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STAFF REPORT

Review of Turlock Irrigation District 2023 Integrated Resource Plan

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ABSTRACT

Senate Bill 350 (De León, Chapter 547, Statutes of 2015), established Public Utilities Code Section 9622, which 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. Turlock Irrigation District submitted its Integrated Resource Plan and supplemental information for review on March 8, 2024. This staff paper presents the results of the California Energy Commission staff review of the *Turlock Irrigation District 2023 Integrated Resource Plan*.

Keywords: Publicly owned utility, integrated resource plan, Turlock Irrigation District, TID, demand, resources, portfolio, generation, transmission, distribution, Renewables Portfolio Standard, forecast, energy efficiency, transportation electrification, demand response, greenhouse gas, GHG, emissions, system reliability

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EXECUTIVE SUMMARY

Senate Bill 350 (De León, Chapter 547, Statutes of 2015) requires publicly owned utilities with annual electrical demand exceeding 700 gigawatt-hours to adopt integrated resource plans that meet certain requirements, targets, and goals, including greenhouse gas emission reduction targets and renewable energy procurement requirements identified in Public Utilities Code Section 9621.

The California Energy Commission's (CEC) *Publicly Owned Utility Integrated Resource Plan Submission and Review Guidelines* require the utilities to file an integrated resource plan with data and supporting information sufficient to demonstrate that they meet these requirements as well as the targets and planning goals from 2018 to 2030. Pursuant to PUC Section 9622, the CEC must review the integrated resource plans for consistency with the requirements of Public Utilities Code Section 9621.

Turlock Irrigation District is the first irrigation district formed in California. It is a publicly owned utility managed by locally elected board members who have the decision-making authority to act on the current and future needs of the district for the benefit of their customers and community. Turlock Irrigation District electric utility territory covers parts of Stanislaus, Tuolumne and Merced Counties in Central California. The district is also the balancing authority for its territory and for Merced Irrigation District.

Turlock Irrigation District plans to meet the 2030 goals requiring a 60 percent Renewables Portfolio Standard and 40 percent reduction of greenhouse gas emissions compared to 1990 levels. The district plans to meet these goals with a diverse and flexible resource portfolio by employing current energy technologies to minimize risk, while positioning to capitalize on emerging technologies should more advantageous opportunities arise. The district's resource planning process includes a focus on decarbonization strategies while meeting statutory and regulatory requirements for reliability, greenhouse gas emissions, renewable portfolio standard requirements, transportation electrification, and energy efficiency.

In reviewing *2023 Turlock Irrigation District's IRP* and determining consistency with the requirements of Public Utilities Code Section 9621, CEC staff relied on the four standardized reporting tables and narrative descriptions in the integrated resource plan filing, as well as analysis and verification of the materials submitted. Staff presents the following conclusions in accordance with the requirements:

- *Achieving Greenhouse Gas Emissions Targets and Renewables Portfolio Standard Requirements:* The district plans to meet the greenhouse gas emission reduction requirements of Public Utilities Code Section 9621(b)(1), and the renewable energy procurement requirement of Public Utilities Code Section 9621(b)(2). The filing shows great progress by 2030 toward zero-carbon emissions and plans for greenhouse gas emissions below the target range set by the California Air Resources Board. The district expects to achieve its greenhouse gas goals supporting energy efficiency, adding solar

PV, wind, geothermal and hydro generation and reducing gas generation. The district has been in negotiations with an unnamed developer for 94 MW of new solar PV paired with battery energy storage to be online in 2026. The district plans to upgrade generating units at Don Pedro Dam during 2025 through 2028 to add 41 MW of new zero-emission hydro generating capacity. Other specific projects to meet resource procurement goals during the planning period are to be determined.

- *Meeting Planning Goals:* The district intends to meet planning goals related to retail rates, reliability, transmission and distribution systems, as set forth in Public Utilities Code Section 9621(b)(3). The integrated resource plan demonstrates consideration for minimizing costs and other goals over the planning period while maintaining its competitive rates. The district plans for adequate generation to meet capacity requirements and considers the impacts of the various options on the district's transmission and distribution systems. The district's current rates are lower on average than comparable utilities. The district anticipates based on modeling that current distribution, transmission and local generation will be adequate to maintain reliability considering the load growth expected through 2030 but anticipates the need to add capacity after 2030.
- *Considering Peak Needs:* The district has considered the role of existing renewable generation, grid operational efficiencies, energy storage, energy efficiency and distributed resources 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). In addition to addressing the peak needs of the district as a utility, the integrated resource plan addresses the district duties as a balancing authority to ensure grid reliability during normal and abnormal conditions. The district's modeling for 2023 integrated resource planning indicates sufficient existing capacity to respond to the district's balancing authority reserve requirements through 2030.
- *Addressing Resource Procurement Types:* The district 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). The district expects to exceed its individual energy efficiency doubling goal by 2030. To meet the energy efficiency goals, the district has several programs, including incentives for replacing non-residential and commercial lighting with light-emitting diodes and for upgrading HVAC systems. It has a power purchase agreement to add solar PV paired with battery energy storage in 2026 and is upgrading capacity of the Don Pedro Dam starting in 2025. The district also plans to add new renewable generation resources after 2026 with unspecified projects. In general, the integrated resource plan demonstrates a strategy to add a mixture of firm and non-firm resources including solar, wind, firm geothermal, firm hydroelectric and energy storage while reducing the output of its gas generation facilities over the planning period.

