DOCKETED	
Docket Number:	18-IRP-01
Project Title:	Integrated Resource Plan
TN #:	229422
Document Title:	Staff Paper - Review of Imperial Irrigation District's 2018 Integrated Resource Plan
Description:	N/A
Filer:	Harinder Kaur
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	8/14/2019 3:57:16 PM
Docketed Date:	8/14/2019

STAFF PAPER

Review of Imperial Irrigation District's 2018 Integrated Resource Plan

Paul Deaver
Melissa Jones
David Vidaver
Mark Kootstra
Supply Analysis Office
Energy Assessments Division
California Energy Commission

California Energy Commission

Gavin Newsom, Governor

August 2019 | CEC-200-2019-012

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ACKNOWLEDGEMENTS

Nick Fugate

Kelvin Ke

Katharine Larson

Galen Lemei

Micah Wofford

Noel Crisostomo

Wendell Krell

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. Imperial Irrigation District's Board of Directors adopted its 2018 Integrated Resource Plan on December 18, 2018, and submitted it to the California Energy Commission for review on April 15, 2019. This staff paper presents the results of the Energy Commission staff review of the Imperial 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

Deaver, Paul, Melissa Jones, David Vidaver, and Mark Kootstra. 2019. *Staff Paper: Review of Imperial Irrigation District's 2018 Integrated Resource Plan.* California Energy Commission. Publication Number: CEC-200-2019-012.

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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 (CEC) *Publicly Owned Utility Integrated Resource Plan Submission and Review Guidelines* requires those 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 CEC must review the IRPs to ensure consistency with the requirements of PUC Section 9621.

The Imperial Irrigation District (IID) is the third largest publicly owned utility and the fourth largest balancing authority in California. It is uniquely located in an area where solar, geothermal, and other renewable resources are abundant. The IID IRP filing provides the utility's strategy to maintain the security of its balancing authority, meet greenhouse gas emission reduction targets and renewable procurement requirements, integrate intermittent renewable energy, and maintain affordable and stable rates for its customers. The utility plans to collaborate with neighboring utilities and other entities to improve its balancing authority infrastructure, which could help make it a primary source of reliable renewable power for Southern California and other western states.

IID performed several analyses, including transmission system and operational system modeling, to determine which resource portfolios were cost-effective. The utility then assessed the risk exposure of each resource portfolio and identified preferred portfolios. The utility found the most cost-effective resource portfolio contains 90 percent intermittent resources (solar) and 10 percent baseload renewable resources (geothermal or biomass). As a result, IID plans to add 10 to15 megawatts of baseload renewables and 300 to 350 megawatts of intermittent renewables no sooner than 2028. The utility plans to reduce output from its aging natural gas fleet, procure additional flexible capacity to integrate renewable resources, add energy storage to address solar over-generation, and purchase any remaining energy needs.

In reviewing the IID IRP and determining consistency with the requirements of PUC Section 9621, CEC 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 tables, along with the narrative 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 tables, along with the analysis and discussion in the IRP filing, demonstrate the utility intends to meet planning goals related to retail rates, reliability, transmission and distribution systems, localized air pollution, and disadvantaged communities as set forth in PUC Section 9621(b)(3).
- *Considering Peak Needs:* The values reported in the standardized tables, along with the analysis and narrative discussion, demonstrate the utility considered the role of existing renewable generation, grid operational efficiencies, energy storage, and distributed resources (including energy efficiency) in helping to ensure the utility's energy and reliability needs 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 tables and narrative discussion that demonstrate the utility has 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).

This IRP is consistent with the PUC Section 9621 requirement to address energy efficiency and demand response. In addition to the IRP provisions, Senate Bill 350 (de León, Chapter 547, Statutes of 2015) requires the CEC to establish statewide and utility-specific targets to achieve a statewide doubling of energy efficiency by 2030. 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 CEC will report on progress in achieving the doubling targets, including those for IID, 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 demand threshold to submit an IRP and updates to the California Energy Commission (CEC) for review to determine consistency with the requirements of PUC Section 9621. If the CEC determines an IRP is inconsistent with these requirements the CEC shall provide recommendations to correct the deficiencies. The CEC 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 CEC to review POU IRPs to ensure they achieve PUC Section 9621 provisions (see **Attachment I**).

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

CEC IRP Review Process

On April 15, 2019, IID submitted its IRP and supporting documentation to the CEC for review.[3] Staff's review occurred in 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 needed for staff to conduct the review.

1 Public Utilities Code Article 16 (commencing with Section 399.11) of Chapter 2.3 of Part 1 of Division 1. See ATTACHMENT 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 POU local governing board, along with standardized tables and other supporting information required to review the IRP for consistency with SB 350.

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 IID 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 resource additions and whether the POU achieved Renewables Portfolio Standard (RPS) procurement requirements, energy efficiency savings projections and programs, and plans for transportation electrification.

Overview of Imperial Irrigation District

IID is a vertically-integrated, city-owned, not for profit electric and water utility in Imperial County, California as described below.[4]

- IID delivers nearly 3.4 million megawatt-hours (MWh) of energy to roughly 150,000 customer accounts.
- Residential customers constitute up to 85 percent of total customer meters; however, commercial and industrial customers consume nearly 40 percent of total load.
- IID has 1,213-megawatts (MW) of generation capacity that serves a forecasted (2019) peak demand of 1,055-MW.
- As a balancing authority, IID is solely responsible for its system operation and planning to meet reliability standards established by the North American Electric Reliability Corporation (NERC) and Western Electricity Coordinating Council (WECC).
- Using the CalEnviroScreen tool, IID estimates there are 23 areas in its territory (137,419 people) that are considered disadvantaged communities.

Imperial Irrigation District's Planning Process

IID's Board of Directors is responsible for developing and adopting an IRP. During the planning process, the utility solicited input from the public. Public participation included two public workshops in 2018 and customer surveys regarding energy programs. As IID is also a balancing authority, the IRP includes plans to improve its balancing authority infrastructure and meet reliability requirements. IID serves both electric and water customers, so both were considered when choosing resources to improve reliability and minimize costs.

4 A vertically-integrated utility is a utility that owns all levels of the supply chain: generation, transmission, and distribution assets.

Demand Forecast

The *POU IRP Guidelines* (Chapter 2.E.1) identify the need for a forecast of energy and peak demand to determine whether a POU's IRP is consistent with the requirements of PUC Section 9621.[5] 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 CEC's adopted demand forecast.[6] The demand forecast and supporting information provided present an adequate estimation of future energy and peak demand that meets the *POU IRP Guidelines* requirements.

Using standard regression techniques, IID developed its energy demand and peak demand forecast in a number of steps.[7] First, IID developed a gross forecast that does not account for impacts from energy efficiency and demand response programs, behind the meter rooftop solar photovoltaic (PV) generation, transportation electrification load, and increased industrial load. Next, using historical data, the utility forecasted load reductions from energy efficiency and demand response programs, rooftop solar PV generation, and increased load impacts from electric vehicle charging.[8] Lastly, it added these forecasted load impacts to the gross forecast to create a net energy demand forecast.[9]

IID derived the demand and peak forecasts from monthly retail sales estimates and hourly load and generation data. IID's load is comprised primarily of residential and commercial customers, 46 percent and 40 percent of load, respectively. The remaining 14 percent are agricultural and other customers.[10] For each of these customer types, IID developed a gross and net energy demand forecast, as described above. IID used the following variables to project load:

- Total population
- Farm employment and retail employment
- Personal income
- Gross regional product

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

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

7 Regression analysis is a modeling technique used for forecasting that investigates the relationship between variables and how they contribute and are related to producing a particular outcome together.

8 Historical data from 2001-2016 was used for most variables, with historical data from 1987-2017 used for the weather variables.

9 Net energy demand or net energy for load are used interchangeably in this paper to refer to the total amount of energy that a load serving entity must generate or purchase to meet its retail load obligations. It includes retail consumption and transmission, distribution, storage and other losses, but excludes energy needed to meet wholesale sales obligations.

10 The 14 percent consists of agricultural, mobile home/recreational vehicles, industrial customers, municipal customers, and outdoor and roadway lighting.

- Heating degree days and cooling degree days[11]
- Seasonal month indicator variables (to account for monthly temperature and load variations)

IID created three scenarios (low, expected, and high) to account for varying levels of load, weather, energy efficiency savings, rooftop solar generation, and electric vehicle charging. The scenarios are listed below:

- The *expected case* assumes normal weather, average energy efficiency savings, average rooftop solar generation, and average levels of electric vehicle charging.
- The *low case* assumes mild weather, high energy efficiency savings, high rooftop solar generation, and low levels of electric vehicle charging. In 2030, the *low case* projects peak and energy demand to be 15 percent lower than the *expected case*.
- The *high case* assumes severe weather, low energy efficiency savings, low rooftop solar generation, high levels of new industrial load, and high levels of electric vehicle charging. In 2030, the *high case* projects peak and energy demand to be 21 percent higher than the *expected case*.

