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SB 846 Diablo Canyon Power Plant (DCPP) Alternative Resource Analysis

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July 07, 2023

Introduction

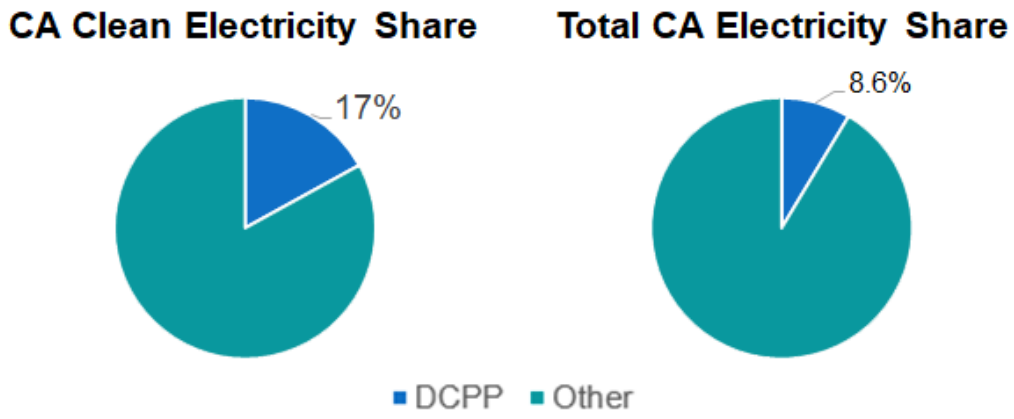
- Q&A and Comments: Zoom Q&A function
- Administrative questions: Zoom Chat function
- Public comments due July 21, 2023
- CEC Docket 21-ESR-01

Comments from the Dais

Agenda

- Diablo Canyon Power Plant (DCPP) and Reliability
- SB 846 Requirements
- Scenario Analysis
- Question and Answer