CHAPTER 1:

Demand Forecast and Procurement

Introduction

Senate Bill 350 (De León, Chapter 547, Statutes of 2015) requires publicly owned utilities (POU) with an annual electrical demand exceeding 700 gigawatt-hours to develop integrated resource plans (IRPs).¹ IRPs are electricity system planning documents that describe how utilities plan to meet their energy and capacity resource needs while achieving policy goals and mandates, meeting physical and operational constraints, and fulfilling other priorities such as reducing impacts on customer rates. SB 350 requires the governing board of a POU to adopt an IRP and a process for updating it at least once every five years starting no later than January 1, 2019.² The Turlock Irrigation District (TID) filed its initial IRP with the CEC on April 24, 2019, and was deemed compliant by the CEC in August of 2019.

Public Utilities Code (PUC) Section 9622 requires the California Energy Commission (CEC) to review POU IRPs to ensure they achieve PUC Section 9621 provisions. If the CEC determines an IRP is inconsistent with the requirements of PUC Section 9621, the CEC shall provide recommendations to correct the deficiencies. The CEC adopted the *Publicly Owned Utility Integrated Resource Plan Submission and Review Guidelines (Guidelines)* to govern the submission and review of the POUs' IRPs.³

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

Turlock Irrigation District

Turlock Irrigation District (TID) is a POU managed by locally elected board members who have the decision-making authority to act on the current and future needs of the district for the benefit of their customers and community.⁴ TID is the first irrigation district formed in California. TID provides electric service for 240,000 customers within 662 square miles of Stanislaus, Merced, and Tuolumne Counties, and irrigation service for 4,700 accounts covering

1 Public Utilities Code § 9621.

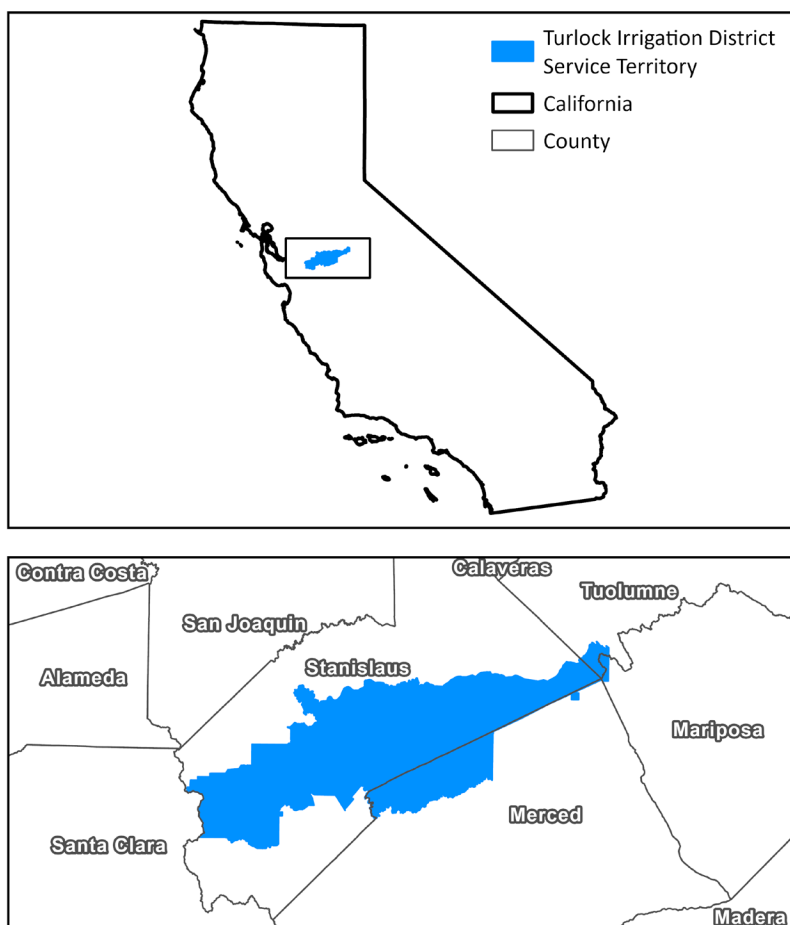
2 Public Utilities Code § 9621(b).

3 CEC. October 2018. [Publicly Owned Utility Integrated Resource Plan Submission and Review Guidelines, 2nd ed.](https://efiling.energy.ca.gov/GetDocument.aspx?tn=224889&DocumentContentId=55481) Chapter 2.E.1. <https://efiling.energy.ca.gov/GetDocument.aspx?tn=224889&DocumentContentId=55481>.

4 TID. [2023 Annual Report](https://www.tid.org/wp-content/uploads/2024/08/TID_2023-Annual-Report.pdf). https://www.tid.org/wp-content/uploads/2024/08/TID_2023-Annual-Report.pdf

146,800 acres.⁵ In addition to providing utility services to its customers, TID is the balancing authority (BA) for its territory. TID has Power Sales Agreement with the Merced Irrigation District (MID) to provide the power to meet MID's loads, and an Interconnection and Transmission Service Agreement to provide BA services for MID, which includes firm transmission, balancing authority, interconnection, reactive power and ancillary services.⁶ As a utility, TID is responsible for operating its distribution system and providing reliable power to its customers. As a BA, TID is responsible for reliably operating the bulk transmission interconnected to its system and balancing loads and resources in real time.