IID's energy demand forecast (expected case) is similar to the CEC's demand forecasts (*California Energy Demand 2018 to 2030 Revised Forecast*).[12] The IID forecast lies between the CEC's *mid demand forecast* that includes mid-levels of additional achievable energy efficiency (AAEE) and additional achievable photovoltaic (AAPV) and the *high demand forecast* that includes low levels of AAEE and AAPV.[13] IID's energy demand forecast projects a 1.2 percent annual average increase in load from 2019 to 2030, with its forecast closer to the CEC's *mid demand forecast* from 2019 to 2023, and growing closer to the *high demand forecast* from 2024 to 2030.

By 2030, the IID energy demand forecast is almost identical to the CEC's *high demand forecast*; IID's forecast is 39 gigawatt-hours (GWh) higher in 2030, less than a 1 percent difference. In the same year, IID's energy demand forecast is 485 GWh higher than the CEC *mid demand forecast*, a 12 percent difference that is adequate in a long-term planning context. **Figure 1** compares IID's energy demand forecast to those of the CEC.

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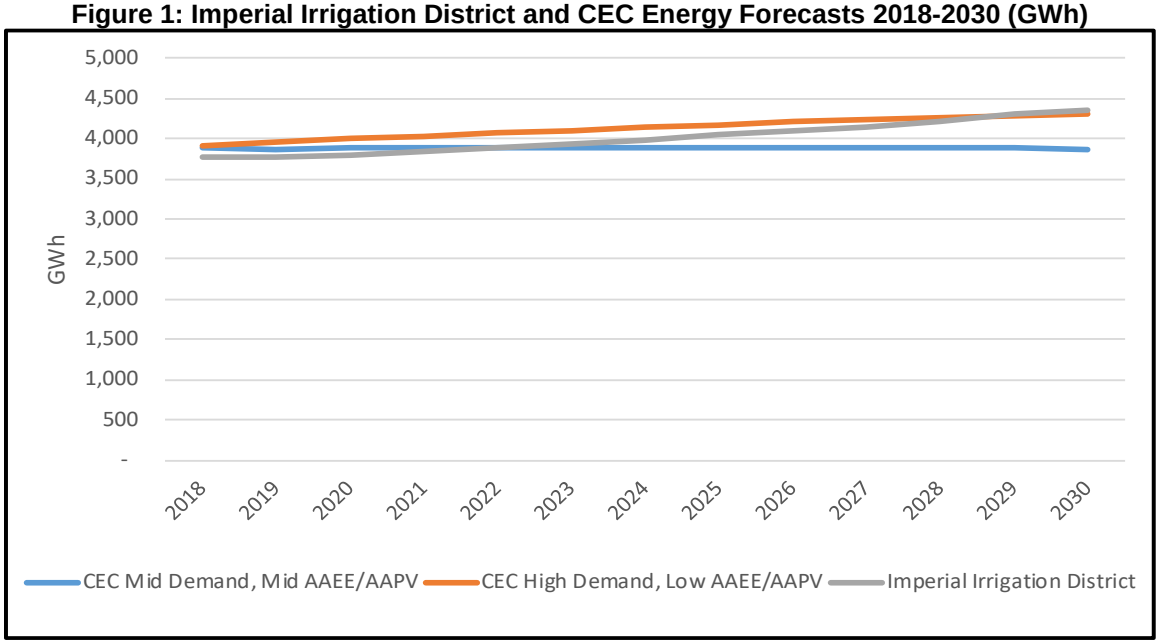
11 A heating degree day quantifies the demand for energy needed to heat a building, representing the number of degrees a day's average temperature is below 65° Fahrenheit. A cooling degree day quantifies the energy to cool a building, representing the number of degrees a day's average temperature is above 65° Fahrenheit.

12 The Energy Commission produced several different demand forecasts for load-serving entities and balancing authorities for the *2018 Integrated Energy Policy Report* that reflect varying demand conditions combined with varying amounts of energy efficiency and solar photovoltaic. Staff compared IID's forecast with the Mid Demand, Mid AAEE/AAPV case and the High Demand, Low AAEE/AAPV case. AAEE refers to additional achievable energy efficiency and AAPV refers to additional achievable photovoltaic, as defined in the next footnote.

13 *Additional achievable energy efficiency savings* are those which result from or are reasonably expected to occur from energy efficiency programs and measures that have yet to be funded and/or implemented. *Additional achievable PV* is the energy from rooftop solar deployment expected from implementation of the 2019 Title 24 Building Energy Efficiency Standards, which will require solar panels on new residential construction beginning January 1, 2020.

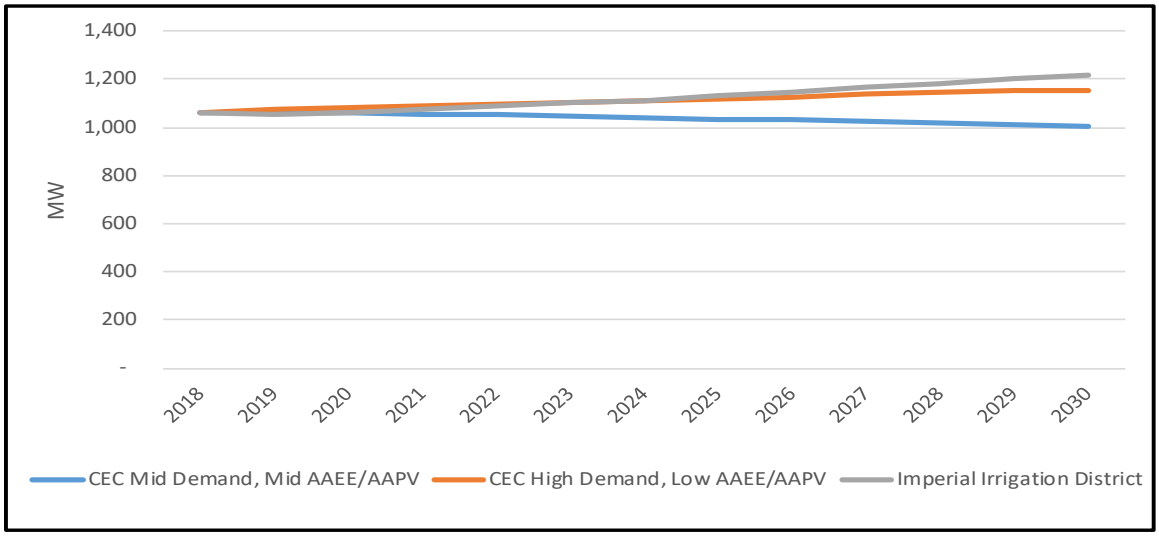
Figure 1: Imperial Irrigation District and CEC Energy Forecasts 2018-2030 (GWh)



Source: CEC, based on IID's 2018 IRP filing and CEC 2019 Demand Forecast

Similar to its energy demand forecast, IID's peak demand forecast (expected case) shows an annual average increase of 1.2 percent from 2019 to 2030. **Figure 2** compares the IID peak forecast to those of the CEC.

Figure 2: Imperial Irrigation District and CEC Peak Forecasts 2018 - 2030 (MW)



Source: CEC, based on IID's 2018 IRP filing and CEC 2019 Demand Forecast

The utility's peak demand forecast is almost identical to the CEC *high demand peak forecast* from 2018 to 2025, then starts to exceed it from 2026 to 2030. IID planned for the possible influx of large commercial customers into its service area, which would increase its load, and may explain why IID's demand forecasts are closer to the CEC high demand forecasts. By 2030, IID's peak demand forecast is 64-MW, or about 5 percent,

higher than the CEC's *high demand peak forecast*. This difference is adequate in a long-term planning context.

Resource Procurement Plan

The *POU IRP Guidelines* require that POUs report the mix of resources they plan to use to meet demand from 2018-2030.[14] POUs are also required to provide an IRP with data and supporting information sufficient to demonstrate that the POUs plan to meet the various targets and goals. Staff has determined that IID'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 tables.

Existing Resources

IID meets its capacity and energy needs through a diverse mix of utility-owned generation, long-term power purchase agreements, and short-term purchases. In 2019, the utility's resource portfolio contains about 49 percent natural gas, 5 percent large hydro and nuclear, 23 percent market purchases, and 23 percent renewables. IID receives baseload capacity from its hydroelectric and nuclear resources. The utility has a contract for 32-MW from the Parker-Davis hydroelectric project in Arizona that is primarily used during the peak periods in summer months. IID also has a contract for 15-MW from the Palo Verde Nuclear Generating Station, also located in Arizona.

