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2022 INTEGRATED RESOURCE PLAN

NOVEMBER 1, 2022

Construction of CPA's High Desert Solar + Storage project, which achieved commercial operation on December 17, 2021

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I. Executive Summary

Clean Power Alliance of Southern California (CPA) is a Load Serving Entity (LSE) and administrator of a Community Choice Aggregation (CCA) program. Formed as a Joint Powers Authority (JPA), CPA's 32 member jurisdictions include the unincorporated areas of Los Angeles and Ventura Counties, as well as the cities of Agoura Hills, Arcadia, Alhambra, Beverly Hills, Calabasas, Camarillo, Carson, Claremont, Culver City, Downey, Hawaiian Gardens, Hawthorne, Malibu, Manhattan Beach, Moorpark, Ojai, Oxnard, Paramount, Redondo Beach, Rolling Hills Estates, Santa Monica, Sierra Madre, Simi Valley, South Pasadena, Temple City, Thousand Oaks, Ventura, West Hollywood, Westlake Village, and Whittier. CPA serves approximately 1 million customer accounts representing over 3 million residents and businesses. CPA is governed by a board of directors comprised of elected officials of its member cities and counties, which span a broad territory that is diverse in its geography, climate, and customer demographics.

CPA began offering service to municipal customers of unincorporated Los Angeles County in February 2018 and began service to non-residential customers of unincorporated Los Angeles County, Rolling Hills Estates, and South Pasadena beginning in June 2018. CPA enrolled residential customers from 31 of its member jurisdictions in February 2019 and completed enrollment of its current non-residential customers in May 2019. Both residential and non-residential customer enrollments in Westlake Village occurred in June 2020.

As set out in its Joint Powers Agreement, CPA is a mission-driven organization. CPA intends to develop an electric supply portfolio with overall lower greenhouse gas (GHG) emissions than that of the local Investor Owned Utility (IOU), Southern California Edison (SCE). CPA's procurement policy encourages the use and development of cost-effective renewable and distributed energy resources and discourages the use of unbundled renewable energy credits (RECs). CPA also intends to manage its energy portfolio and products in a manner that provides cost savings to customers, promotes public health in areas impacted by energy production, supports regional economic benefits and workforce development, and offers customers a choice of differentiated renewable products.

Now in its fourth year of operations, CPA is relying on short- and long-term procurement to meet the needs of its current customers and offers three renewable products while remaining price-competitive and satisfying regulatory requirements. The three supply options that CPA offers to its customers are: Lean Power, which provides a State compliance renewable portfolio content; Clean Power, which provides 50% renewable energy content; and 100% Green Power, which provides 100% renewable energy content. CPA procures electricity for its customers from a variety of resources guided by policies adopted by the CPA Board of Directors (Board), and by regulatory requirements established by the legislature and state regulatory agencies.

Consistent with CPA's governance practices and Public Utilities Code section 454.52, this Integrated Resource Plan (IRP) was approved on October 26, 2022, by the CPA Energy Planning & Resources Committee, the standing committee to whom the Board delegated authority for approval of the IRP through formal action on September 1, 2022, similar to what occurred with CPA's 2018 and 2020 IRP.

CPA is committed to providing safe, reliable, affordable, and clean energy to its customers and seeks to collaborate with statewide energy stakeholders to support California's energy goals.

CPA developed an IRP model that provides resource procurement trajectories to support CPA in meeting its regulatory requirements and renewables and emissions goals at a reasonable cost to ratepayers. The future resources identified in CPA's IRP represent CPA's best good-faith projection of the resource mix that it will seek to procure over the IRP planning horizon, based on the best information currently available. The resources identified in future iterations of CPA's IRP may change due to new information and changed circumstances, and the ultimate resource mix that CPA actually procures may differ from what is reflected in the plan due to a number of variables including availability of supply, price of supply, and/or other market or regulatory considerations.

CPA developed one preferred IRP Conforming Portfolio consistent with the 30 MMT GHG target in 2030 and 25 MMT GHG target by 2035, using assumptions that are consistent with the California Public Utilities Commission's (CPUC) system modeling. In calculating its emissions, CPA used the CPUC's Clean System Power (CSP) calculator to ensure that CPA's portfolio emissions are at or below the CPUC benchmarks for CPA. The preferred portfolio modeling results in an action plan (Action Plan) that is consistent with several clean energy procurement trends. The portfolio consists of long-term wind and solar resources, with 4-hour and 8-hour long duration storage projects added to promote reliability. CPA procurement also includes geothermal resources as the system gets saturated with solar, and offshore wind as onshore wind potential nears exhaustion. CPA's preferred portfolio results are broadly consistent with the trends seen in the CPUC's Reference System Plan.

The assumptions embedded in the preferred portfolio are consistent with the filing requirements and the results reflect CPA's goal to provide its customers with clean, reliable, and reasonably priced energy. CPA will align its procurement with this preferred portfolio as long as procurement can be conducted with input from our communities' local goals, and are subject to change based on needs to minimize customer risk, resource availability, changing market conditions, technological advancements, grid expansion, and potential new regulatory obligations. CPA will also maintain a diverse resource mix and minimize curtailment to contribute its share of grid reliability. Beyond the CPUC's mandates within the scope of this IRP proceeding, CPA's internal procurement planning process is driven by CPA Board-established policies and procedures, and in conjunction with CPA's Community Advisory Committee and other community stakeholders.

Given CPA's obligation to reliably meet customers' needs, the Action Plan calls for significant investment in new build renewable resources as well as strategic use of existing facilities. In addition, CPA seeks to establish a resource portfolio that encourages the use and development of cost-effective local renewable and distributed energy resources.

CPA believes that the recommended Action Plan provides for an optimal combination of expected costs and associated risks, while retaining the flexibility to take advantage of market-driven resource innovations and local stakeholder priorities. It provides CPA an excellent opportunity to deliver safe, clean, reliable, and affordable energy to our customers in an increasingly sustainable way. The Action

Plan takes full advantage of technologies and markets to enable a smarter, greener, and more flexible resource portfolio.

II. Study Design

This section describes the process used by CPA to develop its IRP. In this IRP, CPA demonstrates that it has a clear plan to meet its CEC 2021 IEPR load forecast through 2035 with a reliable resource portfolio comprised of carbon free energy and RPS-eligible energy resources.

To develop its IRP, CPA used:

- Inputs that were consistent with the CPUC Reference System Plan
- An IRP model developed to determine least-cost resource procurement options to meet CPA's emissions goals and regulatory requirements
- The CSP methodology to calculate its emissions and ensure compliance with the emissions benchmark assigned to CPA

Load Assignments for Each LSE

CPA's annual base load forecast and load modifiers are consistent with the assigned forecast from the ALJ June 15, 2022, Ruling Finalizing Load Forecasts and Greenhouse Gas Emissions Benchmarks for 2022 Integrated Resource Plan Filings. For modeling in PLEXOS, CPA derived an hourly load profile, including all load modifiers, consistent with the CEC's "mid Baseline mid AAEE" 2021 IEPR data and ensuring that the total annual energy volumes for load remains consistent with CPA's assigned forecast, as shown in Table 1 below:

Table 1: CPA Load Forecast

CPA	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
CPA Sales Forecast (GWh)	10,902	11,015	11,087	11,155	11,249	11,321	11,398	11,467	11,543	11,590	11,643	11,692	11,744

CPA's annual peak capacity forecast is consistent with the confidential forecast assigned to CPA by Energy Division staff on July 1, 2022, and CPA's capacity planning reflects a 14% Planning Reserve Margin.

Within CPA's CSP, CPA used the template load modifier shapes (i.e., did not use custom load profiles).

Required and Optional Portfolios

CPA's IRP presents a strategy for meeting CPA's energy and capacity needs and is guided by the goals and policies established by CPA's Board and the State's procurement requirements for load-serving entities. Notably, this includes California's renewable portfolio standard (RPS) and GHG emission obligations. CPA has established electricity supply goals and policies as described in the Objectives section below. In applying the goals and policies to CPA's portfolio, CPA analyzed different options for electricity supply procurement over a planning horizon from 2023-2037.

For the purpose of this 2022 IRP Filling, CPA has developed one Preferred Conforming Portfolio which uses a load forecast consistent with the requirements of the June 15, 2022, ALJ Ruling, and inputs and assumptions consistent with those used by the staff to develop the Reference System Portfolio (RSP). The Conforming Portfolio meets CPA's assigned GHG benchmarks under the 2030 30 MMT and 2035 25 MMT scenario and conforms to CPA's policy objectives to achieve an electricity supply with zero GHG emissions.

CPA is not submitting additional Alternative Portfolios.

GHG Emissions Benchmark

CPA developed and evaluated its portfolio using its specific GHG emissions benchmarks as assigned in the Finalizing ALJ Ruling for the 25 MMT portfolio (1.049 MMT for the 2030 GHG Emissions Benchmark and 0.848 MMT for the 2035 GHG Emissions Benchmark). CPA used the CSP methodology and CSP Calculator Tool for GHG accounting and determining the emissions associated with CPA's Conforming Portfolio. CPA determined that its portfolio emissions were aligned as closely as practical with the GHG emissions benchmarks, net of behind-the meter combined heat and power[1], assigned to it under the CSP methodology. This resulted in portfolio with emission benchmarks under the assigned values. The table below shows the respective 2030 and 2035 GHG emissions benchmarks for the 25 MMT GHG portfolio, net of behind-the meter combined heat and power, and CPA Preferred Conforming Portfolio results.

Table 1: CPA Portfolio GHG Results

Metric	2030 GHG Emissions (MMT)	2035 GHG Emissions (MMT)
Emissions Benchmark for CPA	1.049	0.848
CPA Portfolio Results	1.042	0.845

a. Objectives

CPA is committed to complying with the CPUC's IRP process to meet its obligation of serving customers reasonably priced and reliable electricity and meeting or exceeding California's emissions reductions goals. CPA intends to comply with all statutory and regulatory goals and requirements, including SB 350, SB 100, SB 1020, and Resource Adequacy (RA).

CPA's approach was intended to adhere to the 25 MMT GHG target portfolio, consistent with CPUC's adopted assumptions. In addition, CPA's preferred portfolio reflects two key priorities of CPA's communities:

[1] Individual LSEs are not required to plan to reduce BTM CHP emissions, but the CPUC counts these emissions towards the electric sector emissions total and are included in LSE GHG Benchmarks. The CPUC will account for BTM CHP emissions when calculating electric sector emissions of the aggregated LSE portfolios during the development of the Preferred System Plan.

- Beyond the state's minimum renewable procurement requirements, CPA's Board has established additional requirements for renewable procurement via its product offerings and community default rate selections, which pursue aggressive renewable energy targets. As described in the Executive Summary, CPA offers its customers the options of Lean, Clean, and 100% Green rates, which correspond to various renewable energy content percentages (minimum RPS compliance, 50%, and 100%, respectively). Approximately two-thirds of CPA's customers receive service at the 100% Green rate, which means that CPA serves these customers with 100% RPS-certified energy. Due to this additional voluntary procurement to meet its customers' demand for renewable energy resources, CPA is expected to meet and exceed its SB 100 target of 60% renewable energy in 2023 and beyond, much earlier than the 2030 RPS compliance target. CPA assumes a modest growth in RPS portfolio content over time as demonstrated in the Preferred Conforming Portfolio. A substantial driver of the increase in CPA's contracted new renewable capacity is reflective of CPA's transition from meeting renewable energy demand from short-term contracts with existing resources to long-term power purchase agreements with new build renewable resources, which is a priority for CPA's communities.

- Per its Joint Powers Agreement, CPA has a goal of achieving overall lower GHG emissions than that of the local IOU. In order to achieve this internal GHG target, beyond the renewable energy procurement CPA conducts to meet its customer demand obligations, CPA also procures non-RPS carbon free resources from existing large hydro resources. Assumptions about this procurement is described in more detail in the Methodology section.

Table 2: CPA Internal RPS and GHG-Free Targets by Year

CPA	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
RPS	77%	83%	85%	86%	87%	87%	88%	88%	89%	89%	90%	91%	91%
GHG-Free	80%	85%	88%	91%	91%	92%	92%	94%	95%	96%	97%	97%	97%

CPA's portfolio was developed and optimized around these internal RPS and GHG-free goals and which are below the CPUC 25 MMT GHG benchmark. In addition, CPA selected the portfolios that minimize negative impacts and emphasizes benefits for Disadvantaged Communities (DACs) and reduce market risks for energy procurement through long-term acquisition of renewable resources at fixed price.

b. Methodology

The goal of the IRP is to identify a mix of new and existing resources that provides the best combination of expected costs, and associated risks and uncertainties for CPA and its customers. This Section provides an overview of the data, analytical tool, and methods CPA uses to assess resource portfolio performance in this IRP.

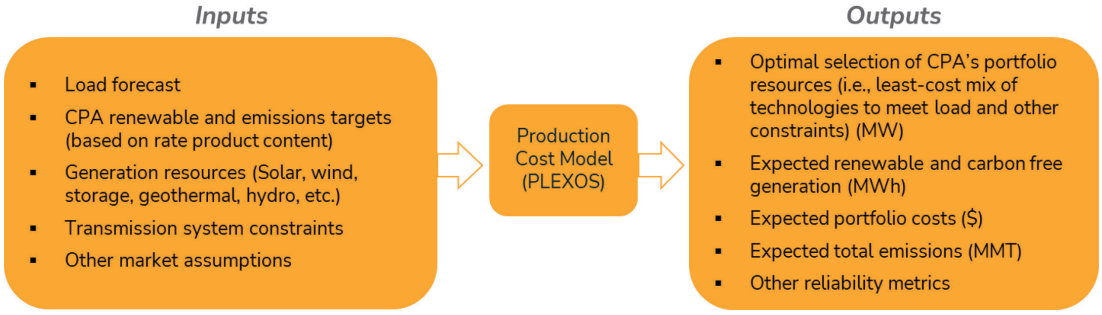
i. Modeling Tool(s)

The modeling software used to develop the IRP was Energy Exemplar's PLEXOS production cost modeling software (PLEXOS®). The version used is PLEXOS® 8.300 R11, released on May 12, 2022. PLEXOS® is a chronological unit commitment model, which works to simulate the economic dispatch of power plants within a competitive market framework. The model uses a mixed integer linear programming (MIP) approach to capture details of power plant while observing real world constraints. Constraints include items such as emission reduction targets, plant operating limits, renewable energy availability and mandatory portfolio targets. PLEXOS® is widely used by electric utilities, consulting agencies, and other stakeholders for the purpose of forecasting generator performance and economics, developing IRPs, forecasting power market prices, assessing detailed impacts of regulatory and market changes impacting the electric power industry, and to generate financially optimized generating portfolios. The model can assess the potential performance and capital costs of existing and prospective generation technologies and resources, and make resource addition and retirement decisions for economic, system reliability, and policy compliance reasons on a utility system.