Figure 1: Map of Turlock Irrigation District Service Territory



Source: California Energy Commission

⁵ [TID History](https://www.tid.org/about-tid/tid-history). <https://www.tid.org/about-tid/tid-history>.

⁶ [Merced Irrigation District Annual Budget Fiscal Year 2025](https://mercedid.org/wp-content/uploads/2024/04/FY-2025-Budget-Book-Final-1.pdf). <https://mercedid.org/wp-content/uploads/2024/04/FY-2025-Budget-Book-Final-1.pdf>

TID Planning Process

The *Turlock Irrigation District 2023 Integrated Resource Plan (2023 TID IRP)* serves as their foundational planning strategy to deliver safe, reliable electricity service to their customers while maintaining stable, just, reasonable, and affordable rates and meeting all pertinent local, state, and federal requirements. The IRP was developed by TID staff and consultants through a transparent process and was approved by the locally elected TID Board of Directors in a public meeting, March 5, 2024.⁷ The IRP does not address details about MID integrated resource planning.

Energy and Peak Demand Forecast, Method and Assumptions

The *Guidelines* identify the need for a forecast of energy and peak demand to determine whether a POU's IRP is consistent with the requirements of PUC Section 9621.⁸ The *Guidelines* also state that the POU must provide information on the method used in developing the demand forecast if a POU uses a forecast other than the CEC's adopted demand forecast.⁹ The demand forecast and supporting information provided present an adequate representation of future energy and peak demand that meets the *Guidelines* requirements.

TID used an econometric model to forecast net energy consumption and net peak demand based on three growth scenarios: base, high growth, and low growth. For each growth scenario, the model considers four temperature scenarios: the 1-in-2 year temperature scenario and three temperature scenarios for peak demand under 1-in-5, 1-in-10, and 1-in-100 year events. The projected gross demand, minus the projected distributed generation and energy efficiency savings, result in the forecasted net demand for TID's energy consumption in megawatt-hours (MWh) and peak load in megawatts (MW).

TID fit their linear regression models to energy and peak demand based on historical inputs. The historical information used in the TID forecasts includes data on customers and energy consumption; loads and coincidence factors¹⁰; distribution losses; temperatures; employment; income; population; consumer price index; delivered natural gas prices to consumers; and the

7 TID. [Mar 05, 2024 Board Meeting - 03-05-24 - Turlock Irrigation District, CA](https://tid.new.swagit.com/videos/299009).
<https://tid.new.swagit.com/videos/299009>.

8 POU IRP Guidelines, Chapter 2, E., pgs. 5–6.

9 Given the timing of these POU IRP submittals the adopted forecast vintage is the 2022 CED Update. [California Energy Demand Update, 2022-2035](#).

10 Coincidence factors in demand forecasting indicate the fraction of a population's peak load that is operating during the system peak. For example, if a population's load peaks at the same time as the system peak the coincidence factor would be 1, which is the maximum value possible for a coincidence factor.

installations, capacity and generation profiles of customer solar. Once fit with historical information, TID refined the models using these projections:

- Natural gas prices from S&P Global and other broker data
- Solar growth profiles from the Energy Information Agency (EIA), the most recent CEC 2021 – 2035 Mid Demand Case forecast, and S&P Global
- Cumulative energy efficiency savings and demand reduction from the GDS Associates proprietary energy efficiency model
- Electric vehicle (EV) growth and associated energy consumption from CEC’s zero-emission vehicle (ZEV) load growth forecast

TID’s peak load was 597 MW in summer 2023. TID anticipates 4.3% energy and peak load growth from 2023 to 2030, which is higher than TID’s historical average growth due largely to the anticipated growth of EVs and customer population. By 2030, TID projects monthly energy consumption to approach 280,000 MWh during the summer months and 160,000 MWh during the winter months, with a summer peak load of 623 MW. Staff compared TID’s energy and peak demand forecast to the Energy Commission’s 2022 Demand Forecast Update report and found the TID demand forecast to be higher than the CEC 1-in-2 forecast but within a similar range.

Resource Procurement Plan

The *Guidelines* require that POU report the mix of resources they plan to use to meet demand through 2030.¹¹ POU are also required to provide an IRP with data and supporting information sufficient to demonstrate that the POU’s plan to meet the various targets and goals. Staff has determined that the *2023 TID IRP* filing meets these requirements. The following is a discussion of the utility’s existing resources, procurement strategy, the portfolio analysis underlying resource selections, and the resources in 2030 identified in the standardized reporting tables.

Existing Resources

TID has a diverse range of resources in its existing portfolio. It owns four thermal gas generation facilities: the 49.6 MW Walnut, 48 MW Almond I, 174 MW Almond II, and 250 MW Walnut Energy Center projects. TID owns six renewable facilities: the 137 MW Tuolumne Wind Project; 6 MW Dawson, 1 MW Hickman, 5 MW La Grange and 3 MW Turlock Lake small hydroelectric facilities; and a 7 MW share of the Geysers Geothermal Powerplant. TID also owns a 139 MW portion of the Don Pedro Dam, which is a zero-carbon resource but not a Renewable Portfolio Standard (RPS) resource. The district has a 54 MW power purchase agreement (PPA) with the renewable Rosamond West Solar 2 project, and a 4 MW PPA with

11 POU IRP Guidelines, Chapter 2.F., pg. 6.

the Western Area Power Administration (WAPA) for zero-carbon resources. TID also has ownership or committed energy from four mini-hydroelectric plants: Fairfield, Parker, Frankenheimer, and Woodward.

