressing Resource Procurement Types:* The IRP filing includes values reported in the standardized forms and narrative discussion that demonstrate the utility addressed the procurement requirements for energy efficiency and demand response, energy storage, transportation electrification (the use of electricity for vehicles vessels, trains, boats, or other equipment that are mobile sources of air pollution), 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 Modesto, 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 impacts 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 Energy Commission shall provide recommendations to correct the deficiencies. The Energy Commission adopted the *Publicly Owned Utility Integrated Resource Plan Submission and Review Guidelines* (*POU IRP Guidelines*) to govern the submission of the POUs' IRPs.[2] PUC Section 9622 requires the Energy Commission to review POU IRPs to ensure they achieve PUC Section 9621 provisions. (See **Attachment I**.)

This chapter outlines the Energy Commission's review process and provides an overview of Modesto Irrigation District (Modesto) 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 its IRP.

Energy Commission IRP Review Process

On March 5, 2019, Modesto submitted its IRP and supporting documentation as outlined in the guidelines to the Energy Commission for review.[3] 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 information

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

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

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.

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 Modesto 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 forecasts, projections for renewable energy resource additions. Staff also examined whether the POU achieved Renewables Portfolio Standard (RPS) requirements, energy efficiency savings projections and programs, and plans for transportation electrification.

Overview of Modesto

Modesto is an independent, publicly owned utility in California's Central Valley that provides electricity and irrigation water and treats and delivers drinking water supply for Modesto area residents.

- Modesto provides power to a 561-square-mile service area, including the communities of Modesto, Waterford, Salida, Mountain House, and parts of Ripon, Escalon, Oakdale, and Riverbank.
- Modesto is governed by a five-member board of directors, with each board member elected to represent a geographical division within the irrigation district boundary.
- The utility has 97,935 residential accounts, 12,490 commercial accounts, and an annual electric load of 1,650.5 GWh. Modesto served a peak load of 697 MW in 2017.
- Modesto owns 415 MW of natural gas capacity, has 62 MW of ownership interest in the Don Pedro large hydroelectric powerhouse, and has 54 MW of peak dependable capacity from RPS-eligible resources under contract in 2019.

Modesto's Planning Process

Modesto's mission is to provide electric, irrigation, and domestic water services for its customers, delivering the highest value at the lowest cost possible. Modesto's IRP presents the utility's plan for reliability planning and budgeting and is intended to demonstrate compliance with Modesto board policy and federal and state laws. It also provides a frame of reference for development of new and revised board policy. Consistent with the IPR guidelines, Modesto's IRP covers the planning horizon for the period 2019 through 2030.

Modesto staff issued a draft IRP in November 2018, which was taken to the Modesto Irrigation District Board for approval. The public board meeting on December 4, 2018,

included a staff presentation summarizing the IRP, followed by a board vote for adoption of the IRP and direction to staff to update the filing to reflect end-of-year actual values.

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.[4] In addition, under the POU IRP Guidelines (Chapter 2.E.2), the POU must provide information on the method used in developing the demand forecast if a POU uses a forecast other than the Energy Commission's adopted demand forecast.[5] 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.

Modesto's energy and peak demand forecasts are based on a set of econometric models describing the hourly load in the region as a function of several weather variables (for example, surface temperature and solar irradiance), calendar variables (such as day of the week, holidays), and demographic variables (for example, labor force data). Modesto uses an in-house model referred to as the *Long-Term Demand and Energy Forecast* to develop its energy and peak demand forecasts. The model incorporates demand-side forecast models, which include projections for solar panels, energy efficiency savings, and electric vehicle charging.

Modesto's net energy demand forecast shows an annual growth of 0.9 percent from 2018 to 2030. The annual energy growth rate was -0.2 percent from 2008 to 2017. The energy forecast growth is mostly due to the regional economic recovery after 2014. The Modesto forecast is comparable to the Energy Commission's forecast, falling within the range of the mid demand case and the high demand case, as shown in **Figure 1**.[6]

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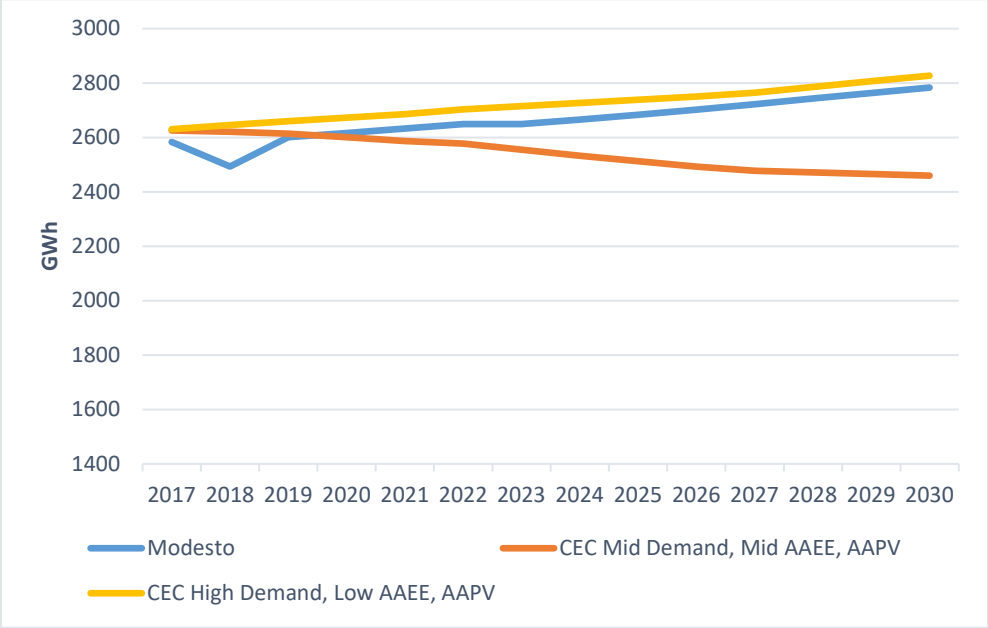
4 *POU IRP Guidelines*, Chapter 2, E., Pp 5-6

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

6 The Energy Commission develops three demand forecasts as part of its Integrated Energy Policy Report: the mid demand, mid AAEE Mid AAPV" (mid demand), the "low demand, high AAEE High AAPV" (low demand), and the "high demand, low AAEE low AAPV" (high demand) forecast. AAEE refers additional achievable energy efficiency and AAPV refers to additional achievable photovoltaics. See *https://efiling.energy.ca.gov/getdocument.aspx?tn=222287.*

