DOCKETED	
Docket Number:	22-OII-02
Project Title:	Gas Decarbonization
TN #:	267004
Document Title:	Presentations - Staff Workshop on Winter 2025-26 Gas Reliability
Description:	N/A
Filer:	Mikayla Roberts
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	11/3/2025 1:39:47 PM
Docketed Date:	11/3/2025

Staff Workshop on Winter 2025-26 Gas Reliability

November 3, 2025

1:00 p.m. – 3:45 p.m.

Introduction

Max Solanki, Manager, Fuels Analysis Branch, CEC

Housekeeping

- **Workshop is being recorded.**

- **Attendees may participate in the workshop by:**
  - Making comments during public comment periods and asking questions during public Q&A periods
  - Questions can be entered in the Q&A section of the Zoom application
  - Submitting written comments by **5:00 p.m. on November 17, 2025**.

Agenda

CEC Winter 2025-26 Gas Reliability Assessment

Miguel Cerrutti, CEC, *Peak Day and Monthly Demand Forecasting*

Jason Orta, CEC, *Overview of Winter 2025-26 Gas System Reliability Assessment and Winter 2025-26 Gas Price Risks*

Joe Long, Aspen Environmental, *SoCalGas Stochastic Model*

Public Q&A

CPUC Reliability Analysis

Khaled Abdelaziz, California Public Utilities Commission (CPUC)

Public Q&A

Agenda (cont.)

Panel - Utility & ISPs: Planning for Winter (2025 & Beyond)

Moderator: Ning Zhang, CEC

Panelists: James Chen, Pacific Gas and Electric (PG&E)

Nate Taylor, Southern California Gas Company (SoCalGas)

Dave Marchese, Caliche Storage (Central Valley Gas Storage)

Public Q&A

Public Comments

Closing Remarks & Adjourn

CEC Winter 2025-26 Gas Reliability Assessment

Peak Day and Monthly Demand Forecasting

Miguel Cerrutti, CEC

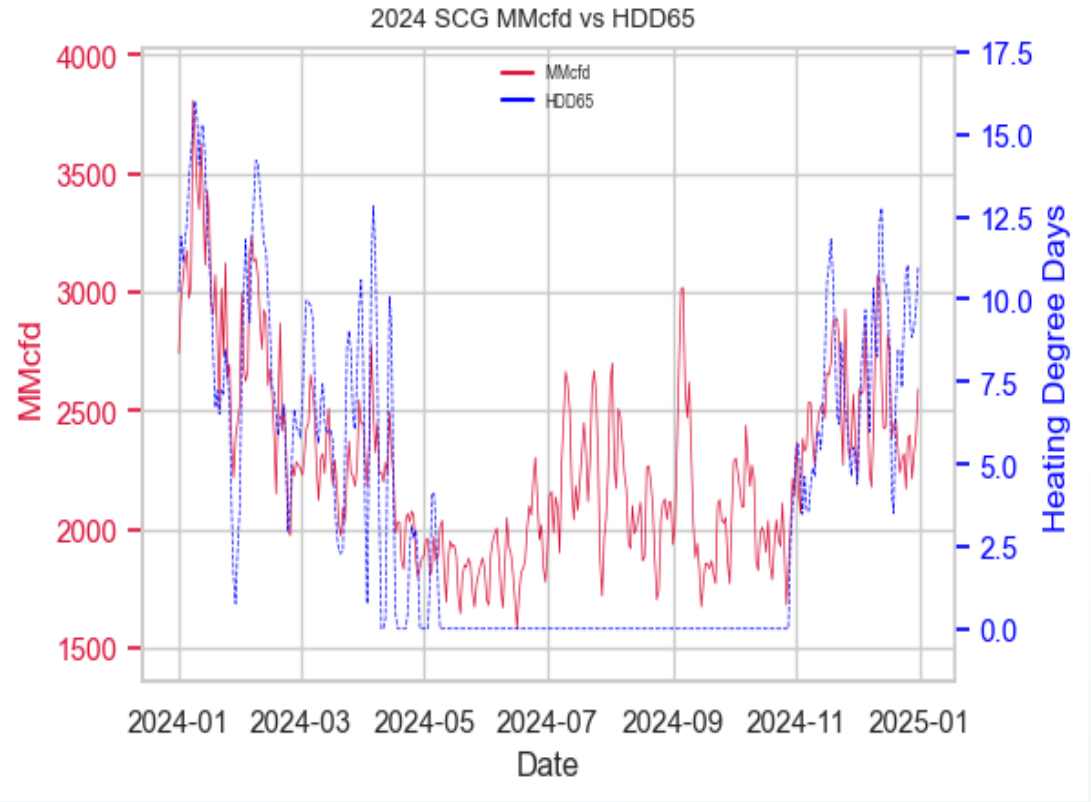
Purpose

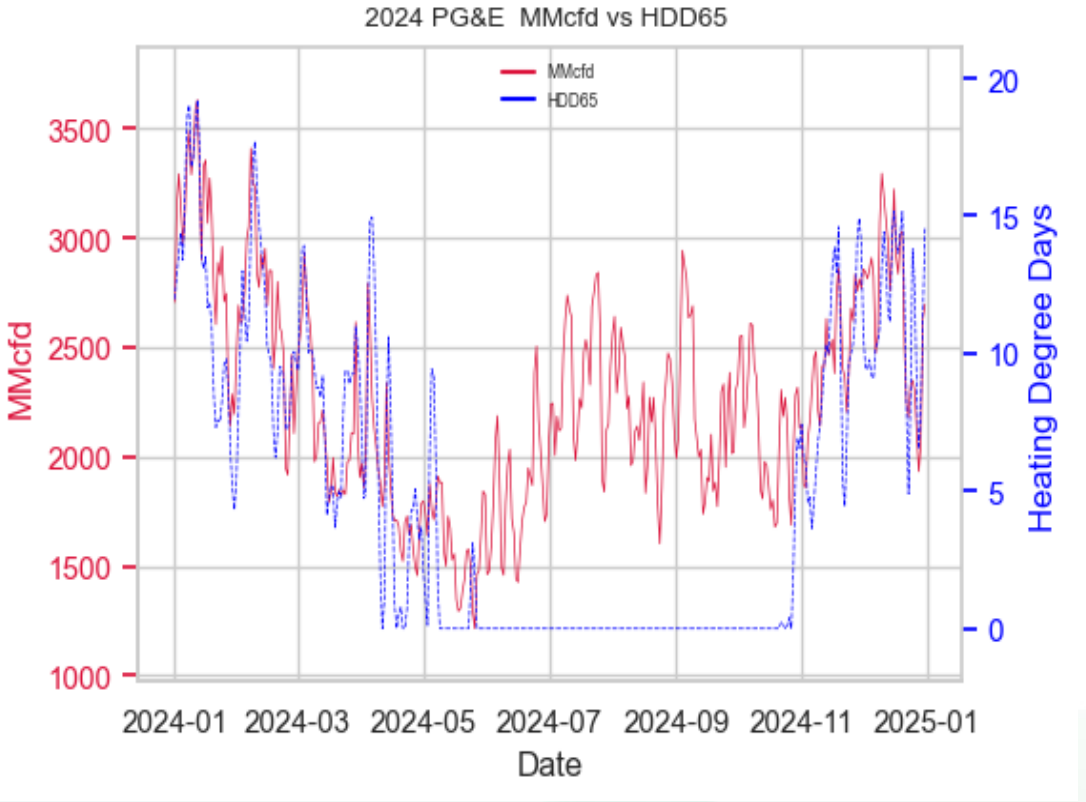
- Independently forecast gas demand for PG&E and SoCalGas, based on the California Gas Report (CGR), to evaluate system reliability.
- Compare these forecasts with those in the CGR report.
- Verify consumption patterns, temperature trends, and forecast accuracy, and identify any discrepancies that could affect winter system stability.

