2026-2027 Transmission Planning Process (TPP) Proposed Decision

Modeling & Analysis

Energy Division Staff

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California Public Utilities Commission

Contents

Overview of 26-27 TPP Proposed Portfolio Analysis

Overview of the CAISO's Transmission Planning Process

- Every year Commission staff develop a recommended set of portfolios for the California Independent System Operator (CAISO) to use in its annual Transmission Planning Process (TPP)
- Generally, in each TPP cycle, the CAISO evaluates a reliability and/or policy-driven base case portfolio
  - Under the CAISO tariff adopted by the Federal Energy Regulatory Commission (FERC), if the results of the base case analysis show the need for additional transmission development, the transmission projects are brought to the CAISO Board for approval in the spring of the second year of the TPP
  - If approved by the CAISO Board, under the FERC tariff, the project would receive cost recovery through the transmission access charge
- Along with the base case analysis that generally leads directly to transmission project approval, in each TPP cycle the CAISO can typically analyze one or more sensitivity portfolios
  - The purpose of the sensitivity portfolio analysis is not to lead directly to transmission development immediately, but rather to assist in future planning by identifying relevant transmission needs and potential costs
- The Commission adopted the 25-26 TPP portfolio in Decision (D.) 25-02-026. That Decision included both a base case and a sensitivity portfolio that the CAISO is in the process of analyzing for the current TPP cycle.
  - The base case portfolio was based on the scenario that achieves a 25 million metric ton (MMT) greenhouse gas (GHG) emissions target in 2035, including 4.5 gigawatts (GW) of offshore wind from CPUC jurisdictional LSEs' IRPs submitted in November 2022
  - The sensitivity portfolio was a potential long lead-time resource deployment future reflective of the upper bound of the CPUC's need determination that was adopted in D.24-08-064, pursuant to Assembly Bill 1373

Overview of 26-27 TPP Analysis

- On September 30, 2025, the Commission issued an Administrative Law Judge Ruling Seeking Comments on Electricity Portfolios for 2026-2027 Transmission Planning Process and Need for Additional Reliability Procurement
  - CPUC staff released supplementary analysis alongside that Ruling: 2026-2027 Transmission Planning Process RESOLVE Analysis
    - That Ruling and the supplemental analysis Staff released supported the development of portfolios for consideration for study in the California Independent System Operator's (CAISO) 26-27 Transmission Planning Process (TPP)
- This deck builds on the Ruling deck by including production cost modeling results from SERVM for the proposed 26-27 TPP base case
  - This deck also includes portions of the RESOLVE analysis released in the Ruling deck related to the proposed 26-27 TPP base case and to the 26-27 TPP sensitivity portfolio
- The PD proposes transmitting a single Base Case portfolio and a single sensitivity portfolio to the CAISO for their TPP
- The Commission is seeking stakeholder comments on the Proposed Decision Transmitting Electricity Resource Portfolios to the California Independent System Operator for 2026 2027 Transmission Planning Process:
  - Opening comments are due on February 3rd, 2025
  - Reply comments are due on February 9th, 2025

Modeling Steps Leading to the Proposed 26-27 TPP Portfolios

- Staff used RESOLVE to produce the Proposed TPP portfolios
- The proposed 26-27 TPP base case portfolio in RESOLVE was translated into SERVM inputs and simulated in SERVM to determine loss of load expectation (LOLE) and GHG emissions. SERVM results for the following are included in this deck:
  - Portfolio before busbar mapping for 2036 and 2041
  - Portfolio after busbar mapping for 2036 and 2041

Input Updates for 26-27 TPP Modeling

RESOLVE and SERVM updates

Summary of RESOLVE Updates Since 25-26 TPP (1)

Further detail can be found in the 2025 Draft Inputs & Assumptions[1]

Data	Change
Zonal Topology (Disaggregation of CAISO)	CAISO RESOLVE zone disaggregated into PG&E, SCE, and SDGE, with associated data updates PG&E<>SCE transmission path expansion candidate(s) added to RESOLVE optimization Remote generator representation added to align with SERVM
Default Candidate Resources	Enhanced Geothermal (EGS) and Generic Long Duration Storage (LDES) added as default candidates Pumped Hydro (PHS) and Adiabatic Compressed Air Storage (A-CAES) combined into a single "Location-Constrained Storage" category
Candidate Regions	Updated to align with CAISO study areas used in transmission planning
Resource Cost	Updated to 2024 NREL ATB New capital cost assumptions for solar, onshore wind, and Li-ion battery New financing costs
Resource Potential	Updates to solar potential using 2024 BLM Western Solar Plan Additional location-constrained storage potential projects included
Minimum Builds	Near-term minimum build constraints added to RESOLVE to reflect recent LSE contracts incremental to the baseline resources (June 2025 IRP Procurement Compliance data)

1 https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/integrated-resource-plan-and-long-term-procurement-plan-irp-ltpp/2024-2026-irp-cycle-events-and-materials/2025_draft_inputs_and_assumptions_public_slides.pdf

Summary of RESOLVE Updates Since 25-26 TPP (2)

Data	Change
Baseline Resources	Updated to latest available data from CAISO, WECC, and LSE filings
Planned External (Non-CAISO) Builds	Updated to reflect most recent IRP Procurement Compliance data
Load Forecast & Profiles	Updated to 2024 IEPR Historical baseline profile updated to include 2021 & 2022
Generation Profiles	Updates to wind model used by staff to develop profiles 2021 and 2002 weather years included New hourly profiles for EGS to represent thermal ambient derates
Day Sampling	Updated 36 RESOLVE sample days incorporating latest load and generation profiles
PRM and ELCC Inputs	Updated target PRM % and resource ELCCs informed by SERVM runs 3D solar-storage surface with dimensions for solar, 4-hr battery, and 8-hr battery (multipliers for longer duration storage relative to 8-hr dimension)
GHG Target	Near-term trajectory updated to reflect historical GHG data up to 2022 Long-term trajectory updated to reflect higher CAISO load share for statewide GHG target
Dollar Year	Costs inflated to 2024 dollar year from 2022 dollar year
Inter-Day Sharing	Functionality in RESOLVE to track long duration storage state of charge over a chronological 8760 hours to enable energy sharing over multi-day and/or seasonal periods

Summary of RESOLVE Updates Since 2025 Draft I&A

Data	Change
Resource Regions	Designated candidate wind and geothermal areas in the portion of northeastern CA served by NVE as new Northeast CA region
Resource Potential and Land Use	• Updated to latest available CEC Protected Areas Layer and Core Land-Use Screen, including corrections to the incorporation of the 2024 BLM Western Solar Plan • Incorporated Global Wind Atlas wind speed data into wind resource potential analysis • Clarified treatment of in-state, non-CAISO wind and geothermal potential within IID and NVE service territories • Revised assumptions for estimating the near-field EGS resource potential
Resource Availability	Extended the first available year of Idaho Wind to 2031 due to recent federal policies
Transmission	EGS resources fully modeled on the CAISO transmission system to study locational dependencies
Resource Cost	Incorporated latest federal policy impacts, including July 2025 Budget Reconciliation Bill and tariffs
Gas Retention Costs	Updated to increase over time to the cost of repowering. More information available in the appendix.

Baseline Resources (GW)

- The IRP Baseline represents online and in-development resources, as of the 2025 Draft I&A
  - Online: from CAISO Master Generating Capability List (MGC), as of Spring 2024
  - In-Development: additional contracts found in the December 2023 LSE Filings (incremental contracts from later LSE filings are forced-in to RESOLVE as minimum builds

Resource Type (cumulative GW)	2026	2028	2031	2036	2041	2045
Natural Gas	26.4	26.4	26.4	26.4	26.4	26.4
CHP	2.4	2.4	2.4	1.9	-	-
Nuclear	0.6	0.6	0.6	0.6	0.6	0.6
Geothermal	1.8	2.1	2.1	2.1	2.1	2.1
Biomass	0.5	0.5	0.5	0.5	0.5	0.5
Biogas	0.3	0.3	0.3	0.3	0.3	0.3
Hydro	9.1	9.1	9.1	9.1	9.1	9.1
In-State Wind	6.5	6.5	6.5	6.5	6.5	6.5
Out-of-State Wind	1.5	3.1	3.1	3.1	3.1	3.1
Utility-Scale Solar	23.3	23.4	23.4	23.4	23.4	23.4
Customer (BTM) Solar	20.8	22.6	25.6	28.5	30.0	31.3
Li-ion Battery (4-hr)	14.2	14.5	14.5	14.5	14.5	14.5
Li-ion Battery (8-hr)	0.3	0.3	0.3	0.3	0.3	0.3
Location-Constrained Storage	1.6	1.6	1.6	1.6	1.6	1.6
Shed DR	3.4	3.4	3.4	3.4	3.4	3.4
Total	**112.70**	**116.8**	**119.8**	**122.2**	**123.7**	**123.1**

Minimum Builds: LSE Contracted Resources (MW)

- Contracts incremental to the baseline found in the June 2025 IRP Compliance Filings are forced-in to RESOLVE as minimum builds

PG&E Minimum Builds (MW)

Technology	2026	2028	2031
Geothermal	67	68	68
In-State Wind	72	72	72
Out-of-State Wind	-	-	-
Solar	460	1,045	1,155
Battery Storage (4-hr)	852	1,411	1,521
Battery Storage (8-hr)	112	147	160

SCE Minimum Builds (MW)

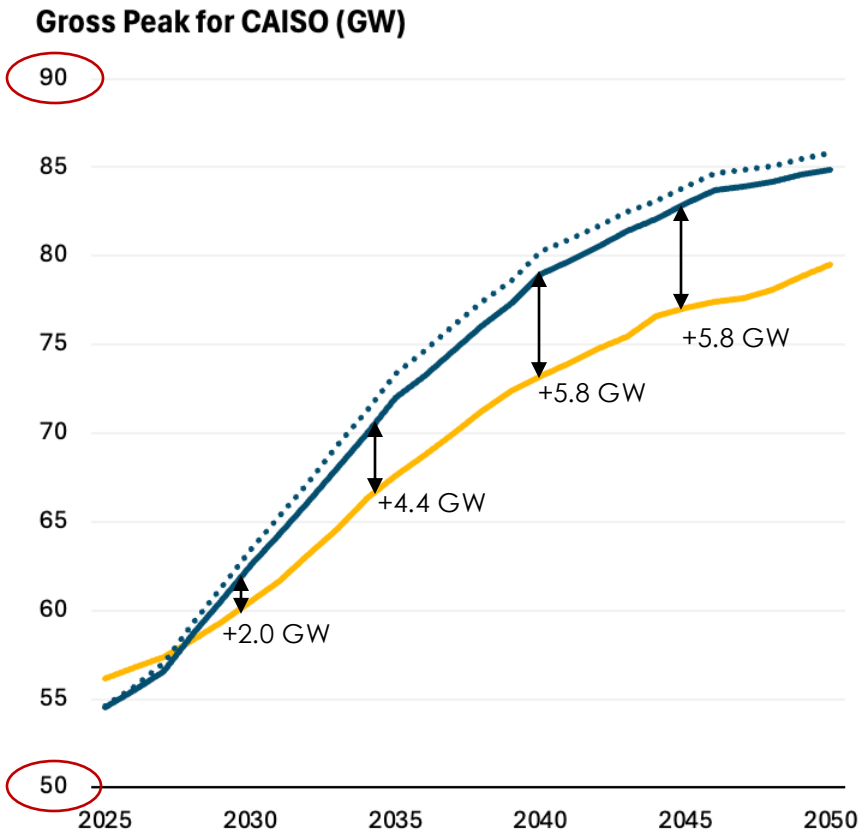
Technology	2026	2028	2031
Geothermal	42	60	100
In-State Wind	-	-	-
Out-of-State Wind	535	535	535
Solar	2,126	3,829	3,829
Battery Storage (4-hr)	2,396	4,541	4,541
Battery Storage (8-hr)	41	876	876

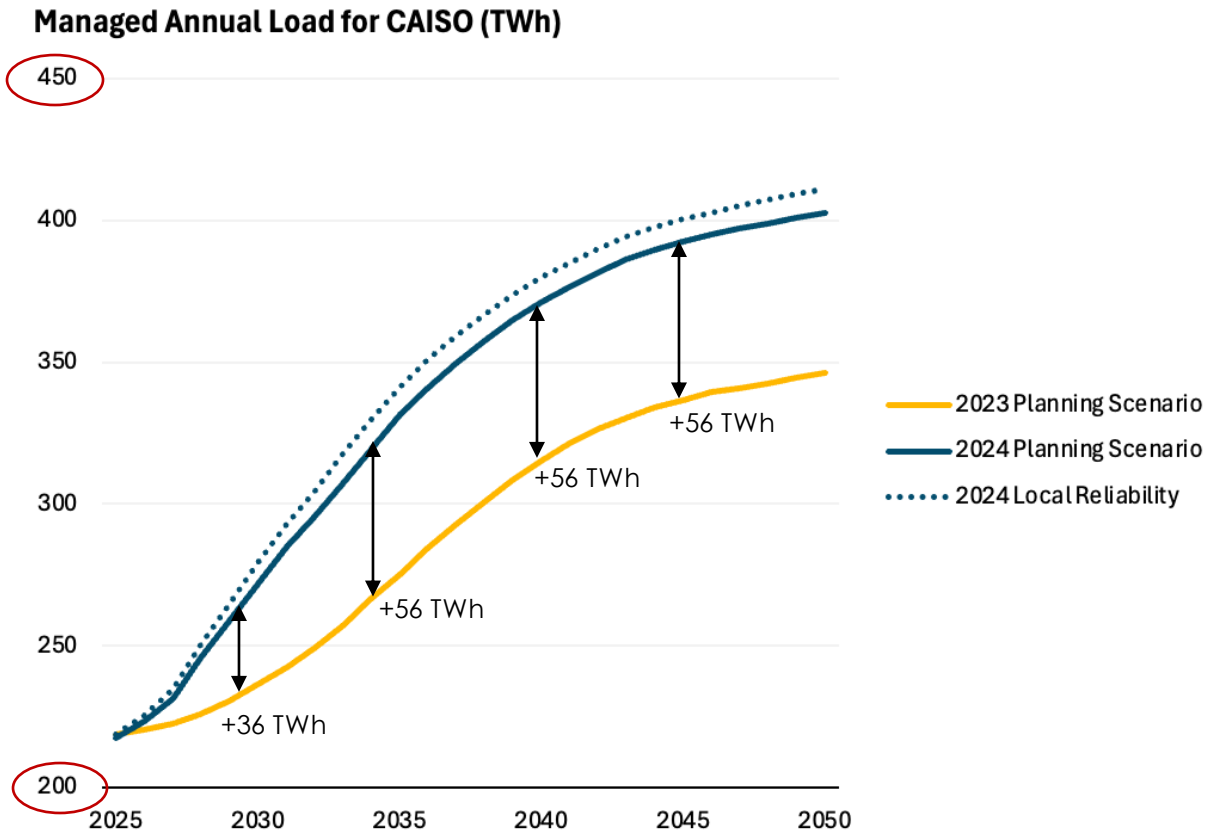
SDGE Minimum Builds (MW)

Technology	2026	2028	2031
Geothermal	-	-	-
In-State Wind	-	-	-
Out-of-State Wind	-	-	-
Solar	175	275	275
Battery Storage (4-hr)	660	760	760
Battery Storage (8-hr)	25	25	25

The 2024 IEPR Forecast Drives Additional Resource Needs

- Forecasts for both system peak and annual energy grow significantly in the 2024 IEPR, compared to the 2023 IEPR, driving increased capacity and GHG-free energy needs