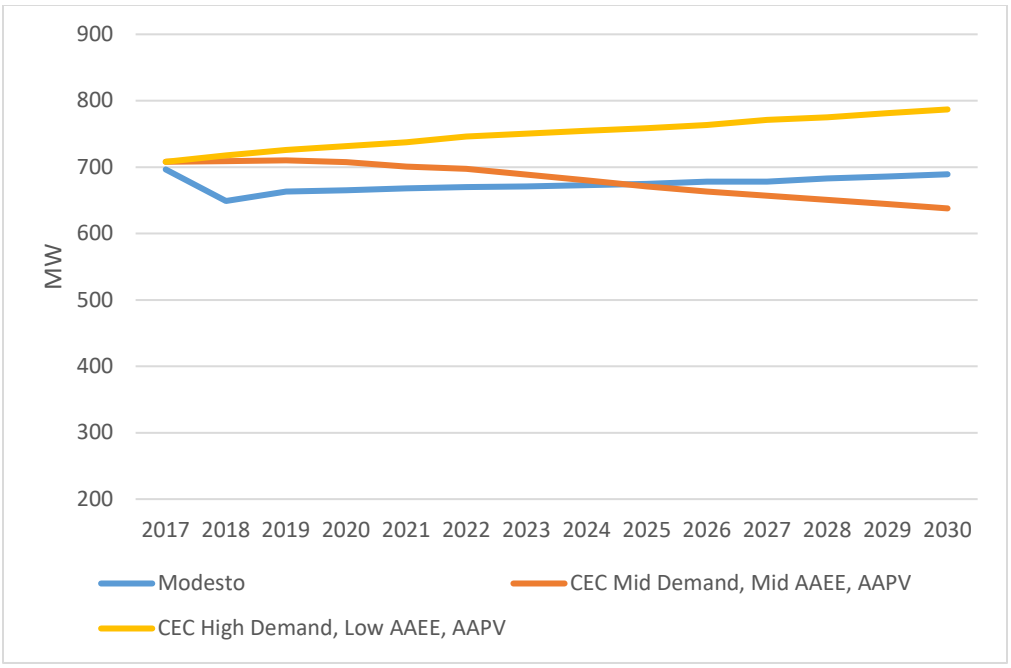
Figure 1: Modesto and Energy Commission Energy Forecasts 2018-2030 (GWh)



Source: California Energy Commission staff, Energy Assessments Division

The Modesto peak demand forecast has an annual growth of 0.4 percent from 2018 to 2030. The annual peak demand growth from 2008 to 2017 was low at 0.8 percent, largely because of slower annual growth in demographic variables. The peak forecast is in the range of Energy Commission's mid demand and high demand cases, as shown in **Figure 2**.

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



Source: California Energy Commission staff, Energy Assessments Division

The differences between Modesto's and the Energy Commission's forecasts could be because of differences in modeling methods, since the Energy Commission's forecasts uses an end-use forecast, and Modesto uses an econometric forecast. Another potential source of the difference between Modesto and the Energy Commission forecast could be how additional achievable energy efficiency (AAEE) and additional achievable solar photovoltaic are calculated and incorporated into the models.

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.[7] 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 Modesto'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.

Modesto is aligning its generation resource mix with California's policy goals to transition to a cleaner energy portfolio while maintaining its low and stable rates for customers. For example, Modesto divested its ownership interest in the San Juan coal plant effective December 31, 2017, and no longer procures coal generation. The utility also took early action to procure renewable resources to meet the RPS requirements, including wind from the Big Horn and Big Horn II wind farms and biogas from the Fiscalini Cheese Company's dairy digester. Modesto has a long-term ownership stake in the Don Pedro large hydroelectric powerhouse, accounting for 62 MW of the 203 MW generating capacity of the hydroelectric plant. Modesto also relies on 414 MW of utility-owned natural gas-fired generation, as well as market power purchases.

Modesto considered three supply resources in its portfolio assessment: utility-owned generation, RPS-eligible renewable resources within and outside the state, and market purchases. Modesto performed its own production cost modeling simulations to validate the feasibility and performance of different portfolios and determine an optimized portfolio.[8] Modesto used the model to identify an initial set of generating resources to determine whether it meets the utility's capacity requirement, which is the sum of the one day in 10 years (1-in-10) peak demand plus a 15 percent planning reserve margin.[9] If Modesto found a capacity shortfall, it identified additional resources and tested the new portfolio for feasibility. This modeling was repeated until the supply portfolio met feasibility, economic, and reliability requirements. Modesto then verified

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

8 Modesto used Prosym, a commercial production cost modeling software program that mimics the dispatch of available generation resources to meet demand and reserve requirements at the least cost, subject to transmission and generator constraints.

9 A 1-in-10 peak demand is the peak demand that can be expected to occur 10 percent of the time and reflects adverse weather conditions. Some utilities use a 1-in-2 peak demand, which is the demand expected to occur 50 percent of the time under normal weather conditions.

that the portfolio would meet GHG reduction targets and RPS procurement requirements. The portfolio was then evaluated for compliance with Modesto's risk management policy, which places financial limits on risk exposure expressed in a dollar-amount and energy-volume basis.

Modesto's procurement strategy involves moving away from high-GHG-emitting resources such as coal and has instead shifted to renewable resources and market purchases. Modesto focused on meeting the 50 percent RPS requirement from Senate Bill 350 (De León, Chapter 547, Statutes of 2015) and will work to implement the 60 percent RPS requirement from Senate Bill 100 (De León, Chapter 312, Statutes of 2018). **Table 1** summarizes the amount of energy from the different resources in Modesto's portfolio in 2019, 2025, and 2030.