IID owns 241-MWs of intermediate (or load following) capacity from natural gas steam turbine plants that provide energy and ancillary services. The utility also owns 221-MW of natural gas peaking plants, to meet energy and ramping needs during the summer peak demand hours. Because most of IID's natural gas resources were built in the 1970s and are relatively inefficient, IID relies on the short-term market for energy, although it continues to use its gas fleet to meet peak demand and flexible capacity needs. IID is evaluating replacement options for aging gas generation, including battery storage, solar paired with storage, and repowering some of its older natural gas plants to increase their efficiency. When evaluating replacement options, the utility will consider factors such as capital, debt, and integration costs, as well as reliability.

IID's renewable resources primarily consist of utility-scale solar PV and biomass; in 2019, these two resources accounted for 60 percent of IID's renewable resource portfolio. Geothermal and small hydroelectric resources make up the remainder of IID's renewable resources. In 2016, the utility installed a battery energy storage system (30-MW of capacity that can produce 20-MWh of energy) to integrate variable renewable resources and provide flexible capacity. Besides one small hydro and one solar resource, all of IID's renewable energy comes from power purchase agreements or contracts.

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

By 2020, to meet peak and energy needs, as well as RPS requirements, IID plans to procure 54-MW of geothermal and 9-MW of utility scale solar resources. In 2021, the utility plans to procure 30-MW of energy storage resources to meet peak capacity and flexibility needs. By 2029, the utility will need to procure additional renewable resources, identified as generic baseload and intermittent renewable resources in its standardized reporting tables.

Resource Portfolio Evaluation

Based on its energy and peak forecasts, IID determined a need for additional resources to meet load, maintain reliability (by 2021), and meet RPS procurement requirements (by 2029). The utility simulated thousands of model scenarios to evaluate cost, financial risk, reliability, and performance metrics for several resource options. These scenarios, which have varying levels of baseload and intermittent resources, helped narrow the set of portfolios that were further studied, including:

- 100 percent baseload resources
- 100 percent intermittent resources
- 75 percent baseload and 25 percent intermittent resources
- 60 percent baseload and 40 percent intermittent resources
- 45 percent baseload and 55 percent intermittent resources
- 30 percent baseload and 70 percent intermittent resources
- 10 percent baseload and 90 percent intermittent resources

Each portfolio was evaluated against the three demand scenarios identified in the **Demand Forecast** Section on page 5. Each portfolio was also evaluated against low, medium, and high prices for natural gas, energy, and greenhouse gas (GHG) emissions. In all portfolios, IID procures 30-MW of battery energy storage by 2021, and additional renewable resources in 2029 and 2030.

After evaluating the cost, reliability, performance, and risk of the seven resource portfolios listed above, IID determined the portfolio with 10 percent baseload and 90 percent intermittent resources is the most cost-effective way to meet RPS energy procurement requirements and GHG emission reduction targets, while still meeting reliability and performance needs.

Procurement Strategy

IID's long-term planning strategy is to procure resources to maintain and enhance reliability and keep customer rates low and stable, while meeting state and federal policies, including GHG emissions reduction targets and renewable resource procurement requirements. Over the planning period, the utility plans to procure solar, biomass, geothermal, battery energy storage, as well as additional energy efficiency resources.

IID has additional priorities and reliability needs as a balancing authority. Although it does not plan to procure new fossil resources, the utility plans to continue operating its existing natural gas resources throughout the planning period as they provide flexible capacity, as well as reliability and ancillary services. However, IID plans to reduce the output of these resources by 12 percent, between 2019 to 2030. As solar and storage costs continue to decline, it plans to evaluate energy storage and utility scale solar-plus-storage resources as replacement options for its aging natural gas generation fleet.

IID generally has excess generation capacity in the winter months (November through April) and a shortage in the summer months (May through October). To increase reliability and keep costs and rates low, IID sells excess energy during the winter months and purchases energy in the summer months when it is short. Over the planning period, the utility plans to enhance and expand its transmission resources to allow for additional opportunities to purchase and sell energy in the wholesale markets. Expanding its transmission resources also allows IID to access additional renewable resources to serve load, and adds diversity to its resource portfolio.

The preferred portfolio includes the following strategies over the planning period:

- By 2021, procure 30-MW of energy storage in the northern territory of the IID system.
- No sooner than 2028, enter into contracts for 10 to 15-MWs of baseload renewables and 300 to 350-MWs of intermittent renewables.
- Diversify its resource portfolio to consider technology type, land use, generation output profile, and contract structuring.
- Implement energy efficiency programs to reduce load by at least 5 percent by 2020 to reduce the need for inefficient natural gas resources that are rarely operated.
- Expand and enhance electric vehicle programs and incentives to help alleviate potential overgeneration from solar and improve air quality for disadvantaged communities.
- Continue hedging activities in the natural gas and electricity markets to reduce risk exposure and provide rate stability to customers.
- Invest in transmission and distribution projects to minimize customer rate increases, meet balancing authority responsibilities, gain access to additional energy markets and resources, and provide additional reliability to the IID system.

IID plans to update or develop a new IRP by 2023 (within 5 years of this IRP) as it evaluates options to maintain balancing authority reliability requirements, keep rates low, meet RPS procurement requirements and GHG emission reduction targets, and meet peak and energy needs.

Table 1 shows IID's energy resources for 2019, 2025, and 2030. In 2019, natural gas and short-term market purchases provide most of IID's energy needs, roughly 35 percent and 15 percent, respectively. Geothermal accounts for about 14 percent, while utility-scale PV and hydroelectric resources (large and small hydro) account for nearly 12 percent each. IID uses biomass (10 percent) and nuclear (3 percent) to meet remaining energy needs.

Between 2019 and 2030, IID reduces energy it receives from natural gas resources by 12 percent; however, it increases spot-market purchases by more than 340,000-MWh, or about 68 percent. Over the same period, IID's energy from geothermal resources decreases by 462,000-MWh, or 86 percent, and by 2025 the utility stops receiving energy from biomass. Energy from hydroelectric, nuclear, and PV resources remain mostly constant between 2019 and 2030. Although the utility does not receive energy from generic renewables in 2019 or 2025, by 2030 it receives almost 1,300-MWhs, or around 30 percent of its energy resources from generic renewables.

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

		2019	2025	2030
Total Net Energy for Load		**3,766,719**	**4,037,502**	**4,346,080**
Non-RPS	Large Hydroelectric	179,783	169,448	150,088
	Natural Gas	1,312,830	1,202,572	1,155,341
	Nuclear	114,143	114,143	114,143
	Spot Purchases	546,172	1,293,853	1,025,438
	Spot Sales	(40,917)	(15,013)	(178,277)
RPS Resources	Biofuels	378,599	0	0
	Geothermal	536,011	549,577	74,013
	Small hydroelectric	271,524	271,524	271,524
	Solar PV	468,574	451,398	437,576
	Generic baseload	0	0	129,678
	Generic intermittent	0	0	1,166,556
Total Energy Procured		**3,766,719**	**4,037,502**	**4,346,080**
Surplus/Shortfall		**0**	**0**	**0**

Source: CEC, based on IID 2018 IRP filing

Table 2 shows IID's capacity resources for 2019, 2025, and 2030, and the amount each resource contributes to peak demand. IID has a peak demand of roughly 1,000-MW in 2019, growing to more than 1,200-MW by 2030, a 15 percent increase. Natural gas contributes more than 590-MW to IID's peak demand, or nearly 49 percent while short-term capacity purchases account for 274-MW or roughly 23 percent. PV resources provide 109-MW of peak capacity, or 9 percent, and the rest comes from nuclear, biomass, geothermal, energy storage, and hydroelectric resources (together almost 19 percent).

Capacity from natural gas, hydroelectric, and PV resources remains constant between 2019 and 2030, but decreases for geothermal (92 percent decrease), and increases for energy storage (107 percent increase). IID procures no capacity from generic renewables in 2019 or 2025, although by 2030 it receives more than 450-MW, or 32 percent of its peak capacity need from generic renewables. See **Appendix B** for energy and capacity resource tables that show all years (2019 to 2030).