The CPUC uses RESOLVE to develop the RSP, which identifies the new resources that meet the GHG emissions planning constraint. As opposed to PLEXOS®, which models each generator independently, the RESOLVE model groups together resource categories with similar operational characteristics (e.g., nuclear, coal, gas CCGT, gas peaker, renewables) and models them collectively. RESOLVE uses a linearized unit commitment where the commitment variable for each class of generators is a continuous variable rather than an integer variable. PLEXOS® has more rigorous unit commitment and dispatch methodologies as compared to RESOLVE. PLEXOS® models the operating cost and performance parameters on a plant-level basis, where the optimization method uses a mixed MIP to determine unit commitment. Based on public documents, RESOLVE is 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. CPUC uses SERVM as a separate tool to examine system reliability and simulate production cost. PLEXOS® is both a Long-Term Capacity Expansion Planning (LT Plan) and a production cost model. In the long-term capacity expansion process, CPA used a Long-term Capacity Expansion module to determine optimal renewable generation investment (or retirement) to meet projected CPA load growth while still complying with reliability criteria, emission limits, and RPS and GHG free targets.

A summary of the methodology with key inputs, algorithms, and outputs is shown below:

Figure 1: PLEXOS inputs and Outputs



PLEXOS® is an hourly, chronological production cost model with an integrated LT Plan feature that produces a resource expansion plan given resource options and constraints around those options. The options can include supply and demand generic resources, including storage, for inclusion in the expansion plan, existing resources, and existing resources for economic retirement as desired. The full set of standard operational and cost parameters for new and existing resources are considered in the LT PLAN, providing a robust framework from which to evaluate different technologies with different operational (intermittent vs. baseload) cost and incentive profiles. The LT Plan considers constraints such as reserve margin targets or requirements, renewable portfolio standards, carbon limits, and ancillary service constraints.

PLEXOS® minimizes production costs and can assign practically any rule with the constraint, decision variable such as:

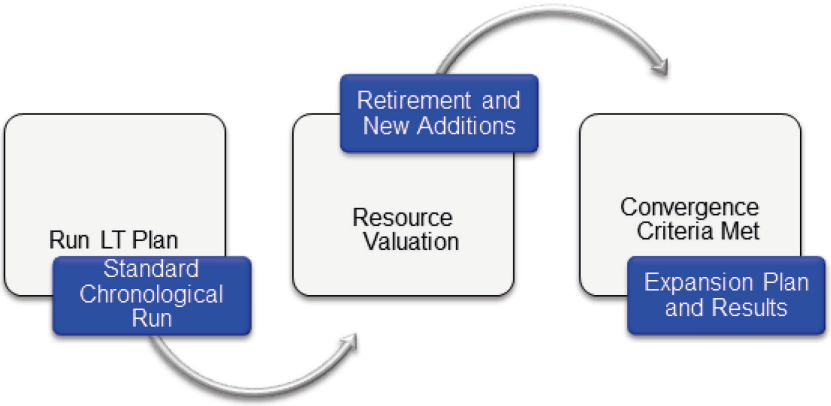
- System capacity reserve margins & ancillary services
- Maximum number of units built and retired
- Technical and Financial life spans
- Fuel availability and maximum fuel usage
- Minimum energy production
- Emission production limits and renewable energy targets
- Hydroelectric storage targets and releasing policies

CPA's long-term capacity expansion logic is illustrated in the Figure below. The LT Plan makes use of an iterative logic to develop a regional capacity expansion plan. At the end of any given iteration, it has the information it needs to take retirement actions on existing uneconomic resources and to select economically viable new resource options. Convergence criteria reduces the total number of resource alternatives which are considered by the LT Plan through the iterations, with a converged solution being defined as one in which system prices remain stable even with change in resource alternatives. In other words, the solution reflects an expansion plan that is at once both economically rational and stable.

PLEXOS® uses a dynamic simulation of adding, or retiring, economic capacity with optimization logic to forecast LT resources and retirements. With this approach, PLEXOS® performs an iterative future analysis where:

1. Resources that have negative going-forward value (revenue minus costs) are retired;
2. Resources with positive values are added to the system on a gradual basis, whereby a set of resources with the most positive net present value is selected from the set of new resource options and added to the study;
3. PLEXOS® then uses the new set of resources to compute all the values again; and
4. The process of adding and retiring resources is continually repeated until the system price stabilizes, indicating that an optimal set of resources has been identified for the study.

Figure 2: Long-Term Capacity Expansion



LT Plan finds the optimal combination of generation new builds and retirements and transmission upgrades (and retirements) that minimizes the net present value (NPV) of the total costs of the system over a long-term planning horizon. That is, to simultaneously solve a generation and transmission capacity expansion problem and a dispatch problem from a long-term perspective.

Long-term (LT) Capacity Expansion determines optimal investment decisions over long period of time, usually up to 30 years. The PLEXOS LT-Plan module accomplishes this by minimizing the Net Present Value of forward-looking investment costs and the portfolio production cost. Therefore, the portfolio cost minimization problem is expanded to include the investment cost and the investment-related constraints as follows:

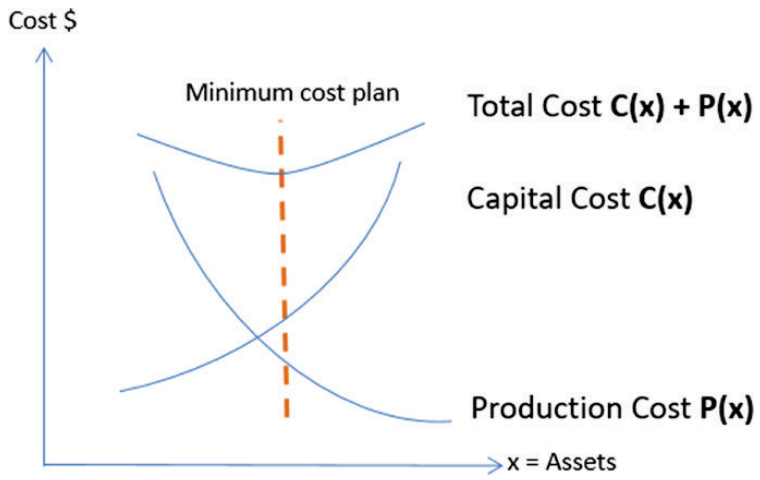
Minimize Portfolio Production Cost + Investment Cost[2] Subject to:

- Portfolio operational constraints
- Investment Constraints

The PLEXOS LT-Plan solution is illustrated by the following chart. The x-axis corresponds to the investment and y-axis corresponds to the cost. As the investment increases, the production cost, P(x), decreases and the capital cost, C(x) increases. The total cost is the sum of capital and production cost, C(x)+P(x). The PLEXOS LT Plan simulation returns the optimal investment decision while observing the investment and operational constraints.

[2]Investment Cost may include cost of new generator builds, cost of transmission expansion, and/or cost of generator investments. The Investment Constraints my include regional capacity reserve margins, resource addition and retirement candidates (i.e., maximum units built / # retired), technical and financial life spans, technology/fuel mix rules, RPS, etc. The build and retirement candidates might include thermal generators, geothermal generators, hydro or pumped storage hydro generators, wind or solar generators, battery and long duration storages, and demand side participation.

Figure 3: PLEXOS LT-PLAN Solution



PLEXOS® and RESOLVE both optimize dispatch for a system under a given set of inputs. RESOLVE is a linear optimization model, which assesses dispatch based on representative days over a defined forecast horizon. PLEXOS® differs in that it is a mixed integer program and hourly chronological dispatch simulation. RESOLVE generally focuses on a single market, reflecting high level interties and market interaction with neighboring regions. PLEXOS® can be set up in several different ways. PLEXOS® can be run for the entire western interconnect.

Both RESOLVE and PLEXOS® identify the optimal resources to meet needs based on the technology options offered including generation and storage. Both models also allow for the incorporation of different types of market and portfolio constraints including renewable generation, carbon emissions (or emission rates), reserve margin, and timing of new build requirements.

ii. Modeling Approach

For this IRP, PLEXOS was used to develop a 15-year IRP that simultaneously satisfies system reliability constraints, RPS and GHG targets and minimizes the Net Present Value (NPV) of the sum of investment cost and operation cost over a 15-year planning horizon.

For its IRP modeling, CPA utilized the PLEXOS LT Plan capacity expansion modeling and production cost modeling ("PCM") simulation software, based on specific requirements of each process step, in creating, analyzing, and validating resource portfolios.

Specifically, CPA used the following two-step iterative process:

1. Step 1: Build the optimized CPA system-wide resource portfolio using PLEXOS LT capacity expansion model to meet the CPA system share of a 25 MMT GHG target, Planning Reserve Margin (PRM) and RPS requirements, and to serve the load of the CPA system load, based on all assumptions for existing and candidate resources.

2. Step 2: Perform the detailed PLEXOS PCM simulation to validate if the CPA system-wide resource portfolio produced by PLEXOS LT capacity expansion model can operate on an expected and deterministic basis, while meeting CPA's load, satisfying individual generation constraints, and incorporating more detailed emissions calculations to reflect the variation of load and generation and meet the annual GHG target. If there are any unserved load and violations of the above limitations, constraints, and targets, the updated requirements will be implemented to rerun the PLEXOS LT capacity expansion model to create a new resource portfolio.

CPA provides more details on its capacity expansion and production cost modeling in the section below.

a) Capacity Expansion Modeling

The capacity expansion model is critical in the IRP process because it is utilized to develop the resource portfolios at least cost. CPA uses PLEXOS LT Plan model to develop its resource portfolios to meet GHG emissions and other constraints. The model seeks feasible solutions that trade-off cost and performance characteristics of a portfolio of existing and candidate resources to meet future demand forecast. The outcome of the model is a capacity expansion plan, sometimes also referred to as capacity additions specified by years in MW (capacity) of a new plant to be built.

CPA runs LT Plan modeling and PLEXOS PCM simulations in sequence to ensure that the least-cost resource portfolio built by LT Plan is operable to meet the hourly demand, PRM, and GHG target in the deterministic PCM simulations, as described further in the next section.

b) PCM Simulation

In the IRP process, it is important to conduct PCM simulations to validate the operational feasibility and performance of the portfolios built by the capacity expansion model for the CPA system. A PCM simulation approach is used to dispatch generation resources to meet the demand and PRM requirements of the system on an hourly basis, while satisfying all the generator operational constraints, and other system reliability requirements. Compared to the capacity expansion model, the PCM, which considers the detailed generator characteristics, ramping capabilities, and balancing load on an hourly basis, is an effective tool to assess the operational feasibility of resource portfolios in a power system. CPA used PLEXOS, a commercial software program with a mixed integer programming optimization engine, to perform the PCM simulation for the CPA system. PLEXOS generates the commitment and dispatch of available generation resources to meet demand and reserve requirements at least cost, subject to transmission and individual generation resource constraints. This modeling approach is a more sophisticated way to determine the dispatch of resources and emissions results as compared to the simplified CSP tool. CPA used both the PCM Simulation and the CSP tool to evaluate portfolio performance and emissions results.

Inputs and Assumptions

CPA's 2022 IRP inputs and assumptions are consistent with those of the CPUC's 2022 Inputs and Assumptions document. The following are the same: load forecast, baseline and candidate resources and resource availability, Effective Load Carrying Capacity (ELCC) of candidate resources, technology operational specifications, state's RPS target, and 30 MMT GHG emissions target or 25 MMT GHG emissions target, depending on case, for the electric sector by 2035. CPA's long-term forecast result is consistent with the CPUC-assigned load forecast for CPA.

CPA's forecast for new build resource costs assumptions deviated from the CPUC resource cost assumptions for some resources, as shown below in red:

Table 4: CPA Forecast for New Candidates Resources (Levelized $/MWh) by Online Year

	Large Hydro ($/MWh)	Small Hydro ($/MWh)	Solar ($/MWh)	Wind onshore ($/MWh)	Wind offshore ($/MWh)	Geothermal ($/MWh)	Biomass ($/MWh)	Battery Storage Hybrid ($/kw-yr)	Battery Storage Standalone ($/kw-yr)	Long Duration Storage ($/kw-yr)
2023	86	190	35	46	185	80	109	138	138	180
2024	86	190	35	45	185	79	109	138	138	180
2025	86	190	28	44	185	78	109	108	108	141
2026	86	179	25	43	185	77	112	102	102	178
2027	86	175	20	41	185	76	112	96	96	168
2028	86	171	18	40	185	75	112	90	90	158
2029	86	167	17	39	185	74	112	84	84	148
2030	86	163	16	38	150	73	113	78	78	161
2031	86	157	16	37	150	72	113	78	78	163
2032	86	151	16	37	150	72	113	78	78	163
2033	86	145	16	37	150	72	113	78	78	163
2034	86	140	16	36	150	72	113	78	78	164
2035	86	134	16	36	150	71	113	78	78	165

Red denotes change from CPUC assumption

CPA made several adjustments to the CPUC resource costs for the following reasons:

- Solar pricing for 2023-2026 was adjusted to account for current elevated pricing conditions; pricing for 2027 and beyond retain the CPUC assumptions given favorable tax credits available in the Inflation Reduction Act.
- Offshore wind costs were adjusted based on recent cost estimates.
- Geothermal pricing was increased to reflect inflated demand due to regulatory mandates (i.e., D.21-06-035).
- Battery Hybrid and Long Duration Storage was updated to reflect high near-term costs and higher long-term costs due to elevated demand for lithium.

- Battery Standalone was updated to equal hybrid costs to reflect new tax credits available for standalone storage from the Inflation Reduction Act.

Contracted Resources

CPA's generation supply consists of a mix of geothermal, hydroelectric, wind, solar PV, and battery storage resources. To date, CPA's Board has approved 17 long-term clean energy power purchase agreements, with hundreds of additional megawatts of new clean energy resources under negotiation. The table below lists the resource type, status, commercial operation date, and capacity under contract for CPA's generation supply.