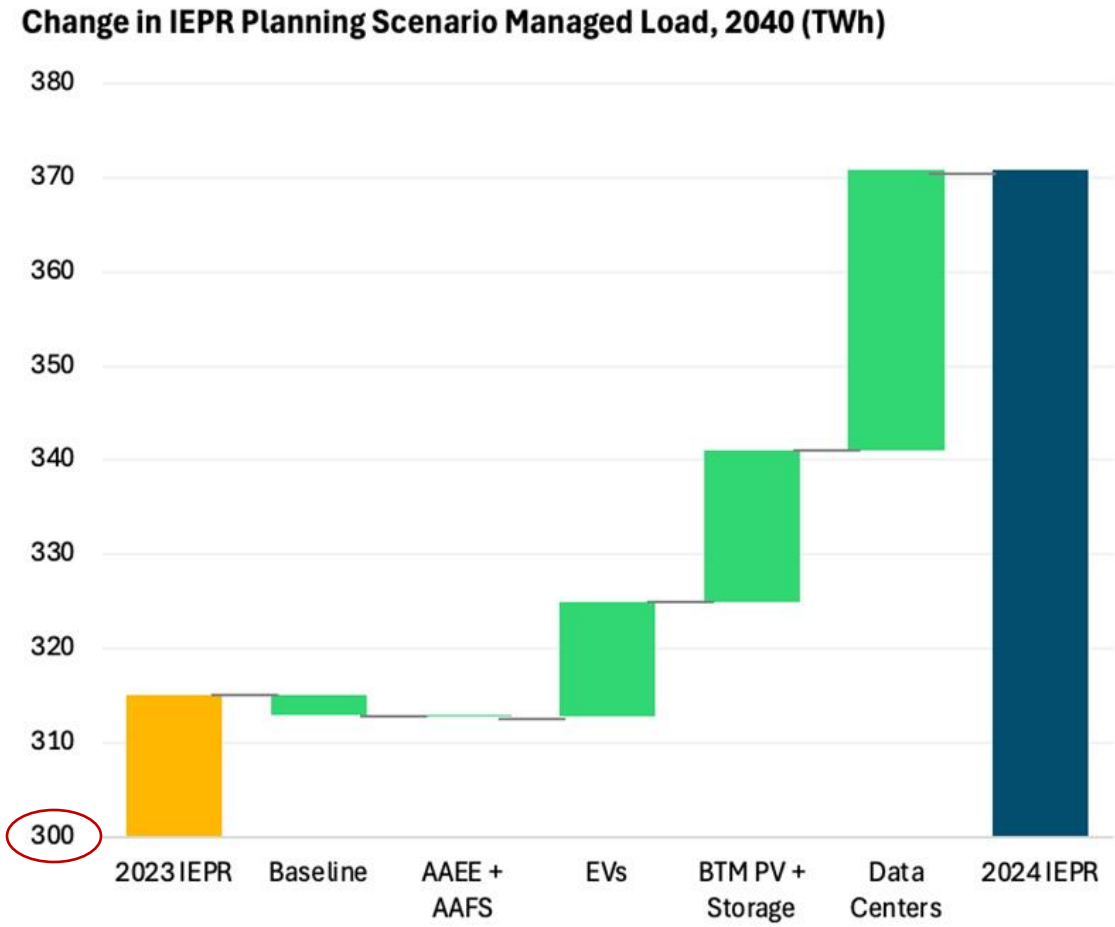




Gross Peak is Managed Peak (sales & losses) + BTM PV. In RESOLVE, Gross Peak and Energy includes the effects of AAEE, AAFS, EV charging, climate change, data centers, and BTM storage. In SERVM, "consumption" peak and energy is modeled, separate from all the above load modifiers including BTM PV. All figures here assume no BTM CHP retirement. which is implemented as a change to baseline consumption in RESOLVE

2024 IEPR vs. 2023 IEPR: Managed Load Waterfall

- Increases in load between IEPR cycles are primarily driven by:
  - The introduction of significant data center loads in the 2024 IEPR by 2040
  - Less adoption and lower capacity factors for BTM Solar and Storage
  - Updates to electric vehicles, including higher vehicle miles travelled (VMT)
- Changes to the baseline, energy efficiency (AAEE), and building electrification (AAFS) are relatively small
  - In the 2030s, AAFS demand is higher in the 2024 IEPR, but is similar by 2040



Managed load = sales + losses

2024 IEPR Total Load by Component

- Baseline consumption remains the bulk of total load by 2040, but most growth is driven by electrification and data centers
  - Managed load grows by 157 TWh from 2024 to 2040; ~80% of this is driven by EVs, building electrification (AAFS), and data centers
  - BTM PV and energy efficiency (AAEE), which reduce load, grow more slowly
- By 2040, EVs grow to 23% of total managed load, followed by building electrification (10%) and data centers (8%)

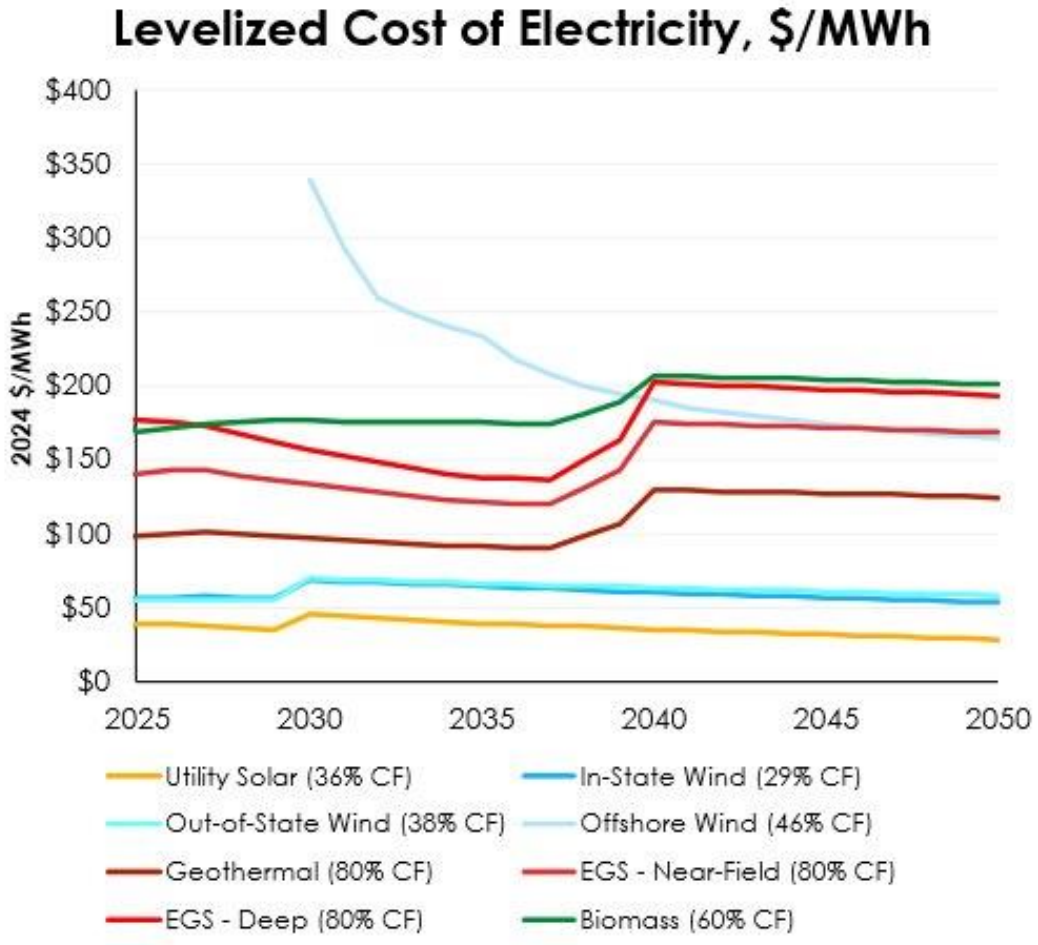
Load Component	2024 Load	2040 Load
Baseline	241 TWh	271 TWh
Climate Impacts	~0	2 TWh
Building Electrification (AAFS)	~0	37 TWh
Baseline LDVs	1 TWh	37 TWh
Baseline MHDVs	~0	9 TWh
Policy-Driven (AATE) LDVs	~0	33 TWh
Policy-Driven (AATE) MHDVs	~0	7 TWh
Data Centers	1 TWh	30 TWh
BTM Storage Losses	~0	<1 TWh
BTM PV	-28 TWh	-45 TWh
Energy Efficiency (AAEE)	-2 TWh	-11 TWh
Total Managed Load	**214 TWh**	**371 TWh**

EVs

Managed load = sales + losses; loads less than 0.2 TWh in 2024 are listed as ~0 (approximately zero)

Summary of Resource Cost Updates

- Policy trajectories shifted materially in Q2 2025, leading to the following updates:
  - Impacts of the OBBBA are reflected via revised tax credit assumptions for renewables, energy storage, and other clean firm technologies
  - Wide-ranging tariffs were announced and applied across U.S. trading partners, impacting every technology but which are especially impactful for technologies dependent upon imports from China and Southeast Asia
- Additional policy drivers of near-term resource costs, including Anti-Dumping and Countervailing Duties (AD/CVD) and Foreign Entities of Concern (FEOC) regulations, are being monitored for additional Treasury guidance but are not reflected in these updates



SERVM Updates: Baseline Resources

- *The SERVM updates described on these next few slides are relative to the model inputs used for last year's 25-26 TPP work*
- Units in SERVM and RESOLVE were further aligned with the CPUC Baseline List of generating resources in early 2025 resulting in better consistency of total annual and monthly installed capacity between the models, relative to what was modeled for the 25-26 TPP in Dec 2024
  - Corrected Capmax, Unit Category, and for units located outside the CAISO footprint and dynamically scheduled in the CAISO market, treatment with respect to transmission capacity
  - Capped Capmax at monthly NQC values for units that have them (mainly Cogen, Biomass, Biogas, and Geothermal)
- The Baseline List of generating resources is updated to include monthly MW values for units that have them: Baseline Generator List with External Build and Monthly MW. This is otherwise unchanged from this version used to derive inputs for the 25-26 TPP modeling: BaselineGeneratorList_ExternalBuildCalibration_v20241125.

SERVM Updates: Electric Demand Forecast and Hourly Profiles

- Like RESOLVE, SERVM electric demand inputs were calibrated to match the CEC's 2024 IEPR demand forecast Planning Scenario
- SERVM continued to use weather-normalized hourly profiles spanning 2000-2022 weather but now including the hour-offset correction described here: ra-track-3-workshop-feb-12.pdf. RESOLVE hourly day samples were also updated with this correction.
- IEPR hourly forecast components UNADJUSTED_CONSUMPTION + PUMPING + OTHER_ADJUSTMENTS were used to calibrate SERVM median consumption peak and energy
- Other IEPR hourly forecast components were modeled as-is in SERVM with no weather variability (DATA_CENTER, CLIMATE_CHANGE, EV charging including AATE, BTM_STORAGE, AAEE, AAFS)

SERVM Updates: Behind-The-Meter Solar PV Forecast and Hourly Profiles

- SERVM used newly developed BTM PV-specific weather-normalized hourly profiles that better align with the corresponding profiles used to develop the CEC's IEPR BTM_PV forecast. They reflect the generally lower efficiency of BTM PV relative to in-front-of-the-meter, as well as the distributed nature of the resource across a given IEPR Forecast Zone. Generally, these profiles have lower capacity factor than the prior profiles used in the 25-26 TPP studies and earlier work.
- Staff calibrated the 2024 IEPR BTM_PV monthly Capmax by IEPR Forecast Zone such that the median annual energy in SERVM matches the IEPR, by Forecast Zone

Other Key SERVM Updates

- SERVM was configured to reschedule up to 20 percent of generator maintenance around extreme weather events, to avoid unnecessarily causing reliability problems in winter months in future years. This reflects some ability for CAISO to reschedule maintenance around week-ahead weather that may increase peak demand
- Import constraint assumptions were ramped during the hours ending 17 through 22 by adding 3 steps of 6,330 MW, 4,000 MW, and 8,660 MW, to avoid the sudden change from 11,040 MW down to 4,000 MW, which caused unrealistic dispatch patterns
- GHG pricing assumptions were revised to be imposed only on in-state emitting units and unspecified imports to CAISO. In the 25-26 TPP SERVM modeling, GHG pricing was applied to all emitting units whether located in California or not
- SERVM's storage dispatch logic was revised to operate storage more efficiently and better align with RESOLVE's storage dispatch
- For weather-driven thermal derating of gas and geothermal units, unit mappings and the hourly derating profiles were corrected
- Run-of-River Hydro was separated from Scheduled Hydro in the PGE and SCE regions
- 8.3% of NW Hydro was allocated to serving CAISO and counted as non-emitting. This change was made to better align with RESOLVE's treatment of NW Hydro
- The SCE <> SDGE transmission path was made unconstrained for 2035 and beyond following RESOLVE. SERVM also expanded the PGE <> SCE transmission path according to whatever expansion RESOLVE selected as part of the TPP portfolio

26-27 TPP Proposed Base Case Portfolio

Proposed 26-27 TPP Base Case Overview

- Proposed base case designed to be similar to the 25-26 TPP base case with similar policy assumptions
  - Incorporates the 25 MMT GHG target by 2035 (same as 25-26 TPP and 24-25 TPP)
  - Same amount of offshore wind forced in (i.e. half of D.24-08-064 potential, the decision pursuant to AB 1373), but extends the online dates
  - Updated to the 2024 IEPR Planning Scenario (25-26 TPP base case used the 2023 IEPR planning scenario)
    - General increase in selected capacity for 26-27 TPP (when compared to 25-26 TPP base case) due to increased load in the 2024 IEPR; peaks in the 2030s at ~30 GW
- For the proposed Base Case Portfolio staff studied a case that reflects a partial buildout of the maximum procurement volumes considered in the Commission's need determination analysis pursuant to D.24-08-064, related to Assembly Bill (AB) 1373. Staff also included a Least-Cost comparison case.
  - Refer to Appendix for 26-27 TPP Least Cost comparison Portfolio
- CAISO's study of these portfolios focuses on model years that are 10 and 15 years in the future:
  - 2036 — 10-year projection
  - 2041 — 15-year projection

Input from D.24-08-064 Procurement, per AB 1373

- AB1373 (Garcia, 2023) authorizes centralized procurement of specified Long Lead-Time (LLT) resources[1], including geothermal, offshore wind, and long duration storage (LDES) with different durations
- For the 26-27 TPP, the proposed base case requires RESOLVE to select **half of the maximum procurement amounts** specified by the CPUC need determination (D.24-08-064). It also Adds flexibility for offshore wind planning:
  - Assumes that the Central Coast resources will come online between 2032 and 2036
  - Recommends to the CAISO that they allow the potential in-service dates for the Humboldt transmission projects to extend out by up to two years to June 1, 2036, with the generation coming online by 2041

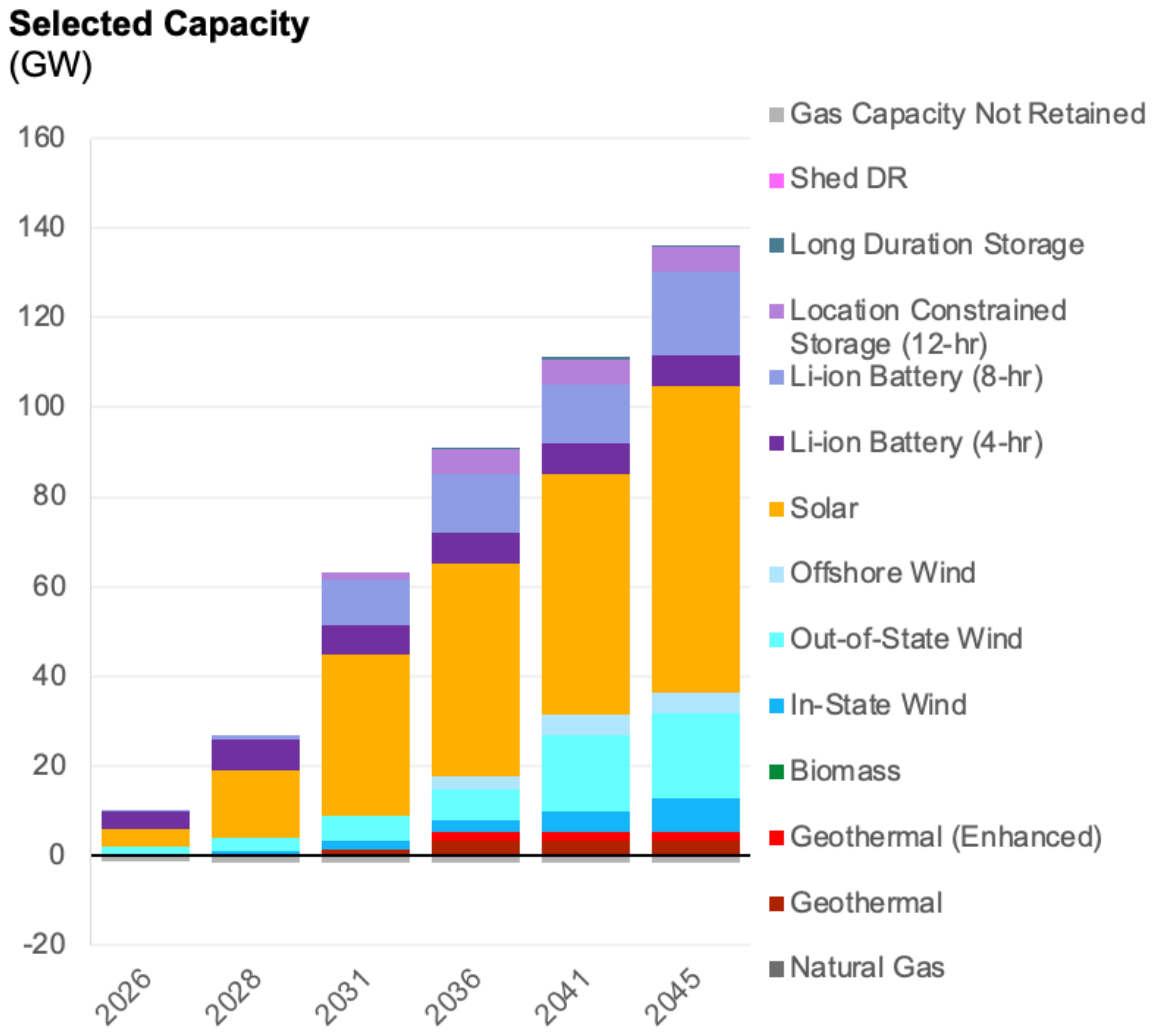
AB1373 Minimum Builds

Procurement Type	Minimum Build
Offshore Wind - Morro Bay	2.9 GW
Offshore Wind - Humboldt	1.6 GW
Geothermal	0.5 GW
Long Duration Storage (12+hr)	0.5 GW
Long Duration Storage (Multi-Day)	0.5 GW