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

		2019	2025	2030
Peak Demand		1,061	1,138	1,224
Planning Reserve Margin		158	170	183
Peak Procurement Requirement		1,213	1,302	1,401
Non-RPS	Large Hydroelectric	39	39	39
	Natural Gas	592	592	592
	Nuclear	15	15	15
	Spot Purchases (system power)	274	408	123
	Storage (Battery)	20	45	41
RPS Resources	Biofuels	47	0	0
	Geothermal	65	69	5
	Small hydroelectric	38	38	38
	Solar PV	109	108	105
	Generic baseload	0	0	20
	Generic intermittent	0	0	435
Total		1,199	1,314	1,413
Surplus/Shortfall		(14)	12	12

Source: CEC, based on IID 2018 IRP filing

CHAPTER 2:
Review for Consistency with PUC Section 9621 Requirements

This chapter summarizes the main elements of IID'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 emission reduction targets and RPS energy procurement requirements, as well as planning goals for retail rates, reliability, transmission and distribution systems, net load, and disadvantaged communities. In addition, the IRP must address procurement of energy efficiency and demand response, energy storage, transportation electrification, and portfolio diversification.

Greenhouse Gas Emission Reduction Targets

POUs are required to meet the GHG emission reduction targets established by the California Air Resource Board, in coordination with the CEC and California Public Utilities Commission.[15] These GHG emission reduction targets reflect the electricity sector's percentage in achieving the economy-wide GHG emission reductions of 40 percent from 1990 levels by 2030. Staff reviewed the GHG emissions associated with IID'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 IID's portfolio to ensure consistency with other data available to staff.

Staff finds that IID plans to achieve the California Air Resources Board established GHG emission reduction target range of 524 to 925 thousand metric tons of carbon dioxide equivalent (MT CO_2e). IID's resource portfolio results in roughly 899 MT CO_2e, which is at the high end of the GHG emission reduction target range and is consistent with the requirement of PUC Section 9621(b)(1). IID estimated their emissions for energy resources by multiplying a specific emission intensity value for a power plant or spot market purchase by the total generation from each for the planning period. **Table 3** shows GHG emissions for IID's portfolio of resources in 2019, 2025, and 2030. Details regarding GHG emissions from individual generating units and spot market activity, for all years, can be found in the GHG Emissions Accounting Table filed by the utility (see **Appendix B**).

Although IID's existing natural gas resources remain online over the planning period for reliability and ramping needs, it starts procuring renewables in 2019 and 2020 to replace some of the output from the natural gas resources with cleaner resources. Despite this, there is an increase in GHG emissions in 2025, largely from increased spot-

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

market purchases. In 2029-2030, IID procures additional generic renewable energy to meet RPS and load requirements, which lowers its portfolio GHG emissions compared to generating from its natural gas resources or procuring spot-market energy.

Table 3: Greenhouse Gas Emissions from Imperial Irrigation District's Resources Portfolio

	Fuel Type	GHG Intensity (mt CO_2e/MWh)	Total Emissions (MT CO_2e)		
			2019	2025	2030
Coachella 1	natural gas	0.809	0	0	0
Coachella 2	natural gas	0.847	0	0	0
Coachella 3	natural gas	0.817	0	0	1
Coachella 4	natural gas	0.817	0	0	0
EL Centro #2	natural gas	0.444	114	83	74
EL Centro #3	natural gas	0.413	265	287	278
EL Centro #4	natural gas	0.695	17	9	22
Yucca GT 21	natural gas	0.787	0	0	0
Niliand 1	natural gas	0.574	14	23	34
Niliand 2	natural gas	0.542	30	33	47
Rockwood 1	natural gas	0.712	5	4	3
Yucca Steam	natural gas	0.587	178	117	77
Rockwood 2	natural gas	0.865	0	0	0
Spot market purchases	system	0.428	234	554	439
Spot market sales	system	0.428	(18)	(6)	(76)
Total Portfolio emissions	**NA**	**NA**	**839**	**1,104**	**899**

Source: CEC, based on IID's 2018 IRP filing

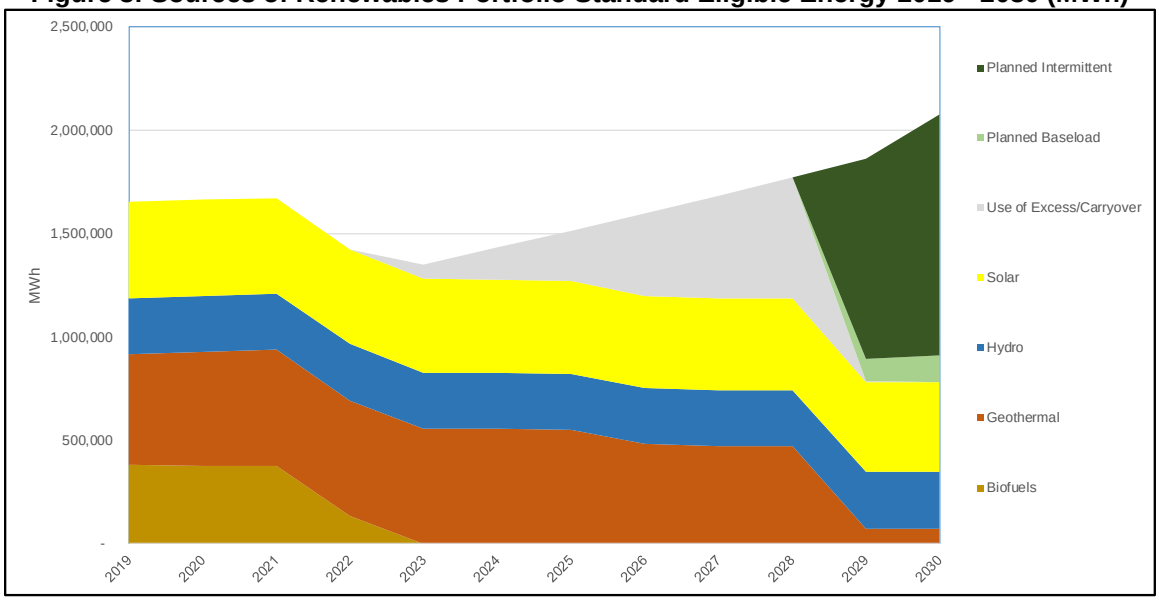
Renewables Portfolio Standard Planning Requirements

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

16 PUC Section 9621(b) requires the governing board of a POU 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 develop IRPs under SB 350 before SB 100 was enacted, they are only required to plan for the 50 percent RPS target in their IRP. Future POU IRPs will need to meet RPS requirements in effect when those updates are filed.

Meeting a 50 percent RPS target requires that IID procure more than 2,000 GWh of RPS-eligible energy by 2030. The utility plans to meet interim procurement requirements by procuring surplus amounts of RPS-eligible energy from 2019 to 2022 and banking the associated Renewable Energy Credits (REC) to cover shortfalls in energy procurement in 2024 to 2028. Additional energy from renewable resources in 2029 and 2030 would meet RPS requirements in the final compliance period from 2028 to 2030. **Figure 3** shows sources and amounts of RPS-eligible renewable resources from 2019 to 2030. Additional detail on annual RPS-eligible energy procurement and the banking and retirement of RECs for the planning period can be found in the RPS standardized reporting table (see **Appendix B**).

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



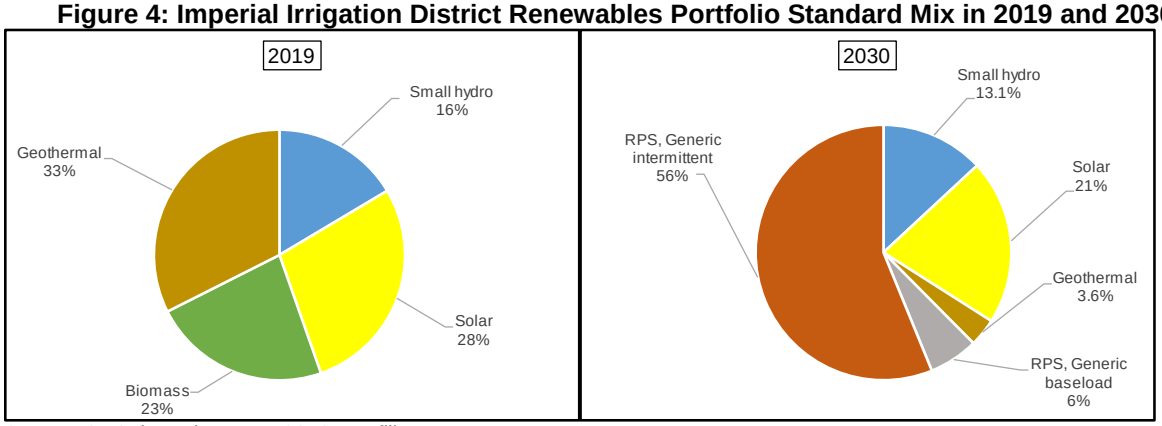
Source: CEC, based on IID's 2018 IRP filing

In 2019, the utility has a renewable resource mix consisting primarily of solar and geothermal, with some biofuels and small hydroelectric. The utility procures solar and geothermal resources in 2019 and 2020. Besides 10-MW of solar and 32-MW of small hydroelectric, IID contracts for all of its renewable resources (217-MW contracted and 42-W utility owned generation). As mentioned above, IID generates and banks RECs in compliance periods three and four (2017-2022), and then starts to use its bank to meet RPS requirements in compliance periods four, five, and six (2023-2029). In 2029-2030, the utility starts to replenish its bank with RECs from geothermal, solar, and biomass resources.