Table 5 Executed Long-term Contracts

Project	Resource Type	Status	Commercial Operation Date	Term (Years)	Renewable MWs	Storage MWs
Voyager	Wind	Online	12/28/2018	15	21.6	
Kaweah	Hydro	Online	6/16/2020	10	20.09	
Isabella	Hydro	Online	12/8/2020	10	11.95	
Mohave	Wind	Online	12/15/2020	20	300	
Golden Fields	Solar	Online	12/21/2020	15	40	
Luna	Storage	Online	8/3/2022	15		100
Sanborn	Storage	Online	11/15/2021	15		100
High Desert	Solar + Storage	Online	12/17/2021	15	100	50
Arlington	Solar	Online	12/31/2023	16	140	120
Rexford	Solar + Storage	Contracted	12/31/2024	15	300	240
Chalan	Solar + Battery	Contracted	12/31/2024	15	65	65
Daggett	Solar + Battery	Contracted	12/1/2023	15	123	61.5
sPower - Estrella	Solar + Battery	Contracted	12/31/2023	16	56	28
Heber South Geothermal	Geothermal	Online	1/1/2022	15	14	
Resurgence	Solar + Battery	Contracted	6/1/2023	20	48	40
Arica	Solar + Battery	Contracted	6/1/2024	15	93.5	71
Daggett 2	Solar + Battery	Contracted	12/19/2023	15	65	52
Geysers Geothermal	Geothermal	Online	1/1/2022	15	50	
Desert Quartzite	Solar + Battery	Contracted	3/1/2025	20	300	150
Azalea	Solar + Battery	Contracted	12/31/2024	15	60	38
Radiant	Solar	Contracted	12/31/2023	15	3	
Cape Station	Geothermal	Contracted	6/1/2028	15	33	
Dominguez	Solar PV - Rooftop	Contracted	12/30/2023	15	0.96	
El Segundo	Solar PV - Rooftop	Contracted	12/30/2023	15	0.64	
Wilmington 1	Solar PV - Rooftop	Contracted	12/30/2023	15	1.8	

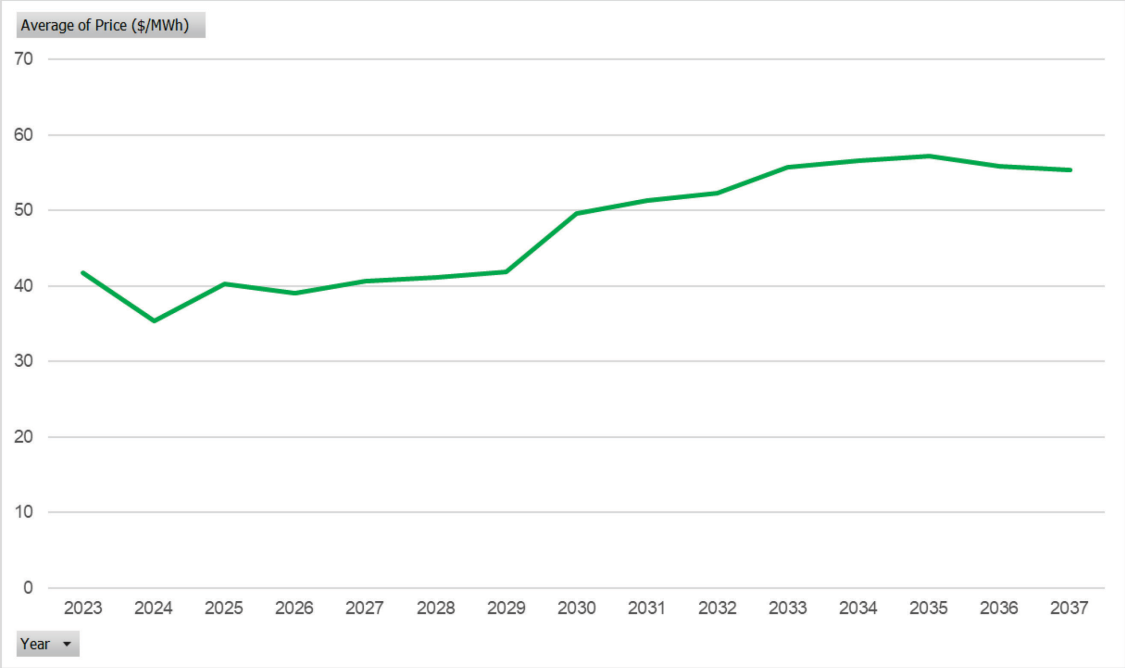
Wilmington 2	Solar PV - Rooftop	Contracted	12/30/2023	15	0.6	
Workman	Solar PV - Rooftop	Contracted	12/30/2023	15	1.92	
Total					**1,850**	**1,116**

CPA provided a list of long-term power purchase agreements (PPAs) currently under contract in the Resource Data Template. The information provided included technology, term, contracted capacity, and generation, among other items. All CPA's executed PPAs were included in the simulations in the PLEXOS model along with planned resources and new candidate resources selected by the LT Capacity Expansion Model.

Energy Market Assumptions

CPA used long-term energy market price forecasts from a third-party vendor, IHS Markit (IHS), to serve as the basis for analysis of the CPA resource portfolio. CPA used IHS's June 2022 Planning Case outlook for natural gas, electricity and CO2 emissions prices. The long-term hourly price forecasts for the California – Southern California Edison (CA-SCE) market area were used to model economic purchases. The price outlook was derived based on a combination of legislative and regulatory requirements and IHS's long-term economic assumptions, to develop a fundamentals-driven framework for long-term market price forecasts. The chart below summarizes the forecast for electricity prices used in the IRP.

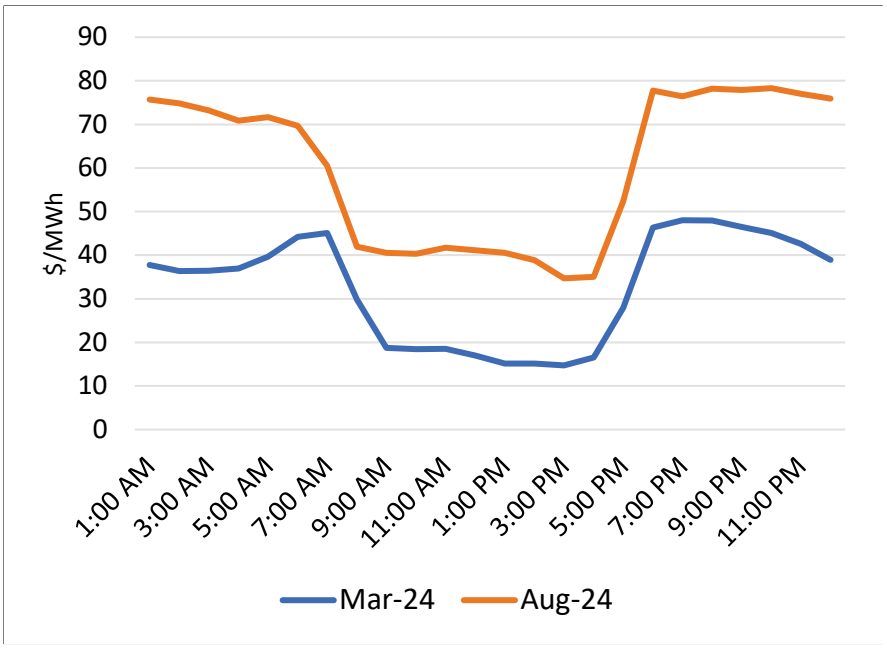
Figure 4: SP15 Annual Average Electricity Price Forecast



Average annual electricity prices shown above are expected to gradually increase due to increasing natural gas prices and GHG emission allowance prices. Natural gas resources are still expected to set the market price of electricity in most of the hours. However, as more solar resources enter the market there are times when solar displaces natural gas generation and sets the hour price of power. The market is seeing zero and negative electricity prices during hours when solar generation exceeds energy demand.

The figure below shows the impact increasing solar penetration has on hourly electricity prices on a typical spring and summer day in California in 2024.

Figure 5: Hourly SP15 Electricity Price Forecast Comparison



Post Processing

As part of the 2022 IRP filing, CPA developed several post-processing calculations that were used to generate metric for the portfolio. The post-processing calculations encompassed cost metrics, emissions metrics and a few other miscellaneous metrics. Almost all the calculations were based off outputs from the PLEXOS model. Critical post-processed calculations are discussed below.

To provide deeper insights into the generation and emission profiles of the portfolio, several metrics were developed to test compliance with CPUC requirements and CPA's internal portfolio targets. Post-processing calculations were considered for the RPS and GHG-free positions of the portfolio. The PLEXOS model did not include the ability for CPA to procure attribute-only contracts to meet RPS and RA procurement targets. As a result, a post-processing calculation was created to identify any additional PCC1 REC products from existing system resources that would be required to procure to meet/exceed the CPUC RPS requirements and meet internal requirements.

Metrics included:

- Long-term Contracting Requirements (MWh)
- Pre-Procurement RPS % of Load
- Pre-Procurement GHG-free % of Load
- Additional short-term PCC1 REC Purchases
- Additional short-term RA Purchases

Curtailment

The PLEXOS model determines curtailments for solar, wind and other non-dispatchable resources on an hourly basis based on load requirements, battery storage charging and economics. During a specific hour of the day, for instance during solar hours, if there is excess generation, the PLEXOS model determines how much of that excess generation is used to charge batteries and how much would be curtailed. Results of curtailment are presented in the System Reliability section.

III. Study Results

a. Conforming and Alternative Portfolios

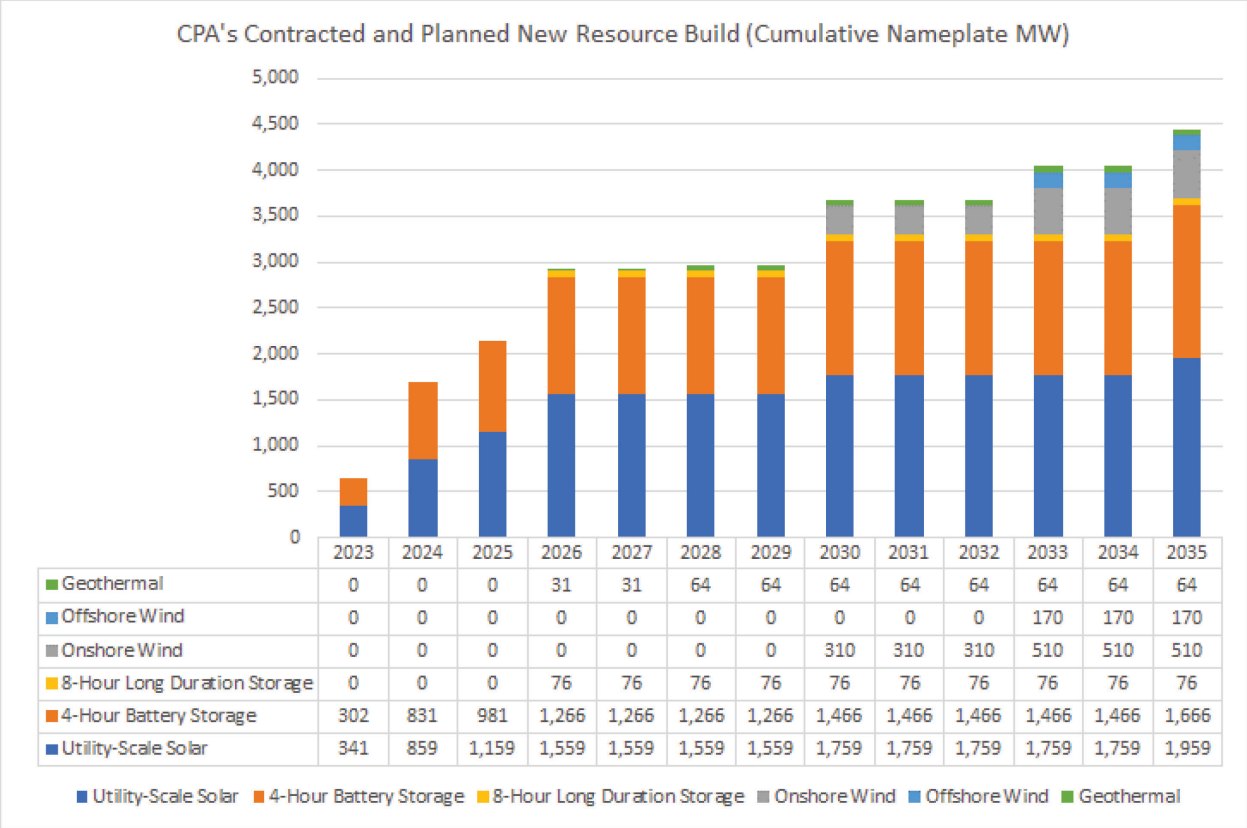
CPA has selected one preferred portfolio that balances procurement flexibility in the near-term and a resource mix that minimizes costs to ratepayers based on NPV, while meeting regulatory requirements, and achieving emissions that are less that CPA's proportional share of the 30 MMT by 2030 and 25 MMT by 2035 GHG targets. The table and figure below provide a summary of the resources provided in the Resource Data Template.

Table 6: Summary of 25 MMT Portfolio in Cumulative Nameplate MW

25 MMT	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Contracted Resources	**1,550**	**2,483**	**2,933**	**2,933**	**2,933**	**2,966**	**2,966**	**2,966**	**2,934**	**2,934**	**2,934**	**2,912**	**2,912**
Solar PV	581	1,099	1,399	1,399	1,399	1,399	1,399	1,399	1,399	1,399	1,399	1,399	1,399
Wind (onshore)	322	322	322	322	322	322	322	322	322	322	322	300	300
RPS Hydro	32	32	32	32	32	32	32	32					
4-Hour Battery Storage (Li-Ion)	552	966	1,116	1,116	1,116	1,116	1,116	1,116	1,116	1,116	1,116	1,116	1,116
Geothermal	64	64	64	64	64	97	97	97	97	97	97	97	97
Planned Resources	**0**	**115**	**115**	**907**	**1,007**	**1,007**	**1,007**	**1,717**	**1,717**	**1,717**	**2,087**	**2,087**	**2,487**
Existing Large Hydro (In State)	0	0	0	0	0	0	0	0	0	0	0	0	0
Existing Large Hydro (Out State)	0	0	0	0	0	0	0	0	0	0	0	0	0
4-Hour Battery Storage (Li-Ion)	0	115	115	400	400	400	400	600	600	600	600	600	800
8-Hour Long Duration Storage	0	0	0	76	76	76	76	76	76	76	76	76	76
Flow Battery	0	0	0	0	0	0	0	0	0	0	0	0	0
Biomass	0	0	0	0	0	0	0	0	0	0	0	0	0
Geothermal	0	0	0	31	131	131	131	131	131	131	131	131	131
Solar PV	0	0	0	400	400	400	400	600	600	600	600	600	800
Wind (onshore)	0	0	0	0	0	0	0	310	310	310	510	510	510
Wind (Offshore)	0	0	0	0	0	0	0	0	0	0	170	170	170
Total	**1,550**	**2,598**	**3,048**	**3,839**	**3,939**	**3,972**	**3,972**	**4,682**	**4,650**	**4,650**	**5,020**	**4,999**	**5,399**

CPA is expecting to bring a significant number of new clean resources to California, 4,445 MW by 2035 in its preferred Conforming Portfolio, as shown in the Figure below.

Figure 6: CPA's Contracted and Planned New Resource Build



	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Geothermal	0	0	0	31	31	64	64	64	64	64	64	64	64
Offshore Wind	0	0	0	0	0	0	0	0	0	0	170	170	170
Onshore Wind	0	0	0	0	0	0	0	310	310	310	510	510	510
8-Hour Long Duration Storage	0	0	0	76	76	76	76	76	76	76	76	76	76
4-Hour Battery Storage	302	831	981	1,266	1,266	1,266	1,266	1,466	1,466	1,466	1,466	1,466	1,666
Utility-Scale Solar	341	859	1,159	1,559	1,559	1,559	1,559	1,759	1,759	1,759	1,759	1,759	1,959

CPA's mix of new resources is generally consistent with the 2021 PSP Portfolio. Overall, there are more new resources selected than the proportional share of the RSP, particularly for solar, wind, geothermal, and battery storage resources.

