Standard LSE Plan

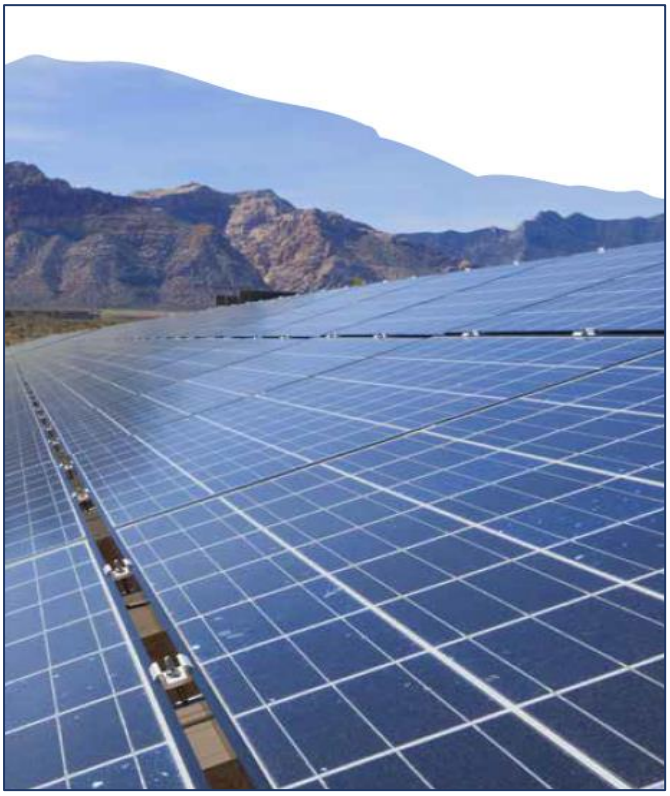
DESERT COMMUNITY ENERGY

2020 INTEGRATED RESOURCE PLAN

September 1, 2020

DESERT COMMUNITY ENERGY

The POWER of choice



Approved by Desert Community Energy Board – August 17, 2020

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I. Executive Summary

Desert Community Energy (DCE) is a California joint powers authority which formed in 2017, located within the geographic boundaries of Riverside County. DCE's purpose is to offer rate savings to electricity customers and develop and implement sustainable energy initiatives that reduce energy demand, increase energy efficiency, and advance the use of clean, efficient, and renewable resources available in the region. While DCE formed in 2017, DCE only began serving load on April 1, 2020 for one of its three member agencies, the City of Palm Springs. DCE's initial launch was delayed due to various issues, including energy market concerns in 2018 and complications arising from the roll-out of SCE customer platforms in 2019. DCE's two other member agencies are the City of Palm Desert and Cathedral City. Cathedral City has voted to withdraw, effective July 2021. The next possible launch date for Palm Desert is 2022.

DCE's Integrated Resource Plan (IRP) objectives include the following:

- Report on recent procurement activity, including expected long-term contracts for renewable energy;
- Quantify how expected long-term contracts for renewable energy from DCE's 2020 request for offers (RFO) will help DCE meet California's contracting requirements, including renewable portfolio standard (RPS) requirements and greenhouse gas (GHG) emissions reductions;
- Quantify how much additional "green" power supply is still needed to meet California's 2030 GHG emissions reduction goals and the DCE Board's long-term procurement objectives; and
- Guide DCE's future procurement activities such that all California's contracting requirements and DCE Board goals are achieved in a timely fashion.

To meet these objectives, DCE has modeled two portfolios as part of this IRP: 1) targeted to meet the 46 million metric tons (MMT) GHG emissions target ("46 MMT Portfolio"); and 2) targeted below the 38 MMT GHG emissions target ("38 MMT Portfolio") that also meets the DCE Board procurement objectives. Both portfolios are considered conforming portfolios based on the California Public Utilities Commission's (CPUC) IRP filing requirements. The 38 MMT Portfolio will function as an aspirational portfolio that DCE will actively plan towards for meeting its internal GHG emission reduction goals. It is targeted to achieve 100% renewable energy on an annual basis by 2030 for DCE's Carbon Free rate product. (The Carbon Free product is the default product upon DCE customer enrollment and is estimated to be 95% of DCE's load.) The 46 MMT Portfolio includes less renewable energy procurement than the 38 MMT Portfolio, and thus has higher emissions in 2030. It will serve as a guideline for the minimum necessary procurement to meet state requirements should DCE encounter barriers to achieving the 38 MMT Portfolio. Both portfolios include resources DCE has recently shortlisted after its 2020 RFO.

DCE is also committed to procuring resource adequacy (RA) to meet all CPUC requirements and contribute its fair share to grid reliability. With the anticipated upcoming changes to the RA market, including from rule changes and the ongoing disagreement over the role and formation of a central procurement entity, it is difficult to forecast RA procurement over the long-term. Nonetheless, DCE has created a forecast of RA procurement for each conforming portfolio per the CPUC's instructions. These include reasonably conservative estimates of the RA to be supplied by resources currently on the 2020

RFO shortlist. DCE acknowledges it may need to change its future procurement targets to accommodate new RA requirements. DCE will report on this in its next IRP.

This IRP was reviewed and approved by the DCE Board of Directors on August 17, 2020 at a public meeting to be ready for submittal by the deadline. This document reflects the intent of the DCE Board of Directors to increase the procurement of renewable energy and continue to offer a 100% carbon-free option. DCE will also comply with the long-term procurement requirements set forth by Senate Bill (SB) 350.

In addition, Board priorities in the near term, include the following:

- Considering alternative rate designs and NEM enhancements to encourage further distributed generation. Feed-in tariffs for local renewable generation will also be considered.
- Developing new energy efficiency programs that enhance, but do not duplicate, existing programs.
- Adopting procurement guidelines for improving service to and providing economic development opportunities for local disadvantaged communities.
- Approving long-term contracts for renewable energy stemming from DCE's 2020 RFO.

Longer term, the Board also intends to consider new programs, which may include electric vehicles, building electrification, energy storage, grid resiliency, energy efficiency, and demand response.

DCE will report on its progress with these activities in future IRPs and as it enters into actual long-term contracts.

DCE has learned much throughout the IRP process and offers several recommendations for the improvement of future IRP cycles, including: better definition of future reliability standards that allow 100% carbon-free portfolios to be considered conforming for all scenarios and allow for easier comparison of resource types and that the CPUC not penalize LSEs for procurement that is inadequate to meet CPUC requirements simply because those requirements changed subsequent to the LSE's long-term procurement.

II. Study Design

Desert Community Energy (DCE) was formed to offer a Community Choice Aggregation program in the desert region of Riverside County. DCE is a California joint powers authority located within the geographic boundaries of Riverside County, which formed in 2017 for the purpose of offering rate savings to electricity customers and developing and implementing sustainable energy initiatives that reduce energy demand, increase energy efficiency, and advance the use of clean, efficient, and renewable resources available in the region. DCE is governed by a board of directors that includes an elected representative from each participating city. While DCE formed in 2017, DCE only began serving load on April 1, 2020 for one of its three member agencies, the City of Palm Springs. DCE's initial launch was delayed due to various issues, including energy market concerns in 2018 and complications in 2019 arising from the roll-out of SCE customer platforms. DCE's two other member agencies are the City of

Palm Desert and Cathedral City. Cathedral City has voted to withdraw, effective July 2021. The next possible launch date for Palm Desert is 2022.

DCE was established with founding principles, as described in the 2017 joint powers agreement, which guide the development of this IRP and related procurement activities:

- Reducing greenhouse gas emissions related to the use of power throughout DCE jurisdictions and neighboring regions;
- Providing electric power and other forms of energy to customers at a competitive cost;
- Carrying out programs to reduce energy consumption;
- Stimulating and sustaining the local economy by developing local jobs in renewable and conventional energy; and
- Promoting long-term electric rate stability, energy security, and reliability for residents through local control of electric generation resources.

These broad policy objectives were used as the basis for the more specific energy procurement strategies included in this IRP.

a. Objectives

The objectives for DCE's IRP include the following:

- Report on recent procurement activity, including expected long-term contracts for renewable energy.
- Quantify how expected long-term contracts for renewable energy from DCE's recent RFO will help DCE meet California's contracting requirements, including RPS requirements, GHG emissions reductions, and incremental resources supporting grid reliability.
- Quantify how much additional "green" power supply is still needed to meet California's 2030 GHG emissions reduction goals and the DCE Board's long-term procurement objectives.
- Guide DCE's future procurement activities such that all of California's contracting requirements and DCE Board goals are achieved in a timely fashion.

To meet these objectives, DCE has modeled two portfolios as part of this IRP: 1) targeted to meet the 46 MMT GHG emissions target ("46 MMT Portfolio") and 2) targeted below the 38 MMT GHG emissions target ("38 MMT Portfolio") that also meets the DCE Board procurement objectives. Both portfolios are considered conforming portfolios based on the CPUC's IRP filing requirements. The 38 MMT portfolio will function as an aspirational portfolio that DCE will actively plan toward for meeting its internal GHG emission reduction goals. The 46 MMT portfolio will serve as a guideline for the minimum necessary procurement to meet state requirements should DCE encounter barriers to achieving the 38 MMT portfolio. Further information on the portfolios is provided in Section III of the IRP. The Action Plan in Section IV of the IRP provides further detail on how the IRP will guide DCE's future procurement activities.

b. Methodology

i. Modeling Tool(s)

DCE developed a spreadsheet model to create each portfolio. DCE relied on the CPUC's Clean System Power (CSP) calculator spreadsheet tool ("CSP calculator") to estimate the emissions from each portfolio. It did not conduct any production cost modeling or portfolio optimization studies. The independent spreadsheet model and CSP calculator results are attached to this IRP.

ii. Modeling Approach

Load

As part of the 2020 IRP process, each LSE is assigned a retail sales forecast to use for resource planning through 2030 for all conforming portfolios. The assigned forecast is based on the 2019 Integrated Energy Policy Report (IEPR) forecast,[1] modified to reflect load migration expectations. In DCE's case, only Palm Springs' load is included in this IRP. Future IRPs will include potential expansion, such as if the city of Palm Desert decides to begin serving customers in 2022.

Figure 1 shows DCE's annual retail sales forecast. The 2020 load is much lower than other years as DCE's customer enrollment did not begin until April 1, 2020. The figure also shows expected wholesale generation needed to serve retail sales after considering delivery losses. The assumed loss factors reflect the CPUC default assumptions embedded in the CSP calculator.

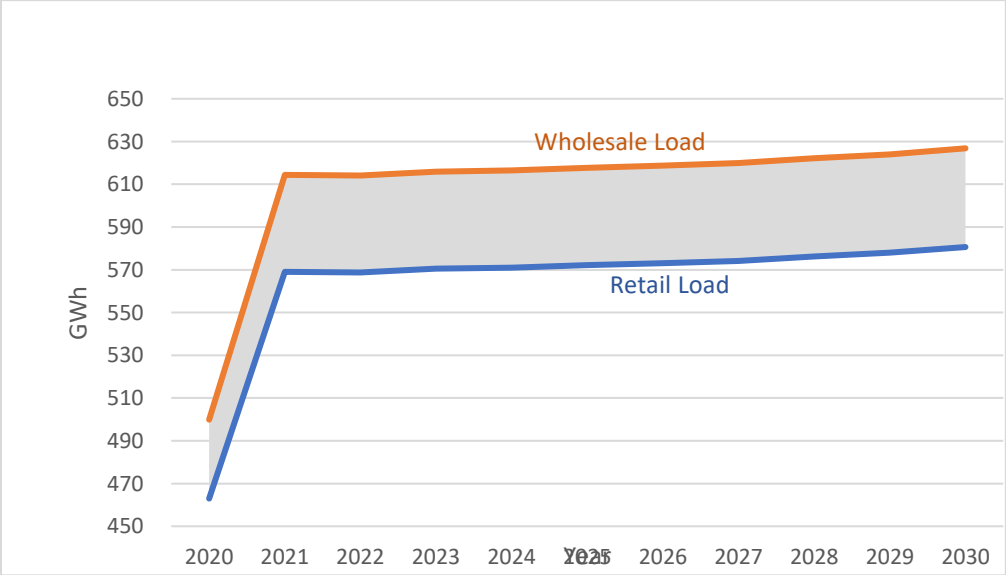


Figure 1. DCE annual retail sales and wholesale load used for IRP modeling.

[1] For more information on the IEPR, please refer to https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report.

To calculate the assigned wholesale forecast, the CPUC relies on important assumptions regarding energy efficiency, behind-the-meter solar ("BTM PV"), electric vehicle sales, and other electrification. The figure below shows these assumptions, and how they influence the final assigned sales forecast for DCE.