Overview

- Forecast peak-day and monthly average gas demands
  - SoCalGas (SCG) and Pacific Gas and Electric (PG&E)
  - Across customer classes and climate change scenarios
  - Winter season (Jan-Mar and Oct – Dec 2025-2026)
  - Independent from IEPR
- Probabilistic modular, additive time series approach

2024 Historical Daily Gas Demand and HDD65 for SCG and PG&E





Source: CEC

Modeling Approach

- Neural Prophet - Daily demand forecasting (trends, seasonality, anomalies)
- Prophet - Monthly average forecasts (medium- to long-term projections)
- Bayesian optimization for variable selection and hyperparameter tuning
- Hybrid Prophet - LSTM (nonlinear residual patterns)
  - Prophet - Facebook's Core Data Science team (now META)
  - LSTM – Long Short-Term Memory – A type of recurrent neural network (RNN)

Data and Modeling Implementation

Historical gas consumption data (2017-2024)
Weather information (paired consumption data)

Probabilistic Approach

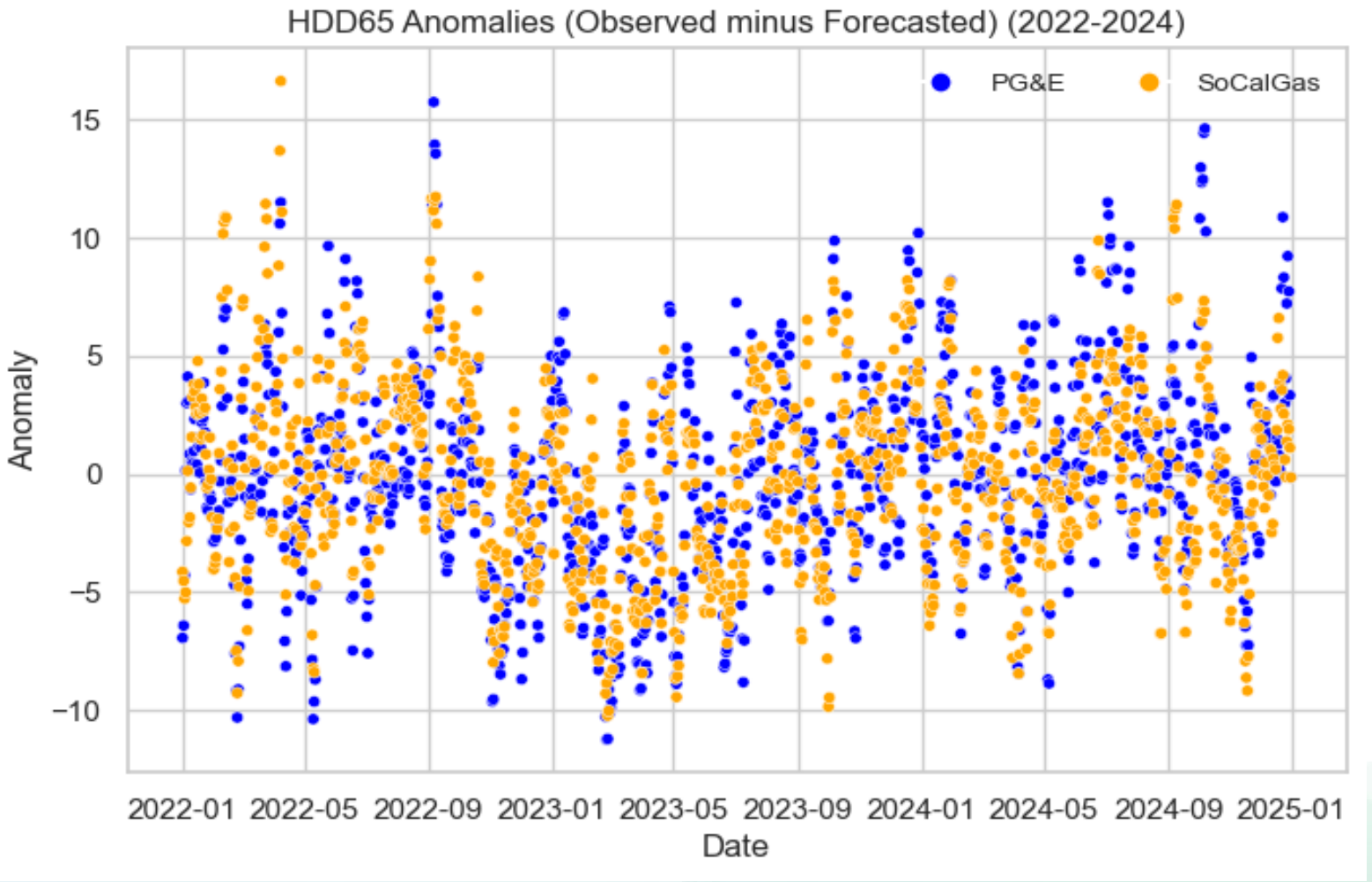
CDD & HDD and calendar effects
Climate change projections (2022-2050) Quantile mapping bias correction

Ex-post Forecast
- Fit model on historical training data and evaluate on testing data

In-sample Forecast
- Fit best-performing ex-post model on all available data

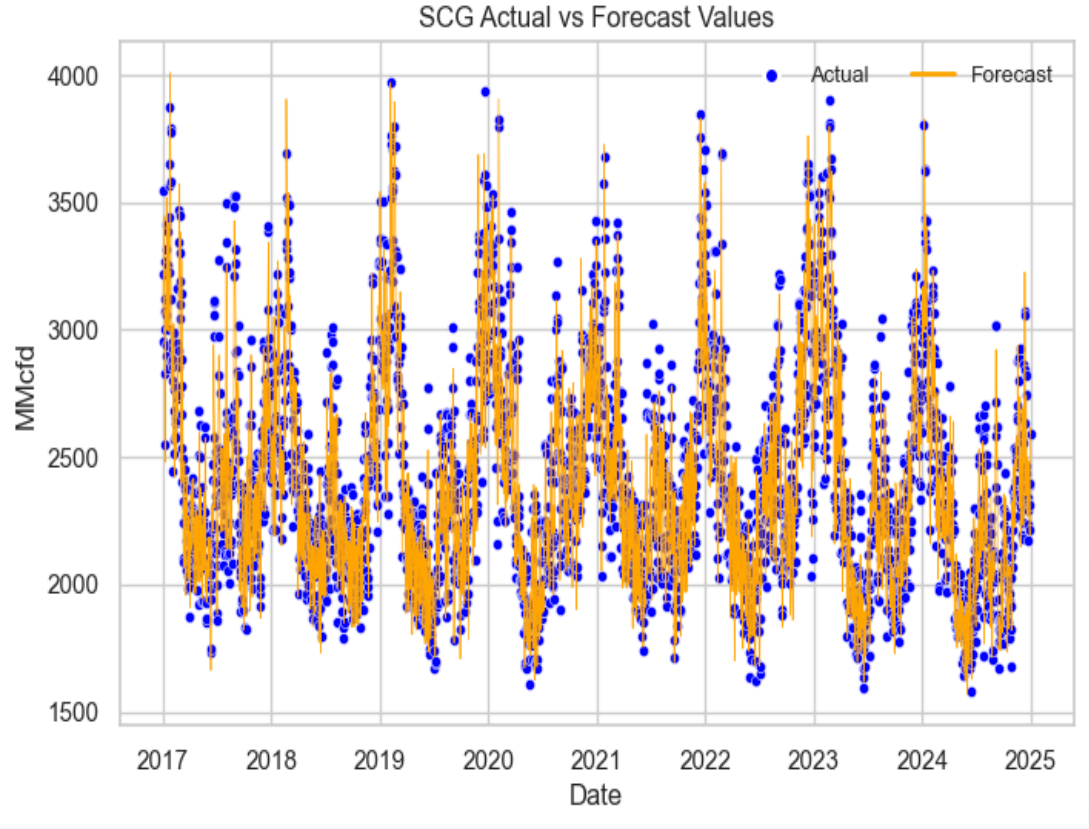
Ex-ante Forecast
- Generate predictions using the in-sample model
- Incorporate climate change scenarios (probability-framed)
- Reconcile forecasts across customer classes