DCPP Overview

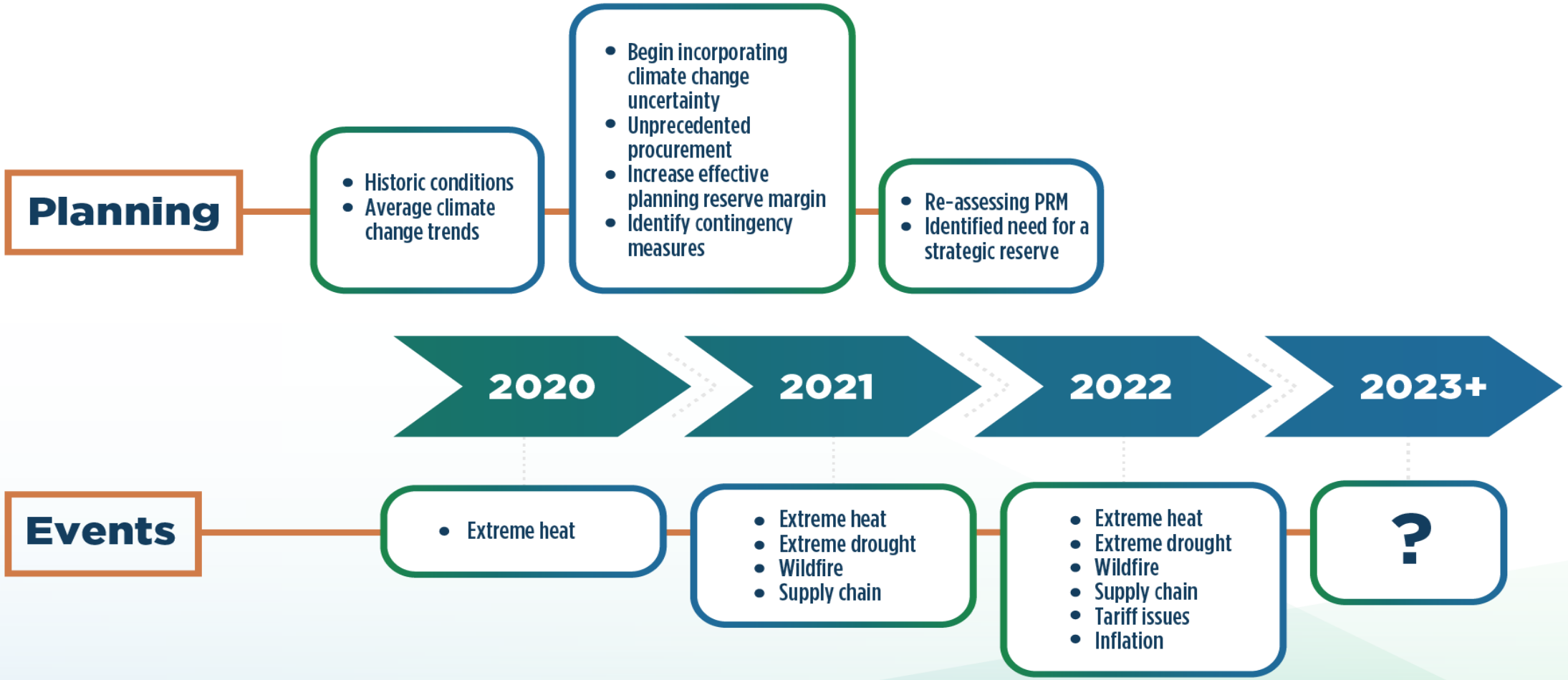


Timeline

Current retirement schedule for DCPP
- Unit 1 in 2024
- Unit 2 in 2025

- DCPP contains two reactor units
  - Generating capacity of 2.2 GW (all hours)
  - ~18,000 GWh of carbon-free energy annually
  - DCPP is a baseload (24/7) resource that provides peak and net peak support (as well as all other hours)

Recent Reliability Challenges



SB 846 CEC DCPP Requirements

SB 846 Requirements

- By March 2
  - Evaluate 2024 – 2030 forecasts for potential reliability deficiencies if Diablo Canyon Power Plant (DCPP) is not extended
  - Make a determination of whether extending operations is prudent to ensure reliability
- By July 1
  - Post a report of DCPP Operations
- By September 30
  - Compare costs of extending DCPP to a portfolio of other resources