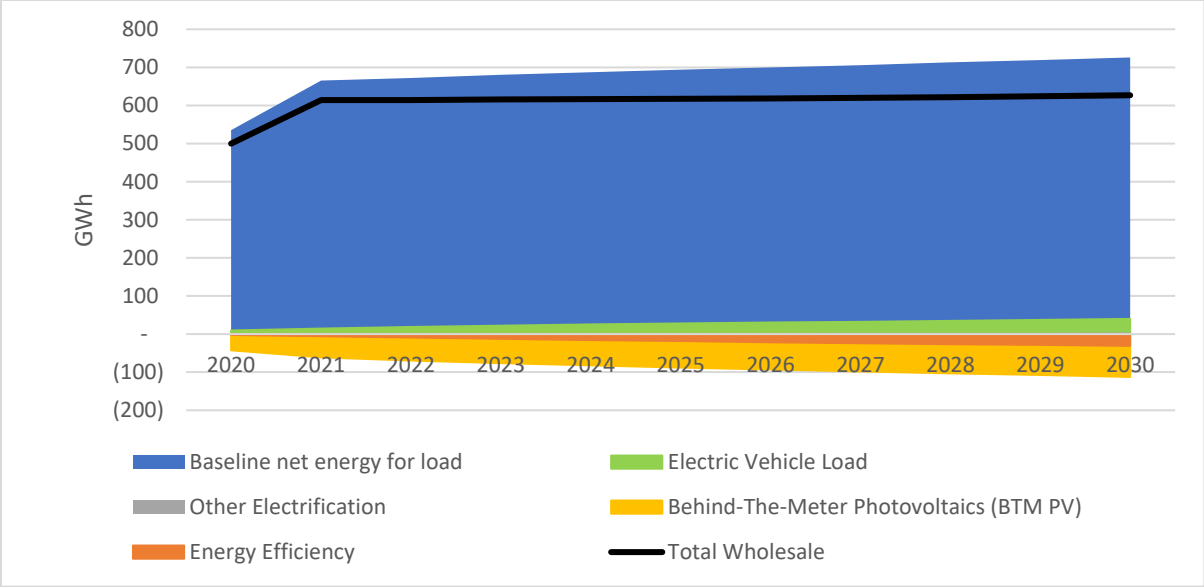


Figure 2. DCE Wholesale Forecast 2020-2030.

The figure above shows the different demand category amounts that contribute to the annual DCE wholesale forecast value. These demand category amounts are based on the demand modifier assumptions created by the CPUC. The "baseline net energy for load" category is composed of both non-commercial/industrial and commercial/industrial energy portions. The energy savings associated with BTM PV and energy efficiency lower the overall DCE wholesale forecast value per year. The black line signifies the total DCE wholesale forecast amount per year, including the energy savings (negative) values associated with BTM PV and energy efficiency.

Because GHG emissions are calculated on an hourly basis in the CSP calculator, an hourly load shape must be applied to the annual load forecast. DCE elected to use a mix of the default load shapes provided in the CSP calculator. DCE assumes a mix of approximately 44% commercial and industrial sales based on historical and recent sales data and 56% non-commercial and industrial sales[2]. The figure below shows DCE's assumed average normalized daily load shape for 2020 and 2030 under these assumptions. Over time, as more behind-the-meter solar is assumed to come online, the load falls in the middle of the day, creating lower minimum loads in the 2030 load shape.

[2] COVID impacts were first seen in the electricity sector in mid-March 2020 and continue to some extent. As DCE began serving load in April 2020 the impact of COVID to DCE's recent load will become clearer as additional data becomes available.

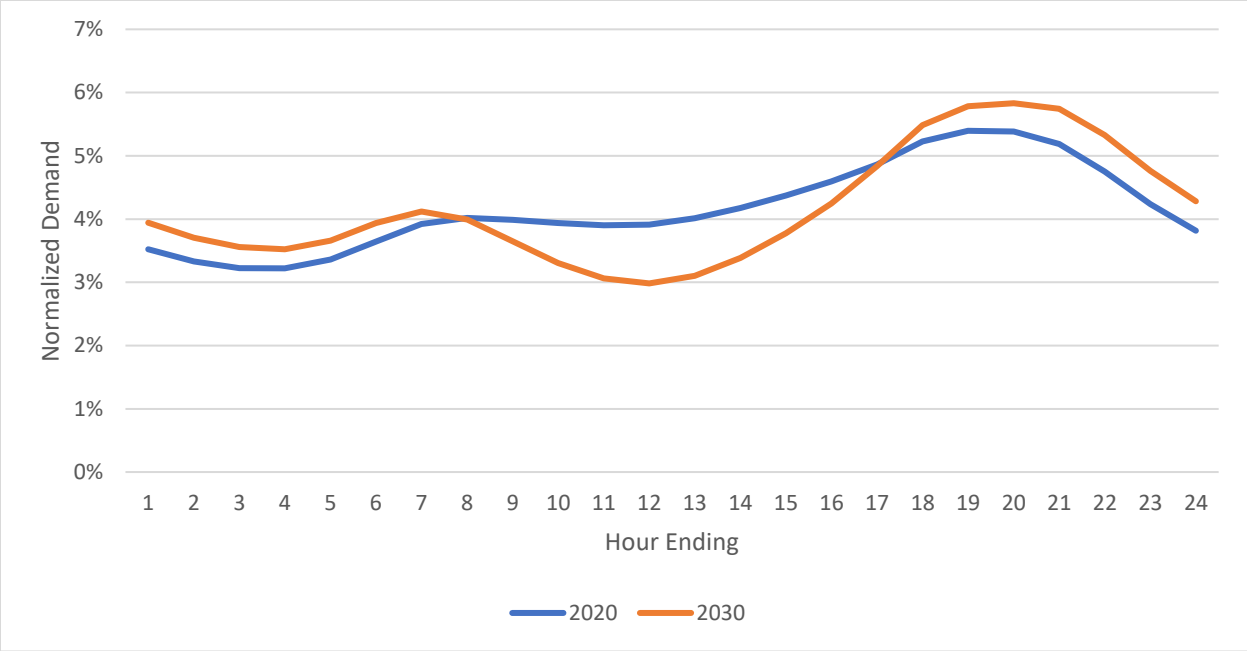


Figure 3. DCE normalized average daily load shape in 2020 and 2030 used for IRP modeling purposes.

GHG Emissions Targets

As part of the 2020 IRP process, the CPUC planned for two different GHG emissions reduction scenarios for California: one targeting 46 MMT of GHG emissions in 2030 and one targeting 38 MMT of GHG emissions in 2030. Each LSE was assigned a 2030 emissions benchmark corresponding to each of these goals. The assigned benchmark, however, includes some GHG emissions from behind-the-meter (BTM) combined heat and power (CHP) facilities, even though LSEs are not responsible for reducing the emissions from such facilities. Because of this, the CPUC also supplied benchmarks net of these emissions. These benchmarks were used for DCE's IRP portfolio planning. Both the assigned emissions benchmarks and benchmarks net of BTM CHP emissions are shown in the table below.

Table 1. DCE 2030 GHG Emission Benchmarks, millions of metric tons (MMT).

	38 MMT Scenario	**46 MMT Scenario**
Assigned 2030 Benchmark	0.085	0.103
2030 Benchmark Net of BTM CHP Emissions	0.0693	0.0873

DCE Rate Products

DCE currently offers two rate products to its customers. The first option, which was the default option for the April 2020 enrollment, is the Carbon Free product, which provides 100% carbon-free electricity at rates at a premium to SCE's current rates. The Carbon Free product uses a mix of approximately 50% renewable and 50% large hydro resources. The second option is Desert Saver, which offers comparable renewable content to SCE's base product at a slightly

lower rate. Based on recent opt-down activity, DCE assumed 95% of its sales would be Carbon Free and 5% would be Desert Saver for all years between 2020 and 2030.

Green Energy Portfolio Supply Approach

The portfolios were constructed to capture the following broad procurement goals by DCE:

- DCE's preferred resource types for RPS-qualified procurement for its Carbon Free product are solar, wind, and small hydro. Geothermal and biomass/biogas resources are excluded over concern they may have carbon emissions.
- DCE only procures non-RPS qualifying carbon-free energy from existing large hydro generation, not nuclear or new large hydro.
- DCE wishes to further explore development of local geothermal energy near the Salton Sea for its Desert Saver product.
- DCE prefers to source green energy from local generation, with preference in the following order: Riverside County, Southern California, all of California, in Western Electricity Coordinating Council (WECC) but outside California.
- DCE only uses portfolio content category one (PCC1) renewable energy credits (RECs) to satisfy RPS requirements.

For the current IRP, DCE created two resource portfolios for years 2020-2030. Section III of the IRP provides a specific listing of the resources in both portfolios. The assumptions used to build the portfolios are described here. Both portfolios include the following:

- DCE's executed contracts for carbon-free energy and for PCC1 RECs. All such contracts are short-term, seller's choice contracts. To the extent the contracts contain mixed resources, such as wind and solar or hydro and wind, the resource mix percentages were calculated based on the number of facilities for each resource type featured in the contract. All contracted carbon-free energy is supplied by imported hydro resources.
- Energy provided by four renewable resources that have been shortlisted in response to DCE's recent request for offers for renewable energy ("2020 RFO Shortlist Resources").[3]

Both portfolios are also similar in the assumptions used to meet short-term resource needs prior to when all 2020 RFO Shortlist Resource contracts begin. The years 2021-2023 reflect the following:

- DCE will procure enough PCC1 energy and RECs to be at least 50% renewable on a total retail sales basis each year.
- The renewable energy procured on a short-term basis in addition to the 2020 RFO Shortlist Resources is assumed to be a mix of solar, wind, and small hydro in proportion to the assumed mix of resources for 2020, which is based on executed seller's choice contracts discussed above.

[3] DCE's 2020 RFO is discussed further in the Procurement Activities Section of the IRP (Section IVb).

- Enough carbon-free energy will be procured to meet DCE's goal of having its Carbon Free product be 100% carbon free on a retail sales basis. Such carbon-free energy is assumed to be from imported hydro resources as it is in 2020.

Between 2024 and 2026, the only RPS-qualifying renewable resources in DCE's portfolio are the 2020 RFO Shortlist Resources, as these are expected to be in excess of 60% of DCE's retail sales, which exceeds minimum RPS requirements. In those years, DCE also continues to assume enough carbon-free energy will be procured to meet DCE's goal of having its Carbon Free product be 100% carbon free on a retail sales basis.

For years 2027 to 2030, the IRP portfolios differ. The 38 MMT Portfolio is constructed as follows:

- The Carbon Free product in 2030 is targeted to be 100% renewable on an annual wholesale load basis, meaning all delivery losses and battery losses are assumed to be met with renewable energy. The Desert Saver product is targeted to be 60% renewable in 2030.
- Imported large hydro resources ramp down to zero by 2030.
- The additional renewable energy to meet the 2030 goals will be procured through another RFO ("Future RFO"), and the energy necessary is assumed to ramp up linearly from 2027 to 2030 as a proxy for contracts starting at different times during this period.
- The Future RFO procurement is unknown, but for IRP planning purposes, DCE assumed the following:
    - The Desert Saver renewable portion is met by local geothermal energy; though not 100% carbon free, geothermal is a local resource.
    - Reliance on existing resources was limited to a load ratio share of CAISO solar, wind, and small hydro resources.
    - The remaining renewable portion of the portfolio was filled with new local solar and wind based on the proportion of new solar and wind in the CPUC's 46 MMT reference system portfolio (RSP) by 2030.[4]
    - For solar resources featured in the portfolios, DCE assumes that it will procure 1 MW of battery storage for every 2 MW of solar capacity, with 50% of the battery storage MW being composed of 4-hour or short-duration battery storage and the other 50% being composed of 8-hour or long-duration battery storage.[5]

For IRP compliance, the 46 MMT Portfolio must meet its assigned GHG emissions benchmark in 2030 exactly. Therefore, DCE did not target this portfolio to be 100% renewable in 2030. Instead, DCE assumed a reduced amount of renewable procurement under its Future RFO for

[4] The 46 MMT RSP was used and not the 38 MMT because the 38 MMT includes a considerable amount of out-of-state wind, and this does not conform to DCE's preference to procure local resources.

[5] For CSP calculator modeling, DCE listed the 8-hour battery storage under pumped storage. Because pumped storage is modeled as 12-hour duration, DCE first multiplied the 8-hour capacity by 8/12 prior entry into the CSP calculator.

this portfolio. DCE first removed the existing resources assumed to be procured in the Future RFO. Then, with only a slight adjustment to the assumed new resources, DCE was able to hit the GHG emissions benchmark exactly. Like the 38 MMT Portfolio, resources procured from the Future RFO are assumed to ramp up linearly from 2027 to 2030 and imported large hydro resources ramp down to zero by 2030.