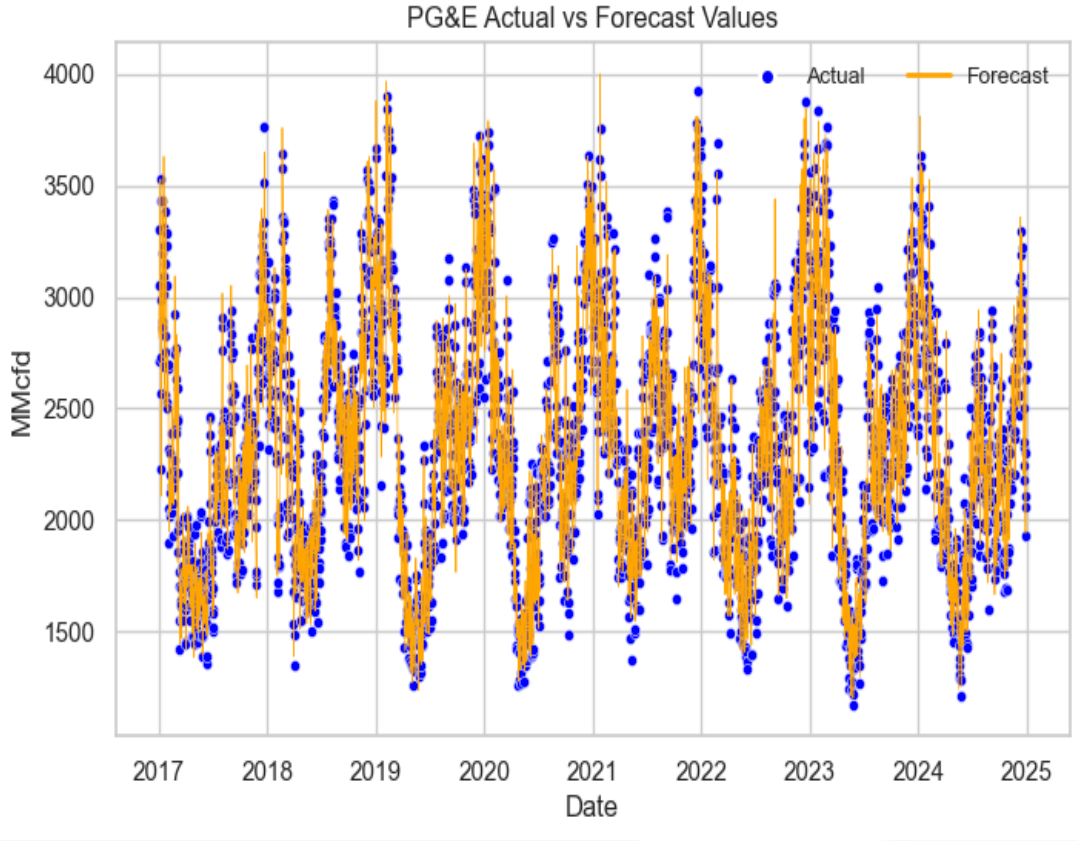
SCG vs. PG&E HDD65 Anomaly Differences (2022-2024)



Source: CEC

SCG and PG&E Actual and Forecast Daily Gas Demand (2017-2024)