As shown in **Figure 4**, in 2019, the utility has roughly 70 percent baseload and 30 percent intermittent renewable resources. By 2030, IID's renewable resource mix consists mostly of contracted resources, and new renewables procured in 2029-2030 are roughly 90 percent intermittent and 10 percent baseload. IID's renewable resource mix, in 2030, includes:

- Nine solar facilities that produce 435 GWhs of electricity or 22.25 percent of total renewable energy supplied.
- Two geothermal facilities that produce 74 GWhs or 3.8 percent of total renewable energy supplied.
- Two small hydroelectric facilities that produce 271 GWhs or 13.9 percent of total renewable energy supplied.
- One contract for generic baseload renewables (geothermal or biomass) that produces 117 GWhs or 6 percent of total renewable energy supplied.
- One contract for generic intermittent renewables (solar or wind) that produces 1,000 GWhs of electricity or 54 percent of total renewable energy supplied.

Figure 4: Imperial Irrigation District Renewables Portfolio Standard Mix in 2019 and 2030



Source: CEC, based on IID's 2018 IRP filing

In 2030, IID does not plan to receive any energy from specific biomass or wind resources. The utility plans to use its energy storage resources, existing natural gas power plants, and spot-market purchases and sales, to integrate its renewable energy resources. The resources IID plans to procure in 2029-2030 provide RECs to meet its RPS requirements and add diversity to its renewable resource portfolio.

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 to ratepayer bills. Staff reviewed the analysis and information IID presented in its IRP filing on the rate and bill impacts from different resource portfolios it evaluated. Staff finds the IRP is consistent with the rates discussion, as required in PUC Section 9621(b)(3).

Besides a rate adjustment in 2015, IID has not changed its rates for more than 20 years and plans to continue monitoring the need for future rate adjustments to support the cost of serving customer needs. To help choose a preferred portfolio that maintains low, stable rates, IID compared the net present value of the cost for each resource portfolio

over the planning period.[17] The utility also estimated the financial risk of each resource portfolio associated with emissions price and load volatility.

IID also analyzed rate impacts from procuring additional renewable resources. The utility estimated the cost of meeting load with conventional generation minus the cost with renewable resources, and divided this by retail sales, to get an estimate of rate impacts from meeting its RPS requirements. Similar price and rate impact analyses were conducted for energy storage, energy efficiency, and transmission resources. Lastly, IID compared costs and risks of retaining existing natural gas generation for reliability and flexible capacity needs and found that repowering the El Centro Unit 4 power plant is not currently cost-effective compared to other options.

IID also conducted price hedging activities, for future procurement of natural gas and electricity, to account for price volatility and help maintain stable rates. In choosing resources, the utility analyzed the range of prices and monthly volatility for different procurement decisions. For all of the resource portfolios studied, IID looked at future cost uncertainty by considering scenarios for variations in energy demand, natural gas prices, GHG emissions prices, GHG emission reduction targets, and RPS targets.

Based on the rate analysis, IID determined that the preferred portfolio, with a mix of 90 percent intermittent renewables (solar) and 10 percent baseload (biomass and geothermal), is the most cost-effective option while still meeting RPS and GHG emission reduction targets, and maintaining reliability.

IID plans to expand its hedging activities to reduce its costs and customer rates, and minimize rate volatility. The utility will monitor the costs of new and emerging resource technologies, like solar plus storage, to evaluate opportunities to replace its aging natural gas fleet, as well as expand its transmission resources to access additional renewable resources.

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.[18] Staff reviewed IID's capacity reporting table and discussion and finds that IID has planned for sufficient resources to maintain a reliable electric system. In addition, IID's selected portfolio of resources contains sufficient capacity to meet anticipated resource adequacy requirements in 2030. Staff finds that the IRP is consistent with the reliability requirements in PUC Section 9621(b)(3) and resource adequacy requirements in PUC Section 9621(d)(1)(E).

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17 Net present value, or discounted value, is a financial calculation that measures the value of a future amount of money or stream of payments in today's dollars adjusted for interest and inflation. In other words, it compares the purchasing power of a future dollar to the purchasing power of one today.

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

System Reliability

In addition to being a distribution utility, IID is a balancing authority that is responsible for continuously balancing supply and demand for electricity within its area and between other balancing authorities. IID considers its balancing authority obligations when procuring generation and transmission resources to maintain and enhance reliability in its service territory. In operating its system, IID must meet reliability standards established by NERC and WECC. IID meets all NERC and WECC reliability standards, and has developed a plan to ensure they will be ready to comply with all future standards by their effective dates. As a member of the Southwest Reserve Sharing Group, IID is able to share contingency reserves with other entities to maximize generator dispatch efficiency and decrease the cost of compliance with reliability standards.

IID plans to meet its peak capacity needs and ensure reliability, including a 15 percent WECC required planning reserve margin, with its utility owned natural gas generation, owned and contracted renewables, energy storage, and short-term and seasonal market purchases. IID is not part of the California Independent System Operator's balancing area; therefore, its resource adequacy need is based on its hourly peak load and net hourly net-short position (due to solar resources).[19]

Local and Flexible Capacity Needs

IID plans for its own local and flexible capacity needs, which are met primarily by its natural gas resources. However, in 2019 and 2020, the utility expects a capacity shortfall, partly due to an expected increase in large commercial customer load in the northern part of IID territory. To address this capacity shortfall, IID plans to install 63-MW of geothermal and solar resources.

IID's existing peaking and intermediate natural gas resources generally provide flexible capacity to meet this need. Between 2019 and 2025, IID expects increased large commercial customer load and additional solar generation coming online, increasing the need for flexible capacity. To address this flexible capacity need, the utility plans to procure 30-MW of energy storage in the northern portion of its territory by 2021. IID plans to continue monitoring its aging natural gas resources and explore other flexible capacity options as necessary.

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. Staff determined that IID's IRP adequately

19 Net-short, or renewable net-short, is the amount of new renewable generation capacity that must be built in California, or delivered from out-of-state sources, or both, to meet RPS targets. Net-short estimates are used to evaluate the electricity infrastructure requirements for integrating new generation additions and identifying market mechanisms that may need to be modified to provide the ancillary services required to maintain reliable system operations.

plans to maintain and enhance its transmission and distribution systems. Staff finds that IID has planned for enough transmission to deliver resources to its service area to meet the requirement as discussed below. Staff also finds that IID conducted planning to address the adequacy of its distribution system. As such, staff finds the IRP is consistent with the transmission and distribution requirements set forth above.

Transmission System

IID's transmission and sub-transmission system includes approximately 1,800 miles of overhead transmission, consisting of 500 kV, 230 kV, 161 kV, and 92 kV lines. The utility's transmission system is used to deliver electricity into and through the IID service territory, including into the Southern California Edison system, and into Arizona. The 92 kV lines provide an interconnection to IID's distribution system substations (92 kV and 13.2 kV).

IID conducts its own transmission planning activities such as grid reliability requirements, system upgrades, and new and expanded transmission projects. As mandated by NERC and WECC planning standards, IID performs both five and ten-year transmission system assessments for its balancing authority. These assessments ensure that the utility has enough generation and transmission resources to serve load and maintain grid reliability, under normal and contingency operating conditions, and different weather and load assumptions. Because the transmission studies found some potential reliability issues between 2019 and 2022, IID plans for upgrades between 2020 and 2027 that include transmission line upgrades and new and upgraded substations.

Along with the transmission assessments, IID performed analyses to explore new transmission projects to further strengthen the utilities' transmission system and find opportunities to export inexpensive renewable power to neighboring areas. The utility expects these projects will provide reliability and economic benefits to the IID system:

- The North Gilato Imperial Valley 2 Transmission Line would provide additional reliability benefits and increase the allowable flow on the Hassayampa – North Gila line from 500-MW to over 1,000-MW. This would allow IID to move over 200-MW into its system. The expected in-service date is 2021, with a cost ranging from $30 to $65 million.
- The IID to CFE Transmission Line is being explored by IID and the Federal Energy Commission of Mexico (CFE) to interconnect the two systems for import and export opportunities. IID has a large potential for surplus solar, wind, and geothermal energy to sell into the CFE system. This project is expected to come online in 2021 at a cost of $50 to $57 million.
- The Path 42 remedial action scheme is designed to increase the flow on the 230 kV transmission lines between the Coachella Valley and Ramon substations in IID's service territory with the Mirage substation in Southern California Edison's

service territory.[20] This project is expected to allow IID to increase exports from 600-MW to over 1,200-MW. This project is expected to come online in 2020, with an estimated cost of $4.5 million.