Table 2 summarizes the capacity resources Modesto will rely on to meet peak demand and reliability requirements in the 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		**2,601,375**	**2,683,735**	**2,783,429**
Non-RPS	Coal	0	0	0
	Large Hydroelectric	167,209	167,209	188,400
	Natural Gas	579,033	505,561	549,345
	Spot-market purchases	1,244,019	1,289,010	1,282,544
	Spot-Market sales	(268,445)	(126,963)	(72,167)
	System power purchases	475,822	438,046	438,045
RPS Resources	Biofuels	13,248	2,400	131,040
	Small hydroelectric	10,374	10,374	10,374
	Solar PV	64,746	395,021	818,064
	Wind	492,988	493,369	366,657
	Undelivered RPS energy	(129,548)	(448,975)	(895,387)
Total Energy Procured		2,649,447	2,725,053	2,816,915
Surplus/Shortfall		48,072	41,318	33,486

Source: California Energy Commission, Energy Assessments Division, based on Modesto 2019 IRP filing

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

		2019	2025	2030
Peak Demand		663	675	689
Planning Reserve Margin		99	101	103
Peak Procurement Requirement		762	776	792
Non-RPS	Coal	0	0	0
	Large Hydroelectric	62	62	62
	Natural Gas	414	414	414
	Short-Term Capacity Contract	271	24	0
	Storage (compressed air)	0	0	0
	Storage (Battery)	0	0	0
	Planned System Capacity Contract(s)	72	48	48
	Generic additions	0	48	48
RPS Resources	Biofuels	2	1	1
	Geothermal	0	0	0
	Small hydroelectric	0	0	0.3
	Solar PV	23	130	270
	Wind	29	29	8
	Generic additions	0	0	155
Total Capacity Procured		874	660	614
Surplus/Shortfall		111	(69)	25

Source: California Energy Commission, Energy Assessments Division, based on Modesto 2019 IRP filing

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

This chapter summarizes the main elements of Modesto'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 findings 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 the GHG targets established by the California Air Resources Board, in coordination with the Energy Commission and California Public Utilities Commission.[10] These GHG targets reflect the electricity sector's percentage in achieving the economy-wide GHG emission reductions of 40 percent from 1990 levels by 2030. Energy Commission staff reviewed the GHG emissions associated with Modesto'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 Modesto's portfolio to ensure consistency with other data available to staff.

Based on this review, staff finds that Modesto plans to achieve the GHG emission target range established by the California Air Resources Board of 317,000 to 559,000 metric tons[11] of carbon dioxide equivalent (mt CO_2e), or 317 to 559 thousand metric tons carbon dioxide equivalent (MT CO_2e). Modesto's resource portfolio is slightly above the midpoint of the GHG range, at roughly 476 MT CO_2e, which is consistent with the requirement of PUC Section 9621(b)(1). The primary reason for the decrease in GHG emissions over the forecast period is from the divestiture of the San Juan coal plant outside the state, in Northern New Mexico.

Modesto estimated its emissions by multiplying the specific generating plant or spot market emission intensity by the total generation expected for the plant or from the spot market for the planning horizon. **Table 3** shows GHG emissions for Modesto's portfolio of resources for 2019, 2025, and 2030. **Table 1** identifies the emission intensities and total emissions for each resource for all years.

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

11 One metric ton equals 2,204.6 pounds

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

	Fuel Type	GHG Intensity (mt CO_2e/MWh)	Total Emissions (MT CO_2e)		
			2019	2025	2030
Woodland 1	natural gas	0.488	17	21	56
Woodland 2	natural gas	0.457	150	162	135
Woodland 3	natural gas	0.445	29	15	28
Ripon 1	natural gas	0.562	9	3	19
Ripon 2	natural gas	0.562	4	2	16
McClure 1	natural gas	1.103	3	3	3
McClure 2	natural gas	0.804	1	1	1
Lodi Energy Center	natural gas	0.39	48	24	3
System Power Purchases	system	**NA**	3	96	96
Spot Market Purchases	system	0.428	532	552	549
Spot Market Sales	system	0.428	(115)	(54)	(31)
Emissions Adjustments	Undelivered RPS energy	**NA**	(57)	(196)	(397)
Total Portfolio Emissions	**NA**	**NA**	**625**	**629**	**480**

Source: California Energy Commission, Energy Assessments Division, based on Modesto 2019 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 (RPS) by 2030 consistent with Article 16 (commencing with Section 399.11) of Chapter 2.3.[12] Staff reviewed the renewable procurement standardized reporting table, the discussion in the IRP filing, and the renewable procurement plan submitted. Staff finds that Modesto'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).

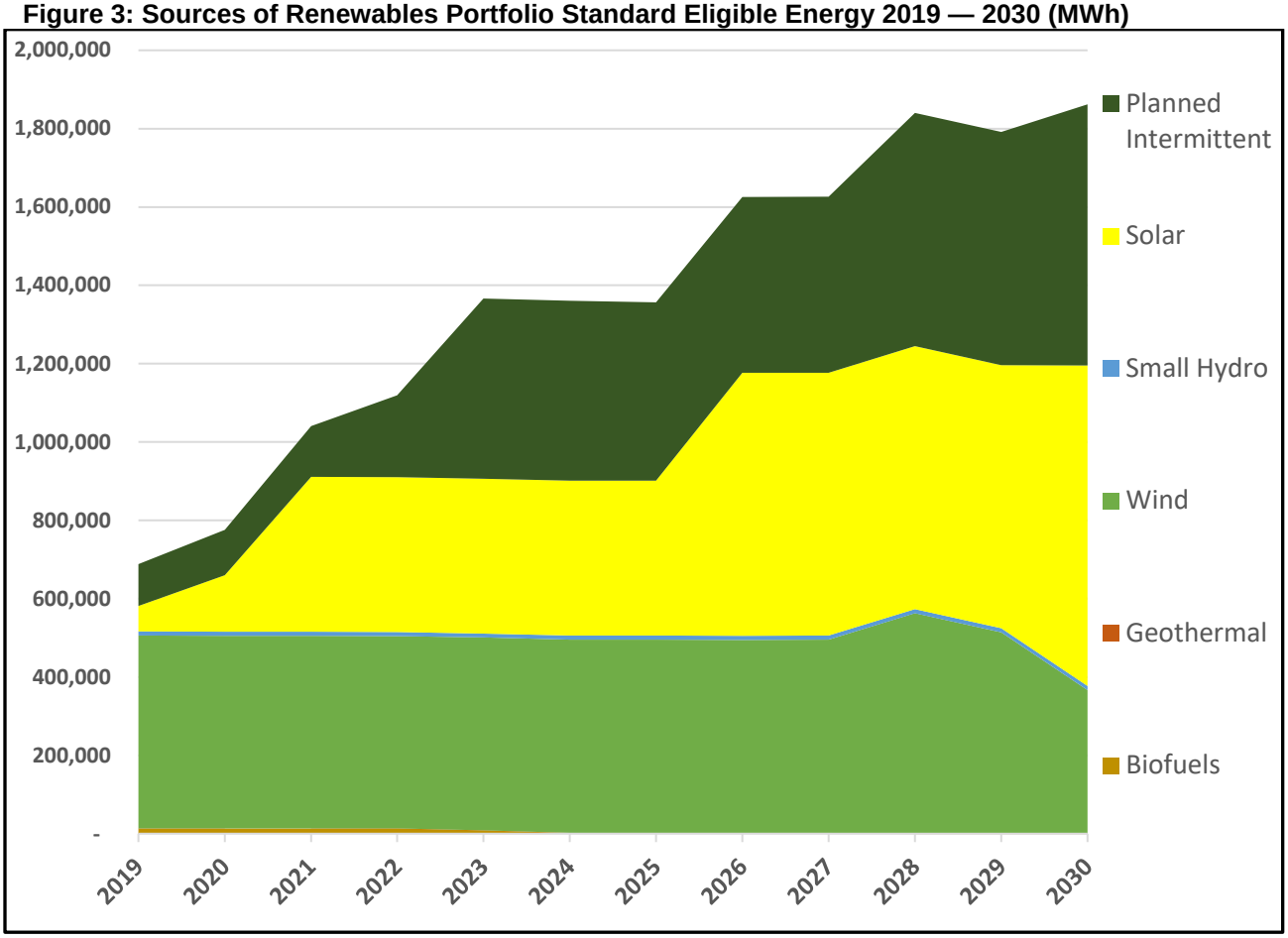
Modesto's IRP focuses on the renewable energy procurement target to meet 50 percent of electric retail sales with renewable energy by 2030. Modesto anticipates a future IRP filing with the updated RPS energy targets, culminating with 60 percent renewable procurement by December 31, 2030.