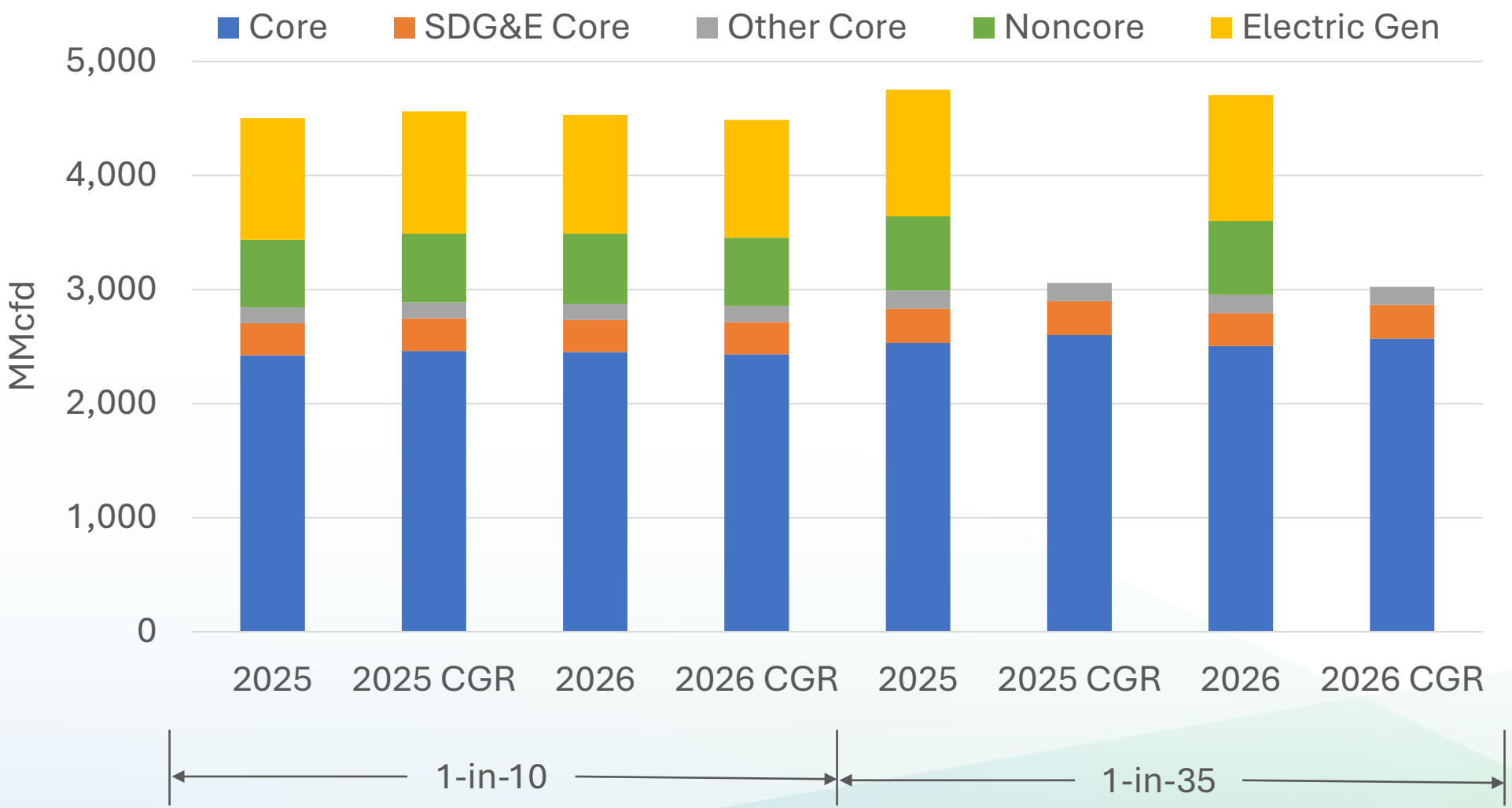




Source: CEC

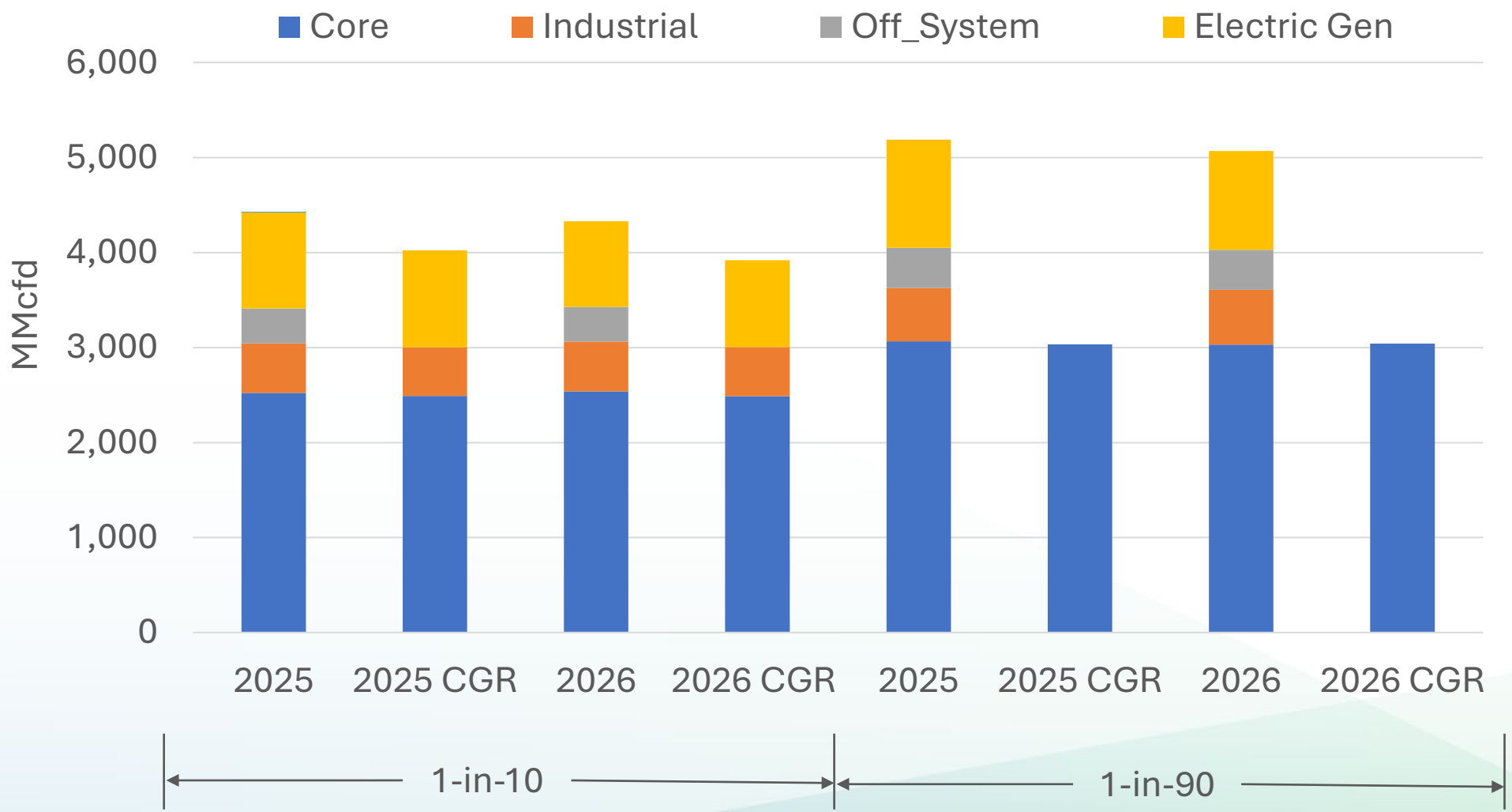
MAPE: Daily Data SCG 3.51%, PG&E 4.18%; Monthly Data SCG 1.45%, PG&E 1.65%

SCG Peak-Day Gas Demand Forecast Composition (2025-2026)