1 Centralized procurement activity would be carried out by the California Department of Water Resources (DWR), when requested by the CPUC
2 https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M539/K202/539202613.PDF

RESOLVE Modeling Results: 26-27 TPP Proposed Base Case Portfolio

Selected Builds



Geothermal is selected for reliability needs due to its high ELCC and high capacity-factor, GHG-free energy; most of the conventional geothermal potential is built out by 2036, and EGS is also built in that year (prior to the expiration of tax credits)

Almost all available out-of-state wind is selected; near-term in-state wind build limits bind through 2028, and the loss of tax credits slows adoption until the 2040s

Solar and storage are resources that scale to meet growing GHG-free energy demand

Small amounts of gas with high fixed O&M are non-retained early on

The partial amounts of the maximum procurement volumes of offshore wind and multi-day storage as considered in AB1373, are forced in; RESOLVE selects above partial AB1373 procurement forced-in amounts for geothermal and location-constrained LDES

26-27 TPP Proposed Base Case

Selected Builds

Note: Generating portfolios is Step #1 as part of the Busbar Mapping Process. See Assumptions for the 2026-2027 TPP for the latest Busbar Mapping Methodology document

- New resources (nameplate GW), both LSE planned and RESOLVE selected, above the IRP-RESOLVE modeling resource baseline (See Slide 14)

Resource Type (cumulative GW)	2026	2028	2031	2036	2041	2045
Natural Gas	-	-	-	-	-	-
Geothermal	0.1	0.3	1.2	3.4	3.4	3.4
Geothermal (Enhanced)	-	-	-	1.7	1.7	1.7
Biomass	-	-	-	-	-	-
In-State Wind	0.3	0.8	2.0	2.6	4.8	7.7
Out-of-State Wind	1.4	2.9	5.5	7.0	17.0	19.0
Offshore Wind	-	-	-	2.9	4.5	4.5
Solar	4.0	15.0	35.9	47.5	53.7	68.5
Li-ion Battery (4-hr)	3.9	6.7	6.8	6.8	6.8	6.8
Li-ion Battery (8-hr)	0.2	1.0	10.0	13.2	13.2	18.6
Location Constrained Storage (12-hr)	-	-	1.6	5.4	5.4	5.4
Generic Long Duration Storage (12-hr)	-	-	-	-	-	-
Generic Long Duration Storage (24-hr)	-	-	-	0.5	0.5	0.5
Generic Long Duration Storage (100-hr)	-	-	-	-	-	-
Shed DR	-	-	-	-	-	-
Gas Capacity Not Retained	(1.3)	(1.7)	(1.7)	(1.7)	(1.7)	(1.7)

Selected Builds – Forced-in vs. RESOLVE-Selected

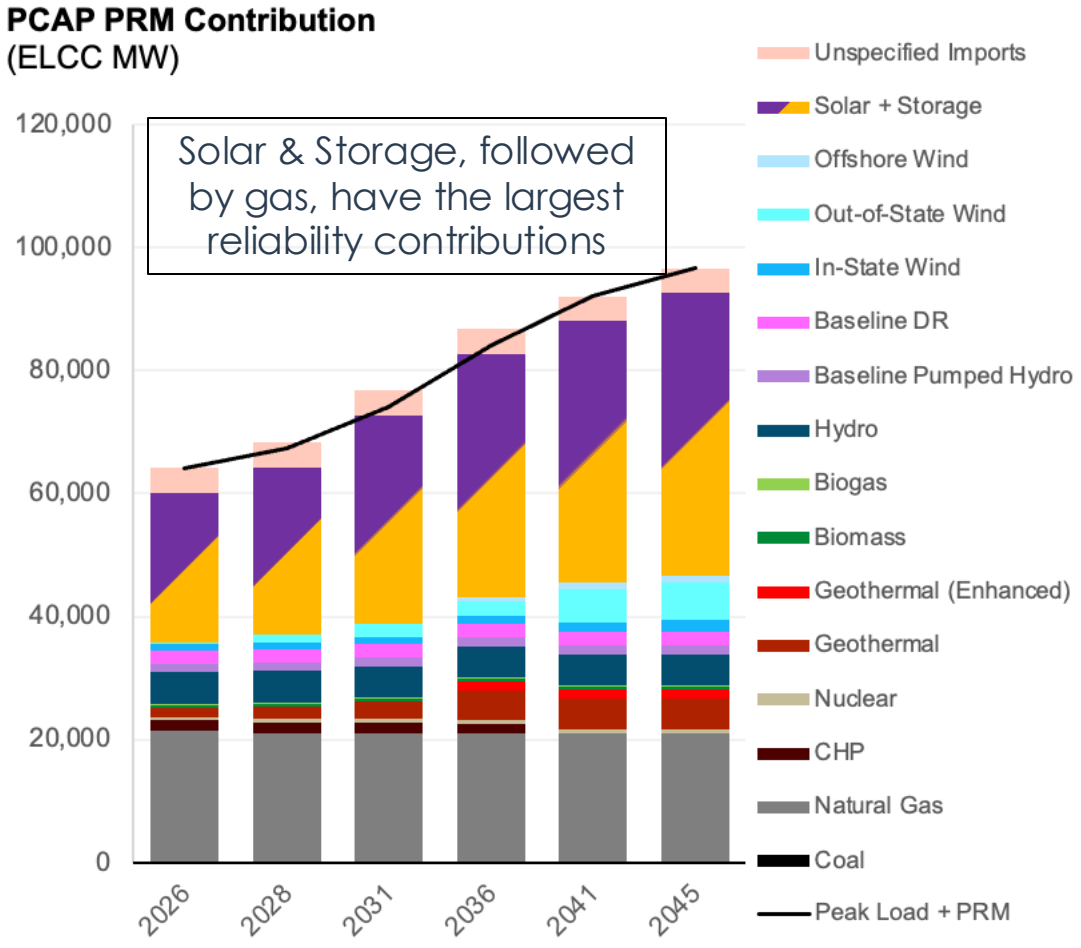
- Significant amounts of conventional geothermal and location-constrained storage are selected beyond AB1373 forced-in amounts
- RESOLVE does not select offshore wind or multi-day storage beyond the forced-in amounts, though the latter is selected a year earlier than required, likely to capture tax credits before expiration

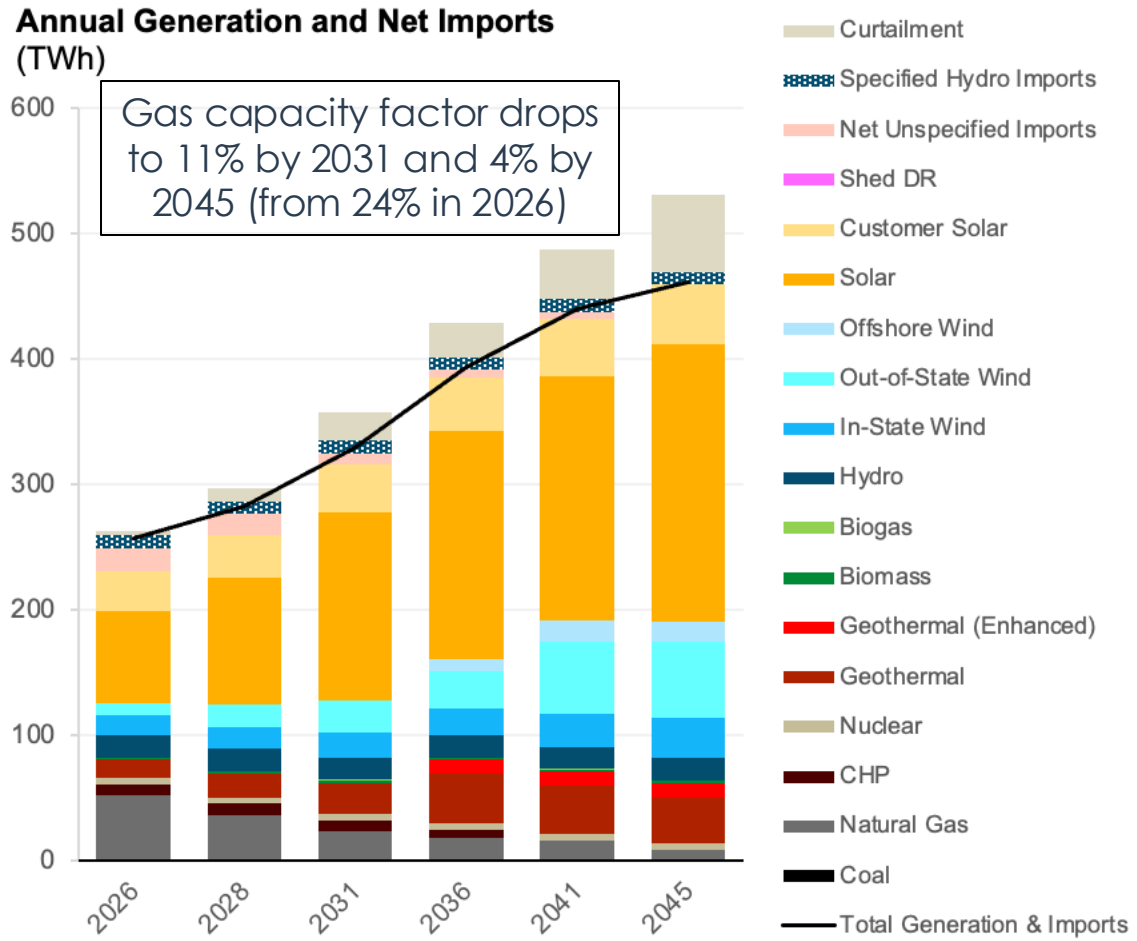
	2036			2041			2045		
Resource/Input	**AB1373**	**RESOLVE-Selected**	**Total**	**AB1373**	**RESOLVE-Selected**	**Total**	**AB1373**	**RESOLVE-Selected**	**Total**
Conventional Geothermal	-	3.4 GW	3.4 GW	0.5 GW	4.6 GW	3.4 GW	0.5 GW	4.6 GW	3.4 GW
Enhanced Geothermal (EGS)	-	1.7 GW	1.7 GW			1.7 GW			1.7 GW
Offshore Wind	2.9 GW	-	2.9 GW	4.5 GW	-	4.5 GW	4.5 GW	-	4.5 GW
Location-Constrained Storage (12-hr)	-	5.4 GW	5.4 GW	0.5 GW	4.9 GW	5.4 GW	0.5 GW	4.9 GW	5.4 GW
Generic LDES (12-hr)	-	-	-		-	-		-	-
Generic LDES (24-hr)	-	0.5 GW	0.5 GW	0.5 GW	-	0.5 GW	0.5 GW	-	0.5 GW
Generic LDES (100-hr)	-	-	-		-	-		-	-

Totals rounded to the nearest 0.1 GW

26-27 TPP Proposed Base Case

Reliability and Energy Mix

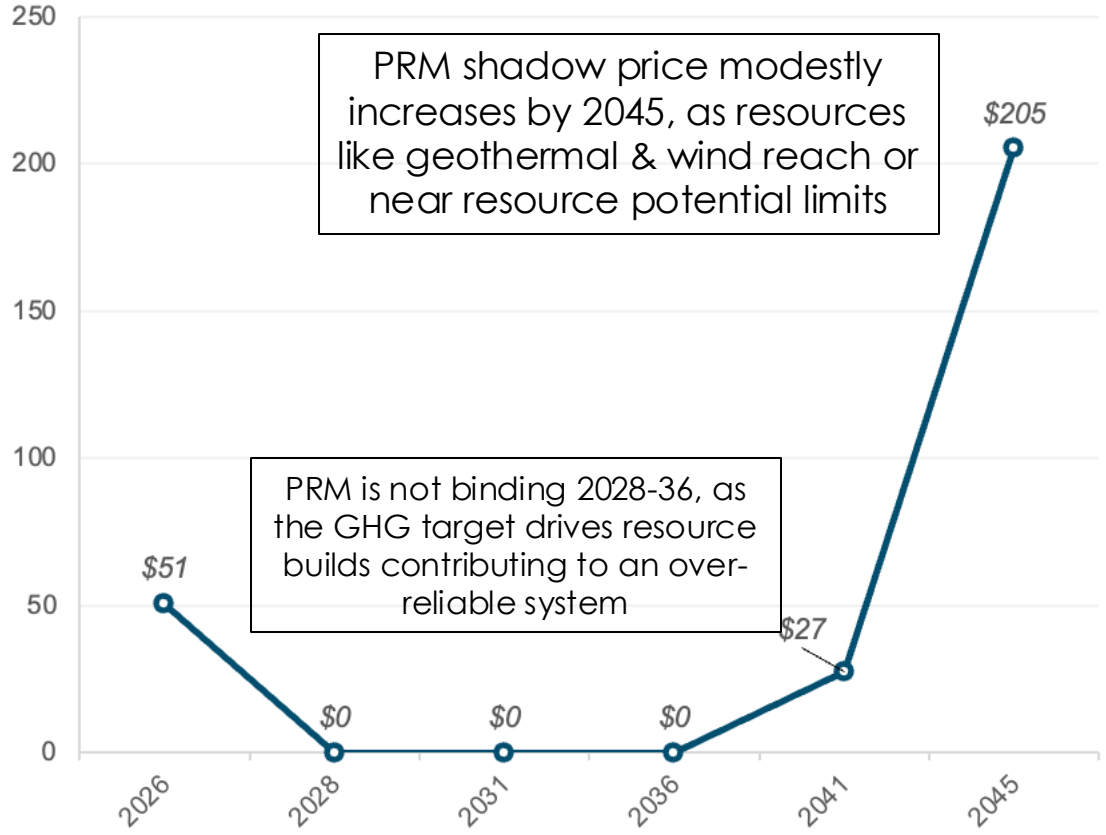




Planning Reserve Margin (PRM) and GHG Constraints

- Shadow prices represent the cost of meeting a constraint, i.e. the cost of the last kW of firm capacity or the last ton of GHG emissions reduction