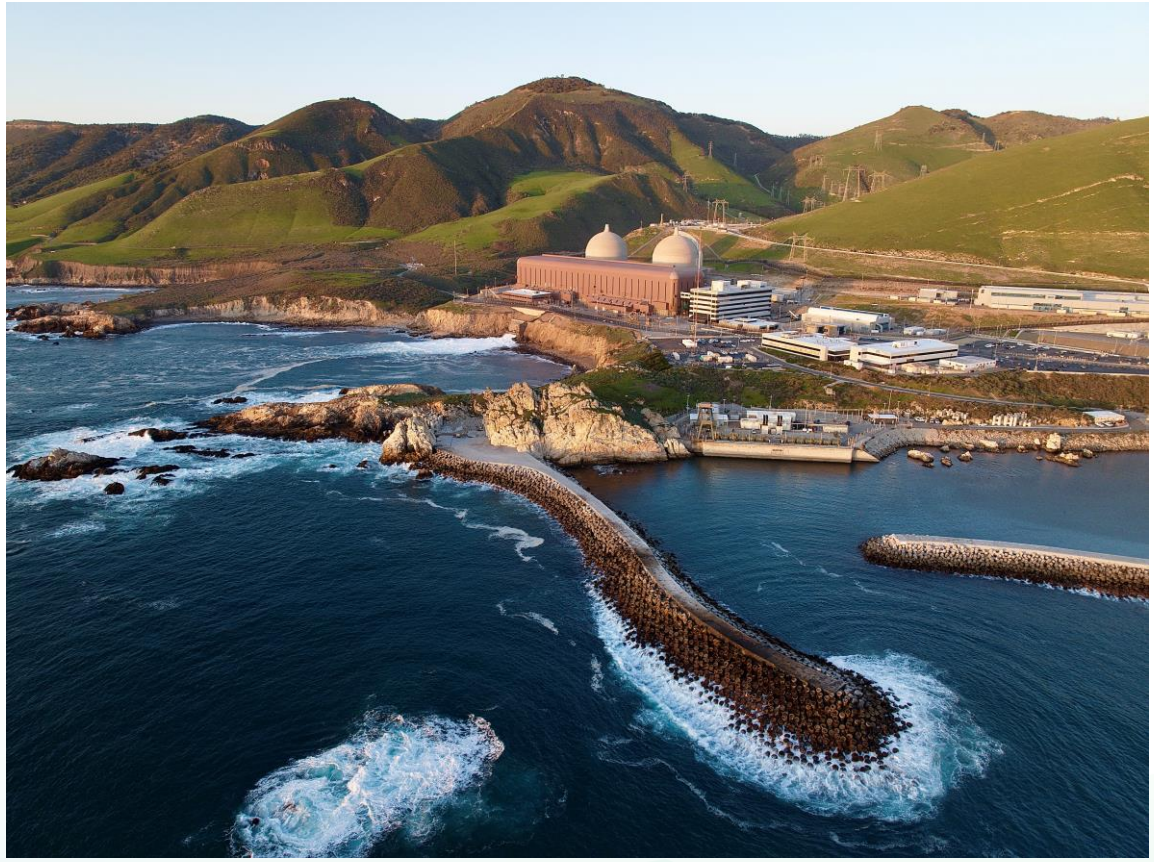
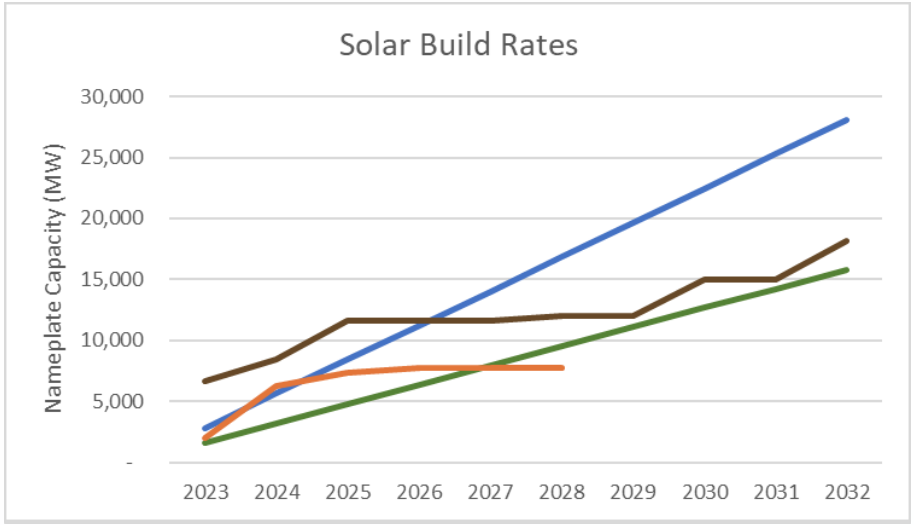
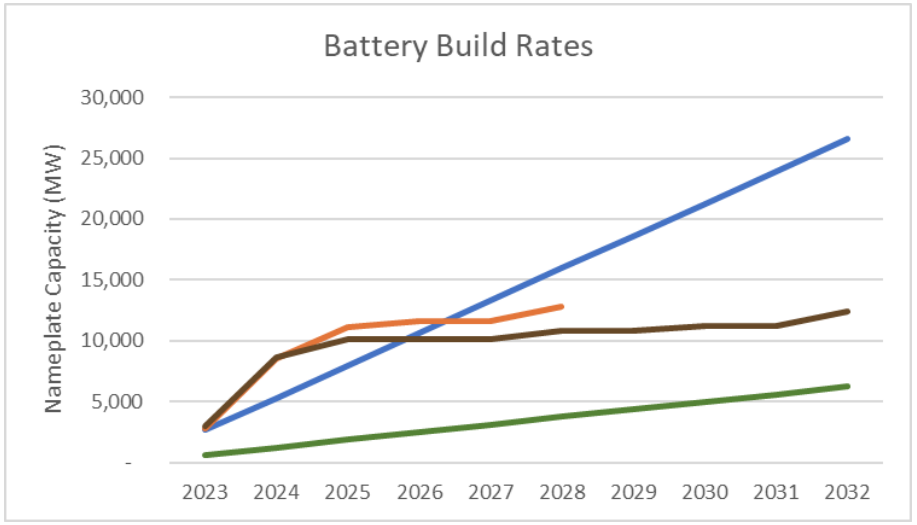
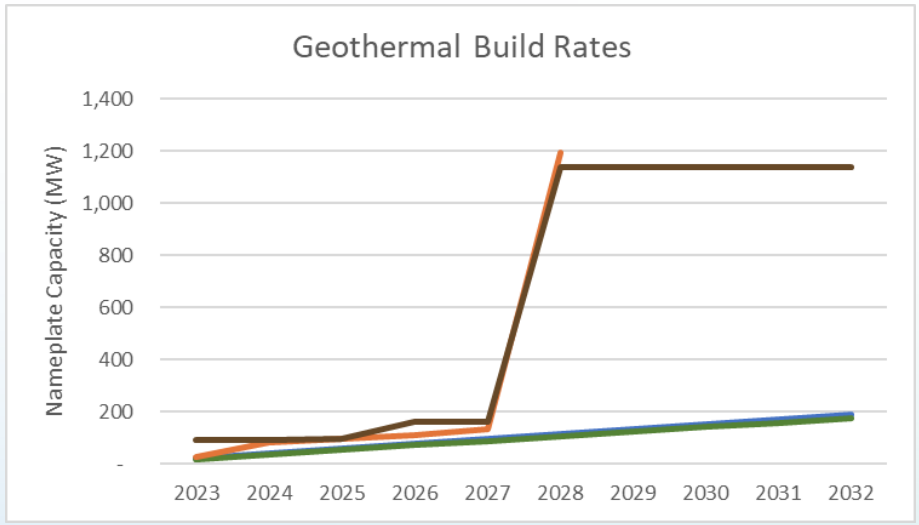