Modesto's RPS portfolio includes power purchases from four wind generation projects including the Big Horn I and II Projects, the Star Point Wind Project, and the High Winds

12 PUC Section 9621(b) requires the governing board 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 required only to plan for the 50 percent RPS target in its IRP. Future POU IRPs will need to meet RPS requirements in effect when these updates are filed.

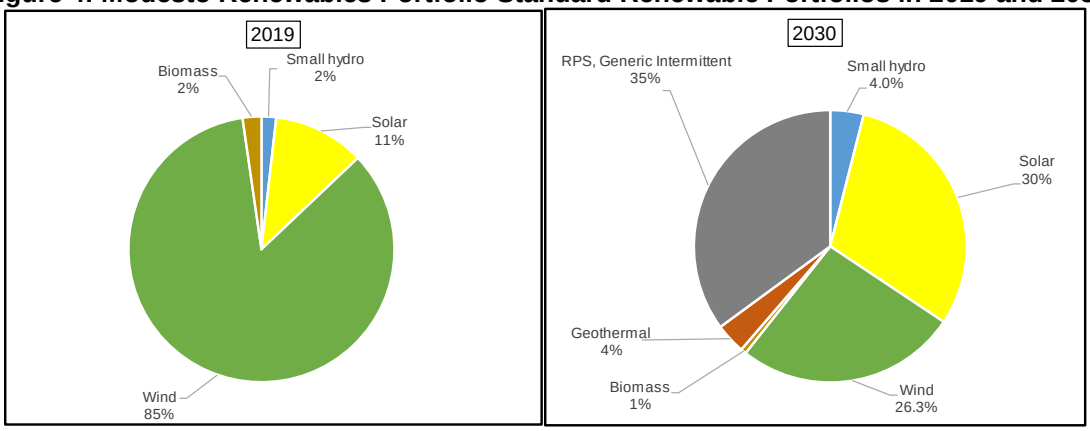
Project. Modesto also procures energy from the New Hogan and Stone Drop small hydro projects, the Ripon Solar Energy Project, the McHenry Solar Farm, and the Fiscalini biogas plant. Modesto has also executed two 20-year power purchase agreements from the Mustang II Barbaro and Blythe Solar IV projects. These two photovoltaic (PV) projects are estimated to come on-line by the end of 2020. At this time, Modesto anticipates that it will not need to procure any additional RPS resources until 2026.

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



Source: California Energy Commission, Energy Assessments Division, based on Modesto 2019 IRP filing

Figure 4: Modesto Renewables Portfolio Standard Renewable Portfolios in 2019 and 2030



Source: California Energy Commission, Energy Assessments Division, based on Modesto 2019 IRP 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 in ratepayer bills. Staff reviewed the analysis and information Modesto presented on the rate and bill impacts from resource portfolios it evaluated. Staff finds the IRP is consistent with PUC Section 9621(b)(3).

A key mission for Modesto's IRP development was maintaining low and stable electric rates. Modesto has consistently maintained electric rates that are lower than the adjacent investor-owned utilities, and its rates have not increased since 2012. Modesto used total system average rate to measure its cost of service, which is calculated by looking at the utility's total revenue divided by total electricity sales. Modesto's 2018 system average rate is 14.37¢/kWh. Modesto's current rate forecast, which extends through 2022, does not show upward rate pressure during this period. As Modesto is still in the midst of its 2019 planning cycle, it has not developed a rate forecast beyond 2022.

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.[13] Energy Commission staff reviewed Modesto's capacity reporting table and discussion and finds that Modesto has planned for sufficient resources to maintain a reliable electric system. Modesto selected portfolio of resources contains sufficient capacity to meet anticipated resource adequacy requirements in 2030. The 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).

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

System Reliability

Modesto works to maintain a safe and reliable electric grid by meeting electric reliability and resource adequacy standards. Modesto is a distribution utility that is part of the Balancing Authority of Northern California (BANC) balancing authority (BA), which is responsible for continuously balancing supply and demand for electricity within its area and between other balancing authorities.[14] BAs must also meet technical and operating standards established by the Western Electricity Coordinating Council (WECC) to ensure reliability.[15] Even though Modesto is a member of BANC, it still must provide for its own reserve energy requirements to cover unforeseen events, including a share of generating plants and transmission lines. Modesto evaluates the electric transmission system annually to assess its compliance with North American Electric Reliability Corporation (NERC) and WECC standards, as well as evaluating its general reliability and operational flexibility.

Modesto uses the commonly accepted one day in ten years (1-in-10) loss of load standard to define its resource adequacy needs. This standard ensures that Modesto should have sufficient generation and demand response resources to meet system peak load in all but one occasion in any ten-year period. Modesto's IRP includes a 15 percent planning reserve margin, with surplus generation capacity available to meet system contingencies such as the loss of a generator or transmission outage. Modesto did not identify any specific local capacity needs or requirements for flexible resources.