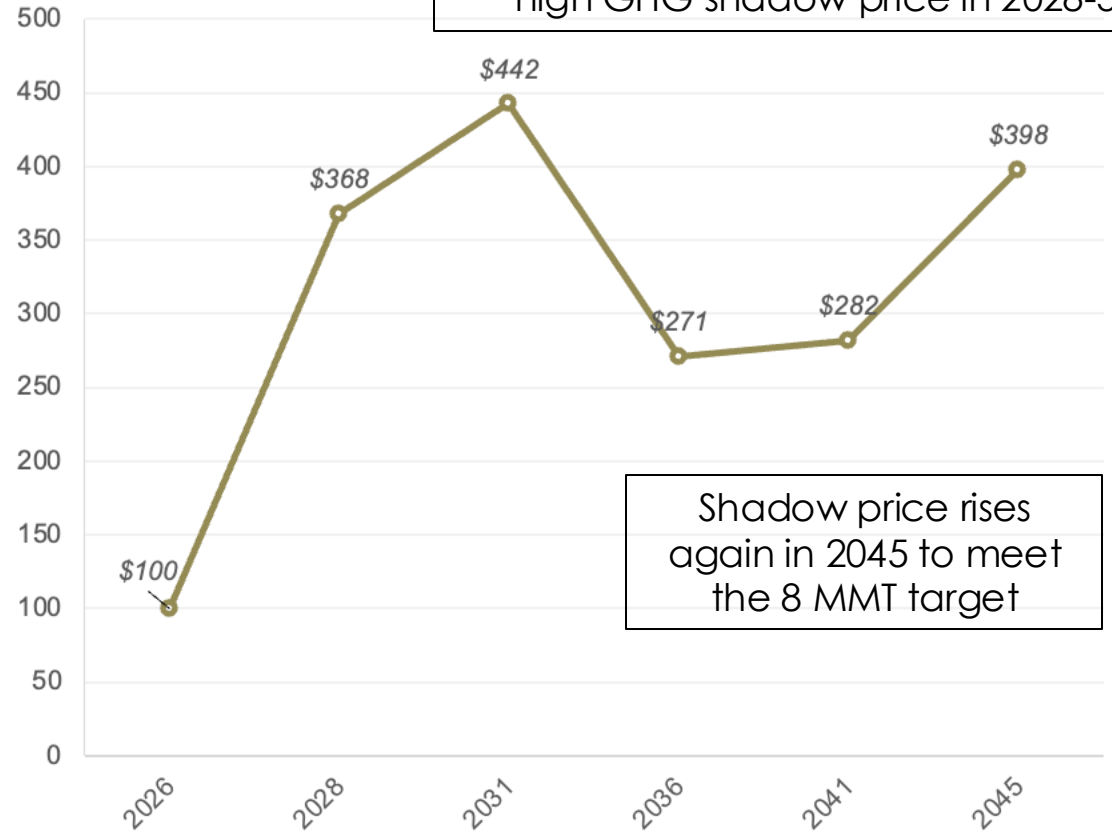
PRM Shadow Prices
($/kW-year)



PRM shadow price modestly increases by 2045, as resources like geothermal & wind reach or near resource potential limits

PRM is not binding 2028-36, as the GHG target drives resource builds contributing to an over-reliable system

GHG Target Shadow Price
($/ton CO_2)

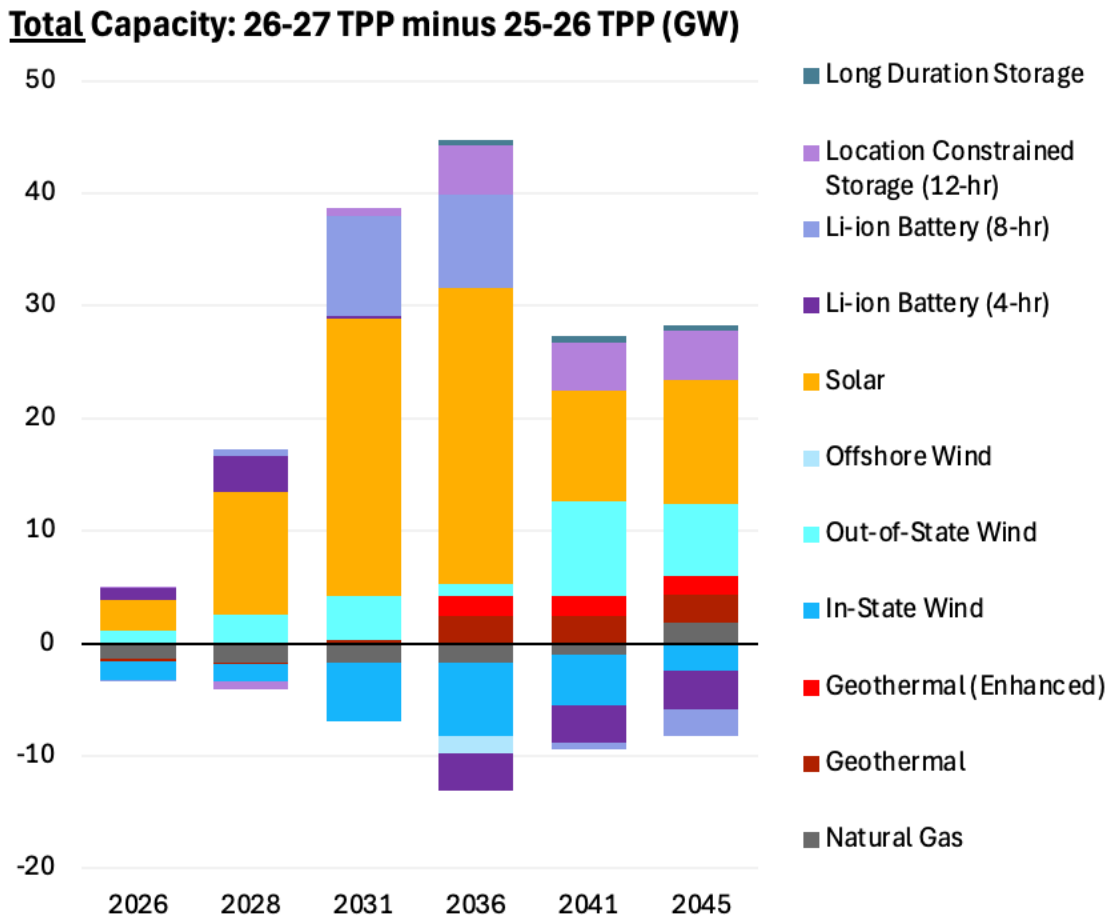


Near-term build limits for wind and geothermal, along with tariffs, drive a high GHG shadow price in 2028-31

Shadow price rises again in 2045 to meet the 8 MMT target

Total Capacity Comparison with the Adopted 25-26 TPP Base Case

- Note: both the previous and the upcoming TPP base case had some amount of resources forced-in, though quantities and resource types differ. Notably, the model never optimally selects offshore wind.
- General increase in selected capacity for 26-27 TPP due to increased load in the 2024 IEPR forecast
  - 25-26 TPP used the 2023 IEPR forecast; capacity differences peak at ~30 GW in the 2030s
- Most incremental capacity is solar, storage, and geothermal (the latter starting in the mid-2030s)
- Shifts from in-state to out-of-state wind, in part because of changing resource potential assumptions
- Extension of offshore wind online dates from 2032-35 to 2036-41
- Shifts from shorter- to longer-duration storage, in part because of significant amounts of 4-hr battery forced-in for 25-26 TPP
- Gas is not retained earlier in the 26-27 TPP, but more gas is retained by 2045



25-26 TPP results for 2031, 2036, and 2041 interpolated between model years

Total Capacity Comparison with the Adopted 25-26 TPP Base Case

Resource Type	2026	2028	2031	2036	2041	2045
Natural Gas	-	-	-	-	-	-
Geothermal	(0.2)	(0.2)	0.3	2.5	2.5	2.5
Geothermal (Enhanced)	-	-	-	1.7	1.7	1.7
Biomass	-	-	-	-	-	-
In-State Wind	(1.7)	(1.6)	(5.3)	(6.5)	(4.5)	(2.5)
Out-of-State Wind	1.1	2.6	3.9	1.1	8.4	6.4
Offshore Wind	-	-	-	(1.6)	-	-
Solar	2.8	10.9	24.6	26.3	9.8	11.0
Li-ion Battery (4-hr)	1.1	3.2	0.2	(3.3)	(3.3)	(3.3)
Li-ion Battery (8-hr)	(0.2)	0.6	8.8	8.3	(0.6)	(2.5)
Location Constrained Storage (12-hr)	0.1	(0.6)	0.8	4.3	4.3	4.3
Generic Long Duration Storage (12-hr)	-	-	-	-	-	-
Generic Long Duration Storage (24-hr)	-	-	-	0.5	0.5	0.5
Generic Long Duration Storage (100-hr)	-	-	-	-	-	-
Shed DR	-	-	-	-	-	-
Gas Capacity Not Retained (positive value = more capacity retained)	(1.3)	(1.7)	(1.7)	(1.7)	(1.0)	1.8

25-26 TPP results for 2031, 2036, and 2041 interpolated between model year

Baseline Capacity Comparison with the Adopted 25-26 TPP Base Case

- Staff updated the IRP baseline resources ahead of the 26-27 TPP to incorporate additional online and in-development resources[1]

Resource Type	2026	2028	2031	2036	2041	2045
Natural Gas	-	-	-	-	-	-
Geothermal	-	0.3	0.3	0.3	0.3	0.3
Geothermal (Enhanced)	-	-	-	-	-	-
Biomass	-	-	-	-	-	-
In-State Wind	-	-	-	-	-	-
Out-of-State Wind	0.2	1.8	1.8	1.8	1.8	1.8
Offshore Wind	-	-	-	-	-	-
Solar	4.3	4.4	4.4	4.4	4.4	4.4
Li-ion Battery (4-hr)	5.2	5.5	5.5	5.5	5.5	5.5
Li-ion Battery (8-hr)	0.1	0.1	0.1	0.1	0.1	0.1
Location Constrained Storage (12-hr)	0.2	0.2	0.2	0.2	0.2	0.2
Generic Long Duration Storage (12-hr)	-	-	-	-	-	-
Generic Long Duration Storage (24-hr)	-	-	-	-	-	-
Generic Long Duration Storage (100-hr)	-	-	-	-	-	-
Shed DR	-	-	-	-	-	-

Accounting changes (e.g. NQC vs. nameplate reporting) excluded

1 https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/integrated-resource-plan-and-long-term-procurement-plan-irp-ltpp/2024-2026-irp-cycle-events-and-materials/2025_draft_inputs_and_assumptions_public_slides.pdf

Summary & Conclusions

- Compared to the **2023 IEPR**, the **revised 2024 IEPR has higher demand and peak load,** driving an **increase in resource buildout**
  - 25-26 TPP used the 2023 IEPR forecast; load growth in the 2024 IEPR (which is being used for the current 26-27 TPP) drives additional resource builds, up to ~30 GW above the 25-26 TPP
  - Shifts from in-state to out-of-state wind, in part because of changing resource potential assumptions
- **GHG target leads to an over-reliable system in some years**; Planning Reserve Margin is not binding from 2028-2036
- Aggressive near-term **solar build rate accelerates** from ~3-4 GW/yr to ~7 GW/yr by 2030 to meet GHG goals due to near-term wind and geothermal limits, in excess of reliability build need
- PG&E<>SCE transmission path expansion candidate(s) added to RESOLVE optimization, and Path 26/Path 15 expansion(s) are selected primarily to **increase zonal import capacity into PG&E TAC area,** but expansion benefit reduces post-offshore wind addition
- RESOLVE **selects above partial AB1373 procurement forced-in amounts for geothermal and location-constrained LDES;** RESOLVE does not currently select any offshore wind due to resource's high cost under current cost assumptions

Reliability & Emissions Results: 26-27 TPP Proposed Base Case Portfolio

SERVM Analysis

Reliability and GHG Results – 26-27 TPP Proposed Base Case – before busbar mapping (from RESOLVE as-is)

	2036		2041		
Category\Model	RESOLVE	SERVM	RESOLVE	SERVM	Units
LOLE		0.0031		0.154	days/year
CAISO emitting generation	24,873	34,179	16,130	30,149	GWh
CAISO generator emissions	10.23	14.14	6.50	11.74	MMT CO2
Unspecified imports	13,091	9,168	14,114	9,219	GWh
Unspecified imports emissions	5.60	3.92	6.04	3.95	MMT CO2
CAISO BTM CHP emissions	3.16	3.16	-	-	MMT CO2
Total CAISO emissions	18.99	21.22	12.54	15.69	MMT CO2
Difference in GHG emissions		2.22		3.15	MMT CO2

- Some difference in emissions between models is expected. Relative to results from the 25-26 TPP modeling, RESOLVE and SERVM show closer alignment here. The GHG gap is significantly smaller than last cycle. The before mapping LOLE result in 2041 is closer to 0.1, meaning that when RESOLVE's reliability constraint is binding, as it is in 2041, it is now more consistent with SERVM in terms of quantifying reliability need and selecting new resources to meet it. These improvements can be attributed to both model improvements and input alignment (described earlier in these slides) that staff conducted in the first half of 2025.

Reliability and GHG Results – 26-27 TPP Proposed Base Case – after busbar mapping

	2036		2041		
Category\Model	RESOLVE	SERVM	RESOLVE	SERVM	Units
LOLE		0.000		0.084	days/year
CAISO emitting generation	24,873	34,156	16,130	30,110	GWh
CAISO generator emissions	10.23	14.17	6.50	11.75	MMT CO2
Unspecified imports	13,091	9,162	14,114	8,943	GWh
Unspecified imports emissions	5.60	3.92	6.04	3.83	MMT CO2
CAISO BTM CHP emissions	3.16	3.16	-	-	MMT CO2
Total CAISO emissions	18.99	21.25	12.54	15.58	MMT CO2
Difference in GHG emissions		2.25		3.04	MMT CO2

- Before remapping, busbar mapping results showed most LOLE occurring on winter mornings in PG&E region. To rectify this, busbar mapping attempted to increase placement of selected resources and reduce gas non-retention in PG&E, while considering the other criterion busbar mapping takes into account. The modeling outcome was minimal change in total GHG emissions and reduction of winter LOLE in PG&E region.
- The mapping changes made in 2041 were also made for the 2036 portfolio for consistency

Total Portfolio Summary (cumulative MW) – 26-27 TPP Proposed Base Case – before and after busbar mapping

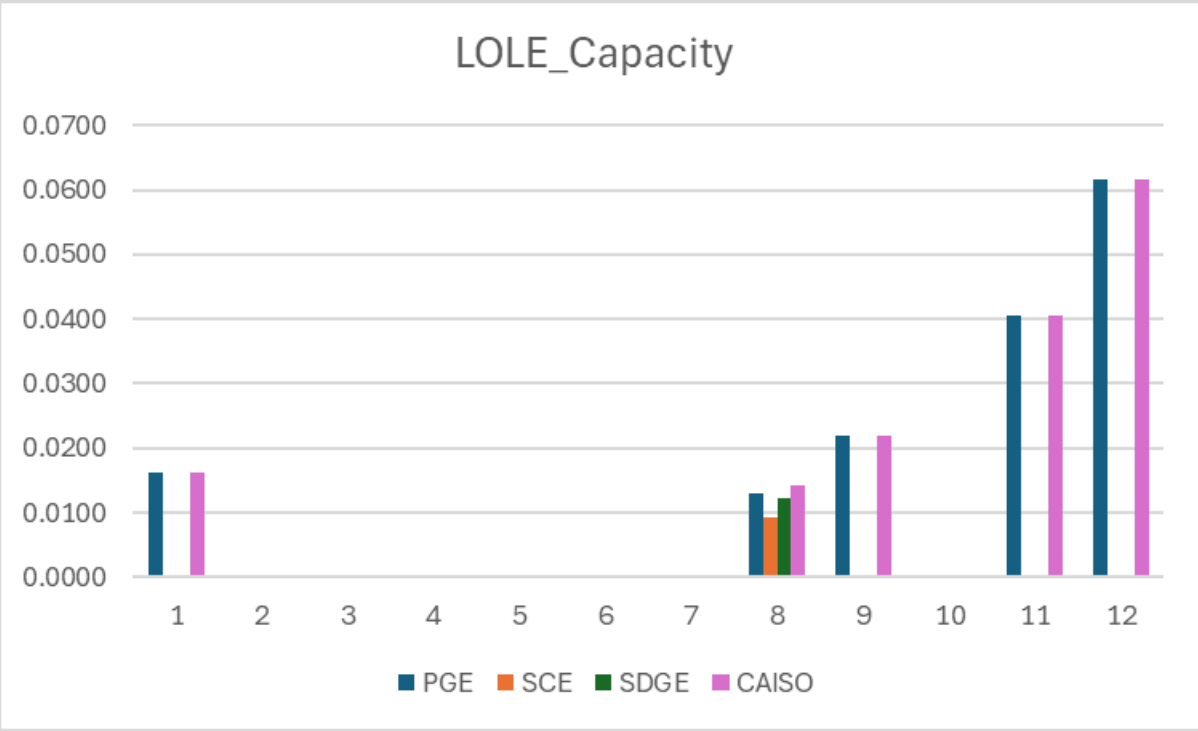
Mapping	Before	After	Before	After	Before	After
Region	PGE		SCE		SDGE	
Year	2036					
Battery_4h	4,725	5,572	14,235	15,552	2,379	2,870
Battery_8h	3,259	2,918	8,862	8,868	1,360	367
LDES	-	-	500	500	-	-
Biomass	611	611	207	207	8	8
BTMPV	14,235	14,235	10,883	10,883	3,421	3,421
CC/CT/ICE/Steam	11,272	11,372	8,945	8,825	3,527	3,567
Coal	-	-	-	-	-	-
Cogen	422	422	384	384	3	3
DR	784	784	1,085	1,085	53	53
Geothermal	4,461	4,370	2,227	2,317	529	530
Hydro	5,473	5,473	1,696	1,696	-	-
Nuclear	-	-	635	635	-	-
OffshoreWind	2,924	2,924	-	-	-	-
OOSWind	200	200	9,922	9,922	-	-
PSH	2,425	3,015	4,166	3,576	500	500
Solar	23,098	25,909	30,173	33,531	17,631	11,462
Wind	2,536	2,469	4,881	4,949	1,692	1,692