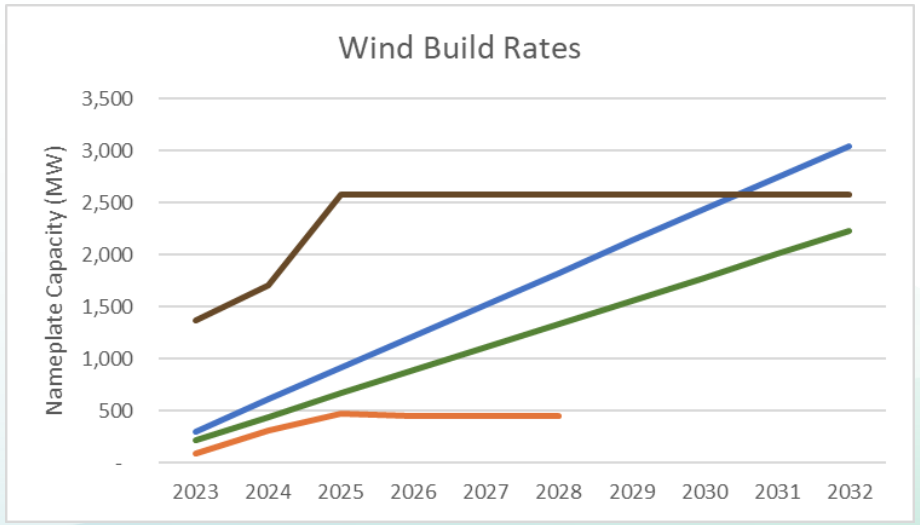
Image – PG&E

Unprecedented Resource Build Rates

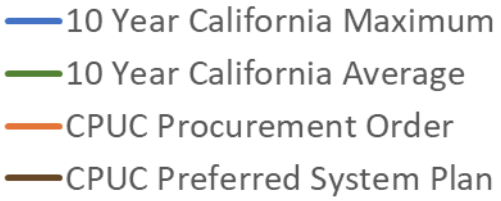




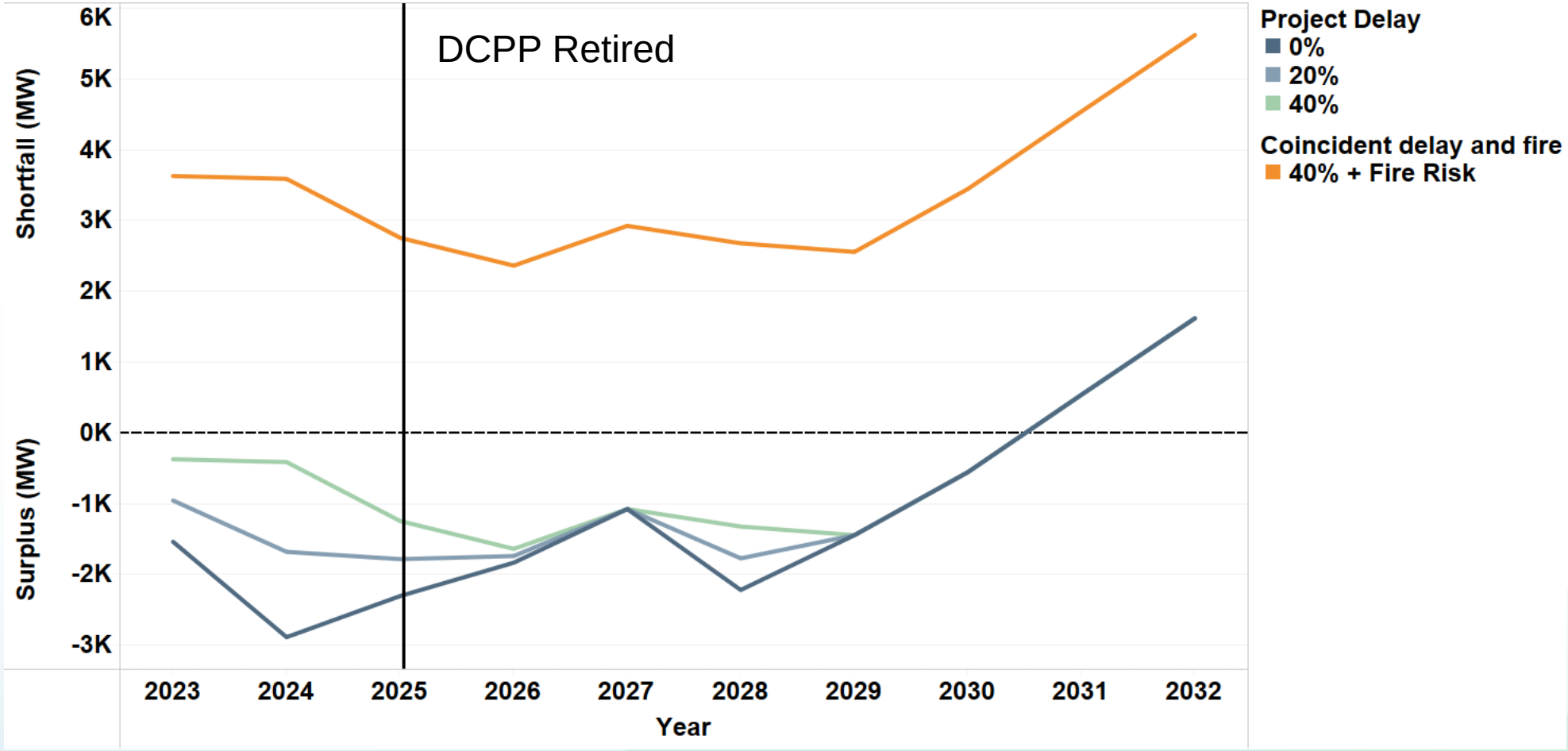