Table 7: Comparison of the CPA Preferred Conforming Portfolio vs. CPA's Load Share of the 2021 PSP Portfolio:

	CPA Proportional Share of the 25 MMT Proposed RSP (MWh)				CPA 25 MMT Capacity (MWh)				Difference (RSP Share-CPA Plan)			
Resource	**2024**	**2026**	**2030**	**2035**	**2024**	**2026**	**2030**	**2035**	**2024**	**2026**	**2030**	**2035**
Large Hydro	875	873	883	881	500	500	-	-	375	373	883	881
Imported Hydro	581	581	581	581	-	-	-	-	581	581	581	581
Asset Controlling Supplier	-	-	-	-	-	-	-	-	-	-	-	-
Nuclear	701	249	249	249	-	-	-	-	701	249	249	249
Biogas	75	75	77	78	-	-	-	-	75	75	77	78
Biomass	159	168	174	173	-	-	-	-	159	168	174	173
Geothermal	465	721	850	850	596	750	2,003	1,989	(131)	(29)	(1,153)	(1,139)
Small Hydro	208	208	208	208	99	99	81	21	109	109	127	187
Wind Resources												
Wind Baseline California	849	849	849	849	668	664	651	427	181	185	198	422
Wind New PG&E	131	255	255	255	-	-	226	226	131	255	29	29
Wind New SCE SDG&E	186	186	186	186	-	-	287	287	186	186	(101)	(101)
Wind Pacific Northwest	-	61	61	61	-	-	-	-	-	61	61	61
Wind Wyoming	-	-	441	441	-	-	-	449	-	-	441	(8)
Wind New Mexico	41	77	548	548	843	841	1,670	1,670	(802)	(764)	(1,121)	(1,121)
Wind Offshore Morro Bay	-	25	42	649	-	-	-	346	-	25	42	303
Wind Offshore Humboldt	-	-	-	365	-	-	-	410	-	-	-	(44)
Solar Resources												
Solar Baseline California	1,920	1,919	1,917	1,916	1,881	1,816	1,707	1,353	39	103	210	563
Solar New PG&E	140	140	162	162	0	1,416	1,684	1,950	140	(1,276)	(1,522)	(1,789)
Solar New SCE SDG&E	635	1,016	2,205	2,421	1,089	2,901	3,158	3,404	(454)	(1,885)	(953)	(983)
Solar Distributed	10	11	11	11	-	-	-	-	10	11	11	11
Hybrid/Paired												
Hybrid or Paired Solar and Battery	314	374	387	386	-	-	-	-	314	374	387	386
Storage & DR												
Shed DR	151	155	155	155	-	-	-	-	151	155	155	155
Pumped Storage	93	102	142	142	-	-	-	-	93	102	142	142
Battery Storage	2,125	2,390	3,550	4,588	1,631	3,375	4,165	4,963	494	(985)	(615)	(375)
User-Specified Profiles												
Storage Resource Custom Profile	-	-	-	-	-	-	-	-	-	-	-	-
RPS Resource Custom Profile	-	-	-	-	*3,516*	*1,115*	-	-	-	-	-	-
GHG-free non-RPS Resource Custom Profile	-	-	-	-	-	-	-	-	-	-	-	-
Coal												
Coal	-	-	-	-	-	-	-	-	-	-	-	-

b. Preferred Conforming Portfolios

CPA is presenting one preferred Conforming Portfolio for the 25 MMT GHG target for Commission approval or certification. This 25 MMT case is reflective of the procurement objectives and preferences of CPA's Board and local stakeholders. The CPA's Conforming Portfolio is also consistent with each relevant statutory and administrative requirement stated in PU Code Section 454.52(a)(1), as follows:

A. Meet the greenhouse gas emissions reduction targets

The Preferred Conforming Portfolio achieves emission targets that are below the GHG emissions benchmarks set by the Commission, which are based on the GHG emission reduction targets set by the California Air Resources Board for the electricity sector. The results are illustrated in the table below:

Table 8: CPA Portfolio 2035 GHG Results

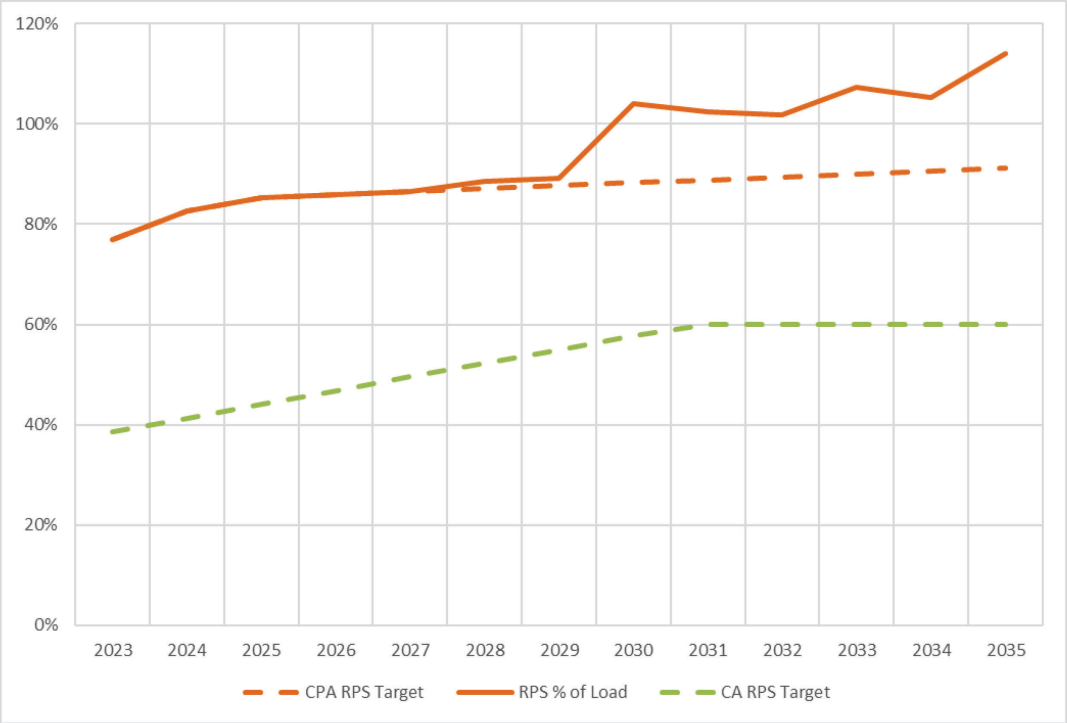
Metric	2030 GHG Emissions (MMT)	2035 GHG Emissions (MMT)
Emissions Benchmark for CPA	1.049	0.848
CPA Portfolio Results	1.0462	0.845

B. Procure at least 60% eligible renewable energy resources

CPA's Preferred Conforming Portfolio would result in 100% of load being served by eligible renewable resources in 2030. This is 40 percentage points above the RPS requirement of 60% by 2030.

As illustrated in the graphs below, The Preferred Conforming Portfolio will achieve the statutory renewable energy procurement goal. The 25 MMT portfolio achieves and exceeds RPS compliance requirements for the entire study period.

Figure 7: 25 MMT RPS Compliance



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

While this requirement does not apply to CPA as CPA is not an electrical corporation, CPA is committed to serving its customers at reasonable rates. In addition, CPA works to minimize rate volatility by constructing a balanced and conservatively hedged power supply portfolio, building significant financial reserves and minimizing rate changes when possible. Total system costs for the 25 MMT conforming portfolio is similar and comparable to CPA's current average costs, as described further in Section E. The steady projected portfolio costs indicate that CPA ratepayers can expect their rates to receive increasingly clean electricity service at affordable and stable rates.

D. Minimize impacts on ratepayers' bills

CPA's Preferred Conforming Portfolio meets the goal of minimizing bill impact on ratepayers by optimizing renewable and carbon-free energy procurement. The 25 MMT Conforming Portfolio identified the lowest cost, bulk power supply portfolio. The cost analysis studies only power supply components of serving retail load; as a CCA, the incumbent IOU is still responsible for transmission and distribution of the energy to the retail level. The cost of procuring the resources selected in the 25 MMT Conforming Portfolio is forecasted to increase CPA's power supply costs at an average rate of 1.4% annually between 2023 and 2035. Additionally, CPA's portfolios account for the RA benefits of IOU resources that its customers pay through the Cost Allocation Mechanism (CAM). The CPUC adopted the CAM to support the development of new generation resources to ensure electric reliability and to allow the costs and benefits of new generation to be shared by all benefiting customers in an IOU's service territory.

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

CPA's Preferred Conforming Portfolio meets the requirement of ensuring system and local reliability. For system reliability, CPA used two metrics to assess if CPA's portfolio maintains system reliability. The first method is evaluating how CPA's portfolio meets RA capacity to comply with the state's system RA requirement. The second is evaluating curtailment of intermittent resources. As described further in Section F, the results of Preferred Conforming Portfolio are reliable. For local reliability, CPA's Preferred Conforming Portfolio places strong emphasis on developing new local capacity to meet the local procurement preference adopted by its Board. CPA's Preferred Conforming Portfolio tracks closely with the resource mix of the Reference System Plan, ensuring that diverse resources are utilized to meet the grid's reliability needs.

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

As indicated in table below, CPA procures more than the required 65% long-term RPS contracting requirement. This is because CPA's internal portfolio renewable target to meet its customers demand exceeds the California RPS targets for its managed retail sales.

Table 9: SB 350 Compliance, CPA Preferred Conforming Portfolio

Calendar Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Retail Sales (MWhs)	10,649,290	10,803,705	10,901,820	11,015,379	11,087,483	11,154,570	11,248,740	11,321,003	11,397,823	11,466,833
RPS Requirement (MWhs)	3,700,628	3,943,352	4,169,946	4,846,767	5,100,242	5,577,285	5,849,345	6,113,342	6,382,781	6,880,100
(A) Annual RPS Targets %	35%	37%	38%	44%	46%	50%	52%	54%	56%	60%
(B) 65% Requirement	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%
(A*B) Long Term Contracting Compliance Requirement	23%	24%	25%	29%	30%	33%	34%	35%	36%	39%
RPS Compliance from Long Term Contracts	1,447,659	2,773,737	2,432,116	3,556,770	5,620,705	7,127,483	7,724,767	8,232,945	8,308,505	9,686,240
CPA RPS under LT Contract (% Load)	14%	26%	22%	32%	51%	64%	69%	73%	73%	84%
CPA RPS Under LT Contract	**23%**				**61%**			**77%**		
Compliance Period Requirement	**25%**				**32%**			**37%**		

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

CPA's Conforming Portfolio relies on procurement from a variety of resource types as well as significant storage resources. CPA carefully evaluates the long-term generation load-matching and congestion risks of new resources and weighs its options in the context of its existing supply and net demand on an hourly basis for the full duration of any contract period. CPA is including both long-duration storage resources as well as conventional 4-hour battery storage in its portfolio currently because the PLEXOS modeling indicated that such resources reflect a cost optimal approach to meeting CPA's load-resource balance. Also, CPA is actively pursuing long-duration storage through its 2022 Mid-Term Reliability Request for Offer (RFO), CPA's competitive solicitation, pursuant to D. 21-06-035. CPA has also developed several customer programs to support clean energy and improve grid resilience, such as Power Response, CPA's demand response program, and Power Ready, which is providing backup solar and storage systems for critical facilities in its service territory to be used in grid emergencies and outages.

H. Enhance distribution systems and demand-side energy management

CPA's Preferred Conforming Portfolio meets the requirement of enhancing demand-side management. Based on CPA's Local Programs for Clean Energy Future Strategic Plan, which was developed through a community outreach process and subsequent Board direction, CPA plans to deploy air pollution mitigation programs in Disadvantaged Communities ("DACs") within its territory, in the following three strategic program areas: resiliency and grid management, building and transportation electrification, and local procurement of distributed energy resources. Details about these programs can be found in sections II.d.ii and III.b.

CPA actively supports EV charging infrastructure and distributed energy resource activities to meet its renewable energy goals. CPA is partnering with customers to utilize energy storage systems for demand response and/or reliability. In addition, CPA's customer programs, such as Power Response and Peak Management Program incentivize commercial and public agency customers to reduce their energy consumption during periods of grid stress and elevated wholesale energy prices.

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

CPA Conforming Portfolio results in emissions lower than CPA's assigned benchmark. CPA does not procure electricity directly from any natural gas or other fossil resource power plants. CPA's Preferred Conforming Portfolio meets the requirement of minimizing localized air pollutants, with the emphasis on DACs. CPA's portfolio relies primarily on renewable generation for its energy supply and would have low GHG and localized air pollutant emissions. As mentioned above, CPA also plans to deploy air pollution mitigation programs in its DACs to further reduce localized air pollution in its service territory.