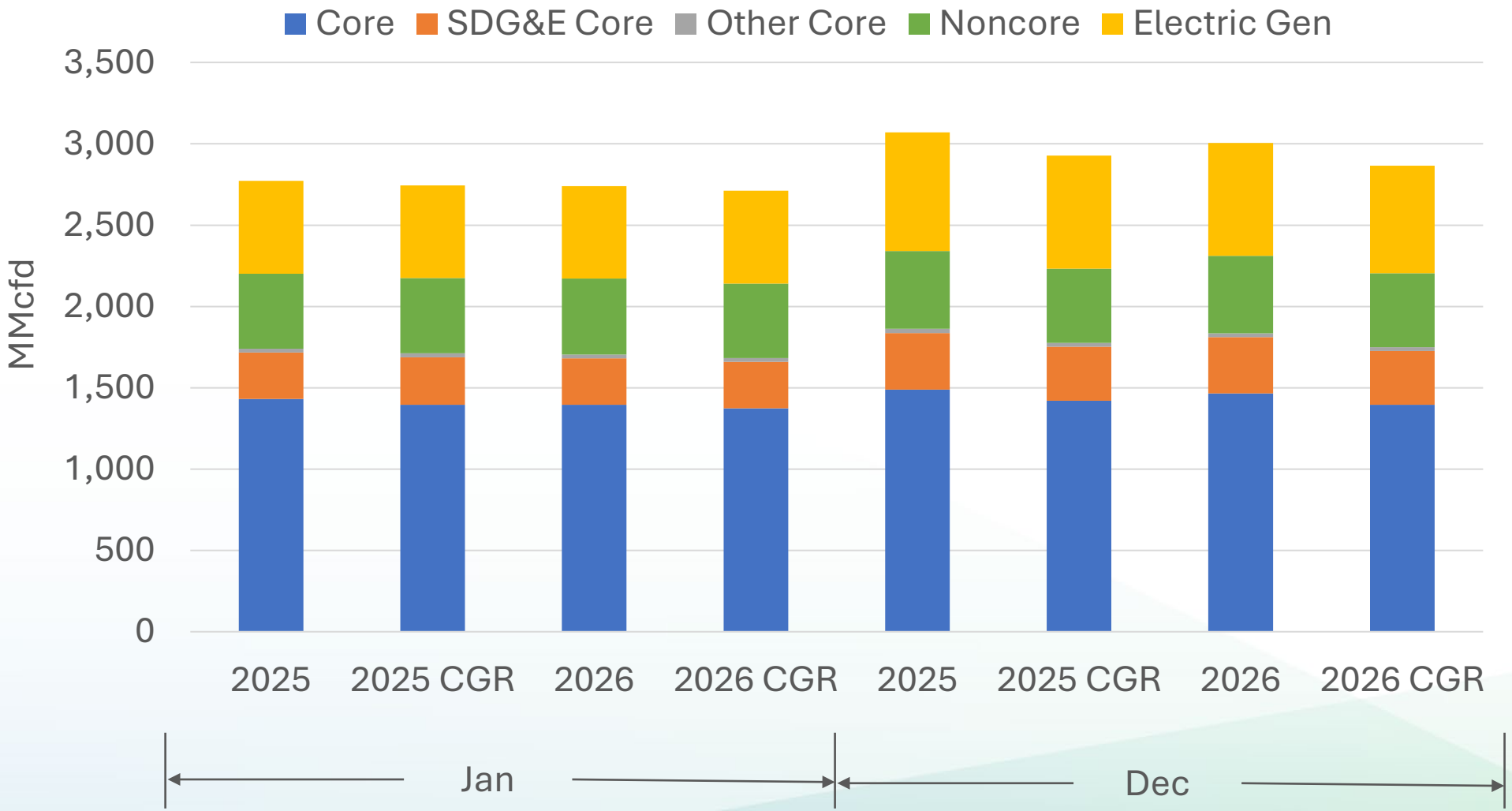
Source: CEC

PG&E Peak-Day Gas Demand Forecast Composition (2025-2026)



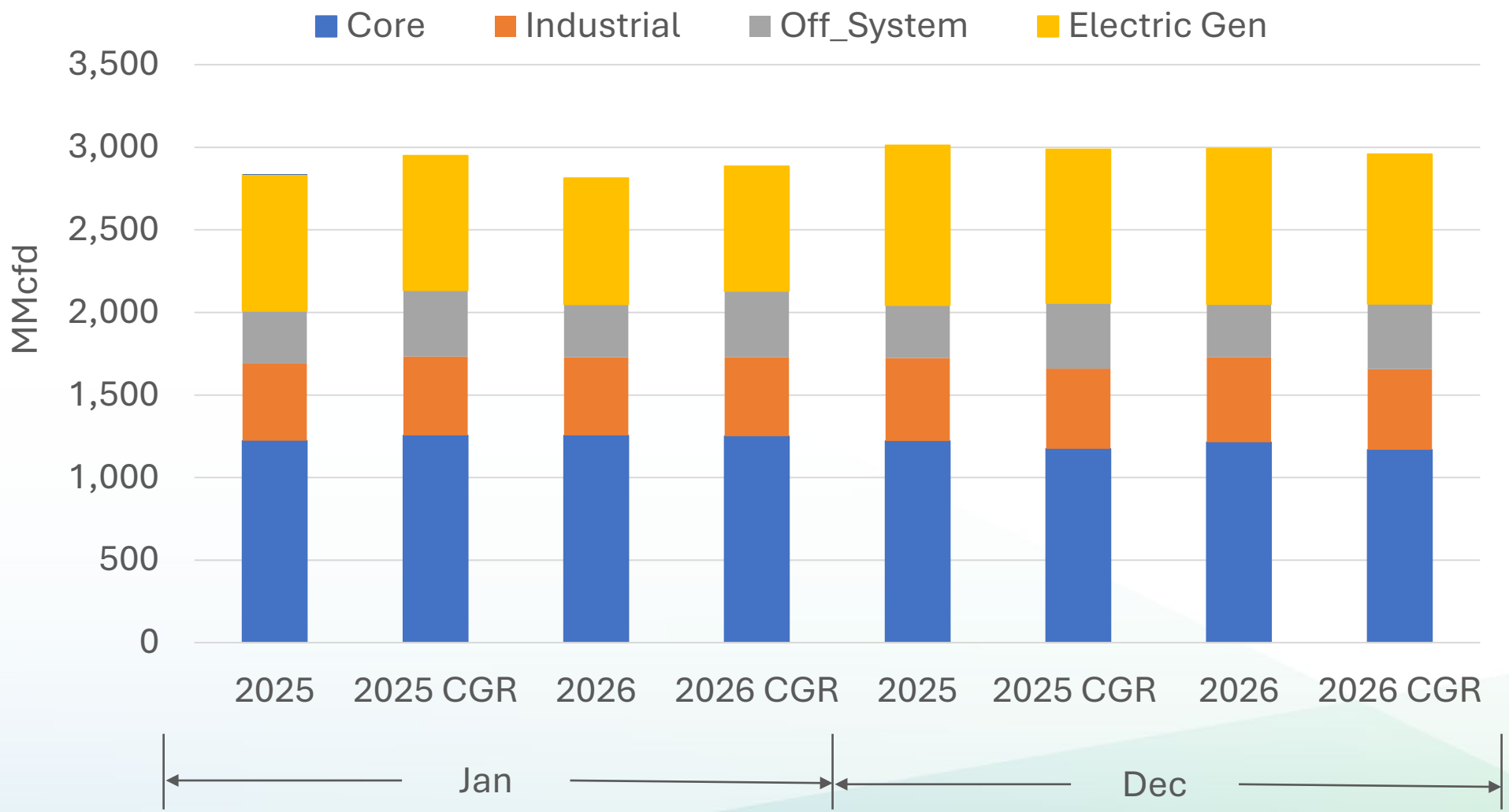
Source: CEC

SCG Monthly Average Gas Demand Forecast Composition (2025-2026)



Source: CEC

PG&E Monthly Average Gas Demand Forecast Composition (2025-2026)



Source: CEC

Limitations

- Models mainly driven by temperature and calendar effects.
- Exclude factors like economic or demographic changes, demand-side management (DSM), shifts in resource mix, and electrification trends.
- Monthly hydroelectric data limit the ability to identify Southern California Edison's (SCE's) hydro-generation contribution to electric gen which introduces uncertainty into gas demand analysis.

Proposed Enhancements

- Expand QFER-based analysis of electric generation.
- Integrate SERVM and PLEXOS simulations.
- Include electrification and decarbonization scenarios.
- Apply AAEE/AAFS reductions through peak-day and monthly adjustments.

Thank You!

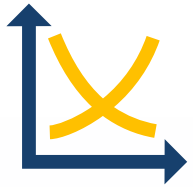
Miguel Cerrutti, PhD
Demand Analysis Branch
Energy Assessments Division

Overview of Winter 2025-26 Gas System Reliability Assessment and Winter 2025-26 Gas Price Risks

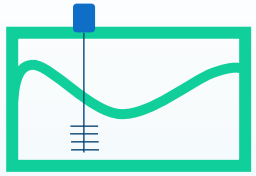
Jason Orta, CEC

Winter 2025-2026 Gas Reliability Assessment

- Assess risk of curtailment for PG&E and SoCalGas



- Analyze supply and demand conditions



- Estimate storage withdrawals and quantities of gas in storage

CEC Modeling Inputs & Reliability (1/2)

Modeling Inputs Prepared by CEC Staff	PG&E	SoCalGas
Winter peak day forecast	✓	✓
Forecasts for average and cold winter months	✓	✓
Estimated Pipeline Capacity	✓	✓
Estimated Storage Field Withdrawal Capability	✓	✓

CEC Analytical Tools	CEC Modeling Inputs Used	PG&E	SoCalGas
Gas balance models	Peak day forecasts; Monthly forecasts; Pipeline capacity; Storage withdrawal capacity	✓	✓
Steady State Analysis of Hydraulic Models- Overall Capacity	Peak day forecasts; Pipeline capacity; Storage withdrawal capacity	✓	✓
Unsteady State Analysis of Hydraulic Models- Intraday and Linepack Assessments	Peak day forecasts; Pipeline capacity; Storage withdrawal capacity		✓
Stochastic Analysis (Intraday)	Peak day forecasts		✓