Resource Adequacy

Both portfolios take a similar approach to developing resource adequacy portfolios for IRP planning purposes. The RA assumptions for both IRP portfolios include the following:

- DCE's agreement with Southern California Edison (SCE) that SCE will supply SCE's resource adequacy for compliance year 2020.
- The resources SCE will procure on DCE's behalf in response to D.19-11-016 from the CPUC requiring incremental procurement of resource adequacy. The CPUC provided DCE with what resources to assume will be so procured for IRP planning purposes.
- DCE's proportional share of resources subject to the cost allocation mechanism (CAM).
- DCE's allocated share of SCE's demand response resources.
- An estimated amount of net qualifying capacity to be procured from DCE's 2020 RFO Shortlist Resources and Future RFO resources. Because the net qualifying capacity of these resources is currently unknown, DCE assumed the following:
    - New solar plus storage hybrid resource RA would be limited to the battery capacity multiplied by the effective load carrying capacity curves for batteries from the CPUC's resource data template.
    - All other resources would have RA based on the assumed maximum capacity of the resource multiplied by the effective load carrying capacity curves from the CPUC's resource data template.
- To the extent there is still a gap in RA procurement needs, DCE assumes it will procure System RA using short-term, RA-only contracts from existing gas resources.

These portfolios are discussed in more detail in the System Reliability Analysis Section of the IRP.

III. Study Results

a. Conforming and Alternative Portfolios

DCE has modeled two portfolios, both of which are considered conforming portfolios based on the CPUC's IRP filing requirements:

- **38 MMT Portfolio**: an aspirational portfolio with emissions below DCE's assigned 38 MMT emissions benchmark; DCE will actively plan toward this portfolio for meeting its internal procurement goals.

- **46 MMT Portfolio**: a portfolio that meets DCE's 46 MMT emissions benchmark and will serve as a guideline for minimum necessary procurement to meet state requirements should DCE encounter barriers to achieving the 38 MMT Portfolio.

DCE elected not to model any Alternative Portfolios.

The methodology used to construct each portfolio is described in detail in Section IIb above. Here, DCE provides a detailed listing of all resources included in each portfolio.

Resources in Both Portfolios

Resources Procured Under Short-Term Contract

DCE has executed eight different seller's choice energy contracts to address its energy needs for 2020 and 2021. Four of these contracts supply energy from imported hydro resources from the Pacific Northwest region, while three contracts provide PCC1 RECs and energy through a combination of wind and solar resources or wind and small hydro resources. For the three mixed-resource contracts, the resource mix percentages were calculated based on the number of facilities for each resource type featured in the contract. Lastly, one contract represents a sale of energy by DCE (reported as negative in the table).

Table 2 provides further details regarding the aforementioned energy contracts:

Table 2. DCE short-term energy contracts for 2020 and 2021. For contracts with a mix of resource types, resource mix percentages were calculated based on the number of facilities for each resource type featured in the contract.

Contract Type	Term (Year)	Volume (GWh)	Contract Start Date	Contract End Date	Hydro (%)	Wind (%)	Solar (%)
Carbon Free	2020	100	4/1/2020	12/31/2020	100%		
Carbon Free	2020	100	4/7/2020	12/31/2020	100%		
Carbon Free	2020	83	4/1/2020	12/31/2020	100%		
Carbon Free	2020	50	4/1/2020	12/31/2020	100%		
PCC1 RECs	2020	90	5/1/2020	12/31/2020	57%	43%	
PCC1 RECs	2021	30	1/1/2021	12/31/2021	57%	43%	
Carbon Free	2020	-94	4/7/2020	12/31/2020	100%		
PCC1 RECs	2020	122	8/1/2020	12/31/2020		43%	57%
PCC1 RECs	2021	30	1/1/2021	12/31/2021		43%	57%

Shortlist Resources from Recent RFO

DCE has shortlisted four renewable resources through its aforementioned 2020 RFO. These resources include two new solar plus battery storage facilities, a new wind farm, and an existing wind farm. One of the solar plus battery storage facilities is located in Tulare County, with the remaining three facilities all situated near Palm Springs, CA or elsewhere in Riverside County.

Table 3 outlines the various characteristics of each shortlist resource:

Table 3. Summary of DCE 2020 RFO Shortlist Resources

Developer	Project	Location	Technology	Contract Start Date	Proposed Size (Solar Component) (MW)	Annual Energy Delivery (GWh)	Battery Storage Capacity (MW)	Battery Storage Duration (Hours)
Clearway Renew	Victory Pass I	Riverside County, CA	New Solar + Storage	September 2023	64	196	32	4
Lendlease Energy Development	Deer Creek Solar I	Tulare County, CA	New Solar + Storage	December 2022	50	133	50	4
Terra-Gen	East Wind	Palm Springs, CA	Existing Wind	December 2022	12.6	34	N/A	N/A
Terra-Gen	Coachella Hills Wind II	Palm Springs, CA	New Wind	March 2021	10.6	36	N/A	N/A

Planned Procurement of Existing Resources Under Short-Term Contract

DCE is planning to procure additional energy from existing solar, wind, and small hydro to fulfill its supply needs between 2021-2023. The procured resources and energy will be the same for both the 38 MMT and 46 MMT portfolios. These additional resources are outlined in Table 4.

Table 4. DCE planned procurement of additional existing resources for 2021-2023 (in MW).

Resource	2021	2022	2023
Small Hydro	16	20	2
Existing CAISO Wind	20	24	3
Existing NW Wind	16	20	2
Existing CAISO Solar	26	32	4

Additionally, DCE is planning to procure carbon-free imported energy from existing large hydro resources. The procurement timespan and amounts of energy will differ for the 38 MMT and 46 MMT portfolios. Table 5 outlines these large hydro resources by portfolio.

Table 5. DCE planned procurement of large hydro (in MW).

Portfolio	2021	2022	2023	2024	2025	2026	2027	2028	2029
38 MMT	69	69	69	40	41	41	26	11	0
46 MMT	69	69	69	40	41	41	35	28	22

Additional Resources From Future RFO

As discussed in Section IIb above, DCE also anticipates procuring resources in a future RFO. The resources procured from this RFO are different for each portfolio. In the 38 MMT Portfolio, enough resources are included to meet DCE's internal goal of being 100% renewable on an annual basis by 2030. In the 46 MMT scenario, only enough resources are included to meet the 2030 GHG emissions benchmark. These resources are summarized in Table 6. The mix of resources should be considered generic. The final mix of resources will depend on what offers project developers actually submit to the RFO.

Table 6. DCE resources assumed to be procured in next RFO and included in conforming portfolios by 2030.

		38 MMT Portfolio	46 MMT Portfolio
New Resources	**Local Geothermal**	2 MW	2 MW
	Local Solar + Storage	26 MW Solar + 7 MW 4-Hour Battery 7 MW 8-Hour Battery	26 MW Solar + 7 MW 4-Hour Battery 7 MW 8-Hour Battery
	Local Wind	7 MW	7 MW
Existing Resources	**Small Hydro**	3 MW	None
	Wind	7 MW	
	Solar	42 MW	

Portfolio Results Summary

Figure 4 shows the mix of resources included in the 38 MMT Portfolio over time on an annual energy basis. The decline in reliance on system power between 2028 and 2030 is a result of DCE's procurement goals. Currently, DCE procures enough total renewable and large hydro energy to meet 100% of DCE's Carbon Free product energy on a retail sales basis. In 2030, DCE plans to procure 100% renewable energy for DCE's Carbon Free product including all battery storage and delivery losses.

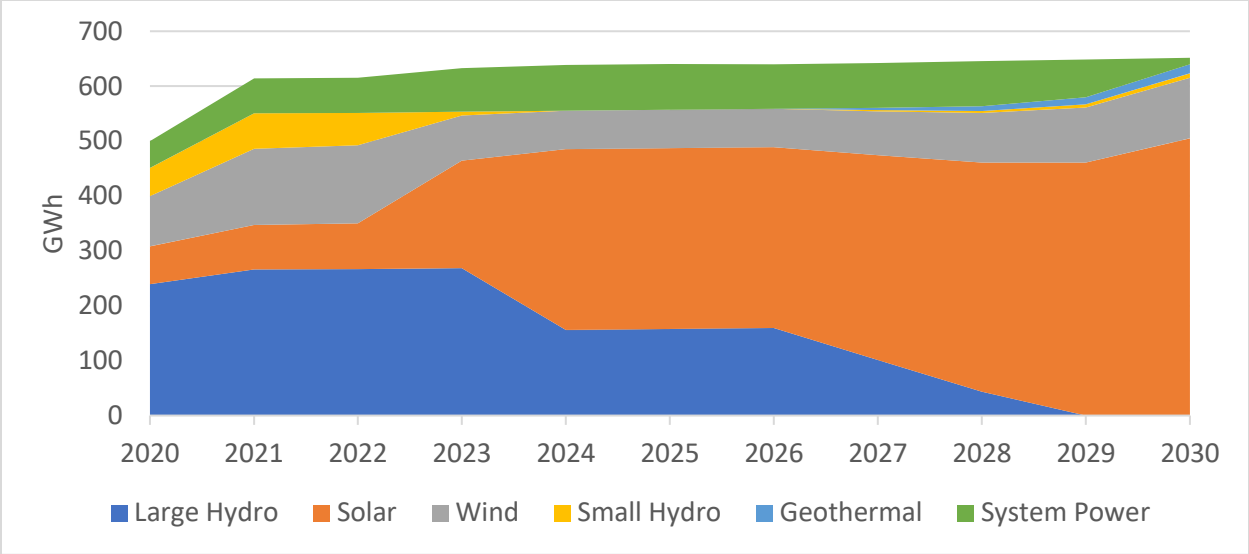


Figure 4. DCE 38 MMT Portfolio annual energy resource mix.

Similar results for the 46 MMT Portfolio are shown in the chart below. The results for each portfolio are the same through 2026. Beginning in 2027, the 46 MMT Portfolio includes a lower amount of added renewable resources and a higher reliance on system power such that the emissions benchmark is reached exactly in 2030.

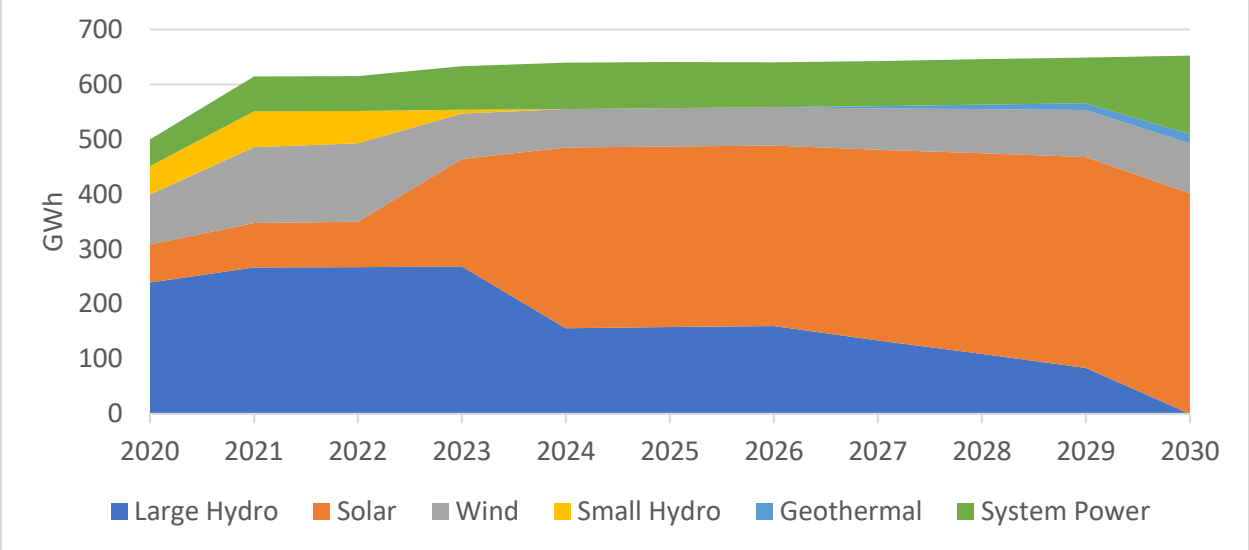


Figure 5. DCE 46 MMT Portfolio annual energy resource mix.

The figure below shows the resource mix of the 38 MMT Portfolio in terms of annual MW of nameplate capacity. This figure includes the capacity contributions of the 4-hour and 8-hour battery storage options. Similar to the 38 MMT Portfolio annual energy resource mix figure shown above, this figure displays the effects of DCE's future RFO.