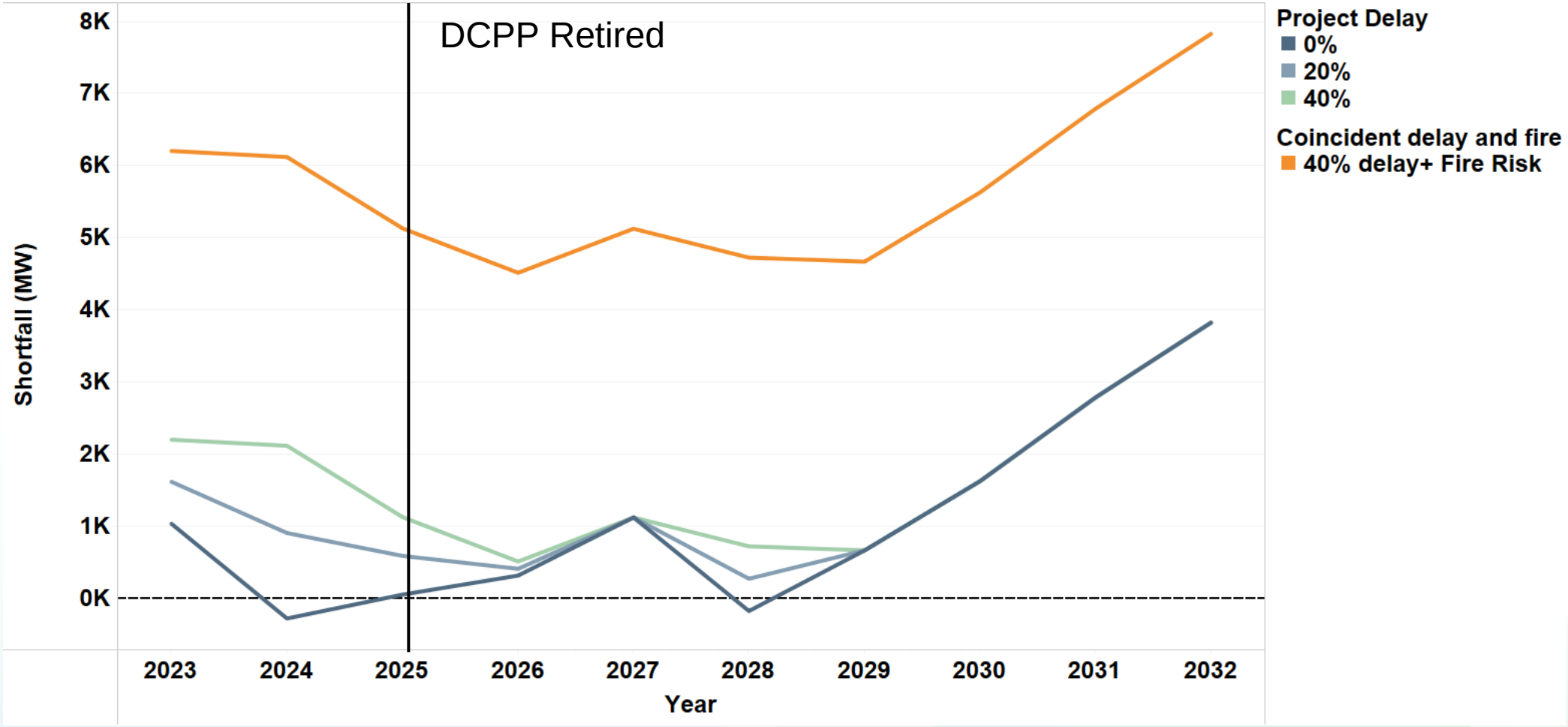
- Average build rates are generally insufficient to reach:
  - Procurement order before the end of the order
  - Preferred System Plan before 2032



