Standard LSE Plan

PENINSULA CLEAN ENERGY

2022 INTEGRATED RESOURCE PLAN

NOVEMBER 1, 2022

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I. Executive Summary

In accordance with the requirements of Senate Bill 350 and the California Public Utilities Commission (CPUC or Commission) Decision (D.)20-03-028, Peninsula Clean Energy Authority (Peninsula Clean Energy) respectfully submits its 2022 Integrated Resource Plan (IRP). The IRP is comprised of this written narrative as well as the following attachments as provided by the CPUC:

i. Completed CPUC Resource Data Template (RDT) - 25MMT Conforming
ii. Completed CPUC Clean System Power Calculator (CSP Calculator) - 30 MMT Conforming
iii. Completed CPUC Clean System Power Calculator (CSP Calculator) - 25 MMT Conforming

This IRP was approved by Peninsula Clean Energy's Board of Directors on October 27, 2022, and the resolution documenting this approval is attached as Appendix F.

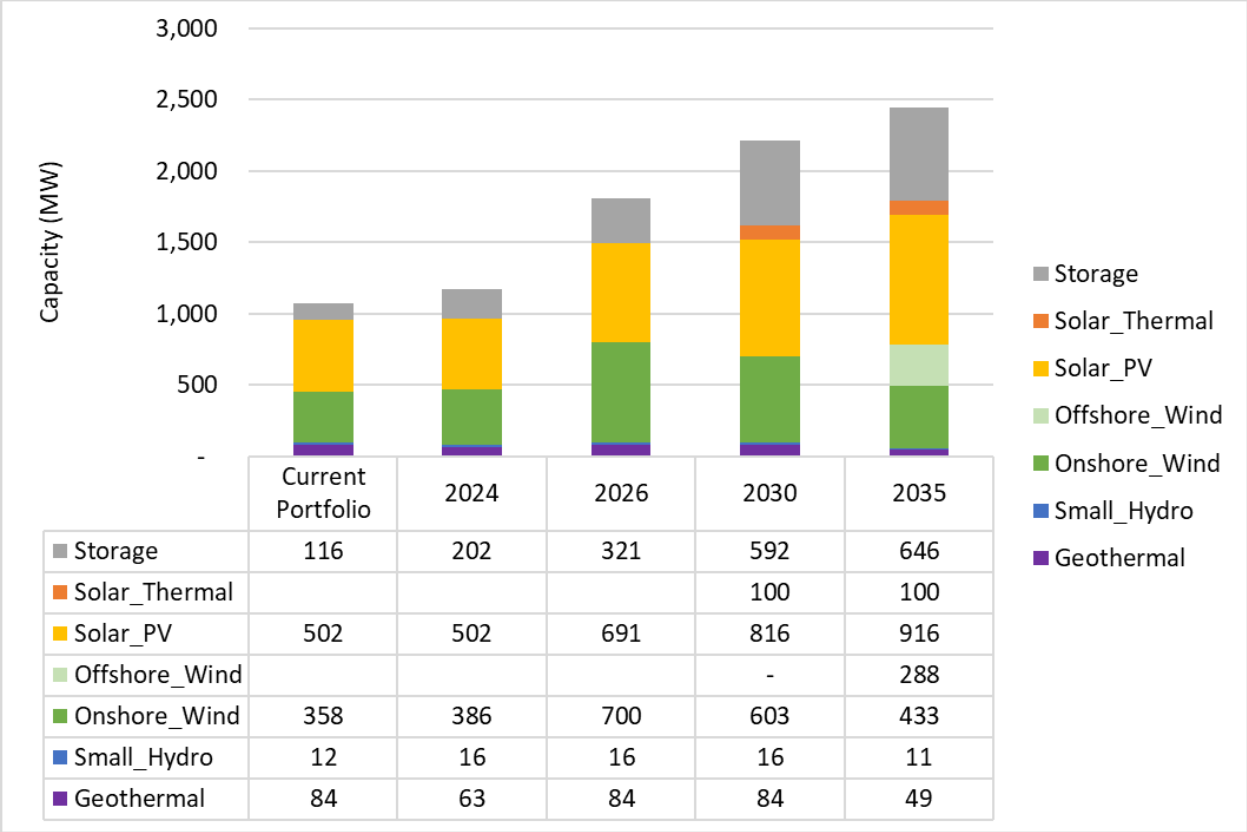
In the 2022-2023 IRP cycle, Peninsula Clean Energy staff performed the modeling in-house. Peninsula Clean Energy staff used the MATCH (Modeling Around-The-Clock Hourly energy) model, to develop the cost-optimal portfolio that met all the specified planning goals. Staff then used the proprietary PowerSimm software, developed by Ascend Analytics, to perform a stochastic evaluation of the selected portfolio.

Peninsula Clean Energy is submitting a single conforming portfolio that exceeds the emissions reduction goals of the 25 Million Metric Tons of CO_2 (MMT) scenario. This preferred portfolio meets all the regulatory requirements of the IRP process and implements Peninsula Clean Energy's aggressive voluntary goals to match renewable supply to customer demand on an hourly basis. Table 1 shows how Peninsula Clean Energy's preferred portfolio performs better than our emissions benchmarks. Figure 1 shows the portfolio composition by nameplate capacity. In the sections below, we provide further details on the composition of these portfolios and discuss our methodology for developing these portfolios.

Table 1: Peninsula Clean Energy Preferred Portfolio Emissions

	2024	2026	2030	2035
Assigned Load Forecast (GWh)	3,456	3,496	3,721	4,033
25 MMT GHG Benchmark (MMT CO_2)			0.4	0.33
30 MMT GHG Benchmark (MMT CO_2)			0.53	0.42
Peninsula Clean Energy Preferred Portfolio Emissions (MMT CO_2) (25MMT Scenario)	0.18	0.02	0.05	0.01
Peninsula Clean Energy Preferred Portfolio Emissions (MMT CO_2) (30MMT Scenario)	0.18	0.02	0.04	0

Figure 1: Peninsula Clean Energy Preferred Portfolio Capacity



	Current Portfolio	2024	2026	2030	2035
Storage	116	202	321	592	646
Solar_Thermal				100	100
Solar_PV	502	502	691	816	916
Offshore_Wind				-	288
Onshore_Wind	358	386	700	603	433
Small_Hydro	12	16	16	16	11
Geothermal	84	63	84	84	49

a. About Peninsula Clean Energy

Peninsula Clean Energy, a community choice energy aggregator (CCA), provides electricity service to residents and businesses in San Mateo County and the City of Los Banos in Merced County. Formed in February 2016, Peninsula Clean Energy is a joint powers authority, consisting of the County of San Mateo, all twenty of its towns and cities, and the City of Los Banos in Merced County. Following a comprehensive feasibility study, consistent with AB 32 voluntary action pathways, elected officials from each member jurisdiction *unanimously* agreed to form Peninsula Clean Energy to meet their local climate action goals and for the benefit of San Mateo County. In 2020, following another comprehensive feasibility study, elected officials from the City of Los Banos voted to join Peninsula Clean Energy.

Peninsula Clean Energy provides cleaner and greener electricity, and at lower rates, than the incumbent investor-owned utility (IOU), Pacific Gas & Electric Company (PG&E). Peninsula Clean Energy plans for and secures commitments from a diverse portfolio of energy-generating resources to reliably serve the electric energy requirements of its customers over the near-, mid-, and long-term planning horizons. Peninsula Clean Energy was assigned an investment-grade credit rating from Moody's in May 2019 and Fitch in April 2020, the second of the three CCAs in California to obtain investment-grade credit ratings. Peninsula Clean Energy's programs include advancing the adoption of electric transportation and transitioning building fossil fuel uses to low carbon electricity. For more information on Peninsula Clean Energy, please go to www.peninsulacleanenergy.com.

As part of its mission-driven, collaborative, not-for-profit, locally focused roots, Peninsula Clean Energy is committed to two key organizational priorities:

- By 2025 deliver a 100% renewable energy on an annual basis and align renewable energy supply with customer demand each and every hour of the day;
- Contribute to San Mateo County reaching the state's goal to be 100% greenhouse gas-free by 2035;

and to the following strategic goals:

- Secure sufficient, low-cost, clean sources of electricity that achieve Peninsula Clean Energy's priorities while ensuring reliability and meeting regulatory mandates;
- Strongly advocate for public policies that support Peninsula Clean Energy's Organizational Priorities;
- Implement robust energy programs that reduce GHG emissions, align energy supply and demand, and provide benefits to community stakeholder groups;
- Develop a strong brand reputation that drives participation in Peninsula Clean Energy's programs while ensuring customer satisfaction;
- Employ sound fiscal strategies to promote long-term organizational sustainability; and
- Ensure organizational excellence by adhering to sustainable business practices and fostering a workplace culture of innovation, diversity, transparency, and integrity.

The importance of these goals for the communities of San Mateo County is underscored by the 2019 declaration of a climate emergency by the Board of Supervisors calling on local agencies and jurisdictions to work "to achieve carbon neutrality throughout San Mateo County and to implement other actions to address climate change."[1]

Peninsula Clean Energy is governed by its Board of Directors. Each member jurisdiction from San Mateo County, plus the city of Los Banos, has one seat on Peninsula Clean Energy's Board of Directors (except for San Mateo County, which has two) for a total of 23 elected officials acting as board members. In addition, the Board of Directors has two board member director emeritus selected from former directors who participate in board activities as non-voting members.

The Board of Directors is responsible for setting the overall strategy for Peninsula Clean Energy, including rate setting and energy procurement decisions. Board meetings are held on the fourth Thursday of each month at 6:30 PM at Peninsula Clean Energy's offices in Redwood City.[2] As prescribed by the Brown Act and the CCA institutional model, all Board meetings are open to the public and all meeting materials are posted online. The decisions of the Board are binding requirements for Peninsula Clean Energy.

[1] San Mateo County Board of Supervisors Resolution 19-847, adopted September 17, 2019, available at: sanmateocounty.legistar.com/LegislationDetail.aspx?ID=4134897&GUID=6121741A-FB48-401A-BC1E-41DE639FFD1F&Options=&Search=

[2] Due to COVID-19, meetings are currently being held remotely over video conference and tele conference but remain open to the public. Details on Board meetings are available here: www.peninsulacleanenergy.com/board-of-directors/

In October 2016, Peninsula Clean Energy began serving its first phase of customers, which included all small and medium commercial customers and 20% of residential customers. The second phase of customers were enrolled in April 2017, consisting of all other customers, including large commercial and industrial, agricultural, and the remaining residential customers.

i. Enrolled Customers

Peninsula Clean Energy serves over 310,000 customer accounts representing approximately 780,000 residents. Table 2 shows the breakdown between commercial/industrial customers and residential customers in Peninsula Clean Energy's service territory.

Table 2: Peninsula Clean Energy Breakdown by Customer Type

	Total Peninsula Clean Energy	Residential	Commercial, Industrial
Number of Customer Accounts (October 2022)	310,293	281,233	29,060
		91%	9%
Total Retail Sales (MWh in 2021)	3,301,729	1,384,272	1,956,320
		42%	58%

Customers are automatically enrolled in Peninsula Clean Energy and have the option to opt-out of Peninsula Clean Energy and return to PG&E for electric service. Customer participation rates shown in Table 2 are expressed as the proportion of customer accounts currently served by Peninsula Clean Energy relative to the total number of electric customer accounts in San Mateo County eligible for Peninsula Clean Energy service.[3] The remaining percentages of accounts reflects the subset of customer accounts who have voluntarily opted out of the Peninsula Clean Energy program, retaining bundled service by PG&E. As of publication, Peninsula Clean Energy's customer participation rate is approximately 97%.

ii. Retail Products

Peninsula Clean Energy customers can choose between two different product options, ECOplus and ECO100. Each product has a different amount of energy from renewable sources such as solar and wind. Table 3 summarizes customer product choice in 2021.

Table 3: Customer Product Choice (2021)

	Total Peninsula Clean Energy	ECOplus	Eco100
Number of Customer Accounts	296,575	289,860	6,715
		98%	2%
Total Retail Sales (MWh)	3,301,729	3,030,741	270,998
		92%	8%

[3] Direct Access customers are not automatically enrolled in a CCA program. The Direct Access (DA) Program allows a limited selection of non-residential consumers in California to purchase their electricity from an energy service provider (ESP) rather than from their investor-owned utility (IOU) or default electricity supplier.

ECOplus is Peninsula Clean Energy's default electric option, in which new customers are automatically enrolled. ECOplus rates are set at 5% below PG&E's generation rates. Beginning in 2021, approximately half of the electricity for ECOplus comes from renewable sources, and half comes from large hydroelectric sources that are GHG-free.

Customers can choose to "opt up" to ECO100 and receive 100% of their electricity from renewable energy resources. ECO100 costs $0.01 per kilowatt-hour (kWh) more than ECOplus. As of the end of 2021, 6,245 accounts opted-up to ECO100. As part of their emission reduction targets and sustainability goals, 16 cities and the County of San Mateo enrolled their accounts in ECO100. The ECO100 option also provides an opportunity for corporate customers to meet their own sustainability goals. For example, Visa and Facebook have both chosen the ECO100 offering for their electricity use in San Mateo County.[4] Beginning in January 2018, the ECO100 product is certified by the Center for Resource Solutions' (CRS) Green-e certification program.

II. Study Design

For the 2022 IRP filing, Peninsula Clean Energy has developed one conforming portfolio to meet both the 30MMT and 25MMT scenarios. Our conforming portfolio assumes market fundamentals consistent with Ascend Analytic's AscendView forecast updated in the first half of 2022. Our conforming portfolio provides at least 100% renewable energy on an annual basis and implements Peninsula Clean Energy's aggressive voluntary goal to match renewable supply to customer demand on a 24x7 hourly basis. The conforming portfolio matches, on average, 95% of hourly customer load to time-coincident renewable supply over the course of a calendar year. The 95% hourly matching is a more conservative portfolio planning target than internal discussions to target 99% hourly matching. However, we feel that presenting a more conservative implementation of our 24x7 matching goal is appropriate for the regulatory context of the IRP.

Peninsula Clean Energy performed all modeling, portfolio selection, and data template preparation internally.

Our conforming portfolio uses the California Energy Commission's (CEC) 2021 Integrated Energy Policy Report (IEPR) demand forecast (Mid Baseline – [Additional Achievable Energy Efficiency] AAEE Scenario 3, [Additional Achievable Fuel Substitution] AAFS Scenario 3), adopted on January 26, 2022, as modified by CPUC in the Administrative Law Judge's Ruling Finalizing Load Forecasts and Greenhouse Gas Emissions Benchmarks for 2022 Integrated Resource Plan Filings (June 15, 2022). Peninsula Clean Energy's disaggregated demand forecast was provided by the CPUC in Form 1.1c of the "2022 Final GHG Emission Benchmarks for LSEs_public" Excel document available on the 2022-2023 IRP Website: www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-power-procurement/long-term-procurement-planning/2022-irp-cycle-events-and-materials

[4] Facebook ECO100 Press Release: www.peninsulacleanenergy.com/wp-content/uploads/2016/06/Facebook-is-Largest-ECO100-Customer-092117.pdf. Visa ECO100 Press Release: www.peninsulacleanenergy.com/wp-content/uploads/2018/05/050218-Peninsula Clean Energy-Release-v.8-Final.pdf

The portfolio uses inputs and assumptions consistent with those used to develop the 2021 Preferred System Plan (RSP). Peninsula Clean Energy's conforming portfolio achieves emissions below the assigned GHG Benchmark for the 25 MMT scenario. The Conforming Portfolio is described in detail in Section III. Study Results below.

In the 2020 IRP Cycle, Peninsula Clean Energy performed joint modeling with two other CCAs. Peninsula Clean Energy considered partnering with other CCAs to perform joint modeling in the 2022-2023 IRP cycle. However, following discussion with other CCAs, Peninsula Clean Energy determined the ideal approach in this cycle was to perform individual modeling.

In Decision 22-02-004, the CPUC published its review of Peninsula Clean Energy's 2020 IRP. Peninsula Clean Energy's IRP was found to be adequate in all areas, and was lauded as Exemplary in the following sections:

- Study Design: Modeling Tools and Modeling Approach
- Study Results: Conforming and Alternative Portfolios, Focus on disadvantaged communities, Cost and rate analysis, System reliability analysis, Hydro generation risk management, Long-duration storage development, and Out-of-state wind development
- Action Plan: Barrier analysis

Peninsula Clean Energy is concurrently undertaking an internal resource planning process to implement our aggressive voluntary goal to provide 24x7 renewable supply that match with customer demand on an hourly basis. Because of the standardized assumptions required in the 2022-2023 CPUC IRP Process, our conforming portfolio differs from the portfolios identified by our internal 24x7 analysis. The two portfolios are generally similar in capacity build out and resource composition, but where there are differences, we believe our internal analysis is more reflective of the specific context of our service territory and our portfolio planning goals.

a. Objectives

Peninsula Clean Energy's primary objectives in submitting this IRP are as follows:

1. To demonstrate that Peninsula Clean Energy has a plan to meet its CEC 2021 IEPR load forecast through 2035;
2. To share with the CPUC Peninsula Clean Energy's Conforming Portfolio which meet the emissions reductions targets and reliability requirements for both the 30 MMT and 25 MMT scenarios for 2035, reflecting CPUC requirements.

Further, we attempt to meet both the requirements set out by the CPUC as well as continue to meet the objectives set out by Peninsula Clean Energy's Board, including our aggressive voluntary goal to provide 24x7 renewable energy to meet our customer demand on an hourly basis by 2025. Peninsula Clean Energy has a goal to provide 100% renewable energy on an annual basis by 2025, far exceeding the RPS target of about 47% in 2025.

Reducing electric utility-sector GHG emissions is one of Peninsula Clean Energy's charter objectives. Peninsula Clean Energy started with a 75% GHG-free supply portfolio in 2016, increased the target by 5% per year, and achieved a 100% GHG-free supply portfolio as of 2021.

Looking forward to 2025, Peninsula Clean Energy intends to replace the non-renewable GHG-free energy resources (that is, large hydroelectric resources) in its supply portfolio with renewable resources. Actual annual renewable content percentages may differ from projections, if resource availability or market conditions preclude cost-effective procurement, but the primary goal is to achieve a 100% RPS-eligible renewable supply no later than 2025.

Further, in providing customers with 100% renewable energy, Peninsula Clean Energy intends to match its electricity supply portfolio to its customer electricity demand profile on a time coincident, or 24x7 hourly basis. This means that for every hour of the year, Peninsula Clean Energy aims to procure energy from renewable generators equal to the amount of demand of Peninsula Clean Energy customers in that hour. Peninsula Clean Energy staff have performed extensive modeling and analysis of our 24x7 renewable goal, which was presented to our Board of Directors on September 22, 2022. Staff's analysis identified an implementation of our 24x7 goal targeting 99% hourly matching as an implementation that maximizes the emissions reductions benefits of 24x7 renewable energy in a cost-effective way. However, for the 2022 IRP, we are using an implementation of 95% hourly matching as a more conservative assumption more appropriate for the regulatory context of the IRP.

In addition, the Peninsula Clean Energy Board has adopted the following three specific policies to guide power procurement:

1. Peninsula Clean Energy shall not use unbundled renewable energy credits (RECs) for meeting its renewable energy goals.[5]
2. In sourcing electricity and resource adequacy (RA), Peninsula Clean Energy will not procure electricity or resource adequacy from coal facilities.[6]
3. Peninsula Clean Energy has published an Inclusive and Sustainable Workforce Policy.[7] Peninsula Clean Energy desires to facilitate and accomplish the following objectives through this policy:
    a. Support for and direct use of local businesses;
    b. Support for and direct use of union members from multiple trades;
    c. Support for and use of training and State of California approved apprenticeship programs, and pre-apprenticeship programs from within Peninsula Clean Energy's service territory; and
    d. Support for and direct use of green and sustainable businesses.

Peninsula Clean Energy's goal is to fulfill its open position with a diverse set of contracts. Peninsula Clean Energy uses a portfolio risk management approach in its power purchasing program, seeking low-cost supply as well as diversity among technologies, production profiles, project sizes, project locations, counterparties, term lengths and timing of market purchases to cost average over time, including remaining cognizant of the value of open market positions. These factors are taken into consideration when Peninsula Clean Energy engages the market, and Peninsula Clean Energy has developed specific

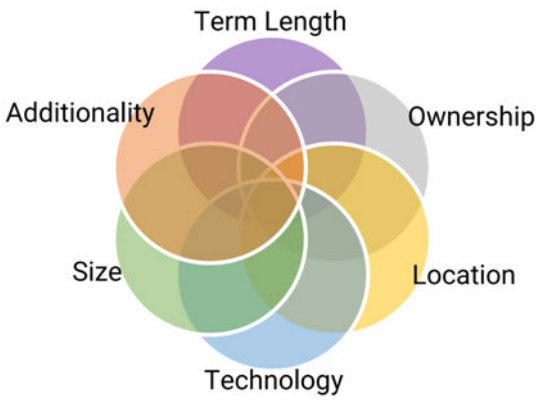
[5] Peninsula Clean Energy policy on unbundled RECs: www.peninsulacleanenergy.com/wp-content/uploads/2017/01/PCE-Policy-11-final.pdf

[6] Peninsula Clean Energy Policy excluding coal for power and resource adequacy: www.peninsulacleanenergy.com/wp-content/uploads/2017/01/Policy-12-Excluding-Coal-for-Power-and-Resource-Adequacy.pdf

[7] Peninsula Clean Energy Sustainable Workforce Policy: www.peninsulacleanenergy.com/wp-content/uploads/2018/10/Policy-10-Inclusive-and-Sustainable-Workforce-revised-10-25-18.pdf

guidelines for each of these diversification factors. Specifically, Peninsula Clean Energy has set a guideline to target a minimum 50% of the portfolio be procured from new projects by 2025 and procure at least 50% of our portfolio from long-term contracts. These procurement diversity targets are described in our 2018 Strategic IRP[8], and are illustrated below.

Figure 2: Procurement Diversity Attributes



b. Methodology

i. Modeling Tool(s)

The 2022 IRP analysis was conducted using a new modeling tool that Peninsula Clean Energy developed to identify the lowest-cost portfolio of contracted renewable energy and energy storage resources that could match our customer demand on a 24/7 basis, which we are calling the MATCH (Matching Around-the-Clock Hourly energy) model. The MATCH model is a deterministic portfolio optimization tool that determines the cost-optimal selection and dispatch of resources to meet load based on a set of assumptions and operating restrictions.
This new portfolio and dispatch optimization model is based on the software architecture of an existing, open-source power system planning model called SWITCH[9], but has been substantially redesigned to meet the needs of modeling time-coincident renewable power portfolios for entities like Peninsula Clean Energy.
Staff then used the proprietary PowerSimm software, developed by Ascend Analytics, to perform a stochastic evaluation of the selected portfolio.

Some key features of MATCH are:

- Cost-optimal resource selection and dispatch
- Ability to match supply and demand on an hourly basis
- Easy-to-use weather-correlated resource generation profiles
- Ability to dispatch storage either to meet load or to respond to market signals

[8] Peninsula Clean Energy 2018 Strategic IRP: www.peninsulacleanenergy.com/wp-content/uploads/2018/01/PCE-FINAL-2017-IRP-Updated.pdf

[9] The SWITCH model is available at switch-model.org/

The key inputs to the MATCH model are:

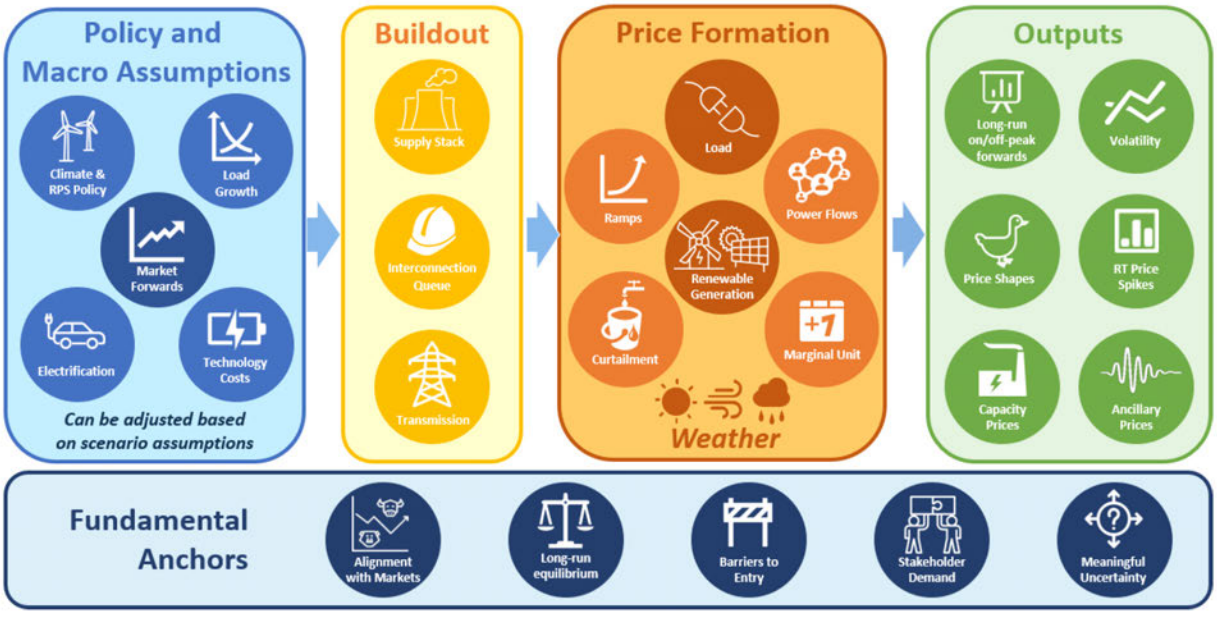
- Hourly Load Forecast
- Hourly Market Prices at each modeled node
- Available resource characteristics and costs (model can automatically develop resource generation profiles, or a user may enter a specified resource generation profile)
- Resource Adequacy Requirements

Once the cost-optimal portfolio was selected in MATCH, staff used PowerSimm to model the stochastic performance of the portfolio:

- Evaluated the performance of the selected portfolios under a variety of possible weather patterns and market price.
- Made stochastic analysis runs many simulations with varied inputs and provides estimates on the range of likely outcome

In order to develop many of the inputs required for the modeling, Peninsula Clean Energy used Ascend Analytics' AscendView fundamental forecast released in May 2022. The AscendView fundamental forecast is updated twice a year and takes into account fundamental macro-level drivers such as market and regulatory structure, current federal and state policies, technology costs, and load forecasts. AscendView provides a forecast of market prices and a supply stack forecast for resource builds and retirements.

Figure 3: Ascend's Fundamental Modeling Framework

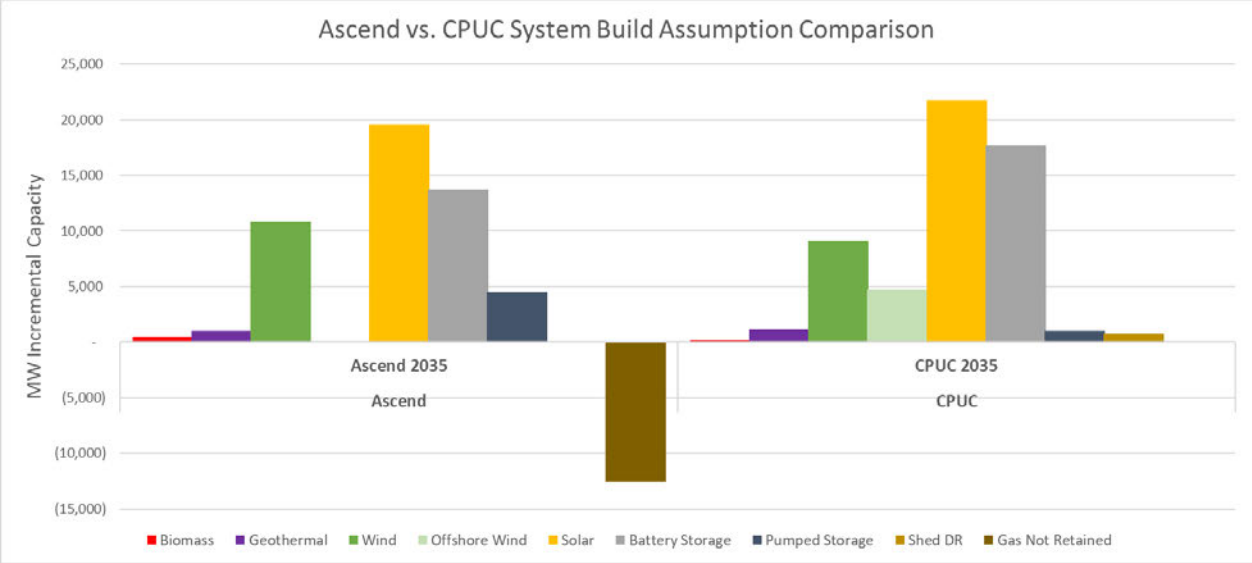


The CPUC used RESOLVE to develop the 2021 Preferred System Plan, which identifies the new resources needed to meet the GHG emissions reductions targeted in the 2020 IRP 38 MMT Scenario.

Both RESOLVE and AscendView are forecasting significant renewable resource capacity additions in future years to meet California's emissions reductions targets, with over 10 GW of new wind, about 20 GW of new solar, and about 15GW of new storage resources added to CAISO by 2035. Although there are differences between the two supply stacks, we would not expecting a significant impact to Peninsula Clean

Energy's selected portfolio. Moreover, by using the AscendView forecasts, we can use the hourly nodal price forecasts developed by Ascend Analytics using the AscendView forecasts, which enables us to do sophisticated hourly dispatch modeling of our selected portfolio.

Figure 4: Comparison of AscendView and RESOLVE Build Assumptions



MATCH and RESOLVE both optimize dispatch for a system under a given set of deterministic inputs. RESOLVE is a linear optimization model, which assesses dispatch based on representative days over a defined forecast horizon. MATCH differs in that it is a mixed integer program and performs hourly chronological dispatch for all 8760 hours in a simulation year. Both RESOLVE and MATCH identify the optimal resources to meet needs based on the available resources including generation and storage. Both models allow for the incorporation of different types of market and portfolio constraints including renewable generation targets, carbon emissions, capacity requirements and reserve margins, and timing of new build requirements. MATCH is further configurable to optimize for hourly renewable targets.

Table 4 below identifies the key differences between CPUC's RESOLVE and Peninsula Clean Energy's MATCH modeling approaches.

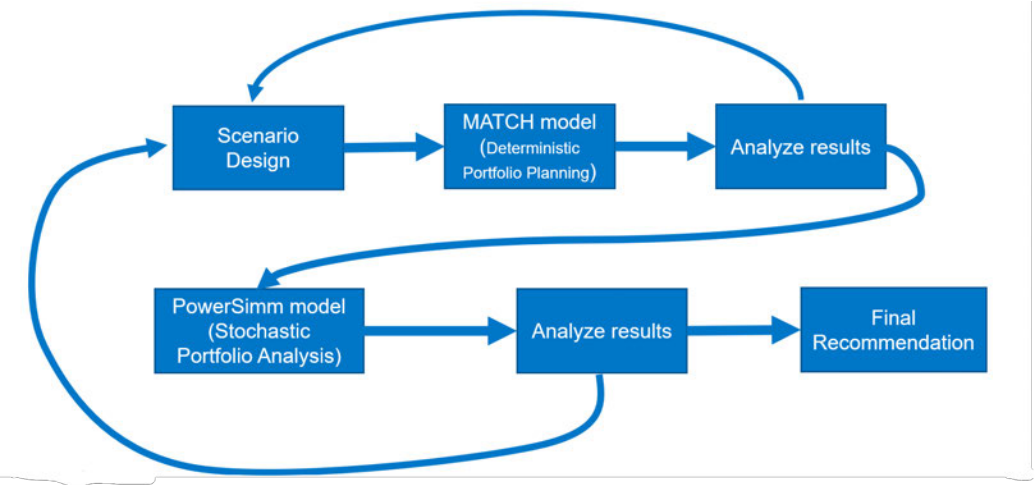
Table 4: Differences Between RESOLVE and MATCH Modeling Approaches

RESOLVE	MATCH
Groups resources into categories with similar operational characteristics (e.g., nuclear, coal, gas CCGT, gas peaker, renewables) and models them collectively.	Models each generator independently.
Linearized unit commitment where the commitment variable for each class of generators is a continuous variable rather than an integer variable.	Models the operating cost and performance parameters on a plant-level basis, where the optimization method uses a mixed integer program (MIP) to determine capacity build of each resource, and the hourly dispatch of each resource.
Run for a sampled 37 days in a year and only for a few years, therefore, only representative load and renewable profiles were selected to reflect system conditions.	Modeled 8760 hours for each of the study years (2024, 2026, 2030 and 2035)
Models an entire market, in this case, CAISO, reflecting high level interties and market interaction with neighboring regions.	MATCH was used to model Peninsula Clean Energy's portfolio within the CAISO market. For this analysis, we used the AscendView fundamental forecast to provide the background CAISO market assumptions and modeled our portfolio within the market.
Allows for the incorporation of annual renewable generation goals	Allows for the incorporation of annual renewable generation goals or for hourly load-matching renewable generation goals

ii. Modeling Approach

Peninsula Clean Energy took an iterative approach to modeling, as illustrated in Figure 5 below. First, Peninsula Clean Energy designed scenarios to run in the MATCH model. After running the model, the results were examined, and often led back to redesigning the scenarios. Once we had developed the appropriate scenarios and run the MATCH model, we used the selected portfolio from MATCH as inputs in to the PowerSimm model, which performed stochastic analysis of our portfolio's performance. The evaluation of the stochastic performance could lead back to redesigning the scenarios. In this way, the modeling process was iterative until the final results were reached.