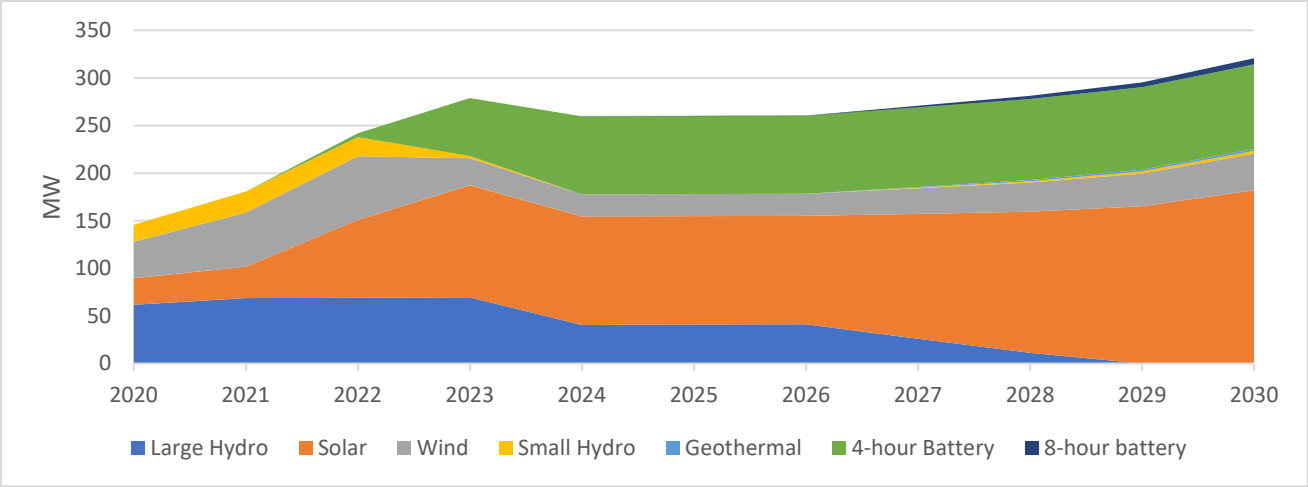


Figure 6. DCE 38 MMT Portfolio annual resource nameplate capacity mix.

The figure below shows the 46 MMT Portfolio resource capacity mix including battery storage. The decline in renewables capacity after 2028 reflects DCE's increased reliance on system power to meet the 46 MMT GHG emissions benchmark.

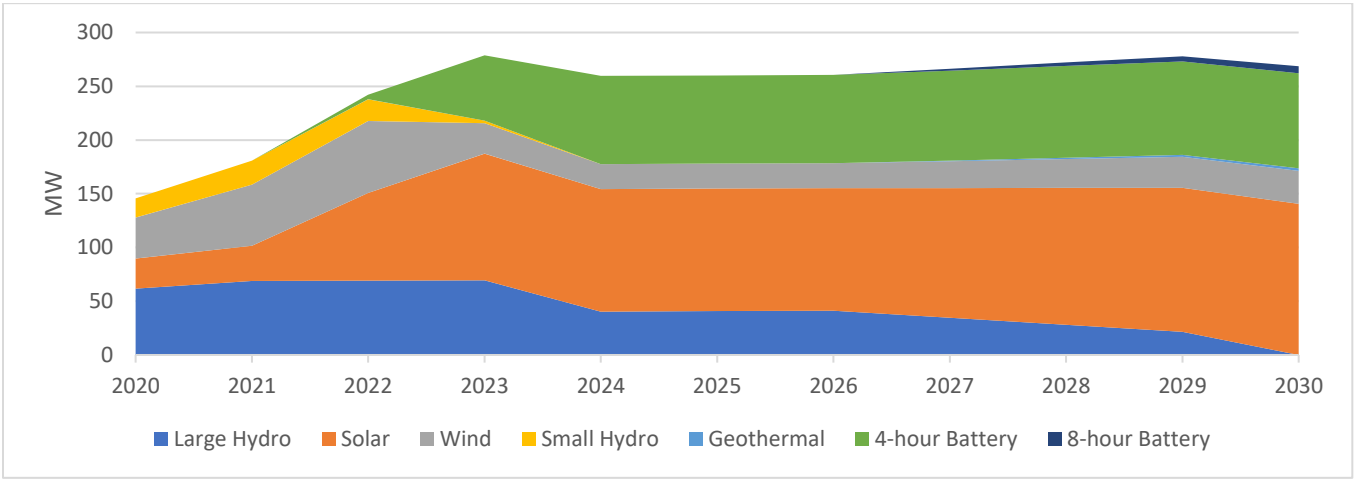


Figure 7. DCE 46 MMT Portfolio annual resource nameplate capacity mix.

Comparison of New Resources to RSPs

Table 7 compares the amount of new resources in 2030 in each DCE portfolio to DCE's load ratio share of the amount of new resources in the RSPs.

Table 7. Comparison of DCE new resources to DCE's load ratio share of new resources in the RSPs in 2030.[6]

	Load Ratio Share of Reference System Portfolios		DCE Portfolios	
	38 MMT	**46 MMT**	**38 MMT**	**46 MMT**
Short-Duration Storage (MW/MWh Capacity)	27/90	25/73	89/354	89/354
Long-Duration Storage (MW/MWh Capacity)	5/54	3/33	7/53	7/53
Total Storage (MW/MWh Capacity)	32/144	28/106	96/407	96/407
Renewable Energy (GWh)	163	113	510	510
Renewable Energy Mix	Solar: 57% In-State Wind: 24% Out-of-State Wind: 19%	Solar: 76% In-State Wind: 19% Out-of-State Wind: 5%	Geothermal: 3% Solar: 79% In-State Wind: 18%	Geothermal: 3% Solar: 79% In-State Wind: 18%
Shed Demand Response (MW)	0.6	0.6	-	-

As the table shows, DCE's conforming portfolios add much more short-duration storage capacity and renewable energy than DCE's load ratio share of the RSPs. DCE's 38 MMT conforming portfolio also includes about the same amount of long duration storage capacity as its load ratio share of the 38 MMT RSP and the 46 MMT conforming portfolio includes more long duration storage capacity as its load ratio share of the 46 MMT RSP.

The mix of renewable energy for each portfolio is not quite the same as the RSPs. First, DCE includes new geothermal development, which is not included in the RSPs, but should contribute to grid reliability. Second, the 38 MMT Portfolio includes more solar than the 38 MMT RSP and no out-of-state wind. This reflects DCE's preference for local resources, and all solar is assumed to be paired with storage so that it can avoid curtailment.

DCE does not include any shed demand response (DR) resources in its portfolios because they were constructed primarily for meeting emissions goals and shed DR does not provide much energy to reduce emissions. DCE is planning to explore DR programs for its customers in the future and will report on such programs in future IRPs.

[6] These resource categories and those in Table 15 roughly correspond to those listed in ordering paragraph six of D. 20-03-028, with shed demand response as the only resource in the "Other Resources" category. Hybrid resources are omitted because they are not included in the RSPs, but DCE solar + storage resources are assumed to be hybrid resources for purposes of estimating RA contributions.

b. Preferred Conforming Portfolios

The CPUC requires each LSE to select one conforming portfolio to be its preferred conforming portfolio for each assigned GHG emissions benchmark. Because DCE only modeled one conforming portfolio for each benchmark, each portfolio is considered a "preferred conforming portfolio" for IRP compliance purposes and each should adequately address all requirements in Public Utility Code Section 454.52(a)(1). DCE also prefers the 38 MMT Portfolio to the 46 MMT Portfolio because it reflects its internal procurement goal to be 100% renewable through significant development of local renewable resources.

As shown in the next section, the 38 MMT Portfolio has emissions below its assigned benchmark. DCE does not anticipate this portfolio will operate significantly differently from a reliability perspective depending on whether other LSEs procure in a manner consistent with a 46 MMT or 38 MMT target for the following reasons:

- Its new solar resources will all be backed by battery storage to avoid curtailment.
- DCE includes geothermal resources and long duration storage resources, which will contribute to grid reliability.
- DCE plans to have RA-only contracts with natural gas resources to support grid reliability.

DCE acknowledges that increased procurement of wind, solar, and battery resources could cause the effective load carrying capability of those resource types to decrease but did not attempt to quantify that for purposes of this IRP. However, DCE emphasizes its commitment to meeting all CPUC reliability requirements in its future procurement. DCE acknowledges the uncertainty in those requirements and may need to change its future procurement targets to accommodate those requirements. DCE will report on this in its next IRP prior to any further long-term contracting.

c. GHG Emissions Results

The table below shows the GHG emissions results for both DCE conforming portfolios as output by the CPUC's CSP calculator. (The load modeling assumptions used for the calculator are described in Section IIb above.) The 38 MMT Portfolio has emissions below the benchmark. The 46 MMT portfolio has emissions at the benchmark, as required by the CPUC.

Table 8. DCE GHG Emissions Results.

CO_2	*Unit*	2020	2022	2026	2030	GHG Emissions Benchmark*
38 MMT Portfolio	*MMt/yr*	0.0228	0.0346	0.0479	0.0593	0.0693
46 MMT Portfolio	*MMt/yr*	0.0231	0.0347	0.0494	0.0873	0.0873

*Net of BTM CHP emissions.

Despite DCE's aggressive renewable procurement goals in 2030, the 38 MMT Portfolio emissions are not zero. This is because: a) the Desert Saver portfolio continues to rely on system power, and b) the 100% renewable target for the Carbon Free portfolio is on an annual basis whereas emissions are calculated on an hourly basis. Some hours have lower emissions reduction potential than other hours

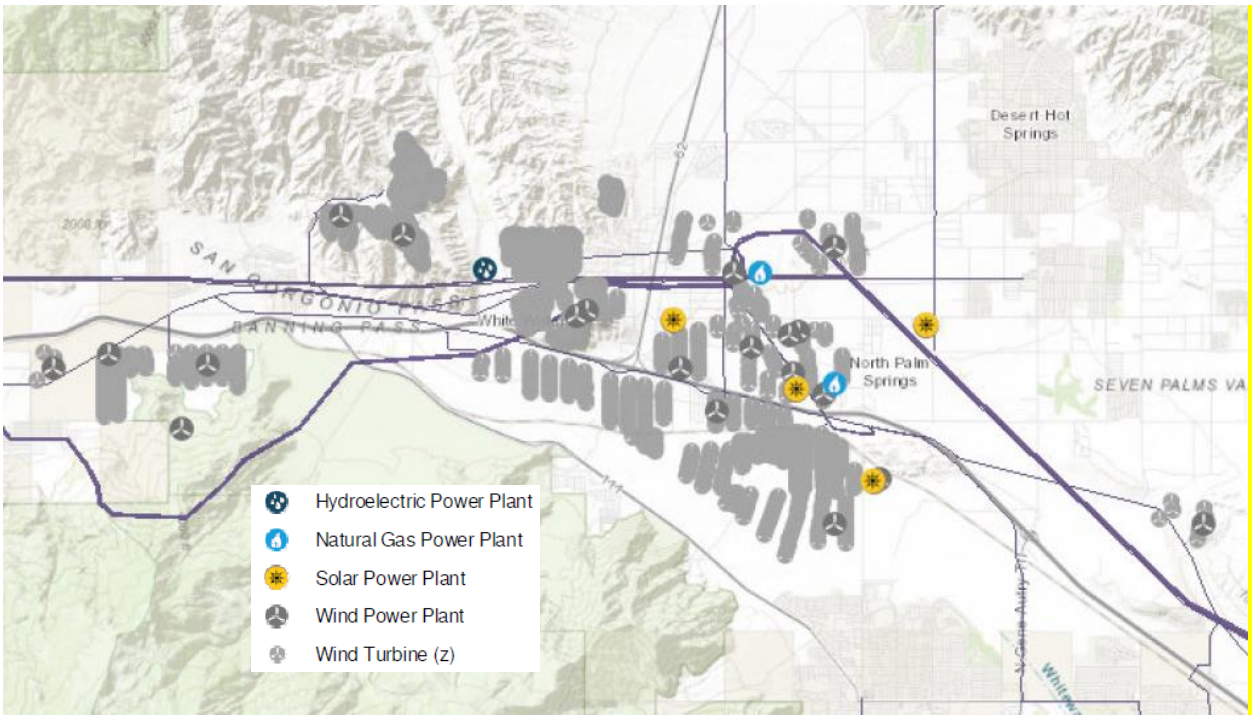
in the CPUC's CSP methodology. Emissions also increase between 2026 and 2030 despite the new renewable generation added to DCE's portfolio. This is due to the reduction of hydro generation in the portfolio. However, DCE anticipates that the hydro generation will continue to supply other LSEs and will not be retired, thus emissions for the system will decline in this period. The increase is only a reflection of how emissions are accounted for in the CPUC's CSP calculator.

d. Local Air Pollutant Minimization and Disadvantaged Communities

i. Local Air Pollutants

The Coachella Valley desert climate creates excellent conditions for renewable energy development. There is a significant amount of generation already in the Coachella Valley, especially near North Palm Springs. This includes several wind farms, multiple solar farms and natural gas-fired plants, as well as one small hydro plant. The map below from the Energy Information Administration (EIA) shows the general location of these facilities.

Figure 8. Map of local generation resources.



The largest natural gas-fired station in the local area is the Sentinel Energy Center, an 800 MW facility in North Palm Springs.