Mapping	Before	After	Before	After	Before	After
Region	PGE		SCE		SDGE	
Year	2041					
Battery_4h	4,725	5,572	14,235	15,552	2,379	2,870
Battery_8h	3,259	2,918	8,862	8,868	1,360	367
LDES	-	-	500	500	-	-
Biomass	611	611	207	207	8	8
BTMPV	14,887	14,887	11,607	11,607	3,547	3,547
CC/CT/ICE/Steam	11,272	11,372	8,945	8,825	3,527	3,567
Coal	-	-	-	-	-	-
Cogen	-	-	-	-	-	-
DR	784	784	1,085	1,085	53	53
Geothermal	4,461	4,370	2,227	2,317	529	530
Hydro	5,473	5,473	1,696	1,696	-	-
Nuclear	-	-	635	635	-	-
OffshoreWind	4,531	4,531	-	-	-	-
OOSWind	4,200	4,200	15,922	15,922	-	-
PSH	2,425	3,015	4,166	3,576	500	500
Solar	25,995	28,799	33,324	36,687	17,859	11,692
Wind	3,414	3,349	4,881	4,949	2,993	2,992

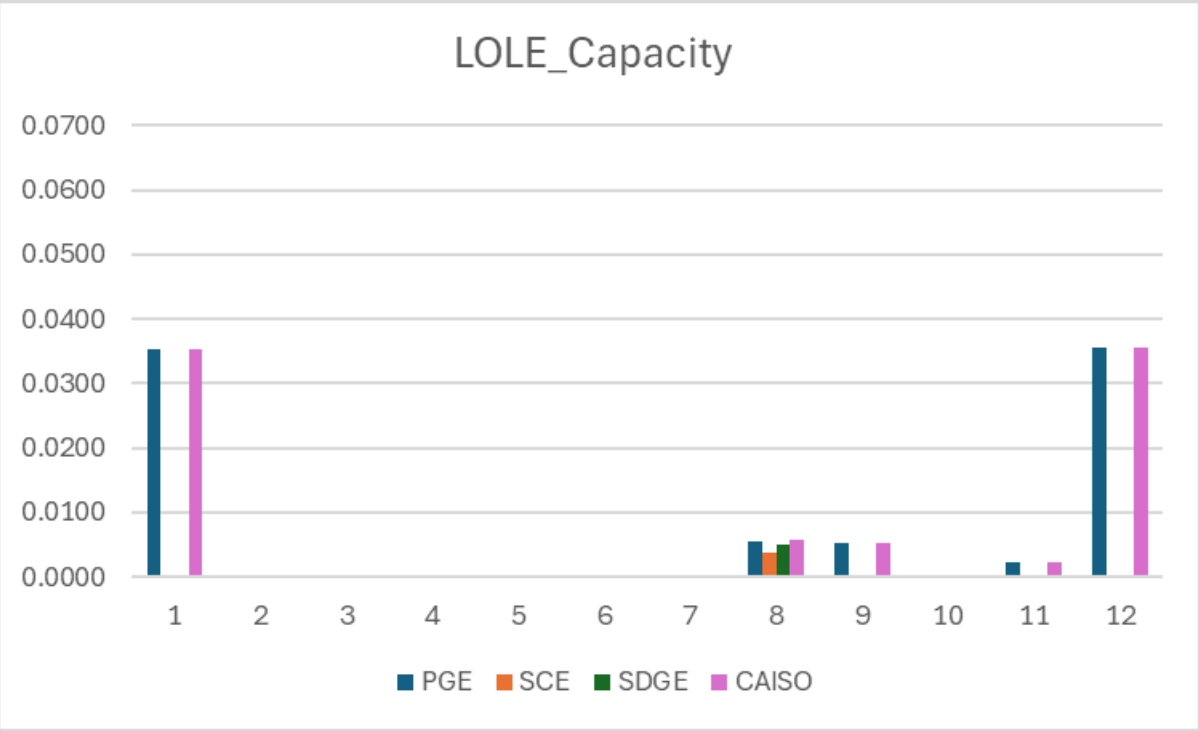
- The initial busbar mapping (not shown here) without considering SERVM outcomes was further adjusted after initial SERVM modeling to have more gas units retained in PG&E region and less in SCE region, and to shift about 200 MW of new geothermal from SCE to PG&E. The final SERVM modeling outcomes shown on the prior slide reflect the busbar mapping for the Proposed Decision. The tables here compare the SERVM-before-mapping-total-portfolio (translated from RESOLVE as-is) to the SERVM-after-busbar-mapping-total-portfolio (includes the further adjustments). The differences from RESOLVE in battery storage build and placement were driven by the initial busbar mapping effort, not by SERVM outcomes.

2041 Monthly LOLE – 26-27 TPP Proposed Base Case – before and after busbar mapping

Before Busbar Mapping

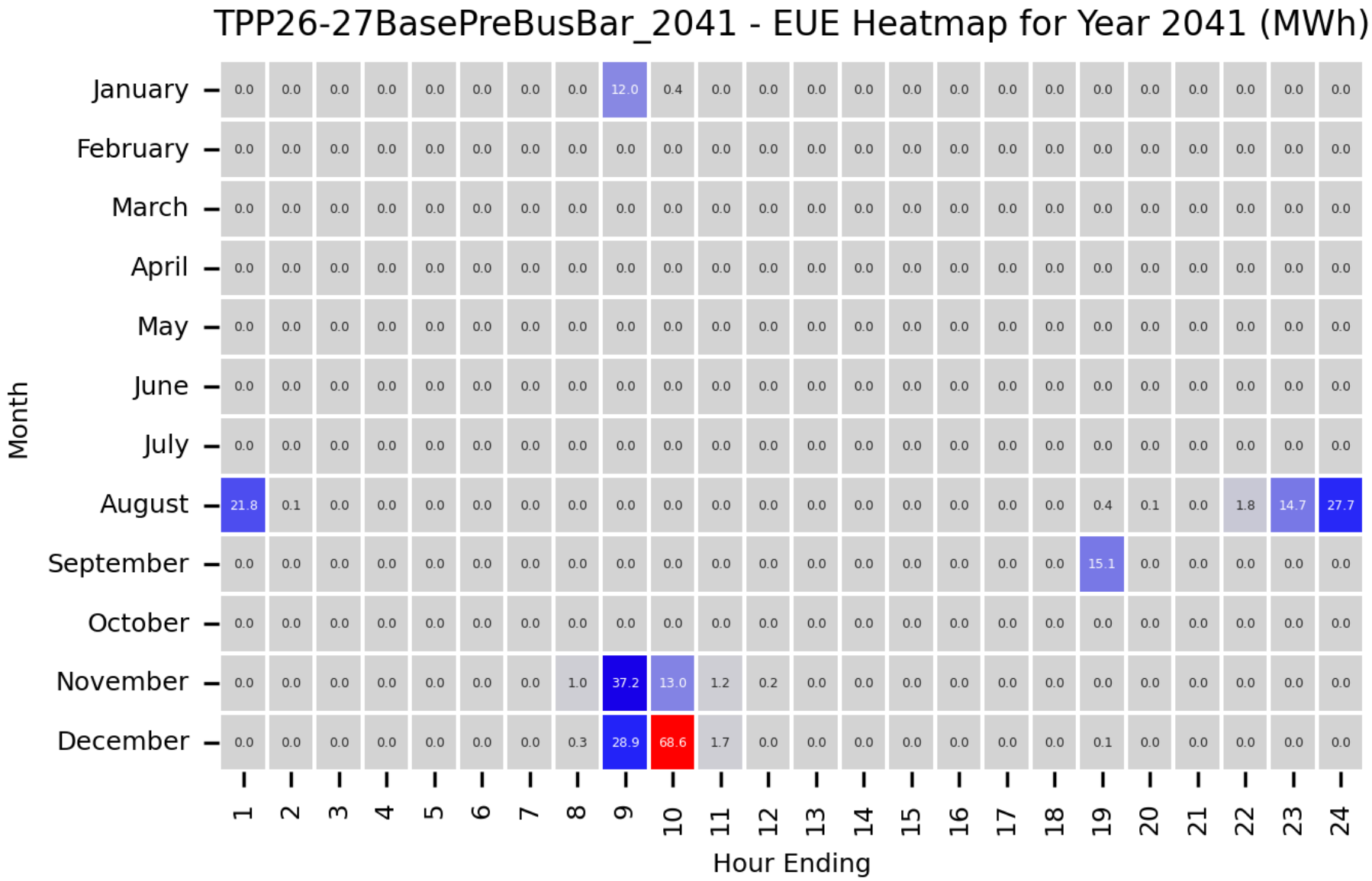


After Busbar Mapping



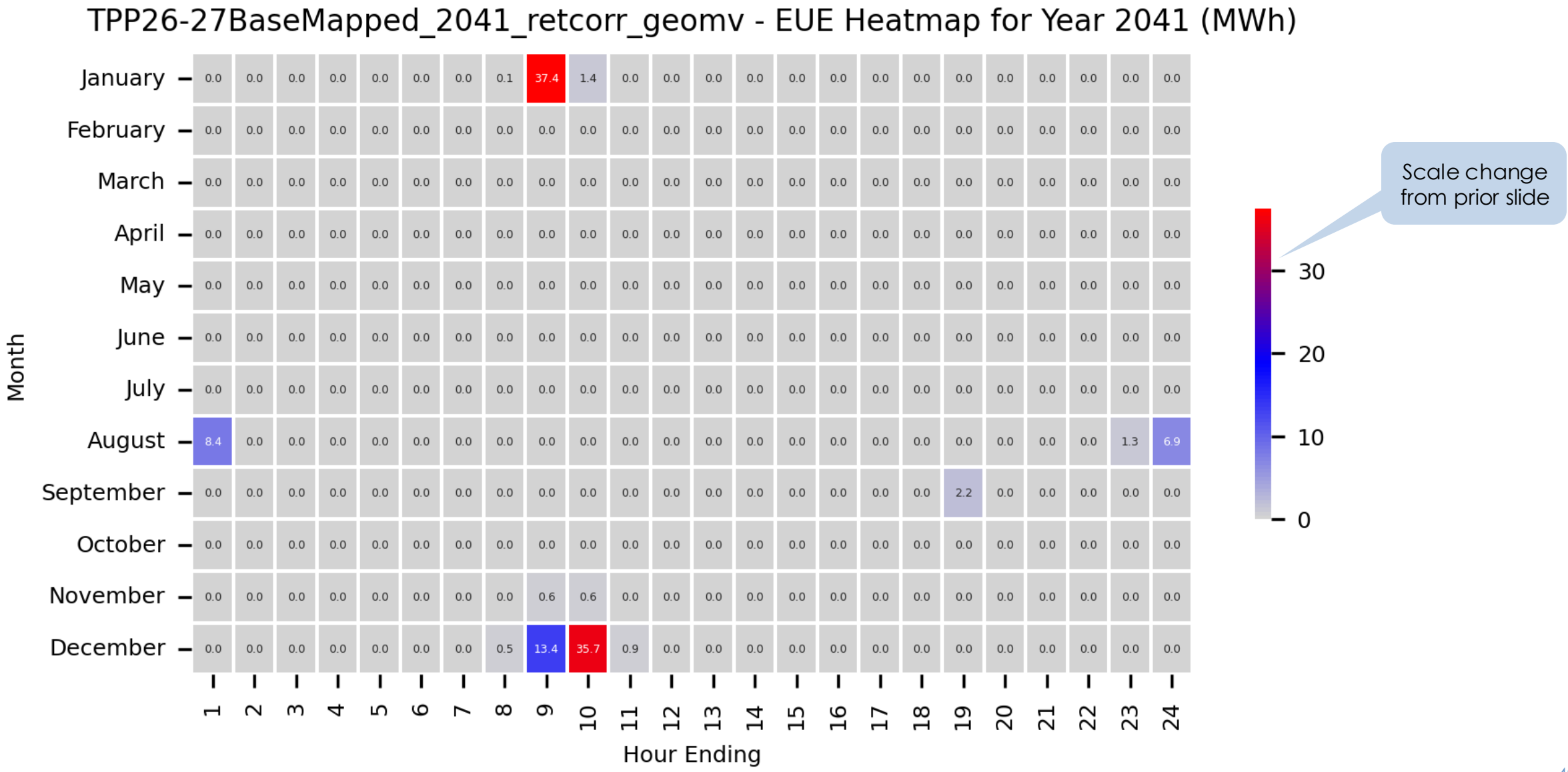
- LOLE occurred primarily in PG&E region in winter months. Busbar mapping reduced LOLE across most months where they occurred, resulting in annual LOLE under the 0.1 target.

2041 Expected Unserved Energy (EUE) Month-Hour Map before Busbar Mapping



EUE (and LOLE) mostly occurred in winter morning periods. This is consistent with the IEPR forecasting winter morning electric demand growing faster in PG&E territory due to EV charging and fuel substitution by the 2040s.

2041 Expected Unserved Energy (EUE) Month-Hour Map after Busbar Mapping



Gas Capacity Factors Comparison between RESOLVE and SERVM

	Model	RESOLVE	SERVM	RESOLVE	SERVM
	Unit Category/Year	2036	2036	2041	2041
Before Busbar Mapping	**CC/CT/ICE ***	**0.083**	**0.147**	**0.074**	**0.145**
	CC		0.204		0.201
	CT		0.014		0.015
	ICE		0.111		0.106
After Busbar Mapping	**CC/CT/ICE ***	**0.083**	**0.146**	**0.074**	**0.145**
	CC		0.201		0.199
	CT		0.017		0.017
	ICE		0.116		0.112

- RESOLVE tends to use less in-CAISO gas and more imports whereas SERVM does the opposite, partially explaining the lower in-CAISO gas capacity factor in RESOLVE
- Relative to results from the 25-26 TPP modeling, RESOLVE and SERVM show closer alignment here

* Only the combined gas capacity factor of RESOLVE was compared to SERVM

Summary and Conclusions: SERVM Reliability and GHG Modeling – 26-27 TPP Proposed Base Case

- The mapped 2036 CAISO LOLE is 0.000 days per year and the GHG emissions are 21.25 MMT CO2 per year. The 2036 portfolio is over-reliable due to the selection of resources to meet GHG reduction model constraints in the early 2030's
- The mapped 2041 CAISO LOLE is 0.084 days per year and the GHG emissions are 15.58 MMT CO2 per year. Before mapping the LOLE was 0.154. Coordinated updates to, and calibration between, RESOLVE and SERVM were effective in making RESOLVE select an un-mapped portfolio that was closer to reliable than the prior cycle. Mapping was able to lower the LOLE the rest of the way to below 0.1
- The GHG gap between SERVM and RESOLVE closed significantly this cycle, also attributed to coordinated updates to, and calibration between, RESOLVE and SERVM.
- The GHG emissions in both 2036 and 2041 are consistent with the CAISO portion of the California electricity sector trajectory set by CARB in the most recent Climate Change Scoping Plan in the 2022 Scoping Plan Update
  - In 2036, the estimate is 21.25 MMT
  - In 2041, the estimate is 15.58 MMT