Figure 5: Peninsula Clean Energy Modeling Approach



Peninsula Clean Energy used assumptions consistent with the 2022-2023 IRP Filing Requirements, with some modifications as described below. Peninsula Clean Energy used our voluntary renewable and GHG-free goals, which exceed the RPS targets. Specifically, Peninsula Clean Energy's portfolios are designed to provide energy entirely from renewable and carbon free resources in 2024, and in 2025 and later years, to provide 100% renewable energy on an annual basis, as well as to provide time-coincident renewable energy in 2025 and later years. For the 2022-2023 IRP modeling, Peninsula Clean Energy is assuming a time-coincident target of 95% renewable energy matching, on average, in each hour of the year. This hourly matching metric does not credit hours in which there is excess generation.

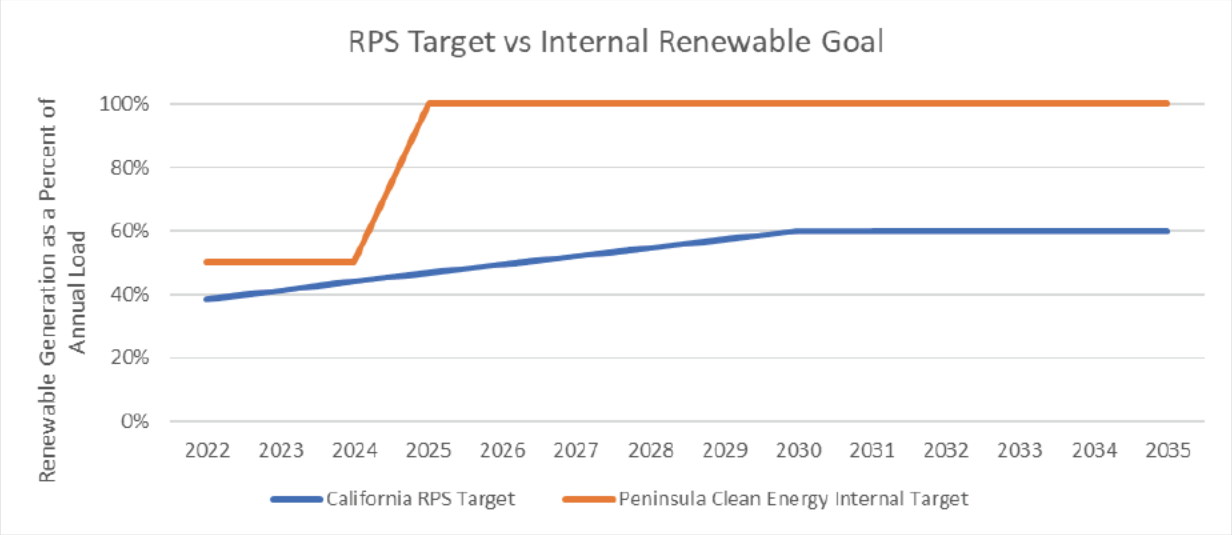
Some key assumptions that are standardized by the Filing Requirements are the assigned load forecast, peak load forecast, and behind-the-meter solar capacity. Peninsula Clean Energy used the annual volumes assigned by the Filing Requirements, but used a customized load shape. Peninsula Clean Energy used the peak load forecast as provided by the CPUC.

Peninsula Clean Energy assumed resource availability consistent with the 2021 Preferred System Plan, with some updated assumptions regarding resource cost, based on our most recent procurement efforts. Resource costs were based on Peninsula Clean Energy's assessment of the market conditions as of the summer of 2022. We did not include the potential market impacts of the recently passed Inflation Reduction Act.

Given the available resources and the current market conditions, implementing a time-coincident renewal target leads to overprocurement of generation on an annual basis. In order to reduce the risk of this overprocurement, Peninsula Clean Energy is planning to resell some of our excess renewable generation and resource adequacy. While we intend to resell as much of our excess renewable generation and resource adequacy as possible while maintaining our 100% annual renewable and 95% hourly renewable targets, for the 2022-2023 IRP modeling effort, we assume that we will resell only 75% of our excess. We believe reselling 75% is a conservative assumption of what we will be able to achieve in near-term market conditions.

Peninsula Clean Energy developed a single conforming portfolio that exceeds our assigned emissions reduction targets for both planning scenarios of 30MMT and 25MMT.

Figure 6: Comparison of RPS Target to Peninsula Clean Energy's Internal Renewable Goals



Specific details on the modeling approach and assumptions are described in the sections below.

1. Load Assumptions

Peninsula Clean Energy's annual load forecast and load modifier volumes assume the California Energy Commission's (CEC) 2021 Integrated Energy Policy Report (IEPR) demand forecast (Mid Baseline – [Additional Achievable Energy Efficiency] AAEE Scenario 3, [Additional Achievable Fuel Substitution] AAFS Scenario 3), adopted on January 26, 2022, as modified by CPUC in the Administrative Law Judge's Ruling Finalizing Load Forecasts and Greenhouse Gas Emissions Benchmarks for 2022 Integrated Resource Plan Filings (June 15, 2022).

Table 5: CEC 2021 IEPR Assigned Load Forecast for Peninsula Clean Energy

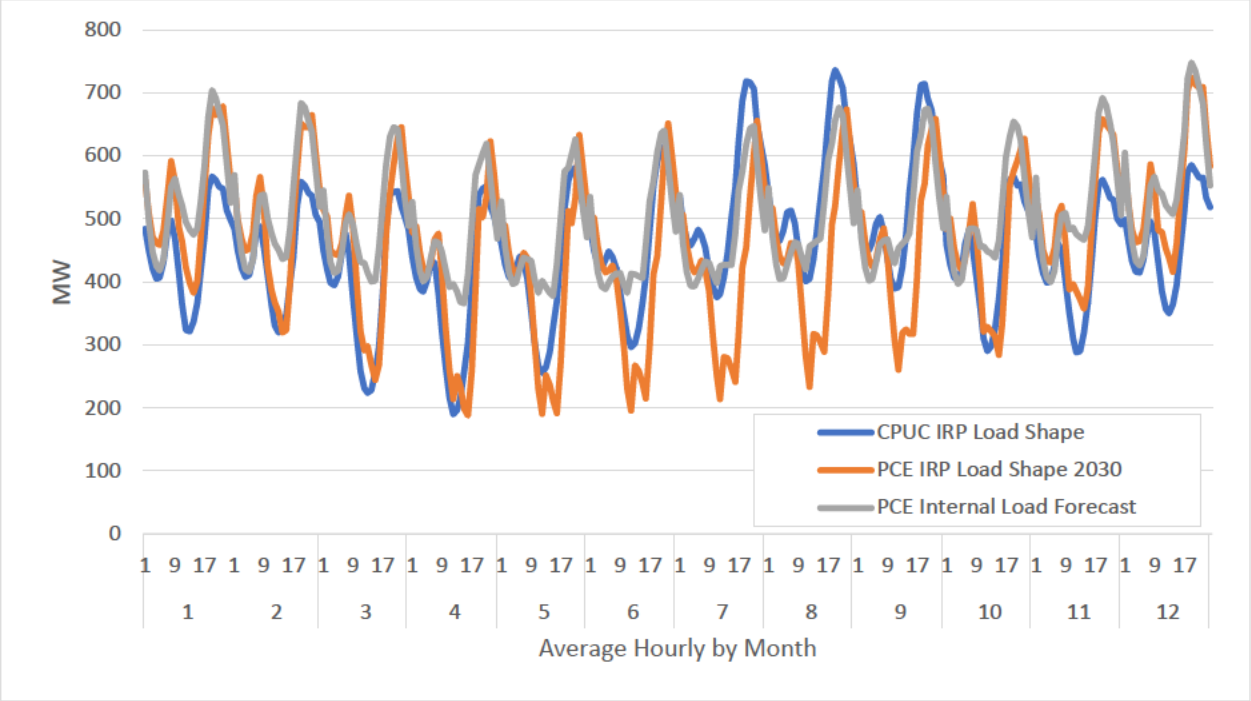
Peninsula Clean Energy	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Load Forecast (GWh)	3,425	3,456	3,461	3,496	3,554	3,620	3,666	3,721	3,781	3,848	3,897	3,961	4,033

Peninsula Clean Energy evaluated the projected load in the CEC 2019 IEPR demand forecast and the load profile in the CSP Calculator against internal forecasts. Peninsula Clean Energy's internal load forecast is developed based on historical hourly meter data (adjusted for COVID impacts), and projections of future growth, including growth of electric vehicles and behind-the-meter rooftop solar.

Peninsula Clean Energy's internal load forecast is higher in later years (~2028 through 2035) due to internal projections of higher electric vehicle adoption, and lower behind-the-meter solar adoption, compared to the IEPR assumptions. Additionally, Peninsula Clean Energy's load shape differs significantly from the shapes in the CSP Calculator, due primarily to Peninsula Clean Energy's service territory including the mild coastal climate of the San Francisco Peninsula in the Bay Area. In order to model a conforming portfolio while still incorporating load shape from our internal forecast, we used the CSP Calculator to develop a load profile that assumes the annual volumetric load and load modifier volumes assigned to Peninsula Clean Energy by the CPUC (Managed Retail Sales Forecast, Behind-The-Meter Photovoltaics (BTM PV) Forecast, Electric Vehicle Load, Building Electrification, Energy Efficiency,

and Behind-The-Meter Storage Losses, but uses custom shapes consistent with Peninsula Clean Energy's internal forecast for Baseline: Non C&I shape, Baseline: C&I shape, Electric Vehicle Load shape, and Behind-The-Meter Photovoltaics shape. Additionally, we specified a custom C&I Fraction of Baseline Demand. Figure 7 demonstrates the differences in load shape between Peninsula Clean Energy's internal forecast, the default load shape in the CSP Calculator, and the customized load input that Peninsula Clean Energy used for modeling. This figure shows average hourly load for each month of the year. Peninsula Clean Energy's forecasted load shape is higher in the winter months and lower in the summer months than the default CSP Calculator load profile. This is due to Peninsula Clean Energy's territory being located in a more temperate region than the state average, requiring less air conditioning load in the summer.

Figure 7: Average Hourly Load by Month



The peak load forecasts help evaluate the reliability of the portfolios analyzed. Table 6 identifies the forecasted peak loads for each of the reporting years. Peninsula Clean Energy used the peak load forecast assigned by the CPUC. In the 2022-2023 IRP, resource capacity was modeled using a perfect capacity methodology, and a marginal effective load carrying capacity. The peak load share of LSEs was adjusted to be compatible with this capacity framework. A planning reserve margin was not used in this cycle.

Table 6: Forecasted Annual Peak Load

Reporting Year	2024	2026	2030	2035
Forecasted Peak Load (MW)	[redacted]			

The behind-the-meter solar capacity assumed was based the forecast assigned by the CPUC. Peninsula Clean Energy's estimates of behind-the-meter solar capacity (based on actual interconnection data) are significantly lower than the assigned capacity.

Table 7: CPUC Assigned Behind-The-Meter Solar Capacity (MW)

Reporting Year	2024	2026	2030	2035
Assumed Behind-The-Meter Solar Capacity	541	621	827	1,081

2. GHG Benchmark

Peninsula Clean Energy's LSE-specific GHG Benchmarks for the 30 MMT and 25 MMT targets as assigned in the ALJ Ruling and adjusted by the Energy Division in the CSP Calculator to account for Peninsula Clean Energy's share of behind-the-meter combined heat and power emissions are identified in Table 8 below.

Table 8: LSE-Specific GHG Emissions Benchmark

	30 MMT conforming portfolio	25 MMT conforming portfolio
GHG Emissions Benchmark	0.530 MMT by 2030	0.400 MMT by 2030
	0.417 MMT by 2035	0.333 MMT by 2035

3. Other Assumptions

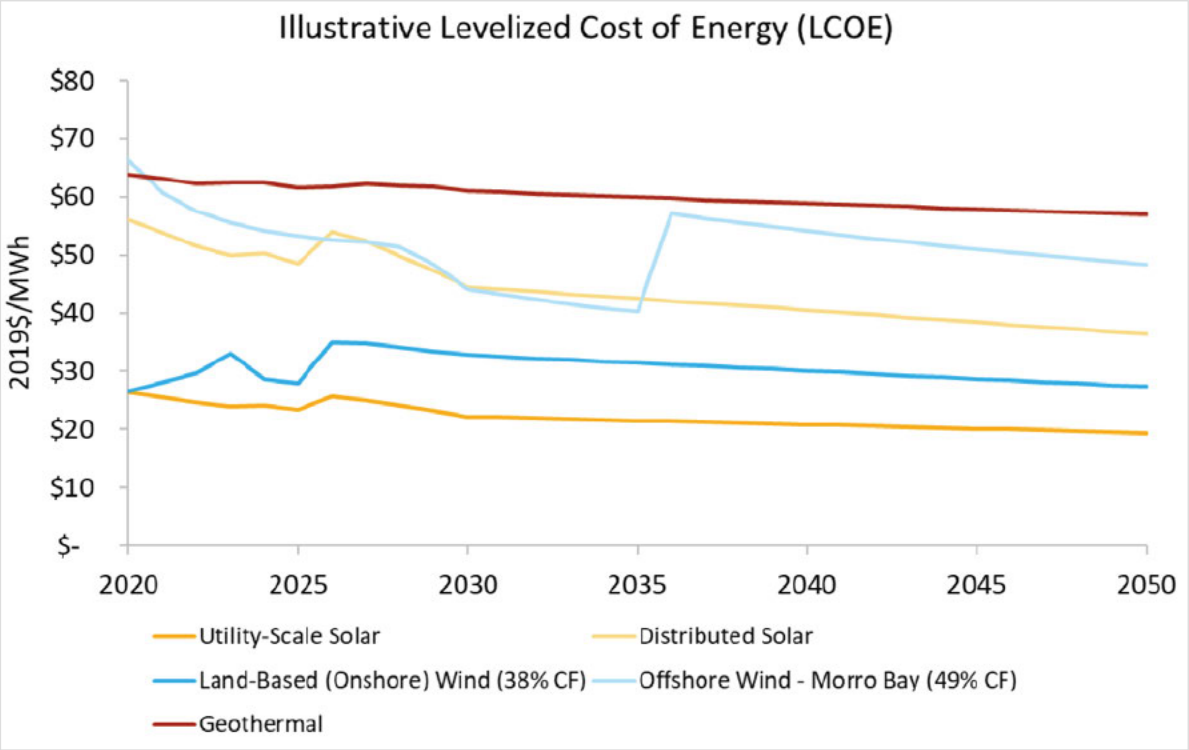
The inputs and assumption used to develop and analyze Peninsula Clean Energy's 2022-2023 IRP portfolios are consistent with the 2022-2023 Filing Requirements. Significant input and assumptions data include:

- Load forecast
- Market cost of load
- Resources available to contract
- Resource contract costs
- Resource generation profiles
- Market revenue of resource generation
- Resource adequacy requirements
- Qualifying capacity of resources
- Resource adequacy market value
- State and internal RPS targets
- Renewable energy attribute market value

In developing the 2022-23 IRP, Peninsula Clean Energy used resource contract costs consistent with recent RFO responses and reflective of market conditions in summer 2022. For future years, we adjusted the resource costs, consistent with AscendView fundamental forecasts of resource costs. Our results are generally consistent with the long-term trends in the CPUC's 2022-2023 IRP assumptions.

Figure 8 below displays the levelized costs assumptions in dollar per megawatt-hour (MWh) for the set of critical technologies as summarized in the CPUC's "LSE Plan Filing Requirements RESOLVE Modeling Results" dated June 15, 2022

Figure 8: CPUC RESOLVE Results of Leveled Cost of Energy (2019$/MWh)



Peninsula Clean Energy adjusted these costs to be consistent with market conditions present in the summer of 2022. These adjustments do not take into account the recently passed Inflation Reduction Act. Peninsula Clean Energy modeled specific generators that had offered into recent solicitations, as well as generic resources based on the 2021 PSP.

Table 9: Generation resource contract cost assumptions used for Peninsula Clean Energy's 2022-2023 IRP (2025$/MWh)

Resource Technology	2024	2026	2030	2035
Solar PV				
Solar Thermal				
Onshore Wind (in-state)				
Onshore Wind (Out-of-State)				
Onshore Wind (Out-of-State Energy Only)				
Offshore Wind				
Geothermal (Existing)				
Geothermal (New)				
Small Hydro (Existing)				

Table 10: Storage resource contract cost assumptions used for Peninsula Clean Energy's 2022-2023 IRP (2025$/kw-mo)

Resource Technology	2024	2026	2030	2035
Storage (Paired with Solar PV)	[redacted]			
Storage (Paired with Solar Thermal)				
Storage (Stand-Alone)				

Premiums for index-plus structured contracts for Portfolio Content Category 1 (PCC1) REC resources were developed based AscendView and Peninsula Clean Energy's evaluation of current market conditions as of summer 2022. Because reselling RECs is an important risk reduction technique, and the ability to resell RECs is uncertain, Peninsula Clean Energy differentiated between purchase cost and sale value of PCC1 index-plus contracts and are identified in **Error! Reference source not found.** below.

Table 11: PCC1 Premium Costs Assumptions for Index-Plus Structured Contracts (2025$/MWh)

	2024	2026	2030	2035
PCC 1 - Buy Premium ($/MWh)	[redacted]			
PCC 1 - Sell Premium ($/MWh)				

Contract costs for short term resource adequacy contracts were developed based on AscendView and Peninsula Clean Energy's evaluation of current market conditions as of summer 2022. Because reselling excess resource adequacy is an important risk reduction technique in our Preferred Portfolio, and the ability to resell resource adequacy in the future is uncertain, Peninsula Clean Energy differentiated between purchase cost and sale value of RA. The MATCH model uses shaped costs over the course of a year, with September as the highest value month. The RA market is expected to evolve significantly with the adoption of the 24-hr slice of day framework, but the details are currently undetermined. For the 2022-2023 IRP exercise, Peninsula Clean Energy assumed that the current market demand for RA, which is in favor of sellers, continues in the future, and that RA prices remain at similar levels to the current market.

Table 12 summarizes the September RA market value assumed in our modeling.

Table 12: Resource Adequacy Costs Assumptions for Short-Term RA-only Contracts (2025$/MWh)

	All study Years
September RA – Buy ($/kw-mo)	[redacted]
September RA – Sell ($/kw-mo)	

4. Existing Contracts

Peninsula Clean Energy included all power purchase agreements (PPAs) currently under contract or in negotiation as of June 30th, 2022 in its modelling. These PPAs are identified in Table 13 below.

Table 13: Existing Project-Specific PPA Contracts

#	Asset Name	Generating Capacity (MW)	Storage Capacity (MWh)	PPA Start Date	Contract Expiration	Technology
1	Bidwell	2		03/09/17	03/08/34	Small Hydro
2	Roaring	2		03/16/17	03/15/34	Small Hydro
3	Hatchet	8		03/09/17	03/08/37	Small Hydro
4	Clover	1		04/01/18	03/31/33	Small Hydro
5	Mustang	100		11/11/20	11/10/35	Solar
6	Wright	200		01/03/20	01/02/45	Solar
7	Sky River B	30		09/17/21	09/16/41	Wind
8	Geysers	35		07/01/22	06/30/32	Geothermal
9	Heber 2	26		01/01/23	12/31/37	Geothermal
10	Chaparral Solar & Storage	102	208	12/31/23	12/21/38	Solar & Storage
11	Arica Solar and Storage	100	200	04/01/24	03/31/39	Solar & Storage
12	Gonzaga Wind	76		10/31/24	10/30/39	Wind
13	Tumbleweed	14	109	06/01/26	05/30/41	8hr Storage
14	OME Fishlake	2		06/01/24	05/31/44	Geothermal
15	Ormat Portfolio	14		06/01/26	09/30/44	Geothermal
16	MCE Interim Resource	4		01/17/22	01/16/27	DAC-GT Solar
17	Dos Palos	3		08/01/23	07/31/43	DAC-GT Solar
18	Voyager	63		01/01/21	12/31/28	Wind
19	Shiloh	25 – 150		01/01/19	12/31/23	Wind
20	Shiloh Extension	150		01/01/24	12/31/30	Wind
21	Buena Vista Extension	38		01/01/23	12/31/27	Wind

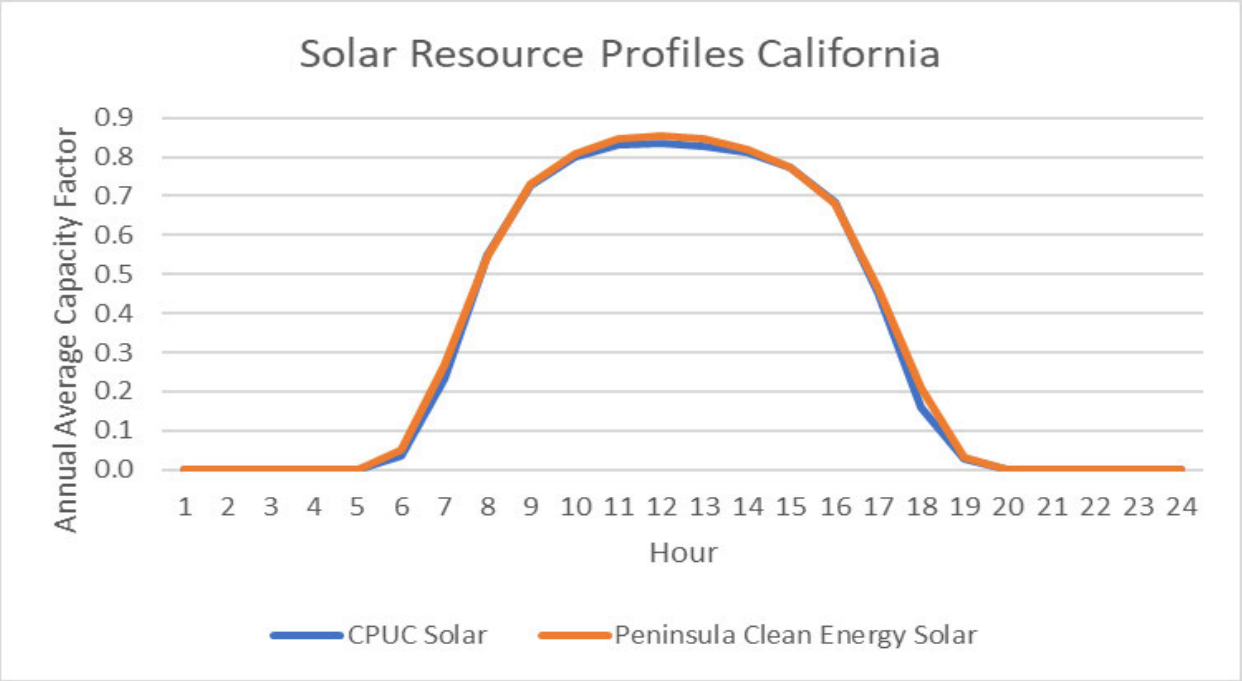
In addition to the executed PPAs, existing Resource Adequacy (RA) contracts and environmental products, which were included in the model.

5. Renewable Generation and Storage Profiles

Peninsula Clean Energy used inputs and assumptions consistent with those used by staff to develop the 2021 PSP. Peninsula Clean Energy generated resource profiles for specific resources in the MATCH model using the National Renewable Energy Laboratory (NREL)'s System Advisory Model. By using the System Advisory Model, all of the resource profiles were generated using consistent weather assumptions. This improves the correlation between resource profiles for purposes of modeling. For new generic resources, Peninsula Clean Energy used the profiles provided in the CSP Calculator.

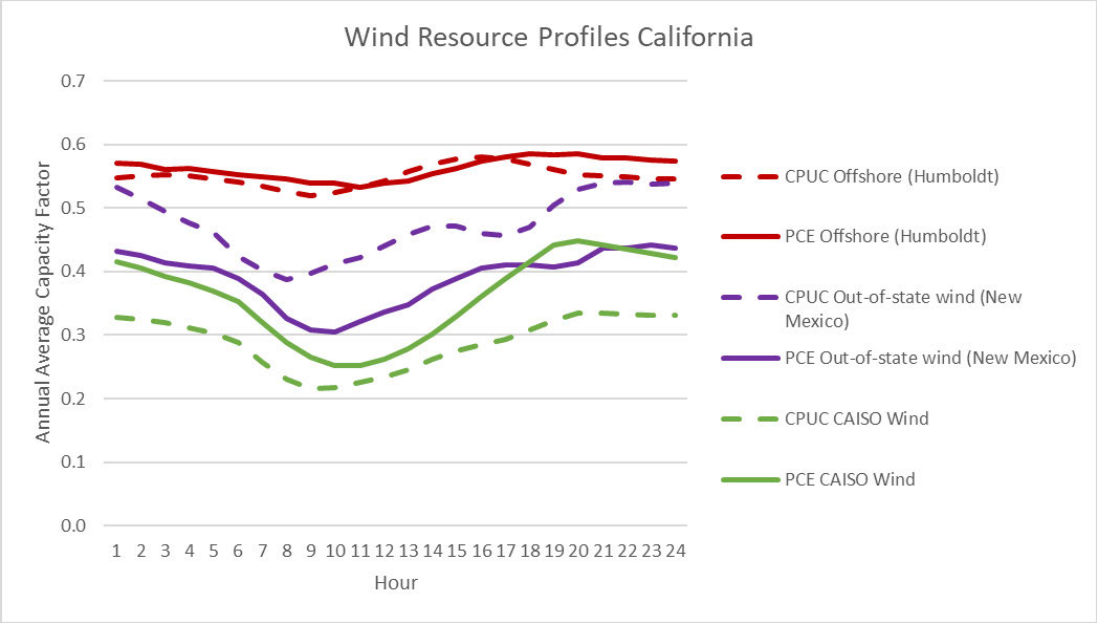
The solar resource profiles used in Peninsula Clean Energy are very similar to the solar profiles provided by the CPUC in the CSP Calculator. Figure 9 compares the differences in the resource profiles.

Figure 9: Comparison of Solar Tracking Shapes



The wind resource profiles used in Peninsula Clean Energy are very similar to the wind profiles provided by the CPUC in the CSP Calculator. Figure 10 compares the differences in the resource profiles.

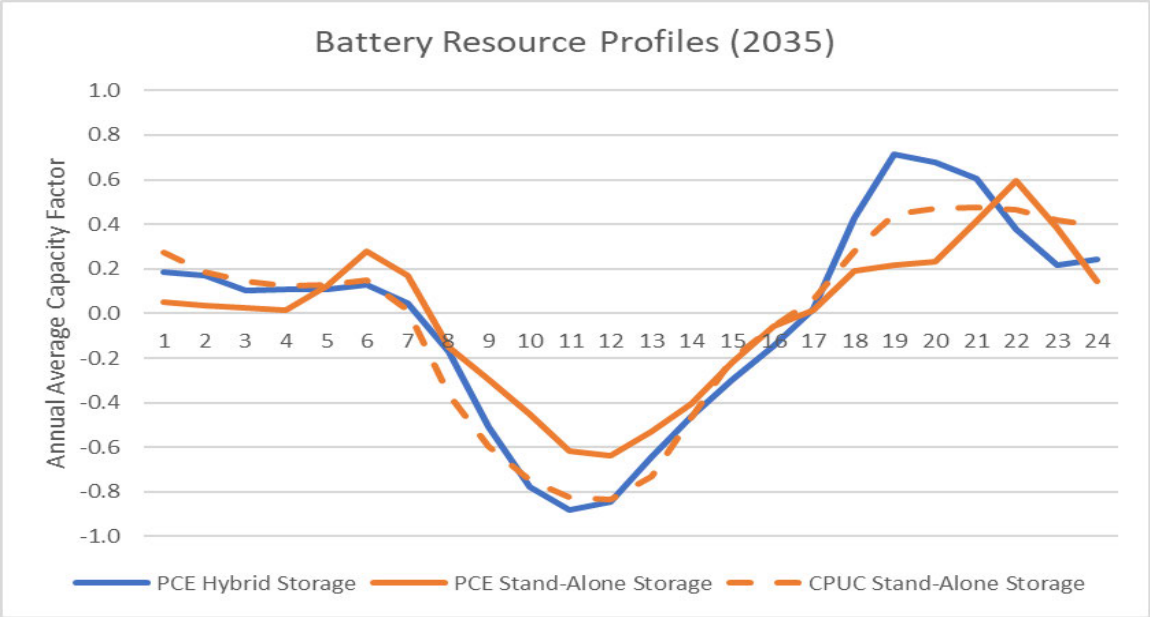
Figure 10: Comparison of Wind Shapes



To determine storage dispatch, the MATCH model uses nodal price forecasts for each storage node, and considers the portfolio's overall load and supply balance in each hour. If there is load that needs to be met, the model dispatches storage. If load is already met by excess supply, the model will dispatch storage if it is economically advantageous. Thus, MATCH uses a combination of dispatch-to-load and dispatch-to-price methodology to determine storage dispatch.

Peninsula Clean Energy's storage dispatch assumptions assume more aggressive use of storage, which reflects Peninsula Clean Energy's intention to use storage to manage load in addition to performing price arbitrage.

Figure 11: Comparison of Storage Dispatch



6. *Geographic Distribution of New Resources*

As described in the previous section, Peninsula Clean Energy assumed resource availability based on specific resources offered in recent solicitations, as well as generic resources consistent with the 2021 PSP. Specific resources have a known project location and can be grouped into geographic areas. Generic resources are assumed to be located within the geographic regions indicated in the 2021 PSP.

Peninsula Clean Energy's analysis took into account the different resource cost and resource generation market revenue forecasts for different geographic areas. Resources costs reflect the development costs such as site control, labor, and materials. Transmission constraints were not explicitly modeled, and were evaluated in a post-processing step, as described below in Section III. N. Transmission Planning. In some cases, transmission constraints make capacity additions in specific geographic locations more costly and would lead to a different geographic distribution of new resource additions. Peninsula Clean Energy strongly supports the implementation of transmission expansion to support the addition of renewable capacity to the CAISO system.

The tables below summarize the distribution of new resources into high-level geographic areas based on CPUC's RESOLVE areas. These tables include capacity from energy-only contracts.

Table 14: Preferred Portfolio Geographic Distribution of New (Incremental)Solar Resources (Cumulative MW)

Resolve Area	2024	2026	2030	2035
Los Banos	3	3	3	3
Westlands	0	0	175	175
Tehachapi	102	102	102	202
Palm Springs	100	100	100	100
SoCal Desert / Inyokern and Kramer	0	189	239	239
Total	**205**	**394**	**619**	**719**

Table 15: Preferred Portfolio Geographic Distribution of New (Incremental) Wind Resources (Cumulative MW)

Resolve Area or Location	2024	2026	2030	2035
Import (New Mexico)	0	322	322	322
Import (Pacific Northwest)	0	0	4	4
Los Banos	76	76	76	76
Tehachapi	30	30	30	30
Offshore (Humboldt)	0	0	0	288
Total	**107**	**429**	**433**	**721**

Table 16: Preferred Portfolio Geographic Distribution of New (Incremental) Storage Resources (Cumulative MW)

Resolve Area or Location	2024	2026	2030	2035
Westlands	0	0	175	175
Tehachapi	52	76	76	126
Ventura	0	0	46	50
Palm Springs	50	50	50	50
San Diego (West)	100	100	100	100
SoCal Desert Inyokern and Kramer	0	94	144	144
Total	**202**	**321**	**592**	**646**

7. Short-Term Contracts

Peninsula Clean Energy's strategic procurement goals include targeting a diversity of contract term lengths to help manage portfolio risk. The inclusion of short-term contracts in a portfolio gives a portfolio flexibility to manage changes in load, regulatory uncertainty, changing portfolio goals, and changes in market conditions. Peninsula Clean Energy's current strategic target is for short-term contracts, defined as less than ten years in length, to make up 50% of our portfolio.

In the near term, Peninsula Clean Energy plans to rely on short-term contracts to provide energy-only volumes of large hydroelectric energy in 2024. Peninsula Clean Energy also uses short-term contract to procure resource adequacy under capacity-only contracts.

In the later years of the IRP planning horizon, when Peninsula Clean Energy expects to have excess generation and engage in RPS sales, we plan to use a mix of short-term and long-term contract structures to sell our excess RPS energy.

New resources typically require a long-term contract in order to be financed. Because Peninsula Clean Energy's conforming portfolio includes mostly new resources to be added to our current portfolio, there may be a disconnect between our short-term contracting goals and our plans to add new resources to our portfolio. We could address this disconnect by seeking short-term contracts, potentially with existing resources instead of new resources. We could also revise our portfolio diversity targets to accommodate the current typical term lengths for new resources.

8. Curtailment

We assessed curtailment potential of our portfolio using both our deterministic modeling tool, MATCH, and the stochastic analysis performed in PowerSimm. These models determine curtailments for solar, wind, and other non-dispatchable resources on an hourly basis. The models consider nodal prices, customer demand, and the ability of the portfolio to meet customer load in a given hour. If nodal prices are negative, and customer demand can be fully met with the other resources in our portfolio, the models curtail generation at the node where prices are negative in that hour. If, however, the customer load cannot be met by the other resources in our portfolio, the models do not curtail, and incur the negative nodal pricing in order to meet customer load with renewables. The main difference between the

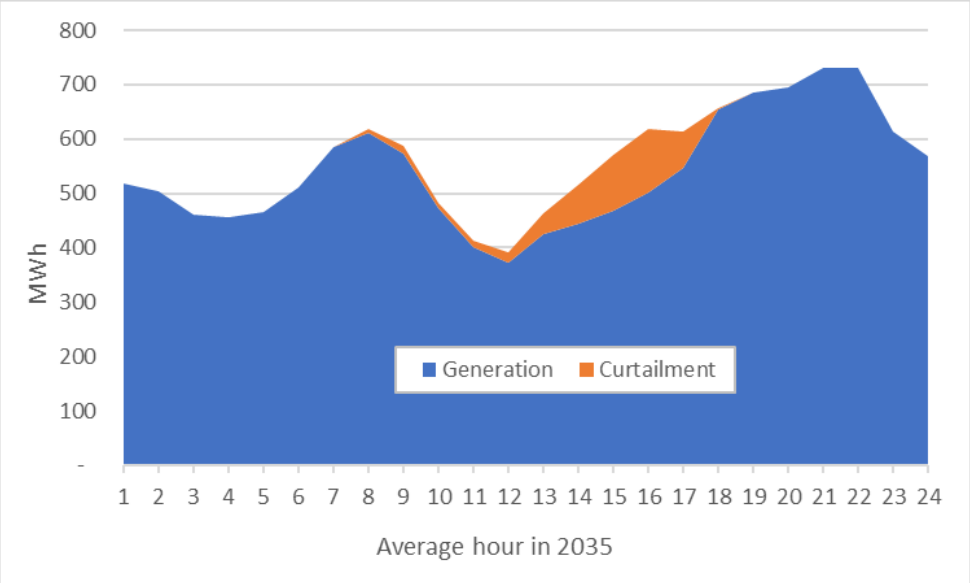
curtailment modeling in the two models is that MATCH is a deterministic model that runs a single scenario, while PowerSimm performs a stochastic analysis of multiple simulations.