IID plans to continue monitoring is transmission system and update its five and ten-year transmission system assessments, as needed.

Distribution System

IID's distribution system covers all of Imperial County, as well as the Coachella Valley in parts of Riverside County, and includes about 4,400 miles of overhead lines and 1,740 miles of underground lines. Between these two areas, the location, needs, and density of customers are diverse, which IID takes into consideration when assessing its distribution system needs.

For its distribution studies, IID determined three main areas of need:

- Projects needed to maintain reliability.
- Projects based on customer interconnections for large industrial producers of cannabis located in IID's system.
- Projects for new development that depend on load growth.

Of the three needs listed above, the majority of costs come from new development projects. Based on the engineering studies on its distribution system, IID plans to develop the following types of projects between 2019 and 2027:

- Establish new circuits and enhance existing circuits
- Install new transformer banks
- Install new distribution breakers
- Construct new substations
- Arrange in/out transmission lines
- Install new distribution feeders

IID also studied distribution system impacts from adding increased amounts of distributed generation, primarily rooftop solar, to its system, including:

- Voltage issues at the customer's sites
- Voltage and reactive power issues on distribution feeders[21]

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20 A remedial action scheme is designed to detect predetermined system conditions and automatically take corrective actions that may include curtailing generation or other sources, curtailing load or reconfiguring a system to ensure reliable operations.

21 Reactive power is the resultant power in watts of an AC circuit when the current waveform is out of phase with the waveform of the voltage, usually by 90 degrees if the load is purely reactive, and is the result of either capacitive or inductive loads. Only when current is in phase with voltage is there actual work done, such as in resistive loads. An example is powering an incandescent light bulb; in a reactive load energy flows toward the load half the time, whereas in the other half power flows from it, which gives the illusion that the load is not dissipating or consuming power.

- Substation transformer bank voltage regulation issues and reverse power flow through the substation transformer

The utility plans to address and mitigate the above challenges before allowing any distributed generation to interconnect to its system. IID is also developing a plan to deploy a supervisory control and data acquisition system in areas served by non-remote-operable distribution substations.[22] This system will potentially provide better data acquisition, shorter service restoration times, and improve system reliability.

IID plans to continue monitoring its distribution system for impacts from new development, increased levels of distributed generation, and reliability concerns.

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

There are 23 areas in IID's service territory, affecting 137,419 residents, that are considered disadvantaged communities by the California Environmental Protection Agency's California Communities Environmental Health Screening Tool. While these areas are geographically distributed across IID's service territory, the majority of the customers in disadvantaged communities are in and around the major urban areas of El Centro and Calexico.

IID offers programs for low income and disadvantaged communities. Some of the programs that IID offers and will continue to expand include:

- Residential energy assistance programs
- Emergency energy assistance programs
- Medical equipment energy usage assistance programs, and
- Electric vehicle infrastructure programs

In addition to the programs listed above, IID conducts on-going discussions on equitable local air pollutant reduction in disadvantaged communities.

Net Energy Demand in Peak Hours

PUC Section 9621(c) requires POUs to consider existing renewable generation, grid operation efficiencies, energy storage, distributed energy resources, and energy

22 The supervisory control and data acquisition system is a control architecture that uses computers, networked data communications and graphical user interfaces for high-level process supervisory management of the electricity grid.

reduction measures (such as energy efficiency and demand response) to reduce the need for new or additional gas-fired generation, distribution and transmission resources. IID includes a discussion of how preferred resources contribute to meeting peak demand when selecting resources for its portfolio. This is consistent with the requirement set forth above.

IID studied how the generation profiles of intermittent resources, primarily solar, do not match with its load profile, creating challenges during the peak hour and hours around the peak, when load is ramping up or down. To remedy this mismatch, IID plans to install a 30-MW battery storage system by 2021 to help smooth the swing in solar output or instant changes in load. The utility is also considering repowering the El Centro Unit 4 natural gas plant to provide increased flexible capacity to help integrate solar generation. Lastly, IID is planning to upgrade and enhance its transmission system to more efficiently use its existing resources to meet peak demand needs. IID plans to meet its net-peak demand with a combination of its existing resources and net-zero carbon resources it plans to procure.

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 Reliability** on page 18.

Energy Efficiency and Demand Response Resources

Staff finds that IID's 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 quantify the amount of energy efficiency savings they plan to achieve. IID plans to meet the SB 350 doubling of energy efficiency targets established by the CEC throughout the planning period.

From 2015-2017, conservation and energy efficiency programs saved IID participating customers over 52,000-MWh of energy and 17-MW in peak capacity. The custom energy solutions program for commercial customers resulted in the largest energy savings, compared to other programs over the same time period.

As shown in **Table 4**, by 2030, IID projects 231 GWh of cumulative energy efficiency savings consistent with SB 350. The utility plans to implement energy efficiency programs to reduce load by 5 percent by 2020, and adjust the goals annually to ensure they meet or exceed the SB 350 energy efficiency doubling targets. In 2030, IID's projected energy efficiency savings account for roughly 6 percent of its energy requirements. To achieve their savings goals, IID employs both residential and commercial energy efficiency savings programs. Residential programs include home energy audits, home rebates for appliances, air conditioning units, energy efficient windows, and pool pumps, air conditioning tune-ups, and refrigerator recycling. For the

residential sector, HVAC rebates and tune-ups accounted for most of the savings (91 percent) for 2015-2017.

Commercial customer energy efficiency programs include the custom energy solutions program that offers financial incentives to purchase energy efficient measures and technologies that exceed state energy efficiency requirements, commercial energy audits, rebates for energy efficient HVAC equipment and programmable thermostats, and a demand response program for large commercial customers. For commercial programs, lighting accounted for the most savings (65 percent).

Table 4: Imperial Irrigation District's Energy Efficiency Savings (GWh)

Year	SB 350 targets (GWh)
2018	58
2019	74
2020	91
2021	109
2022	127
2023	145
2024	162
2025	179
2026	195
2027	209
2028	221
2029	231

Source: CEC, based on IID's 2018 IRP filing (values from 2028 to 2029 are extrapolated)

Energy Storage

Staff finds that IID's IRP is consistent with the requirement in PUC Section 9621(d)(1)(B) to address procurement of energy storage as it discusses the potential role of energy storage on its system. In addition, AB 2514 (Skinner, Chapter 469, Statutes of 2010) requires POUs to evaluate the potential of energy storage systems as a resource and establish procurement targets, if appropriate.

On October 1, 2016, IID began operating a 30-MW (20-MWh) battery energy storage system located on the site of the El Centro Generating Station and the Sol Orchard Solar Farm, on the outskirts of El Centro. IID uses this storage system to absorb solar generation when there is excess supply, and discharge energy to help address ramping needs. The utility's storage resource is connected to automatic generation control to respond to voltage, frequency, and energy fluctuations, and help maintain power quality.

IID studied the future value and need of energy storage resources by modeling a 30-MW, 60-MW, and 100-MW battery storage resource in its system, and comparing the cost and performance of meeting various energy planning needs. The studies found that energy and grid needs, including integrating additional intermittent generation, can be cost-

effectively met with a 30-MW battery storage resource placed in the Coachella area by 2021. IID plans to gain experience using their existing and planned battery energy storage resources, and use this information to study the potential for procuring additional energy storage resources over the planning period. Depending on the value and operational performance of the existing and planned energy storage resources, the utility may put out requests for proposals for additional energy storage resources later in the planning period.

IID is also considering pump storage as a candidate resource to meet grid and reliability needs. The utility is considering converting the Pilot Knob Hydroelectric Plant into a pump storage plant as it operates infrequently and is not needed for reliability. As a pump storage resource, Pilot Knob could provide 6 hours of at least 25-MW of peak energy, as well as ancillary services.

Transportation Electrification

Staff finds that IID's IRP is consistent with the requirement of PUC Section 9621(d)(1)(C), in that they address transportation electrification for light-duty vehicles, as well as medium and heavy duty electric vehicles. Although IID does not provide detailed descriptions of customer programs, they are evaluating programs to increase adoption of electric vehicles and align with state policy goals. IID compared the costs, range, charging times, and grid impacts for gasoline, plug-in hybrid electric vehicle, and battery electric vehicles and found that battery electric vehicles had the lowest cost and made the most sense for its customers and grid. The utility is evaluating charger rebates and other customer incentives for residential and commercial customers.