Staff Recommended 26-27 TPP Sensitivity Portfolio

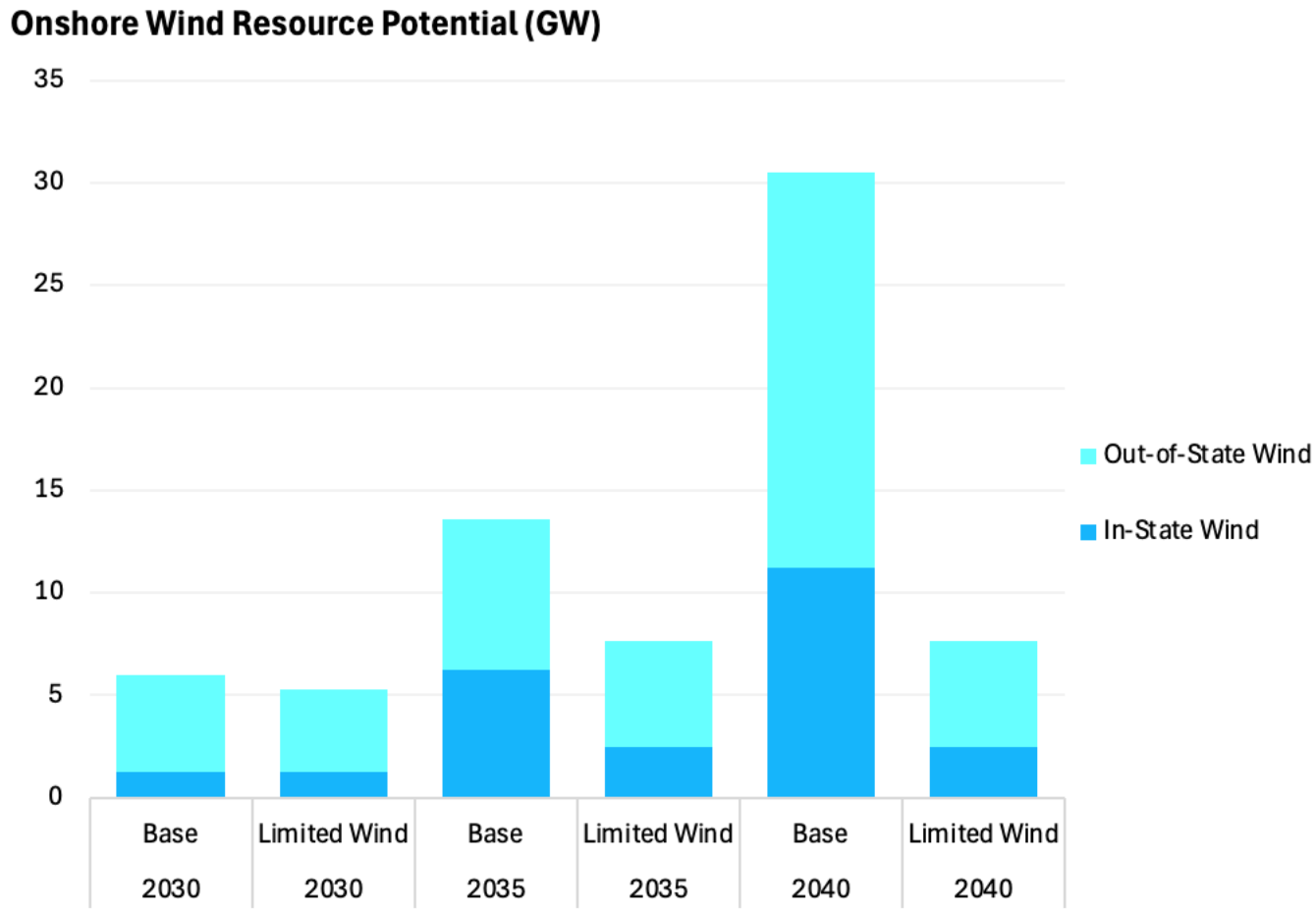
Background – Purpose of Sensitivity

- In addition to the Proposed 26-27 TPP Base Case portfolio, Staff is proposing to transmit one sensitivity portfolio to the CAISO focused on a limited wind deployment future
- The sensitivity would represent a future with reduced in-state and out-of-state wind procurement, and without offshore wind
  - Reflects the recent lack of wind development in California, the increased difficulty of permitting wind in California, and the current changes in federal policy toward wind projects
  - Designed to serve as a plausible alternative scenario associated with the proposed base case (as opposed to a TPP sensitivity that gathers additional transmission information to support future portfolio development and explore incremental optionality or risk)
  - Would provide insights into transmission implications and resources that would be needed to replace wind in the recommended base case portfolio and recently adopted TPP portfolios if its development were significantly limited

Sensitivity Portfolio Results: Limited Wind

Limited Wind Sensitivity – Resource Potential Inputs

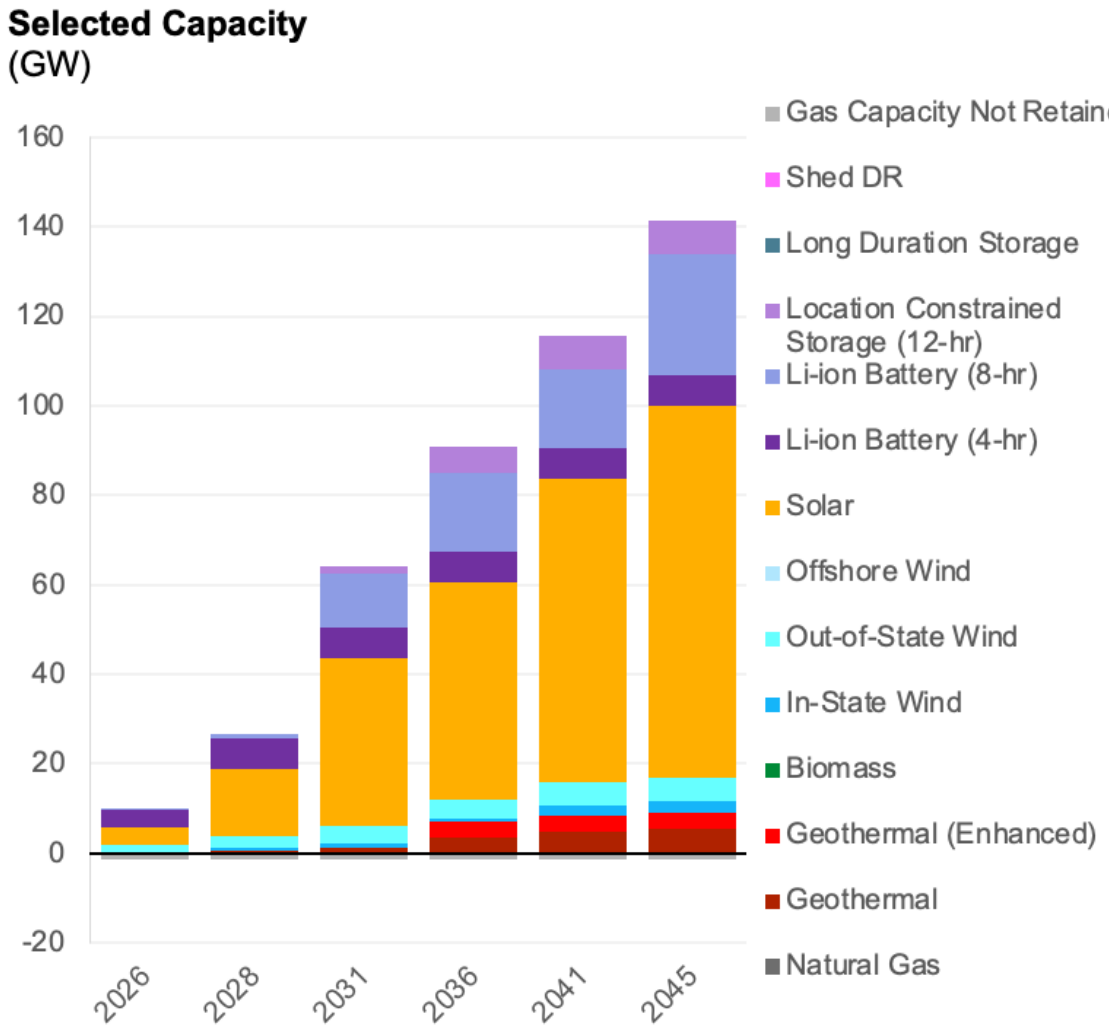
- The limited wind potential sensitivity explores significant reductions to resource potential (as shown in the graphic to the right)
  - Maximum 2.5 GW In-State Wind
  - Out-of-State Wind limited to existing transmission rights (SunZia, SWIP-North, TransWest), plus 2 GW of additional SunZia potential
  - No Offshore Wind



On graph, In-State Wind potential for "Base" includes build limits through 2035

26-27 TPP Proposed Sensitivity Case: Limited Wind

Selected Builds



Geothermal is selected for reliability needs due to its high ELCC (contribution to reliability) and high capacity- factor, GHG-free energy; the entire conventional geothermal potential is built out to fill need otherwise met by wind; significant amounts of EGS is also built in 2036 (prior to the expiration of tax credits)

Limits to wind potential bind in most years, with the exception of in-state wind in the 2030s (shortly after the loss of tax credits)

Solar and storage are resources that scale to meet growing GHG-free energy demand and fill some of the need otherwise met by wind

Small amounts of gas with high fixed O&M are non-retained early on

Actual buildout will depend on procurement options, therefore, geothermal selection in model could be considered a proxy for other resources with similar attributes, e.g. high ELCC

26-27 TPP Proposed Sensitivity Case: Limited Wind

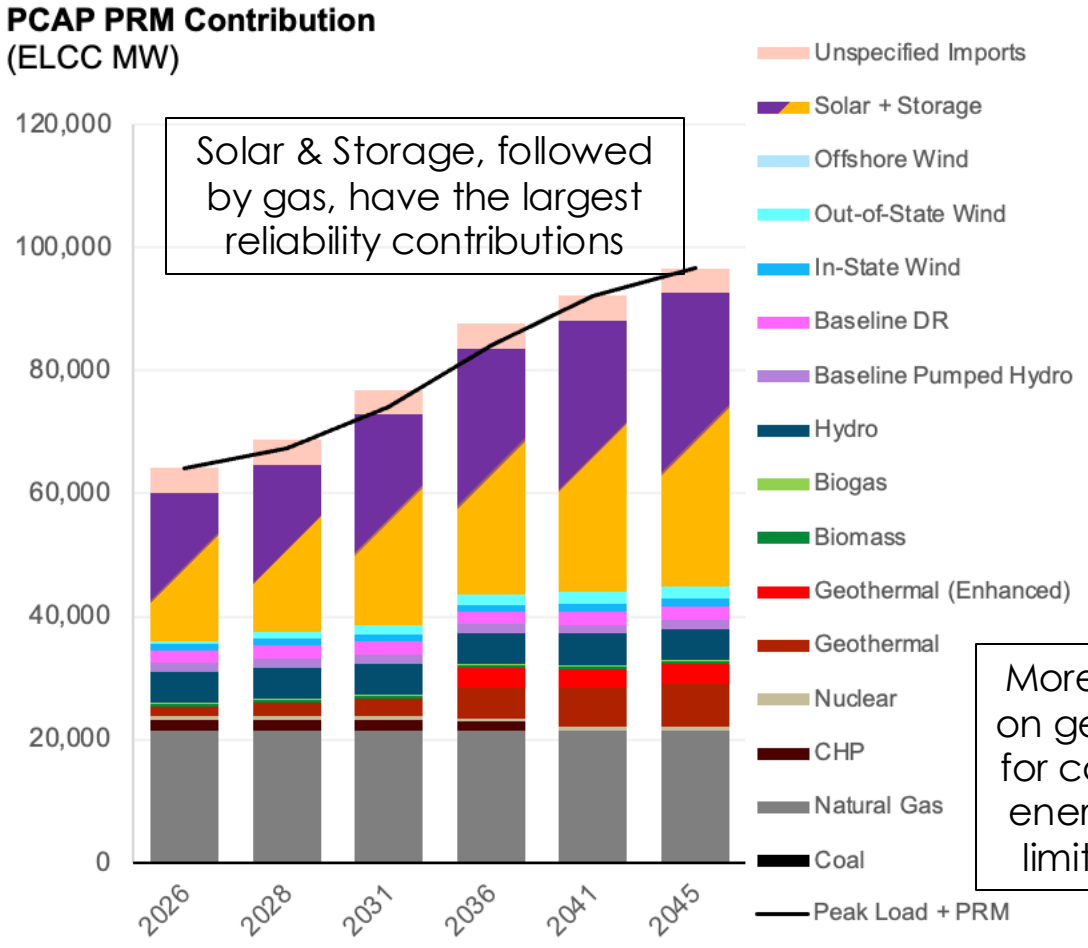
Selected Builds

Note: Generating portfolios is Step #1 as part of the Busbar Mapping Process. See Assumptions for the 2026-2027 TPP for the latest Busbar Mapping Methodology document

Resource Type	2026	2028	2031	2036	2041	2045
Natural Gas	-	-	-	-	-	-
Geothermal	0.1	0.6	1.2	3.4	4.7	5.6
Geothermal (Enhanced)	-	-	-	3.6	3.6	3.6
Biomass	-	-	-	-	-	-
In-State Wind	0.3	0.8	0.9	0.9	2.5	2.5
Out-of-State Wind	1.4	2.5	4.0	4.0	5.1	5.1
Offshore Wind	-	-	-	-	-	-
Solar	4.0	15.0	37.5	48.6	67.6	83.2
Li-ion Battery (4-hr)	3.9	6.7	6.8	6.8	6.8	6.8
Li-ion Battery (8-hr)	0.2	1.0	12.1	17.7	17.7	26.9
Location Constrained Storage (12-hr)	-	-	1.6	5.7	7.5	7.5
Generic Long Duration Storage (12-hr)	-	-	-	-	-	-
Generic Long Duration Storage (24-hr)	-	-	-	-	-	-
Generic Long Duration Storage (100-hr)	-	-	-	-	-	-
Shed DR	-	-	-	-	-	-
Gas Capacity Not Retained	(1.2)	(1.2)	(1.2)	(1.2)	(1.2)	(1.2)

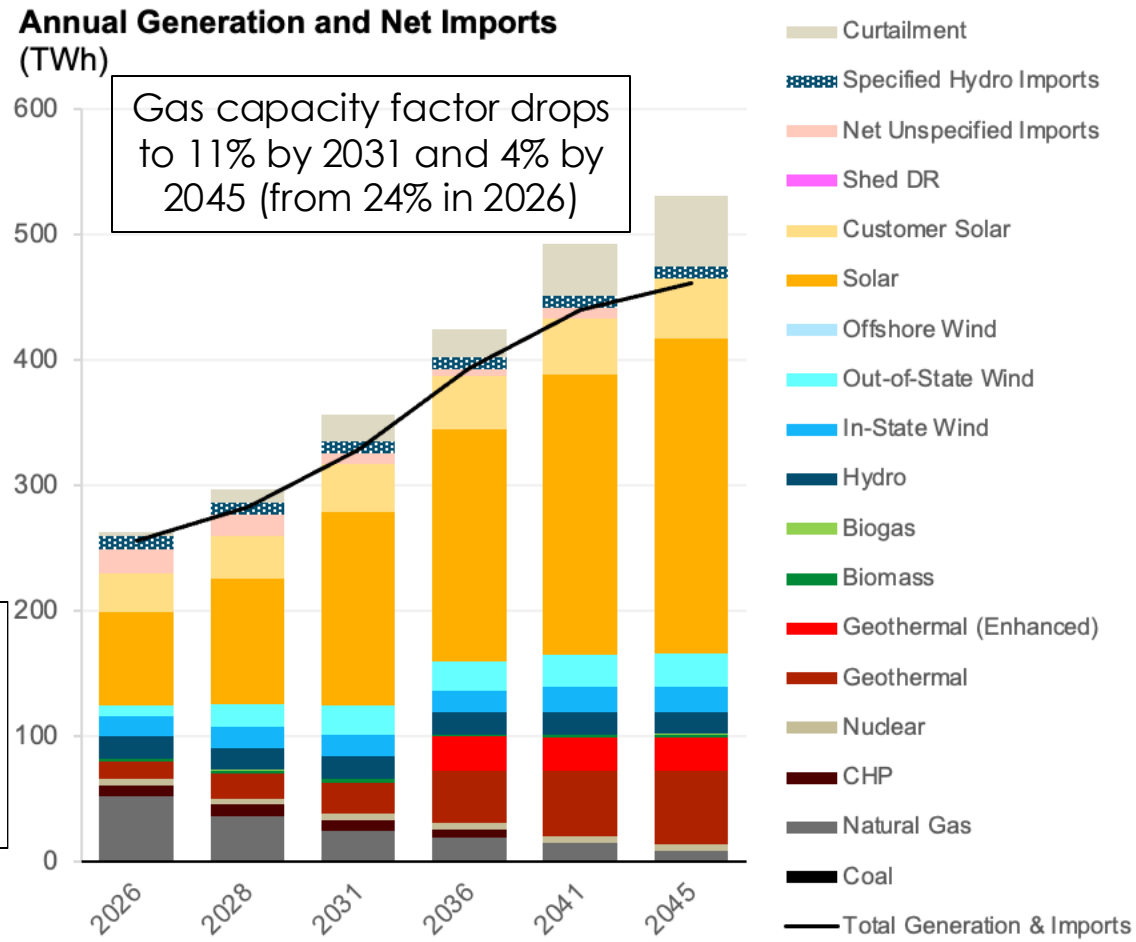
26-27 TPP Proposed Sensitivity Case: Limited Wind