Given the current market conditions and high fuel prices, which are projected to continue in the near term, the MATCH and Powersimm models calculate relatively little curtailment. The nodal price forecasts used in our modeling incorporate fundamental market drivers such as new renewable capacity additions to the system. However, if the fundamental market drivers change, of if fuel prices decrease, we would expect the modeling results to change.

We also assessed curtailment of our portfolio using the CSP Calculator. The CSP Calculator uses SERVM modeling performed by the CPUC to estimate hours in which excess generation on the system will be curtailed. The CSP Calculator estimates relatively larger volumes of curtailment for our portfolio relative to our MATCH and Powersimm modeling.

Figure 12 below shows the combined curtailment estimates of our portfolio using curtailment volumes from MATCH, Powersimm, and the CSP Calculator. We believe the combined curtailment estimates from all three models representative a conservative assumption on the high end of potential curtailment that our portfolio could face.

Figure 12: Curtailment volumes in 2035



9. Metric Analysis

Peninsula Clean Energy evaluated the model outputs using several key metrics. These metrics included cost, reliability, and RPS and emissions metrics.

a. Cost Metrics

Peninsula Clean Energy evaluated portfolio cost on an absolute and per unit basis, and with a range of assumptions regarding resale of excess generation and RA. We evaluated portfolio cost using the results of our stochastic analysis of the portfolio; thus we can determine the probability of exceeding certain

cost level. We evaluated the cost that has a 5% chance of being exceeded (called the P95 cost), the cost that has a 95% chance of being exceeded (the P5 cost), and the cost that has a 50% chance of being exceeded (the P50, or median cost).

- Portfolio Total Cost
- Weighted Average Cost
- Effect of Resale of Excess RECs and RA
- Probability of Cost Exceedances (P5, P50, P95)

b. Reliability Metrics

Peninsula Clean Energy evaluated our conforming portfolio using three distinct reliability metrics: an annual peak load analysis, a comparison of month-hour generation vs load under both a deterministic and stochastic modeling approach, and an evaluation of our portfolio using the proposed SCE Showing and Validation Tool for the 24-hr Slice of Day RA Framework.

For the first set of metrics, Peninsula Clean Energy compared its assigned peak load to the Net Qualifying Capacity of its portfolio to determine the open RA balance per the calculations in the Resource Data Template. The reliability metrics include the following:

- Surplus/Short megawatt (MW) over assigned Reliability Need

The additional reliability metrics were analyzed on a voluntary basis. Peninsula Clean Energy compared month-hour average load profiles to month-hour average supply profiles, net of storage dispatch, to evaluate the ability of the portfolio to meet load in each and every hour of the year. We performed this comparison using both a deterministic and a stochastic modeling approach. We further evaluated the % of our load that was supplied by system power, when considered on an hourly basis and not crediting hours where we were net exporters to the system. The reliability metrics include:

- Month-Hour MW of net system power use in P5, P50, and P95 of hours
- Percent of load served by system power on an hourly basis, not crediting hours in which there was excess generation.

The third reliability metric was to evaluate the portfolio using SCE's proposed Showing and Validation Tool (SCE Tool), developed for the implementation of the 24-hr slice of day resource adequacy framework. We input our preferred portfolio and our load into the SCE Tool to evaluate how our portfolio would perform under a potential 24-hr resource adequacy framework.

c. RPS and Emissions Metrics

Peninsula Clean Energy evaluated the RPS content and the emissions associated with our portfolio. We determined the RPS content as well as the long-term contract content (SB350 requires 65% of an LSE's RPS content to be procured via a long-term contract). We also evaluated the carbon dioxide emissions associated with our portfolio using the CSP Calculator. These metrics can be summarized as:

- Long-term Contracting (% of Load);
- RPS Content (% of Load)
- Carbon Dioxide Emissions (MMT per year)

III. Study Results

a. Conforming and Alternative Portfolios

Peninsula Clean Energy's Preferred Conforming Portfolio uses the assigned load forecast and uses inputs and assumptions consistent with those used by staff to develop the 2021 PSP to identify the least cost set of resources to meet the respective 2030 and 2035 GHG Benchmark emissions, as calculated by the CSP Calculator. Peninsula Clean Energy developed a single portfolio that meets the emissions targets of both scenarios, and this is our Preferred Portfolio. The Preferred Portfolio achieves far lower emissions than Peninsula Clean Energy's proportional share of the 30 MMT and the 25 MMT GHG target. The load, 2030 and 2035 GHG Benchmarks and calculated GHG emissions for each of the portfolios, using the CSP Calculator, are presented in Table 17 below.

Table 17: Preferred Portfolio GHG Emissions Results

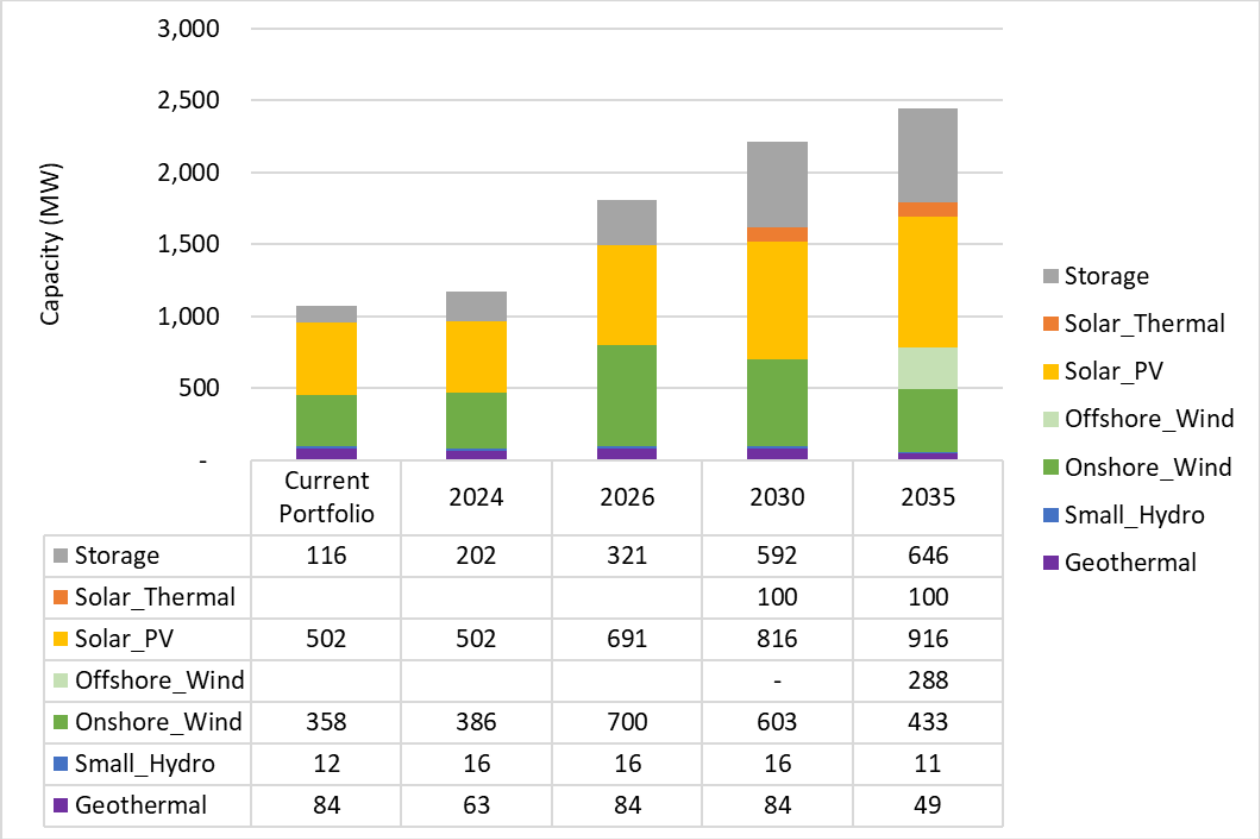
	2024	2026	2030	2035
Assigned Load Forecast (GWh)	3,456	3,496	3,721	4,033
25 MMT GHG Benchmark			0.400	0.333
30 MMT GHG Benchmark			0.530	0.417
Preferred Portfolio Emissions	0.18	0.02	0.05	0.01

The Preferred Portfolio includes all of Peninsula Clean Energy's current executed portfolio, as summarized in Table 13 above.

The Preferred Portfolio adds an additional 530MW of storage, 514MW of solar, 71 MW of onshore wind, 288 MW of offshore wind by 2035. Due to contract expiration, our Preferred Portfolio results in 1 MW less small hydro, and 35 MW less geothermal in 2035 than is currently contracted. The selected capacity results in the lowest cost portfolio that meets all of our goals, including our aggressive voluntary goal to provide renewable energy to meet demand in each and every hour of the day.

Figure 13 shows the annual cumulative capacity of the portfolio.

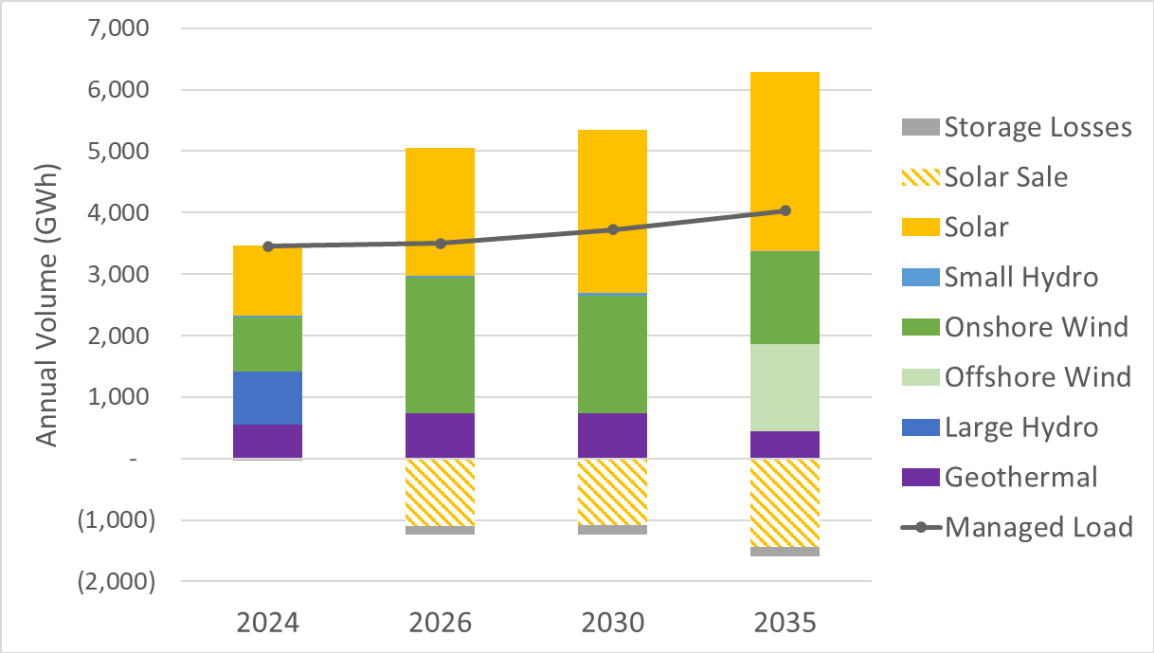
Figure 13: Preferred Portfolio Cumulative Capacity



	Current Portfolio	2024	2026	2030	2035
Storage	116	202	321	592	646
Solar_Thermal				100	100
Solar_PV	502	502	691	816	916
Offshore_Wind				-	288
Onshore_Wind	358	386	700	603	433
Small_Hydro	12	16	16	16	11
Geothermal	84	63	84	84	49

Figure 14 shows how Peninsula Clean Energy is meeting its load in each year from a combination of existing PPAs, new resources, short term renewable contracts and market purchases.

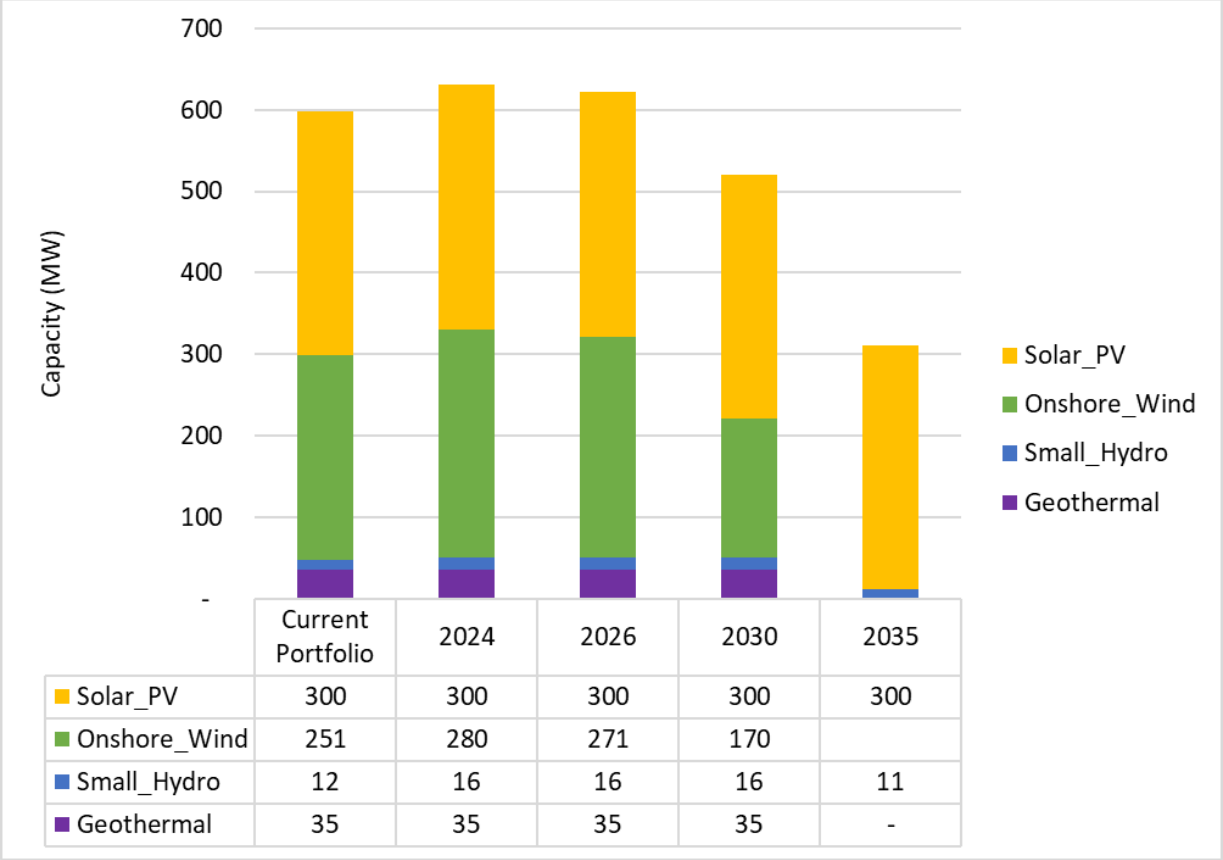
Figure 14: Preferred Portfolio Load and Generation



Our Preferred Portfolio includes existing resources under contract, existing resources that we plan to contract with in the future, new resources under contract (expected to commence deliveries in 2023 and later), and new resources that we plan to contract with in the future. We define new resources consistent with the definition used in D19-11-016 and D21-06-035, that is, resources incremental to the baseline resource list published by the CPUC for purposes of determining compliance with those decisions.

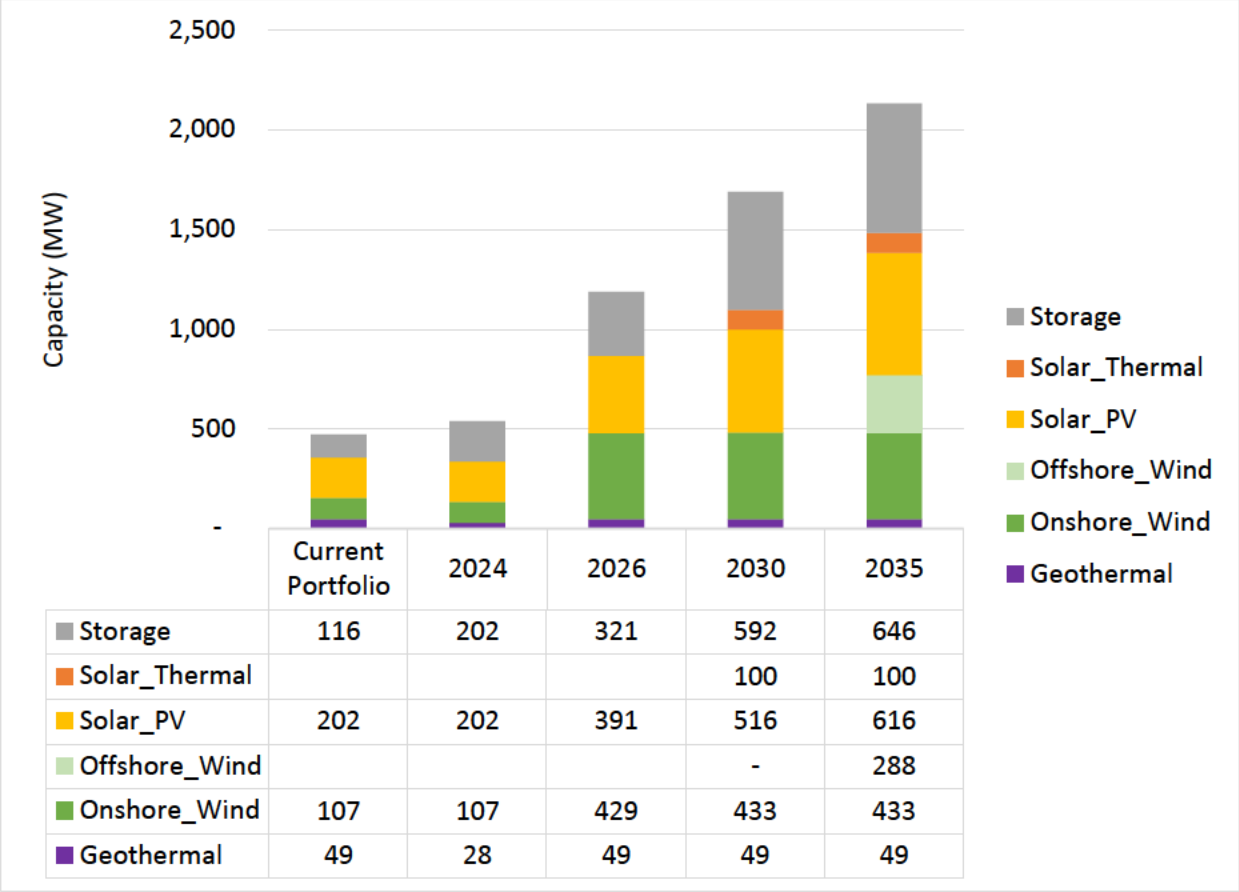
The figures below provide a summary of the existing and new resources currently in our portfolio, and those planned to be added between 2024 and 2035. Additional details are provided in the Resource Data Template.

Figure 15: Existing Resources in Peninsula Clean Energy's Preferred Portfolio



	Current Portfolio	2024	2026	2030	2035
Solar_PV	300	300	300	300	300
Onshore_Wind	251	280	271	170	
Small_Hydro	12	16	16	16	11
Geothermal	35	35	35	35	-

Figure 16: New Resources in Peninsula Clean Energy's Preferred Portfolio



	Current Portfolio	2024	2026	2030	2035
Storage	116	202	321	592	646
Solar_Thermal				100	100
Solar_PV	202	202	391	516	616
Offshore_Wind				-	288
Onshore_Wind	107	107	429	433	433
Geothermal	49	28	49	49	49

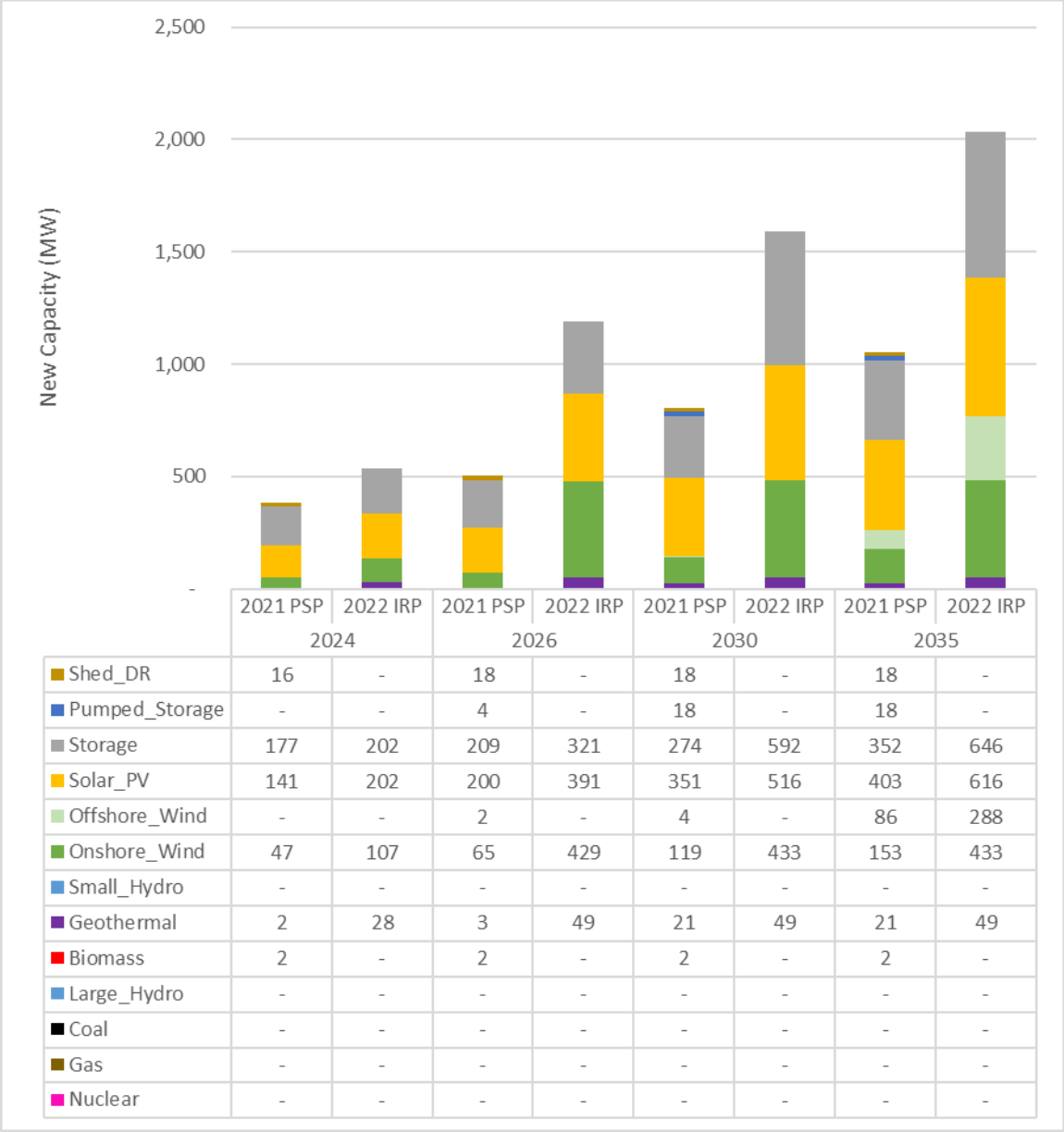
Peninsula Clean Energy is not submitting an alternative portfolio.

Comparison to 2021 Preferred System Plan

Peninsula Clean Energy compared the new capacity assumed in the 2021 Preferred System Plan (2021 PSP) to the new capacity selected in our Preferred Portfolio. We used our load share as calculated on the "Demand Inputs" tab of the CSP Calculator, which compares Peninsula Clean Energy's annual retail sales volume to the entire CAISO system demand volume. Peninsula Clean Energy's load share is approximately 1.7%.

As shown in Figure 17 below, Peninsula Clean Energy's Preferred Portfolio results in more new capacity built than our load share of the 2021 PSP would imply. We hypothesize that this is due to Peninsula Clean Energy's aggressive goal to align renewable supply with customer demand in each and every hour of the day. Providing time-coincident renewable supply in the current market conditions leads to excess procurement of energy and capacity, in order to address the intermittency of renewable resources. Peninsula Clean Energy is planning for more new wind and storage capacity than our load share of the 2021 PSP would imply. Wind and storage help to provide renewable supply in the hard-to-serve evening and overnight hours, when solar energy is not directly available. Peninsula Clean Energy's portfolio includes larger amounts of new geothermal, which help to provide renewable baseload whether or not the sun is shining or the wind is blowing.

Figure 17: Comparison of New Capacity in the 2021 Preferred System Plan to New Capacity in Peninsula Clean Energy's 2022 Preferred Portfolio



	2024		2026		2030		2035	
	2021 PSP	2022 IRP	2021 PSP	2022 IRP	2021 PSP	2022 IRP	2021 PSP	2022 IRP
Shed_DR	16	-	18	-	18	-	18	-
Pumped_Storage	-	-	4	-	18	-	18	-
Storage	177	202	209	321	274	592	352	646
Solar_PV	141	202	200	391	351	516	403	616
Offshore_Wind	-	-	2	-	4	-	86	288
Onshore_Wind	47	107	65	429	119	433	153	433
Small_Hydro	-	-	-	-	-	-	-	-
Geothermal	2	28	3	49	21	49	21	49
Biomass	2	-	2	-	2	-	2	-
Large_Hydro	-	-	-	-	-	-	-	-
Coal	-	-	-	-	-	-	-	-
Gas	-	-	-	-	-	-	-	-
Nuclear	-	-	-	-	-	-	-	-

There are certain resources in the 2021 PSP that are not reflected in Peninsula Clean Energy's Preferred Portfolios including shed demand response, pumped storage, and biomass. These resources were not selected in Peninsula Clean Energy's portfolios because other resources were determined by the model to be more cost effective to meet the goals identified. Specifically, Peninsula Clean Energy's internal renewable goals target of 100% renewable on an annual basis and aligning renewable supply with demand on an hourly basis by 2025 is a significantly more ambitious target than California's RPS of 60% renewables by 2030 and 100% clean energy by 2045. This target resulted in most of Peninsula Clean Energy's new resources being added to the portfolio by 2026. New pumped storage resources are not anticipated to be available in 2026.

Peninsula Clean Energy is interested in the benefits that alternative storage technologies can bring to a balanced and diverse portfolio and will continue to explore options for procurement despite the inputs and assumptions used in this modeling resulting in these resources not being selected as part of Peninsula Clean Energy's Preferred Portfolio.

b. Preferred Conforming Portfolios

Peninsula Clean Energy is submitting a single conforming portfolio, which is our Preferred Portfolio. The Preferred Portfolio adds an additional 530MW of storage, 514MW of solar, 71 MW of onshore wind, 288 MW of offshore wind by 2035. Due to contract expiration, our Preferred Portfolio results in 1 MW less small hydro, and 35 MW less geothermal in 2035 than is currently contracted. The selected capacity results in the lowest cost portfolio that meets all of our goals, including our aggressive voluntary goal to provide renewable energy to meet demand in each and every hour of the day.

To support the description of how Peninsula Clean Energy's selections are consistent with each relevant statutory and administrative requirement, we have included the text of PU Code Section 454.52(a)(1) below and then describe how each Preferred Conforming Portfolio addresses each of the requirements herein.

> *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, and shall 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 60 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 on both a near-term and long-term basis, including meeting the near-term and forecast long-term resource adequacy requirements of Section 380.*
>
> *(F) Comply with subdivision (b) of Section 399.13 - A retail seller may enter into a combination of long- and short-term contracts for electricity and associated renewable energy credits. Beginning January 1, 2021, at least 65 percent of the procurement a retail seller counts toward the renewables portfolio standard requirement of each compliance*

period shall be from its contracts of 10 years or more in duration or in its ownership or ownership agreements for eligible renewable energy resources.

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

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

(I) 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.

Peninsula Clean Energy's Preferred Portfolio is consistent with each relevant statutory and administrative requirement stated in Public Utilities Code Section 454.52(a)(1), as described below:

(A) Meet the greenhouse gas emissions reduction targets

Peninsula Clean Energy's Preferred Portfolio 2035 GHG emissions of 0.01 MMT (calculated using the CSP Calculator) are far below Peninsula Clean Energy's the assigned benchmark of 0.333 MMT. The Preferred Portfolio also performs better than our 2030 GHG emissions benchmark of 0.400, by achieving only 0.05 MMT in 2030.

(B) Procure at least 60% eligible renewable energy resources

Peninsula Clean Energy's Preferred Portfolio results in annual procurement of renewable energy that is greater than annual load in 2026 and later years. In 2030, our Preferred Portfolio results in net procurement of approximately 106% of annual load from renewable energy resources, which exceeds the SB 100 target of 60% of annual load from renewable energy resources in 2030.

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

Peninsula Clean Energy's rates are currently set at 5% below PG&E's rates. As detailed in Section III.e below, Peninsula Clean Energy is committed to serving our customers at reasonable rates. In addition to setting rates that are competitive with PG&E, Peninsula Clean Energy works to minimize rate volatility by constructing a balanced and conservatively hedged power supply portfolio, building significant financial reserves[10] and minimizing rate changes to once per year when possible.

(D) Minimize impacts on ratepayers' bills

The MATCH model optimizes for portfolios that meet assigned objectives at least cost based on the inputs and assumptions. The Preferred Portfolio is the least cost option for meeting the requirements of the IRP.

[10] Peninsula Clean Energy Financial Reserves Policy: www.peninsulacleanenergy.com/wp-content/uploads/2018/06/Peninsula Clean Energy-Policy-18-Reserves-Policy_Adopted-0628818.pdf

(E) Ensure system and local reliability on both a near-term and long-term basis, including meeting the near-term and forecast long-term resource adequacy requirements

Peninsula Clean Energy evaluated the reliability of its portfolios using several metrics, including the following:

- The volume of system RA provided through the portfolio compared to peak load assigned by the CPUC, as determined in the RDT;
- Hourly net system power use probability, as evaluated in our stochastic analysis of our portfolio;
- Evaluation of our portfolio using the draft SCE Showing and Validation Tool, developed for the implementation of the 24-hr slice of day RA framework

The results of this analysis indicate that the Preferred Portfolio helps ensure system and local reliability, including under a 24-hr RA framework.

The operation of the Preferred Portfolio will not differ markedly whether other LSEs procure to a 30 MMT or 25 MMT target. The Preferred Portfolio will meet load during the solar window with direct generation, while storing excess solar generation to meet evening and overnight load, in concert with wind and geothermal generation. As discussed in Section III.f below, some portion of load will be met with net system power (primarily natural gas), but this portion is lower than Peninsula Clean Energy's load share. If other LSEs procure to a 25 MMT target, the greater build of solar resources would likely depress daytime prices making storing excess energy for evening and nighttime discharge more economical.

Please see Section III.f for a more thorough discussion of the System Reliability Analysis.

(F) Ensure that at least 65% of RPS procurement is from long-term contracts.

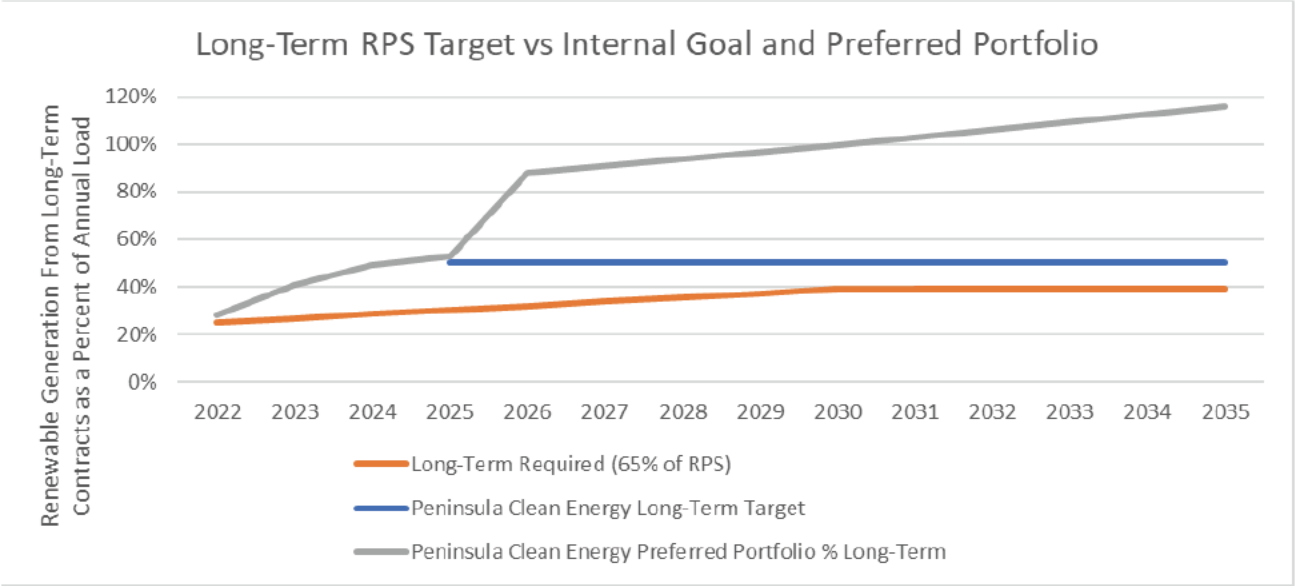
Peninsula Clean Energy's internal goal is for 50% of its retail sales to be procured through long-term contracts of 10 years or more. This equates to more than the required 65% long-term RPS contracting requirement because the long-term RPS contracting requirement refers to the portion of the RPS compliance period renewable requirement that must come from long-term contracts, whereas Peninsula Clean Energy's target applies to its entire retail load.