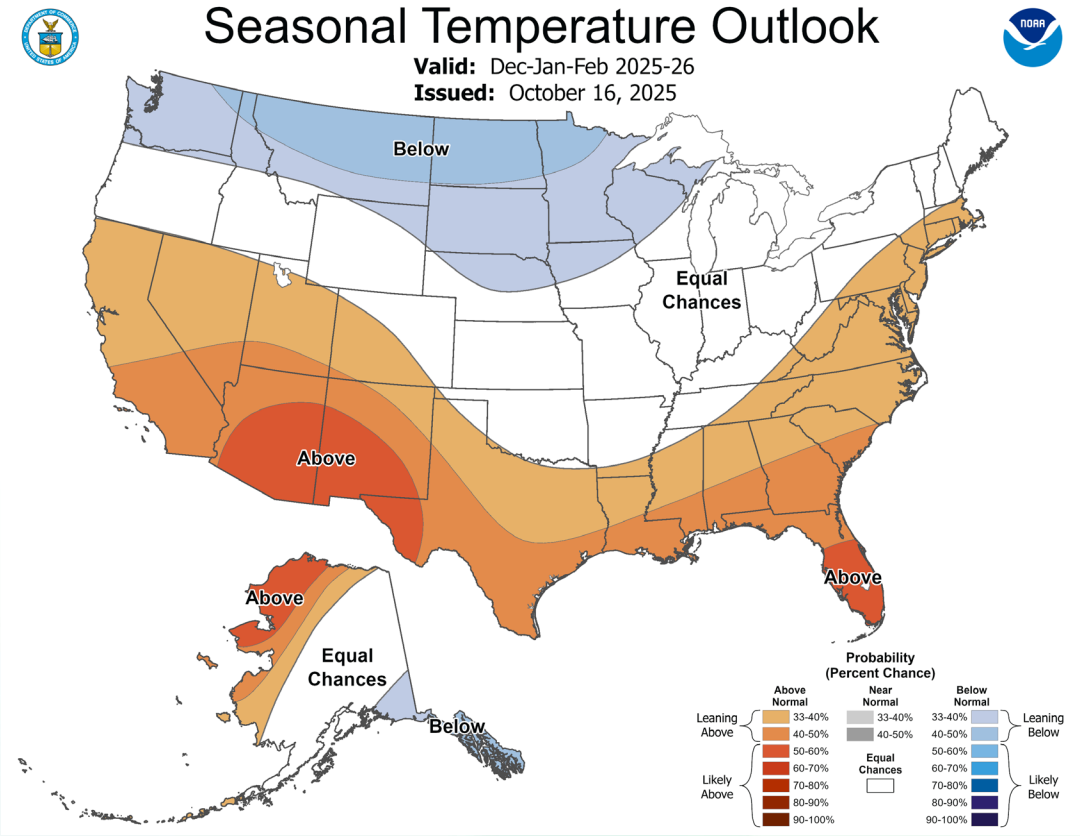
CEC Modeling Inputs & Reliability (2/2)

Modeling Inputs Prepared by CEC Staff	PG&E	SoCalGas
Winter peak day forecast	✓	✓
Forecasts for average and cold winter months	✓	✓
Estimated Pipeline Capacity	✓	✓
Estimated Storage Field Withdrawal Capability	✓	✓

CEC Analytical Tools	CEC Modeling Inputs Used	PG&E	SoCalGas
Gas balance models	Peak day forecasts; Monthly forecasts; Pipeline capacity; Storage withdrawal capacity	✓	✓
Steady State Analysis of Hydraulic Models- Overall Capacity	Peak day forecasts; Pipeline capacity; Storage withdrawal capacity	✓	✓
Unsteady State Analysis of Hydraulic Models- Intraday and Linepack Assessments	Peak day forecasts; Pipeline capacity; Storage withdrawal capacity		✓
Stochastic Analysis (Intraday)	Peak day forecasts		✓

2025-2026 National Weather Service Forecast

- Weak and short-lived La Nina conditions expected
- Probable above normal temperatures in California



Source: National Weather Service

PG&E Peak Days Gas Balance

Demand, Withdrawal, and Net Shortfall	Case 1: Cold Day Core + Noncore 1-in-10 (MMcfd)	Case 2: Abnormal Peak Day Plus 1-in-90 Core + Noncore 1-in-10 (MMcfd)
Demand		
Core	2,524	3,065
Noncore-NonEG	521	521
EG	1,016	1,016
Off System	+ 80	+ 80
Total Demand	**4,141**	**4,682**
Available Pipeline Capacity	- 3,021	- 3,021
Needed Withdrawal	**1,120**	**1,661**
Assumed Available Withdrawal (PG&E Storage)	- 883	- 883
Net Shortfall *(Does Not Include ISPs' Withdrawals)*	= 237	= 778

Source: CEC

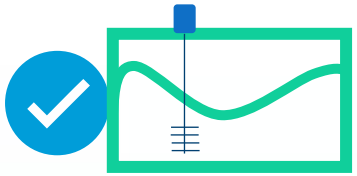
PG&E - Meeting Net Shortfall

- ISPs
  - Some data not public
  - PG&E can procure ISP gas
  - Transactions may not prioritize reliability
- Operational Flow Orders & Emergency Flow Orders
  - Mitigate system imbalances

Source: PG&E

PG&E Conclusions

- Curtailments preventable
  - Hydraulic modeling shows ISP withdrawals feasible on peak day