Table 9 shows emissions results for local criteria air pollutants for each DCE portfolio. Results are generated by the CPUC CSP calculator using assumed hourly emissions rates. All emissions are from system power, and thus will be spread throughout the state of California, and not just the Coachella Valley. The Action Plan in Section IV of the IRP discusses how DCE expects to reduce reliance on system power.

Table 9. DCE Portfolio local criteria air pollutant emissions.

	Emissions Total	*Unit*	2020	2022	2026	2030
46 MMT Portfolio	PM2.5	*tonnes/yr*	1.2	1.9	2.1	3.9
	SO_2	*tonnes/yr*	0.1	0.2	0.2	0.4
	NO_x	*tonnes/yr*	3.4	4.9	5.1	7.8
38 MMT Portfolio	PM2.5	*tonnes/yr*	1.2	1.9	2.1	2.6
	SO_2	*tonnes/yr*	0.1	0.2	0.2	0.3
	NO_x	*tonnes/yr*	3.4	4.8	5.2	4.9

Both portfolios include plans for contracts with local resources, both new and existing. DCE plans to pursue continued development of new renewable resources in the Coachella Valley area. Such development is expected to reduce emissions and provide local economic development. DCE does not plan to contract with any new local fossil fuel resources. Thus, when customers elect to take service from DCE, it should not increase local emissions, and it may decrease local emissions, depending on how new renewable development impacts the dispatch of local natural gas-fired generation.

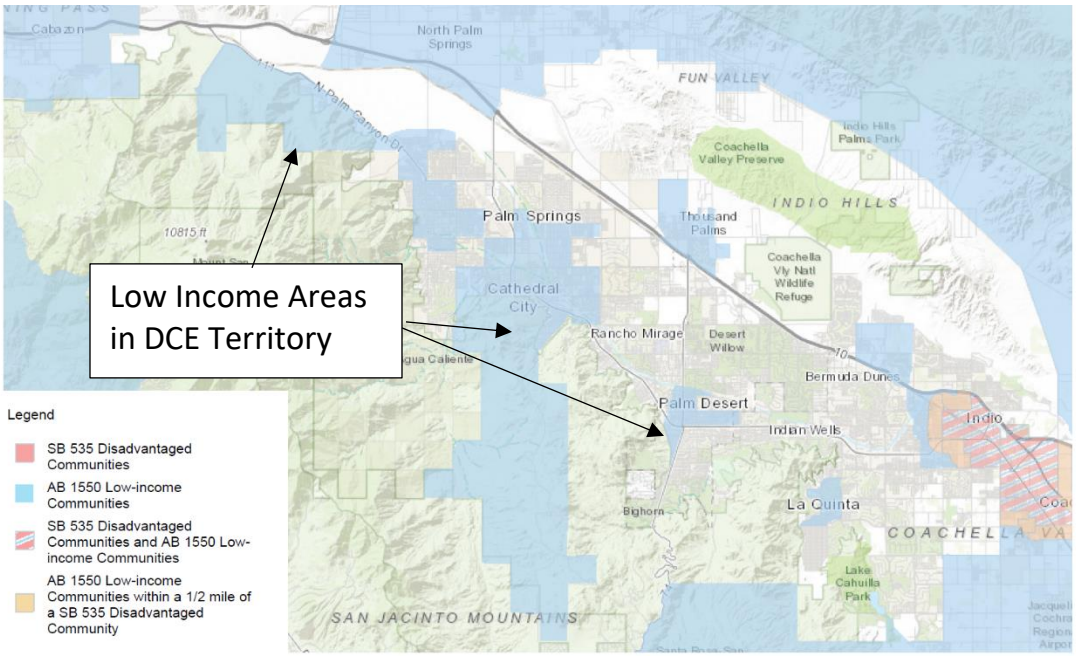
ii. Focus on Disadvantaged Communities

DCE's service territory lies within Riverside County's Coachella Valley. The valley has long been and continues to be a popular winter tourist destination and is home to a diverse population year-round. It is also known as a retirement haven and has a large population of people over 65.

DCE identified 81 census tracts that at least partially overlap with DCE's three-city service territory. Based on the CPUC's definition of a disadvantaged community, which relies on CalEnviroScreen, none of the identified census tracts qualify as disadvantaged communities. However, there are 28 census tracts that at least partially overlap with areas considered low income under AB 1550. Figure 9 shows these areas graphically.

The DCE service territory also includes Tribal lands of the Agua Caliente Band of Cahuilla Indians. The Tribe itself is a direct access customer for most of their facilities (offices, casino etc.), and will not be enrolled automatically in DCE. Due to the checkerboard pattern of the Reservation lands, many DCE customers in Palm Springs reside on Tribal leased land.

Figure 9. Map of low-income communities in DCE service territory.



Although DCE does not serve any disadvantaged communities based on the definition used for IRP purposes, the greenhouse gas emissions reduction and air quality improvements associated with DCE's conforming portfolios are expected to benefit the low income and disadvantaged communities in the region, even though they may be outside the DCE territory. DCE has also focused on programs that would assist low income and disadvantaged communities. DCE initiated an outreach program to encourage income eligible customers who are not currently enrolled in utility discount programs to sign up. These programs include California Alternate Rates for Energy (CARE) that reduces energy bills for eligible customers by about 30% and Family Electric Rate Assistance (FERA) which provides an approximate 18% bill discount. CARE customers account for 16% of all customers in Palm Springs. DCE procurement efforts have emphasized local projects that will bring local jobs and economic benefits to the community.

e. Cost and Rate Analysis

DCE's rate setting has the following objectives:

- Rate competitiveness
- Rate stability
- Equity among customers
- Customer understanding
- Revenue sufficiency

Each objective is described in more detail in DCE's Implementation Plan.[7] DCE intends to modify its procurement goals if necessary to achieve these objectives.

DCE has adopted rate designs and rates based on SCE's current rates. The Desert Saver product is currently priced 1.5% below SCE's rates and the Carbon Free product is priced about 2.5% above SCE's rates on a total bill basis. Over time, DCE will consider adopting unique rate designs. Rate setting will typically be done once per year in an open and transparent process culminating in a Board decision each January. The Board retains the right to change rates at any time if circumstances warrant.

DCE's Board has approved the following rates for domestic (residential) customers in 2020: $0.06808/kWh for Desert Saver customers and $0.07736/kWh for customers electing Carbon Free power. All other rates, including time-of-use rates and commercial rates are available on DCE's website.[8]

DCE is offering a NEM program that will match SCE's rates for surplus production exported to the grid. Existing SCE NEM customers will be automatically enrolled. DCE will also continue SCE's FERA, CARE, and Medical Baseline programs for low-income customers and those with medical limitations. Such customers are defaulted to the Carbon Free product, but at the lower Desert Saver rate.

As described in more detail in the Implementation Plan,[9] DCE expects positive cash flows in the near term and will use these revenues to build a rate-stabilization or reserve fund, as well as build DCE's credit profile.

Cost Impacts of New Procurement

With current prices of renewable and carbon-free energy, DCE fully expects it can meet its current procurement objectives as embedded in the 38 MMT portfolio as well as its rate objectives. DCE has based its analysis for the cost impact of its highly green portfolio on both the general California market price data its portfolio manager, The Energy Authority, has observed historically, along with pricing data it collected from the robust response to its 2020 Renewable RFO. DCE estimates that the cost savings over the lifetime of the Power Purchase Agreements (PPAs) from its shortlisted contracts will be between $60 million and $80 million compared to the expected cost of the same quantity of short-term market purchases. Should market conditions change, the 46 MMT portfolio serves as a guidepost for an alternative portfolio that may allow DCE to meet is rate objectives, while achieving California's green power mandates.

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[7] Available on DCE's website at https://desertcommunityenergy.org/wp-content/uploads/2018/05/DCE_Implementation-Plan.pdf. See descriptions of the rate setting objectives beginning on page 27.

[8] See https://desertcommunityenergy.org/billing-rates/.

[9] See Chapter 7: Financial Analysis.

f. System Reliability Analysis

DCE is committed to procuring resource adequacy (RA) to meet all CPUC requirements and contribute its fair share to grid reliability.

Because DCE just launched service in April, DCE reached an agreement with SCE in October 2019, such that SCE will be responsible for meeting DCE's resource adequacy requirements through 2020. SCE will also be responsible for procuring incremental RA on behalf of DCE for purposes of meeting the November IRP procurement order requirements.[10]

Beginning in the 2021 compliance year, DCE will procure sufficient RA products to meet its RA requirements. RA procurement is currently ongoing on two fronts. First, DCE intends to procure all of the RA provided by the resources in its RFO shortlist. The net qualifying capacity (NQC) values of the new resources not yet online is estimated at this time. However, all developers have received full deliverability status from CAISO, so their NQC values should be the same for all other resources of the same technology type. Second, DCE has begun soliciting RA products through short-term contracts, with contracts with one counterparty currently in negotiation, and another RA solicitation scheduled to launch in August.

With the anticipated upcoming changes to the RA market, including from rule changes and the ongoing discussion over the role and formation of a central procurement entity, it is difficult to forecast RA procurement over the long-term. Nonetheless, DCE has created an RA tracking table for each conforming portfolio per the CPUC's instructions, which are shown below. The RA portfolios in the tracking tables below include the following:

- DCE's allocated share of resources subject to the cost allocation mechanism (CAM). Per the CPUC's IRP filing requirements instructions, DCE included a share of all SCE CAM resources in the most recent year-ahead CAM list.[11] The share is estimated as the ratio of DCE's load to the SCE transmission access charge area peak demand listed in the resource data template. The tracking table lists these resources as unknown ELCC type with contract type online.
- DCE's allocated share of SCE demand response resources. For purposes of the RA tracking table, the 2021 initial allocation was held constant through 2030 and is reported as an unknown ELCC type with contract type online.
- DCE's agreement with Southern California Edison (SCE) that SCE will supply SCE's resource adequacy for compliance year 2020. The tracking table lists these resources as unknown ELCC type with contract type online.
- The resources SCE will procure on DCE's behalf in response to D.19-11-016 from the CPUC requiring incremental procurement of resource adequacy. The CPUC provided DCE with information about what resources to assume will be procured by SCE for IRP planning purposes.

[10] D.19-11-016.

[11] CAM resources are included through the contract expiration date listed on the year ahead list.

- An estimated amount of RA to be procured from DCE's 2020 RFO Shortlist Resources and future RFO resources. Because the NQC and EFC of these resources is not yet set, DCE assumed the following:
  - New solar plus storage hybrid resource RA would be limited to the battery capacity multiplied by the battery ELCC curves from the CPUC's resource data template.[12] These resources are listed as unknown ELCC type in the tables.
  - All other resources would have RA based on the assumed maximum capacity of the resource multiplied by the ELCC curves from the CPUC's resource data template.
- To the extent there is still a gap in RA procurement needs, DCE assumes it will procure System RA using short-term, RA-only contracts from existing gas resources. These are planned existing contracts for thermal resources in the tracking tables.

[12] D.20-06-031 provides a methodology for estimating the NQC of hybrid resources. DCE has elected not to estimate the NQC using this method for IRP purposes, and instead uses only the battery capacity as a conservative estimate. DCE will provide the requested information in the unique contracts tab of the resource data template that will allow the CPUC to calculate the NQC value of these resources using the D.20-06-031 methodology.

Table 10. RA Tracking Table for 38 MMT Portfolio.