Table 18 below compares Peninsula Clean Energy's internal goal against the requirement to procure 65% of RPS procurement from long-term contracts.

Table 18: RPS Long-term Contract Requirements Compared to Peninsula Clean Energy Targets

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
California RPS Target	39%	41%	44%	47%	49%	52%	55%	57%	60%	60%	60%	60%	60%	60%
Peninsula Clean Energy Internal RPS Target	50%	50%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Long-Term Required (65% of RPS)	25%	27%	29%	30%	32%	34%	36%	37%	39%	39%	39%	39%	39%	39%
Peninsula Clean Energy Long-Term Target				50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Peninsula Clean Energy Preferred Portfolio % Long-Term	28%	41%	49%	53%	88%				100%					116%

Figure 18: RPS Long-term Contract Requirements Compared to Peninsula Clean Energy Targets and Preferred Portfolio



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

Peninsula Clean Energy's Preferred Portfolios support the diversity, sustainability, and resilience of the bulk transmission and distribution system by adding capacity from a variety of resource types as well as significant storage resources. Peninsula Clean Energy has performed an analysis of the Preferred

Portfolio with respect to the impacts to and reliance on the transmission system, as discussed further in Section III. n. Peninsula Clean Energy supports the CPUC's use of the High Electrification scenario for use in CAISO's Transmission Planning Proceeding.

Peninsula Clean Energy's Preferred Portfolio includes out-of-state wind resources that will require additional transmission infrastructure to be built in order to be delivered to California. Peninsula Clean Energy believes that expanding and strengthening the transmission system is critical to achieving the decarbonization mandated in SB 100.

Peninsula Clean Energy has developed several customer programs to support demand-side energy management to improve grid resilience. Peninsula Clean Energy has residential and local government sector solar and storage programs. The local governments program for distributed solar and storage systems will provide local resilience during emergencies. Similarly, the ongoing residential program provides resilience and optimizes the dispatch schedule to provide maximum peak shaving. Additionally, Peninsula Clean Energy is in the launch phase of a FLEXmarket program to provide a market-based platform for grid serving load shaping and will pilot an electric vehicle managed charging program in 2023.

Our portfolio helps the diversity, sustainability and resilience of the bulk transmission and distribution systems by helping to reduce the system net peak. We model that our Preferred Portfolio reduces the 2035 system net peak by about 349 MW on average.

Peninsula Clean Energy's FLEXmarket program is a load shaping program designed to reduce customer electricity usage when the grid is most stressed. The FLEXmarket platform encourages reductions in customer usage especially during the summer evening hours.

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

Demand-side resource planning is important to Peninsula Clean Energy. Peninsula Clean Energy actively supports electrification and distributed energy resource activities to meet its renewable energy goals. Peninsula Clean Energy has developed the FlexMarket program in concert with CPUC staff, that rewards customers for reducing their load during peak load events.

Peninsula Clean Energy did not explicitly model demand-side energy management in the 2022-2023 IRP due to lack of reliable input data on how programs would perform, and what the program costs would be. Peninsula Clean Energy is actively pursuing pilot programs and initial data from other organizations offering these types of programs, and we are eager to include these types of resources in our modeling in the next IRP cycle.

As discussed above in (G), PCE's programmatic activities enhance distribution systems and demand-side energy management through reducing the system net peak.

(I) Minimize localized air pollutants and other greenhouse gas emissions, with early priority on disadvantaged communities

Peninsula Clean Energy's Preferred Portfolio performs significantly better than our assigned GHG benchmarks. Peninsula Clean Energy does not procure electricity directly from any natural gas or

other fossil resource power plants. Five of Peninsula Clean Energy's executed PPAs are for resources located in DACs, including three contracts for new resources. By entering long-term PPAs with Peninsula Clean Energy, these projects will deliver renewable power to Peninsula Clean Energy's customers, while improving air quality, providing economic benefits, and creating hundreds of jobs in the projects' regions. Please refer to Section III.d below for further details.

c. GHG Emissions Results

Table 19 below presents the GHG emissions associated with the Preferred Portfolio. The CSP calculator was used to estimate the emissions. Peninsula Clean Energy's Preferred Portfolio performs significantly better in reducing GHG Emissions in comparison to our assigned GHG Benchmark. This is due to the implementation of Peninsula Clean Energy's aggressive voluntary goal to align renewable supply with customer demand on an hourly basis, which results in significantly less use of net system power.

Table 19: GHG Emissions Results from CSP Calculator (25 MMT Scenario)

	2024	2026	2030	2035
Assigned Load Forecast (GWh)	3,456	3,496	3,721	4,033
25 MMT GHG Benchmark (MMT CO_2)			0.400	0.333
30 MMT GHG Benchmark (MMT CO_2)			0.530	0.417
Peninsula Clean Energy Preferred Portfolio Emissions (MMT CO_2) (25MMT Scenario)	0.18	0.02	0.05	0.01
Peninsula Clean Energy Preferred Portfolio Emissions (MMT CO_2) (30MMT Scenario)	0.18	0.02	0.04	0.00

d. Local Air Pollutant Minimization and Disadvantaged Communities

i. Local Air Pollutants

Table 20 below identifies the estimated emissions in tons per year associated with the Conforming Portfolio based on the calculations in the CSP calculator.

Table 20: Preferred Portfolio Local Air Pollutants (25 MMT Scenario)

	2024	2026	2030	2035
NOx	21	16	17	6
PM2.5	4	0	2	0
SO2	0	0	0	0

Table 21: Preferred Portfolio Local Air Pollutants (30 MMT Scenario)

	2024	2026	2030	2035
NOx	22	16	17	7
PM2.5	4	0	1	-1
SO2	0	0	0	0

Peninsula Clean Energy does not currently procure and does not plan to procure electricity directly from any fossil-fueled power plants. Peninsula Clean Energy's only contribution to air pollutants is a result of reliance on system power. Based on the analysis in the CSP, Table 22 below identifies the portion of load that is being served by system power for each year of the study for the Conforming Portfolio.

Table 22: Preferred Portfolio Comparison of Demand and Net System Power (25 MMT)

	2024	2026	2030	2035
Demand (at Generator Busbar)	3,731	3,774	4,019	4,356
Net System Power (Net)	224	-141	-44	-73
Net System Power (Purchases Only)	609	184	191	212
% of Load Served by System Power (Net)	6%	-4%	-1%	-2%
% of Load Served by System Power (Purchases Only)	16%	5%	5%	5%

On average, Peninsula Clean Energy's supplies exceed demand, and Peninsula Clean Energy actually contributes energy to the system. This framework credits Peninsula Clean Energy for excess energy in some hours and is generally consistent with an annual accounting framework. However, we believe it is important to use an hourly accounting framework, similar to that recently adopted in SB 1158, to analyze the impact of hourly where we are a net purchaser of system power. If we look only at those hours, we see that we purchase about 5% of our energy from system power beginning in the 2026 study year. This is consistent with our goal to align renewable supply with customer demand on an hourly basis. In the 2022-2023 IRP, Peninsula Clean Energy implemented this hourly renewable goal using a 95% hourly matching criteria. Hence, we do expect our results to show a 5% net system purchase when using an hourly accounting framework similar to that in SB 1158.

Peninsula Clean Energy's aggressive voluntary goal to align renewable supply and demand results in significant emissions benefits, and signals to the market that less fossil fueled resources are needed to provide system power.

ii. Focus on Disadvantaged Communities

For purposes of the IRP, a disadvantaged community is defined based on CalEPA's designation[11] and includes:

I. *Census tracts receiving the highest 25 percent of overall scores in CalEnviroScreen 4.0[12] (1,984 tracts).*

[11] SB 535 Disadvantaged Communities | OEHHA (ca.gov)

[12] oehha.ca.gov/calenviroscreen/report/calenviroscreen-40

II. *Census tracts lacking overall scores in CalEnviroScreen 4.0 due to data gaps, but receiving the highest 5 percent of CalEnviroScreen 4.0 cumulative pollution burden scores (19 tracts)*

III. *Census tracts identified in the 2017 DAC designation as disadvantaged, regardless of their scores in CalEnviroScreen 4.0 (307 tracts).*

IV. *Lands under the control of federally recognized Tribes.*[13]

Peninsula Clean Energy identified seven census tracts in San Mateo County in the top 25% of impacted census tracts in CES 4.0, thereby meeting this definition of DACs. There were an additional 2 census tracts in San Mateo County that qualified as disadvantaged in CES 3.0 that are included as well. Peninsula Clean Energy identified five census tracts in the City of Los Banos that are in the top 25% of impacted census tracts in CES 4.0, including one census tract that was in the top 5% of cumulative pollution burden scores in CES 4.0.

Please refer to Table 23 below for a list of the census tracts and locations of disadvantaged communities. Additionally, Figure 19 below provides a map to the location of each census tract in San Mateo County.

Table 23: San Mateo County's Disadvantaged Communities[14]

Census Tract	Approximate Location	CES 4.0 Percentile Range	Customer Accounts Served by PCE	Qualification	Map Label
6047002201	Los Banos, Merced	95-100%	84	Top 5% in CES 4.0	1
6047002302	Los Banos, Merced	85-90%	2,917	Top 25% in CES 4.0	2
6047002202	Unincorporated Merced County area	85-90%	439	Top 25% in CES 4.0	3
6047002100	Unincorporated Merced County area	85-90%	1,058	Top 25% in CES 4.0	4
6081602100	South San Francisco, San Mateo	80-85%	1,012	Top 25% in CES 4.0	5

[13] For purposes of this designation, a Tribe may establish that a particular area of land is under its control even if not represented as such on CalEPA's DAC map and therefore should be considered a DAC by requesting a consultation with the CalEPA Deputy Secretary for Environmental Justice, Tribal Affairs and Border Relations.

[14] Table 23 includes data from oehha.ca.gov/calenviroscreen/report/calenviroscreen-30, under CalEnviroScreen 3.0 Data and Additional Materials - ces3results.xlxs (updated June 2018)

6081610201	Redwood City, San Mateo	80-85%	8	Top 25% in CES 4.0	6
6047002000	Unincorporated Merced County area	80-85%	0	Top 25% in CES 4.0	7
6081602300	South San Francisco, San Mateo	80-85%	1,036	Top 25% in CES 4.0	8
6081606200	San Mateo, San Mateo	75-80%	2,052	Top 25% in CES 4.0	9
6081612000	East Palo Alto, San Mateo	75-80%	1,377	Top 25% in CES 4.0	10
6081604101	San Bruno, San Mateo	75-80%	2,552	Top 25% in CES 4.0	11
6081610202	Redwood City, San Mateo	75-80%	1	Top 25% in CES 4.0	12
6081611900	East Palo Alto, San Mateo	70-75%	2,018	Top 25% in CES 3.0	13
6081604200	San Bruno, San Mateo	65-70%	1,115	Top 25% in CES 3.0	14

Figure 19: Map of DACs in San Mateo County (Numbers correlate to "Map Label" in Table 23

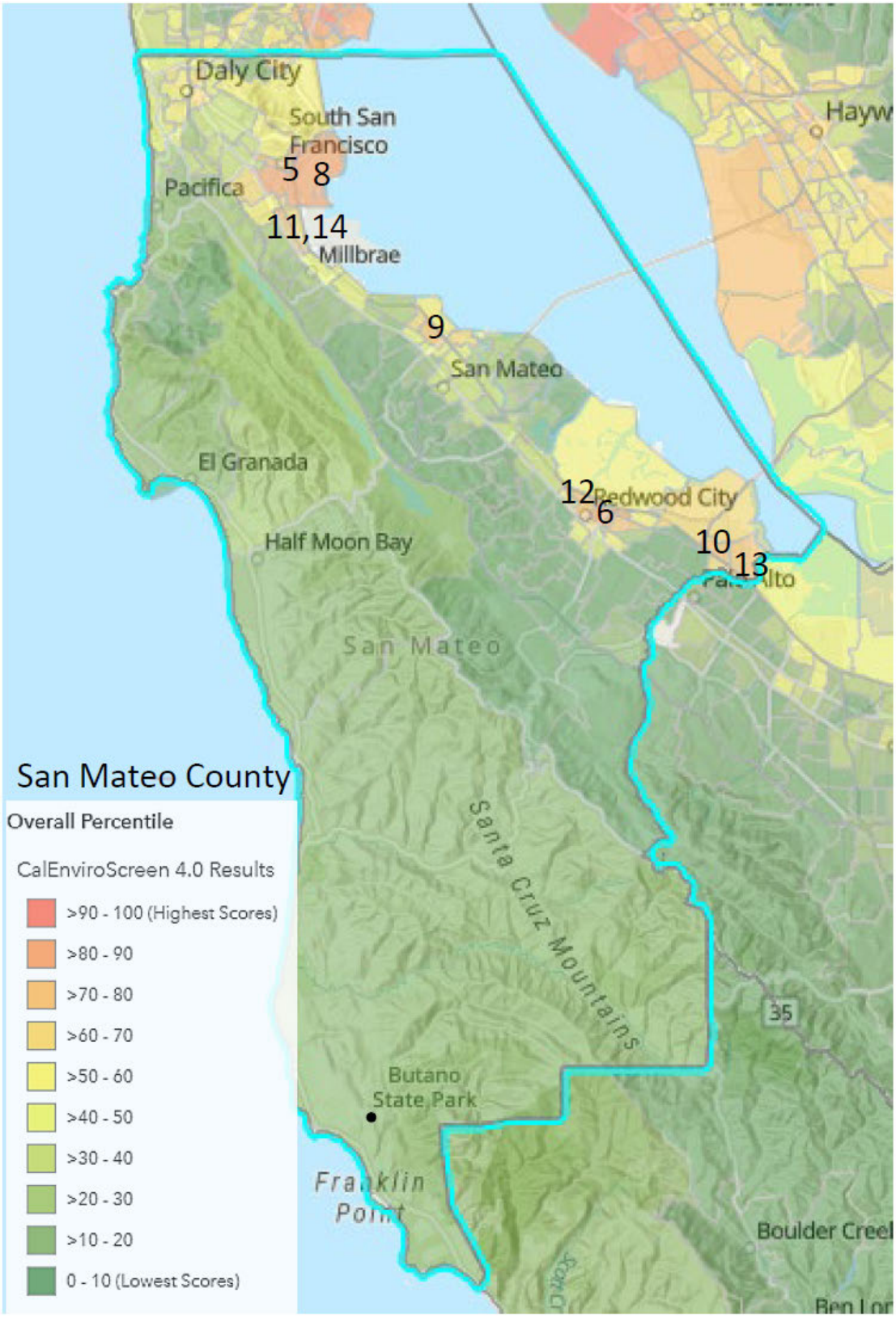
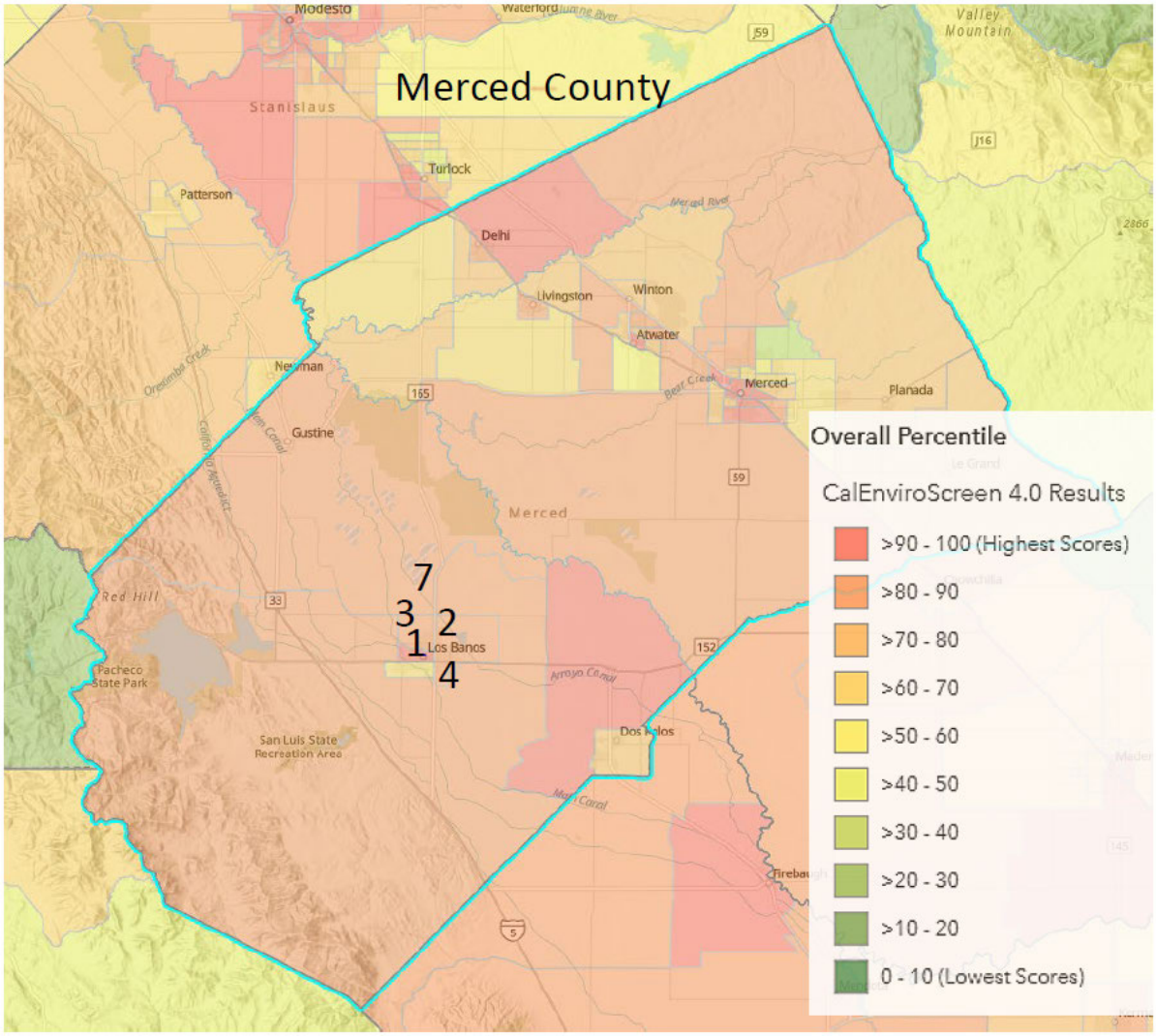


Figure 20: Map of DACs in the portion of Merced County that Peninsula Clean Energy serves (City of Los Banos) (Numbers correlate to "Map Label" in Table 23)



Peninsula Clean Energy estimates that it serves approximately 15,669 customer accounts, including residential and non-residential, serving a population of approximately 40,000 people, in DACs located within its service territory. This represents roughly 5.0% of Peninsula Clean Energy's total customer accounts. 6.1% of Peninsula Clean Energy's accounts located in DACs (948 accounts) participate in the Disadvantaged Communities Green Tariff (DAC-GT), which provides clean energy to income qualified residential customers at a 20% discount.

Peninsula Clean Energy staff conducted outreach and solicited feedback through public meetings in August and October 2022. When seeking community input, staff leveraged existing relationships with highly engaged residents and representatives of community-based organizations who are familiar with Peninsula Clean Energy.

Peninsula Clean Energy's Citizens Advisory Committee is an advisory body of fifteen residents appointed to serve as liaisons to communities in San Mateo County and the City of Los Banos. Staff utilized Citizen

Advisory Committee meetings, which are virtual and open to the public, as a forum for providing information and soliciting feedback. Staff also invited the eleven nonprofits that have received outreach grants from Peninsula Clean Energy to participate in the meeting. Several of the invited organizations serve low-income and other disadvantaged communities.

Staff introduced the Integrated Resource Plan's guiding principles and modeling approach during the August 11, 2022 meeting. During the October 13, 2022 meeting, staff explained the results of the Integrated Resource Plan process. Staff invited Citizen Advisory Committee members and members of the public to provide feedback on the selected resource portfolio, action plan, and outreach process.

Additionally, staff reviewed the results with the Executive Committee of Peninsula Clean Energy's Board of Directors on October 12, 2022.

Power Procurement in DACs

Peninsula Clean Energy does not procure electricity directly from any natural gas or other fossil resource power plants. Further, there are no polluting electricity generation resources located in the DACs in Peninsula Clean Energy's service territory identified above.

Peninsula Clean Energy fully recognizes the need to help mitigate the impacts of air pollution in regions of the state where communities have been disproportionately impacted by the existing generating fleet as well as the need to bring economic benefits to communities with high levels of poverty and unemployment. Consistent with this recognition, Peninsula Clean Energy has executed long-term power purchase agreements (PPAs) to build new renewable resources with four renewable energy projects in disadvantaged communities: two solar projects located in Merced County and in Kings County, a new wind project located in Merced County, and a new geothermal project located in Imperial County. We also have a contract with an existing wind project located in a DAC in Solano County. By entering into long-term PPAs with Peninsula Clean Energy, these projects will deliver renewable power to Peninsula Clean Energy's customers, while improving air quality, providing economic benefits and creating hundreds of jobs to the projects' region.

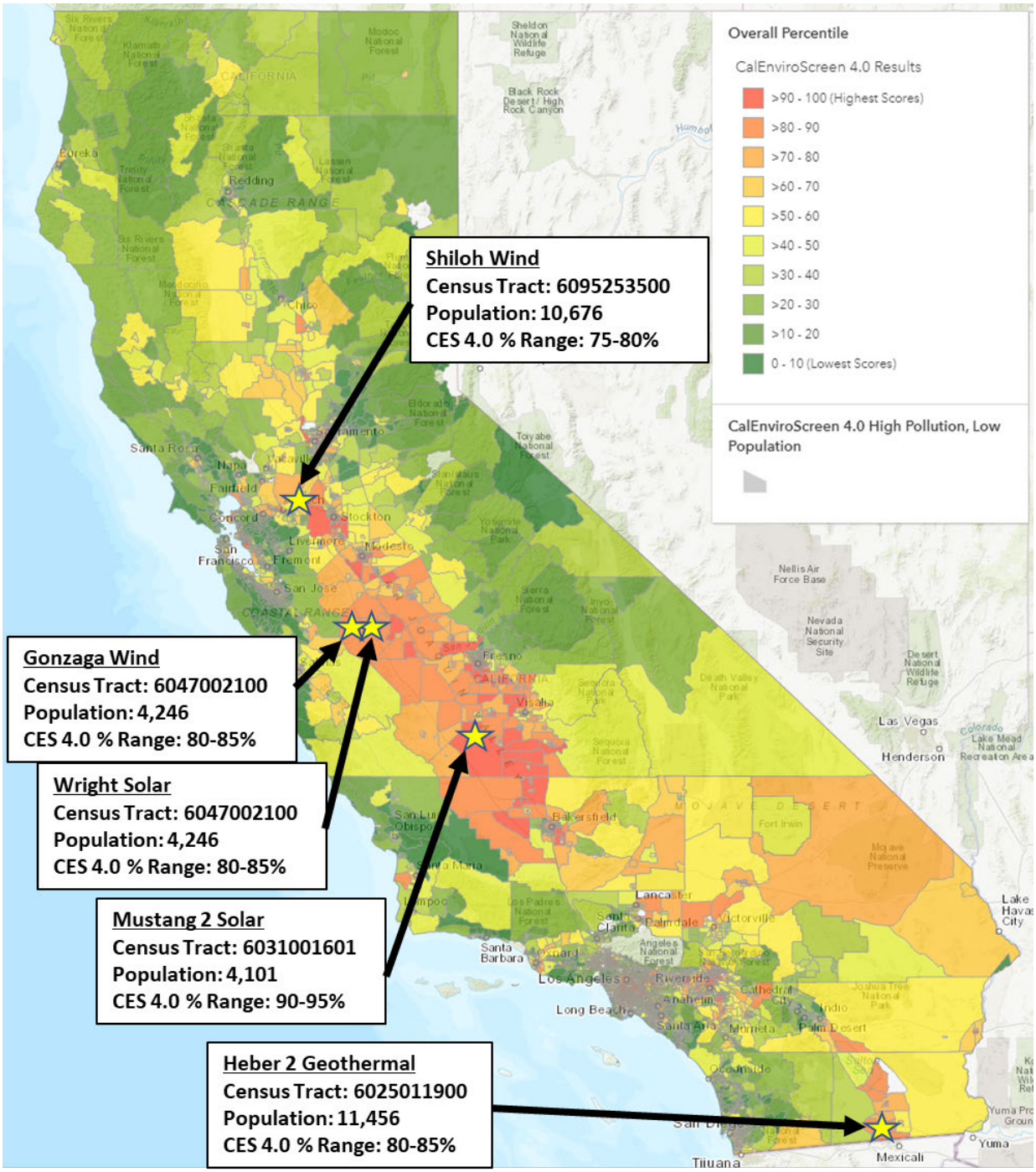
Each of the two of solar projects used a project labor agreement (PLA) with local unions for the construction of the projects. The new wind project used a PLA or a similar type of agreement when union labor was available to supply the type and quantity of skilled work needed for the project. The geothermal project has committed to prevailing wage for construction of the project.

A PLA is a pre-hire collective bargaining agreement with one or more labor organizations that establishes the terms and conditions of employment for a specific construction project. Consistent with Peninsula Clean Energy's Sustainable Workforce policy[15] Peninsula Clean Energy believes support of local businesses, union labor and apprenticeship and pre-apprenticeship programs that create employment opportunities are important components of building and sustaining healthy and sustainable communities. As part of its procurement process, Peninsula Clean Energy collects information from project owners on expected labor impacts. This information is used to evaluate potential workforce impacts of proposed projects with the goal of promoting fair compensation, fair worker treatment,

[15] Peninsula Clean Energy Sustainable Workforce Policy: www.peninsulacleanenergy.com/wp-content/uploads/2018/10/Policy-10-Inclusive-and-Sustainable-Workforce-revised-10-25-18.pdf

multi-trade collaboration, and support for the existing wage base in local communities where contracted projects will be located.

Figure 21: Peninsula Clean Energy Power Procurement in Disadvantaged Communities



Wright Solar is a 200 MW new solar project currently operating in Merced County, less than 100 miles south of San Mateo County. Wright Solar is located in a disadvantaged community that is ranked in the 80 to 85th percentile range on CalEnviroScreen 4.0. The plant is producing power equivalent to

that used by over 75,000 households. The construction of Wright Solar over the course of 2018 and 2019 produced approximately 180 jobs and resulted in over $2.7 million dollars of sales and use tax in the county of Merced.

Mustang Two Solar is a 100 MW new solar project currently operating in Kings County, roughly 200 miles outside San Mateo County. The facility is located in a disadvantaged community that ranks on the CalEnviroScreen 4.0 in the 90 – 95th percentile of communities burdened by the highest pollution. The plant is producing power equivalent to that used by over 37,000 households. The project owner estimates that approximately $3.1 million was spent locally on materials and services, $3.6 million in tax revenue will go to Kings County and $8.1 million in tax revenue will go to the state.

Shiloh Wind is a 150 MW existing wind project operating in Solano County, approximately 50 miles northeast of San Mateo County. Shiloh Wind is located in a disadvantaged community that is ranked in the 75 – 80th percentile on the CalEnviroScreen 4.0. The plant is producing power equivalent to that used by over 55,000 households.

Gonzaga Wind is a new wind project that will be constructed in Merced County, less than 100 miles south of San Mateo County. Peninsula Clean Energy has contracted for 76 MW of the project, which is expected to be over 100 MW in total size. Gonzaga Wind is expected to come online at the end of 2024. The project is located in a disadvantaged community that is ranked in the 80 to 85th percentile range on CalEnviroScreen 4.0. The plant is expected to produce power equivalent to that used by over 27,000 households. The project has agreed to secure a Project Labor Agreement or similar type of agreement to the extent that union labor is available to supply the type and quantity of skilled work needed.

Heber 2 Geothermal is 26 MW new geothermal project that is currently under construction in Imperial County, over 500 miles south of San Mateo County. The project is expected to come online at the beginning of 2023. The project is located in a disadvantaged community that is ranked in the 80 to 85th percentile on CalEnviroScreen 4.0. The plant is expected to produce power equivalent to that used by over 32,000 households. The project has agreed to pay prevailing wage for all construction work.

LSE Activities & Programs Impacting DACs

Peninsula Clean Energy's ECOplus customers receive a 5% discount from PG&E's electrical service rate, which is an immediate benefit provided to all residents who want to reduce their monthly electrical bill. This saves residential customers $2.51 on average per month and in aggregate saves customers $18 million annually.[16] Peninsula Clean Energy offers an array of programs that are available to all customers, including those located with a DAC. Many programs are income-qualified, reserving program funding and benefits for low-income customers.

[16] Based on a typical usage of 427 kWh/month. For details on rates and savings calculation: www.peninsulacleanenergy.com/for-residents/

Table 24: Overview of Peninsula Clean Energy Programs Available to all customers, including those located within a DAC

Program	Description	Status
Transportation electrification reach Codes:	Program supporting local governments in adopting code enhancements which support EV readiness at multi-family housing and non-residential locations. Increasing charging at new multi-family housing, which the reach codes often achieve by providing access to 100% of residential units, is highly beneficial for renters and other multi-family residents.	To date 19 local cities have adopted local codes that ensure widescale EV readiness for new multifamily and expanded EV readiness in commercial construction. By 2035, the reach codes are anticipated to result in 19,000 new charge ports, assuming development continues consistent with historical trends.
Building electrification Reach Codes	program supporting local governments in adopting code enhancements for all-electric new construction	To date 18 cities have adopted local codes that ensure all-electric construction in most segments. In addition, the program has begun working with local governments on existing building reach codes.
Distributed Generation: Local Government PV + Solar	Local government solar and storage program that identifies local government sites for scaled deployment of solar and selectively, storage systems for local resilience during emergencies.	Pursuing solar and/or solar+storage at facilities in Brisbane, Colma, Pacifica, and Redwood City. We have chosen a vendor to install systems at customer sites and plan to commence this program in 2023.
Power On Peninsula Medically Vulnerable (Portable Battery Program)	Donating portable batteries to medically vulnerable customers in high fire threat districts or in areas that are at risk for PSPS events. Program focuses on renters and residents of mobile home parks and condo who are not able to take advantage of SGIP Equity Resilience batteries rebates. Intensive outreach in Spanish.	Results: 150 portable batteries, 3kWh each, and 100 solar panels, 200W each, were donated before the program was concluded in 2021
Community Solar Green Tariff (CSGT) and Disadvantaged Community Green Tariff (DAC-GT)	Pursuant to D.18-06-027, CCAs may develop and implement their own DAC-GT and CS-GT programs to promote the installation of renewable generation among residential customers in disadvantaged communities	Approximately 1,000 customers are currently receiving a 20% bill discount from enrolling into the program.

		We have signed a PPA for a 3MW new solar project to serve those customers.
Community Outreach Grants	Annual grant cycle open to nonprofits and local government agencies to fund collaboration with provide accurate information about Peninsula Clean Energy and help enroll customers in our programs. The grants help Peninsula Clean Energy distribute its message in English, Spanish, Chinese, Tongan and Samoan. The goal of distributing these small grants is to gain further participation from the public and local organizations to collaborate with Peninsula Clean Energy on efforts to create a sustainable, cleaner environment for San Mateo County.	The 2021-2022 cycle awarded 12 grants for a total of $310,000. The RFP for the 2022-2023 cycle was released in September and proposals were due on 10/17/2022.
"EV Ready"[17] - EV Charging Incentives and Technical Assistance	This program aims to install 3,500 charge ports by 2024 across multi-family, workplace and public segments. It includes a special emphasis on multi-family charging through advanced design assistance that "right-sizes" infrastructure through power management and low-power charging to maximize cost-effective port installations	This program launched in October 2022 and will run for 3 years.
Low-Power and Curbside Charging Pilots	Pilots to research and test unique technology and business model innovations for expanded EV infrastructure within multi-unit dwellings and for curbside charging. The strategy is intended to help address the lack of excess power in a large segment of the County's multi-unit dwellings (80% are over 50 years old) and expand access to EV charging beyond single-family homeowners.	13 smart Level 1 outlets were installed at 3 multi-family housing properties in 2020[18] (case study) and Level 1 has been integrated into PCE's EV Ready charging infrastructure program. Curbside charging continues to be evaluated as submetering policy is implemented.
Used EV Rebate	This program provides incentives of up to $6,000 for the purchase of used electric vehicles. The program is open to all residents and includes higher incentives and a "hotline" for income-qualified individuals.	The program has issued 225 rebates since its inception in March 2019. Of those 177 have been issued to income-qualified residents.