CPA currently administers the Commission-funded Disadvantaged Community Green Tariff (DAC-GT) and Community Solar Green Tariff (CS-GT) programs to promote development of RPS-eligible projects

located in DACs. These projects deliver renewable power to CPA's customers, while improving air quality, providing economic benefits, and creating hundreds of jobs in the projects' regions. Please refer to Section III.b below for further details.

c. GHG Emissions Results

The 25 MMT Conforming Portfolio's emissions, calculated using the CSP methodology from the CPUC's GHG Calculator, are below the respective 2030 & 2035 GHG emissions benchmarks set by the CPUC, as illustrated in the table below:

Table 10: CPA's Portfolio Emissions

Metric	2030 GHG Emissions (MMT)	2035 GHG Emissions (MMT)
Emissions Benchmark for CPA	1.049	0.848
CPA Portfolio Results	1.042	0.845

CPA utilized a custom production profile in the CSP to account for short-term renewable energy purchases from existing resources in the 2024 and 2026 study years to meet its internal renewable energy demand procurement targets. These profiles were developed using solar and wind hourly profiles, assuming the renewable energy would be sourced 50% from wind and 50% for solar.

d. Local Air Pollutant Minimization and Disadvantaged Communities

i. Local Air Pollutants

Below is a summary of the NOx, PM2.5, and SO2 emissions associated with CPA's Preferred Conforming Portfolio:

Table 11: Local Air Pollutants Estimate from CSP

Emissions Total	***Unit***	**2024**	**2026**	**2030**	**2035**
CO_2	*MMt/yr*	1.33	1.14	1.04	0.85
PM2.5	*tonnes/yr*	38	26	35	28
SO_2	*tonnes/yr*	4	3	3	3
NOx	*tonnes/yr*	98	83	90	57

The only contribution to air pollutants in CPA's portfolio is from system power. As CPA continues to increase the portion of its portfolio under long-term contract with clean energy resources and bringing online more storage resources to minimize the emissions intensity of system power during net peak load hours, CPA will reduce its reliance on system power and its portfolio's contribution to local air pollution.

ii. Focus on Disadvantaged Communities

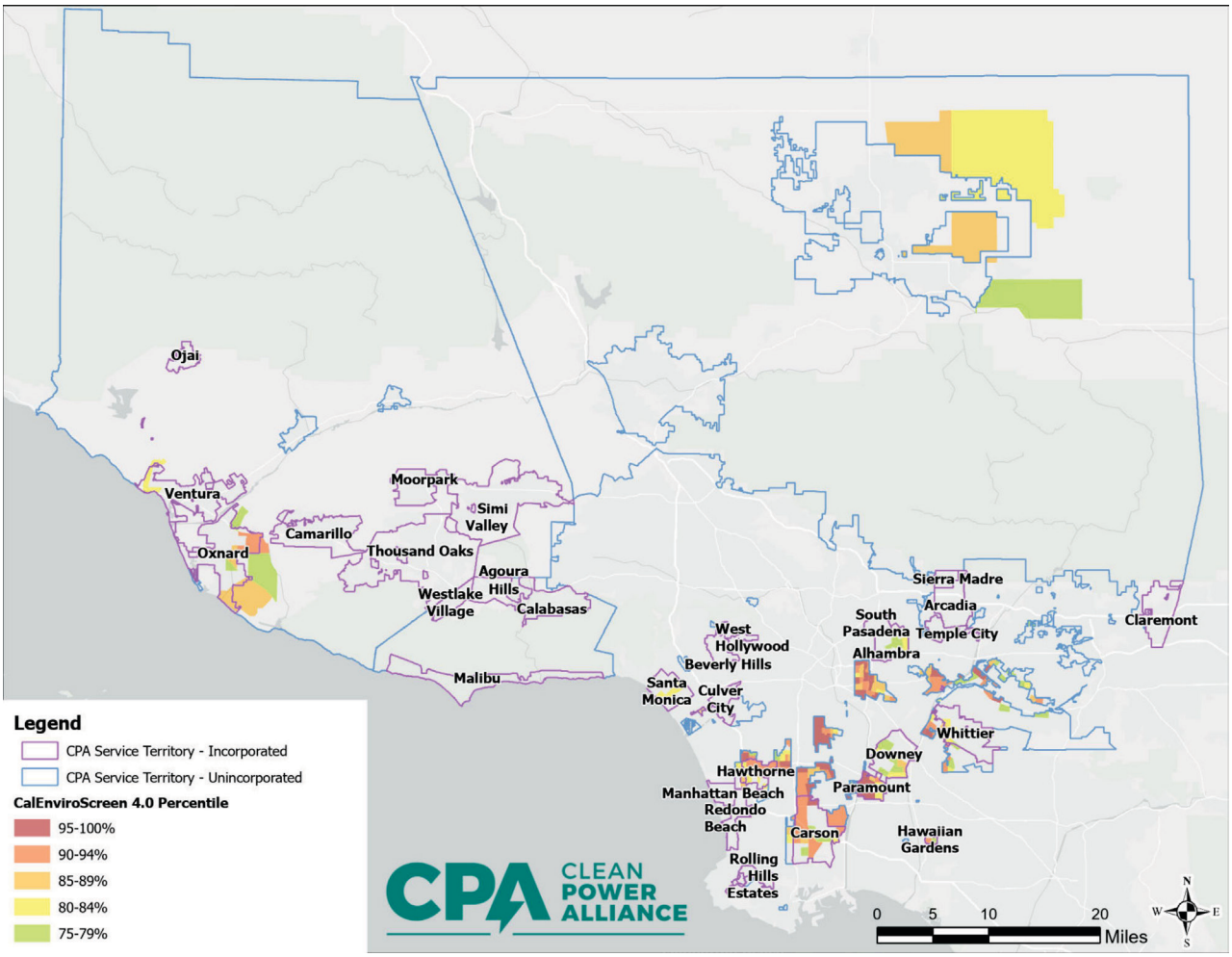
Per its Joint Powers Agreement, CPA intends to provide and manage its energy portfolio and products in a manner that promotes public health in areas impacted by energy production, including Disadvantaged Communities (DACs), as defined based on CalEPA's CalEnviroScreen tool.

Description of Disadvantaged Communities

Utilizing the CalEnviroScreen 4.0 dataset, CPA has determined that 36% of the 182 zip codes within its service territory either entirely or partially contain census tracts identified as Disadvantaged Communities. These communities approximately represent a total population of 892,160 ratepayers, or roughly 29% of CPA's total number of customers.

The map below provides a visual representation of DAC census tracts within CPA's service territory:

Figure 8: CPA Service Territory Map



The table below shows the specific zip codes within CPA service territory that contain DAC census tracts:

Table 12: DACs served by CPA, by member jurisdictions

Member Agencies	DAC Zip Codes
Agoura Hills	None
Alhambra	91801, 91803
Arcadia	None
Beverly Hills	None
Calabasas	None
Camarillo	None
Carson	90502, 90745, 90746, 90810
Claremont	None
Culver City	90066, 90232
Downey	90240, 90241, 90242
Hawaiian Gardens	90716
Hawthorne	90250
Los Angeles County (unincorporated)	90001, 90002, 90022, 90023, 90043, 90044, 90047, 90059, 90061, 90063, 90220, 90221, 90222, 90248, 90250, 90255, 90262, 90270, 90292, 90303, 90304, 90502, 90601, 90605, 90606, 90640, 90660, 90670, 90810, 91016, 91342, 91608, 91702, 91732, 91733, 91744, 91745, 91746, 91748, 91754, 91767, 91768, 91770, 91776, 93535, 93543, 93550, 93552
Malibu	None
Manhattan Beach	None
Moorpark	None
Ojai	None
Oxnard	93030
Paramount	90723
Redondo Beach	None
Rolling Hills Estates	None
Santa Monica	90401, 90404
Sierra Madre	None
Simi Valley	None
South Pasadena	None
Temple City	None
Thousand Oaks	None
Ventura	93001
Ventura County (unincorporated)	93001, 93033, 93036
West Hollywood	None
Westlake Village	None
Whittier	90601, 90602, 90606

Procurement Considerations Related to Disadvantaged Communities

In developing its IRP, CPA carefully considered the impact of its resource procurement on DACs. The CPA portfolio does not include energy contracts with gas generators, including those gas facilities located within or adjacent to DACs. The portfolio minimizes the use of unspecified CAISO system power by increasing its long-term contracting with clean energy resources over time, reducing its potential indirect reliance on gas generators that have an impact on DACs.

One of CPA's long-term program objectives to minimize local air pollutants is to provide to its customers clean energy through the renewable and GHG-free power procurement, and CPA intends to contract exclusively with renewable or GHG-free generation resources, pursuant to its program objective and SB 100 mandate. To promote cost savings and risk management for our ratepayers, CPA will continue to rely on some unspecified CAISO system power for short-term energy needs beyond its long-term contracts. In 2023, CPA's generation portfolio will achieve an 80 percent GHG-free and 77 percent renewable energy mix, resulting in an energy supply that possesses both a greater renewable content and a lower GHG emission rate than that of the incumbent utility. CPA's long-term energy procurement policy is not expected to negatively impact local air quality.

Utilizing the U.S. EPA's Facility Level Information on Greenhouse Gases Tool (FLIGHT) data, CPA has identified six power plants within its territory that are classified as large emitters, two of which are located within a zip code containing Disadvantaged Communities. To the extent practical, CPA is committed to identifying opportunities to support the replacement of retired facilities with renewable resources to reduce the pollution burden in these communities through its procurement activities.

Pursuant to CPUC D.18-06-027, CPA obtained the Commission's approval to administer the DAC/CS-GT programs, collectively known as the CPA Power Share Program, in 2020. At the time of this filing, CPA has contracted with the following new build solar projects located within DACs. This program increases the number of clean energy projects located in DACs, not only within CPA's service territory, but statewide:

Table 13: CPA Contracted DAC-GT Resources

Project	Size	Location	Program
Radiant	3.0 MW	Minneola, CA	DAC-GT
Dominguez	0.96 MW	Carson, CA	DAC-GT
El Segundo	0.64 MW	Hawthorne, CA	DAC-GT
Wilmington 1	1.8 MW	Carson, CA	DAC-GT
Wilmington 2	0.6 MW	Carson, CA	DAC-GT
Workman	1.92 MW	Whittier, CA	DAC-GT

DAC Outreach

The development of the IRP was based on input from disadvantaged community representatives, both from CPA's Community Advisory Committee[3] and based on CPA's Local Programs for Clean Energy Future Strategic Plan[4], which was developed through a community outreach process and subsequent Board direction. CPA plans to deploy air pollution mitigation programs in Disadvantaged Communities within its territory, in the following three strategic program areas:

- Resiliency and grid management, including clean back-up power for essential facilities, demand response from behind the meter energy storage, and peak management pricing
- Electrification, including incentives for public electric vehicle charging and building electrification codes
- Local procurement, including the DAC/CS-GT Power Share program

Prior to finalizing the IRP, CPA presented the analysis and action plan to its Community Advisory Committee and received positive feedback from committee members, some of them representing disadvantaged communities served by CPA. CPA plans to follow up with its Community Advisory Committee to present the final results to inform the development of its future IRPs, as well as its procurement and program design strategies.

In addition, CPA partners with 180 community-based organizations (CBOs) on a range of outreach efforts, including targeted outreach to disadvantaged communities. Through regular dialogue with our communities, CPA's resource planning and procurement strategies, rate and product offerings, and customer program designs are informed by the feedback we receive from community members and organizations. All these activities are factored in the IRP development to inform CPA's organization-wide strategy to better serve our customers, with a special focus on improving air quality and access to clean energy in disadvantaged communities.

e. Cost and Rate Analysis

CPA's Preferred Conforming Portfolio achieves results and performance characteristics consistent with the Section 454.52(a)(1)(D) goal of minimizing the impact of planned procurement on ratepayers' bills. CPA's portfolio costs and expected impacts to electricity rates for the 25 MMT preferred compliance portfolio is depicted below. A full description of the cost components follows that define each discrete component.

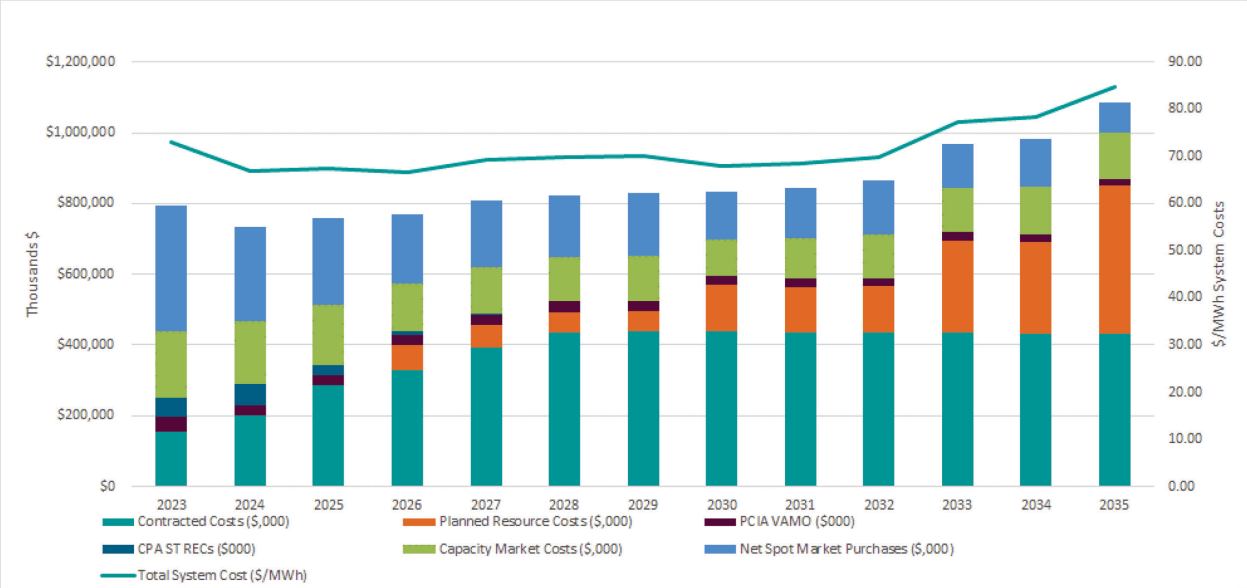
As discussed in Section II. Study Design, CPA's portfolio was optimized around RPS and GHG-free regulatory requirements and added or removed resources to arrive at or just below the 2035 25 MMT GHG target. As a result, most of the CPA's portfolio cost in the early years is driven by the underlying

[3] Clean Power Alliance has a dedicated Community Advisory Committee (CAC) comprised of customers who are leaders in their communities to advise our Board of Directors on policies, programs, and planning, while also serving as customer advocates. Our 15-member CAC represents 7 sub-regions of our service territory, including disadvantaged community customers.

[4] See CPA website for further information: https://cleanpoweralliance.org/localprogramsplan/

changes in the California market. In the final years of the study horizon, the expansion plan is building additional onshore and offshore wind resources to achieve its proportional share of the GHG MMT target. Below is the chart of costs considered in CPA's portfolio, followed by detailed explanation of each factor.

Figure 9: CPA 25 MMT Portfolio Costs ($,000)



Market Purchases: The Preferred Conforming Portfolio starts with significant amounts of market purchases in the early years of the study period. Market purchases continue to diminish over the study horizon as CPA enters into long-term contracts. Given the portfolio mix of CPA, there is early reliance on short-term contract purchases. Over time, CPA becomes less reliant on short-term purchases as long-term contracts with new candidate resources increase, providing significant amount of generation.

Planned Resource Costs: As CPA begins to build new resources within the portfolio, the cost mix of the portfolio begins to shift and becomes largely driven by the capital and fixed O&M costs for long term capacity selected by the optimization routine.

Capacity Market Costs: Capacity market costs serve as a representation for the cost of RA products to meet reliability requirements. Capacity market contract costs were based on CPA's RA price forecasts over the duration of the study period. RA prices were forecasted to be driven by BESS capital costs. CPA assumed that RA prices will decline due to battery deployment and reductions in BESS capital costs, with batteries increasingly providing RA. In the later years, RA prices will rise as the required storage duration for full ELCC increases at higher battery penetrations, offsetting capital cost reductions. The contribution to total system costs from the reliability products is steady over the study horizon.

CPA Short-Term Renewable Energy Credit (ST REC) Costs: REC purchases serve as a representation for the cost of short-tern renewable energy products from existing resources that CPA will need to meet

internal RPS and GHG-free targets. REC price forecasts were derived from CPA internal market forecasts and were assumed to fluctuate depending on available renewable generation in California.

PCIA VAMO Costs: Pursuant to the Voluntary Allocation Market Offer (VAMO) framework in the PCIA rulemaking (R.17-06-026), the CPA's Board of Directors approved electing 50% of the Long-Term Voluntary Allocations from SCE's PCIA-eligible RPS energy portfolio. CPA formally made the Long-Term Voluntary Allocation election on May 24, 2022, and these resources are included in the Preferred Conforming Portfolio. CPA pays for the PCIA VAMO resources at the RPS Market-Price Benchmark, and CPA has assumed the same short-term REC price forecast for these resources, as described in the paragraph above.