- Withdrawals from ISPs feasible

- Significant pipe inventory

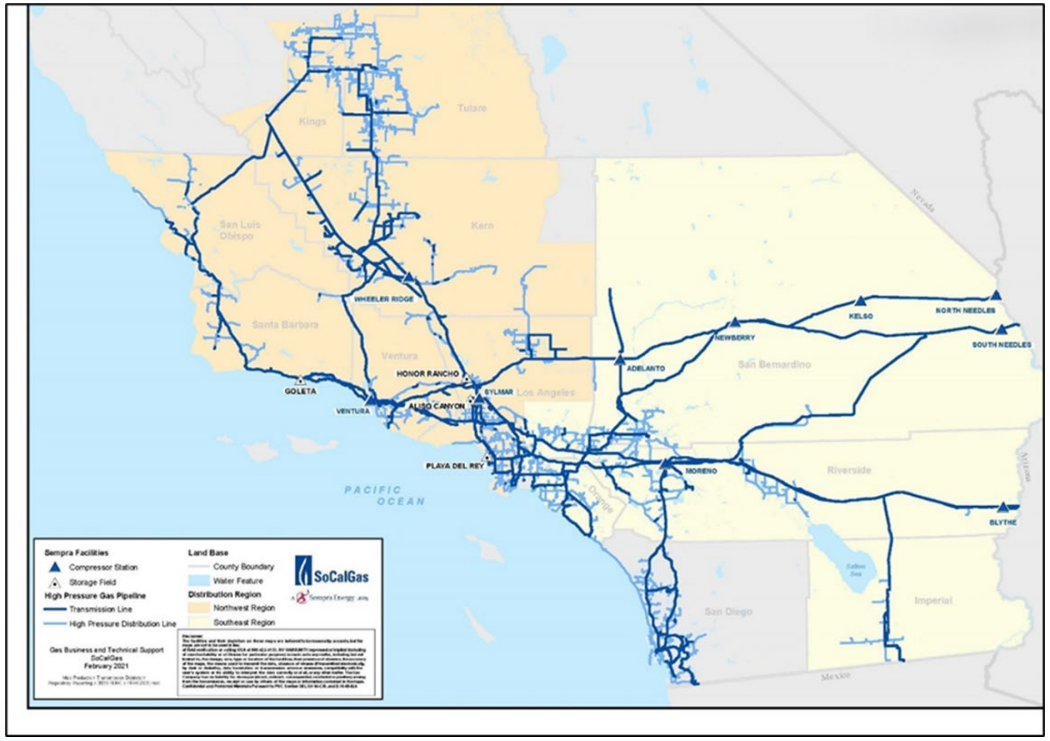
SoCal Gas Peak Days Gas Balance

Demand, Withdrawal, and Net Shortfall	Case 1: Cold Day Core + Noncore 1-in-10 (MMcfd)	Case 2: Extreme Peak Day Plus 1-in-35 Core + Noncore 1-in-10 (MMcfd)
Demand		
Core	2,843	2,991
Noncore-NonEG	594	594
EG	+ 1,067	+ 1,067
Total Demand	**4,504**	**4,662**
Available Pipeline Capacity	- 3,035	- 3,035
Needed Withdrawal	**1,469**	**1,617**
Assumed Available Withdrawal	- 2,000	- 2,000
Net Shortfall	= 0	= 0

Source: CEC

SoCal Gas Conclusions

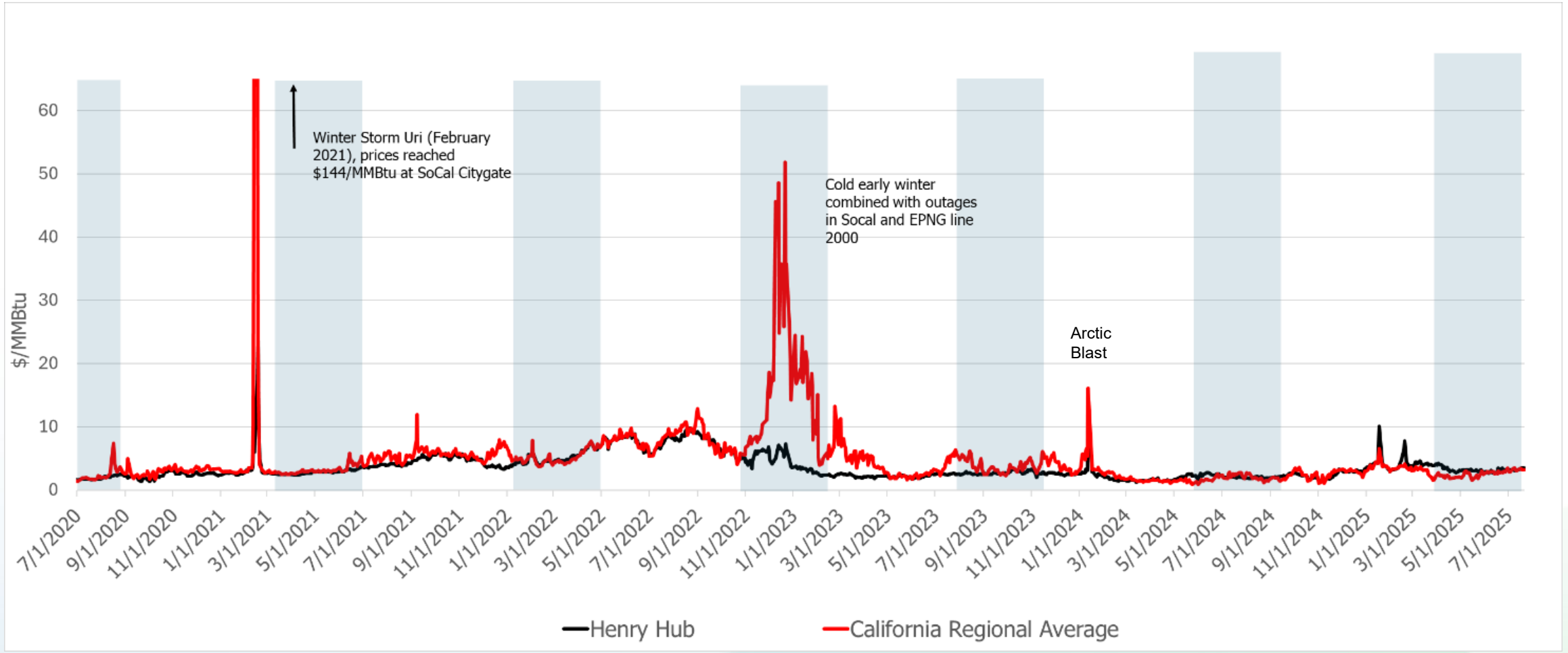
- SoCalGas can meet demands w/o curtailments
  - Hydraulic modeling simulation
- Pipeline and storage withdrawal capacity restorations have helped