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 Modesto's IRP adequately plans to maintain and enhance its transmission and distribution systems. Staff finds Modesto has planned for enough transmission to deliver resources to its service area to meet the requirement as 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.

Each year Modesto performs a study of the electric transmission system to assess its general reliability and operational flexibility. Its five-year plan, updated annually, assesses both the transmission (69 kV – 230 kV) and distribution (6.9 kV – 21 kV) systems, with a focus on meeting system peak demand.

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14 BANC is a Joint Powers Authority that contracts with SMUD for operations of the BA and BANC members have an ownership voice in all BA decisions consistent with the principle of maximizing customer value.

15 WECC establishes reserve criteria to ensure reliability in the event of contingencies such as equipment failures and natural disasters.

Transmission System

Modesto, along with other northern California cities and utilities, is a member of the Transmission Agency of Northern California (TANC), a joint powers agency. NCPA, Pacific Gas & Electric (PG&E), Western Area Power Administration and other participants own the California-Oregon Transmission Project (COTP), a 1,600 MW, 550 kV transmission project that delivers electricity between southern Oregon and central California. Modesto has rights to 320 MW of firm capacity southbound and 314 of firm capacity northbound. PG&E also provides bidirectional transmission service connected to the COTP under the "South of Tesla Principles" agreement that gives Modesto 102 MW of firm capacity. These firm transmission rights allow Modesto to access power from the Pacific Northwest.

Modesto has several other bulk transmission facilities including:

- Westley Transmission State: a 230 kV transmission station jointly owned with Turlock Irrigation District
- Rosemore and Parker 230 kV transmission substations
- Standiford, Santa Cruz, and Claus 115 kV transmission substations.

Modesto's most recent transmission assessment demonstrates that its transmission system meets all NERC and WECC standards. The assessment identified areas of the system where improvements should be made including:

- 230 and 115 kV Relay Protection Coordination Study
- Lapham Claus 69 kV Line Rating Upgrade
- Westley Station replacement of three 230 kV circuit breakers
- 30-Minute Emergency Ratings for 115 kV Import Lines 7 & 8.

Distribution System

Modesto's distribution system consists of over 1,000 miles of distribution lines and 35 distribution substations over a 561 square mile service territory. Its traditional 12 kV distribution system includes all of Modesto and the surrounding communities of Empire, Waterford, and Salida. Modesto also serves portions of the cities of Riverbank at 12 kV and Ripon, Escalon, and Oakdale at 17 kV and the community of Mountain House at 21 kV. Modesto's six planning areas are defined by electric boundaries that limit load transfers, with substations in each area adjacent to each other so they provide back up.

Modesto conducts annual distribution planning for a five year period in which multiple capital projects are scheduled including constructing new substations, reconductoring underground feeder getaways,[16] and protective relay replacements. Several distribution enhancement projects are expected between now and 2023.

16 Distribution feeder circuits are the connections between output terminals of distribution substations and input terminals of primary circuits. The distribution feeder circuit conductors leave the substation from a getaway (circuit breaker or circuit recloser) via underground cables.

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 Modesto's IRP filing to determine the extent to which they are minimizing local air pollutants with a priority on disadvantaged communities. Staff finds that Modesto has made efforts to address these issues in selecting the resources to include in its portfolio consistent with the requirement.

In Modesto's service area roughly 35 percent of the residents live within disadvantaged communities.[17] Modesto recognizes that barriers to investment in energy efficiency by low income households stem primarily from cash flow concerns (where energy costs often compete with other necessities) and lack of available credit. In addition, many residents in disadvantaged communities are renters who depend on the willingness of landlords to make investments. Modesto offers a discounted rate for low income customers Community Alternative Rate for Electric Service that reduces the fixed monthly charge from $20 to $8 and applies a 23 percent discount of the first 850 kWh of energy used each moth for a period of up to three years. Modesto offers a weatherization program to rental or owner occupied low-income customers that can include replacement of broken windows, refrigerator, microwave, swamp coolers and installation of insulation, sunscreens and weather stripping.

As discussed in the section on Transportation Electrification on page 19. Modest has a low penetration of electric vehicles (EVs), largely due to the high poverty rate. About 18 percent of the population in Modesto live below the poverty lines, which is higher than the national average of 14 percent. Similar to energy efficiency, a high percentage (35 percent) of residents living in disadvantaged is also a barrier to EV adoption. At this time, Modesto does not provide incentives to customers who purchase EV. Modesto is considering rate option, including time differentiated rates, for qualified EVs and may develop incentives such as rebates for charging equipment and its installation.

Net Energy Demand in Peak Hours

PUC Section 9621(c) requires POUs to consider existing renewable generation, grid operation efficiency, energy storage, distributed energy resources, and energy reduction measures (such as energy efficiency and demand response) to reduce the need for new or additional gas-fired generation and distribution and transmission resources. Modesto's IRP includes a discussion of how preferred resources contribute to meeting their peak demand, including an evaluation of distributed energy resources (DERs) contribution to peak shaving capacity. Modesto's DER programs evaluated include behind the meter solar, electric vehicles, and energy efficiency. The contribution of

17 Modesto summed the number of residents in disadvantaged communities defined by CalEPA (CalEnviroScreen) and divided by total residents in the census tracts served.

these programs to net system demand is expected to grow from 60 MW in 2019 to 91 MW in 2030. This is consistent with the requirement that filing POUs address how they can meet peak hour demand with renewable and other preferred resources.

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 below. The resource adequacy provisions of this code Section are discussed in System and Local Reliability Section on pages 14 through 15.

Energy Efficiency and Demand Response Resources

Staff finds that the Modesto IRP is consistent with the requirement in PUC Section 9621(d)(1)(A), as they include a discussion of energy efficiency and demand response programs they plan to implement and quantifies the amount of energy efficiency savings they plan to achieve. Modesto's planned energy efficiency estimates are stated below, in **Table 4**. Modesto notes that poverty and the minimal supply of affordable housing present barriers to investment in energy efficiency. Modesto offers a weatherization program that provides energy efficient measures to qualifying rental or owner occupied low-income customer homes. These measures may include the replacement of broken windows, refrigerator, microwave, swamp coolers, and the installation of insulation, sunscreens, weather-stripping, and other repairs. Modesto manages a voluntary demand response program called Shave the Energy Peak (STEP) for residential customers, who receive a device on their air conditioner that allows Modesto to cycle off the air conditioner at peak times during hot summer months.