TID supplements their resources with purchases from other utilities and the California Independent System Operator (California ISO) and other markets when the cost is less than generation from one of their gas plants. The district also has partial ownership in the California-Oregon Transmission Project to access power markets in the northwestern states.

Resource Portfolio Evaluation

TID submitted standard tables for the Forecast Total Peak-Hour 1-in-2 Demand scenario. TID expects to fully meet its capacity requirements in the out years, including a 15 percent planning reserve margin (PRM). For 2023, 2024 and 2025, TID expects planned capacity to fall short of the PRM by 10 MW, 15 MW and 18 MW, respectively, to be met with short-term capacity purchases. The capacity planning shortfalls would be about 1 percent of TID's capacity requirement in 2023, and about 2 percent in 2024 and 2025. The *2023 TID IRP* includes the following portfolio modeling efforts:

- Resource adequacy modeling to ensure the portfolio reliably meets forecasted demand by determining a loss-of-load-probability.
- Capacity expansion modeling to ensure cost-optimal procurement type, quantity, and timing for resources to meet energy and capacity requirements.
- Production cost modeling to ensure the load-limited economic dispatch of the portfolio is meeting the specified RPS, zero-carbon, and carbon emissions targets over the planning horizon.

Procurement Strategy

TID based the IRP on proven, commercially available generation technologies, and identified emerging technologies potentially feasible during the planning horizon. As noted above, the *2023 TID IRP* falls short in meeting its PRM targets but plans to meet these small planning shortfalls with short-term procurements, which CEC staff finds reasonable.

TID plans to reduce gas generation at existing facilities while adding hydroelectric, solar PV, wind, geothermal and storage resources. In 2025 through 2028, TID plans to upgrade three turbines at the zero-emission Don Pedro large hydroelectric facility to add 41 MW of capacity. TID is currently negotiating a 94 MW PPA with a RPS eligible solar photovoltaic (PV) project paired with a battery energy storage system (BESS). TID expects the remaining additions of solar PV, wind, geothermal and storage will be met from currently unspecified projects.

In future years, TID may shift its strategy to utilize emerging technologies if they become advantageous. TID continues to monitor developments in green hydrogen, small modular reactors, long duration energy storage, pumped hydro storage, and carbon capture and sequestration. These technology options may be assessed in future IRP cycles.

CHAPTER 2:

Review for Consistency with PUC Section 9621 Requirements

This chapter summarizes the main elements of the *2023 TID IRP* and provides staff's findings regarding the consistency with PUC Section 9621 requirements, as well as the *Guidelines*. These findings include whether the utility meets greenhouse gas (GHG) emission reduction targets and RPS energy procurement requirements, as well as planning goals for retail rates, reliability, transmission and distribution systems, net load, and disadvantaged communities. In addition to the above elements, the IRP must address procurement of energy efficiency and demand response, energy storage, transportation electrification and portfolio diversification.

Greenhouse Gas Emission Reduction Targets

POUs are required to meet the GHG targets established by the California Air Resources Board (CARB), in coordination with the CEC and California Public Utilities Commission.¹² The initial GHG targets set by CARB reflect the electricity sector's percentage in achieving the economywide GHG emission reductions of 40 percent from 1990 levels by 2030. The 2030 electricity sector GHG planning target range was updated with CARB's *2022 Scoping Plan for Achieving Carbon Neutrality* adopted in September 2023.^{13,14}

The district plans to reduce its carbon emissions by increasing efficiency; adding solar PV, wind, geothermal and hydroelectric resources; and reducing gas generation. The 2030 planning target range set for TID by CARB in 2023 is 189,000-238,000 metric tons of carbon dioxide equivalent (MTCO_{2e}). TID expects GHG emissions of 60,000 MTCO_{2e} in 2030, exceeding CARB's reduction target. TID's planned GHG emissions are reported on the GHG Emissions Accounting Table in the standardized reporting tables and are summarized in **Table 1**.

12 Public Utilities Code § 9621(b)(1).

13 CARB. September 2023. [Senate Bill 350 Integrated Resource Planning Electricity Sector Greenhouse Gas Planning Targets: 2023 Update](https://ww2.arb.ca.gov/sites/default/files/2023-09/sb350-final-report-2023.pdf). <https://ww2.arb.ca.gov/sites/default/files/2023-09/sb350-final-report-2023.pdf>.

14 CARB. [2022 Scoping Plan for Achieving Carbon Neutrality](https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents). <https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents>.

Table 1: Planned TID 2030 Greenhouse Gas Emissions

Power Source	Fuel Type	GHG Intensity (MT CO ₂ e/MWh)	Total Emissions (MT CO ₂ e) 2025	Total Emissions (MT CO ₂ e) 2030
Walnut Combustion Turbine	Natural Gas	0.776	100	0
Almond 1 and 2	Natural Gas	0.527	283,700	65,900
Walnut Energy Center	Natural Gas	0.422	670,400	192,300
Tuolumne Wind Project	Wind	0	0	0
Rosamond West Solar 2	Solar PV	0	0	0
Dawson	Small Hydro	0	0	0
Hickman	Small Hydro	0	0	0
La Grange	Small Hydro	0	0	0
Turlock Lake	Small Hydro	0	0	0
Don Pedro Hydroelectric	Large Hydro	0	0	0
WAPA Contracts	Hydro	0	0	0
Mini-Hydroelectric	Mini-Hydro	0	0	0
The Geysers Geothermal	Geothermal	0	0	0
New Solar PV	Solar PV	0	0	0
New Geothermal	Geothermal	0	0	0
New Wind	Wind	0	0	0
New Li-Ion Storage	Storage	0	0	0
Net Spot Market Purchases	System	0.428	126,000	262,000
Undelivered RPS Energy adjustment	System	0.428	-216,000	-211,000
Firm Sales adjustment	System	0.428	-244,000	-249,000
Total Portfolio Emissions	NA	NA	620,000	60,000