[17] https://www.peninsulacleanenergy.com/ev-ready/

[18] https://www.peninsulacleanenergy.com/wp-content/uploads/2021/05/Low-Power-Case-Study-1.pdf

EV Rebates	Incentives for EV purchases (new and used at different points in time)	Over 600 incentives provided
E-Bikes	Peninsula Clean Energy provides incentives to income-qualified residents for the purchase of e-bikes with point-of-sale rebates.	"E-bikes for Everyone," Peninsula Clean Energy's e-bike rebate program launched in spring of 2021 has provided over 500 rebates to low-income customers.
Public Fleets	The Public Fleets program is focused on local government fleets, providing technical assistance for developing a vehicle replacement and infrastructure plan for local agencies. The program will provide incentives and bridge agencies towards meeting state requirements.	This program launched in October 2022 and will run for 3 years.
Ride Hailing	Peninsula Clean Energy has partnered with Lyft to deploy 100 EVs for subsidized rental by ride-hailing drivers.	100 EVs have been rented by drivers on the Lyft platform and are currently averaging about .5 million all-electric miles per month.
EV Managed Charging	In 2023, this program targets 1,000 to 2,000 EVs as the second phase of a pilot program to align residential charging to grid needs and reduce EV owner charging costs.	Completed phase 1 proof-of-concept in 2020, launching phase 2 pilot in 2023.
Developer Technical Assistance (for building electrification):	This program provides no-cost technical assistance to builders, developers and designers primarily for new construction.	To date over 47 firms have been provided with substantive assistance with a portfolio of sector specific experts.
Electric Appliances	Incentives for heat-pump water heaters and heat pump space conditioning including combo systems. Offers zero percent on-bill finance option and closely coordinated with BayREN program.	300 appliance incentives
Home Upgrade	Turnkey retrofit program for low-income homes. Includes health and safety upgrades plus at least one electrification measure such as a heat pump water heater. Closely coordinated with other programs such as the Energy Savings Assistance program to maximize benefits to residents.	Over 70 homes upgraded
FLEXmarket	This is a soon to launch pay-for-performance program primarily aimed at load shaping in both residential and	We have signed a contractor with a program implementer and plan to

	commercial sectors. The program pays out incentives based on metered performance using the Avoided Cost Calculator as the basis of incentive value.	launch this program in 2023.
Distributed Generation: Residential Solar and Storage	Incentives to customers for the installation of solar + storage systems that are dispatched under an optimized schedule for net peak reduction	This program is active. We are dispatching energy storage in the evening with battery storage systems located at customer sites.

Since disadvantaged communities based on the CalEnviroScreen definition make up a relatively small portion of Peninsula Clean Energy's customer base, we often expand the definition of eligible customers for the purposes of our programs to include eligibility based on income, customers on specific rates, and by using the San Mateo County Community Vulnerability Index.

For income-based eligibility, low income is often defined as household income below 80% of the area's median income. We estimate that more than 127,000 households[19] in San Mateo County fall within this definition. Low income could also be defined as households eligible for certain electric rates including California Alternate Rates for Energy (CARE) or Family Electric Rate Assistance (FERA) program. Peninsula Clean Energy has 44,260 accounts enrolled in the CARE rate and 1,663 accounts enrolled in the FERA program.

In addition to evaluating income-based eligibility and enrollment in the CARE or FERA programs, we also consult the San Mateo County Community Vulnerability Index (CVI)[20],which is an initiative of the County Manager's Office and aims to demonstrate the geographical distribution of the overall vulnerability of the residents of the county. Although this tool is focused specifically on the County of San Mateo, we believe the methodology is appropriate for use across of our service territory including the City of Los Banos in Merced County.

The CVI evaluates the following seven indicators of vulnerability:

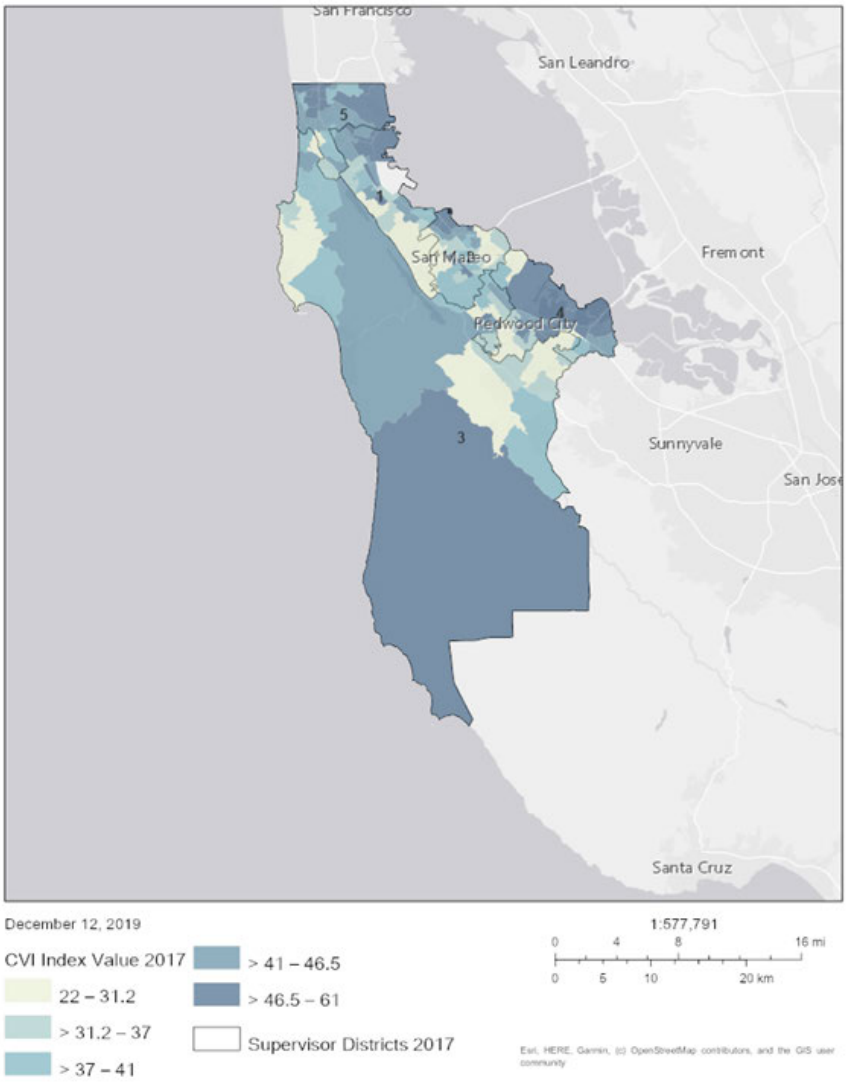
- Health insurance coverage;
- Educational attainment;
- Supplemental security income;
- Gross rent as a percentage of income;
- Poverty;
- Unemployment; and
- Disability status.

[19] Based on 2018 American Community Survey - data.census.gov/cedsci/table?q=San%20Mateo%20County,%20California&g=0500000US06081&tid=ACSDP1Y2018.DP03&hidePreview=true

[20] "Community Vulnerability Index": cmo.smcgov.org/cvi

The CVI identifies a large vulnerable population on the San Mateo County coast, which is not identified through the CalEnviroScreen definition. Please refer to Figure 22 below for a map of the Community Vulnerability Index for San Mateo County.

Figure 22: Map of San Mateo County Community Vulnerability Index. A dark shade of blue represents a high degree of vulnerability



e. Cost and Rate Analysis

Peninsula Clean Energy's rates are set by its Board of Directors. Since inception, Peninsula Clean Energy's goal has been to offer rates that are at parity or lower than PG&E rates. Peninsula Clean Energy's default product is ECOplus and rates for this product are currently set at 5% below PG&E's rates while providing customers with electricity that is supplied entirely from renewable or carbon-free sources through 2024, and is 100% renewable on an annual basis beginning in 2025. In addition, Peninsula Clean Energy has an aggressive voluntary goal to provide 24x7 renewable supply that matches

customer demand on an hourly basis by 2025.It is imperative to Peninsula Clean Energy's success to manage cost and offer our customers competitive rates while maintaining our financial sustainability.

To meet this goal, Peninsula Clean Energy takes a number of actions to procure the lowest cost portfolio and protect our customers from unexpected price increases.

- Competitive procurement: Peninsula Clean Energy engages in competitive procurement processes to secure the lowest cost resources possible for our customers.
- Financial reserves: Peninsula Clean Energy maintains cash reserves at least equivalent to 180 days of total operating expenses, which can help Peninsula Clean Energy manage risk and remain financially solvent.[21]
- Credit rating: Peninsula Clean Energy obtained an investment grade credit rating in 2019. This helps us to secure the lowest cost power resources for our customers.
- Risk Management: Peninsula Clean Energy is subject to cost volatility and market price risk in meeting load requirements in the CAISO market. We manage this risk through forward procurement of fixed price contracts for energy. Peninsula Clean Energy uses a portfolio risk management approach in its power purchasing program, seeking low-cost supply as well as diversity among technologies, production profiles, project sizes, project locations, counterparties, term lengths and timing of market purchases to cost average over time, including remaining cognizant of the value of open market positions.

Considering these goals, Peninsula Clean Energy analyzed the modeled cost of our Preferred Portfolio. Overall, Peninsula Clean Energy's expected costs increase over time, generally in proportion to anticipated market forward curves. We note that the cost results are sensitive to market conditions, and uncertainty increases in later years. These uncertainties are discussed further in the Barrier Analysis section below.

In order to evaluate the cost uncertainty and associated risk of our Preferred Portfolio, we used a stochastic analysis to determine the probability that our costs would exceed certain thresholds. The stochastic analysis results in a probability distribution curve of potential portfolio costs. Here we are summarizing these stochastic results by showing the 5th, 50th, and 95th percentile costs from the stochastic analysis.

An additional component of uncertainty is whether or not we are able to resell any excess renewable energy or resource adequacy from our portfolio. As a default assumption, we assume that we can resell 75% of our excess renewable energy and resource adequacy. We also provide cost estimates for our portfolio for scenarios that assume that 1) we are unable to resell any excess, or 2) that we are able to resell 100% of any excess renewable energy or resource adequacy in our portfolio.

Peninsula Clean Energy's expected portfolio costs for our Preferred Portfolio are depicted in

Table 25 below. A description of the cost components is provided below.

[21] Financial Reserves Policy: www.peninsulacleanenergy.com/wp-content/uploads/2020/03/Peninsula Clean Energy-Policy-18-Reserves-Policy-Revised-2-27-20-1.pdf

Table 25: Portfolio Total Cost Results ($M) with expected resale assumptions (75% resale of excess generation and RA)

	2024	2026	2030	2035
Median (P50)				
Lower Cost Estimate (P5)				
Higher Cost Estimate (P95)				

Table 26: Portfolio Weighted Average Cost Results ($/MWh) with expected resale assumptions (75% resale of excess generation and RA)

	2024	2026	2030	2035
Median (P50)				
Lower Cost Estimate (P5)				
Higher Cost Estimate (P95)				

Table 27: Portfolio Total Cost Results ($M) with no resale assumptions (0% resale of excess generation and RA)

	2024	2026	2030	2035
Median (P50)				
Lower Cost Estimate (P5)				
Higher Cost Estimate (P95)				

Table 28: Portfolio Weighted Average Cost Results ($/MWh) with no resale assumptions (0% resale of excess generation and RA)

	2024	2026	2030	2035
Median (P50)				
Lower Cost Estimate (P5)				
Higher Cost Estimate (P95)				

Table 29: Portfolio Total Cost Results ($M) with full resale assumptions (100% resale of excess generation and RA)

	2024	2026	2030	2035
Median (P50)				
Lower Cost Estimate (P5)				
Higher Cost Estimate (P95)				

Table 30: Portfolio Weighted Average Cost Results ($/MWh) with full resale assumptions (100% resale of excess generation and RA)

	2024	2026	2030	2035
Median (P50)				
Lower Cost Estimate (P5)				
Higher Cost Estimate (P95)				

For each portfolio, costs are comprised of the following components which are each described in more detail below:

- Market Cost of Customer Load
- Contract Costs
- Market Revenue from Energy Generation
- REC and GHG-free Attribute Costs, net of any resales
- Capacity Market Costs, net of any resales

Market Cost of Customer Load:
Peninsula Clean Energy buys load to serve customers at the PG&E DLAP. The cost of this load is determined using the hourly day ahead and real-time imbalance CAISO market prices for the PG&E DLAP.

Contract Costs:
Peninsula Clean Energy buys renewable energy under several contracting structures, primarily long-term PPAs with a fixed price over the project term. Peninsula Clean Energy pays a fixed price for the renewable energy generated by its contracted projects.

Market Revenue from Energy Generation:
Peninsula Clean Energy sells its renewable energy into the CAISO market at each contracted project delivery point, which generates revenue for Peninsula Clean Energy. If market prices at a particular node during a particular interval are negative and Peninsula Clean Energy chooses not to curtail generation at that node during that hour, then Peninsula Clean Energy would pay CAISO for the injection of that energy into the system.

REC and GHG-free Attribute Costs:
If Peninsula Clean Energy's portfolio does not provide enough renewable and/or carbon-free energy through long-term PPAs to meet its targets, we would contract REC and GHG-free energy via short-term contract structures such as index-plus contracts. Under these contracting structures, Peninsula Clean Energy pays the market price for the energy plus an attribute premium. In the 2022-2023 IRP, Peninsula Clean Energy's Preferred Portfolio is long is all years except 2024, and 2024 is the only year in which our Preferred Portfolio includes net purchases or REC or GHG-Free attributes. In the other years, Peninsula Clean Energy makes sales of a portion of its excess renewable energy via index-plus structures. Peninsula Clean Energy assumes a lower price for attribute sales than for attribute purchases, in order to be conservative. The price of the products was derived from AscendView's forecast and is updated to reflect Peninsula Clean Energy's most current assessment of the market.

Capacity Market Costs:
If Peninsula Clean Energy's portfolio does not provide enough resource adequacy through long-term PPAs, we would contract for capacity via short-term contract structures for resource adequacy. Capacity market costs are based on Peninsula Clean Energy's assessment of the resource adequacy market and are not adjusted for future years. Instead, we assume that future years will have similar market values as the current conditions.

f. System Reliability Analysis

In this section, Peninsula Clean Energy describes several methods for evaluating system reliability and how our Preferred Portfolio contributes to system reliability.

Peninsula Clean Energy takes its responsibility to procure a portfolio of resources that contribute to system reliability very seriously. Peninsula Clean Energy's Board has set aggressive renewable energy goals that go beyond the RPS requirements in timeline, volume and by instructing Peninsula Clean Energy staff to hit these targets by matching hourly load with renewable energy. These efforts are focused on eliminating reliance on system fossil fuel resources and ensuring system reliability in all hours. Meeting our own load in all hours means that Peninsula Clean Energy would be meeting our share of needed reliability resources.

Numerous studies have demonstrated that high renewable portfolios can deliver solid reliability at a reasonable cost. The National Renewable Energy Laboratory's Renewable Electricity Futures Study has demonstrated that "renewable electricity generation from technologies that are commercially available today, in combination with a more flexible electric system, is more than adequate to supply 80% of total U.S. electricity generation in 2050 while meeting electricity demand on an hourly basis in every region of the United States."[22] Similarly, other studies have found that serving California with 80% renewable energy would be cheaper than business as usual while serving load in all hours reliably.[23,24] In addition, studies of California examining the costs of a 100% renewable system indicate that a mix of variable energy resources, storage, and some clean firm resources are fully capable of delivering adequate reliability in all hours.[25] Based on these studies, the low carbon portfolio under consideration here should not implicate inherent reliability concerns for the grid, provided adequate grid planning and grid management.

The transition to variable energy resources, especially wind and solar, will require an evolution of reliability evaluation beyond a peak load analysis. Reliability assessment of low carbon resources will also need to evaluate serving load across all hours, since resources to meet load during the solar window will not be the same as resources used to meet evening ramping or overnight load. This 24-hr framework has been adopted by the CPUC and is currently under development, with the first compliance year of 2025.

The primary metric we use to evaluate our Preferred Portfolio is an analysis of our September NQC using the capacity counting rules established in the 2022-2023 IRP proceeding. According to this metric, Peninsula Clean Energy's Preferred Portfolio meets its reliability need in all years of the study period (2024 to 2035).

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[22] Renewable Electricity Futures Study, National Renewable Energy Laboratory. (2012). Hand, M.M.; Baldwin, S.; DeMeo, E.; Reilly, J.M.; Mai, T.; Arent, D.; Porro, G.; Meshek, M.; Sandor, D. eds. 4 vols. NREL/TP-6A20-52409. Golden, CO: Nation, Vol 1, at 4. www.nrel.gov/analysis/re_futures/

[23] Cost-effective decarbonization of California's power sector by 2030 with the aid of battery storage (2019) Amol Phadke, Nikit Abhyankar, Ranjit Deshmukh, Julia Szinai, and Anand Gopal (2019), available at eta-publications.lbl.gov/sites/default/files/californiapowerdecarbonizationdraft_v6.pdf

[24] The 2035 Study: Plummeting Solar, Wind, And Battery Costs Can Accelerate Our Clean Electricity Future (2020) Amol Phadke, Umed Paliwal, Nikit Abhyankar, Taylor McNair, Ben Paulos, David Wooley, Ric O'Connell, available at www.2035report.com/wp-content/uploads/2020/06/2035-Report.pdf?hsCtaTracking=8a85e9ea-4ed3-4ec0-b4c6-906934306ddb%7Cc68c2ac2-1db0-4d1c-82a1-65ef4daaf6c1

[25] .JCS Long, E Baik, JD Jenkins, C Kolster, K Chawla, A Olson, A Cohen, M Colvin, S M Benson, RB Jackson, DG Victorf,, SP Hamburg (2022) Clean Firm Power is the Key to California's Carbon-Free Energy Future, Issues in Science and Technology, Available at: issues.org/california-decarbonizing-power-wind-solar-nuclear-gas/

The Reliability summary analysis from the Reliability tab of the Resource Data Template[26] for our Preferred Portfolio is presented below as Figure 23 and Figure 24, and demonstrates how Peninsula Clean Energy's portfolio will meet our assigned reliability need in all years. Peninsula Clean Energy plans to resell excess capacity from our portfolio. The figures below show our reliabilty analysis prior to sales, and net of sales.

Figure 23: LSE Capacity by Resource Type Chart from the Reliability Tab of the RDT – Peninsula Clean Energy Preferred Portfolio (25 MMT scenario, prior to sales)

[26] Results from the 25 MMT scenario are provided here. The Preferred Portfolio meets its reliability need in all years in the 30 MMT scenario as well.

Figure 24: LSE Capacity by Resource Type Chart from the Reliability Tab of the RDT - Peninsula Clean Energy Preferred Portfolio (25 MMT scenario, net of sales)

Figure 25:LSE Capacity by Contract Status from the Reliability Tab of the RDT – Peninsula Clean Energy Preferred Portfolio (25 MMT Scenario, prior to sales)

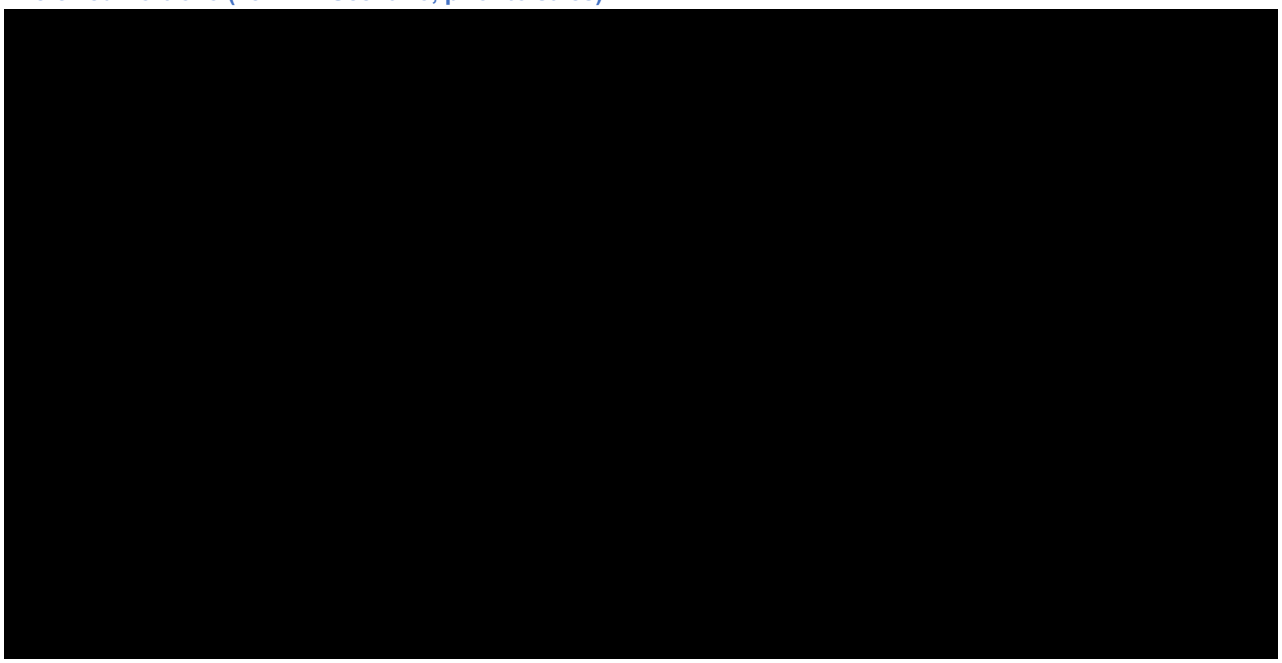


Figure 26: LSE Capacity by Contract Status from the Reliability Tab of the RDT – Peninsula Clean Energy Preferred Portoflio (25 MMT Scenario, net of sales)

Table 31: Load and Resource Table by Resource Type from the Resource Data Template (25 MMT Scenario, prior to sales)

Load and Resource Table by Resource Type												
	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
LSE reliability need (MW)												
ELCC by resource type (effective MW)	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**
hybrid												
in_state_wind_south												
in_state_wind_north												
out_of_state_wind_WYID												
out_of_state_wind_WAOR												
out_of_state_wind_AZNM												
offshore_wind												
utility_pv												
btm_pv												
4hr_batteries												
5hr_batteries												
6hr_batteries												
7hr_batteries												
8hr_batteries												
pumped_storage												
demand_response												
hydro												
small_hydro												
geothermal												
biomass_wood												
biogas												
nuclear												
gas_cc												
gas_ct												
cogen												
ice												
coal												
steam												
unspecified_import												
LSE total supply (effective MW)												
Net capacity position (+ve = excess, -ve = shortfall) (effective MW)												

Table 32: Load and Resource Table by Resource Type from the Resource Data Template (25 MMT Scenario, net of sales)

Load and Resource Table by Resource Type												
	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
LSE reliability need (MW)												
ELCC by resource type (effective MW)	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**
hybrid												
in_state_wind_south												
in_state_wind_north												
out of state wind WYID												
out of state wind WAOR												
out of state wind AZNM												
offshore_wind												
utility_pv												
btm_pv												
4hr_batteries												
5hr_batteries												
6hr_batteries												
7hr_batteries												
8hr_batteries												
pumped_storage												
demand_response												
hydro												
small_hydro												
geothermal												
biomass_wood												
biogas												
nuclear												
gas_cc												
gas_ct												
cogen												
ice												
coal												
steam												
unspecified_import												
LSE total supply (effective MW)												
Net capacity position (+ve = excess, -ve = shortfall) (effective MW)												

Table 33: Load and Resource Table by Contract Status from the Reliability Tab of the RDT (25 MMT Scenario, prior to sales)

Load and Resource Table by Contract Status												
	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
LSE reliability need (MW)												
ELCC by contract status (effective MW)												
Online												
Development												
Review												
PlannedExisting												
PlannedNew												
BTM PV												
LSE total supply (effective MW)												
Net capacity position (+ve = excess, -ve = shortfall) (effective MW)												

Table 34: Load and Resource Table by Contract Status from the Reliability Tab of the RDT (25 MMT Scenario, net of sales)

Load and Resource Table by Contract Status												
	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
LSE reliability need (MW)												
ELCC by contract status (effective MW)												
Online												
Development												
Review												
PlannedExisting												
PlannedNew												
BTM PV												
LSE total supply (effective MW)												
Net capacity position (+ve = excess, -ve = shortfall) (effective MW)												

Peninsula Clean Energy evaluated our Preferred Portfolio using two supplemental reliability metrics. Both supplemental metrics represent provisional approaches and should be viewed as qualitative measures of the reliance on market or system energy, rather than any precise quantitative representation of the exact amount of energy or capacity that would be needed to meet all load in all hours. First, the reliance on system power represents an approximate metric of the degree to which an

LSE relies on resources outside its directly contracted resources. In addition, we use the SCE Showing and Validation Tool to approximate the showings we might make under the 24-hour RA program currently under development in R.21-10-002. This tool is a prototype, since the details of the 24-hr RA Framework implementation are still under development. Thus, these results are presented solely for the qualitative patterns.

The second metric that Peninsula Clean Energy evaluated is the reliance of our portfolio on Net System Power. For this analysis, we reviewed both our use of Net System Power per the CSP Calculator, and we performed a stochastic analysis of our Preferred Portfolio, and evaluated the distribution of Net System Power use, as a percent of total load use in multiple simulations. Table 35 below compares the use of Net System Power under this evaluation. According to the CSP calculator, our portfolio only meets 5% of load with Net System Power (when excluding hours where we have excess generation). However, in our stochastic analysis, our portfolio meets between 9% and 12% of load from net system power (again, excluding hours where we have excess generation). The higher system power use indicated by the stochastic analysis is likely a more realistic picture of how our portfolio will actually operate, as well as the more detailed Peninsula Clean Energy-specific assumptions about both generation and load. This discrepancy signals the caution that should be placed on the quasi-deterministic models that don't capture the full LSE-specific variability in load and renewable generation.

This analysis demonstrates some of the contours of California's future energy system as it moves to greater reliance on variable energy resources and storage. In particular, the hours of potential grid stress are no longer summer and early fall evenings that are currently the tightest hours, but move to the night and early morning hours in winter and early spring because of the reduced renewable generation, especially solar, in those months.

Table 35: Conforming Portfolio Comparison of Demand and Net System Power (CSP Calculator)

	2024	2026	2030	2035
Demand (at Generator Bus-Bar)	3,731	3,774	4,019	4,356
Net System Power (Net)	224	-141	-44	-73
Net System Power (Purchases Only)	609	184	191	212
% of Load Served by System Power (Net)	6%	-4%	-1%	-2%
% of Load Served by System Power (Purchases Only)	16%	5%	5%	5%

Table 36: Comparison of 2035 Net System Power Use by the Preferred Portfolio under a deterministic evaluation in the CSP Calculator and a stochastic evaluation

	% of Load Served by Time-Coincident Renewables (SB 1158 Methodology)	Average % of Load Served by Net System Power (excluding credits for hours with excess generation)
CSP Calculator (Deterministic)	95%	5%
Stochastic Analysis: P50 or Median	89%	11%
Stochastic Analysis: P5 or Lowest Estimate of Net System Power Use	91%	9%
Stochastic Analysis: P95 or Highest Estimate of Net System Power Use	88%	12%

In the heat maps shown in Figure 27 and Figure 28, we compare the month-hour average net system power use between the CSP Calculator and the median results of our stochastic analysis.

Figure 27: 2035 Net System Power Use per the CSP Calculator

Hour Ending	Month 1	2	3	4	5	6	7	8	9	10	11	12
1	28%	14%	4%	0%	0%	0%	0%	6%	18%	4%	35%	40%
2	25%	17%	8%	0%	0%	0%	4%	13%	29%	14%	34%	30%
3	21%	17%	8%	0%	0%	0%	3%	12%	27%	11%	27%	25%
4	21%	14%	1%	0%	0%	0%	0%	7%	9%	4%	21%	20%
5	16%	5%	0%	0%	0%	0%	0%	0%	0%	0%	19%	19%
6	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	6%
7	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
8	8%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	20%
9	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
12	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11%
13	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	13%
14	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%
15	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
16	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%
17	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	16%
18	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	4%
21	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
22	3%	0%	0%	0%	0%	0%	0%	0%	0%	1%	7%	23%
23	30%	13%	0%	0%	0%	0%	0%	1%	4%	1%	33%	42%
24	22%	6%	0%	0%	0%	0%	0%	3%	4%	1%	32%	34%

Figure 28: 2035 Net System Power Use per our stochastic analysis (P50, or median performance)

Hour Ending	Month 1	2	3	4	5	6	7	8	9	10	11	12
1	28%	23%	26%	14%	7%	3%	19%	29%	25%	27%	31%	29%
2	25%	24%	31%	14%	8%	4%	20%	27%	25%	22%	29%	27%
3	29%	24%	35%	14%	9%	5%	23%	30%	27%	22%	32%	31%
4	27%	25%	35%	14%	12%	8%	27%	31%	28%	28%	30%	28%
5	22%	18%	36%	13%	6%	3%	23%	30%	23%	20%	27%	24%
6	26%	21%	31%	12%	3%	3%	20%	30%	26%	25%	31%	24%
7	18%	4%	8%	0%	0%	0%	8%	13%	23%	13%	21%	20%
8	17%	10%	17%	2%	0%	0%	0%	4%	9%	12%	8%	20%
9	11%	5%	0%	0%	0%	0%	3%	0%	0%	2%	7%	10%
10	8%	2%	0%	0%	0%	0%	1%	0%	2%	0%	7%	11%
11	13%	6%	0%	0%	0%	0%	0%	0%	2%	9%	12%	15%
12	14%	6%	3%	0%	0%	0%	0%	0%	1%	8%	14%	19%
13	18%	14%	1%	0%	0%	0%	0%	0%	1%	2%	14%	17%
14	23%	12%	4%	0%	0%	0%	0%	0%	0%	3%	15%	19%
15	18%	8%	1%	0%	0%	0%	0%	0%	0%	0%	6%	13%
16	13%	6%	0%	0%	0%	0%	0%	0%	0%	1%	7%	9%
17	15%	10%	2%	0%	0%	0%	0%	0%	0%	2%	19%	25%
18	3%	19%	10%	0%	0%	0%	0%	0%	0%	2%	2%	6%
19	6%	1%	12%	1%	0%	0%	1%	0%	1%	0%	4%	14%
20	13%	6%	1%	0%	0%	0%	0%	1%	1%	1%	15%	27%
21	19%	3%	1%	0%	0%	0%	1%	0%	1%	4%	12%	20%
22	30%	20%	6%	0%	0%	0%	2%	9%	13%	24%	30%	26%
23	28%	24%	24%	9%	7%	2%	14%	24%	19%	26%	33%	36%
24	31%	28%	25%	14%	6%	3%	17%	26%	21%	25%	31%	35%

The final reliability metric we evaluated was to analyze our conforming portfolio using SCE's proposed Showing and Validation Tool (SCE Tool) for the 24-hr slice of day RA framework implementation. Although this is only a prototype of the methodologies that could eventually be used in the RA program going forward, this provides a useful insight into how much of Peninsula Clean Energy's RA needs would be met with this portfolio. Peninsula Clean Energy input our average hourly load shapes for each month from the CSP Calculator, and then entered our portfolio of resources. We manually tuned the hourly qualification of our storage resources to meet load in all hours. Although this is a more intensive approach, this optimization of storage reflects how LSEs will be showing their RA resources in this system. We used P50 average generation or dispatch profiles (as a percent of nameplate capacity) as a proxy for the effective load carrying capacity for each resource. Since the exceedance resource counting methodologies have not been developed in R.21-10-002, these reflect the simplest approach at this time. These P50 average profiles differ from the ELCCs assumed in the 2022-2023 IRP, and thus we do not expect the reliability analysis results from the SCE Showing and Validation Tool to align with the Reliability analysis in the 2022-2023 IRP RDT.

The results of our Preferred Portfolio in the SCE Showing and Validation Tool, show that our portfolio can meet our 24-hr reliability needs in all hours, and has significant excess capacity during the solar hours, especially in summer. As with the CSP hourly analysis, winter months overnight are the tightest, especially if the excess generation capacity is marginally sufficient to charge the storage. As 2025 approaches, Peninsula Clean Energy anticipates reviewing the portfolio to ensure full compliance with the 24-hour methodology, once it is established.

The figures below display Peninsula Clean Energy's Preferred Portfolio, as entered into the SCE Tool, for representative months of each season in 2035.