Energy Storage

Staff finds that the Modesto 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) requires POUs to evaluate the potential of energy storage systems as a resource and establish procurement targets.

Modesto did not adopt mandatory energy storage procurement targets, but plans to encourage developers to offer stand-alone energy storage systems or hybrid energy storage components in response to future RPS solicitations.

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

	AAEE (GWh)	SB 350 targets (GWh)
2018	-[18]	49
2019	-	59
2020	136	70
2021	142	82
2022	147	95
2023	152	108
2024	157	122
2025	161	136
2026	165	149
2027	168	161
2028	170	172
2029	171	182
2030	173	

Source: California Energy Commission, Assessments Division, based on Modesto 2019 IPR filing

Transportation Electrification

Staff finds the Modesto IRP is consistent with the requirement of PUC Section 9621(d)(1)(C), as it addresses transportation electrification, primarily for light-duty vehicles. Modesto's demand and energy forecast incorporates the electric vehicle forecast and assumptions from the Energy Commissions Light Duty Plug-In Electric Vehicle Energy and Emission Calculator. By the end of 2030, the projected electric vehicle charging load is expected to be 19 GWh, with an annual growth rate of 18 percent. Modesto's share of the Energy Commission's estimated 3 million electric vehicles in the state by 2030 is roughly 0.16 percent or about 5,000 electric vehicles.

Modesto is evaluating electric vehicle charging station installation standards for single-family homes, multifamily dwellings, and workplaces. Because of low ownership rates of electric vehicles in its service area, Modesto has no definite infrastructure development plan or grid plan for electric vehicle charging stations at this time. It also does not have a public transit or heavy-duty vehicle electrification investment plan.

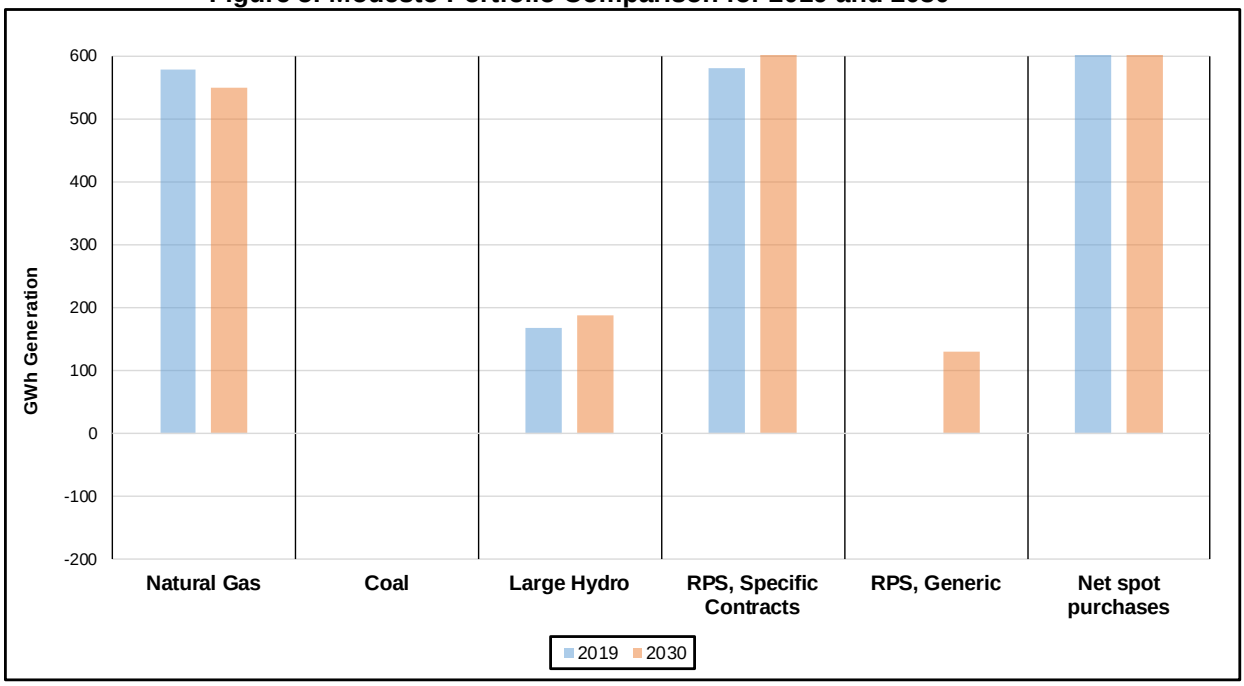
18 Modesto had already included the funds for energy efficiency programs in its 2018 and 2019 budgets and so did not consider those savings as "additional."

Residents in Modesto's service area are eligible for the Clean Vehicle Rebate Project administered by the California Air Resources Board. The program promotes clean vehicle adoption in California by offering rebates of up to $7,000 for the purchase or lease of new, eligible zero-emission vehicles, including electric, plug-in hybrid electric and fuel cell vehicles. Although Modesto does not sponsor electric vehicle incentive programs for disadvantaged communities, the Clean Vehicle Rebate project offers high rebates for consumers with household incomes less than or equal to 300 percent of the federal poverty level.

Portfolio Diversification

PUC Section 9621(d)(1)(D) requires that POUs address the procurement of a diversified portfolio of resources consisting of both short-term and long-term electricity and electricity-related and demand-response products. Based on staff's review of Modesto's existing resources, its portfolio analysis, and the selection of resource additions in its IRP, staff concludes that the utility has fulfilled this requirement. **Figure 5** shows a comparison of the energy mix by resource in Modesto's preferred portfolio in 2019 and 2030.

Figure 5: Modesto Portfolio Comparison for 2019 and 2030



Source: California Energy Commission, Energy Assessments Division, based on Modesto 2019 IRP filing Energy Balance Table

ACRONYMS

Acronym	Term
AAEE	Additional achievable energy efficiency
AAPV	Additional achievable photovoltaic
Barriers Study	Low-Income Barriers Study, Part A: *Overcoming Barriers to Energy Efficiency and Renewables for Low-Income Customers and Small Business Contracting Opportunities in Disadvantaged Communities*
California ISO	California Independent System Operator
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
MT	Thousand metric tons
MMT	Million metric tons
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)

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 (or on the customer's side of the meter) PV developed as a result of the requirement in the California Building Standards that new home construction include solar PV as of January 1, 2020.