Total System Cost: Overall, the transition from relying on market purchases to serving energy needs through owned and contracted resources does not have a major impact on the cost to serve load on a $/MWh basis. The range of cost to serve load on a $/MWh basis is within $63-$85/MWh over the entire study horizon. These costs do not reflect CPA's non-energy procurement costs (e.g., data and customer management, overhead, etc. are not included in this analysis).

The portfolio cost components include:

- **Planned Resource Costs**: Includes capital and fixed O&M costs for long term capacity selected by the optimization analysis
- **Contracted Costs:** Reflects total cost for existing PPAs, as provided by CPA
- **Capacity Market Costs:** Existing and future RA capacity purchase needs to meet an overall 14% planning reserve margin requirement
- **Short-term REC Costs:** Reflects CPA-developed REC market price forecast for short-term renewable energy contracts with existing resources
- **PCIA VAMO Costs:** Reflects CPA-developed REC market price forecast for PCIA voluntary RPS allocation from SCE
- **Market Purchases:** Reflects spot market Purchases
- **Market Sales:** Reflects spot market Sales
- **NPV: Discount** Rate of 8% is applied

The Preferred Conforming Portfolio identified the lowest cost, bulk power supply portfolio to meet the 25 MMT GHG target as well as CPA's procurement goals and is reasonable from a cost perspective. The cost analysis studies only power supply components of serving retail load; as a CCA, the incumbent IOU is still responsible for transmission and distribution of the energy to the retail level. The cost of procuring the resources selected in the 25 MMT Conforming Portfolio reflects a manageable increase CPA's power supply costs at an average rate of 1.4% annually between 2023 and 2035. The range of costs declines in early years and begins to rise steadily through the forecast horizon as CPA expands its portfolio. This is because CPA relies more heavily on short-term capacity and energy market purchases in early years, and more on candidate resources with a falling cost projection in later years. CPA's portfolio total costs decline overtime specifically because of the falling cost of solar, wind, and battery resources over time. Additionally, CPA's portfolio accounts for

the costs of more short-term renewable resources in early years that CPA customers already pay above market costs for through the PCIA. CPA's portfolio total costs increase in the period starting in 2030 and beyond with a shift to more expensive technologies, such as offshore wind. CPA also recognizes that future resource costs are highly uncertain, and technology advancement can happen unexpectedly; CPA's procurement cycle is designed to take advantage of technology and cost improvements by adding new resource commitments incrementally over time.

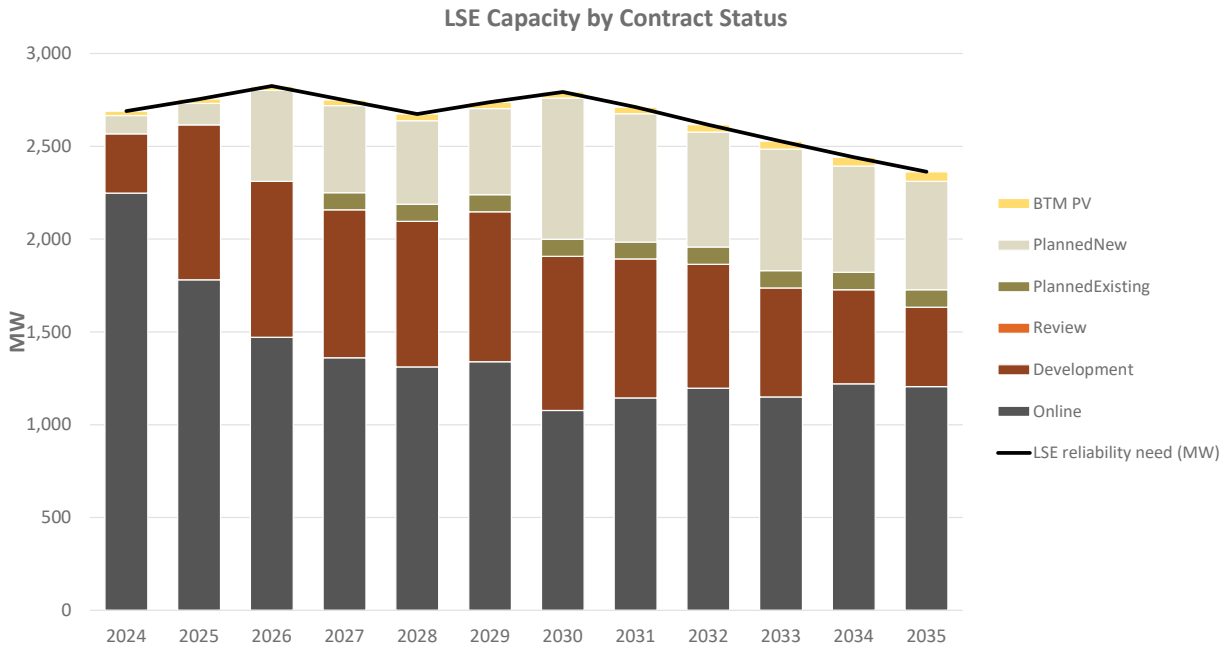
f. System Reliability Analysis

CPA's Preferred Conforming Portfolio meets its system reliability needs using a combination of contracted resources, planned new build resources, and existing resources:

Table 14: Load and Resource Table from RDT

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
LSE reliability need (MW)	**2,690**	**2,755**	**2,825**	**2,749**	**2,674**	**2,738**	**2,793**	**2,711**	**2,616**	**2,528**	**2,441**	**2,363**
ELCC by contract status (effective MW)												
Online	2,248	1,780	1,471	1,361	1,311	1,339	1,077	1,144	1,196	1,149	1,220	1,206
Development	320	836	840	797	785	808	831	749	668	588	507	427
Review	-	-	-	-	-	-	-	-	-	-	-	-
PlannedExisting	-	-	-	92	93	92	91	92	93	93	94	95
PlannedNew	98	115	491	470	449	464	762	691	620	654	573	584
BTM PV	24	24	23	30	37	35	32	36	39	43	47	51
LSE total supply (effective MW)	**2,690**	**2,755**	**2,825**	**2,749**	**2,674**	**2,738**	**2,793**	**2,711**	**2,616**	**2,528**	**2,441**	**2,363**
Net capacity position (+ve = excess, -ve = shortfall) (effective MW)	-	-	-	-	-	-	-	-	-	-	-	-

Figure 10: CPA Capacity by Contract Status



In addition, CPA used two metrics to assess if CPA's portfolio maintains system reliability. The first is evaluating the extent to which CPA's portfolio relies on short-term RA purchases from existing resources

to comply with the state's system RA requirement. The second is evaluating curtailment of intermittent resources.

Resource Adequacy (RA)

CPA evaluated system reliability by assessing its open System RA position compared to its load share of total system resources in the respective RSP, net of its contracted resources and coal and nuclear resources, for which CPA does not contract. Including a 14% reserve margin over CPA's forecast peak load and the projected declines in ELCC for clean energy resources, the largest anticipated open System RA position is still within the CPA's load share of existing system resources in the RSP, as shown in the Table below. As long as the System RA attributes in excess of other LSE load shares are not withheld from the market, the system as a whole should have adequate resources to accommodate CPA's portfolio.

Table 15: CPA RA Assessment (Preferred Conforming Portfolio)

Year	LSE Reliability Need	System RA need Met with Short-Term Purchases	CPA Load Share of System Resources (ELCC Adjusted)	Short-term Purchases Exceeding System Share
2024	2,690	1,334	2,347	No
2026	2,825	776	2,463	No
2030	2,793	461	2,162	No
2035	2,363	793	2,044	No

Curtailment

CPA evaluated curtailment as a metric for reliability using the PLEXOS model.[5] CPA's 25 MMT case demonstrates less than 0.4% of supply curtailed in year 2035. There are minimal curtailments expected for all other years. The simulation results show curtailments mostly during the solar hours. There are minimal or no curtailments of renewables during non-solar hours. This is because of a large amount of battery storage and paired of solar and storage buildouts that reduce renewable curtailments. Most of the curtailments happen after the study horizon (post 2035), when there is greater penetration of renewable generation in the portfolio and in the California market. A summary of curtailment as a percentage of load is provided in the table below.

Table 16: Curtailment as a Percentage of Load by Case

CPA	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
25 MMT	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%

[5] CPA believes that the curtailment estimate from the PLEXOS is more accurate than the CSP tool, because the CSP is a static tool that does not reflect actual market dispatches of resources.

g. High Electrification Planning

As part of its scenario planning, CPA developed a resource needs analysis under a high load and high electrification scenario. For this scenario, CPA determined that it would need to procure additional new renewable resources to meet its RA, RPS, and Greenhouse Gas Reduction Targets, specifically additional solar generation. There is no locational-specific information for these generic resources, although CPA expects to procure these resources within CAISO, and likely southern California.

Table 17: Additional Resource Needs for the High Electrification Scenario

Resource Type	MWs	Annual GWh	2035 GHG target	Transmission Zone	Substation/Bus	Alternative location	Note
Solar PV	315	973	25 MMT	Solar New SCE SDG&E	N/A	N/A	N/A

h. Existing Resource Planning

Beyond its long-term contracting for build resources CPA's portfolio also relies on existing resources to meet its renewable energy demand and RA demand.

Renewable Energy Resources

In addition to long-term contracts with new build RPS-eligible resources, CPA also expects to meet its renewable energy demand using PCIA VAMO resources and using short-term contracts for renewable energy from existing RPS resources. PCIA VAMO resources are included in the CSP tool based on the portfolio resource mix provided by SCE and reflect only the 50% election of long-term contracts that were approved by CPA's Board to date. The short-term renewable energy contracts are included in the CSP tool for the 2024 and 2026 study years, using a custom profile and assuming a mix of 50% wind and 50% solar resources. These volumes are consistent with the short-term renewable energy purchases that CPA has historically made to meet its renewable energy demand, and CPA is also considering short-term volume that will be made available to purchase from SCE's PCIA VAMO Market offer process.

RA Resources

As described in detail in Section III.f, CPA plans to meet some of its RA requirements in the future with short-term RA contracts with existing resources. As part of its system reliability analysis, CPA determined that it is not relying on more than its load-share of statewide RA resources.

CPA believes that some reliance on existing resources to meet its portfolio demand is appropriate because it allows CPA to meet its RA requirements cost effectively, and it ensures that existing RA resources in the market are not stranded. CPA may increase its proportion of new resources to meet RA requirements in the future if it deems that new resources will result in a more cost-effective reliable portfolio.

Comparison to the 2020 38 MMT Preferred Conforming Portfolio

In comparison to CPA's 2020 38 MMT Preferred Conforming Portfolio, CPA's 2035 25 MMT portfolio in the 2022 IRP has selected significantly less hydrogeneration resources to acknowledge the increasing risk associated with in-state and imported hydro generation due to severe drought brought on by climate change. In shifting away from hydrogeneration procurement, CPA's 2035 25 MMT portfolio has selected more onshore wind, and in later planning years, more offshore wind, as those require longer planning horizon would need to mitigate the risks associated with higher cost and transmission capability to realize. CPA's 2022 IRP has also selected less solar due to its higher saturation on the grid. Lastly, CPA's expected procurement of short-term RA purchases from existing resources to meet its reliability needs in its 2022 IRP is less than what was forecasted in the 2020 IRP, as discussed in Section III.f.

i. Hydro Generation Risk Management

CPA's portfolio has limited exposure to in-state drought. CPA's portfolio includes only a small amount of RPS hydro currently under contract, the 11.95 MW Isabella facility and the 20.09 MW Kaweah facility, which are existing resources and would be impacted by changing rainfall/snowpack. These resources make up less than 1% of CPA's overall load, and therefore pose minimal risk. They are expected to have a negligeable impact on costs, GHG emissions and reliability. While having a small overall impact on CPA's portfolio and expected costs, there are four distinct risks and potential impacts associated with these resources related to drought:

- **Energy.** CPA expects to know ahead of the impacted year what the impact of a drought will be on production. Any energy shortfall will be addressed through CAISO spot market purchases.
- **Capacity.** CPA's small-scale hydro resources represent only 1% of total capacity for all CPA's contracted resources and therefore capacity risk for hydro generation is negligeable
- **RPS.** CPA expects to achieve and exceed RPS compliance requirements for the 2023-2035 study period, which means any shortfall of RPS due to hydro generation will likely not affect the RPS compliance for CPA.
- **GHG.** A shortfall of energy will reduce the amount of carbon-free energy in CPA's portfolio. However, hydro generation's impact on CPA's GHG emissions is small, and CPA expects to be able to make up for any shortfall with short-term RECs purchases.

In developing its conforming portfolio, CPA took several steps to manage the risk of reduced hydropower availability due to in-state or out-of-state drought. Compared to CPA's 2020 IRP which included in-state and out-of-state large hydro in its 38 and 46 MMT preferred portfolios, CPA's 2022 IRP does not include is not including any incremental hydro generation beyond what is already contracted to date[6] as a means to achieve CPA's 2035 GHG benchmark emissions targets for the 25MMT

[6] CPA's CSP includes existing hydro resources in the 2024 and 2026 study years. These are already under contract.

conforming portfolio, reducing CPA's dependence on this technology type in the case of a WECC-wide drought event:

Table 18: Comparison of Planned Hydro Resources in CPA's 2022 IRP vs. the 2020 IRP

Planned Hydro Resources (MW)	2024	2026	2030	2035
2022 IRP				
Existing Large Hydro (In State)	0	0	0	0
Existing Large Hydro (OOS)	0	0	0	0
2020 IRP (38 MMT Case)				
Existing Large Hydro (In State)	90	120	300	N/A
Existing Large Hydro (OOS)	90	120	290	N/A

In section II.b.a, CPA provided a comparison of the 2021 PSP with CPA's 2022 IRP 2035 25 MMT conforming portfolio. In comparison, CPA's 2035 25 MMT conforming portfolio has selected significantly less hydrogeneration than its proportional share of 2021 PSP hydrogeneration resources.

However, CPA recognizes that a drought could reduce the delivery of carbon-free energy from contracted hydro resources and therefore put CPA at risk of buying short-term energy purchases at high prices. To mitigate this risk, CPA plans to increase the amount of solar PV and wind in its portfolio and thereby reduce expected emissions to less than the benchmark GHG amounts. Higher levels of solar PV and wind in CPA's portfolio may also help reduce the overall costs of electricity for CPA's customers.