System Reliability Progress Tracking Table (NQC MW) for month of September by contract status, 38 MMT portfolio	ELCC type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
online	wind_low_cf	-	-	-	-	-	-	-	-	-	-	-
online	wind_high_cf	-	-	-	-	-	-	-	-	-	-	-
online	biomass	-	-	-	-	-	-	-	-	-	-	-
online	cogen	-	-	-	-	-	-	-	-	-	-	-
online	geothermal	-	-	-	-	-	-	-	-	-	-	-
online	hydro	-	-	-	-	-	-	-	-	-	-	-
online	thermal	-	-	-	-	-	-	-	-	-	-	-
online	battery	-	-	-	-	-	-	-	-	-	-	-
online	nuclear	-	-	-	-	-	-	-	-	-	-	-
online	solar	-	-	-	-	-	-	-	-	-	-	-
online	psh	-	-	-	-	-	-	-	-	-	-	-
online	unknown	116	33	28	18	17	17	17	16	16	16	16
development	wind_low_cf	-	-	-	-	-	-	-	-	-	-	-
development	wind_high_cf	-	-	-	-	-	-	-	-	-	-	-
development	biomass	-	-	-	-	-	-	-	-	-	-	-
development	cogen	-	-	-	-	-	-	-	-	-	-	-
development	geothermal	-	-	-	-	-	-	-	-	-	-	-
development	hydro	-	-	-	-	-	-	-	-	-	-	-
development	thermal	-	-	-	-	-	-	-	-	-	-	-
development	battery	-	-	-	-	-	-	-	-	-	-	-
development	nuclear	-	-	-	-	-	-	-	-	-	-	-
development	solar	-	-	-	-	-	-	-	-	-	-	-
development	psh	-	-	-	-	-	-	-	-	-	-	-
development	unknown	-	-	-	-	-	-	-	-	-	-	-
review	wind_low_cf	-	2	2	3	4	5	5	5	5	5	5
review	wind_high_cf	-	-	-	-	-	-	-	-	-	-	-
review	biomass	-	-	-	-	-	-	-	-	-	-	-
review	cogen	-	-	-	-	-	-	-	-	-	-	-
review	geothermal	-	-	-	-	-	-	-	-	-	-	-
review	hydro	-	-	-	-	-	-	-	-	-	-	-
review	thermal	-	-	-	-	-	-	-	-	-	-	-
review	battery	-	1	1	1	1	1	1	1	1	1	1
review	nuclear	-	-	-	-	-	-	-	-	-	-	-
review	solar	-	-	-	-	-	-	-	-	-	-	-
review	psh	-	-	-	-	-	-	-	-	-	-	-
review	unknown	-	4	4	86	86	86	86	85	83	82	81
planned_existing	wind_low_cf	-	-	-	-	-	-	-	0	1	1	2
planned_existing	wind_high_cf	-	-	-	-	-	-	-	-	-	-	-
planned_existing	biomass	-	-	-	-	-	-	-	-	-	-	-
planned_existing	cogen	-	-	-	-	-	-	-	-	-	-	-
planned_existing	geothermal	-	-	-	-	-	-	-	-	-	-	-
planned_existing	hydro	-	-	-	-	-	-	-	0	1	1	2
planned_existing	thermal	-	97	101	25	26	26	26	23	20	17	14
planned_existing	battery	-	-	-	-	-	-	-	-	-	-	-
planned_existing	nuclear	-	-	-	-	-	-	-	-	-	-	-
planned_existing	solar	-	-	-	-	-	-	-	1	1	2	2
planned_existing	psh	-	-	-	-	-	-	-	-	-	-	-
planned_existing	unknown	-	-	-	-	-	-	-	-	-	-	-
planned_new	wind_low_cf	-	-	-	-	-	-	-	0	1	1	2
planned_new	wind_high_cf	-	-	-	-	-	-	-	-	-	-	-
planned_new	biomass	-	-	-	-	-	-	-	-	-	-	-
planned_new	cogen	-	-	-	-	-	-	-	-	-	-	-
planned_new	geothermal	-	-	-	-	-	-	-	0	1	1	2
planned_new	hydro	-	-	-	-	-	-	-	-	-	-	-
planned_new	thermal	-	-	-	-	-	-	-	-	-	-	-
planned_new	battery	-	-	2	4	4	4	4	4	4	4	4
planned_new	nuclear	-	-	-	-	-	-	-	-	-	-	-
planned_new	solar	-	-	-	-	-	-	-	-	-	-	-
planned_new	psh	-	-	-	-	-	-	-	-	-	-	-
planned_new	unknown	-	-	-	-	-	-	-	3	6	9	12

Table 11. RA Tracking Table for 46 MMT Portfolio.

System Reliability Progress Tracking Table (NQC MW) for month of September by contract status, 46 MMT portfolio	ELCC type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
online	wind_low_cf	-	-	-	-	-	-	-	-	-	-	-
online	wind_high_cf	-	-	-	-	-	-	-	-	-	-	-
online	biomass	-	-	-	-	-	-	-	-	-	-	-
online	cogen	-	-	-	-	-	-	-	-	-	-	-
online	geothermal	-	-	-	-	-	-	-	-	-	-	-
online	hydro	-	-	-	-	-	-	-	-	-	-	-
online	thermal	-	-	-	-	-	-	-	-	-	-	-
online	battery	-	-	-	-	-	-	-	-	-	-	-
online	nuclear	-	-	-	-	-	-	-	-	-	-	-
online	solar	-	-	-	-	-	-	-	-	-	-	-
online	psh	-	-	-	-	-	-	-	-	-	-	-
online	unknown	116	33	28	18	17	17	17	16	16	16	16
development	wind_low_cf	-	-	-	-	-	-	-	-	-	-	-
development	wind_high_cf	-	-	-	-	-	-	-	-	-	-	-
development	biomass	-	-	-	-	-	-	-	-	-	-	-
development	cogen	-	-	-	-	-	-	-	-	-	-	-
development	geothermal	-	-	-	-	-	-	-	-	-	-	-
development	hydro	-	-	-	-	-	-	-	-	-	-	-
development	thermal	-	-	-	-	-	-	-	-	-	-	-
development	battery	-	-	-	-	-	-	-	-	-	-	-
development	nuclear	-	-	-	-	-	-	-	-	-	-	-
development	solar	-	-	-	-	-	-	-	-	-	-	-
development	psh	-	-	-	-	-	-	-	-	-	-	-
development	unknown	-	-	-	-	-	-	-	-	-	-	-
review	wind_low_cf	-	2	2	3	4	5	5	5	5	5	5
review	wind_high_cf	-	-	-	-	-	-	-	-	-	-	-
review	biomass	-	-	-	-	-	-	-	-	-	-	-
review	cogen	-	-	-	-	-	-	-	-	-	-	-
review	geothermal	-	-	-	-	-	-	-	-	-	-	-
review	hydro	-	-	-	-	-	-	-	-	-	-	-
review	thermal	-	-	-	-	-	-	-	-	-	-	-
review	battery	-	1	1	1	1	1	1	1	1	1	1
review	nuclear	-	-	-	-	-	-	-	-	-	-	-
review	solar	-	-	-	-	-	-	-	-	-	-	-
review	psh	-	-	-	-	-	-	-	-	-	-	-
review	unknown	-	4	4	86	86	85	83	83	83	83	83
planned_existing	wind_low_cf	-	-	-	-	-	-	-	-	-	-	-
planned_existing	wind_high_cf	-	-	-	-	-	-	-	-	-	-	-
planned_existing	biomass	-	-	-	-	-	-	-	-	-	-	-
planned_existing	cogen	-	-	-	-	-	-	-	-	-	-	-
planned_existing	geothermal	-	-	-	-	-	-	-	-	-	-	-
planned_existing	hydro	-	-	-	-	-	-	-	-	-	-	-
planned_existing	thermal	-	97	101	25	26	27	29	26	23	20	16
planned_existing	battery	-	-	-	-	-	-	-	-	-	-	-
planned_existing	nuclear	-	-	-	-	-	-	-	-	-	-	-
planned_existing	solar	-	-	-	-	-	-	-	-	-	-	-
planned_existing	psh	-	-	-	-	-	-	-	-	-	-	-
planned_existing	unknown	-	-	-	-	-	-	-	-	-	-	-
planned_new	wind_low_cf	-	-	-	-	-	-	-	0	1	1	2
planned_new	wind_high_cf	-	-	-	-	-	-	-	-	-	-	-
planned_new	biomass	-	-	-	-	-	-	-	-	-	-	-
planned_new	cogen	-	-	-	-	-	-	-	-	-	-	-
planned_new	geothermal	-	-	-	-	-	-	-	0	1	1	2
planned_new	hydro	-	-	-	-	-	-	-	-	-	-	-
planned_new	thermal	-	-	-	-	-	-	-	-	-	-	-
planned_new	battery	-	-	2	4	4	4	4	4	4	4	4
planned_new	nuclear	-	-	-	-	-	-	-	-	-	-	-
planned_new	solar	-	-	-	-	-	-	-	-	-	-	-
planned_new	psh	-	-	-	-	-	-	-	-	-	-	-
planned_new	unknown	-	-	-	-	-	-	-	3	6	10	13

DCE will report back in future IRPs regarding RA procurement once more is known about the system reliability requirements.

g. Hydro Generation Risk Management

Hydro Generation Risk Background

There are two fundamental issues with regard to hydro risk management. The first relates to the limited availability of new hydro development. The second relates to the annual variability in hydro generation. Both will be discussed in turn below.

Hydro Availability

Other than some ongoing development of new large hydro resources in Canada, there is little to no development of new hydro resources in North America. This is largely due to a lack of available sites to build new facilities and concerns over the environmental impacts of creating new impoundments.

However, the existing hydro fleet is expected to continue to provide significant benefits in terms of low-cost, flexible, carbon-free generation. As decarbonization mandates intensify over the coming years, resource planners anticipate hydro generation resources will be in high demand. The problem is that if enough LSEs plan to rely on hydro to meet green power goals, there may be inadequate hydro available to supply this demand, which would ultimately lead to inadequate development of new, non-hydro, carbon-free resources. Thus, for IRP purposes, LSEs are required to assess their reliance on hydro generation.

Hydro Variability

The amount of generation supplied by a hydro facility may vary year-to-year because of variation in water supply. The volume of water available to flow through a hydro turbine determines how much electric generation a hydro facility will produce. In a drought, there will be reduced water supply available for generation. In some hydro systems, large reservoirs can hold water multiple years, including from wet years into dry years, to average out the impact of drought through time. California's hydro system does not have such water storage capacity, so the hydro generation varies year-to-year based on hydrological conditions. The chart below shows how during recent droughts, California's hydro generation has decreased.

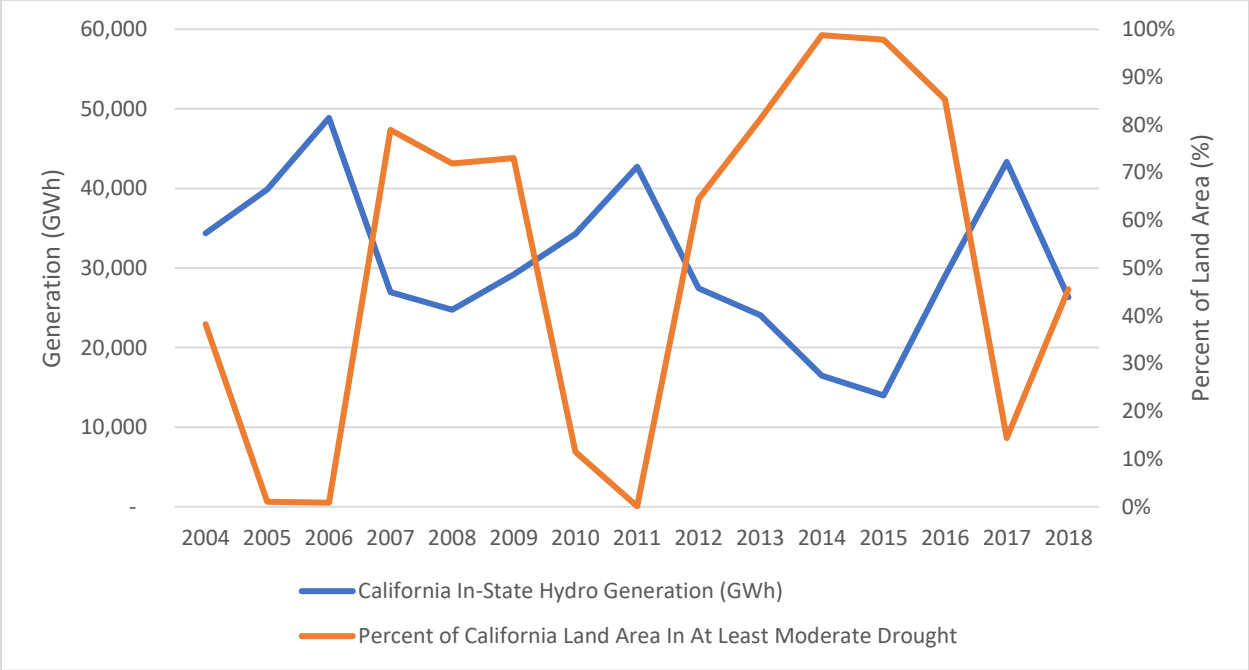

Figure 10. California In-State Hydro Generation compared to percent of California land area in at least moderate drought for 15 years.[13]

Though drought also impacts generation from hydro facilities in the Pacific Northwest region, for purposes of IRP, LSEs are only required to discuss strategies to mitigate the risk from in-state drought.

DCE Hydro Generation Risk

As discussed above, DCE currently relies on imported large hydro to meet about 50% of its Carbon Free product portfolio. It also relies on some small hydro imports for RPS compliance. It does not rely on in-state hydro resources. DCE is committed to reducing reliance on large hydro over time and instead relying on renewable resources to meet its Carbon Free procurement objectives. Reliance on large hydro is expected to decline as the 2020 RFO Shortlist Resources come online in the coming years. DCE also plans to further reduce reliance on hydro through procurement of more renewable resources in another RFO, with the aspirational goal of no large hydro reliance in 2030. This is reflected in both conforming portfolios in the IRP. DCE is open to continued procurement of small hydro resources, but has limited reliance on small hydro for 2030 planning purposes to its load ratio share of the existing small hydro fleet. DCE has also chosen not to include any new large hydro resources in its portfolio.