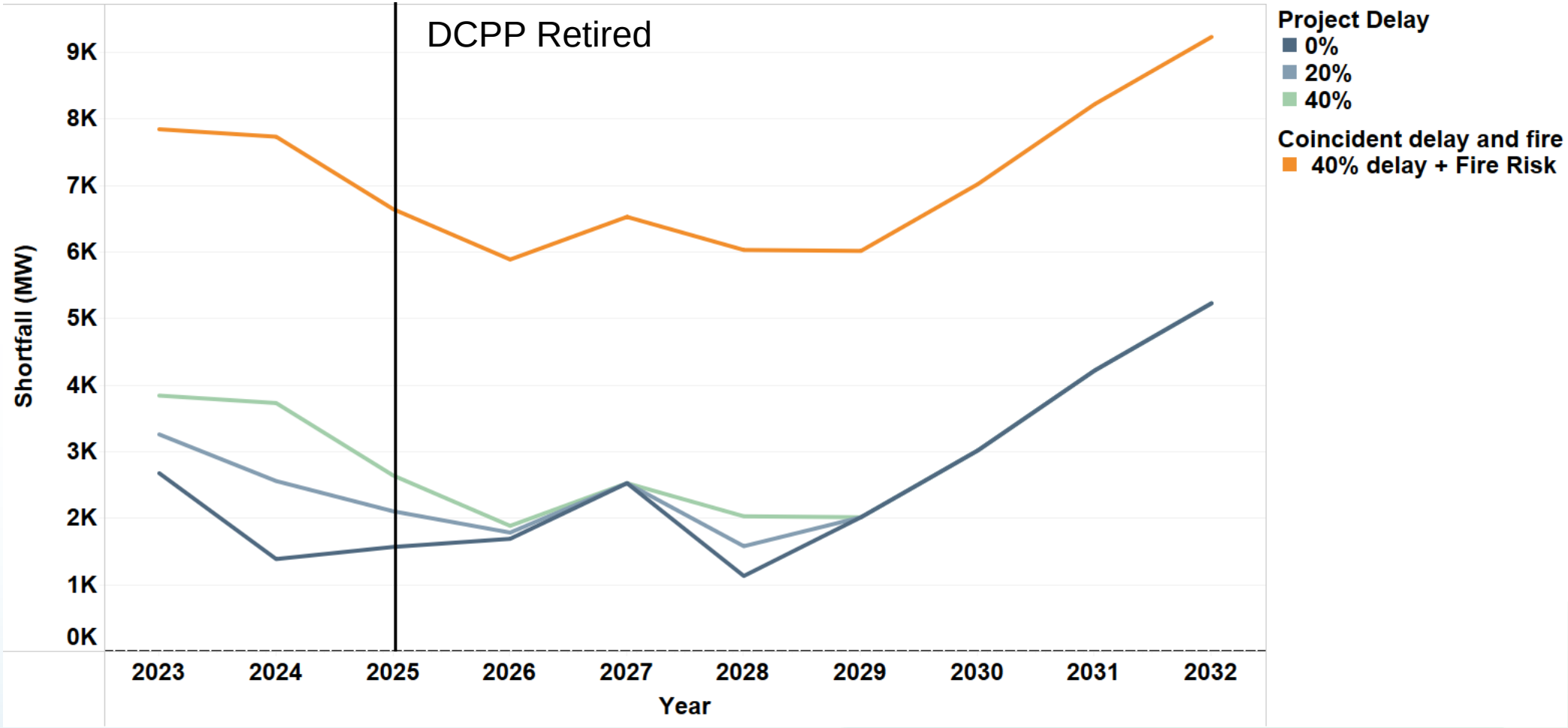
DCPP Retirement and Reliability Resource Adequacy Planning Standard