Source: CEC, Energy Assessments Division, Based on 2023 TID IRP filing

Renewables Portfolio Standard Planning Requirements

PUC Section 9621(b)(2), as established by SB 350, requires that POU IRPs ensure procurement of at least 50 percent renewable energy resources by 2030, consistent with Article 16 (commencing with Section 399.11) of Chapter 2.3. In 2018, SB 100 (De León, Chapter 312, Statutes of 2018) increased the RPS requirement for 2030 from 50 to 60 percent by 2030.¹⁵ Staff reviewed the renewable procurement table, the discussion in the IRP filing, and the renewable procurement plan submitted. Staff finds TID's plans consistent with the

¹⁵ Public Utilities Code § 399.11(a).

RPS procurement requirements and all interim compliance periods, as well as the requirements of PUC Section 9621(b)(2).

TID's renewable procurement plans include new planned solar PV resources starting in 2026, unspecified new solar and geothermal resources starting in 2027, and unspecified new wind resources starting in 2030. TID anticipates its RPS-eligible renewables will exceed the required 60 percent of retail sales in 2030.

Retail Rates

PUC Section 9621(b)(3) requires POU's to develop IRPs that enhance each POU's ability to fulfill its obligation to serve its customers at just and reasonable rates, minimizing impacts to ratepayer bills. Staff reviewed the analysis and information TID presented in its IRP filing on the rate and bill impacts from its planned resource portfolio and finds the *2023 TID IRP* consistent with the rates discussion required in PUC Section 9621(b)(3).

TID's goal for its IRP is to optimally minimize the cost of serving load over the planning period, including the cost of thermal and renewable generation, BESS, and sales and purchases from TID's electricity trading hubs. TID's current and planned rates are below average in California. TID rates are set in a transparent process by its locally elected board of directors based on annual assessment of all revenue requirements, including implementing laws and mandates. TID plans an updated modeling effort to determine power supply costs more accurately.

System and Local Reliability

SB 350 requires filing POU's to adopt an IRP that ensures system and local reliability and addresses resource adequacy requirements.¹⁶ Staff reviewed the *2023 TID IRP* filing capacity reporting table and discussion and finds TID planned for sufficient resources to maintain a reliable electric system. TID's selected portfolio of resources also contains sufficient capacity to meet anticipated resource adequacy requirements in 2030. Staff finds this IRP is consistent with the reliability requirements in PUC Section 9621(b)(3) and resource adequacy requirements in PUC Section 9621(d)(1)(E).

TID's service territory is part of its own BA, which also provides service to the MID. As utilities, both TID and MID are required to procure sufficient resources to meet their peak loads plus reserves. As the BA, TID also must ensure the overall standards set by North American Electric Reliability Corporation and Western Electricity Coordinating Council (WECC) are met to ensure system reliability of the BA during normal and abnormal conditions. TID plans to procure sufficient resources to cover reliability requirements for TID territory and provide resources to MID through power sales and other services.

¹⁶ Public Utilities Code § 9621(b)(3); Public Utilities Code § 454.52(a)(1)(E).

TID meets its BA reserve requirements through participation in the Northwest Power Pool Reserve Sharing Group (NWPP RSG) and participates in short-term power market purchases to meet its reliability and other goals at reduced cost. TID plans to further enhance system reliability with additional procurement of firm geothermal resources, and a new demand response program to shift and reduce loads during supply shortages. TID used effective load carrying capacity analysis to assess the capacity value of non-dispatchable assets for meeting reliability needs.

Local Capacity Needs

TID's dispatchable hydroelectric and natural gas facilities are all located within its BA, enhancing its system reliability. TID has enough capacity from its local hydro and natural gas resources to meet its local capacity needs.

Flexible Capacity Needs

TID's Walnut Energy Center, Almond II Power Plant and Don Pedro Dam are expected to be online through the planning period to provide flexible capacity within its BA. TID also plans to add flexible energy storage. Although the IRP did not model sub-hourly markets associated with its participation in the Western Energy Imbalance Market (WEIM), TID plans to continue participating in WEIM for flexible resources and other benefits. TID's production cost dispatch simulations show the flexible natural gas generation, hydro generation, and storage will be sufficient to follow the net load ramps during peak periods.

Transmission and Distribution Systems

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

TID regularly assesses the need for transmission and distribution maintenance and upgrades. TID expects its current distribution, transmission and local generation will be sufficient to meet projected loads, growth of solar PV and adoptions of EVs without new transmission or distribution projects in the current IRP planning horizon.

TID continues to receive inquiries to interconnect larger solar PV facilities, although none have interconnected or committed to interconnect. TID notes National Renewable Energy Laboratory published sunlight intensity data show TID service territory to be less favorable to solar, especially compared to parts of Southern California.