[13] Generation data from CEC at: https://ww2.energy.ca.gov/almanac/electricity_data/total_system_power.html; Drought index data from: https://www.drought.gov/drought/states/california.

The chart below compares the reliance on hydro in the RSPs and DCE's conforming portfolios over time. For purposes of the chart, hydro reliance is measured as DCE's hydro purchases as a percent of DCE's retail sales for its conforming portfolios compared to the hydro generation in the reference system portfolios as a percent of total CAISO retail sales. Although DCE relies on hydro to a much greater extent than the RSPs currently, this reliance is cut to 27% by 2024 when the 2020 RFO Shortlist Resources are fully online. By 2030, the conforming portfolios reflect DCE's aspirational goal to reduce large hydro reliance to zero.[14] Thus, meeting the 2030 GHG emissions benchmark with these portfolios is not dependent on hydro availability.

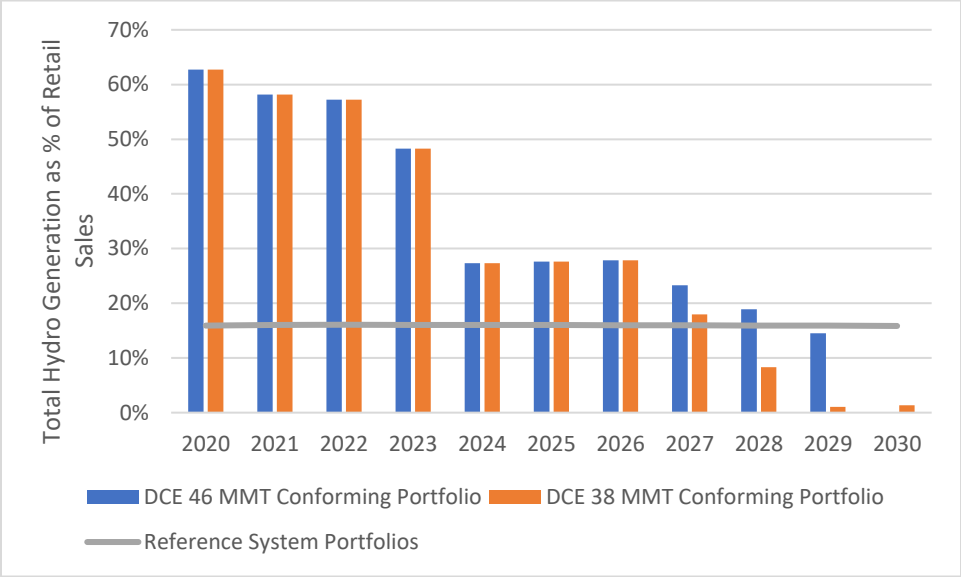

Figure 11. Comparison of hydro reliance in reference system portfolios (CAISO system) and DCE's conforming portfolios. Hydro purchases include all imported hydro, small hydro, and large hydro.

With regard to the risk from hydro variability and drought, currently DCE relies on imported hydro resources and not in-state hydro resources. To date, DCE has only bought hydro from counterparties guarantying a certain amount or range of amounts of energy delivery. The majority of sellers DCE has procured from are out-of-state generation owners. In-state hydro generation owners are typically investor-owned utilities who are not often offering to sell, perhaps to mitigate their own risk of drought versus a guaranteed delivery contract. For IRP planning purposes, DCE assumes its reliance on imported hydro will continue, and thus will not rely on in-state hydro subject to drought risk in California. However, DCE is still open to procurement from in-state hydro generation and will report back on this issue in future IRPs.

[14] As modeled the 46 MMT portfolio has zero reliance on hydro in 2030. The 38 MMT portfolio includes DCE's load ratio share of existing small hydro, which amounts to only 1% of DCE's retail sales.

h. Long-Duration Storage Development

The CPUC defines long-duration storage as 8-12 hour duration.[15] DCE actively sought offers for 8-hour battery storage in its recent RFO. However, such resources were not selected due to cost concerns, though 4-hour storage batteries are included in the shortlist of resources. In its next RFO, DCE expects to continue to seek offers for 8-hour battery storage and included such storage in its conforming portfolios beginning in 2027. As Table 7 above shows, the amount included in 2030 is about equal to or greater than DCE's load ratio share of the long-duration storage in the RSPs. However, the final mix of resources to be procured is unknown, and this only reflects an assumption that some long-duration storage will eventually be necessary for grid reliability and renewable integration. As described more fully in the Lessons Learned section of the IRP, DCE requests the CPUC provide clearer guidance on the benefits long-duration storage is expected to provide to the grid. This guidance would allow DCE to consider how best to meet the needs of the grid through future procurement, whether through long-duration storage or alternative technologies, including geothermal, which is not included in the RSP.

DCE is also monitoring the responses to the recent request for information (RFI) for long duration storage[16] issued by several other CCAs. The responses to the RFI may generate interest in a joint procurement by CCAs for a larger long-duration storage project, such as pumped storage. DCE will report back on this in future IRPs.

i. Out-of-State Wind Development

DCE prefers to procure resources local to its service territory, but it still allowed out-of-state wind developers to submit responses to its most recent RFO. One out-of-state wind resource did submit an offer, but it was not selected both due to cost and the availability of wind located directly in Palm Springs. DCE anticipates it will continue to be open to offers for out-of-state wind, but also continue to preference local resources. As described above for long-duration storage and described more fully in the Lessons Learned section of the IRP, DCE requests the CPUC provide clearer guidance on the benefits out-of-state wind is expected to provide to the grid so that it may consider how best to meet the needs of the grid through future procurement.

j. Transmission Development

The table below summarizes the location information of the new RFO resources. For modeling purposes, RESOLVE areas were selected based on the physical location of the resource as compared

[15] D. 20-03-028, p. 63: "…long-duration storage, defined as able to provide 8-12 hours of storage…".

[16] The RFI is available at https://www.mcecleanenergy.org/wp-content/uploads/2020/06/MCE-2020-Joint-CCAs-Long-Duration-Storage-RFI_061720.pdf.

to the physical boundaries of the transmission areas in the map of in-state transmission zones in RESOLVE.[17]

Table 12. New RFO Resource Location Information.

Resource	Resource Type	Location	CAISO Queue Position	Coordinates	RESOLVE Area
Victory Pass I	New Solar + Storage	Desert Center, Riverside County, CA	Q1200	Lat: 33.698958 Long: -115.312892	Riverside-Palm Springs
Deer Creek Solar I	New Solar + Storage	Terra Bella, Tulare County, CA	WDT1384	Lat: 35.972286 Long: -119.0639104	Northern California Outside Transmission Constraint Zones
Coachella Hills Wind II	New Wind	Palm Springs, Riverside County, CA	1429	Lat: 33.935506 Long: -116.6436111	Riverside-Palm Springs

For the generic new resources, the conforming portfolios reflect DCE's preference for local resources. Thus, new solar and wind were assumed to be located in the RESOLVE Riverside-Palm Springs transmission subarea.[18] The new geothermal is assumed to be in the Greater Imperial Valley area. However, DCE is open to other resource locations to balance other preferences and goals, including reducing cost and interconnection availability. For instance, the RFO shortlist includes a new solar resource in Tulare County. This project was selected in part due to its locational diversification benefit which complements the other selected resources. Therefore, these generic resource locations should not be considered firm, but aspirational.

[17] CPUC, "2019-2020 Inputs and Assumptions," Figure 4.1, p. 38, available at ftp://ftp.cpuc.ca.gov/energy/modeling/Inputs%20%20Assumptions%202019-2020%20CPUC%20IRP%202020-02-27.pdf.

[18] The CSP emissions calculator aggregates the Riverside-Palm Springs subarea into the Southern California and Southern Nevada Desert region. RESOLVE did not include the Riverside-Palm Springs are for wind development, so for the resource data template, Coachella Hills Wind II, was placed into the Southern California and Southern Nevada Desert RESOLVE region.

IV. Action Plan

a. Proposed Activities

DCE's procurement is ongoing. Further detail on the schedule of procurement activity is provided below under Procurement Activities. The Procurement Activities section below also includes a table showing what procurement activity will be necessary to procure all planned resources included in each IRP portfolio. DCE is not actively procuring incremental RA per the recent procurement order (D.19-11-016), as SCE is doing that procurement on its behalf.

DCE's communities have been and will continue to be active participants in local environmental planning, including electric service improvements. Notably, the municipalities within DCE's service area have conducted detailed greenhouse gas inventory analyses and adopted municipal energy action plans designed to reduce energy usage, promote energy efficiency, and support the deployment of electric vehicles through 2020. All three cities have adopted Climate Action Plans, with a goal to reduce greenhouse gas emissions to 1990 levels. In addition, Cathedral City, Palm Desert, and Palm Springs were members of the Desert Cities Energy Partnership, which was a local government partnership comprised of Blythe, Cathedral City, Desert Hot Springs, Indian Wells, Palm Springs, Rancho Mirage, Agua Caliente Band of Cahuilla Indians, La Quinta, Coachella, Indio, Southern California Gas Company (SoCalGas), Imperial Irrigation District (IID), and Southern California Edison (SCE). The local government partnership program was concluded in December 2019 and the Desert Cities Energy Partnership completed its efforts.

The Desert Cities Energy Partnership assisted local governments to effectively lead their communities to increase energy efficiency, reduce greenhouse gas emissions, increase renewable energy usage, protect air quality and ensure that their communities are more livable and sustainable. This Partnership focused on installing measurable and effective energy efficiency and conservation devices for the benefit of the cities, their constituencies, the State of California, and California IOU ratepayers. Partnership activities focused on implementing energy efficiency measures in municipal facilities but also promote energy efficiency community-wide. The partnership established energy savings goals through city-identified projects, funded by partnership incentives and technical assistance. The partnership supported city and community energy efficiency efforts through marketing and outreach funds.

A Plug-in Electric Vehicle Readiness Plan was adopted by Coachella Valley Association of Governments in 2014; DCE member agencies were participants in the PEV plan. These activities leave DCE well-positioned to achieve continued energy efficiency improvements and gains in electric vehicle use in the future consistent with the default demand assumptions in Figure 2.

The Coachella Valley Association of Governments is currently pursuing establishment of a Regional Energy Network (REN) that will provide opportunities for energy efficiency and energy-related workforce development in our region. The REN is being developed in partnership with Western Riverside Council of Governments and San Bernardino Associated Governments. The business plan is now in development and could be approved in 2021, pending possible delays related to COVID-19.

The REN would provide opportunities for collaborative efforts with DCE. DCE is also exploring the potential for an application to the CPUC for a CCA Energy Efficiency program.

Expected Board agenda items in the near term, include the following:

- Consideration of alternative rate designs and NEM enhancements to encourage further distributed generation. Feed-in tariffs for local renewable generation will also be considered.
- Developing new energy efficiency programs that enhance, but do not duplicate, existing programs
- Adopting procurement guidelines for improving service to and providing economic development opportunities for local disadvantaged communities
- Approving long-term contracts for renewable energy stemming from DCE's recent RFO

The Board also intends to consider new programs, which could include demand response, electric vehicle incentives, building electrification, grid resiliency, and energy storage.

In addition, DCE offers its customers Net Energy Metering (NEM) service with grid exports compensated at a rate that matches the rate offered by SCE. This will allow customers to pair cleaner grid electricity with renewable energy generated on their premises and potentially support solar-related jobs in the region. The DCE Board plans to explore ways to incentivize rooftop solar, community solar, and other renewable electric generation systems in the future.

Finally, customers will continue to have access to important electric rate discounts under programs such as Medical Baseline and CARE/FERA, as well as potential new programs specific to DCE customers.

DCE expects similar programs and actions under either portfolio. The only significant difference would be the lower amount of renewable procurement necessary with the 46 MMT portfolio.

For the next IRP, DCE also plans to do a more detailed analysis of the optimum mix of resources to procure from its next RFO in order to meet its load. This will require specific analysis of its load shape compared to resource supply to reduce reliance on system power and maximize reductions to GHG and local criteria pollutant emissions. For instance, for this IRP, DCE assumed a generic mix of solar and wind resources based on the 46 MMT RSP, with 1 MW of storage added for every 2 MW of solar. This may not be optimal for meeting DCE load and can be analyzed further.

b. Procurement Activities

Long-Term PPA Procurement Activities

DCE issued its first RFO for Long Term Renewable PPAs in May 2020 and received a robust response. DCE staff presented a recommended shortlist of projects to the DCE Board in July 2020. With authorization from the DCE Board, negotiations with firms from this shortlist of projects are ongoing and should conclude in Q3 or Q4 2020. Procurement will be for all resource attributes, including energy and ancillary services, RECs, and RA. As described in Section III, both conforming portfolios include these shortlisted resources.