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

Behind the meter resources: A renewable energy generating system that produces power intended for on-site use in a home, office building, or commercial facility. A behind the meter resource is behind the utility's meter and on the side of the customer's meter.

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

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

Demand forecast: A forecast of electricity demand served by the electric grid, measured by peak demand and energy consumption. 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 its compliance obligation in the next compliance period. Excess balance can include excess procurement, historic carryover, or purchased RECs that have not been retired.

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

Historic Carryover: Electricity from qualifying renewable energy resources from January 1, 2004, through December, 31, 2010, that was in excess of 2004-2010 RPS procurement targets that was not otherwise applied to another state RPS program or a

voluntary program. This historic carryover may be applied to a POUs procurement requirements for Compliance Period 1 or any subsequent compliance period.

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

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

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 systemwide demand is greatest. Noncoincident peak demand is referred to as "peak demand" throughout these guidelines.

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

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

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

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

Retail sales: Electricity consumption after accounting for behind-the-meter onsite generation, including storage charge and discharge. It indicates the net energy delivered through the meter to the customer and thus excludes any generation or procurement in satisfaction of firm wholesale commitments (for example, 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, 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			2,601,375	2,615,832	2,632,436	2,648,764	2,649,437	2,665,095	2,683,735	2,702,442	2,722,018	2,743,564	2,763,692	2,783,429
Non-RPS Resources	Woodland1	Natural Gas	34,826	109,499	49,574	20,168	109,337	51,800	42,096	102,378	78,077	92,876	98,771	114,371
	Woodland2	Natural Gas	327,555	279,978	363,106	357,827	272,505	353,970	354,875	276,318	323,777	308,546	246,073	296,069
	Woodland3	Natural Gas	66,302	65,787	61,523	81,156	56,281	42,594	33,499	48,102	38,193	23,872	22,109	63,701
	Ripon1	Natural Gas	15,580	12,371	13,139	10,743	7,292	11,404	6,126	10,779	12,575	23,611	48,939	33,933
	Ripon2	Natural Gas	6,991	4,752	5,136	5,373	2,875	3,355	3,942	5,710	7,413	7,131	23,398	28,052
	McClure1	Natural Gas	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
	McClure2	Natural Gas	1,827	1,827	1,827	1,803	1,827	1,827	1,827	1,827	1,827	1,827	1,827	1,827
	DON PEDRO	Large Hydroelectric	153,809	153,809	175,000	153,809	153,809	153,809	153,809	175,000	153,809	175,000	175,000	175,000
	San Juan	Coal	0	0	0	0	0	0	0	0	0	0	0	0
	Lodi Energy Center	Natural Gas	123,453	115,293	106,348	101,481	87,425	78,749	60,697	48,060	39,760	30,796	14,874	8,892
	WAPA CVP	Large Hydroelectric	13,400	13,400	13,400	13,400	13,400	13,400	13,400	13,400	13,400	13,400	13,400	13,400
	CCSF	Large Hydroelectric	0	0	0	0	0	0	0	0	0	0	0	0
	ACS Specified Energy	Unspecified/System I	219,022	0	0	0	0	0	0	0	0	0	0	0
	Zero Emission Source Specified Energy	Unspecified/System I	256,800	256,800	0	0	0	0	0	0	0	0	0	0
	Spot Purchases	N/A	1,244,019	1,246,802	1,196,679	1,240,335	1,264,581	1,258,202	1,289,010	1,150,999	1,175,914	1,180,952	1,217,699	1,282,544
	Spot Sales	N/A	268,445	230,596	203,379	184,945	168,716	152,942	126,963	112,799	104,331	94,585	78,580	72,167
RPS resources	Stone Drop	Small Hydroelectric	700	700	700	700	700	700	700	700	700	700	700	700
	BigHorn	Wind	63,960	63,961	63,960	63,961	63,961	63,961	63,961	63,961	63,961	63,961	63,961	63,960
	BigHornII	Wind	81,688	81,312	81,521	81,357	81,698	81,384	81,576	81,282	81,562	81,550	81,712	81,250
	Fiscalini	Biofuels	2,400	2,400	2,400	2,392	2,400	2,400	2,400	2,400	2,400	0	0	0
	McHenry Solar	Solar PV	64,746	64,746	64,746	64,746	64,746	64,746	64,746	64,746	64,746	64,746	64,746	64,746
	StarPoint	Wind	238,313	237,662	237,814	237,142	237,481	238,834	238,807	238,212	238,417	237,217	237,786	90,599
	Blythe4	Solar PV	-	6,618	183,500	183,500	183,500	183,500	183,500	183,500	183,500	183,500	183,500	183,500
	High Winds	Wind	109,026	109,026	109,026	109,026	109,026	109,026	109,026	109,026	109,026	49,403	0	0
	Loyalton	Biofuels	6,970	6,970	6,970	6,970	2,291	0	0	0	0	0	0	0
	Mustang2	Solar PV	-	72,701	146,775	146,775	146,775	146,775	146,775	146,775	146,775	146,775	146,775	146,775
	New Hogan	Small Hydroelectric	9,674	9,674	9,674	9,674	9,674	9,674	9,674	9,674	9,674	9,674	9,674	9,674
	SB859 Biomass	Biofuels	3,878	3,878	3,878	3,878	3,878	0	0	0	0	0	0	0
	Future Solar	Solar PV	0	0	0	0	0	0	0	276,268	276,268	276,268	276,268	423,043
	Future Base Load Renewable	Biofuels	0	0	0	0	0	0	0	0	0	0	131,040	131,040
	Future Wind	Wind	0	0	0	0	0	0	0	0	0	130,847	130,847	130,847
Total Energy		N/A	2,649,447	2,664,249	2,674,039	2,691,993	2,692,148	2,708,738	2,725,053	2,741,112	2,762,237	2,781,638	2,802,454	2,816,915
Surplus/Shortfall		N/A	48,072	48,417	41,603	43,229	42,711	43,643	41,318	38,670	40,219	38,074	38,762	33,486

Source: California Energy Commission, Energy Assessments Division, based on Modesto 2019 IRP filing