Figure 29: March 2035 24-hr Reliability Analysis

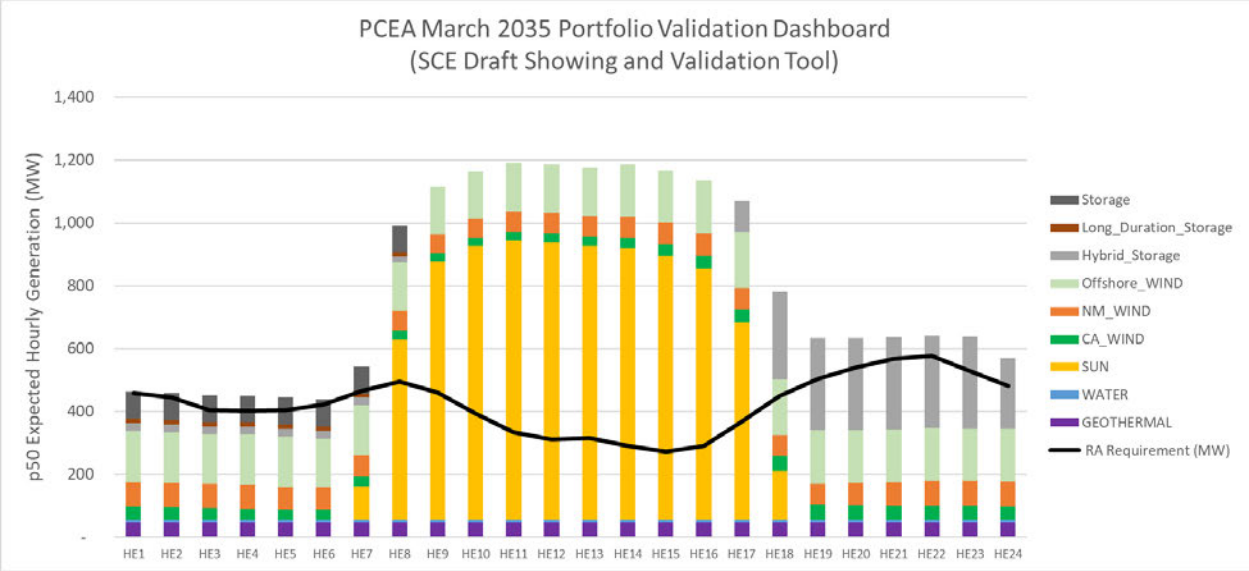


Figure 30: June 2035 24-hr Reliability Analysis

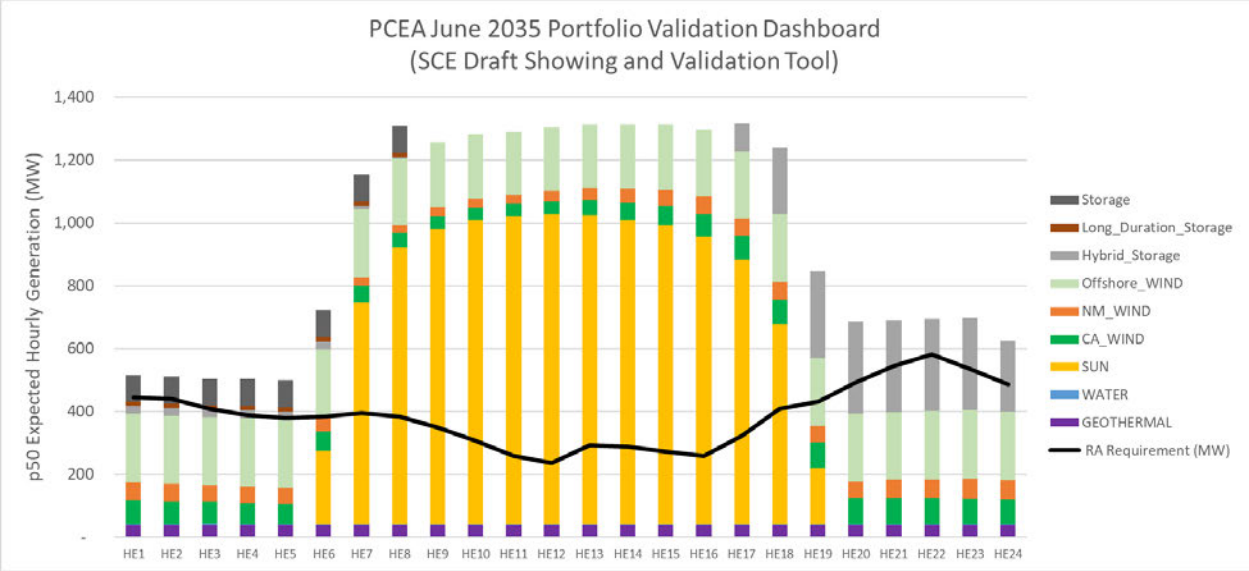


Figure 31: September 2035 24-hr Reliability Analysis

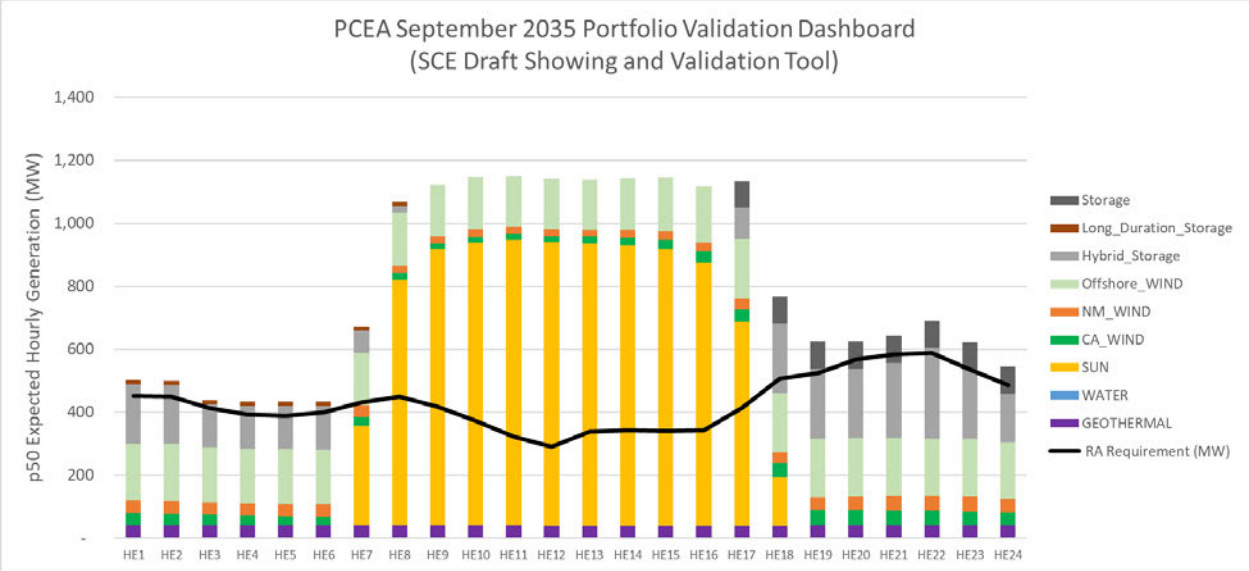
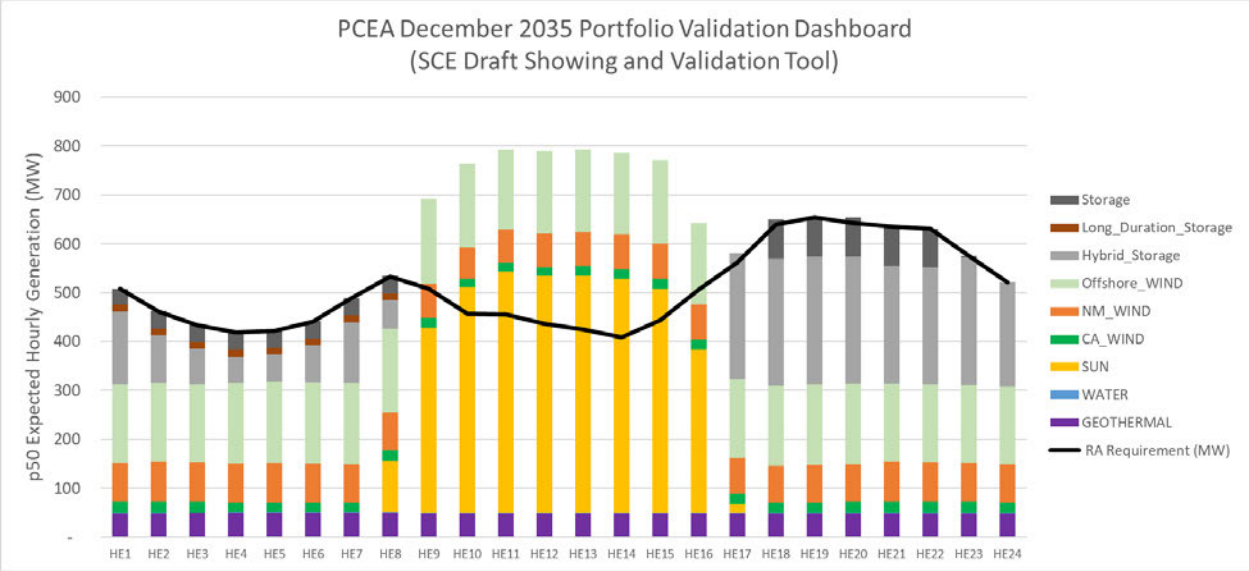


Figure 32: December 2035 Reliability Analysis



Overall, the reliability analysis of our Preferred Portfolio indicates that Peninsula Clean Energy is well-positioned to support grid reliability and meet its reliability needs under a variety of evaluation frameworks. Our Preferred Portfolio reduces reliance on System Power and provides 24-hr reliability under the general framework of a 24-hr resource adequacy framework.

g. High Electrification Planning

Peninsula Clean Energy supports the exploration of the impact of high electrification to the statewide portfolio planning. Peninsula Clean Energy is assuming high electrification in our internal analysis, but did not use these assumptions for the 2022-2023 IRP, due to the filing requirements.

Peninsula Clean Energy reviewed the high electrification scenarios presented in the CPUC's July 1, 2022 "30MMT HE Sensitivity RESOLVE portfolio overview and update" slides27. The High Electrification scenario builds approximately 30 GW more resources by 2035 than the baseline assumptions adopted in the 2021 Preferred System Plan. Peninsula Clean Energy has not analyzed the High Electrification IRP scenario in our MATCH and Powersimm models, but instead is presenting a high-level review of the potential impacts of the scenario.

If Peninsula Clean Energy were responsible for our load share of the additional capacity modeled under the High Electrification scenario, it would be approximately 600 MW, composed of approximately 220 MW of storage, 250 MW of solar, 120 MW of wind (approximately half onshore and half offshore), and 10 MW of Shed Demand Response.

Peninsula Clean Energy has summarized our high-level assessment of this additional capacity in Table 37 below. Peninsula Clean Energy has not identified the transmission zones or substation/bus bars for this

[27] www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-power-procurement/long-term-procurement-planning/2019-20-irp-events-and-materials

additional capacity. Peninsula Clean Energy prefers to contract for resources with deliverability in most cases and would pursue resources that can receive deliverability.

Table 37: Additional Resources suggested by the High Electrification Scenario

Resource Type	MWs	Annual GWh	2035 GHG target	Transmission Zone	Substation/Bus	Alternative location	Note
Solar	250	700	Both	Not identified at this time	Not identified at this time	N/A	
Onshore Wind	65	180	Both	Not identified at this time	Not identified at this time	N/A	
Offshore Wind	55	250	Both	Not identified at this time	Not identified at this time	N/A	
Storage	200	-40	Both	Not identified at this time	Not identified at this time	N/A	
Pumped Storage	20	-10	Both	Not identified at this time	Not identified at this time	N/A	
Shed Demand Response	10	0	Both	Not identified at this time	Not identified at this time	N/A	
Total	**600**	**1,080**					

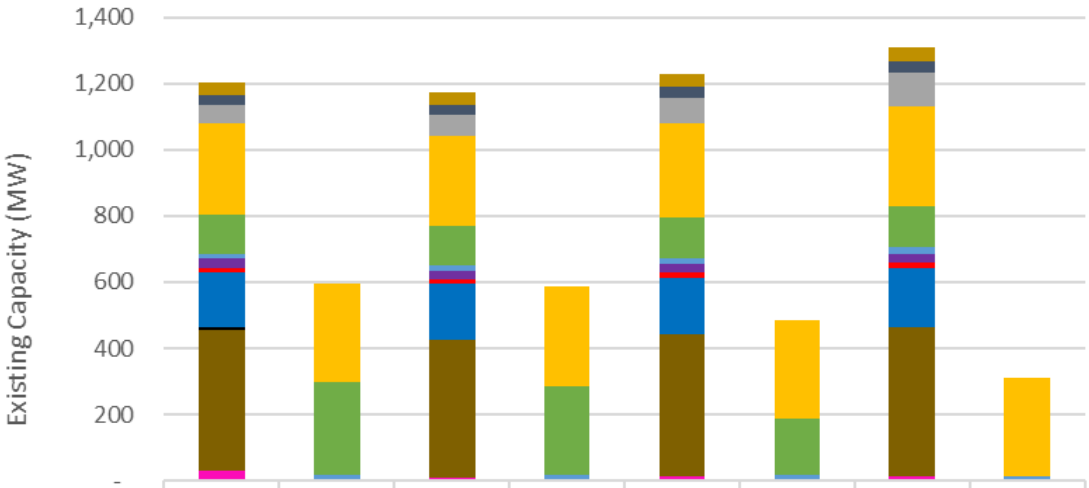
h. Existing Resource Planning

Peninsula Clean Energy's conforming portfolio includes a significant amount of capacity from new resources. Our current portfolio includes 344 MW of resources that came online in 2021 or earlier, and 667 MW of resources that will come online in 2023 or later. By 2035 we are projecting to add another 1,680 MW, of which only 26 MW are expected to come from existing resources. Our total portfolio in 2035 is projected to be 2,438 MW, of which 441 MW will have come online in 2021 or earlier, and 1,998 MW will come online in 2023 and later years.

We have compared the existing resources in our portfolio to the existing[28] resources in the 2021 PSP, as shown in Figure 33. Our Preferred Portfolio depends heavily on new resources, and the proportion of existing resources in our portfolio declines over time as our current contracts expire, while we are planning to replace them with new contracts. Relative to our load share of the 2021 PSP, our Preferred Portfolio has significantly less reliance on existing resources.

[28] For our analysis here, we are using capacity summarized in the RESOLVE Results Viewer for the 38 MMT scenario. For future IRP cycles it could improve coordination and data quality if the Filing Requirements specifically quantified the existing and new resources that LSEs should assume for their modeling in the adopted Preferred System Plan.

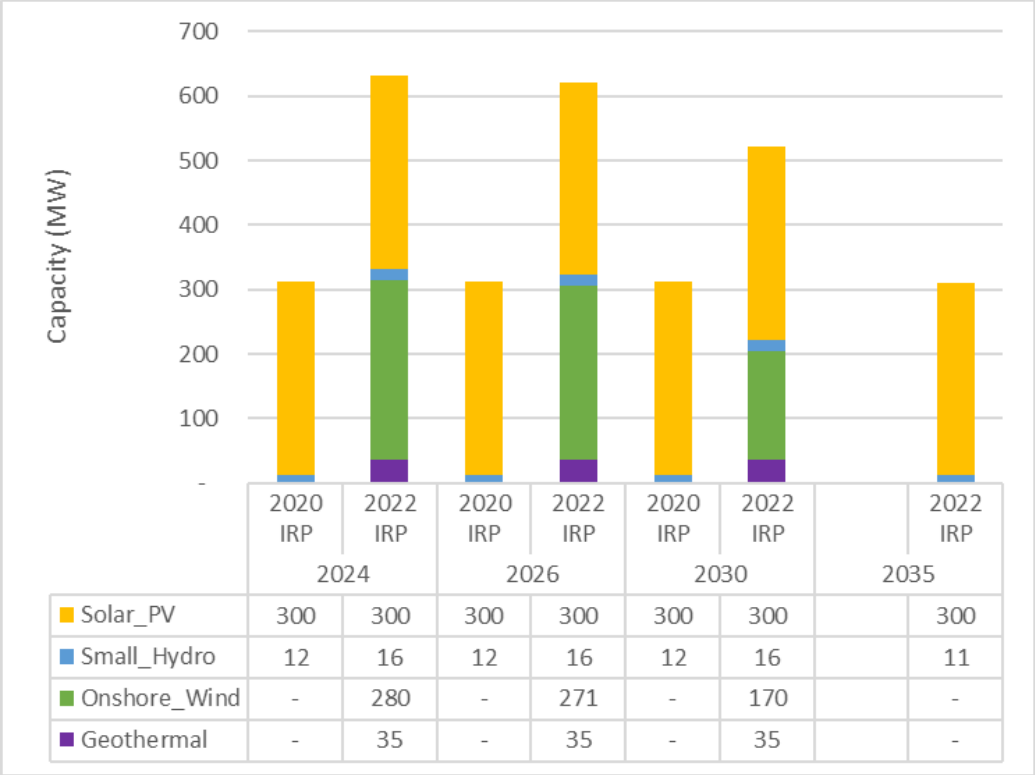
Figure 33: Peninsula Clean Energy's Load Share of Existing Resources in the 2021 PSP versus our Preferred Portfolio for the 2022-2023 IRP



	2024		2026		2030		2035	
	2021 PSP	2022 IRP	2021 PSP	2022 IRP	2021 PSP	2022 IRP	2021 PSP	2022 IRP
Shed_DR	37	-	37	-	38	-	40	-
Pumped_Storage	32	-	32	-	33	-	35	-
Storage	53	-	60	-	78	-	104	-
Solar_PV	277	300	276	300	286	300	299	300
Offshore_Wind	-	-	-	-	-	-	-	-
Onshore_Wind	118	280	117	271	121	170	127	-
Small_Hydro	16	16	16	16	17	16	17	11
Geothermal	27	-	27	-	28	-	29	-
Biomass	14	-	14	-	14	-	15	-
Large_Hydro	168	-	167	-	173	-	181	-
Coal	8	-	-	-	-	-	-	-
Gas	424	-	416	-	431	-	450	-
Nuclear	30	-	11	-	11	-	12	-

We also compared the existing resources in our 2022-2023 Preferred Portfolio to those in our 2020 IRP preferred conforming portfolio (38MMT B portfolio). Our 2022-2023 Preferred Portfolio includes more capacity from existing resources than our 2020 Preferred Portfolio, due to additional contracts we have executed with existing onshore wind generators in the past two years. However, the amount of existing resources in our portfolio is still within a reasonable range, and our Preferred Portfolio does not appear to rely excessively on existing system resources.

Figure 34: Existing Resources in Peninsula Clean Energy's 2020 IRP versus 2022 IRP



	2024 2020 IRP	2024 2022 IRP	2026 2020 IRP	2026 2022 IRP	2030 2020 IRP	2030 2022 IRP	2035	2035 2022 IRP
Solar_PV	300	300	300	300	300	300		300
Small_Hydro	12	16	12	16	12	16		11
Onshore_Wind	-	280	-	271	-	170		-
Geothermal	-	35	-	35	-	35		-

Peninsula Clean Energy has executed contracts with the majority of the existing resources in our Preferred Portfolio. The existing resources that we plan to add to our portfolio are currently in the advanced stage of contract negotiation. In other words, we are not planning to add existing resources to our portfolio other than those we already have under contract, or in the advanced phases of contract negotiations. We are confident that our planning for existing resources is appropriate and represents an accurate view of the market for existing resources.

i. Hydro Generation Risk Management

In-state drought and reliance on hydro generation poses a manageable risk in the near term and no direct risk in the long term since Peninsula Clean Energy does not plan to rely on large hydroelectric resources after 2025. Peninsula Clean Energy's Preferred Portfolio includes about 16 MW of small hydroelectric capacity, which plays a minor role in a portfolio of more than 2 GW.

Electrical generation from hydroelectric facilities depends on the volume of water available to flow through turbine generators. A lack of precipitation in drought years creates low water availability and hence lower hydro generation output. Hydro systems without large reservoirs that can store water for multiple years and that can average out generation over time are at particular risk. California's hydro generation system is vulnerable to drought and has experienced lower than average hydro generation during droughts in 2007-2009, 2012-2016 and 2020-2022.

Drought risk can impact generation system reliability. Hydro generation systems with at least

some water storage and dispatch flexibility can generate up to their maximum capacity for short periods of time but cannot do so for long periods because of a lack of water due to the drought. Hydro systems with no effective water storage will be energy and capacity limited in a drought.

The risks that in-state drought pose to Peninsula Clean Energy's portfolios are consistent with the amount of hydro generation and level of risk borne by the 2021 PSP prior to 2025 and significantly less than the 2021 PSP after 2025. This is due to Peninsula Clean Energy's internal goals to phase out hydro power by 2025 through procurement of additional renewable resources, therefore hydroelectric generation was not considered as an option in the portfolio after 2025. During 2024, the sole study year in which large hydro was considered, approximately 856 GWh is included in the Preferred Portfolio. This is greater than Peninsula Clean Energy's load share of large hydro and imported hydro expected to be available in 2024, per the CSP Calculator. However, in later years, Peninsula Clean Energy plans to include zero large hydroelectric generation in our portfolio, which will eliminate the direct risk of drought to our portfolio. There will continue to be effects of drought on our portfolio, through elevated market prices, which we mitigate through our hedging strategy[29].

Table 38: Comparison of Large Hydro Reliance in the CSP versus Peninsula Clean Energy's Preferred Portfolio

	2024	2026	2030	2035
Peninsula Clean Energy Load Share of Available Large Hydro per the CSP Calculator (GWh)	504	501	522	545
Large Hydro Included in Peninsula Clean Energy's Preferred Portfolio (GWh)	856	0	0	0

Peninsula Clean Energy manages its risk to hydro generation fluctuation and prices by signing contracts from resources in both California and the Pacific Northwest, signing primarily firm delivery contracts and minimizing the volume procured through unit contingent contracts. Peninsula Clean Energy also contracts for hydro resources through a mix of counterparties and for varying terms to manage risk associated with counterparty default on hydro resources. Finally, Peninsula Clean Energy conducts statistical modeling on the volume of hydro it expects to be delivered for any unit contingent contracts, taking into account snowpack levels and historical generation in similar years.

j. Long-Duration Storage Planning

Energy storage is critical to California meeting its reliability and environmental objectives. With respect to reliability objectives, energy storage can help the State meet its capacity needs, which will be amplified by the retirement of natural gas-fired power plants and the upcoming retirement of California's last nuclear power plant, Diablo Canyon. Energy storage can also provide energy to the grid as scheduled energy as well as regulation energy required by the CAISO to manage grid frequency. This energy service is particularly important during the specific times of the day when solar and/or wind are not available to serve load. Energy storage can help California meet its renewables and GHG goals by charging when there is excess renewable generation, thereby avoiding the need to curtail renewable energy generation, and discharging when the emissions intensity of the grid is highest, helping to displace generation from emitting fossil resources.

[29] Peninsula Clean Energy's hedging strategy defines the net open position targets for future years, and is a guide for managing market risk. Our hedging strategy is defined in our 2018 Strategic IRP, beginning on page 19.

CPUC Decision 21-06-035, the "Mid Term Reliability Order" (MTR) requires LSEs including Peninsula Clean Energy to procure specific resources on a specific timeline and includes a requirement for Peninsula Clean Energy to procure approximately 24 MW of nameplate capacity from an 8-hr storage resource by 2026. Peninsula Clean Energy collaborated with 12 other CCAs to issue a joint Request for Information for long duration storage resources in 2020. Later in 2020, Peninsula Clean Energy participated in California Community Power (CC Power)'s Request for Offers for Long Duration Storage Resources. As a result of that RFO, Peninsula Clean Energy contracted for approximately 14 MW of a long duration storage resource through CC Power. Our Preferred Portfolio includes the addition of another 8 MW of long duration storage capacity by 2026, which is planned to be achieved through the amendment of an existing storage contract to convert some 4-hr storage to 8-hr storage.

Long Duration Storage has been of specific interest to Peninsula Clean Energy, as a promising technology to help meet our aggressive voluntary goal to align renewable supply with demand each and every hour of the day. Peninsula Clean Energy included a variety of long duration storage technologies in our modeling, including 8-hour lithium-ion storage, 8-hr compressed air storage, 12-hour pumped storage, and 12-hour thermal storage technologies. The Preferred Portfolio is the result of a portfolio optimization that determines the least-cost portfolio that meets the specified targets, including the regulatory requirements of the IRP, the MTR, and our voluntary goals to provide time-coincident renewable energy. The modeled optimal portfolio includes 11MW of 8-hr compressed air storage, 50 MW of 12-hour thermal storage, and approximately 24 MW of 8-hr lithium-ion storage (as ordered under the MTR). The volumes from compressed air and thermal storage are in excess of the minimum long duration storage capacities required under the MTR.

In addition, Peninsula Clean Energy evaluated the risk of the Preferred Portfolio using a stochastic modeling approach and found that the Preferred Portfolio decreases risk compared to Peninsula Clean Energy's current portfolio. Thus, Peninsula Clean Energy believes that the inclusion of Long Duration Storage in our portfolio helps to compose a low cost portfolio and helps to reduce the risk of our portfolio.

k. Clean Firm Power Planning

Clean Firm Power will be critical to enabling the transition of the California electricity system away from fossil fuels and to clean power. Peninsula Clean Energy is particularly interested in clean renewable baseload resources, such as geothermal30 to help us meet our aggressive voluntary goal to provide renewable energy to meet customer demand in each and every hour of the day.

The MTR order discussed above also requires LSEs including Peninsula Clean Energy to procure clean firm power by 2026. Peninsula Clean Energy is required to procure approximately 20 MW of nameplate capacity from new clean firm resources by 2026. Peninsula Clean Energy has actively pursued these resources and has currently contracted with 37 MW of new nameplate geothermal, thus meeting our MTR requirements.

[30] In March 2020, Peninsula Clean Energy's Board of Directors voted not to procure energy from biomass resources. Thus, we limit our discussion of Clean Firm Power to geothermal resources.

Peninsula Clean Energy has included existing and new construction clean firm resources in our portfolio modeling, and the model selects clean firm resources to be included in our portfolio in order to meet high levels of hourly renewable energy matching with demand. Our preferred portfolio includes 47 MW of existing geothermal and 37 MW of new geothermal. We note that in our internal modeling, we use an even more aggressive time-coincident target, which results in the model selecting additional geothermal resources.

Peninsula Clean Energy's contracted clean firm resources includes significant capacity from resources outside of CAISO. These resources must be imported into CAISO. In order for imported resources to qualify for resource adequacy inside CAISO, they must be paired with Import Capability at which they are imported. Import Capability is allocated by CAISO to LSEs depending on contracts and requested imports and is subject to the Maximum Import Capability at each intertie. If LSEs collectively request more Import Capability at a given intertie than the Maximum Import Capability, CAISO allocates pro rata amounts to LSEs based on various criteria.

Peninsula Clean Energy anticipates that we will need more Import Capability than the current Maximum Import Capability at several of the interties where we plan to import our clean firm power. We strongly support the potential Maximum Import Capability expansion efforts under way. In addition, there are transmission projects underway outside of CAISO that could facilitate imports by providing a path to deliver energy from our contracted resources to CAISO interties that have additional Import Capability.

Peninsula Clean Energy view importing energy as a significant risk in our portfolio, and we have internal targets to limit the amount of resources that we contract with that would require Import Capability in order to qualify for resource adequacy. We support transmission upgrades that would increase Maximum Import Capability at several interties, including IID-SDGE, IID-SCE, and Mona.

l. Out-of-State Wind Planning

Out of state wind can offer several advantages over in-state wind. Specifically, it generally offers higher capacity factors and production profiles that differ from resources available in California. These attributes can make out of state wind an attractive resource. However, the higher cost and risk associated with interconnection is a concern. Additionally, Peninsula Clean Energy's Board has expressed concern around whether union labor would be used to construct of out of state wind projects, whether these projects would be subject to the same level of environmental siting analysis and permitting as in-state projects and the possibility for out of state projects to increase emissions by causing states to build polluting resources.

Peninsula Clean Energy included several out-of-state wind resources in our 2022-2023 IRP modeling, and some New Mexico wind was selected, as was some Pacific Northwest Wind. The New Mexico wind would require construction of new transmission facilities, which represents a significant risk. And, similar to the discussion of out-of-CAISO firm clean power, a New Mexico wind project would be subject to Import Capability allocations in order to qualify for resource adequacy. The 2022-2023 IRP also includes New Mexico wind that would be imported to CAISO on an energy-only basis, i.e., not seek qualification for resource adequacy. An energy-only contracting structure would reduce some risk, because the resource would not attempt to receive import capability allocations.

Peninsula Clean Energy is hopeful that current transmission planning efforts underway to potential expand CAISO transmission to areas outside of California could help facilitate the inclusion of out of state wind in our portfolio, while minimizing the risk that these resources would not be able to qualify for resource adequacy.

m. Offshore Wind Planning

Offshore wind is a promising resource that can offer several advantages over onshore wind. The generation profiles tend to have higher capacity factors and are anti-correlated with solar generation profiles, making offshore wind an important complement to California solar resources. Offshore wind has been successfully implemented in other areas of the world, however the process to implement it in California is still in the early stages. The schedule for when the resource will be available is subject to significant uncertainty, but the 2021 PSP includes some offshore wind as early as 2030. The costs are expected to decline over time as the resource becomes more mature in California.

Peninsula Clean Energy included offshore wind as a potential resource in our modeling beginning in 2030. However, the model did not select offshore wind to be included in our portfolio until 2035, when projected costs have declined slightly. North coast offshore wind is projected to have a better benefit-to-cost tradeoff than central coast offshore wind. Our modeling results are consistent with the planning goals established by the CEC in response to AB 525, specifically the CEC's adoption of a preliminary planning goal range of 2 to 5 GW of offshore wind by 2030, and 25 GW by 2045. Peninsula Clean Energy's approximate load share of such goals would be 36 to 90 MW by 2030, and 450 MW by 2045. Peninsula Clean Energy is projecting about 288 MW by 2035, which is consistent with our load share of the state planning goals.

n. Transmission Planning

Table 39 summarizes the set of existing resources Peninsula Clean Energy had under long-term contract as of October 2022. Details are included in the Resource Data Template.

Table 39 :Resources Under Contract as of October 2022

Project Name	Technology	Detailed Location	Queue Position	Point of Interconnection	RESOLVE area
Arica Hybrid	Solar Storage Hybrid	Riverside, CA	[redacted]	[redacted]	Palm Spring
Bidwell Ditch	Small Hydro	Shasta, CA			Round Mountain
Buena Extension	Wind	Contra Costa, CA			Solano County
Fish Lake	Geothermal	Import with MIC allocation			N/A Import
CC Power Firm Clean - Ormat	Geothermal	Import with MIC allocation			N/A Import
CC Power Firm Clean - Ormat	Geothermal	Import with MIC allocation			N/A Import
CC Power Firm Clean - Ormat	Geothermal	Import with MIC allocation			N/A Import
CC Power Firm Clean - Ormat	Geothermal	Import with MIC allocation			N/A Import
CC Power Firm Clean - Ormat	Geothermal	Import with MIC allocation			Sonoma County

Chaparral Hybrid	Solar Storage Hybrid	Kern, CA	[redacted]	Tehachapi
Clover	Small Hydro	Shasta, CA		Round Mountain
Direct long term	Wind	N/A Portfolio		N/A Portfolio
Dos Palos DAC Resource	Solar PV	Merced, CA		Los Banos
Geysers Contracted	Geothermal	Lake, Sonoma, CA		Sonoma County
Gonzaga	Wind	Merced, CA		Los Banos
Hatchet Creek	Small Hydro	Shasta, CA		Round Mountain
Heber	Geothermal	Imperial, CA		Imperial South
MCE Interim Resource	Solar PV	Kern, CA		Westlands
Mustang 2	Solar PV	Kings, CA		Westlands
Roaring Creek	Small Hydro	Shasta, CA		Round Mountain
Shiloh	Wind	Solano, CA		Solano County
Shiloh	Wind	Solano, CA		Los Banos
Sky River	Wind	Kern, CA		Tehachapi
Tumbleweed Storage 8hr	Storage	Kern, CA		Tehachapi
Voyager 2	Wind	Kern, CA		Tehachapi
Willow Spring Solar (bridge resource for Chaparral Storage)	Solar PV	Kern, CA		Tehachapi
Wright Solar	Solar PV	Merced, CA		Los Banos

Of the 29 resources listed, 18 are online and have achieved Full Capacity Deliverability Status (FCDS) or the equivalent. The 11 remaining resources have projected commercial operation dates from April 2024 through December 2026. Three (3) of resources are dependent on the completion of specific network upgrades before they are eligible to declare commercial operation and achieve FCDS. Those network upgrades include:

- Southern California Edison's West of Colorado central Remedial Action Scheme (cRAS), current estimated in-service date is April 2027 contingent on the completion of related network upgrades
- Pacific Gas and Electric's QC8RAS-08 RAS to trip Generation offline for outage and overload of either Gates 500/230 kV Transformer Bank 11 or 12, current estimated in-service date is Quarter 4 2023
- Pacific Gas and Electric's Dos Amigos PP–Panoche 230kV Line #3 Reconductor, current estimated in-service date is Quarter 2 2025.

PCE performs interconnection and deliverability reviews for all projects in the PPA negotiation process as well as projects under consideration in specific targeted areas. This includes a review of the interconnection study documents, interconnection agreements, and descriptions provided by Sellers as available. Where projects have complex circumstances or unique considerations PCE has an interconnection and transmission expert on retainer to review and provide guidance. PCE is engaged in contract negotiations or pre-negotiation information exchanges on the projects listed below. Details are included in the Resource Data Template.

Table 40: Resources Under Consideration as of October 2022

Project Name	Technology	Detailed Location	Queue Position	Point of Interconnection	RESOLVE area
[redacted]	Solar Storage Hybrid	Kern County, CA	[redacted]	[redacted]	Tehachapi
Cape Mendocino Offshore	Offshore Wind	Humboldt, CA	based on OSW plans	Not yet available	Cape Mendocino Offshore Wind
[redacted]	Solar Storage Hybrid	Fresno, CA	[redacted]	[redacted]	Westlands
	Storage	Kern, CA			Tehachapi
	Wind	Kern, CA			Tehachapi
	Wind	Kern, CA			Tehachapi
PNW Wind	Wind	Unknown	N/A Import	COB	N/A Import
[redacted]	Storage	San Diego, California	[redacted]	[redacted]	San Diego
PVHybrid Desert 50	Solar Storage Hybrid	Unknown	Based on CPUC solar profile	Unknown	SoCal Desert / Inyokern / Kramer
[redacted]	Storage	Ventura, CA	[redacted]	[redacted]	Ventura County
	Small Hydro	Shasta, CA			Round Mountain
	Wind	Lincoln, Torrance, and Guadalupe, NM			New Mexico Wind
	Wind	Lincoln, Torrance, and Guadalupe, NM			New Mexico Wind
	Solar Thermal	Unknown			Westlands
	Solar Thermal	Unknown			SoCal Desert / Inyokern / Kramer

Of the 15 projects three (3) are existing resources that have achieved Full Capacity Deliverability Status (FCDS) or the equivalent and are not waiting on the energization of additional transmission. The 11 remaining resources have projected commercial operation dates from June 2024 through January 2035. Seven of the resources have started the interconnection process and transmission needed for their interconnection is captured in CAISO Transmission Planning Process (TPP) results 2021-2022 or prior, and in the project's specific interconnection results.