CPA's hedging of supply risk is focused on the forward 5-year period and includes securing a variety of resources to ensure delivery at stable costs of all the attributes needed in CPA's portfolio, including energy, RA, GHG emissions, and RPS requirements. Due to their short-term nature, hedging decisions are not directly part of the IRP or able to address hydro delivery risk towards the end of the forecast period. However, if CPA's carbon goals are deemed to be at risk, the hedging policy will seek to minimize that risk by procuring additional capacity or energy from carbon-free resources up to 5 years in advance.

j. Long-Duration Storage Planning

In response to its procurement requirements under D.21-06-035, CPA has issued several RFOs for long-duration storage resources, with the capability to discharge at full capacity for 8 hours or longer. The first solicitation was CPA's 2021 Mid-Term Reliability RFO, with bids due in November 2021. Although CPA shortlisted and entered into negotiations with several long-duration storage projects, it was not successful in contracting for resources from this RFO. In June 2022, CPA issued its 2022 Mid-Term Reliability RFO, with bids due in September 2022. CPA received responses from several entities representing chemical and thermal long-duration storage technologies, including lithium-ion batteries, flow batteries, and compressed air storage technologies. CPA will be considering the information available through the RFO and will be evaluating the economics of such projects. This evaluation is expected to lead to PPA negotiations with shortlisted bidders aimed at bringing long duration storage projects online by 2026.

CPA anticipates it will procure at least 75.4 MW of long duration storage online by 2026, as required by D.21-06-035 and reflected in the Preferred Conforming Portfolio. CPA's PLEXOS modeling did not select any additional long-duration storages candidate resources for its portfolio beyond what is required for D.21-06-035 compliance. The benefits of including long-duration storage in the portfolio mix include meeting CPA's regulatory compliance and supporting overall grid reliability needs. The risks of including long-duration storage in the portfolio mix is potentially adding technology risk (if the long-duration storage technology is nascent) as well as increased costs for customers to meet storage needs that could otherwise be met with lower-cost storage configurations.

k. Clean Firm Power Planning

CPA currently contracts for two existing clean firm power resources, the 14 MW Heber South geothermal plant and a 50 MW portion of the Geysers geothermal facility. Pursuant to D.21-06-035, CPA is required to procure 59 MW of incremental clean firm power NQC. In Fall 2021, CPA ran its 2021 Mid-Term Reliability RFO, from which it contracted for the 33 MW Cape Station geothermal facility in Utah, which is currently under development. CPA will require 33 MW of MIC at IPP in order to count the resource towards CPA's RA requirements.

Beyond these contracted resources, CPA's Preferred Conforming Portfolio includes 30.6 MW of additional incremental clean firm power resources to reflect the remaining procurement CPA will conduct to meet its D.21-06-035 requirements. These resources may be located within CAISO or outside of CAISO, however, specific MIC or transmission upgrades are not yet known since specific resources have not yet been identified. In addition, CPA has included 100 MW of additional planned contracting with existing geothermal resources starting in 2027, which is under negotiation at the time of this filing.

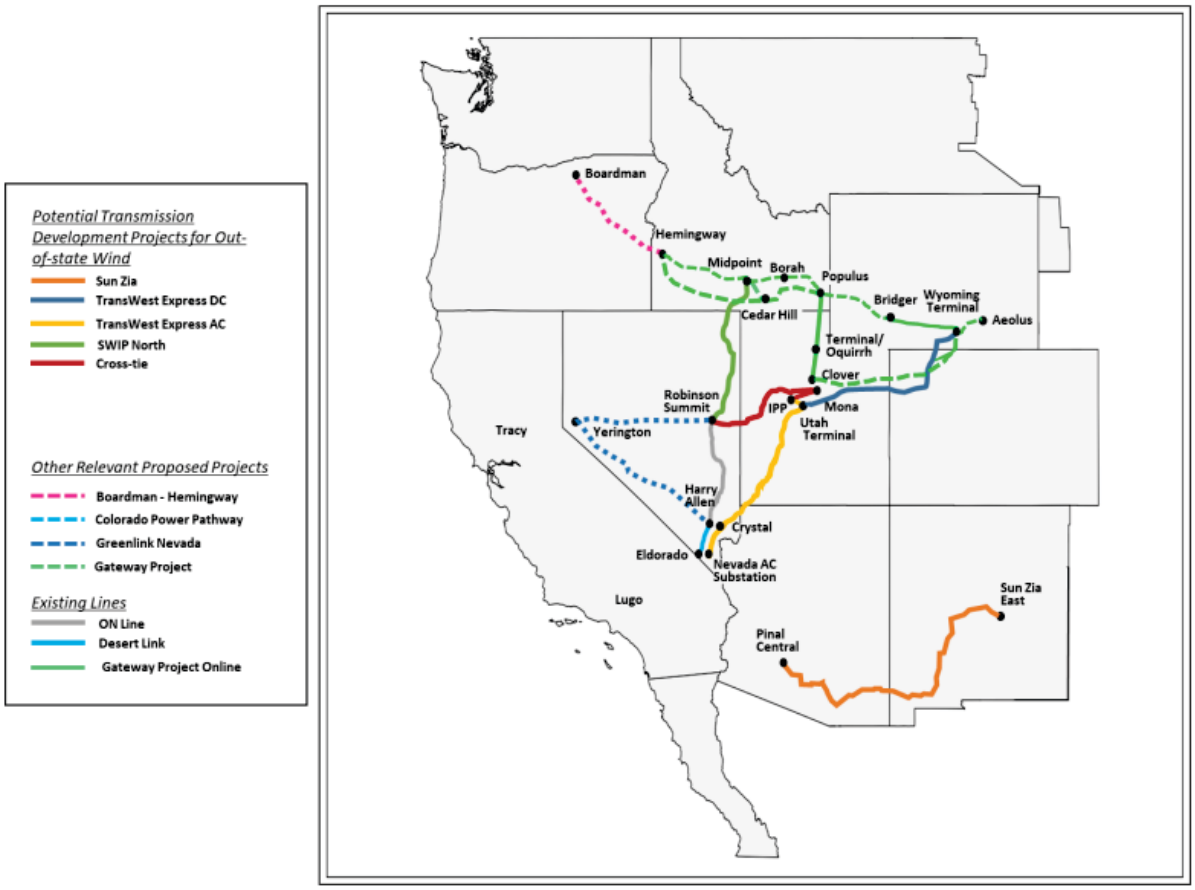
The benefits of including clean firm power resources in the portfolio mix include meeting CPA's regulatory compliance and supporting overall grid reliability needs. The risks of including clean firm power resources in the portfolio mix is potentially adding curtailment risk from baseload, non-dispatchable resources as well as increased costs for customers to meet renewable energy needs that could otherwise be met with lower-cost, more flexible technologies.

l. Out-of-State Wind Planning

CPA has already contracted for 300 MW of out-of-state ("OOS") wind from its Mohave Wind project located in Arizona. For its preferred portfolio, the PLEXOS model selected some new onshore wind for the study period. CPA is actively exploring new wind projects for procurement, including both in-state and out-of-state wind resources. OOS wind can offer several advantages over in-state wind. Specifically, it generally offers higher capacity factors than wind resources available in California. It also offers a complementary generation profile to the solar resources, and it is well suited to match CAISO's evening resource needs. These advantages can make OOS wind an attractive renewable resource. However, the higher cost and risk associated with interconnection is a concern.

Given the saturation of wind resources within CAISO, CPA expects that a significant portion of new wind resources will be developed out-of-state. CPA's onshore candidate resources include 105 MW in Northern California wind, 105 MW in Southern California, 200 MW in New Mexico, and 100 MW in Wyoming. These geographic locations were selected to be consistent with the new transmission projects identified in the CAISO 2021-2022 Transmission Planning Process, as shown below.

Figure 11: Proposed Out-of-State Transmission Projects from the CAISO 2021-2022 Transmission Planning Process[7]



For the candidate resources in New Mexico and Wyoming, CPA understands that new transmission projects will be needed to connect significant quantities of OOS wind to the CAISO grid to achieve the statewide GHG reductions associated with the 25 MMT Reference System Plan. These transmission projects require significant lead-times, therefore, CPA has not included OOS Wind candidate resources in its preferred Conforming Portfolio until 2030. CPA is open to purchases of such resources and will evaluate offers it receives during its regular procurement process.

[7] From CAISO's White Paper - Accessing Out-of-State Wind Resources to meet California Resource Adequacy Requirements, June 20, 2022

m. Offshore Wind Planning

AB 525 directed the CEC to evaluate and quantify the maximum feasible capacity of offshore wind and set a statewide goal for procurement. The latest CEC report showed that between 3 to 5 GW of offshore wind could be procured by 2030, and California should be able to bring online 25 GW of offshore wind by 2045. D.22-02-004 further prescribed a process to explore the potential of offshore wind, which has recently culminated in sensitivity portfolios for TPP that force in offshore wind resources that the CAISO will be examining once the portfolios are adopted. CPA is encouraged that the Commission as well as other energy agencies are taking steps to conduct long-term transmission planning focused on offshore wind, which is an important factor for bringing online a new resource type to the California energy market.

CPA acknowledges that there is a vast amount of offshore wind potential off the Pacific Coast. However, the development of these resources is challenged by the depth of sea floor (which would necessitate floating applications) and the lack of transmissions to areas with the best wind conditions. Although significant uncertainty exists about the viability of offshore wind in California, CPA has included both onshore and offshore wind in the IRP. CPA's PLEXOS modeling identified offshore wind as a potentially beneficial resource to come online beginning in 2033 due to its higher capacity factor and energy delivery profile, which is complementary to solar. While offshore wind is an intermittent resource, its daily availability profile matches CPA's load much better than solar and it shows less seasonal variability than solar. At this time, CPA does not have a position on which geographic area that offshore wind will be viable, and therefore has assumed 50% to be in the Central Coast and 50% to be in the North Coast. Assuming it becomes both technologically viable and cost effective, offshore wind, with its attractive wind generation profiles, may contribute to California achieving its 100% zero carbon goal by 2045.

n. Transmission Planning

CPA has a number of contracted resources that are contingent on interconnection upgrades, as summarized below:

Table 19: CPA Contracted Resources Requiring Interconnection Upgrades

Facility Name	Technology Type	MW	Location	COD	Network Upgrades Milestone
Azalea	Solar + Storage	60 MW Solar / 38 MW Storage	Kern County, CA	12/31/2024	Expected May 2024
Chalan	Solar + Storage	64.9 MW Solar / 25 MW Storage	Kern County, CA	12/31/2024	Expected 12/1/2023
Rexford	Solar + Storage	300 MW Solar / 180 MW Storage	Tulare, CA	12/31/2024	Expected December 2024

Daggett	Solar + Storage	123 MW Solar / 61.5 MW Storage	San Bernardino County, CA	12/01/2023	Expected April 15, 2023
Estrella	Solar + Storage	56 MW Solar / 28 MW Storage	Los Angeles County, CA	12/31/2023	Expected 11/30/2022
Daggett Solar Power 2	Solar + Storage	52 MW Solar / 65 MW Storage	San Bernardino County, CA	12/19/2023	Expected 12/09/2022
Arica	Solar + Storage	93.5 MW Solar / 71 MW Storage	Riverside County, CA	06/01/2024	Expected 06/20/2023
Desert Quartzite	Solar + Storage	300 MW Solar / 150 MW Storage	Blythe, CA	03/01/2025	Expected 07/15/2024
Cape Station	Geothermal	33 MW	Beaver County, UT	06/01/2028	Expected 06/01/2028
Prologis – Dominguez	Distributed Solar	0.96 MW	Carson, CA	12/30/2023	Expected 10/01/2023
Prologis – El Segundo	Distributed Solar	0.64 MW	Hawthorne, CA	12/30/2023	Expected 10/01/2023
Prologis – Wilmington 1	Distributed Solar	1.8 MW	Carson, CA	12/30/2023	Expected 10/01/2023
Prologis – Wilmington 2	Distributed Solar	0.6 MW	Carson, CA	12/30/2023	Expected 10/01/2023
Prologis - Workman	Distributed Solar	1.92 MW	Whittier, CA	12/30/2023	Expected 10/01/2023

For the generic new candidate resources, the Preferred Conforming Portfolio reflects CPA's best estimate for new resource siting, based on resource availability and transmission projects identified by CAISO. CPA does not have specific siting (i.e., busbar mapping level) information for the generic new candidate resources. For new resources planned within CAISO, CPA is assuming that the locations align with current transmission systems with existing capability or upgrades currently under construction or approved by the CAISO board. However, depending on what resources are made available to CPA to meet its procurement targets, additional new transmission upgrades may be required.

CPA's portfolio identifies new onshore wind resources located outside of CAISO and expects that new transmission projects may be required to deliver that energy into California. However, these new transmission projects are consistent with the CAISO's 2021-2022 Transmission Plan.

CPA will continue to monitor the CAISO's Transmission Planning Process and the status of different transmission projects as it develops new resources for its Preferred Conforming Portfolio.

IV. Action Plan

a. Proposed Procurement Activities and Potential Barriers

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

CPA has met and exceeded its needed procurement to meet D.19-11-016 2021, 2022, and 2023 targets with resources that have already come online:

Table 20: CPA D.19-11-016 Compliance Position

		2021	2022	2023
Total D.19-11-016 Requirement (Cumulative)		98.5	147.7	196.9
Compliance Resources	**Online Date**	**2021**	**2022**	**2023**
Voyager Wind II	12/28/2018	3.2	3.2	2.36
White Hills	12/15/2020	39.38	39.38	39.38
High Desert Solar + Storage	12/8/2021[8]	64	60.2	58
Sanborn Storage	11/1/2021[9]	100.0	100.0	100.0
Arlington Solar (100 MW)	3/21/2022		14	11.1
Luna Storage	7/30/2022		100.0	100.0
Total Resources (NQC)		**206.6**	**316.8**	**310.8**

Because the requirements have been met and exceeded, no additional procurement related to D.19-11-016 is planned and no barriers have been identified.

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

CPA procurement obligation for D.21-06-035 is summarized below, for a total of 679 MW (in September NQC):

Table 21: CPA D.21-06-035 Procurement Obligation

2023	2024	2025	2026 (LLT Resources)	Minimum Zero-Emitting Capacity by 2025	Total
118	354	89	118	148	679

CPA's procurement plans related to each of the D.21-06-035 categories is described in the following sections A through D.

[8] The contracted COD date for High Desert Solar + Storage was August 1, 2021. The project was delayed several months due to force majeure, as reported to the CPUC via CPA's IRP Data Request submissions.

[9] The contracted COD date for Sanborn was August 1, 2021. The project was delayed several months due to permitting delays and vandalism, as reported to the CPUC via CPA's IRP Data Request submissions.

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

Pursuant to D.21-06-035, CPA is required to procure 59 MW of firm zero-emitting resources. In Fall 2021, CPA ran its 2021 Mid-Term Reliability RFO, from which it contracted for the 33 MW Cape Station geothermal facility in Utah, which is currently under development. Below is a table summarizing CPA's outstanding procurement requirement for zero-emitting resources:

Table 22: CPA D.21-06-035 Compliance Position, Zero-Emitting Resources

	September NQC MW
Zero-Emitting Resource Requirement	59.0
CPA Contracted Resources	30.6
Remaining Requirement	28.4

In August 2022, CPA launched its 2022 Mid-Term Reliability RFO to procure additional resources needed to fully contract for its D. 21-06-035 remaining obligations. This RFO is underway, and CPA anticipates executing contracts in early 2023. CPA intends to fill its remaining requirement for zero-emitting resources through this RFO as well as bilateral negotiations that CPA has underway at the time of this filing. These candidate resources are reflected in CPA's plan.