TID monitors the potential impacts of customer-installed solar PV interconnected with its system and finds installations have not caused major issues on its transmission and distribution systems despite their occasional unpredictability. TID continues to monitor the growth of EVs and potential impacts to reliability. In 2022, there were approximately 2,600

EVs located in its service territory, up from only a few hundred EVs five years previously. TID expects this to double by 2030. Currently, TID has observed no substantive impact from EVs.

TID forecasts the growth in the customer-installed PV and EVs will remain dispersed in its service area and currently has no plans for transmission or distribution upgrades to address solar PV and EV impacts during the current planning period. TID continues to monitor growth of customer-installed solar PV, the potential for larger solar PV, and associated impacts to its transmission and distribution systems. TID expects there will be needs for transmission and distribution projects to support projected load growth, and the expansion of Distributed Energy Resources (DERs), transportation and building electrification loads after the 2024 through 2030 planning period.

Staff determines the *2023 TID IRP* filing demonstrates plans to maintain and enhance its transmission and distribution systems and is planning for enough transmission to adequately deliver resources to its service area to meet the requirement as discussed above. Staff also finds that the *2023 TID IRP* demonstrates progress toward increasing the capacity and reliability of its distribution system. As such, staff finds the IRP consistent with the transmission and distribution requirements set forth above.

Transmission System

TID is responsible for the bulk transmission system for its BA area and utility service area. TID owns 379 miles of transmission lines interconnected with several other transmission systems included within the TID BA, the California ISO BA, and the Balancing Authority of Northern California (BANC). TID's transmission assets provide access to participation in the NWPP RSG and wider markets. Participation in markets like WEIM helps reduce transmission and distribution system congestion and meet sub-hourly demands.

Within the TID BA, TID is directly interconnected with MID. TID is also directly interconnected with Hetch Hetchy Water and Power and Pacific Gas and Electric within the California ISO, and Modesto Irrigation District and WAPA within BANC.

TID owns part of the California-Oregon Transmission Project¹⁷ and Pacific Northwest Alternating Current intertie¹⁸ transmission, providing transmission rights to the California-Oregon Border point of sale in southern Oregon. These rights provide access to 237 MW of import capacity, mostly hydroelectric generation from the Pacific Northwest.

17 TANC. [California-Oregon Transmission Project information](https://www.tanc.us/projects/cotp/). <https://www.tanc.us/projects/cotp/>.

18 Bonneville Power Administration. [Pacific Northwest AC Intertie information](https://www.bpa.gov/-/media/Aep/transmission/ptp-service/nwaci-faq-1-18-24.pdf). <https://www.bpa.gov/-/media/Aep/transmission/ptp-service/nwaci-faq-1-18-24.pdf>.

Distribution System

TID owns approximately 2,200 miles of distribution lines and 29 substations. TID regularly plans, constructs, operates, and maintains a variety of projects and activities preserving high reliability. TID completed implementing its Advanced Metering Infrastructure in 2020, providing extensive new data for tailoring programs and aligning rate incentives to benefit customers and the overall distribution system. TID invested \$5.9 million in new distribution facilities and line upgrades in 2022. Outages in 2022 occurred less than once per customer, for 68 minutes per customer on average.

TID distribution system upgrades during the IRP planning period may include replacing equipment at end-of-life, system voltage control improvements, system capacity improvements, system load balancing improvements, new construction, and other measures. TID expects alternatives like adding solar PV paired with BESS and improved energy efficiency will also reduce the need for distribution system upgrades.

TID employs industry standard reliability measures to monitor service quality, replacing underground cables based on failure trends, prioritizing preventive equipment inspections based on reliability impacts, and refining data categorizations to better target reliability. TID also routinely practices tree trimming to keep power line paths clear.

Disadvantaged Communities and Localized Air Pollutants

The majority of TID territory is classified as either disadvantaged or low-income. TID considers keeping its rates low and service high to be a core tenet of its mission and notes its rates are some of the lowest in California. In a comparison with SMUD, MID, and Modesto Irrigation District, TID notes its rates are below the average for every rate class and lowest in 7 of the 11 rate classes. Maintaining low rates benefits all customers, which is particularly helpful in disadvantaged and low-income communities.

TID conducted surveys in 2018 and updated analysis in 2021 to assess its effectiveness serving disadvantaged and low-income communities. The assessment provided substantial insights about the TID customer base, which TID continues to use for current and future planning to maximize benefits to its customers.

TID offers several programs assisting low-income customers and disadvantaged communities, including discounts for low-income customers. TID provides rate assistance for customers needing special medical equipment, or special heating or cooling requirements due to medical conditions. TID offers a "budget billing" option allowing customers to spread their bill payments evenly throughout the year to avoid spiking during peak months. TID's weatherization program offers customers direct installations of a wide variety of energy efficiency measures free of cost.

TID is making efforts to minimize localized air pollutants and GHG emissions with early priority on disadvantaged communities, consistent with the statutory requirements of Public Utilities Code Section 454.52 (a)(1)(I) established by SB 350. TID's EV rebates for vehicle and charger

purchases are higher for low-income customers to encourage participation in disadvantaged communities. Enhanced EV adoption in disadvantaged communities benefits local air quality. TID plans on reducing fossil fuel-fired generation in TID territory during the IRP planning period, thus reducing air pollution in communities near power plants, including disadvantaged communities.