Five of the projects are slated for areas that the Commission and the CAISO have acknowledged as areas preferred for development:

- 188 MW of proposed solar PV storage hybrid generation in the SoCal Desert RESOLVE area
- 288 MW of proposed offshore wind in the Cape Mendocino Offshore Wind RESOLVE area
- 100 MW of solar thermal generation in the Westlands or Los Banos RESOLVE regions
- 5 MW of wind located at the California-Oregon border. (COB)

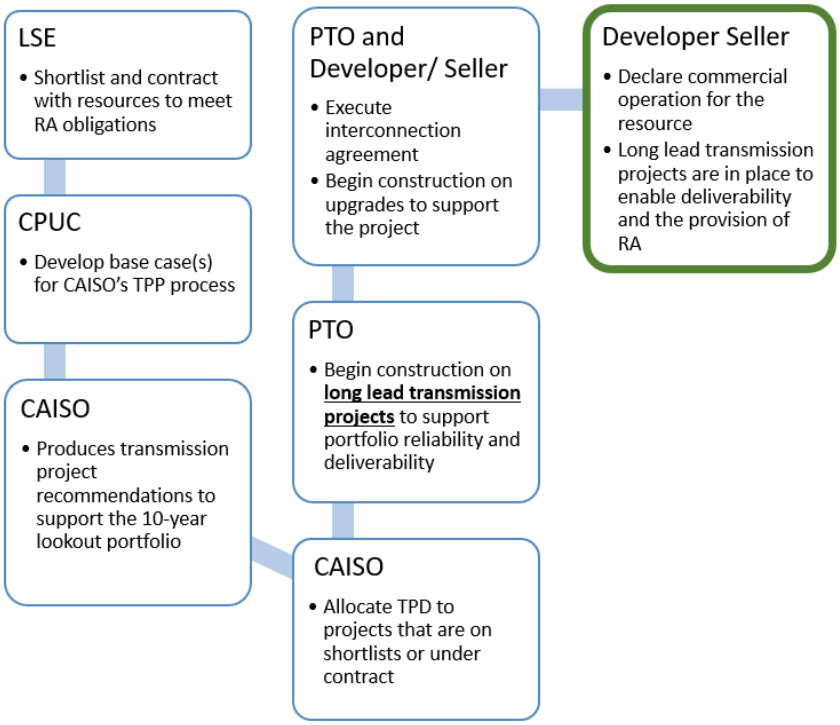
These proposed resources are in the early stages of development and PCE acknowledges that because of their immaturity they could be relocated geographically during the Commission's modeling. PCE respectfully requests that the Commission not relocate any of these resources during base case development as the resources have been selected are consistent with the Commission's directives and modeling the resources at their specific locations ensures synchronicity with the CAISO's process for allocating Transmission Plan Deliverability (TPD) to resources. TPD is a precursor status for a resource to be eligible to be listed on CAISO's Net Qualifying Capacity (NQC) list and be eligible to provide Resource Adequacy (RA). If projects are precisely and accurately mapped in the base case then the CAISO's Transmission Planning Process will produce transmission recommendations aligned with LSE planning, and resources on PCE's IRP are more likely to be allocated TPD via the CAISO's Generator Interconnection Deliverability Allocation Process (GIDAP).

In transmission areas where the amount of requested TPD exceeds the amount of TPD available the GIDAP process is designed to allocate TPD first to interconnection requests that have success with LSEs. CAISO defines success in in this case as interconnection requests with executed power purchase agreements to provide RA to an LSE with an RA obligation and interconnection requests on LSE shortlists. The specific resources PCE has under consideration will receive preference in TPD allocation process because they have progressed to this level in PCE's solicitation process.

Mapping resources as indicated in the RDT ensures that information about procurement transmits between California entities accurately and the CAISO's TPP produces results that support the portfolios as planned, and that the PPA contracting process is correctly timed to give the resources appropriate priority in the TPD allocation process.

Figure 35 illustrates how information about one project is exchanged by the Commission, CAISO, Sellers, and Participating Transmission Owners (PTOs) over a multi-year period.

Figure 35: Project data exchange for transmission planning



Transmission required for the 11 pre-operational resources under consideration is in various stages of consideration and planning. The siting of all 11 projects is consistent with various proposed development scenarios to drive toward SB 100 directive to achieve an RPS target of 50 percent by 2026 and 60 percent by 2030. It is certain that additional transmission investment will be required to interconnect and reliably integrate renewable supply and storage resources to meet these goals, and PCE resource locations are consistent with those objectives.

Specifically, PCE's portfolio contains renewable generation in the RESOLVE areas consistent with the base case and sensitivity cases provided to the CAISO by the Commission for the 2020-2021 TPP.

The portfolio also contains increased offshore wind in the Cape Mendocino Offshore Wind RESOLVE area. This is also contemplated in the CAISO's Board approved 2021-2022 transmission plan. The Sensitivity 2 portfolio reviewed the impacts of adding 6,216 MW of offshore wind at Cape Mendocino. The proposed 2035 COD for this resource is consistent the complexity and length of time it will take to approve, engineer, permit, construct, and energize the transmission needed to enable the offshore wind.

This 2022 submission reflects the significant contracting activities PCE has completed since the 2020 IRP/ 38 MMT scenario. This 2022 submission aligns with PCE's 2020 submission, with one resource in the 2020 portfolio being swapped for several similar located projects with the same technology type.

Peninsula Clean Energy is providing additional background on two contracts that we have executed via CC Power.

- **Fish Lake Geothermal (COD June 2024):** The Fish Lake geothermal project will connect to the Silver Peak substation in NV Energy territory. It is currently finalizing its interconnection

agreement and expecting execution shortly. The developer does not anticipate any transmission-scale upgrades—just an upgrade to the Silver Peak substation. Fish Lake has secured transmission to [redacted], where CC Power members have secured 2023 MIC in preparation for a long-term MIC reservation. However, wheeling power [redacted] has resulted in higher costs that could be mitigated if MIC in northern Nevada became available.

- **Ormat Geothermal Portfolio (COD starting Oct 2024):** The Ormat portfolio of geothermal projects are expected to mostly be import resources in northern NV Energy territory or the Imperial Irrigation District. Projects are at various stages of maturity in their subsurface characterization, permitting, and interconnection. The RDT contains a representation of what the portfolio might look like (entered as 7 projects with potential substations). Ormat has limited ability to deliver at southern Nevada import points (Mead and Merchant), so MIC expansion will likely be needed at Summit, Gonder, and Silver Peak to deliver up to 125 MW. One potential CAISO resource in the portfolio [redacted] recently received Phase 1 results from its Cluster 14 study indicating that it is impacted by a costly network upgrade with a completion date no earlier than 2029—which may require it be substituted for an import resource.

IV. Action Plan

a. Proposed Procurement Activities and Potential Barriers

Peninsula Clean Energy's mission is to reduce greenhouse gas emissions by expanding access to sustainable and affordable energy solutions with a priority to design a power portfolio that is sourced by entirely by renewable energy by 2025 that aligns supply and consumer demand on a 24 x 7 basis. At the same time, Peninsula Clean Energy is committed to serving customers with affordable power. The Preferred Portfolio identifies the most cost-effective way to achieve these goals and includes a significant volume of new resources including wind, solar and storage.

Peninsula Clean Energy takes a multi-pronged approach to meet its annual and long-term clean energy goals for RPS and carbon-free non-RPS eligible resources. This includes issuing Requests for Proposals (RFPs) or RFOs, participating in other entities' RFPs / RFOs, bilateral negotiations and exploring partnerships to develop clean energy resources. Peninsula Clean Energy varies the timing of its clean energy procurement to ensure a diversification of counterparties, prices, and term and to meet short-term needs based on actual load.

Peninsula has elected to self-procure all of the capacity required by Ordering Paragraph 3 of D.19-11-016. The capacity assigned to Peninsula Clean Energy in this decision is identified Table 41 below.

Table 41: Peninsula Clean Energy D.21-06-035 Procurement Requirements

Compliance Date	Capacity
08/01/2021	13.75 MW
08/01/2022	27.5 MW
08/01/2023	13.75 MW

In June of 2021, CPUC issued Decision 21-06-035 (D21-06-035) that mandates that LSEs, including Peninsula Clean Energy, procure specific resources on a specified timeline. Peninsula Clean Energy's mandated procurement under D21-06-035 is identified in Table 42 below.

Table 42: Peninsula Clean Energy D.21-06-035 Procurement Requirements

Compliance Date	Capacity
08/01/2023	38 MW
06/01/2024	117 MW
06/01/2025	28 MW
06/01/2025 (Zero-emitting generation, generation paired with storage, or demand response)	47 MW* (subset of 2023, 2024, and 2025 capacity, not additive)
06/01/2026 (Long Duration Storage)	19 MW
06/01/2026 (Firm Clean Resources)	19 MW

Peninsula Clean Energy's Board of Directors has adopted the following three specific policies to guide power procurement:

1. Peninsula Clean Energy shall not use unbundled renewable energy credits (RECs) for meeting its renewable energy goals.[31]
2. In sourcing electricity and resource adequacy (RA), Peninsula Clean Energy will not procure electricity or resource adequacy from coal facilities.[32]
3. Peninsula Clean Energy has published an Inclusive and Sustainable Workforce Policy.[33] Peninsula Clean Energy desires to facilitate and accomplish the following objectives through this policy:
    a. Support for and direct use of local businesses;
    b. Support for and direct use of union members from multiple trades;
    c. Support for and use of training and State of California approved apprenticeship programs, and pre-apprenticeship programs from within Peninsula Clean Energy's service territory; and
    d. Support for and direct use of green and sustainable businesses.

Peninsula Clean Energy's goal is to fulfill its open position with a diverse set of contracts. Peninsula Clean Energy uses a portfolio risk management approach in its power purchasing program, seeking low-cost supply as well as diversity among technologies, production profiles, project sizes, project locations, counterparties, term lengths and timing of market purchases to cost average over time, including remaining cognizant of the value of open market positions. These factors are taken into consideration when Peninsula Clean Energy engages the market, and Peninsula Clean Energy has developed specific

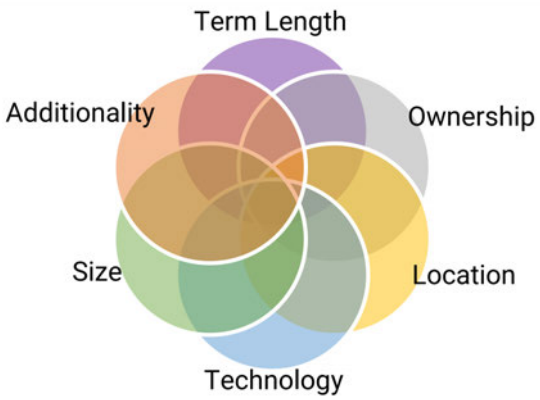
[31] Peninsula Clean Energy policy on unbundled RECs: www.peninsulacleanenergy.com/wp-content/uploads/2017/01/PCE-Policy-11-final.pdf

[32] Peninsula Clean Energy Policy excluding coal for power and resource adequacy: www.peninsulacleanenergy.com/wp-content/uploads/2017/01/Policy-12-Excluding-Coal-for-Power-and-Resource-Adequacy.pdf

[33] Peninsula Clean Energy Sustainable Workforce Policy: www.peninsulacleanenergy.com/wp-content/uploads/2018/10/Policy-10-Inclusive-and-Sustainable-Workforce-revised-10-25-18.pdf

guidelines for each of these diversification factors. Specifically, Peninsula Clean Energy has set a guideline to target a minimum 50% of the portfolio be procured from new projects by 2025 and procure at least 50% of our portfolio from long-term contracts. These procurement diversity targets are described in our 2018 Strategic IRP[34], and are illustrated below.

Figure 36: Procurement Diversity Attributes



Most recently, on November 18, 2021, Peninsula Clean Energy released a Request for Offers to solicit proposals for renewable energy contracts to fulfill our RPS requirements, mid-term reliability requires, and to meet our 24/7 renewable energy goal. Offers were received in mid-January 2022, projects were shortlisted in March 2022, and Peninsula Clean Energy is currently negotiating contracts with shortlisted projects, with contract execution expected in Q4, 2022. All renewable energy technologies except biomass, and all storage technologies were eligible under this RFO. In previous RFOs we have required new projects to meet specific development milestones to ensure resource viability, such as a complete Phase 2 interconnection study from CAISO or equivalent. However, in the 2021-2022 RFO, Peninsula Clean Energy has relaxed this requirement in consideration of projects that are in CAISO's Cluster 14, which had not yet received their Phase 1 deliverability studies as of the offer deadline. Peninsula Clean Energy is currently evaluating how best to contract for Cluster 14 projects, given the changed process for projects to receive deliverability from CAISO. In previous clusters, projects could receive deliverability prior to executing a contract with an Offtaker: Offtakers could thus contract with projects that have guaranteed RA qualification. In Cluster 14 and later clusters, projects will need to show an executed contract with an Offtaker in order to receive their final deliverability allocation. Thus, Offtakers (including Peninsula Clean Energy) will need to execute contracts with projects without guaranteed RA qualification. This changes the nature of deliverability risk and requires updates to Peninsula Clean Energy's management of project risk.

Peninsula Clean Energy participates in joint RFOs with other CCAs from time to time. In 2022, Peninsula Clean Energy participated in a joint RFO with three other CCAs soliciting for capacity that qualifies for the Mid Term Reliability Order Tranche 2 (2024 online dates). Projects were shortlisted in September 2022, and contract negotiations are ongoing, with contract execution expected in Q4 2022 or Q1 2023. As a member of CC Power, Peninsula Clean Energy participated in two Request for Offers and one Request for Information administered by CC Power. Peninsula Clean Energy executed three contracts as a result of these CC Power procurement activities, including the Tumbleweed long duration storage

[34] Peninsula Clean Energy 2018 Strategic IRP: www.peninsulacleanenergy.com/wp-content/uploads/2018/01/PCE-FINAL-2017-IRP-Updated.pdf

contract, a contract for firm clean resources with Open Mountain Energy, and a contract for firm clean resources with Ormat.

Peninsula Clean Energy works with a group of three other CCAs, including East Bay Community Energy, San José Clean Energy and Central Coast Community Energy to pool and procure RA. In 2022, this joint-RA group enlisted the support of The Energy Authority (TEA) to administer requests for RA offers and manage intra-pool transactions. For the 2022 compliance year, Peninsula Clean Energy has met all of its System and Flexible RA needs and most of its Local RA obligations. For the upcoming 2023 and future compliance years, Peninsula Clean Energy anticipates procuring additional System and Flexible RA through the joint-CCA effort, its own RFPs and bilateral negotiations, and also through participation in other load serving entities' solicitations, including solicitations by PG&E. Consistent with the CPUC's central procurement entity decision, Peninsula Clean Energy does not plan to procure Local RA products beyond 2023 unless it is a preferred resource such as DER or local renewables.

Peninsula Clean Energy plans to continue similar procurement activities on an approximately annual basis to fulfill the procurement of new resources identified in the Preferred Conforming Portfolios. This corresponds to Peninsula Clean Energy's Preferred Portfolio that show Peninsula Clean Energy adding significant quantities of new renewable energy and energy storage resources by 2026 and continuing through 2035.

Any contracts with a term longer than five years must be approved by Peninsula Clean Energy's Board. These approvals take place during public Board meetings which provide opportunity for members of the public to comment on the proposed contract.

Additional details on Peninsula Clean Energy's action plans regarding specific areas are detailed in the sections below.

i. Resources to meet D.19-11-016 procurement requirements

Peninsula Clean Energy has fully contracted for resources to meet D.19-11-016, which includes a portion of the Sutter Energy Center in Yuba County, new solar capacity from Chaparral Solar and Willow Springs Solar (which is acting as a bridge resource until capacity from Chaparral Storage can come online). We are closely monitoring the construction timelines of the new resources to ensure that our contracted resources are online by the required dates in the Decision.

ii. Resource to meet D.21-06-035 procurement requirements, including:

a. 1,000 MW of firm zero-emitting resource requirements

Peninsula Clean Energy has contracted for 26 MW of repowered geothermal capacity from Heber 2 Geothermal, 14 MW of which is incremental and qualifies as firm zero-emitting resource under D.21-06-035. Peninsula Clean Energy contracted this resource following participation in Ormat's Request for Bids in 2021. This project has high viability scores and is currently under construction and expected to reach commercial operation in early 2023. Peninsula clean energy has secured import allocation at the delivery point to import a large portion of the capacity and is seeking additional import allocation. Peninsula Clean Energy conducts monthly project status reviews with Ormat to ensure that the project schedule remains on track. Because Peninsula Clean Energy has had difficulty contracting for additional resources to meet D21-06-035 2023 requirements, we may decide to use the Heber 2 Geothermal facility towards our general 2023 requirements and our zero-emissions generation requirements, and

secure additional firm clean resources, if needed, based on the final allocation from CC Power's contract with Ormat (see discussion below).

Peninsula Clean Energy has contracted for up to 24 MW of new geothermal capacity through its share of two executed contracts from CC Power. These resources were identified through a solicitation completed in early 2022. Together, Peninsula Clean Energy expects them to provide approximately 19 MW of MTR NQC (based on September NQC evaluation hours) which satisfies its D21-06-035 firm clean resource obligation.

The 13 MW Fish Lake geothermal project (Peninsula Clean Energy's share is 2.31 MW) is expected to be commissioned in June 2024. As represented in the RDT, the project has high viability scores with subsurface characterization complete, a nearly finalized interconnection agreement, and partial financing. CC Power has also secured the MIC at the project's delivery point sufficient to claim a long-term reservation.

The Ormat portfolio of up to 125 MW (Peninsula Clean Energy's share is up to 21 MW) has several risks. The contract included an illustrative facility list indicating a possible first COD in October 2024 and final COD in 2026. Peninsula Clean Energy used the illustrative facility list to calibrate the representation of the Ormat portfolio in the RDT, which is likely to mostly rely on resources in northern NV Energy territory or the Imperial Irrigation District. Unlike Fish Lake, many of the projects in Ormat's portfolio are still dependent on subsurface characterization and need additional permitting. Importantly, although CC Power is hopeful the Ormat contract will provide 125 MW of capacity for MTR, only 64 MW is guaranteed (Peninsula Clean Energy's share of the minimum capacity is about 11 MW). Because specific projects are not yet identified, CC Power has also not been able to secure import allocations—which is scarce in northern Nevada and may be difficult to obtain. Although Ormat can provide some transmission service to southern Nevada, MIC expansion at Gonder, Silver Peak, and Summit or transmission upgrades will likely be required to deliver the maximum capacity of the portfolio to CAISO.

CC Power currently holds bi-weekly meetings with Ormat and plans to closely follow development progress in the Ormat portfolio. An update will be provided to the CPUC on timing and scope of the contract in the planned February 2023 regulatory filing. If it is determined unlikely Ormat can deliver 125 MW by June 2028, SCPA will consider offering a solicitation for replacement capacity independently or through CC Power in 2023.

Peninsula Clean Energy continues to solicit resources that qualify as firm zero-emitting resources under D21-06-035, in order to secure the remaining required capacity should the CC Power Ormat portfolio project only meet the minimum capacity levels. Peninsula Clean Energy will solicit for firm clean resources in its next RFO, expected to be released late 2022 or early 2023. Peninsula Clean Energy plans to issue solicitations both individually and possible jointly with other CCAs on an as-needed basis.

b. 1,000 MW of long-duration storage resource requirements

Peninsula Clean Energy has contracted for 13.6 MW of new long duration storage capacity through its share of an executed contract from CC Power with Tumbleweed Storage. This resource was identified through a solicitation completed in 2021. Peninsula Clean Energy expects this resource to provide approximately 10.6 MW of MTR NQC (Based on September NQC evaluation hours, as specified in the Astrape memo).

Tumbleweed Storage is a 63 MW eight-hour lithium-ion storage project expected to be commissioned in June 2026. The project has high viability scores with a completed interconnection agreement and full site control. The project is located within CAISO in Kern County and does not require any import allocation. CC Power currently holds regular meetings with the Tumbleweed developer, LS Power, to review the project status and ensure that it remains on schedule.

Peninsula Clean Energy is continuing to solicit resources to fulfill the remaining 8.4 MW of MTR NQC that it is required to contract to meet D21-06-035 long duration storage requirements. Peninsula Clean Energy is in active discussions with a developer to provide an 8-hr flow battery as part of a solar plus storage project. Peninsula Clean Energy will also solicit for long duration storage in its next RFO, expected to be released late 2022 or early 2023. Peninsula Clean Energy plans to issue solicitations both individually, or jointly with other CCAs on an as-needed basis.

c. 2,500 MW of zero-emissions generation, generation paired with storage, or demand response resource requirements. All other procurement requirements

Peninsula Clean Energy is actively procuring resources to meet the requirements of D21-06-035, including the requirement to procure our share of the 2,500 MW of zero-emissions generation, generation paired with storage, or demand response resources, and all other procurement requirements.

Peninsula Clean Energy is required to procure 47 MW of zero-emissions generation, generation paired with storage, or demand response resources. Peninsula Clean Energy has currently met these procurement requirements with the Arica Solar plus Storage resource and is planning to use the Heber 2 Geothermal resource, as discussed above. These projects are currently under construction, and Peninsula Clean Energy conducts regular project meetings with the developers to ensure that the project remains on schedule.

As discussed above, Peninsula Clean Energy has contracted for 26 MW of repowered geothermal capacity from Heber 2 Geothermal, 14 MW of which is incremental and qualifies as firm zero-emitting resource under D.21-06-035. Peninsula Clean Energy contracted this resource following participation in Ormat's Request for Bids in 2021. This project has high viability scores and is currently under construction and expected to reach commercial operation in early 2023. Peninsula clean energy has secured import allocation at the delivery point to import a large portion of the capacity and is seeking additional import allocation. Peninsula Clean Energy conducts monthly project status reviews with Ormat to ensure that the project schedule remains on track. Because Peninsula Clean Energy has had difficulty contracting for additional resources to meet D21-06-035 2023 requirements, we may decide to use the Heber 2 Geothermal facility towards our general 2023 requirements and our zero-emissions generation requirements. Heber 2 would qualify for approximately 13 MW of MTR NQC under D21-06-035.

Arica Solar Plus Storage is a 100 MW solar plus 50 MW of 4-hour lithium-ion storage project located in Riverside County and expected to be commissioned in June 2024. The project has high viability scores with ha completed interconnection agreement and partial financing and is currently under construction. The project is located within CAISO and does not require any import allocation. Peninsula Clean Energy holds regular meetings with the developer, Clearway, to ensure the project remains on schedule.

Peninsula Clean Energy is actively procuring resources to meet all other procurement requirements under D21-06-035, including the general resource requirements for 2023, 2024, and 2025. Peninsula Clean Energy has made significant progress in procuring these resources, with approximately 17 MW of 2023 MTR NQC, 78 MW of 2024 MTR NQC, and 17.2 of 2025 MTR NQC. Peninsula Clean Energy is actively pursuing the remaining 21 MW of 2023 MTR NQC, 39 MW of 2024 MTR NQC, and 10.8 MW of 2025 MTR NQC, and is in active negotiations with resources that could meet these requirements. Peninsula Clean Energy will also solicit for these resources in its next RFO, expected to be released late 2022 or early 2023. Peninsula Clean Energy plans to issue solicitations both individually, or jointly with other CCAs on an as-needed basis.

iii. Offshore wind

Offshore wind is a promising resource that can offer several advantages over onshore wind. Peninsula Clean Energy's Preferred Portfolio includes offshore wind resources in 2035. Our modeling results are consistent with the planning goals established by the CEC in response to AB 525, specifically the CEC's adoption of a preliminary planning goal range of 2 to 5 GW of offshore wind by 2030, and 25 GW by 2045. Peninsula Clean Energy's approximate load share of such goals would be 36 to 90 MW by 2030, and 450 MW by 2045. Peninsula Clean Energy is projecting about 288 MW by 2035, which is consistent with our load share of the state planning goals.

Peninsula Clean Energy will continue to monitor the status of offshore wind planning and development and offer support to the statewide planning process. Where there are opportunities to signal Peninsula Clean Energy's interest in the resource to the market, Peninsula Clean Energy intends to participate.

iv. Out-of-state wind

Peninsula Clean Energy's Preferred Portfolio includes some New Mexico wind in 2026, some New Mexico wind on an energy-only basis in 2026, and some Pacific Northwest Wind in 2030. Peninsula Clean Energy is in active discussion with out-of-state wind developers, including developers in New Mexico and Wyoming. [redacted] Peninsula Clean Energy supports CAISO's potential expansion of transmission outside of California that could facilitate the delivery of out of state wind projects to California with minimum import risk.

Peninsula Clean Energy will solicit for out-of-state wind resources in its next RFO, expected to be released late 2022 or early 2023. Peninsula Clean Energy plans to issue solicitations both individually, or jointly with other CCAs on an as-needed basis.

v. Other renewable energy not described above

As discussed extensively in our narrative, Peninsula Clean Energy has an aggressive voluntary goal to provide 100% renewable energy on an annual basis by 2025, and to align renewable supply with customer demand in each and every hour of the day by 2025. In order to implement these goals, Peninsula Clean Energy's Preferred Portfolio includes renewable procurement far in excess of the minimum required by the CPUC under SB 350, SB 100, D19-11-016 and D21-06-035.

Peninsula Clean Energy solicits for short-term and long-term renewable resources to meet our renewable energy goals. We evaluate resources on a least-cost best-fit basis, to determine the most

cost-effective way to meet our renewable energy goals with the resources available. In order to implement our time-coincident renewable goal in particular, the expected generation profile of the resource, and how it complements the existing resources in our portfolio, is very important.

We issue regular procurements to manage exposure to market risk. In alignment with our procurement strategies described in our 2018 Strategic IRP35, we target a diversity of contract term lengths, resource additionality, and resource technologies to develop a diverse, cost-effective, and low-risk power portfolio. We value short-term contracts (less than 10 years in length) to help us manage future uncertainty in our load, supplies, and regulatory requirements. We see a valuable role for existing renewable resources in our portfolio, which may be more feasible to contract under short-term contracts than new resources. Furthermore, as discussed in the programmatic approach to procurement requirements in D22-02-004, existing resources will play an important role in the transition to a zero-carbon retail electricity sector, even though they are currently excluded from the allowed resources under D21-06-035.

Peninsula Clean Energy will solicit for short-term and long-term contracts for renewable resources, both new and existing, in its next RFO, expected to be released late 2022 or early 2023. Peninsula Clean Energy plans to issue solicitations both individually, or jointly with other CCAs on an as-needed basis.

vi. Other energy storage not described above

As discussed extensively in our narrative, Peninsula Clean Energy has an aggressive voluntary goal to provide 100% renewable energy on an annual basis by 2025, and to align renewable supply with customer demand in each and every hour of the day by 2025. In order to implement these goals, Peninsula Clean Energy's Preferred Portfolio includes storage procurement far in excess of the minimum required by the CPUC under SB 350, SB 100, D19-11-016 and D21-06-035.

Peninsula Clean Energy solicits for short-term and long-term renewable resources to meet our renewable energy goals. We evaluate resources on a least-cost best-fit basis, to determine the most cost-effective way to meet our renewable energy goals with the resources available. In order to implement our time-coincident renewable goal in particular, storage will play a critical role in managing the intermittency of renewable generation, and in shifting renewable energy from solar hours to evening peak and overnight hours.

In alignment with our procurement strategies described in our 2018 Strategic IRP36, we target a diversity of resource technologies to develop a diverse, cost-effective, and low-risk power portfolio. In particular regarding storage, we are interested in non-lithium technologies that can help us diversify our technology risk.

Peninsula Clean Energy will solicit for storage resources from a variety of technologies, in its next RFO, expected to be released late 2022 or early 2023. Peninsula Clean Energy plans to issue solicitations both individually, or jointly with other CCAs on an as-needed basis.

35 www.peninsulacleanenergy.com/wp-content/uploads/2018/01/PCE-FINAL-2017-IRP-Updated.pdf

36 www.peninsulacleanenergy.com/wp-content/uploads/2018/01/PCE-FINAL-2017-IRP-Updated.pdf

vii. Other demand response not described above

Peninsula Clean Energy will soon launch a pay-for-performance FLEXmarket program primarily aimed at load shaping in both residential and commercial sectors. The program pays out incentives based on metered performance using the Avoided Cost Calculator as the basis of incentive value. While most measures are expected to reduce and/or shift electric load, fuel switching is also supported. This is a CPUC funded program so will not utilize additional Peninsula Clean Energy funds.

viii. Other energy efficiency not described above

Peninsula Clean Energy does not have any other energy efficiency activities.

ix. Other distributed generation not described above

Peninsula Clean Energy provides two solar and storage programs with a collective target of deploying 20 MW of distributed generation by 2025. The first is a residential program in a long-term partnership with Sunrun that provides incentives to customers for the installation of solar + storage systems that are dispatched under an optimized schedule for net peak reduction. In addition, a local government solar and storage program is aggregating local government sites for scaled deployment of solar and selectively, storage systems for resilience.

x. Transportation electrification, including any investments above and beyond what is included in Integrated Energy Policy Report (IEPR)

Peninsula Clean Energy's service territory is a region of high electric vehicle adoption. An estimated 40,000 personal plug-in electric vehicles are in operation out of roughly 550,000 total personal vehicles as of June 30, 2022. The region also includes an additional 60,000 commercial vehicles across light-, medium-, and heavy-duty classes. In 2021, 24% of new personal vehicle sales were plug-ins and this grew to an estimated 50% in the first half of 2022, outpacing the state average. It is anticipated that new private vehicles sales will be nearly entirely plug-in electric in advance of the state's 2035 target. However, internal forecasts suggest existing private gas vehicles will still dominate with 250,000 to 350,000 on the road in that timeframe.

Fleet conversions have been very modest, but local governments are increasingly preparing to meet Air Resource Board mandated requirements. This includes the SamTrans transit service, which is beginning to deploy electric busses this year.

EV charging to support the growing number of electric vehicles is primarily in residential single-family homes. Data is limited on chargers installed in other locations, but industry data indicates an estimated 4,600 chargers across public, workplace and multifamily segments. The overall charge port gap, the difference between chargers expected to be installed by 2035 and the projected need by the California Energy Commission, is projected at roughly 35,000 chargers, with a particularly acute gap in multifamily. Finally, e-bikes have generated substantial interest. While data on alternative mobility electrification is unavailable, Peninsula Clean Energy has provided incentives for 514 e-bikes and 100 ride-hailing vehicles in the service territory to-date.

Peninsula Clean Energy's strategy in transportation focuses on private vehicle electrification with an emphasis on the low-income community. Transportation electrification delivers significant economic benefits to EV adopters.

Specific programs are as follows:

1. **Reach Codes**: Peninsula Clean Energy has had an extremely successful program supporting local governments in adopting code enhancements which support EV readiness. To date 17 local cities have adopted local codes that ensure widescale EV readiness for new multifamily and expanded EV readiness in commercial construction. By 2035, the reach codes are anticipated to result in 19,000 new charge ports, assuming development continues consistent with historical trends. This program is a joint program with Silicon Valley Clean Energy and East Bay Community Energy with Peninsula Clean Energy in the lead role. See www.BayAreaReachCodes.org.
2. **EV Charging Incentives and Technical Assistance**: This program aims to install 3,500 charge ports by 2024 across multi-family, workplace and public segments. It includes a special emphasis on multi-family charging through advanced design assistance that "right-sizes" infrastructure through power management and low-power charging to maximize cost-effective port installations.
3. **Used EV Rebate**: This program provides incentives of up to $6,000 for the purchase of used electric vehicles. The program is open to all residents and includes higher incentives and a "hotline" for income-qualified individuals.
4. **Fleets**: The fleets program is focused on local government fleets providing technical assistance for developing an infrastructure plan for local agencies. The program will provide incentives and bridge agencies towards meeting state requirements.
5. **Alternative Mobility**: Peninsula Clean Energy provides incentives to income-qualified residents for the purchase of e-bikes and has partnered with Lyft to deploy 100 EVs for subsidized rental by ride-hailing drivers.
6. **EV Managed Charging**: In 2023, this program targets 1,000 to 2,000 EVs as the second phase of a pilot program to align residential charging to grid needs and reduce EV owner charging costs.

Peninsula Clean Energy has developed an in-depth analysis characterizing the transportation sector in the service territory and defining a strategy for maximizing decarbonization by 2035. The plan includes complementing state and federal funding and incentives with an additional $30M to $40M in direct investment in transportation electrification over the dozen years through 2035, assuming projected budget capacity. In addition to the above investments, Peninsula Clean Energy is planning an aggressive EV load shaping program which can generate an estimated additional $40M to $50M in CPUC-directed and/or wholesale market funds over the same period of time for further investment in electrification. The plan calls for continued scaling of the above programs particularly to advance EV charging in multi-family and ensure that low-income residents have access to EVs, e-bikes and other modes of electric transportation.

xi. Building electrification, including any investments above and beyond what is included in Integrated Energy Policy Report (IEPR)

Peninsula Clean Energy has approximately 300,000 residential units and 8,046 commercial buildings with 194 million square feet of space. 60% of housing units are over 50 years old and 40% of units are rentals, with a heavy concentration of rentals in the multifamily segment (85%). 62% of building methane gas use is in the residential sector with the majority for space and water heating. Electrification of the built environment is in the earliest stages. Approximately 40,000 residential accounts in the service territory are electric-only, though this includes multifamily buildings which have central gas water heating systems. Water and space heating are predominantly gas combustion, 98% and 68% respectively in the residential sector. Through Peninsula Clean Energy's incentive programs begun in 2021, nearly 300 gas-to-electric appliance replacements have been installed, mostly heat pump water heaters.

In addition, the service territory includes approximately 21,000 NEM accounts with an estimated 166MWac of generation capacity. In addition, the service territory has approximately 1,931 accounts with storage systems with approximately 20MWac of power capacity.

Peninsula Clean Energy's strategy in buildings advances local codes covering all building types and for incentive programs focuses on small residential (single-family and small multifamily) with self-contained home systems. Load shaping and distributed generation programs cover both residential and select commercial sectors for grid services and site resilience.