Reliability and Energy Mix



Solar & Storage, followed by gas, have the largest reliability contributions

More reliance on geothermal for capacity & energy under limited wind

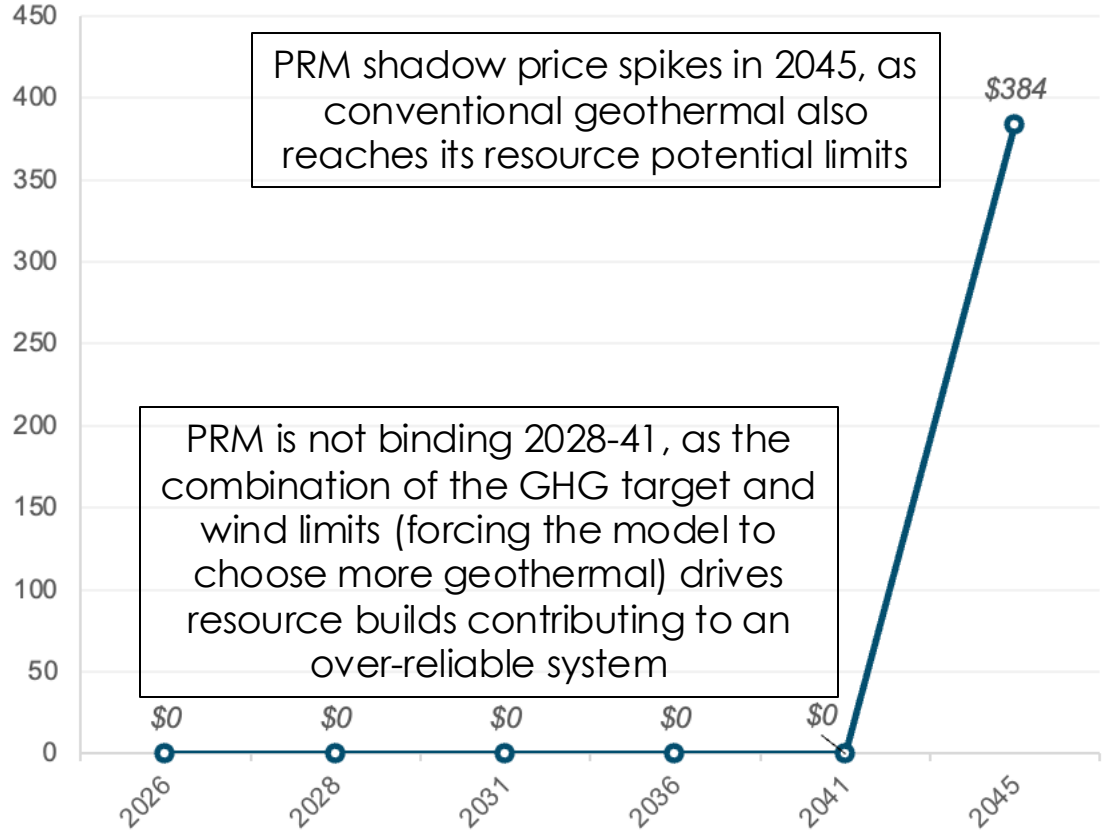


Gas capacity factor drops to 11% by 2031 and 4% by 2045 (from 24% in 2026)

PRM and GHG Constraints

- Shadow prices represent the cost of meeting a constraint, i.e. the cost of the last kW of firm capacity or the last ton of GHG emissions reduction

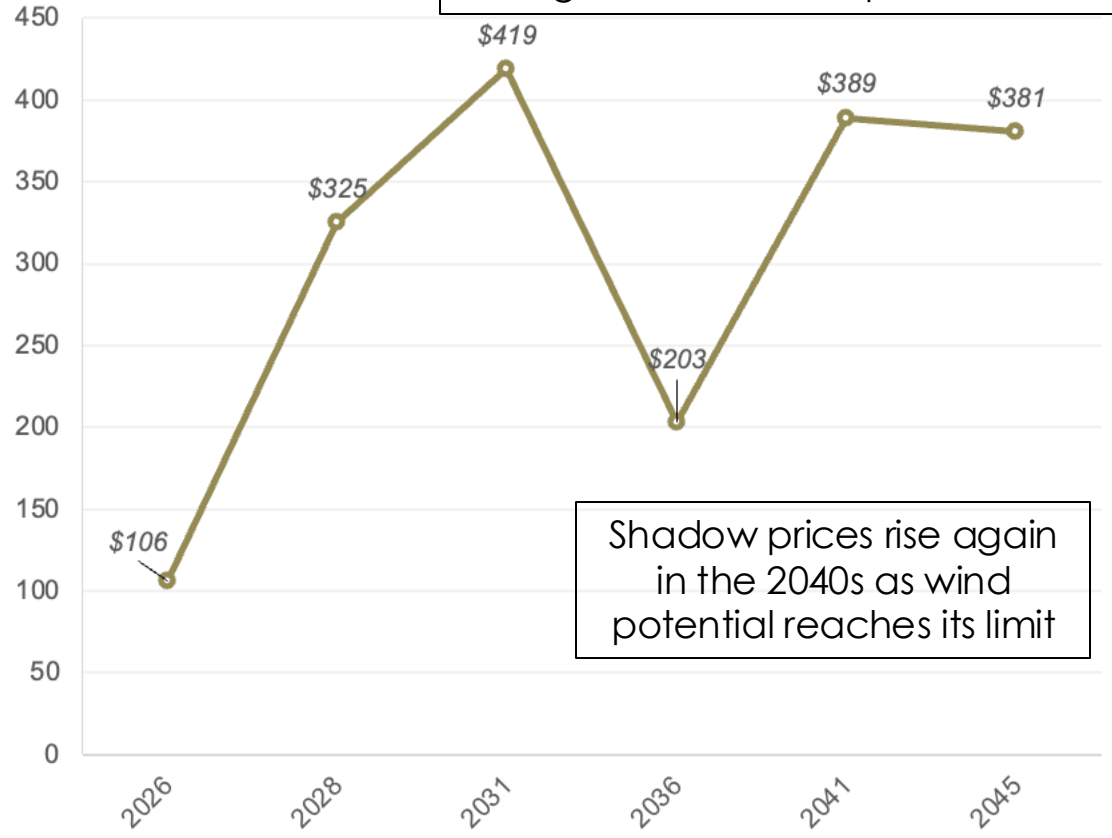
PRM Shadow Prices
($/kW-year)



PRM shadow price spikes in 2045, as conventional geothermal also reaches its resource potential limits

PRM is not binding 2028-41, as the combination of the GHG target and wind limits (forcing the model to choose more geothermal) drives resource builds contributing to an over-reliable system

GHG Target Shadow Price
($/ton CO_2)



Near-term build limits for wind and geothermal, along with tariffs, drive a high GHG shadow price in 2028-31

Shadow prices rise again in the 2040s as wind potential reaches its limit

Summary & Conclusions

- Primarily replaces wind with **additional solar and storage**, plus ~3 GW of **geothermal** (conventional and enhanced)
  - More reliance on geothermal for capacity & energy with limited wind
- Forcing in offshore wind is **more expensive** than limiting onshore wind
- Limits to wind potential bind in most years, with the exception of in-state wind in the 2030s (shortly after the loss of tax credits)
- **Additional expansion of the Path 26/Path 15 expansion** compared to the Proposed Base Case is required to meet PG&E load

Appendices

Appendix II: Additional RESOLVE modeling results

26-27 TPP Proposed Base Case

Selected Builds (MW) by CAISO Study Area (2036)

Region	In-State Wind	Out-of-State Wind	Offshore Wind	Solar	Li-ion Battery (4-hr)	Li-ion Battery (8-hr)	Location-Constrained Storage (12-hr)	In-State Geothermal	Out-of-State Geothermal	EGS - Near Field	EGS - Deep
PG&E_Fresno	-	-	-	3,256	226	2,396	-	-	-	-	269
PG&E_GBA	247	582	-	684	612	45	149	-	-	-	87
PG&E_Kern	-	-	2,924	9,675	369	1,182	818	-	-	-	-
PG&E_NGBA	599	-	1,607	2,454	314	-	-	668	808	45	-
PG&E_Northeast_CA	-	-	-	-	-	-	-	178	-	-	-
SCE_Arizona	-	2,936	-	4,940	904	156	-	-	-	-	-
SCE_Eastern	372	-	-	4,646	470	-	1,800	7	-	-	-
SCE_EOP	255	4,100	-	690	638	748	500	-	1,069	-	-
SCE_Metro	-	-	-	5	1,365	6,874	-	-	-	-	-
SCE_NOL	-	-	-	543	542	6	386	142	-	-	-
SCE_Northern	-	-	-	6,082	623	969	1,280	-	-	-	-
SDGE_Arizona	-	-	-	14,207	85	1,198	-	-	-	-	-
SDGE_Baja_California	353	-	-	-	-	-	-	-	-	-	-
SDGE_Imperial	700	-	-	190	675	137	-	529	-	-	-

+ 500 MW Generic Long Duration Storage sited in SCE

SDGE Baja California interconnects at SDGE Imperial

26-27 TPP Proposed Base Case

Selected Builds (MW) by CAISO Study Area (2041)

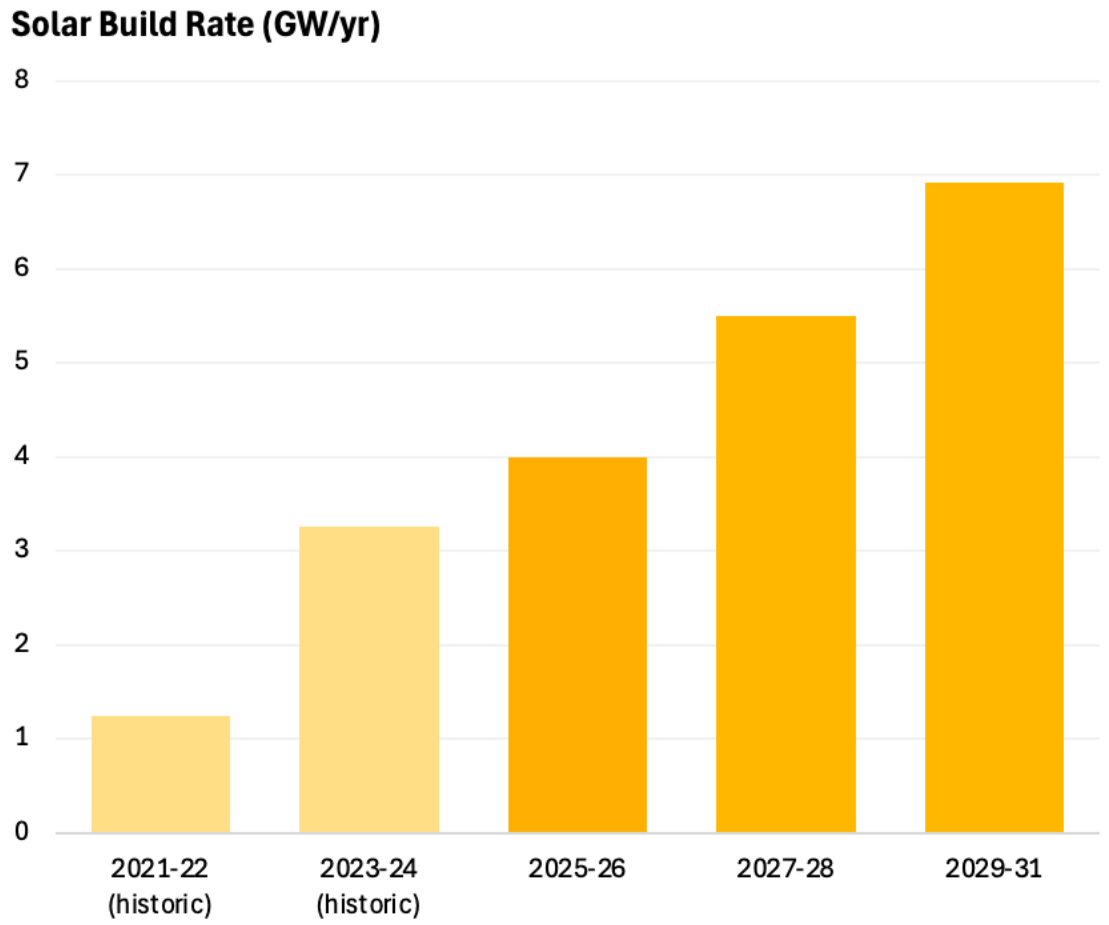
Region	In-State Wind	Out-of-State Wind	Offshore Wind	Solar	Li-ion Battery (4-hr)	Li-ion Battery (8-hr)	Location-Constrained Storage (12-hr)	In-State Geothermal	Out-of-State Geothermal	EGS - Near Field	EGS - Deep
PG&E_Fresno	-	-	-	6,034	226	2,396	-	-	-	-	269
PG&E_GBA	247	4,000	-	1,084	612	45	149	-	-	-	87
PG&E_Kern	-	-	2,924	9,675	369	1,182	818	-	-	-	-
PG&E_NGBA	1,867	-	1,607	2,466	314	-	-	668	808	45	-
PG&E_Northeast_CA	-	-	-	-	-	-	-	178	-	-	-
SCE_Arizona	-	8,936	-	4,940	904	156	-	-	-	-	-
SCE_Eastern	372	-	-	7,386	470	-	1,800	7	-	-	-
SCE_EOP	255	5,957	-	690	638	748	500	-	1,069	-	-
SCE_Metro	-	-	-	387	1,365	6,874	-	-	-	-	-
SCE_NOL	-	-	-	697	542	6	386	142	-	-	-
SCE_Northern	-	-	-	7,409	623	969	1,280	-	-	-	-
SDGE_Arizona	-	-	-	14,207	85	1,198	-	-	-	-	-
SDGE_Baja_California	1,654	-	-	-	-	-	-	-	-	-	-
SDGE_Imperial	700	-	-	190	675	137	-	529	-	-	-

+ 500 MW Generic Long Duration Storage sited in SCE

SDGE Baja California interconnects at SDGE Imperial

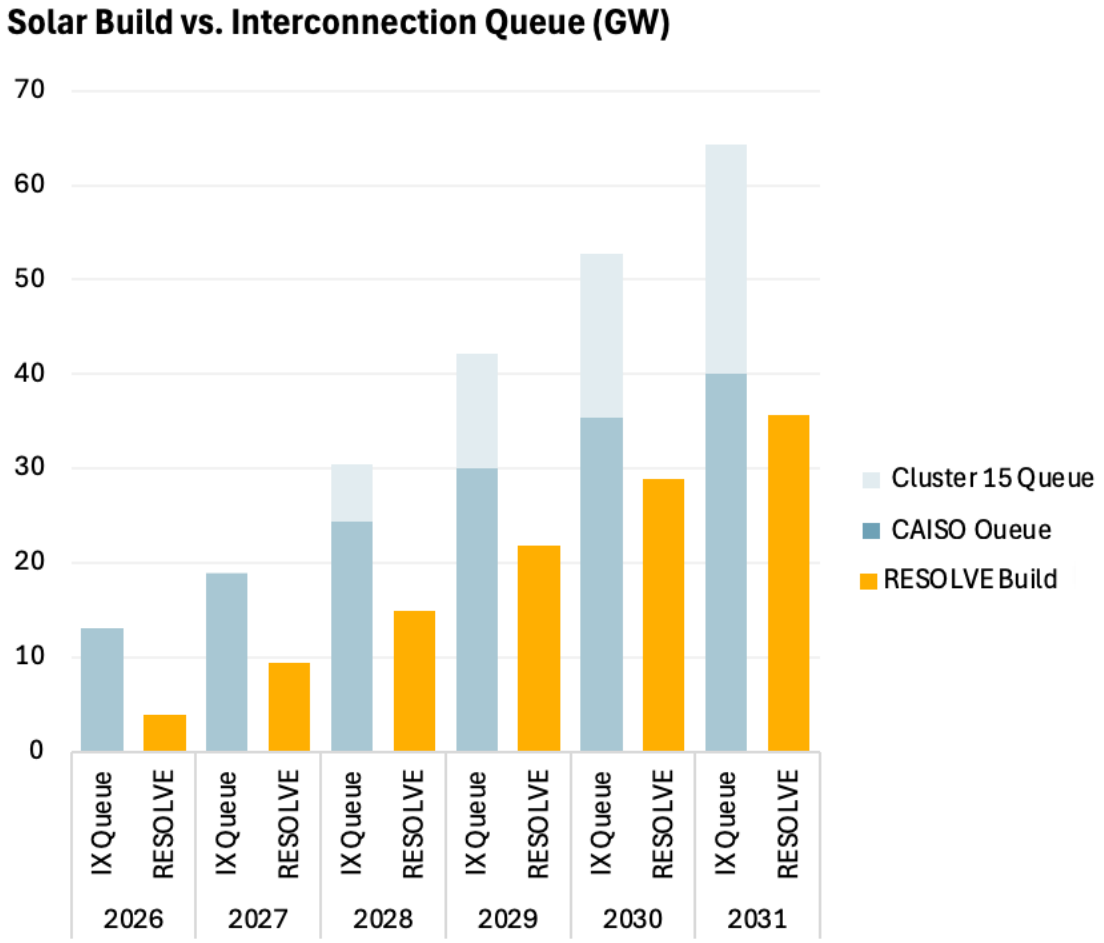
Solar Build Rates Through 2031

- Solar is the scalable energy resource due to near-term wind and geothermal limits, and significant builds are needed to meet the 2030 GHG target
- Build rate accelerates from ~3-4 GW/yr (recent historical) to ~7 GW/yr by 2030