Net Energy Demand in Peak Hours

Senate Bill 338 (Skinner, Chapter 389, Statutes of 2017) requires POUs to consider an existing renewable generation portfolio, grid operation efficiency, energy storage, distributed energy resources, and energy reduction measures such as energy efficiency and demand response to reduce the need for new or additional gas-fired generation and distribution and transmission resources (PUC Section 9621(c)). Staff finds the *2023 TID IRP* consistent with these requirements.

TID anticipates peak demand to grow approximately 4.3 percent from 2023 through 2030. TID plans for meeting its peak load plus its 15 percent PRM during each year in the IRP planning period. In its planning, TID assessed 1-in-5, 1-in-10 and 1-in-100 years peak demand scenarios, and the standard 1-in-2 scenario.

The *2023 TID IRP* discusses how renewable resources, grid-operational efficiencies, customer and utility-scale energy storage, DERs, energy efficiency and demand response were considered for meeting capacity, ramping and reliability needs during the net-peak hours. TID assessed current and projected impacts of customer solar PV and EVs. TID notes it adopted a special EV rate in 2022 to promote off-peak EV charging. TID also notes its Walnut Power Plant primarily provides non-spinning reserves but generates power during peak periods to reduce power purchases when market prices are high. To meet its BA obligations during normal and abnormal grid conditions, TID participates in the NWPP RSG.

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 above.

Energy Efficiency and Demand Response Resources

CEC staff finds the *2023 TID IRP* 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 measures the amount of energy efficiency savings it plans to

achieve. TID expects 157 GWh of cumulative energy efficiency savings by 2030 compared to 2015,¹⁹ exceeding its SB 350 target of 140 GWh of cumulative savings.²⁰

TID manages a comprehensive portfolio of energy efficiency programs for home and business to support energy conservation, peak-shaving, GHG reduction, and reducing the need for distribution system upgrades. TID has spent \$25.6 million on energy efficiency programs since 2001, resulting in reduced energy consumption and emissions. TID highlights the following energy efficiency program activities:

- Non-residential lighting incentives to replace inefficient lighting with highly efficient light-emitting diodes (LEDs)
- Commercial direct-install program for qualified businesses replacing inefficient lighting with LEDs for little to no installation cost
- Home energy analysis comparing customer energy consumption with similar uses, including a web portal with an energy audit tool and energy saving tips
- Tune-up rebate to promote HVAC efficiency.

TID provides residential customers with information on their energy use on an hourly basis, and sub-hourly for non-residential customers. TID has a time of use (TOU) rate option encouraging customers to shift energy usage to off-peak hours. Currently, every TID customer is on a smart meter able to provide TOU rates. In 2022, 47 percent of TID customers had opted in to TOU rates.

TID has started installing a new customer information system with meter data management software. The smart meters and information system create a foundation for future programs to meet changing technology and customer needs, including demand response.

TID has put out a request for proposals seeking an industry expert consultant to design one or more of its first demand response programs. TID aims to implement a plan in 2024 to provide at least one demand response service to customers in 2025, with the size and type of demand response program to be determined by the consultant's design process. TID expects the demand response program will curtail or shift load during supply shortages and offset RA procurement with demand response capacity.

Energy Storage

CEC staff finds TID's discussion of the potential role of energy storage on its system consistent with the requirement in PUC Section 9621(d)(1)(B). This code also requires POUs to evaluate

19 TID. October 22, 2024. *2023 TID IRP revised Figure 21*.
<https://efiling.energy.ca.gov/GetDocument.aspx?tn=259659&DocumentContentId=95800>.

20 CEC. October 2017. *Revised SB 350 Doubling Energy Efficiency by 2030 Report*, pg. A-21.
<https://efiling.energy.ca.gov/GetDocument.aspx?tn=224615&DocumentContentId=5>.

the potential of energy storage systems as a resource and establish procurement targets, if appropriate.

TID recognizes the value and role energy storage will have for meeting peak demand and ramping needs and integrating intermittent renewable generation. TID includes 4-hour and 8-hour BESS as candidate resources in its IRP modeling. For this IRP, TID only modeled commercially proven, commercially available lithium-ion BESS technologies but may evaluate emerging storage technologies in future planning. TID is negotiating a PPA for 94 MW of RPS-eligible solar PV plus 50 MW BESS to be online in 2026 to improve system flexibility and support ancillary services.

Transportation Electrification

CEC staff finds the *2023 TID IRP* consistent with the requirements of PUC Section 9621(b)(4) and (d)(1)(C) as it addresses transportation electrification, projecting for light-duty electric vehicle growth. TID considers the load impact of increasing EV adoption to ensure adequate generation supporting the transition to transportation electrification. TID developed an hourly EV load profile based on third-party studies, which was used to forecast the hourly zero-electric vehicle forecast used in the IRP.

TID anticipates larger than historical load growth during the IRP planning period largely due to the growth of EVs and population. The *2023 TID IRP* includes an estimate of increased electrical load from EV charging for light duty plug-in EVs reported in the Standard Tables — EBT, and increased peak from EV charging for light duty plug-in EVs reported in Standard Tables — CRAT.

Transportation electrification is an important part of TID's strategy of reducing GHG emissions. To support decarbonizing the transportation sector, TID created programs promoting EV adoption in its service area. The annual EV program budget is approximately \$500,000, funded by the CARB Low Carbon Fuel Standard program.