Specific programs are as follows:

1. **Reach Codes**: Peninsula Clean Energy has had an extremely successful program supporting local governments in adopting code enhancements for all-electric new construction. To date 16 cities have adopted local codes that ensure all-electric construction in most segments. In addition, the program has begun working with local governments on existing building reach codes. This program is a joint program with Silicon Valley Clean Energy and East Bay Community Energy with Peninsula Clean Energy in the lead role. See www.BayAreaReachCodes.org.
2. **Developer Technical Assistance**: This program provides no-cost technical assistance to builders, developers, and designers primarily for new construction. To date over 47 firms have been provided with substantive assistance with a portfolio of sector specific experts. See www.AllElectricDesign.org.
3. **Appliance Incentives & Finance**: This program provides incentives for fuel switching to electric space and water heating currently with over $3,000 per water heater or space conditioning system. Combo systems and panels are supported, and income-qualified customers get additional incentives. The program also includes 0% interest on-bill finance and is closely coordinated with the regional BayREN program with a joint application and processing. Future enhancements to the program are planned for additional residential technical assistance and turnkey offerings.
4. **Low-Income Home Upgrade**: This is a turnkey program which provides an average of $6,500 in funding per income-qualified home for a range of upgrades based on a custom assessment.

Health and safety repairs are included in addition to at least one electrification measure plus coordination with other programs such as the Energy Savings Assistance program to maximize benefits to the resident.

5. **FLEXmarket**: This is a soon to launch pay-for-performance program primarily aimed at load shaping in both residential and commercial sectors. The program pays out incentives based on metered performance using the Avoided Cost Calculator as the basis of incentive value. While most measures are expected to reduce and/or shift electric load, fuel switching is also supported. This is a CPUC funded program so will not utilize additional Peninsula Clean Energy funds.

6. **Distributed Generation**: Peninsula Clean Energy provides two solar and storage programs with a collective target of deploying 20 MW of distributed generation by 2025. The first is a residential program in long-term partnership with Sunrun that provides incentives to customers for the installation of solar + storage systems that are dispatched under an optimized schedule for net peak reduction. In addition, a local government solar and storage program is aggregating local government sites for scaled deployment of solar and selectively, storage systems for resilience.

Peninsula Clean Energy has developed an in-depth analysis characterizing the building sector in the service territory and defining a strategy for maximizing decarbonization by 2035. The plan includes complementing state and federal funding and incentives with an additional $180M or more in direct investment in building electrification over the dozen years through 2035, assuming projected budget capacity. In addition to the above investments, Peninsula Clean Energy is planning to aggressively leverage conventional and innovative finance strategies to aid customers in making the conversion. The plan calls for larger incentives for residents with less capacity to bear costs in addition to higher initial incentives which are expected to decline as the market matures and costs decline.

xii. Other

The following discussion concerning the Voluntary Allocation Marker Offer (VAMO) was taken from our Draft 2022 RPS Procurement Plan and is included here to provide information regarding Peninsula Clean Energy's rejection of PG&E's RPS VAMO allocation.

The *Final Report of Working Group 3 Co-Chairs: Southern California Edison Company (U-338E) California Community Choice Association, and Commercial Energy* ("Final Report") was filed on February 21, 2020, in the Commission's PCIA rulemaking (R.17-06-026). One of the Final Report's key proposals was for the Commission to create a "Voluntary Allocation Market Offer" ("VAMO") framework, where each load serving entity ("LSE") serving customers subject to the PCIA would be provided an annual option to receive an allocation ("Voluntary Allocation") from the IOUs' PCIA-eligible RPS energy portfolios, based on that LSE's forecasted, vintaged, load share, and subject to certain conditions. Further, the Final Report proposed that any declined shares would be offered to LSEs through a market process ("Market Offer"). On May 20, 2021, the Commission adopted Decision 21-05-030 ("D.21-05-030"), addressing the proposals in the Final Report. D.21-05-030 adopted the Final Report's VAMO proposal, subject to certain limitations and additional requirements. To implement this modified VAMO structure, D.21-05-030 identifies various next steps, including a meet-and-confer process with the IOUs regarding the method for calculating potential Voluntary Allocations based on vintaged, annual load forecasts and a method

for dividing the IOU's RPS portfolios into shares. This will be followed by the submission of an advice letter and workshops. PG&E provided Peninsula Clean Energy with a Voluntary Allocation offer in May 2022. As currently scheduled per the Administrative Law Judge's Ruling Modifying the Renewables Portfolio Standard Program's Procedural Schedule to Accommodate Filing of the Voluntary Allocation and Market Offer Information Adopted in Decision 21-05-030, issued May 20, 2022, IOUs and LSEs will confirm the LSEs' elections for Voluntary Allocation in July 2022, with contracting occurring by the beginning of 2023.

Peninsula Clean Energy has carefully evaluated the Voluntary Allocation offer provided by PG&E for fit within its portfolio. Peninsula Clean Energy plans to decline the Voluntary Allocation offers, both long-term and short-term, for several reasons.

At this time, Peninsula Clean Energy has executed RPS contracts in excess of requirements for 2023 through 2029 and does not need to execute additional contracts to meet the RPS requirement. Accepting the Voluntary Allocation would result in unnecessary costs while over-procuring RPS energy that does not fit our Board of Director's approved goals

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Peninsula Clean Energy has a goal of to provide 100% renewable energy on a time-coincident basis, that is, to match hourly renewable energy supply to hourly customer demand. To achieve that goal, Peninsula Clean Energy contracts for resources that can be scheduled to meet hourly customer demand. As the contract is currently proposed, the Voluntary Allocation offer resources cannot be scheduled by Peninsula Clean Energy, and the hourly generation data of the Voluntary Allocation offer resources will not be available to Peninsula Clean Energy to allow Peninsula Clean Energy to schedule other resources around the Voluntary Allocation offer resources. Thus, the Voluntary Allocation offer resources will not contribute to meeting Peninsula Clean Energy's goal of time-coincident renewable energy.

Peninsula Clean Energy has identified price risks associated with the proposed structure of the Voluntary Allocation contracts. Normally, when Peninsula Clean Energy signs a contract to procure RPS resources, the contract has a fixed price. Under VAMO, the price is variable year to year. The price is structured as an index-price plus a REC adder. For the REC adder LSEs electing to accept allocations shall be required to pay the applicable year's market price benchmark (MPB), which is determined through the PCIA proceeding, for RPS attributes received.

Peninsula Clean Energy has also identified volume risks associated with the proposed structure of the Voluntary Allocation contracts. As the contract is currently proposed, the volume that will be delivered to Peninsula Clean Energy is not firm or guaranteed and is dependent on Peninsula Clean Energy's load share and how PG&E manages its portfolio. Among other things, if PG&E decides to sell additional energy from its portfolio, there will be less energy remaining to distribute via the Voluntary Allocation, and Peninsula Clean Energy would receive less energy. Thus, Peninsula Clean Energy could not rely on the Voluntary Allocation to provide a guaranteed volume.

The Voluntary Allocation includes biomass resources, which Peninsula Clean Energy's Board of Directors voted not to procure on March 26, 2020.

Finally, Peninsula Clean Energy has a policy not to procure energy from PCC3 resources, and a significant portion of the Voluntary Allocation offer is from resources that would be classified as PCC3, if they were not grandfathered as PCC0 due to their contract start date. Although it appears that these resources would remain PCC0 from a compliance standpoint when they are offered in the Voluntary Allocation offer, Peninsula Clean Energy has concerns about incorporating resources that have PCC3 characteristics into our portfolio.

Finally, Peninsula Clean Energy has found that index-plus contract structures, such as the VAMO contract, are less economically beneficial to our customers than contracting for bundled products through PPAs. Bundled products include energy, renewable energy credits, capacity, market revenue, and other attributes such as ancillary services.

Given our evaluation of the Voluntary Allocation offer, Peninsula Clean Energy plans to decline the offer provided in 2022. The Voluntary Allocation offers will be provided once per compliance period, and Peninsula Clean Energy will evaluate future offers and may choose to accept an allocation in the future.

The PCIA Working Group 3 proposal also includes an allocation of a share of greenhouse gas-free, non-RPS eligible energy from either existing hydroelectric resources, nuclear resources or both. This part of the allocation proposal was not adopted by the CPUC in its final decision on May 20, 2021.

In 2020 and 2021, PG&E offered allocations from their large hydro and nuclear resources, of which Peninsula Clean Energy opted to accept the large hydroelectric portion, but not the nuclear. D.21-05-021 extends these allocations through 2023. In November 2020, Peninsula Clean Energy's Board of Directors voted to accept the large hydroelectric allocations, but not the nuclear allocations, through 2023.

Potential Barriers

Peninsula Clean Energy identifies the following factors as potential barriers or risks to the procurement and eventual commercial operation of the resources identified in Peninsula Clean Energy's Preferred Portfolio.

Accurate Load Forecasting: Ability to accurately forecast load will influence the volume of resources Peninsula Clean Energy commits to as it does not want to over-contract for resources. This is impacted by expectations around customer participation and the number of customers opting to return to the incumbent utility and potential competition for customers from direct access, both of which could leave Peninsula Clean Energy with stranded assets in the form of long-term contracts. Load forecasting uncertainty has been exacerbated during the pandemic, increasing numbers of people working from home, the closure of businesses and general uncertainty.

Availability of Certain Resources: Peninsula Clean Energy has experienced strong competition for limited wind resources in California and interconnection challenges for out of state wind resources. Peninsula Clean Energy remains committed to procuring wind energy contracts in the future and is in negotiations for wind resource PPAs. There is also risk that assumptions around the timelines for the availability of newer resources such as offshore wind or long duration storage are not accurate.

Climate Change: Climate change itself is also exacerbating these risks. Among the effects is more severe and volatile weather which creates uncertainty in resource generation and load forecasting. Further, the severe weather has resulted in more intense fire conditions which can impact construction timelines both if the fire is located close to a project under construction, but also if an interconnecting utility has to focus resources on fire prevention and management, this may slow the processing timeline for interconnection studies and agreements.

Counterparty Credit: Damage to counterparty credit particularly in the context of the pandemic and economic uncertainty which may hurt Peninsula Clean Energy's confidence in a counterparty and may also make it more difficult or expensive to access financing for construction.

COVID-19: The coronavirus pandemic significantly disrupted project development in 2020, due to social distancing, delays due to shelter-in-place orders, and an economic turndown. Peninsula Clean Energy's load decreased by about 8% at the nadir of the pandemic but has since begun to rebound. Although many of the impacts of the pandemic have begun to lessen, there is still uncertainty of whether there will be a new variant that may lead to similar disruptions.

Curtailment: Peninsula Clean Energy plans for curtailment in our portfolio, but there is uncertainty whether actual curtailment volumes will align with our forecasts. The CAISO balancing authority area has experienced an increasing frequency and magnitude of curtailment and negative pricing events in recent years, although current high energy prices appear to have decreased curtailment. It remains to be seen if this effect will continue in the long-term, or if prices will become more volatile and resources subject to curtailment.

Development and Construction Delays: In the development and construction of any new project there is the potential for delays related to unforeseen circumstances, including permitting timelines, interconnection construction timelines, product delivery, delays related to weather during construction. As discussed below, some of this is exacerbated by the novel coronavirus, trade tariffs, the Bulk System Power Executive Order and climate change leading to more extreme weather events.

Market Risks: Fluctuation and increasing volatility in market prices (*e.g.*, locational marginal prices, RA prices, RPS prices, project specific PPA prices) impact Peninsula Clean Energy's ability to plan accurately and may impact valuation for projects.

Plant Retirements: We do not expect plant retirements to be a significant risk. Peninsula Clean Energy's portfolios do not rely on specific existing resources beyond those currently under contract. There is some reliance on system power to meet load and natural gas for RA, but Peninsula Clean Energy's plan is to decrease this reliance over time.

Power Charge Indifference Adjustment: The Power Charge Indifference Adjustment (PCIA) is imposed on CCA customers to account for long-term costs incurred by the IOUs for customers who have departed to CCAs. Peninsula Clean Energy adjusts the generation that we charge to customers so that the combination of the PCIA and our generation rate is 5% lower than PG&E's generation rate. Thus, Peninsula Clean Energy's revenue is highly dependent on the PCIA. Peninsula Clean Energy has no control of or influence on the methodology to calculate the PCIA and has limited insight into the process of how and when changes to the PCIA are calculated or made. There is no reliable forecast for the future cost of the PCIA, which impedes our ability to plan for and manage our customer's energy

generation costs to maintain affordability. In addition, if customers depart Peninsula Clean Energy, there is no corresponding "PCIA" to make Peninsula Clean Energy whole for those departures.

Regulatory Uncertainty: Regulatory uncertainty is a significant risk in planning and implementing a long-term portfolio. Existing long-term contracts for resource adequacy will need to operate under the recently adopted 24-hr RA framework, the details of yet are not yet determined. It remains to be seen whether the existing contracts will be compatible with the detailed implementation of the framework. If they are not, it could lead to contract renegotiation or termination. The Central Procurement Entity (CPE) is currently appointed to procure local RA in the PG&E area but has been unable to fulfill its procurement mandates. Peninsula Clean Energy and other LSEs who were depending on the CPE's procurement, are now left significantly exposed to a tight RA market, with very little time to cure deficiencies. The failure of the CPE has significantly increased the cost of RA that will be borne by ratepayers. It remains to be seen whether the rules surrounding the CPE will be changed to address the failure of the CPE in 2023. The mid-term reliability orders were developed outside of the main Integrated Resource Plan analysis and were imposed on LSEs with a very short turn-around time (released in June 2021, with the first online requirement in August 2023). With the contemplation of a programmatic procurement approach by the CPUC, we are left in uncertainty as to when and how much more mandated procurement will be required, and whether it will be compatible with our Preferred Portfolio. Finally, there exists the potential for new regulations that could interfere with Peninsula Clean Energy's ability to implement its Preferred Portfolio.

Supply Chain Disruptions: There are currently significant supply chain disruptions impacting the industry, converging from a variety of contributing factors, including labor shortages, high interest rates, the war in Ukraine, surging prices for raw materials, port congestion and increased shipping costs, and lingering effects of COVID-19. These supply chain disruptions have led to delays in project development and have increased the difficulty of contracting for new resources.

Trade Tariffs or Other Supply Restrictions: In 2022 the Department of Commerce announced an investigation into alleged violation of tariffs on solar modules from China. The investigation started a market disruption that is still impacting the market today. In addition to potential expansion of solar tariffs, there is uncertainty regarding potential tariffs or restrictions that may be imposed on procurement of storage modules, especially lithium ion. These possible tariffs have created uncertainty that makes it difficult to contract for certain resources.

b. Disadvantaged Communities (DACs)

Peninsula Clean Energy is sensitive to the impact of procurement activities on disadvantaged communities and take this into account in energy procurement. In its recent solicitation for renewable energy and hybrid resources, Peninsula Clean Energy requested information from respondents on whether projects are located in DACs, any benefits their project will provide to DACs and information on how they have conducted outreach to DACs. Responses to these questions will be part of the project evaluation. Additionally, Peninsula Clean Energy has a number of programs in progress that benefit DACs. These were outlined above in Section III.d.ii.

Power Procurement in DACs

Peninsula Clean Energy does not procure electricity directly from any natural gas or other fossil resource power plants. Further, there are no polluting electricity generation resources located in the DACs in Peninsula Clean Energy's service territory identified above.

Peninsula Clean Energy fully recognizes the need to help mitigate the impacts of air pollution in regions of the state where communities have been disproportionately impacted by the existing generating fleet as well as the need to bring economic benefits to communities with high levels of poverty and unemployment. Consistent with this recognition, Peninsula Clean Energy has executed long-term power purchase agreements (PPAs) with two solar projects located in DACs in Merced County and one located in Kings County. By entering into long-term PPAs with Peninsula Clean Energy, these three projects will deliver renewable power to Peninsula Clean Energy's customers, while improving air quality, providing economic benefits and creating hundreds of jobs to the projects' region.

Two of these projects has signed a project labor agreement (PLA) with local unions. The third project has committed to using a PLA or similar agreement. A PLA is a pre-hire collective bargaining agreement with one or more labor organizations that establishes the terms and conditions of employment for a specific construction project. Consistent with Peninsula Clean Energy's Sustainable Workforce policy,[37] Peninsula Clean Energy believes support of local businesses, union labor and apprenticeship and pre-apprenticeship programs that create employment opportunities are important components of building and sustaining healthy and sustainable communities. As part of its procurement process, Peninsula Clean Energy collects information from project owners on expected labor impacts. This information is used to evaluate potential workforce impacts of proposed projects with the goal of promoting fair compensation, fair worker treatment, multi-trade collaboration, and support for the existing wage base in local communities where contracted projects will be located.

Programmatic Activity in DACs

Peninsula Clean Energy's ECOplus customers receive a 5% discount from PG&E's electrical service rate, which is an immediate benefit provided to all residents who want to reduce their monthly electrical bill. This saves residential customers $2.51 on average per month and in aggregate saves customers $18 million annually.[38] Peninsula Clean Energy offers an array of programs that are available to all customers, including those located with a DAC. Many programs are income-qualified, reserving program funding and benefits for low-income customers. These programs are outlined in Section III.d.ii above.

Outreach activities

Peninsula Clean Energy does not typically conduct targeted outreach directed towards disadvantaged communities in areas where projects in our Preferred Portfolio are located, which is an activity typically undertaken by developers. Peninsula Clean Energy collects information from developers regarding their outreach directed towards community members in areas where projects are located, including from disadvantaged communities. Peninsula Clean Energy assesses the effectiveness outreach, includes

[37] Peninsula Clean Energy Sustainable Workforce Policy: www.peninsulacleanenergy.com/wp-content/uploads/2018/10/Policy-10-Inclusive-and-Sustainable-Workforce-revised-10-25-18.pdf

[38] Based on a typical usage of 427 kWh/month. For details on rates and savings calculation: www.peninsulacleanenergy.com/for-residents/

whether accessible materials are available in the languages spoken in the community, that there are meaningful and transparent opportunities to provide input, and how the community input is considered in the development process. These factors are taken into consideration during Peninsula Clean Energy's evaluation of projects and can impact whether a project is shortlisted and advanced to final negotiations.

Peninsula Clean Energy staff conducted outreach and solicited feedback regarding the 2022-2023 IRP cycle, modeling, and Preferred Portfolio results through public meetings in August and October 2022. When seeking community input, staff leveraged existing relationships with highly engaged residents and representatives of community-based organizations who are familiar with Peninsula Clean Energy.

Peninsula Clean Energy's Citizens Advisory Committee is an advisory body of fifteen residents appointed to serve as liaisons to communities in San Mateo County and the City of Los Banos. Staff utilized Citizen Advisory Committee meetings, which are virtual and open to the public, as a forum for providing information and soliciting feedback. Staff also invited the eleven nonprofits that have received outreach grants from Peninsula Clean Energy to participate in the meeting. Several of the invited organizations serve low-income and other disadvantaged communities.

Staff introduced the Integrated Resource Plan's guiding principles and modeling approach during the August 11, 2022 meeting. During the October 13, 2022 meeting, staff explained the results of the Integrated Resource Plan process. Staff invited Citizen Advisory Committee members and members of the public to provide feedback on the selected resource portfolio, action plan, and outreach process.

Additionally, staff reviewed the results with the Executive Committee of Peninsula Clean Energy's Board of Directors on October 12, 2022.

Peninsula Clean Energy values the community's input in our procurement practices and is interested in expanding our community outreach activities in the next IRP cycle. Peninsula Clean Energy welcomes feedback on best practices for engaging the community to provide meaningful and transparent input on our procurement practices.

c. Commission Direction of Actions

Peninsula Clean Energy's Board of Director's oversees and governs Peninsula Clean Energy's planning and procurement activities. This IRP was approved by Peninsula Clean Energy's Board of Directors on October27, 2022, and the resolution documenting this approval is attached as Appendix B.

Peninsula Clean Energy requests that the Commission certify the completeness of Peninsula Clean Energy's IRP detailing Peninsula Clean Energy's Conforming Portfolios, as summarized above and detailed in the completed Resource Data Templates.

Peninsula Clean Energy supports the Commission's efforts to develop a programmatic approach to procurement requirements, as discussed in D.22-02-004 pages 152-156. Any programmatic approach should be responsive to changes in demand that are driven by electrification, climate-induced load changes, as well as load migration. Moreover, any programmatic approach should allow LSEs to manage their portfolio risk by allowing a variety of resource types and contract lengths, according to an LSE's adopted hedge policy. The programmatic approach should support the maintenance of contracts with

existing resources, as well as contracts with new resources, especially by supporting a mix of longer term and short-term resources. These short-term contracts in particular allow LSEs to take advantage of new technologies and cost declines, rather than locking in long-term contracts with soon-to-be-obsolete technologies. Moreover, a programmatic approach should not penalize LSEs that have already developed a robust clean portfolio that provides the reliability and emissions reductions benefits required by that LSE. A failure to account for these early action risks introducing serious cost shifts when early moving LSEs that have filled their portfolios are then called on to procure additional resources that will be actually used to meet other LSE loads.

V. Lessons Learned

Peninsula Clean Energy appreciates the CPUC's time and efforts in preparing for this round of integrated resource planning. We appreciate staff's responsiveness to questions and efforts to address stakeholder concerns ahead of the filing deadline. Peninsula Clean Energy appreciates the amount of effort and time that must go into this type of initiative and recognizes the developments and improvements over the first IRP cycle. Clearly, developing a robust and accurate planning process is no small feat and we appreciate the ability to move forward constructively together on this challenge.

In an effort to make future processes simpler, more accurate and more transparent, Peninsula Clean Energy offers the following additional suggestions.

Allow for a firm timeline for portfolio development. Delays in the publishing of the final filing requirements, especially the reliability criteria such as effective load carrying capacity for resources, reduces the amount of time that LSEs have to conduct their modeling. In this cycle, the final modeling assumptions were not released until the end of July. This is in contrast to the expectation that many LSEs had that Filing Requirements would be available in June. The loss of one month in the development of the IRP resulted in less time for public engagement and less time for modeling of potential alternative portfolios. Peninsula Clean Energy is strongly interested in providing the Commission with robust and extremely well-analyzed portfolios to support the Commission in its efforts but needs sufficient time in which to perform that analysis, and needs to be able to plan when the work will be able to occur. Uncommunicated delays affect our ability to manage our work schedules to ensure the modeling is completed on time. While Peninsula Clean Energy certainly understands the challenges in foreseeing every possible issue complexity that arises while several dozen LSEs engage in the IRP process, Peninsula Clean Energy recommends increasing staffing or other resources or reconsidering the timelines and structures for this planning process. In general, the critical requirements and major parameters, such as load forecasts, required data inputs including available resources, costs, and reliability targets, required targets, and required portfolios must be finalized at least 8 to 10 months in advance in allow for robust portfolio development. Peninsula Clean Energy believes this will be in the best interest of the overall process so that LSE IRPs can be of the highest quality and usefulness to the Commission.

Align Reliability Planning with the Resource Adequacy Proceeding. Peninsula Clean Energy is keenly interested in supporting the Commission's efforts to ensure the IRP process delivers a reliable system. However, Peninsula Clean Energy is also concerned by the reliability framework adopted in the 2022-2023, and its significant differences from the current resource adequacy market rules, as well as its lack of alignment with the 24-hr framework recently adopted. Peninsula Clean Energy looks forward to a constructive conversation around these and many other methods to solve the many issues facing California.

Provide transparency in decision making. In future iterations of the planning process and as the process becomes more routinized, Peninsula Clean Energy recommends an increased level of transparency about how the plans will be used and what metrics will be assessed to evaluate conformance. Clear up-front standards for evaluation and clear processes for any conclusions to be reached from IRPs will help LSEs craft a better product and ensure a higher quality overall outcome. Peninsula Clean Energy looks forward to working with the Commission in future to develop such standards to ensure the Commission's needs are met.

Develop a centralized project database to minimize repetitive data collection. Many of the data points required to be input in the RDT are redundant with data that the CPUC should already have collected. Specifically, for online resources with CAISO resource IDs, the CPUC should have access to the nameplate capacity, technology type, capacity area, location, commercial operation date, and contract term. Asking LSEs to continuously re-input the same data for the same resource across various filings invites data input errors and is an inefficient use of staff time. The CPUC should develop a centralized project database that contains quality assured and quality-controlled data for each project. LSEs should be able to provide CPUC with a resource ID, and then CPUC can use the database to look up the relevant project information.

Glossary of Terms

Alternative Portfolio: *LSEs are permitted to submit "Alternative Portfolios" developed from scenarios using different assumptions from those used in the Reference System Plan. Any deviations from the "Conforming Portfolio" must be explained and justified.*

Approve (Plan)*: the CPUC's obligation to approve an LSE's integrated resource plan derives from Public Utilities Code Section 454.52(b)(2) and the procurement planning process described in Public Utilities Code Section 454.5, in addition to the CPUC obligation to ensure safe and reliable service at just and reasonable rates under Public Utilities Code Section 451.*

Balancing Authority Area (CAISO): *the collection of generation, transmission, and loads within the metered boundaries of the Balancing Authority. The Balancing Authority maintains load-resource balance within this area.*

Baseline resources: *Those resources assumed to be fixed as a capacity expansion model input, as opposed to Candidate resources, which are selected by the model and are incremental to the Baseline. Baseline resources are existing (already online) or owned or contracted to come online within the planning horizon. Existing resources with announced retirements are excluded from the Baseline for the applicable years. Being "contracted" refers to a resource holding signed contract/s with an LSE/s for much of its energy and capacity, as applicable, for a significant portion of its useful life. The contracts refer to those approved by the CPUC and/or the LSE's governing board, as applicable. These criteria indicate the resource is relatively certain to come online. Baseline resources that are not online at the time of modeling may have a failure rate applied to their nameplate capacity to allow for the risk of them failing to come online.*

Candidate resource: *those resources, such as renewables, energy storage, natural gas generation, and demand response, available for selection in IRP capacity expansion modeling, incremental to the Baseline resources.*

Capacity Expansion Model: *a capacity expansion model is a computer model that simulates generation and transmission investment to meet forecast electric load over many years, usually with the objective of minimizing the total cost of owning and operating the electrical system. Capacity expansion models can also be configured to only allow solutions that meet specific requirements, such as providing a minimum amount of capacity to ensure the reliability of the system or maintaining greenhouse gas emissions below an established level.*

Certify (a Community Choice Aggregator Plan)*: Public Utilities Code 454.52(b)(3) requires the CPUC to certify the integrated resource plans of CCAs. "Certify" requires a formal act of the Commission to determine that the CCA's Plan complies with the requirements of the statute and the process established via Public Utilities Code 454.51(a). In addition, the Commission must review the CCA Plans to determine any potential impacts on public utility bundled customers under Public Utilities Code Sections 451 and 454, among others.*

Clean System Power (CSP, formerly "Clean Net Short") methodology*: the methodology used to estimate GHG emissions associated with an LSE's Portfolio based on how the LSE will expect to rely on system power on an hourly basis.*

Community Choice Aggregator*: a governmental entity formed by a city or county to procure electricity for its residents, businesses, and municipal facilities.*

Conforming Portfolio*: the LSE portfolio that conforms to IRP Planning Standards, the 2030 LSE-specific GHG Emissions Benchmark, use of the LSE's assigned load forecast, use of inputs and assumptions matching those used in developing the Reference System Portfolio, as well as other IRP requirements including the filing of a complete Narrative Template, a Resource Data Template and Clean System Power Calculator*.

Effective Load Carrying Capacity*: a percentage that expresses how well a resource is able avoid loss-of-load events (considering availability and use limitations). The percentage is relative to a reference resource, for example a resource that is always available with no use limitations. It is calculated via probabilistic reliability modeling and yields a single percentage value for a given resource or grouping of resources.*

Effective Megawatts (MW): *perfect capacity equivalent MW, such as the MW calculated by applying an ELCC % multiplier to nameplate MW.*

Electric Service Provider*: an entity that offers electric service to a retail or end-use customer, but which does not fall within the definition of an electrical corporation under Public Utilities Code Section 218.*

Filing Entity*: an entity required by statute to file an integrated resource plan with CPUC.*

Future*: a set of assumptions about future conditions, such as load or gas prices.*

GHG Benchmark (or LSE-specific 2030 GHG Benchmark)*: the mass-based GHG emission planning targets calculated by staff for each LSE based on the methodology established by the California Air Resources Board and required for use in LSE Portfolio development in IRP.*

GHG Planning Price: *the systemwide marginal GHG abatement cost associated with achieving a specific electric sector 2030 GHG planning target.*

Integrated Resources Planning Standards (Planning Standards)*: the set of CPUC IRP rules, guidelines, formulas and metrics that LSEs must include in their LSE Plans.*

Integrated Resource Planning (IRP) process*: integrated resource planning process; the repeating cycle through which integrated resource plans are prepared, submitted, and reviewed by the CPUC*

Long term*: more than 5 years unless otherwise specified.*

Load Serving Entity*: an electrical corporation, electric service provider, community choice aggregator, or electric cooperative.*

Load Serving Entity (LSE) Plan*: an LSE's integrated resource plan; the full set of documents and information submitted by an LSE to the CPUC as part of the IRP process.*

Load Serving Entity (LSE) Portfolio*: a set of supply- and/or demand-side resources with certain attributes that together serve the LSE's assigned load over the IRP planning horizon.*

Loss of Load Expectation (LOLE): *a metric that quantifies the expected frequency of loss-of-load events per year. Loss-of-load is any instance where available generating capacity is insufficient to serve electric demand. If one or more instances of loss-of-load occurring within the same day regardless of duration*

are counted as one loss-of-load event, then the LOLE metric can be compared to a reference point such as the industry probabilistic reliability standard of "one expected day in 10 years," i.e., an LOLE of 0.1.

Maximum Import Capability: *a California ISO metric that represents a quantity in MWs of imports determined by the CAISO to be simultaneously deliverable to the aggregate of load in the ISO's Balancing Authority (BAA) Area and thus eligible for use in the Resource Adequacy process. The California ISO assess a MIC MW value for each intertie into the ISO's BAA and allocated yearly to the LSEs. A LSE's RA import showings are limited to its share of the MIC at each intertie.*

Net Qualifying Capacity: *Qualifying Capacity reduced, as applicable, based on: (1) testing and verification; (2) application of performance criteria; and (3) deliverability restrictions. The Net Qualifying Capacity determination shall be made by the California ISO pursuant to the provisions of this California ISO Tariff and the applicable Business Practice Manual.*

Non-modeled costs*: embedded fixed costs in today's energy system (e.g., existing distribution revenue requirement, existing transmission revenue requirement, and energy efficiency program cost).*

Nonstandard LSE Plan*: type of integrated resource plan that an LSE may be eligible to file if it serves load outside the CAISO balancing authority area.*

Optimization*: an exercise undertaken in the CPUC's Integrated Resource Planning (IRP) process using a capacity expansion model to identify a least-cost portfolio of electricity resources for meeting specific policy constraints, such as GHG reduction or RPS targets, while maintaining reliability given a set of assumptions about the future. Optimization in IRP considers resources assumed to be online over the planning horizon (baseline resources), some of which the model may choose not to retain, and additional resources (candidate resources) that the model is able to select to meet future grid needs.*

Planned resource: *any resource included in an LSE portfolio, whether already online or not, that is yet to be procured. Relating this to capacity expansion modeling terms, planned resources can be baseline resources (needing contract renewal, or currently owned/contracted by another LSE), candidate resources, or possibly resources that were not considered by the modeling, e.g., due to the passage of time between the modeling taking place and LSEs developing their plans. Planned resources can be specific (e.g., with a CAISO ID) or generic, with only the type, size and some geographic information identified.*

Qualifying capacity*: the maximum amount of Resource Adequacy Benefits a generating facility could provide before an assessment of its net qualifying capacity.*

Preferred Conforming Portfolio*: the conforming portfolio preferred by an LSE as the most suitable to its own needs; submitted to CPUC for review as one element of the LSE's overall IRP plan.*

Preferred System Plan: *the Commission's integrated resource plan composed of both the aggregation of LSE portfolios (i.e., Preferred System Portfolio) and the set of actions necessary to implement that portfolio (i.e., Preferred System Action Plan).*

Preferred System Portfolio: *the combined portfolios of individual LSEs within the CAISO, aggregated, reviewed and possibly modified by Commission staff as a proposal to the Commission, and adopted by the Commission as most responsive to statutory requirements per Pub. Util. Code 454.51; part of the Preferred System Plan.*

Short term*: 1 to 3 years (unless otherwise specified).*

***Staff**: CPUC Energy Division staff (unless otherwise specified).*

***Standard LSE Plan**: type of integrated resource plan that an LSE is required to file if it serves load within the CAISO balancing authority area (unless the LSE demonstrates exemption from the IRP process).*

***Transmission Planning Process (TPP):** annual process conducted by the California Independent System Operator (CAISO) to identify potential transmission system limitations and areas that need reinforcements over a 10-year horizon.*

Table of Acronyms

ALJ	Administrative Law Judge
APEP	Advanced Power and Energy Program
CAISO	California Independent System Operator
CAM	Cost Allocation Mechanism
CARE	California Alternate Rates for Energy
CCA	Community Choice Aggregator
CEC	California Energy Commission
CPE	Central Procurement Entity
CPM	Capacity Procurement Mechanism
CPUC	California Public Utilities Commission
CSP	Clean System Power
CVI	San Mateo County Community Vulnerability Index
D	Decision
DCPP	Diablo Canyon Power Plant
ELCC	Effective Load Carrying Capacity
EPRI	Electric Power Research Institute
EV	Electric Vehicle
FERA	Family Electric Rate Assistance
GEL	Grid Evolution Laboratory
GHG	Greenhouse Gas
IEPR	Integrated Energy Policy Report
IOU	Investor-Owned Utility
IRP	Integrated Resource Plan
kW	Kilowatt
kWh	Kilowatt-hour
LSE	Load Serving Entity
LTCE	Long-Term Capacity Expansion
MIP	Mixed Integer Linear Programming
MMT	Million Metric Ton
MW	Megawatt
MWh	Megawatt-hour
PCC1	Portfolio Content Category 1
PCIA	Power Charge Indifference Adjustment
PG&E	Pacific Gas and Electric
PPA	Power Purchase Agreement
PRMR	Planning Reserve Margin Requirement
PSPS	Public Safety Power Shutoff
R	Rulemaking
RA	Resource Adequacy

RDT	Resource Data Template
RFO	Request for Offers
RFP	Request for Proposals
RMR	Reliability Must Run
RPS	Renewable Portfolio Standard
RSP	Reference System Plan
SCE	Southern California Edison
UCI	University of California, Irvine