Solar Build: RESOLVE vs. Interconnection Queue

- By 2030, RESOLVE is selecting nearly the full amount of solar in the CAISO interconnection queue
- Cluster 15 queue would add some (potentially) available projects, but RESOLVE still selects well over half by 2030 to meet the GHG target



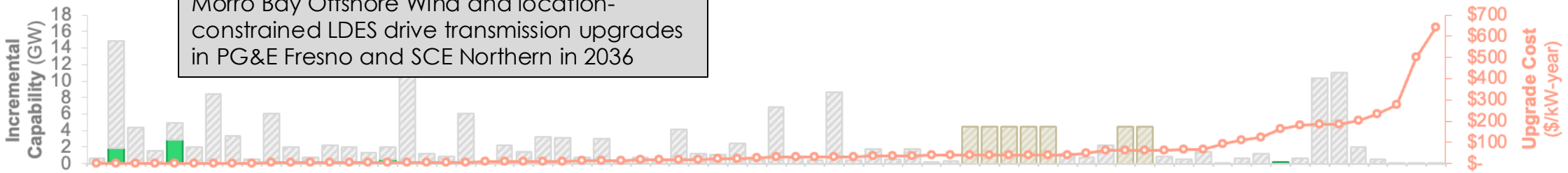
Appendix III: Transmission Information for TPP analyses

Note: Officially selected transmission upgrades are determined by the CAISO Transmission Plan

RESOLVE-Selected Transmission Upgrades

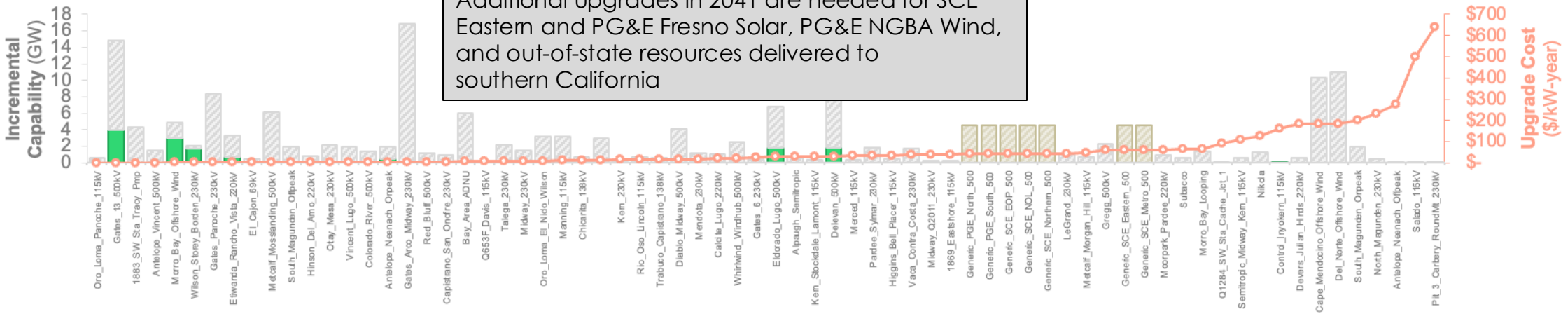
Selected Transmission Upgrades by Cost, 2036
(GW)

Morro Bay Offshore Wind and location-constrained LDES drive transmission upgrades in PG&E Fresno and SCE Northern in 2036



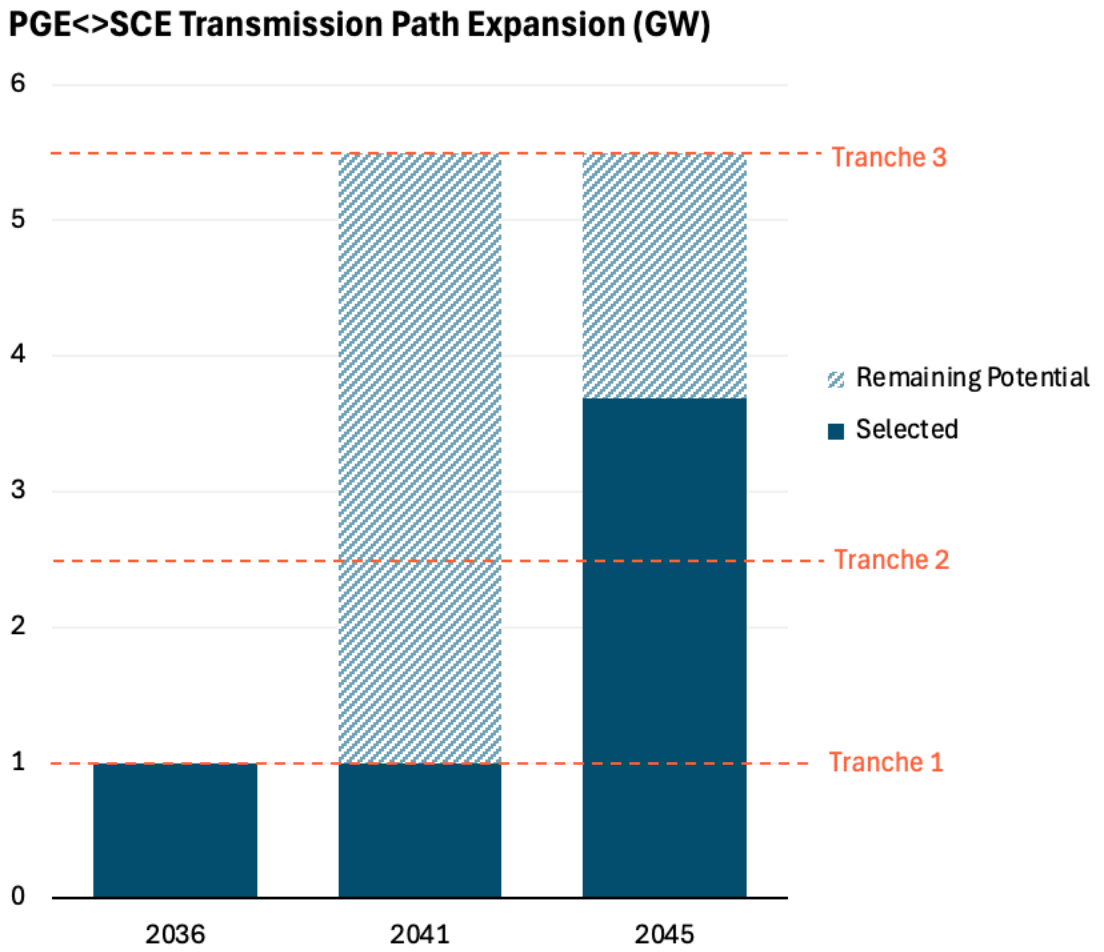
Selected Transmission Upgrades by Cost, 2041
(GW)

Additional upgrades in 2041 are needed for SCE Eastern and PG&E Fresno Solar, PG&E NGBA Wind, and out-of-state resources delivered to southern California



PG&E<>SCE Transmission Expansion

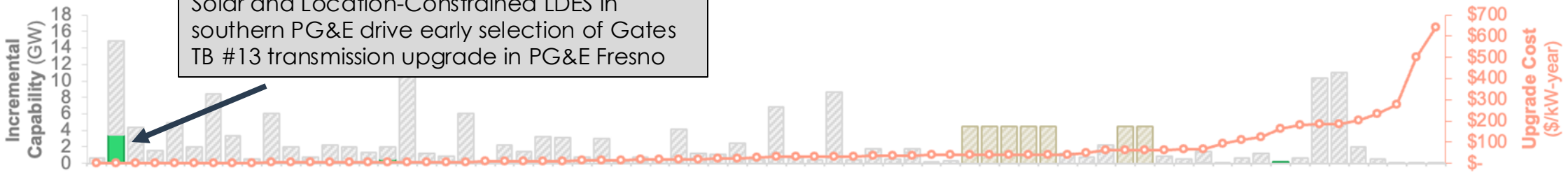
- Path 26/Path 15 expansion(s) are selected primarily to increase import capacity into PG&E
- The first tranche (1 GW) is optimally selected in the first available year (2036)
- An additional ~2.5 GW expansion, including all of tranche 2, is optimally selected in 2045



Note: Officially selected transmission upgrades are determined by the CAISO Transmission Plan

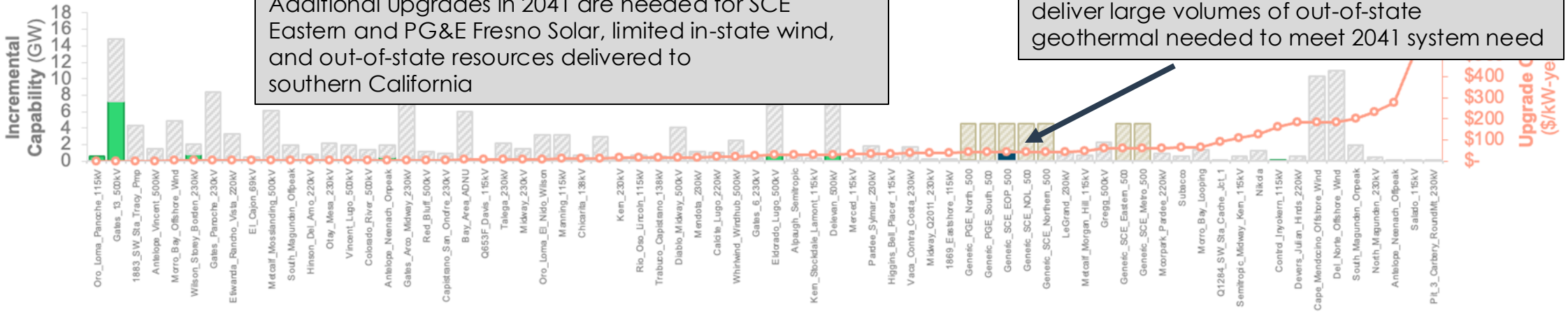
RESOLVE-Selected Transmission Upgrades

Selected Transmission Upgrades by Cost, 2036
(GW)



Solar and Location-Constrained LDES in southern PG&E drive early selection of Gates TB #13 transmission upgrade in PG&E Fresno

Selected Transmission Upgrades by Cost, 2041
(GW)

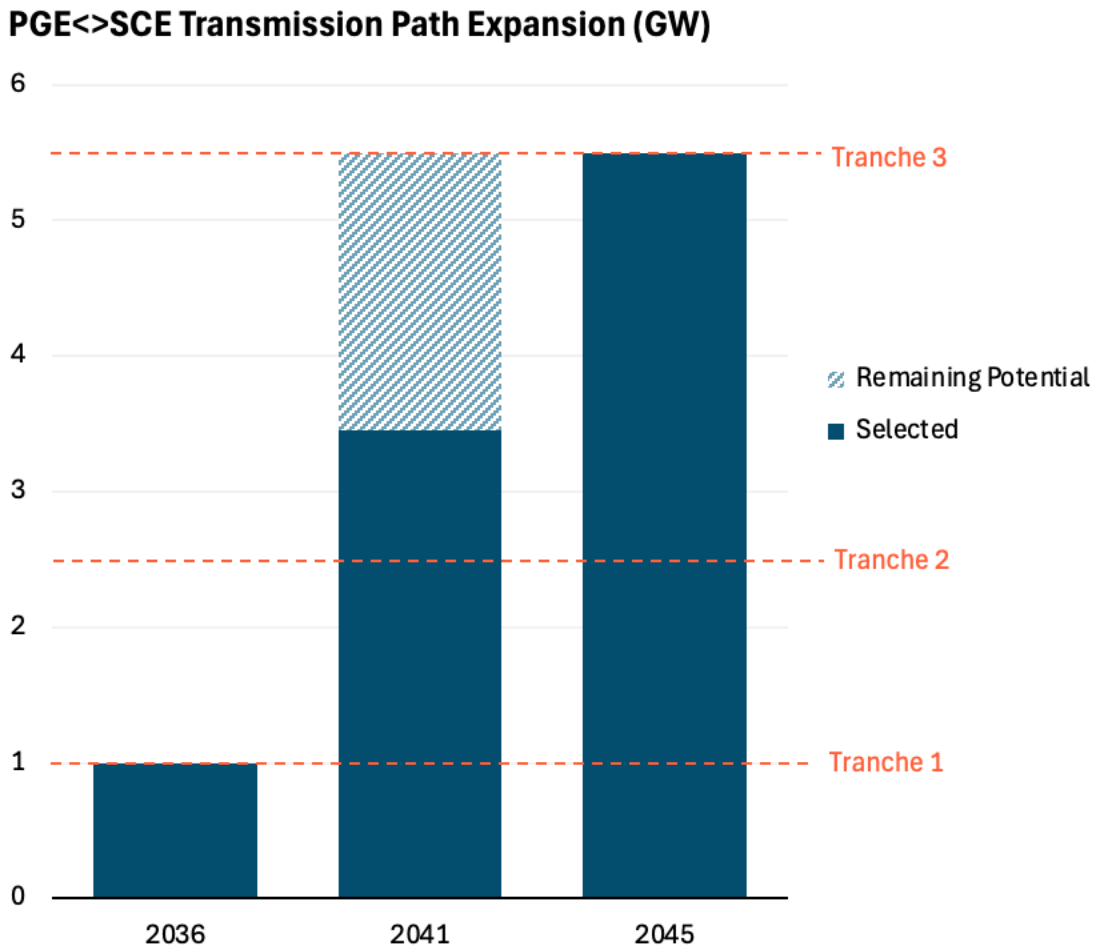


Additional upgrades in 2041 are needed for SCE Eastern and PG&E Fresno Solar, limited in-state wind, and out-of-state resources delivered to southern California

Selection of generic upgrade suggests that CAISO-identified upgrade are insufficient do deliver large volumes of out-of-state geothermal needed to meet 2041 system need

PG&E<>SCE Transmission Expansion

- Path 26/Path 15 expansion(s) are selected primarily to increase import capacity into PG&E
- The first tranche (1 GW) is selected in the first available year
- Significant expansion is selected by 2041, with the whole 5.5 GW potential built out by 2045



Appendix IV: SERVM modeling conventions for CAISO remote units

SERVM modeling conventions for CAISO remote units

- Units in SERVM and RESOLVE were further aligned with the CPUC Baseline List of generating resources in early 2025, including updating the modeling conventions for units located outside the CAISO footprint and participating in the CAISO market
  - CAISO "Remote" units are located outside CAISO and subject to SERVM's assumed transmission capacity and simultaneous import constraints. Consistent treatment between SERVM and RESOLVE was verified. Examples are Vulcan_1 geothermal and Tecolote wind.
  - Certain other CAISO market units located outside CAISO are modeled as if they were located within CAISO because they are assumed to have firm transmission to CAISO incremental to SERVM's assumed transmission capacity and not subject to the CAISO simultaneous import constraint. Consistent treatment between SERVM and RESOLVE was verified. Examples are Palo Verde nuclear and Sunzia wind.
  - About 930 MW of dispatchable gas capacity located outside CAISO (GRIFFI_2_LSPDYN, MALIN_5_HERMDYN, NGILAA_5_SDGDYN) are modeled in SERVM as serving local load (and exporting to CAISO if economic, subject to transmission limits and the simultaneous import constraint) even though in reality they are dynamically scheduled in the CAISO market. This is because of SERVM limitations making these units must-run if modeled like "Remote" units. RESOLVE on the other hand dispatches all the output of these units in CAISO.
  - Some SERVM "Remote" units are modeled as located in a region other than where they are physically located such as certain CAISO New Mexico wind units because the SERVM zonal model does not include PNM/EPE. Therefore, a CAISO "Remote" New Mexico unit would be placed in WALC in SERVM but still assigned a New Mexico weather station for its wind (or solar) hourly profile. An example is Tecolote wind.