IID estimates that each customer that plugs in to charge their electric vehicle can add up to 1,500-2,500 KWh per year of customer load. It concluded that a properly structured program can help alleviate solar over–generation, or generation that is surplus to loads, and provide air quality equality to IID customers, particularly if targeted to disadvantaged communities. As electric vehicles have a direct impact on the electric grid, IID looked at scenarios for charging habits (1, 2, or 3 charges per day) to better understand these grid impacts.

IID projects a peak impact from vehicle electrification of 1.75-MW in 2018, increasing to 7.74-MW in 2030. The energy requirements increase from 5.6-MWh in 2018 to 24.6-MWh in 2030. IID does not discuss the number of electric vehicle chargers installed, or the number of electric vehicles in their service territory, but analyzed three scenarios for statewide electric vehicle adoption:

- A low scenario representing a business as usual case that assumes the historic federal, state, and local incentives, and customer acceptance.
- An expected scenario that assumes 1.5 million EVs by 2025, and the required infrastructure.
- A high scenario that assumes 5 million EVs by 2030.

IID is evaluating programs to increase the adoption and utilization of medium and heavy duty electric vehicles, and reduce their electric grid impacts. Four categories of medium and heavy duty vehicles were considered for increased adoption and electric grid impacts: public transit buses, school buses, hotel/airport shuttle buses and commercial fleets, and freight trucks. For these categories, IID analyzed load impact and the value for 5, 15, and 30 percent saturation levels. IID estimated that transit buses have the lowest electric system impact while freight trucks have the highest impact.

The utility plans to monitor grid impacts from increased adoption of light duty and medium and heavy duty electric vehicles. This includes tracking and monitoring EV load consumption and charging profiles, and optimizing charging by incentivizing it with time of use rates when electrical load is low.

Portfolio Diversification

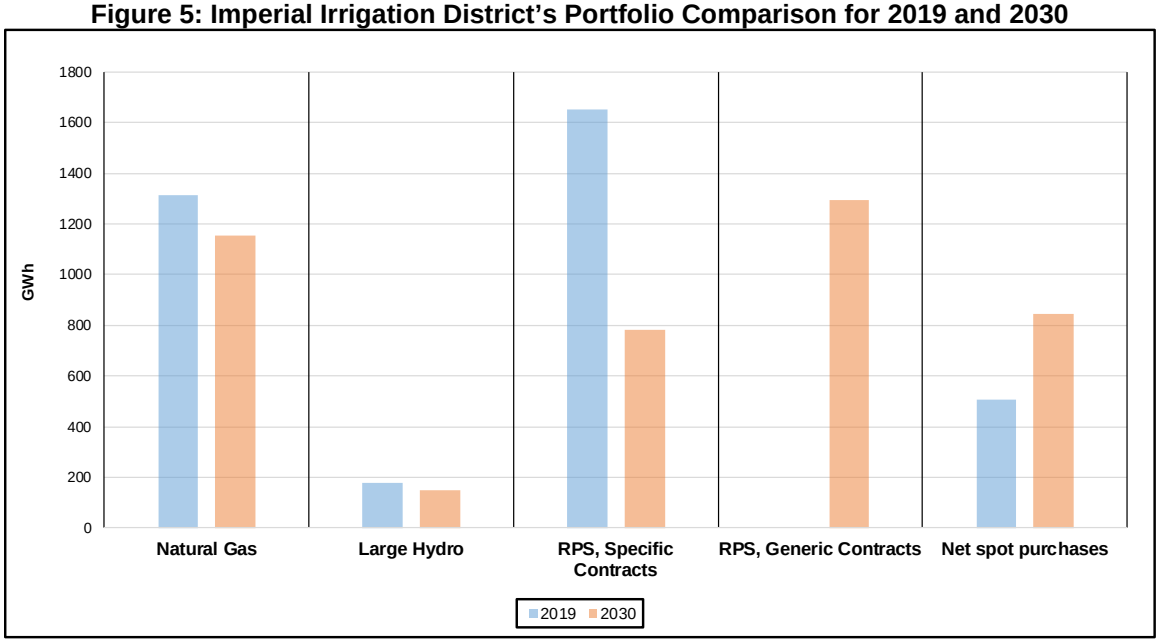
PUC Section 9621(d)(1)(D) requires that POUs address the procurement of a diversified portfolio of resources consisting of both short-term and long-term electricity, electricity related, and demand response products. Based on staff's review of IID's existing resources, its portfolio analysis, and the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

From 2019 to 2030, IID reduces its natural gas use by 12 percent and ends contracts for 14-MW of geothermal and 47-MW of biomass resources. IID originally modeled and considered thousands of potential portfolios, and chose a preferred portfolio that adds 30-MW of energy storage, 435-MW of intermittent renewables, and 20-MW of baseload renewables. This portfolio was chosen to diversify its resources, as IID currently has mostly baseload resources (90 percent baseload and 10 percent intermittent).

By 2030, IID plans to have a resource portfolio consisting of its owned natural gas units, large hydroelectric, contracts for biomass, geothermal, energy storage, small hydroelectric, and solar, along with short-term market purchases. This portfolio meets the utility's 2030 renewable energy procurement requirements and GHG emission reduction target, while maintaining system and local reliability, and affordable customer rates.

Figure 5 shows a comparison of the energy mix by resource in 2019 compared with IID's preferred portfolio in 2030.

Figure 5: Imperial Irrigation District's Portfolio Comparison for 2019 and 2030



Source: CEC, based on IID's 2018 IRP filing

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*
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
GHG	Greenhouse gas
GWh	Gigawatt-hour
IRP	Integrated resource plan
mT	Metric ton
MT	Thousand metric tons
MMT	Million metric tons
MW	Megawatt
MWh	Megawatt-hour
NERC	North American Electric Reliability Corporation
POU	Publicly owned utility
PUC	Public Utilities Code
REC	Renewable energy credit
RPS	Renewables Portfolio Standard
SB 350	Senate Bill 350 (de León, Chapter 547, Statutes of 2015)
WECC	Western Electricity Coordinating Council

APPENDIX A: DEFINITIONS

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

Additional achievable photovoltaic (AAPV): Distributed PV developed as a result of the requirement in the 2019 California Building Energy Efficiency Standards that new residential construction include solar PV as of January 1, 2020.

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

Bundled renewable energy credit: 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 both peak demand and energy consumption. Some factors that determine load forecast include economics, demographics, behind-the-meter resources, and retail rates.

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

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

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

IRP filing: An IRP adopted by the filing POU's governing board that is electronically submitted to the CEC, 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 largest amount of power a POU must generate or procure in any hour of the year. Compare this to coincident peak demand which is the amount of power the POU must generate or procure in the hour in which system wide demand is greatest. Noncoincident peak demand is referred to as peak demand throughout these guidelines.

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

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

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

Renewables Portfolio Standard Portfolio Balance Requirements: The minimum and maximum limits on certain types of bundled and unbundled RECs that may be counted towards 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 end-use customer, and thus excludes any generation or procurement in satisfaction of firm wholesale commitments (e.g., firm and spot market sales).

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

Sensitivity: A technique that determines how a 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 CEC. 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, Energy Balance Table, Renewable Procurement Table, and Greenhouse Gas Emissions Accounting Table.