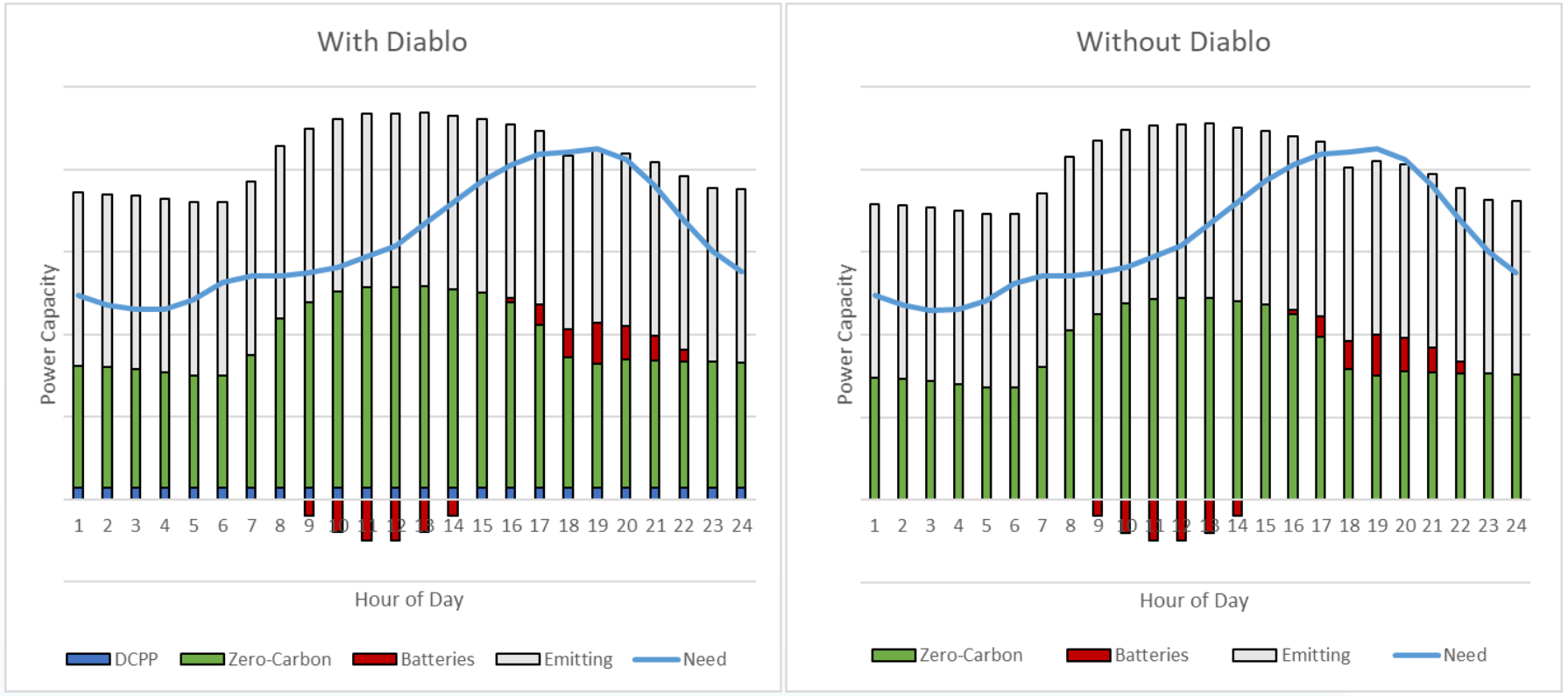
DCPP Retirement and Reliability 2020 Equivalent Event



DCPP Retirement and Reliability
2022 Equivalent Event



DCPP Reduces Reliance on Emitting Resources



Note: Figures are for illustrative purposes only. Diablo Canyon Power Plant's power capacity is approximately to scale with the total power capacity of the system.

CEC Determination

- Adopted report at February 28 Business Meeting
  - Noted risks with bringing new energy resources online
  - Determined that keeping DCPP is valuable until the replacement resources are on-line

- Provided to the Legislature March 1, 2023

Image – PG&E

SB 846 Requirement

"*By September 30, 2023, the commission shall present* ***a cost comparison of whether extended operations at the Diablo Canyon powerplant compared to a portfolio of other feasible resources available for calendar years 2024 to 2035****, inclusive, is* ***consistent with the greenhouse gases emissions reduction goals*** *of Section 454.53 of the Public Utilities Code. As part of this comparison, the commission shall* ***evaluate the alternative resource costs****, and shall make all evaluations available to the public within the proceeding docket*."

SB 846 DCPP Alternatives Analysis Considerations

- Portfolio of other feasible resources
  - Technology maturity
  - Timeliness of deployment (resources online by 2025)
  - Support reliability (at a minimum during peak and net peak)
  - Incremental to other resources (e.g., LSE and POU procurements, Strategic Reliability Reserve)
- Consistent with GHG emissions reduction goals
  - Portfolio should provide 18,000 GWh (annually) of zero-carbon replacement energy
- Cost
  - Compare to $1.4B loan for extension and net operating costs