If Palm Desert or any other city commit to joining DCE's CCA load service at any point in 2022, then it is anticipated that DCE will issue another RFO for renewable resources in 2021. Barring any addition to DCE's load service territory, DCE will likely issue another RFO in 2022 for resources to reach the 100% renewable target by 2030. The existing and new generic resources that are added to each conforming portfolio beginning in 2027 are proxies for the resources that will be procured around this time. The actual mix of resources procured will depend on the responses received to the future RFO. The table below summarizes the assumed generic resources to be procured in the next RFO that are included in each conforming portfolio.

Table 13. Resources assumed to be procured in next RFO for long-term PPAs.

Resource Type	Assumed Location	Portfolio	Assumed Added to DCE Portfolio
New Solar + Storage	Riverside-Palm Springs	38 MMT Conforming Portfolio; 46 MMT Conforming Portfolio	Sometime between 2027 and 2030
New Wind	Riverside-Palm Springs		
New Geothermal	Greater Imperial Valley		
Existing Wind, Solar, Small Hydro	CAISO	38 MMT Portfolio	

Short-Term Contract Procurement Activities

Procurement for 2020 is completed. Some additional short-term procurement will be necessary to meet DCE's 50% renewable target for its Carbon Free product for years 2021-2023 as the RFO resources will not all be online until the end of 2023. Procurement for resource adequacy and large hydro energy will also be necessary over the next few years. The table below summarizes the schedule for these procurement activities.

Table 14. Procurement schedule for short-term products.

Resource Type	Assumed Resource Mix in Conforming Portfolios	Years Included in Conforming Portfolios	Procurement Schedule
PCC1 Energy and RECs	Existing Solar, Wind, & Small Hydro	2021-2023	As needed
Carbon Free Energy	Imported Large Hydro	2021-2029	As needed
Resource Adequacy	Existing Natural Gas	2021-2030	Feb, Aug, and Oct of each year for year ahead requirements, plus as needed for monthly requirements

c. Potential Barriers

Risks and barriers for each planned resource type in the 2030 conforming portfolios are discussed below, except for large hydro resources, which are discussed in detail in the Hydro Generation Risk Management section.

RFO Resources

The risks associated with the resources recently shortlisted for DCE's Renewable Resources falls into two primary categories: contractual risk and development risk. All four of the shortlisted projects face contractual risk, meaning that DCE and the developer of the project may not be able to finalize a PPA contract in the coming months as the negotiations proceed. To reduce this risk, DCE circulated a term sheet of key contractual terms as part of its RFO, and part of each project's qualitative score was based on redlines each developer submitted for their projects. Additionally, potential contracting hurdles were discussed in detail with each developer team as part of the shortlisting process. While the contractual risk for these projects has not been eliminated, there are no significant roadblocks to reaching a finalized PPA for each project. Development risk, meaning the risk that a project may not reach commercial operation due to site control failure, permitting failure, financing failure, construction failure, or other failure on the path from a project's conception to its commercial operation date, is a concern for the three new build projects on DCE's shortlist. To reduce this risk, DCE chose to shortlist projects that had clear paths forward for each of these potential obstacles (e.g. completed site control) and that had strong development teams with a history of bringing new renewable projects to commercial operation in California. DCE will continue to monitor the development of all of its shortlisted projects during the negotiation process as well as after PPAs are signed, and will report back on this in future IRPs.

Other Existing Wind, Solar, and Small Hydro

Because of the limited availability of existing renewable resources, DCE limited the contribution these resources could make to its 2030 portfolio to a load ratio share of the RSP amount. If existing resources are not available, DCE anticipates it will support new resource development instead. The final selection will depend on offers submitted to its next RFO. DCE understands that although the RSP assumed all existing renewable resources would remain online through 2030, such resources will require investment to avoid retirement. This includes the need for aging wind facilities to be repowered with newer turbines.

New Local Geothermal

DCE plans to support new local geothermal resources for the economic development and grid reliability benefits. Significant geothermal resources occur near the Salton Sea in adjacent Imperial County. While geothermal has desirable attributes, DCE limited the amount of new geothermal in its portfolio in recognition of the risk of higher costs compared to wind or solar and concern over the carbon emissions from geothermal facilities.[19] Geothermal was not included in the 2020 RFO because

[19] Certain closed-system geothermal facilities can produce energy without carbon emissions. Should such generation be available, DCE would consider expanding its geothermal procurement.

it is not carbon free. In the future, some geothermal could be included in the DCE portfolio for the Desert Saver product, if cost competitive. Should local geothermal not become available, DCE anticipates it would procure from the resource types included in its recent RFO, namely wind, solar, and small hydro.

Other New Local Solar

There is significant potential for low-cost, new solar development in the Southern California desert region, as evidenced by the robust response of local resources in DCE's first RFO for renewable resources. DCE does not anticipate significant barriers to the development of this resource, but will consider solar development in other regions for inclusion in its portfolio, as it has with the Deer Creek solar project in Tulare County. DCE will evaluate new solar development in terms of environmental impacts and benefits, as was done in the 2020 RFO.

Other New Local Wind

There has already been significant development of wind resources in Riverside County, especially near North Palm Springs and in the San Gorgonio pass. (Refer to map in Figure 8, above.) DCE anticipates new development potential is more limited, but some new local wind has been included in the RFO shortlist. In addition, many of the turbines in the San Gorgonio pass are older and in need of repowering. The repowering could increase the total wind produced from the region.[20] If local wind is not available, DCE will consider purchasing wind in other locations or additional solar and storage.

Other New Local Storage

DCE assumes all new solar development in its portfolio will include pairing with battery storage to support grid reliability and reduce risk of curtailment. Given the current low cost of 4-hour battery storage and its limited environmental footprint, DCE does not anticipate significant barriers to its development. Long duration storage will be more challenging as is discussed in the Long Duration Storage Development section of the IRP.

Existing Natural Gas (RA Only)

As shown in the RA tracking tables, DCE anticipates it will contract with existing natural gas resources for RA. DCE understand natural gas will be subject to retirement risk as California pursues its aggressive decarbonization strategy. However, DCE expects reliance on natural gas for RA will fall over time to only 10% of RA supply[21] by 2030 as its portfolio of renewables expands. This is likely to be an overestimate, as it also does not include any other resource types for short-term RA procurement, which should also be available. DCE will consider more aggressive goals for reducing natural gas reliance in future IRP cycles.

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[20] For background on repowering San Gorgonio pass, see https://www.desertsun.com/story/tech/science/energy/2018/10/24/palm-springs-iconic-wind-farms-could-change-dramatically/1578515002/.

[21] The number reported is for the 38 MMT portfolio. For the 46 MMT portfolio, it is 11.5%. Does not include CAM resources.

d. Commission Direction or Actions

DCE is not seeking any specific CPUC direction at this time, though it has provided some suggestions for improvement of the IRP process in the Lessons Learned section.

e. Diablo Canyon Power Plant Replacement

All RFO shortlist resources are scheduled to be fully online by 2024, when Diablo Canyon is scheduled to begin retirement. These resources are a mix of wind and solar paired with storage. These resources should be suitable substitutes for nuclear power given the following:

- The resources are carbon-free
- The battery storage provides reliability benefits

To evaluate the sufficiency of the RFO resources for meeting demand in the absence of Diablo Canyon, DCE compared these new resources to its load ratio share of the RSPs in 2026. The results are summarized in the table below.

Table 15. Comparison of new resources included in DCE's RFO shortlist compared to DCE's load ratio share of the new resources added in the RSPs by 2026.

Resource	Load Ratio Share of Reference System Portfolios		DCE New RFO Shortlist Resources
	38 MMT	46 MMT	
Short-Duration Storage (MW/MWh Capacity)	14/61	17/73	82/328
Long-Duration Storage (MW/MWh Capacity)	4/54	3/33	-
Total Storage (MW/MWh Capacity)	19/115	20/106	82/328
Renewable Energy (GWh)	95	82	365
Renewable Energy Mix	Solar: 70% In-State Wind: 30%	Solar: 75% In-State Wind: 25%	Solar: 90% In-State Wind: 10%
Shed Demand Response (MW)	0.6	0.6	-

As the table shows, the amount of new renewable energy and total battery energy storage capacity provided by the new RFO resources is much greater than DCE's load ratio share of the RSPs in 2026. In addition, the new carbon-free energy is supplied by wind and solar in the RSPs, the same as provided by the RFO resources. However, the RFO resources do not include any long duration storage or shed demand response resources. As discussed in other sections of the IRP, DCE plans to solicit offers from 8-hour battery storage projects in its next RFO, and included such long-duration storage in its generic resource mix in its conforming portfolios, with target online date between 2027 and 2030. In addition, DCE plans to explore programs to support local demand response in the future.

V. Lessons Learned

DCE has learned a lot through its first RFO for long-term renewable energy development and through its long-term resource planning activities in this IRP. It expects its long-term strategy will continue to evolve as it learns more and continues procurement. For the next IRP cycle, DCE offers the following recommendations for CPUC consideration.

The first concerns the CPUC direction to include portfolios with a minimum amount of GHG emissions for the 46 MMT scenario. Including such emissions is contrary to the primary goal of the IRP, which is to reduce GHG emissions to meet state goals. In D.20-03-028, which sets IRP requirements, the CPUC states that "we note the comments of the Joint CCAs that request the ability to file portfolios containing 100 percent GHG-free resources. While we applaud these LSEs for their forward thinking, they will still need to address how such portfolios will be reliable without further technological or fuel development. It is not sufficient for LSEs to assume that the reliability, renewable integration, and ramping needs associated with their portfolios will be met by resources in the portfolios of other LSEs." However, the CPUC did not specify any standards LSEs could use to show a carbon-free portfolio adequately supplies reliability, renewable integration, and ramping needs. Instead, it required LSEs to include a fixed amount of emissions in their 46 MMT conforming portfolios. Emissions do not provide reliability, renewable integration, and ramping benefits. Natural gas generation does, but so do other resources. In the next IRP cycle, the CPUC should define reliability standards more clearly so 100% carbon-free portfolios can be conforming for all scenarios.

The second concerns the difficulty DCE has in valuing the contributions of resources that are not included in the RSP. DCE includes a preference for new geothermal resources, and there were no geothermal resources selected in the RSPs this IRP cycle. The CPUC in D.20-03-028 discusses how certain resources may act as proxies for other resources of similar type, including geothermal as a proxy for baseload renewables. However, the term "baseload renewables" was not specifically defined, nor is it listed in the broad categories of resources that LSEs are expected to procure in the decision. As discussed above, DCE recommends the CPUC define a set of standards required to create a reliable portfolio. Then, CCAs can compare resource attributes against the set of standards and procure the set that best meets CPUC requirements and internal Board directives.

DCE acknowledges that defining new reliability standards for carbon-free portfolios is not an easy task. Traditional resource planning standards, namely procuring capacity equal to peak load plus a reserve margin, does not work when resources are energy-limited at non-peak hours. The energy available from renewable resources varies significantly in different time periods, including annual, seasonal, and daily variation, making new reliability requirements necessary to ensure stable grid operation. Based on the CPUC's own RESOLVE modeling in this IRP cycle, which showed that portfolios selected to meet planning reserve margin standards could not always meet loss of load expectation standards in SERVM and given the recent rolling blackout events, California is rapidly approaching the time—if not already at the point—when renewable resources are such a large component of supply that new reliability standards beyond the planning reserve margin are necessary. DCE recommends the CPUC analyze loss of load study results in order to define a new set of reliability planning standards that can be used for carbon-free portfolios.

Finally, DCE is also concerned about the changes in IRP requirements from the past cycle to this cycle. DCE also expects more changes in subsequent IRP cycles. For instance, in this cycle DCE had to plan for multiple GHG reduction scenarios. Eventually, LSEs will need to plan toward one. DCE faces this regulatory uncertainty at a time when it must also sign long-term contracts that carry financial obligations. DCE recommends the CPUC not penalize LSEs for procurement that is inadequate to meet CPUC requirements simply because those requirements changed subsequent to the LSE's long-term procurement.

Glossary of Terms

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Loss of Load Expectation (LOLE): *a metric that quantifies the expected frequency of loss-of-load events per year. Loss-of-load is any instance where available generating capacity is insufficient to serve electric*

demand. If one or more instances of loss-of-load occurring within the same day regardless of duration are counted as one loss-of-load event, then the LOLE metric can be compared to a reference point such as the industry probabilistic reliability standard of "one expected day in 10 years," i.e. an LOLE of 0.1.

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

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

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

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

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

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

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

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

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

Reference System Plan: *the Commission's integrated resource plan that includes an optimal portfolio (Reference System Portfolio) of resources for serving load in the CAISO balancing authority area and meeting multiple state goals, including meeting GHG reduction and reliability targets at least cost.*

Reference System Portfolio*: the multi-LSE portfolio identified by staff for Commission review and adopted/modified by the Commission as most responsive to statutory requirements per Pub. Util. Code 454.51; part of the Reference System Plan.*

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

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

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