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

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

APPENDIX B:
SUMMARY TABLES

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

		Fuel Type	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Retail sales			**3,382**	**3,412**	**3,448**	**3,489**	**3,534**	**3,582**	**3,632**	**3,685**	**3,739**	**3,794**	**3,850**	**3,908**
Net energy for load			**3,767**	**3,802**	**3,835**	**3,879**	**3,931**	**3,983**	**4,038**	**4,094**	**4,152**	**4,213**	**4,303**	**4,346**
Non-RPS Resources	Coachella	Natural gas	0	0	0	0	0	0	0	0	0	0	2	2
	El Centro	Natural gas	922	898	782	778	855	877	895	933	918	940	884	874
	Niland	Natural gas	80	75	78	80	83	93	103	112	133	153	129	145
	Rockwood	Natural gas	7	9	9	6	6	6	6	5	5	5	4	4
	Yucca GT 21	Oil	0	0	0	0	0	0	0	0	0	0	0	0
	Yucca Steam	Natural gas	304	235	219	229	198	182	199	205	201	195	140	131
	Augustine	Solar	3	3	3	3	3	3	3	3	3	3	3	3
	BCP/Hoover+Tribes	Large Hydro	27	27	27	27	27	27	27	27	27	27	27	27
	Parker_Davis	Large Hydro	153	142	141	142	142	143	142	142	142	143	128	123
	SCAPPA Nuclear	Nuclear	114	114	114	114	114	114	114	114	114	114	114	114
	Total Non-RPS energy		**1,610**	**1,504**	**1,373**	**1,379**	**1,428**	**1,445**	**1,489**	**1,541**	**1,543**	**1,580**	**1,431**	**1,423**
RPS Resources	DROPS	Small Hydro	256	257	256	262	256	257	256	256	256	257	256	256
	Imperial Valley Solar Center	Solar	51	50	50	50	49	49	48	48	48	48	47	47
	Biomass contracts	Biomass	379	378	375	131	0	0	0	0	0	0	0	0
	Geothermal contracts	Geothermal	536	550	562	559	556	554	550	481	472	471	74	74
	REC YCWUA	Small Hydro	15	15	15	15	15	15	15	15	15	15	15	15
	Solar contracts	Solar	415	413	410	408	405	403	400	398	395	394	391	388
	Baseload RPS-eligible resources	Renewable	0	0	0	0	0	0	0	0	0	0	108	130
	Intermittent RPS-eligible resources	Renewable	0	0	0	0	0	0	0	0	0	0	969	1,167
	Total RPS energy		**1,652**	**1,664**	**1,668**	**1,424**	**1,281**	**1,279**	**1,270**	**1,198**	**1,187**	**1,185**	**1,859**	**2,077**
	Short term/spot purchases:	Unspecified	546	664	816	1,090	1,236	1,278	1,294	1,377	1,454	1,496	1,154	1,025
	Short term/spot sales	Unspecified	(41)	(30)	(22)	(13)	(14)	(18)	(15)	(22)	(33)	(48)	(142)	(179)
	Total energy, RPS and Non-RPS		**3,767**	**3,802**	**3,835**	**3,880**	**3,931**	**3,983**	**4,038**	**4,094**	**4,152**	**4,213**	**4,303**	**4,346**
	Surplus/shortfall		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Source: CEC, based on IID's 2018 IRP filing Energy Balance Table

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

		Fuel Type	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Forecast Peak Demand			1,061	1,068	1,080	1,092	1,108	1,119	1,138	1,155	1,171	1,186	1,206	1,224
Demand Response			(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Planning Reserve Margin			158	159	161	163	165	167	170	172	175	177	180	183
TotalProcurement Requirement			**1,213**	**1,221**	**1,235**	**1,249**	**1,267**	**1,280**	**1,302**	**1,321**	**1,340**	**1,357**	**1,380**	**1,401**
Non-RPS Resources	Coachella 1-4	Natural gas	72	72	72	72	72	72	72	72	72	72	72	72
	El Centro 2-4	Natural gas	296	296	296	296	296	296	296	296	296	296	296	296
	Niland 1-2	Natural gas	86	86	86	86	86	86	86	86	86	86	86	86
	Rockwood 1-2	Natural gas/Oil	45	45	45	45	45	45	45	45	45	45	45	45
	Yucca GT 21	Oil	18	18	18	18	18	18	18	18	18	18	18	18
	Yucca Steam	Natural gas	75	75	75	75	75	75	75	75	75	75	75	75
	BCP/Hoover+Tribes	Large hydro	6	6	6	6	6	6	6	6	6	6	6	6
	Parker Davis	Large hydro	33	33	33	33	33	33	33	33	33	33	33	33
	SCAPPA Nuclear	Nuclear	15	15	15	15	15	15	15	15	15	15	15	15
	Augustine	Unspecified	1	1	1	1	1	1	1	1	1	1	1	1
RPS Resources	Desert View Colmac	Biofuels	45	45	45	45	0	0	0	0	0	0	0	0
	SB 859 Biomass	Biofuels	2	2	2	2	0	0	0	0	0	0	0	0
	Cal Energy	Geothermal	50	50	50	50	50	50	50	50	50	50	0	0
	GeoGenCo	Geothermal	0	4	4	4	4	4	4	4	0	0	0	0
	Ormat Geothermal	Geothermal	10	10	10	10	10	10	10	10	0	0	0	0
	Ormat Ormesa	Geothermal	5	5	5	5	5	5	5	5	5	5	5	5
	IID BESS	Battery Storage	20	19	19	18	18	18	17	17	17	16	16	16
	DROPS	Small hydro	32	32	32	32	32	32	32	32	32	32	32	32
	Imperial Valley Solar Center	Solar PV	10	10	10	10	10	10	10	10	10	10	10	10
	REC YCWUA	Small hydro	6	6	6	6	6	6	6	6	6	6	6	6
	8 Min Energy	Solar PV	21	21	21	21	21	21	21	21	21	21	21	21
	Citizens	Solar PV	9	9	9	9	9	9	9	9	9	9	9	9
	ECPV	Solar PV	14	14	14	14	14	14	14	14	13	13	13	13
	Feed-in-tariff programs	Solar PV	11	11	11	11	11	11	11	11	11	11	10	10
	Heber Solar	Solar PV	5	5	5	5	5	5	5	5	5	5	5	5
	Regenerate	Solar PV	25	25	25	25	25	24	24	24	24	24	24	24
	SDSU PV1	Solar PV	4	4	4	4	4	4	4	4	4	4	4	4
	SunPeak 2	Solar PV	10	10	10	10	10	10	10	10	10	10	10	9
	Total existing capacity		**926**	**929**	**929**	**928**	**881**	**880**	**879**	**879**	**864**	**863**	**812**	**811**
	Additions													
	Battery Storage/Energy Storage	Storage	0	0	30	29	29	28	28	27	27	26	26	25
	Baseload RPS-eligible resources	Renewable	0	0	0	0	0	0	0	0	0	0	18	20
	Intermittent RPS-eligible resources	Renewable	0	0	0	0	0	0	0	0	0	0	326	435
	Short-term/spot purchases	Unspecified	273	278	293	308	371	385	407	427	451	468	203	122
	Total capacity, with planned additions		**1,199**	**1,207**	**1,252**	**1,265**	**1,281**	**1,293**	**1,314**	**1,333**	**1,342**	**1,357**	**1,385**	**1,413**
	Surplus/shortfall		**(14)**	**(14)**	**17**	**16**	**14**	**13**	**12**	**12**	**2**	**0**	**5**	**12**

Source: CEC, based on IID's 2018 IRP filing Capacity Resource Accounting Table

Table B-3: GHG Emissions from Imperial Irrigation District's Resource Portfolio, All Years

Supply Resources	Fuel Type	Emissions Intensity (mt CO_2-e/MWh)	Total Emissions (MT CO2e)											
			2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Coachella 1	Natural Gas	0.809	0	0	0	0	0	0	0	0	0	0	0	0
Coachella 2	Natural Gas	0.847	0	0	0	0	0	0	0	0	0	0	0	0
Coachella 3	Natural Gas	0.817	0	0	0	0	0	0	0	0	0	0	1	1
Coachella 4	Natural Gas	0.817	0	0	0	0	0	0	0	0	0	0	0	0
EL Centro #2	Natural Gas	0.444	113	106	75	75	75	82	84	86	84	84	82	74
EL Centro #3	Natural Gas	0.413	266	266	252	251	282	284	287	298	292	299	282	279
EL Centro #4	Natural Gas	0.695	17	9	2	3	3	4	9	12	14	20	12	21
Yucca GT 21	Natural Gas	0.787	0	0	0	0	0	0	0	0	0	0	0	0
Niliand 1	Natural Gas	0.574	14	15	19	20	20	21	24	26	28	33	30	34
Niliand 2	Natural Gas	0.542	30	27	25	25	26	30	32	36	45	52	42	47
Rockwood 1	Natural Gas	0.712	5	7	6	4	4	4	4	4	4	3	3	3
Yucca Steam	Natural Gas	0.587	178	138	128	134	116	107	116	120	118	114	82	77
Rockwood 2	Natural Gas	0.865	0	0	0	0	0	0	0	0	0	0	0	0
Total GHG emissions - existing resources			**623**	**568**	**507**	**512**	**526**	**532**	**556**	**582**	**585**	**605**	**534**	**536**
spot-market/short-term purchases		0.428	234	284	349	466	529	547	554	589	623	640	494	439
spot-market/short-term sales		0.428	(18)	(13)	(9)	(6)	(6)	(8)	(6)	(9)	(14)	(21)	(61)	(76)
Total GHG emissions			**839**	**839**	**847**	**972**	**1,049**	**1,071**	**1,104**	**1,162**	**1,194**	**1,224**	**967**	**899**
Emissions adjustment			0	0	0	0	0	0	0	0	0	0	0	0
Adjusted Portfolio emissions			**839**	**839**	**847**	**972**	**1,049**	**1,071**	**1,104**	**1,162**	**1,194**	**1,224**	**967**	**899**

Source: CEC, based on IID's 2018 IRP filing Greenhouse Gas Emissions Accounting Table

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 gigawatthours, 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 CEC, for the electricity sector and each local publicly owned electric utility that reflect the electricity sector's percentage in achieving the economywide 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 economywide 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 gigawatthours, 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.)