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

Pursuant to D.21-06-035, CPA is required to procure 59 MW of long-duration storage resources. In Fall 2021, CPA ran its 2021 Mid-Term Reliability RFO and despite entering into negotiations with several developers, was unable to secure any long-durations storage contracts. These negotiations fell through due the unprecedented challenges faced by storage developers in 2022, including significant disruptions to commodity markets and supply chains resulting from the COVID-19 pandemic and the Ukraine War.

Below is a table summarizing CPA's outstanding procurement requirement for long-duration resources:

Table 23: CPA D.21-06-035 Compliance Position, Long-Duration Storage Resources

	September NQC MW
Long-Duration Resource Requirement	59.0
CPA Contracted Resources	0.0
Remaining Requirement	59.0

CPA expects to procure all its remaining requirements for long-duration storage from its 2022 Mid-Term Reliability RFO, currently underway. These candidate resources are reflected in CPA's plan.

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

To date, CPA has contracted with the following resources that qualify as incremental D. 21-06-035 resources, which are all renewable generation paired with storage:

Table 24: CPA Contracted D.21-06-035 Zero-Emissions Generation Resources

Resource	Commercial Operation Date	Nameplate Renewable MW	Nameplate Storage MW	Incremental Zero-Emitting Capacity MW
Resurgence Solar plus Storage	06/01/2023	48	40	32
Daggett 3 Solar plus Storage	12/01/2023	123	61.5	49.2
Daggett 2 Solar plus Storage	12/19/2023	65	52	41.6
Estrella Solar plus Storage	12/31/2023	56	28	22.4
Azalea Solar plus Storage	12/31/2024	60	38	30.4
Chalan Solar plus Storage	12/31/2024	65	65	52
Arica Solar plus Storage	06/01/2024	93.5	71	56.8
Rexford Solar plus Storage	12/31/2024	300	240	192
Desert Quartzite Solar plus Storage	03/01/2025	300	150	120
Total		**1,110.5**	**745.5**	**596.4**

In summary, CPA has met its requirements towards the 2,500 MW of zero-emissions generation requirement by 2025:

Table 25: CPA D.21-06-035 Compliance Position, Zero-Emissions Generation

	September NQC MW
Zero-Emissions Generation Resource Requirement	148.0
CPA Contracted Resources	596.4
Remaining Requirement	0

CPA does not plan to do any additional procurement with respect to this requirement. However, CPA will be doing additional procurement related to its D. 21-06-035 remaining obligations, which may include addition zero-emissions generation resources, as described in the following section.

d. All other procurement requirements

To date, CPA has contracted for the following resources in meeting its D.21-06-035 2023-2025 procurement obligations:

Table 26: CPA Other Contracted D.21-06-035 Resources

Resource	Commercial Operation Date	Nameplate Renewable MW	Nameplate Storage MW	Tranche 1 NQC	Tranche 2 NQC	Tranche 3 NQC
Arlington Storage	Online	0	132	115.6		
Resurgence Solar plus Storage	06/01/2023	48	40	38.52		
Daggett 3 Solar plus Storage	12/01/2023	123	61.5		63.9	
Daggett 2 Solar plus Storage	12/19/2023	65	52		51.5	
Estrella Solar plus Storage	12/31/2023	56	28		25.4	
Azalea Solar plus Storage	12/31/2024	60	38			40.1
Chalan Solar plus Storage	12/31/2024	65	65			52.6
Arica Solar plus Storage	06/01/2024	93.5	71			64.4
Rexford Solar plus Storage	12/31/2024	300	240			198.2
Desert Quartzite Solar plus Storage	03/01/2025	300	150			111.3
Total		**1,110.5**	**877.5**	**154.1**	**140.8**	**466.6**

Below is summary of the annual cumulative compliance obligations and CPA's net compliance position using the resource counting methodology adopted in the Decision:

Table 27: CPA D.21-06-035 Compliance Position, General Procurement

	8/1/2023	6/1/2024	6/1/2025
D.21-06-035 General Procurement Need	118.0	472.0	561.0
CPA Contracted Resources	118.0	368.0	730.1
Compliance +Short / (Long)	**0.0**	**104.0**	**(169.1)**

CPA will require further procurement of resources coming online by June 1, 2024. In August 2022, CPA launched its 2022 Mid-Term Reliability RFO to procure these additional. This RFO is underway, and CPA anticipates executing contracts in early 2023.

iii. Offshore wind

CPA's Preferred Conforming Portfolio does not include new wind resources until 2033. Therefore, CPA plans to run competitive solicitations for these resources in the 2027-2030 timeframe. The greatest barrier to offshore wind procurement is cost and technological viability. Offshore wind technology is nascent and expected to be expensive until it becomes commercially viable. CPA will determine whether offshore wind is a sensible addition to its portfolio once the cost effectiveness and viability of the resource is better understood.

iv. Out-of-state wind

CPA's Preferred Conforming Portfolio does not include new wind resources until 2030. Therefore, CPA plans to run competitive solicitations for these resources in the 2026-2028 timeframe. However, should CPA find opportunities to secure these resources prior the 2026—2028, CPA will accelerate procurement of cost-effective, high value wind resources to diversify its portfolio. Currently, the largest barrier for the development of these resources is available transmission capacity to import the resources into CAISO.

v. Other renewable energy not described above

The Preferred Conforming Portfolio anticipates of procurement of new solar resources to come online by 2026. Therefore, CPA plans to run competitive solicitations for these resources in the 2023-2024 timeframe. CPA does not anticipate any material barriers to procuring these resources.

vi. Other energy storage not described above

The Preferred Conforming Portfolio anticipates procurement of new storage resources to come online by 2026, either standalone storage or storage paired with solar. Therefore, CPA plans to run competitive solicitations for these resources in the 2023-2024 timeframe. CPA does not anticipate any material barriers to procuring these resources.

vii. Other demand response not described above

CPA has no additional demand response investments other than what is included in the IEPR forecast. CPA's demand response program is described further in Section III.b.

viii. Other energy efficiency not described above

CPA has no additional energy efficiency investments other than what is included in the IEPR forecast.

ix. Other distributed generation not described above

CPA is continuing to procure resources to meet its DAC-GT and CS-GT programs, including negotiations that are currently underway with two community solar projects. CPA is planning to launch its 2022 Power Share RFO in December 2022 to fill its remaining supply needs under the two programs, and will release another RFO in 2023 if additional supply resources are needed to fill CPA's program cap. CPA's disadvantaged community programs (aka Power Share) are described further in Section III.b.

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

CPA has no additional transportation electrification investments other than what is included in the IEPR forecast. CPA's transportation electrification program is described further in Section III.b.

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

CPA has no additional building electrification investments other than what is included in the IEPR forecast. CPA's building electrification program is in development and will be discussed further in the next IRP cycle.

xii. Other

CPA has no other resource types to describe in the Action Plan.

b. Disadvantaged Communities

CPA administers several activities and programs that address the needs of disadvantaged communities. As mentioned above in Section III.d.ii., CPA currently administers Power Share, the Commission-funded DAC/CSGT program. As of October 2022, CPA has fully subscribed eligible customers for the DAC-GT program. CPA manages a waitlist and enrolls eligible waitlisted customers on a monthly basis based on DAC-GT program unenrollment. Once CS-GT projects are live, CPA will enroll customers living in DAC areas within 5 miles of the CS-GT project site. Existing DAC-GT participants that are eligible for CS-GT will first be moved into the CS-GT program and the remaining spots will be filled with new program participants. To ensure that customers in disadvantaged communities are well-informed of Power Share's benefits, CPA partnered with Active SGV and MERITO Foundation, both organizations promote awareness around climate change, and energy and environment education. Active SGV is a San Gabriel Valley-based community organization in Los Angeles County, and MERITO is based in Oxnard, Ventura County, focused on multi-cultural education and outreach to youth.

Also mentioned in Section III.d.ii., CPA is following through on its Local Programs for Clean Energy Future Strategic Plan to deploy air pollution mitigation programs in Disadvantaged Communities within its territory. After a year of piloting, CPA launched its Power Response Program, a Distributed Energy Resource (DER) based demand response program in January 2022. Participating Power Response customers include residential and commercial customers who are able to reduce their energy usage during peak times. Customers are eligible to participate with behind the meter smart connected energy saving technologies, or by simply manually adjusting their energy usage at their home or business during

energy saving events. During these events, customers are asked to reduce their energy usage to relieve strain on the grid when electricity usage is at its highest. Participating customers are eligible to receive enrollment and participation performance incentives, which vary by participation pathway. To broaden the reach of this program in Disadvantaged Communities, CPA's Power Response program offers a residential behavioral demand response option that does not require smart technology to participate. CPA is expanding its Power Response program to reach more households, including single and multi-family low-income customers.

In 2021, CPA launched the largest electric vehicle charger installation effort in Ventura County in partnership with the California Energy Commission's CALeVIP program, the Ventura County Air Pollution District, and Ventura County Regional Energy Alliance. The program offers rebates for the purchase and installation of Level 2 and direct current fast chargers. Increased funding was provided for multi-unit dwellings, disadvantaged communities, and low-income communities. CPA plans to launch a similar program in Los Angeles County to again focus a part of the funding on disadvantaged and low-income communities to expand their access to electric vehicle charging infrastructure.

To expand disadvantaged communities' access to renewable energy, CPA makes available higher tiers of renewable product offerings to all its customers, including its customers that receive rate assistance through the California Alternative Rates for Energy (CARE), Family Electric Rate Assistance (FERA), and Medical Baseline programs. CARE, FERA, or Medical Baseline customers located in jurisdictions that have selected CPA's 100% renewable as their default energy product are defaulted into CPA's 100% renewable product at a rate that matches the overall bill cost those customers would pay on SCE's discounted bundled rate, inclusive of PCIA and their existing discounts. The incremental cost of including customers on discount programs in the 100% renewable default without raising their rates is shared by all other customers, both residential and commercial, in those jurisdictions. This voluntary subsidy provides equitable access to renewable energy options for customers that might otherwise have difficulty accessing other traditional renewable energy programs and avoids automatically increasing generation costs for CPA's most vulnerable customers. CPA provides this default 100% renewable energy benefit to approximately 38,000 of its 235,000 residential customers that take service on CARE, FERA, and Medical Baseline rate assistance programs. Customers in these three rate assistance programs comprise approximately 27% of CPA's residential customer accounts.

CPA also has several programs that aim to reach disadvantaged communities and expand their access to the clean energy economy:

- Community Benefits Grant Program: Eligible 501(c)3 organizations can apply and receive between $5,000 to $30,000 for work related to renewable energy research and planning, green workforce development, energy and environmental education, and clean energy in disadvantaged communities. The work has to serve communities within CPA's service territory. This program is a partnership between CPA and Calpine Energy Solutions, where Calpine Energy Solutions awards the program funding, and CPA assists in determining the grant guidelines and project criteria and helps recruit organizations to apply for funding. Both entities work together to assess grant applications.

- Voyager Scholarship: This initiative supports students at seven community colleges throughout Los Angeles County and Ventura County and provides financial aid to students enrolled in energy-driven career pathways, such as electric vehicles, energy and environmental science, and alternative energy.
- Workforce development fund: CPA is currently providing funding for a workforce development program partnership with the Los Angeles Cleantech Incubator and supporting students from disadvantaged communities to pursue training focused on microgrid development.

Lastly, as noted in Section II.d, CPA's estimated local air pollutants are derived from reliance on system power. As CPA continues to increase the portion of its portfolio under long-term contract with clean energy resources, as well as bringing online more storage resources to minimize the emissions intensity of system power during net peak load hours, CPA is planning to reduce its reliance on system power.

c. Commission Direction of Actions

As an attachment to the Administrative Law Judge's Ruling Seeking Comments on Staff Paper on Procurement Program and Potential Near-Term Actions to Encourage Additional Procurement (Ruling on Procurement Program), issued on September 8, 2022, CPUC staff proposed two interim approaches to programmatic procurement.[10] Both the resource-specific interim option and the attribute-based interim option would require LSEs to show in 2024 (or another designated year) a portion of forward contracting of some percentage of resources. CPA understands that there is an opportunity to comment on the Staff Paper in December 2022 and will work with CPA's trade association, CalCCA, to develop comments on this matter. However, given that there is a potential that a portion of the forecasted 2030 resource portfolio may be binding, CPA urges the Commission to clarify its direction on the interim options as soon as possible. If the Commission decides that LSEs have forward contracting obligations in 2024, an expeditious decision would allow LSEs to determine their procurement needs and strategies.

V. Lessons Learned

In developing the 2022 IRP, CPA notes the different resource cost assumptions it used in its modeling that differ from the assumptions provided by the CPUC, as described in Section II.b. CPA recommends that the CPUC update its resource cost assumptions to reflect significant changes in market conditions and technology costs that have occurred since the last IRP cycle, including rising costs for commodities as well as the passage of the Inflation Reduction Act.

CPA also recommends that the CPUC assess the robustness of its planning tools and consider more sophisticated tools to determine the reliability of LSE portfolios. For example, the CSP tool is a static tool using deterministic sample resource profiles and is not as effective as other tools, such as production cost models, to evaluate reliability of high-renewable penetration portfolios, including

[10] Pages 41-42, Attachment A of Ruling on Procurement Program.

curtailment risk. Based on its comparison of estimated emissions from its PLEXOS modeling, CPA believes that the CSP tool is over-estimating the system emissions of the LSE portfolios and potentially leading to overbuild of new resources.

In addition, CPA suggests that the Commission adopt a durable, long-term procurement framework that sets clear carbon-free and renewable procurement goals and allows LSEs to maximize their portfolio planning ability to meet those goals, based on their existing portfolios and other goals set by their local jurisdictions or governing bodies. Based on CPA's experience in securing resources for the requirements set in D. 21-06-035, the Commission should refrain from requiring the showing of forward contracting more than two years in advance of the online date. While some resources take longer lead time to procure, such as geothermal and out of state wind resources that require import capacity expansion and allocations, the required transmission capacity may not be available at the time of contract execution if LSEs are required to sign contracts in advance to demonstrate compliance. This creates the risk where LSEs would be signing contracts with resources without securing deliverability, and ultimately California ratepayers may not see the RA benefits that they pay for.

Rather than setting forward contracting requirements, the Commission should consider updating the RPS compliance program to include procurement targets for carbon-free resources, in order to achieve the SB 100 carbon-free requirement by 2045. As CPUC staff acknowledges in the Staff Paper, the RPS program has been successful in bringing online renewable resources to meet various statutory requirements. The RPS program's success is largely due to clear targets set for LSEs, complemented by defined compliance periods where LSEs would need to achieve those targets or face penalties.

The long-term procurement framework should also consider LSE's best efforts to conduct procurement despite the challenging market conditions that clean energy development is facing, including pandemic related supply chain challenges, rising commodity costs, and significant interconnection delays.