Replacement Options

Analysis

What resources can successfully replace the **DCPP?**

Characteristics

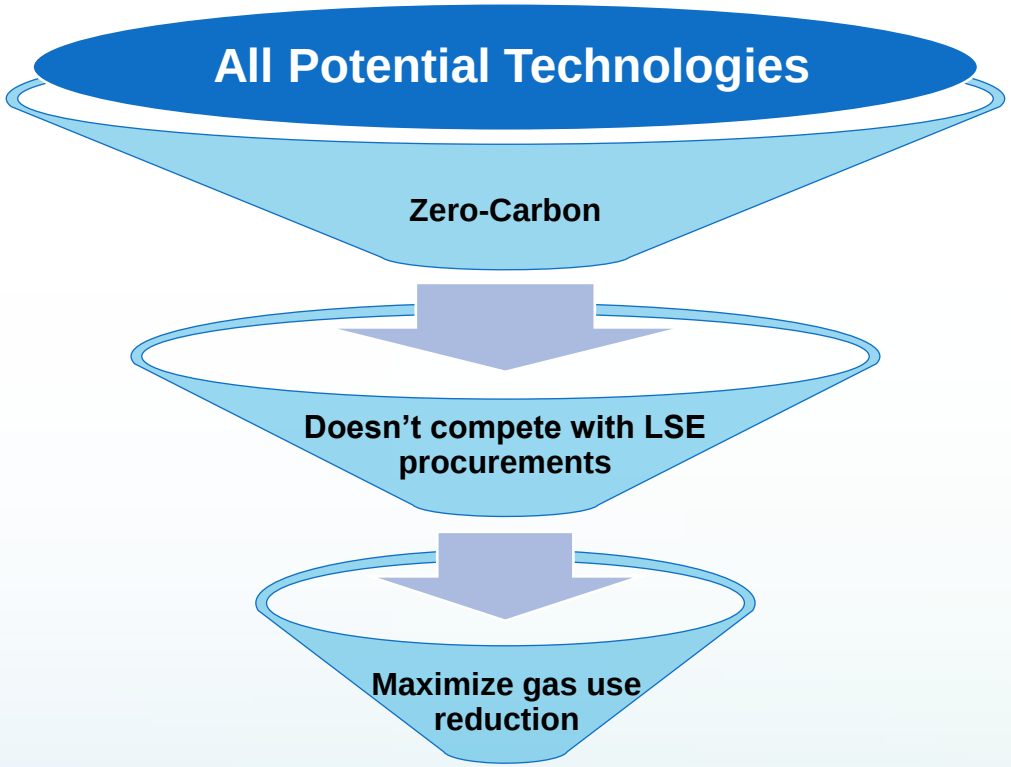
- Analysis intended to address the need to **support peak and net peak and provide 18,000 GWh of clean energy**

Utility-scale Supply

Demand-side

Analytical Approach

Resource Filtering



Resource Analysis

Technology Potential
How much capacity of this resource can be integrated annually?

Cost Estimate
How much does this resource cost to acquire and integrate?

Project Lead Time
How long does this resource take to implement?

Preliminary Supply Resource Alternatives

Included Supply Resources	
Gaseous Fuel Generation	Combustion Turbines/Reciprocating Engines (clean hydrogen)
	Fuel Cells (clean hydrogen)
	Non-Combustion and Non-Fuel Cell Gas-Fueled Generator (clean hydrogen)
Long Duration Energy Storage	Electrochemical (flow, iron-air, zinc, magnesium, sodium, excluding lithium)
	Mechanical* (gravity-based, geo-mechanical, excluding PSH)
	Thermal* (solid medium, liquid medium)

*These LDES options do not directly supply electricity

	Resources with Potential Limitations	Cause
Renewables	Solar	Intermittent resource, competes w/ LSE procurements
	Wind (onshore/offshore)	Intermittent resource, competes w/ LSE procurements
	Geothermal	Competes w/ LSE procurement
	Small Hydro (< 30 MW)	Competes w/ LSE procurement
	Pumped Storage Hydro (PSH)	Competes w/ LSE procurement
Storage	Energy Storage (short duration, < 8 hrs; lithium)	Competes w/ LSE procurement
Gaseous Fuel Generation	Fossil or Renewable Gas Generation (recip. engines, turbines, fuel cells)	Not zero carbon
	Blended Gas Generation (recip. engines, turbines, linear generator)	Not zero carbon

Preliminary Demand-side Resource Alternatives

Included Resources	
Demand Response	DR Measures
Electric Vehicles	Electric Vehicle Control Infrastructure (smart chargers, bidirectional chargers)
Distributed Generation	Solar + Battery Storage
	Hydrogen-powered Distributed Generation (fuel cells, reciprocating engines, linear generators)

Resources with Potential Limitations		Cause
Distributed Generation	Fossil or Renewable Gas Generation (fuel cells, reciprocating engines)	Not zero carbon
	Blended Gas Generation (linear generators, reciprocating engines)	Not zero carbon
	Diesel or Biodiesel Generation (reciprocating engines)	Not zero carbon

Question and Answer