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

		Technology	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Peak Demand			663	665	668	670	671	673	675	678	678	683	686	689
Planning Reserve Margin			99	100	100	101	101	101	101	102	102	103	103	103
Peak Procurement Requirement			762	765	768	771	772	774	776	780	780	786	789	792
Non-RPS Resources	Woodland1	Natural Gas	45	45	45	45	45	45	45	45	45	45	45	45
	Woodland2	Natural Gas	83	83	83	83	83	83	83	83	83	83	83	83
	Woodland3	Natural Gas	49	49	49	49	49	49	49	49	49	49	49	49
	Ripon1	Natural Gas	50	50	50	50	50	50	50	50	50	50	50	50
	Ripon2	Natural Gas	50	50	50	50	50	50	50	50	50	50	50	50
	McClure1	Natural Gas	54	54	54	54	54	54	54	54	54	54	54	54
	McClure2	Natural Gas	54	54	54	54	54	54	54	54	54	54	54	54
	DON PEDRO	Large Hydroelectric	62	51	62	62	62	62	62	62	62	62	62	62
	San Juan	Coal	0	0	0	0	0	0	0	0	0	0	0	0
	Lodi Energy Center	Natural Gas	30	30	30	30	30	30	30	30	30	30	30	30
	WAPA CVP	Large Hydroelectric	0	0	0	0	0	0	0	0	0	0	0	0
	CCSF	Large Hydroelectric	0	0	0	0	0	0	0	0	0	0	0	0
	ACS Specified Energy	Unspecified/System	24	0	0	0	0	0	0	0	0	0	0	0
	Zero Emission Source Specified Energy	Unspecified/System Power	48	48	0	0	0	0	0	0	0	0	0	0
	Short Term Capacity Contracts	Unspecified/System	271	103	107	109	16	20	24	12	0	0	0	0
	Future ACS Specified Resource	Unspecified/System Power	0	0	24	24	24	24	24	24	24	24	24	24
	Future Unspecified Resourc	Unspecified/System	0	0	24	24	24	24	24	24	24	24	24	24
RPS resources	Stone Drop	Small Hydroelectric	0	0	0	0	0	0	0	0	0	0	0	0
	BigHorn	Wind	5	5	5	5	5	5	5	5	5	5	5	5
	BigHornII	Wind	3	3	3	3	3	3	3	3	3	3	3	3
	Fiscalini	Biofuels	1	1	1	1	1	1	1	1	1	0	0	0
	McHenry Solar	Solar PV	23	23	23	23	23	23	23	23	23	23	23	23
	StarPoint	Wind	21	21	21	21	21	21	21	21	21	21	21	0
	Blythe4	Solar PV	0	0	59	59	59	59	59	59	59	59	59	59
	High Winds	Wind	0	0	0	0	0	0	0	0	0	0	0	0
	Loyalton	Biofuels	1	1	1	1	0	0	0	0	0	0	0	0
	Mustang2	Solar PV	0	48	48	48	48	48	48	48	48	48	48	48
	New Hogan	Small Hydroelectric	0	0	0	0	0	0	0	0	0	0	0	0
	SB859 Biomass	Biofuels	1	1	1	1	1	0	0	0	0	0	0	0
	Future Solar	Solar PV	0	0	0	0	0	0	0	93	93	93	93	140
	Future Base Load Renewable	Biofuels	0	0	0	0	0	0	0	0	0	0	15	15
	Future Wind	Wind	0	0	0	0	0	0	0	0	0	0	0	0
Total Capacity Procured			**874**	**718**	**744**	**746**	**652**	**656**	**660**	**648**	**636**	**635**	**635**	**614**
Surplus/Shortfall			**111**	**-47**	**24**	**24**	**-71**	**-70**	**-69**	**9**	**-3**	**-10**	**2**	**25**

Source: California Energy Commission, Energy Assessments Division, based on Modesto 2019 IRP filing

Table B-3: GHG Emissions From Modesto's Resource Portfolio, All Years

	Fuel Type	GHG Intensity (mt CO_2e/ MWh)	Total Emissions (MT CO_2e)											
			2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Woodland1	Natural Gas	0.488	17	53	24	10	53	25	21	50	38	45	48	56
Woodland2	Natural Gas	0.457	150	128	166	164	125	162	162	126	148	141	112	135
Woodland3	Natural Gas	0.445	30	29	27	36	25	19	15	21	17	11	10	28
Ripon1	Natural Gas	0.562	9	7	7	6	4	6	3	6	7	13	28	19
Ripon2	Natural Gas	0.562	4	3	3	3	2	2	2	3	4	4	13	16
McClure1	Natural Gas	1.103	3	3	3	3	3	3	3	3	3	3	3	3
McClure2	Natural Gas	0.804	1	1	1	1	1	1	1	1	1	1	1	1
San Juan	Large Hydroelectric	1.083	0	0	0	0	0	0	0	0	0	0	0	0
Lodi Energy Center	Coal	0.39	48	45	41	40	34	31	24	19	16	12	6	3
ACS Specified Energy	Unspecified/System Power	0.012	3	0	0	0	0	0	0	0	0	0	0	0
Future ACS Specified Resource	Unspecified/System Power	0.012	0	1	3	3	3	3	3	3	3	3	3	3
Future Unspecified Resource	Unspecified/System Power	0.428	0	39	94	94	94	94	94	94	94	94	94	94
Spot market purchases	system	0.428	532	534	512	531	541	539	552	493	503	505	521	549
Spot market sales	system	0.428	(115)	(99)	(87)	(79)	(72)	(65)	(54)	(48)	(45)	(40)	(34)	(31)
Emissions adjustments	Undelivered RPS energy	NA	(57)	(91)	(201)	(201)	(199)	(196)	(196)	(262)	(262)	(294)	(332)	(397)
Portfolio emissions	portfolio	NA	625	653	594	610	613	622	629	509	527	498	473	480

Source: California Energy Commission, Energy Assessments Division, based on Modesto 2019 IRP filing

ATTACHMENT I:
Public Utilities Code for SB 350

PUBLIC UTILITIES CODE - PUC

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

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

9621.

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

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

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

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

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

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

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

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

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

(C) Transportation electrification.

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

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

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

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

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

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

PUBLIC UTILITIES CODE - PUC

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

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

PART 1. PUBLIC UTILITIES ACT [201 - 2120]

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

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

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

ARTICLE 1. Rates [451 - 467]

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

454.52.

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

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

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

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

(D) Minimize impacts on ratepayers' bills.

(E) Ensure system and local reliability.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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