TID's EV programs consist of five components:

- Customer incentives: TID customer incentives are available for purchasing EVs and for residential and non-residential charging infrastructure. Higher rebates are available for low-income customers to encourage participation in disadvantaged communities.
- Community and government partnerships: TID consults with local government, school districts, delivery companies, and other customers interested in electrifying fleets or installing charging stations. TID plans to install, operate and maintain 10 community charging stations throughout its service territory.
- TID's fleet: Whenever fleet vehicles reach end-of-life, TID considers replacing them with hybrids or EVs. TID's fleet currently includes several hybrid pool vehicles and is pursuing additional grants to support further electrification of its fleet. TID also monitors and minimizes the idling time of its gas vehicles.

- TID employee charging: TID provides charging stations throughout its service area to encourage employee EV adoption. TID expects employee purchases of EVs to grow as charging stations become more common.
- Special EV rate: TID adopted a special EV rate in 2022 to promote customer off-peak charging. TID offers higher rebates for low-income customers.

Portfolio Diversification

PUC Section 9621(d)(1)(D) requires that POU address the procurement of a diversified portfolio of resources consisting of both short-term and long-term electricity, and demand-response products. The *2023 TID IRP* and standardized tables show the mix of existing and planned resources are a diverse array of zero-emission resources, including solar, wind, geothermal, hydro and BESS. TID's planned resource portfolio paired with its extensive and well-connected transmission network provide in-state and out-of-state geographic diversity, access to wider markets in the Western Interconnect, and a variety of other services and benefits. Resource development is spread throughout the planning period and includes resources within and outside its utility and BA footprint.

APPENDIX A:

Abbreviations

Abbreviation	Term
BANC	Balancing Authority of Northern California
BESS	Battery Energy Storage System
CARB	California Air Resources Board
CEC	California Energy Commission
DER	Distributed Energy Resource
EV	Electric vehicle
GHG	Greenhouse gas
IRP	Integrated resource plan
ISO	Independent System Operator
LED	Light-emitting Diode
MID	Merced Irrigation District
MTCO ₂ e	Metric tons of carbon dioxide equivalent
MW	Megawatt
MWh	Megawatt-hour
NWPP RSG	Northwest Power Pool Reserve Sharing Group
POU	Publicly owned utility
PPA	Power purchase agreement
PUC	Public Utilities Code
RPS	Renewables Portfolio Standard
SB 350	Senate Bill 350 (De León, Chapter 547, Statutes of 2015)
TID	Turlock Irrigation District
TOU	Time of Use
WAPA	Western Area Power Administration
WECC	Western Electricity Coordinating Council
WEIM	Western Energy Imbalance Market

APPENDIX B:

Glossary

Term	Definition
Behind-the-meter resources	Generation and storage located at the customer site. More generally, it can refer to any device located at the customer site that affects the consumption of grid-provided energy (appliance control systems, for example)
California Air Resources Board (CARB)	The "clean air agency" in California government. CARB's main goals include attaining and maintaining healthy air quality, protecting the public from exposure to toxic air contaminants, and providing innovative approaches for complying with air pollution rules and regulations.
California Energy Commission (CEC)	<p>The state agency established by the Warren-Alquist State Energy Resources Conservation and Development Act in 1974 (Public Resources Code, Sections 25000 et seq.) responsible for energy policy. The Energy Commission's seven major areas of responsibilities are:</p> <ul style="list-style-type: none"> • Forecasting statewide energy demand. • Licensing of power plants and transmission lines sufficient to meet those needs. • Promoting energy conservation and efficiency measures. • Promoting the development of renewable energy. • Promoting the transition to clean transportation fuels. • Investing in energy innovation. • Planning for and supporting the state's response to energy emergencies. <p>Funding for the Commission's activities comes from the Energy Resources Program Account, Federal Petroleum Violation Escrow Account, and other sources.</p>
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.

Term	Definition
Demand response	Providing wholesale and retail electricity customers with the ability to choose to respond to time-based prices and other incentives by reducing or shifting electricity use, particularly during peak demand periods, so that changes in customer demand become a viable option for addressing pricing, system operations and reliability, infrastructure planning, operation and deferral, and other issues.
Distributed energy resources	Small-scale power generation technologies (typically in the range of 3 to 10,000 kilowatts) located close to where electricity is used (for example, a home or business) to provide an alternative to or an enhancement of the traditional electric power system.
Greenhouse gas (GHG)	Any gas that absorbs infra-red radiation in the atmosphere. Greenhouse gases include water vapor, carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), halogenated fluorocarbons (HCFCs), ozone (O ₃), perfluorinated carbons (PFCs), and hydrofluorocarbons (HFCs).
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.
Plug-in electric vehicle (EV)	A vehicle that uses one or more electric motors for propulsion. Electric vehicles include battery-electric and plug-in hybrid vehicles.
Public Utilities Code (PUC)	The set of laws that regulates public utilities in California, including natural gas, telecommunications, private energy producers, and municipal utility districts.
Renewable Portfolio Standard (RPS)	A regulation that requires a minimum procurement of energy from renewable resources, such as wind, solar, biomass, and geothermal.
Senate Bill 350 (De León, Chapter 547, Statutes of 2015)	Also known as the Clean Energy and Pollution Reduction Act, this bill established clean energy, clean air, and greenhouse gas reduction goals, including reducing greenhouse gas to 40 percent below 1990 levels by 2030 and to 80 percent below 1990 levels by 2050. The California Energy Commission is working with other state agencies to implement the bill.
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).

Term	Definition
Zero-emission resources	An engine, motor, process, or other energy source, that emits no waste products that pollute the environment or disrupt the climate.