Source: SoCalGas

Winter 25-26 Gas Price Risks

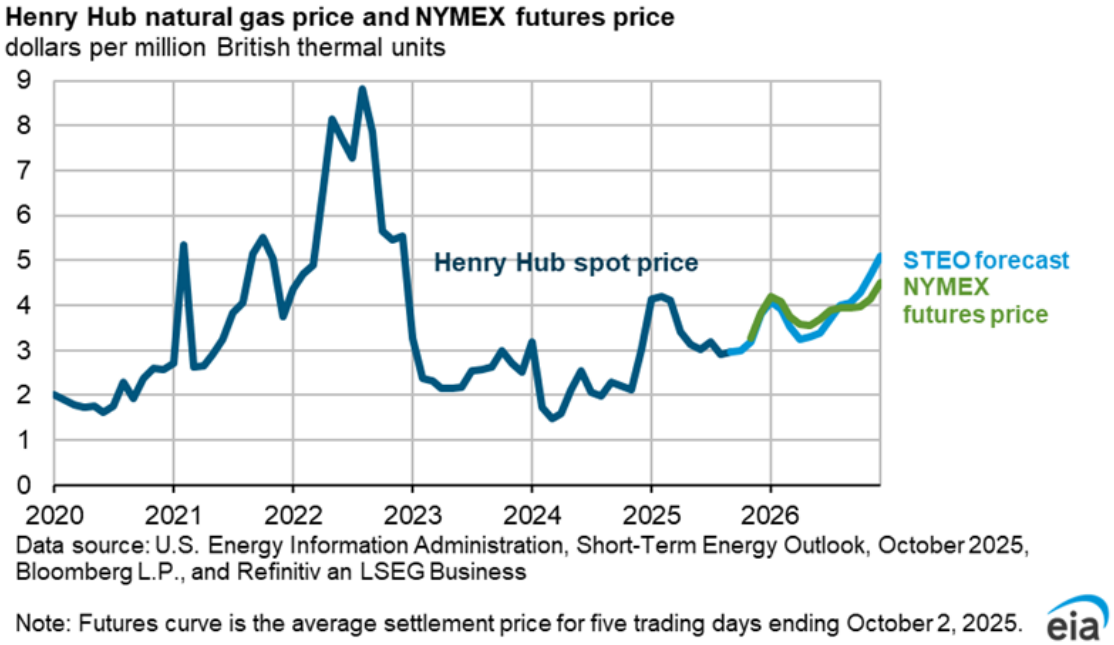
Fossil Gas Prices Look Back



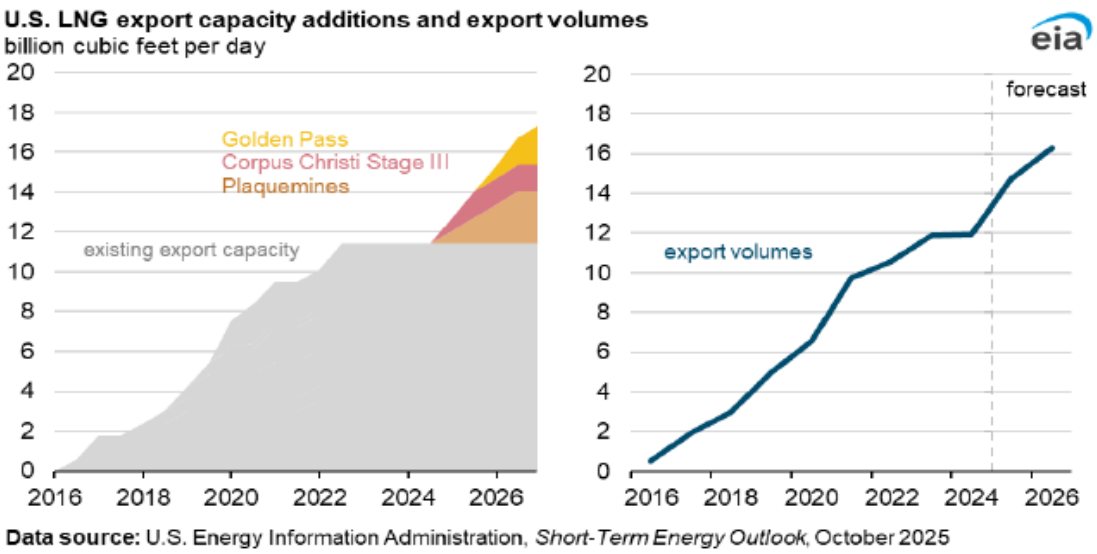
Source: CEC

EIA Short-Term Fossil Gas Price Forecasts

- Prices increase in winter
  - Increased space & water heating demand
- Forecasts show lower prices increases
  - High storage levels
  - Higher than expected production
  - But increased LNG exports



EIA Projections of LNG and Pipeline Exports



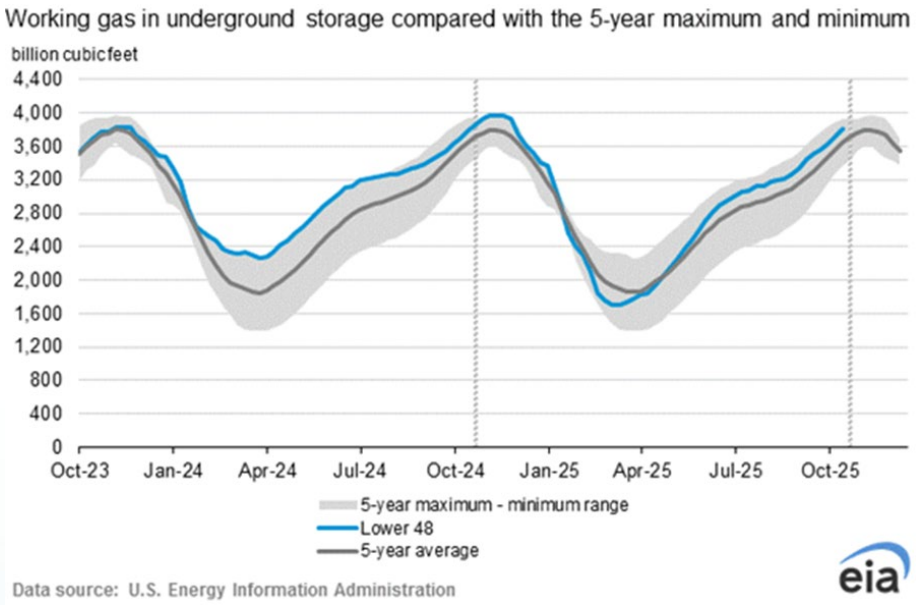
Increased LNG Exports

2024 - 12 Bcf/d

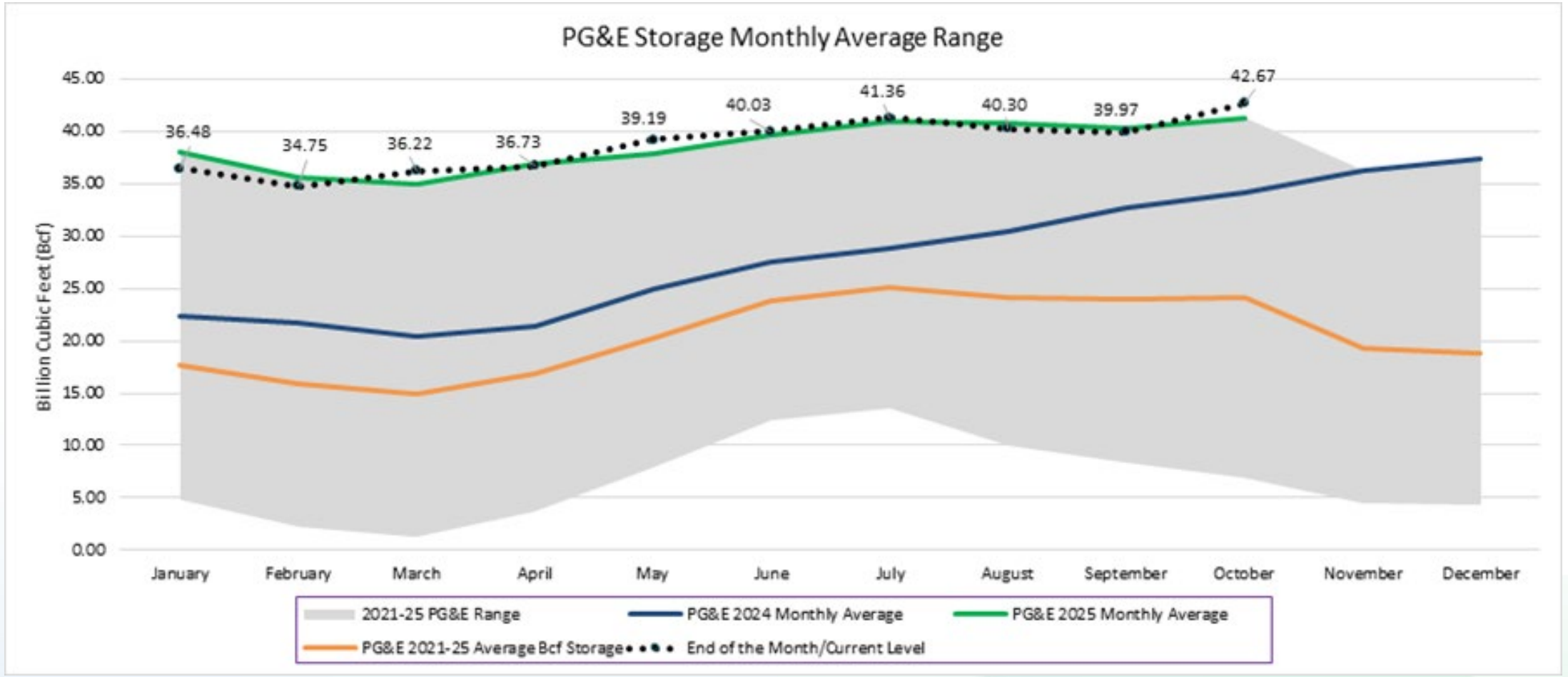
2026 - 16 Bcf/d

EIA U.S. Fossil Gas Storage

- Nov 2025 - 4.0 TCF
  - 5-year average of 3.8 TCF
- Storage volumes trending higher

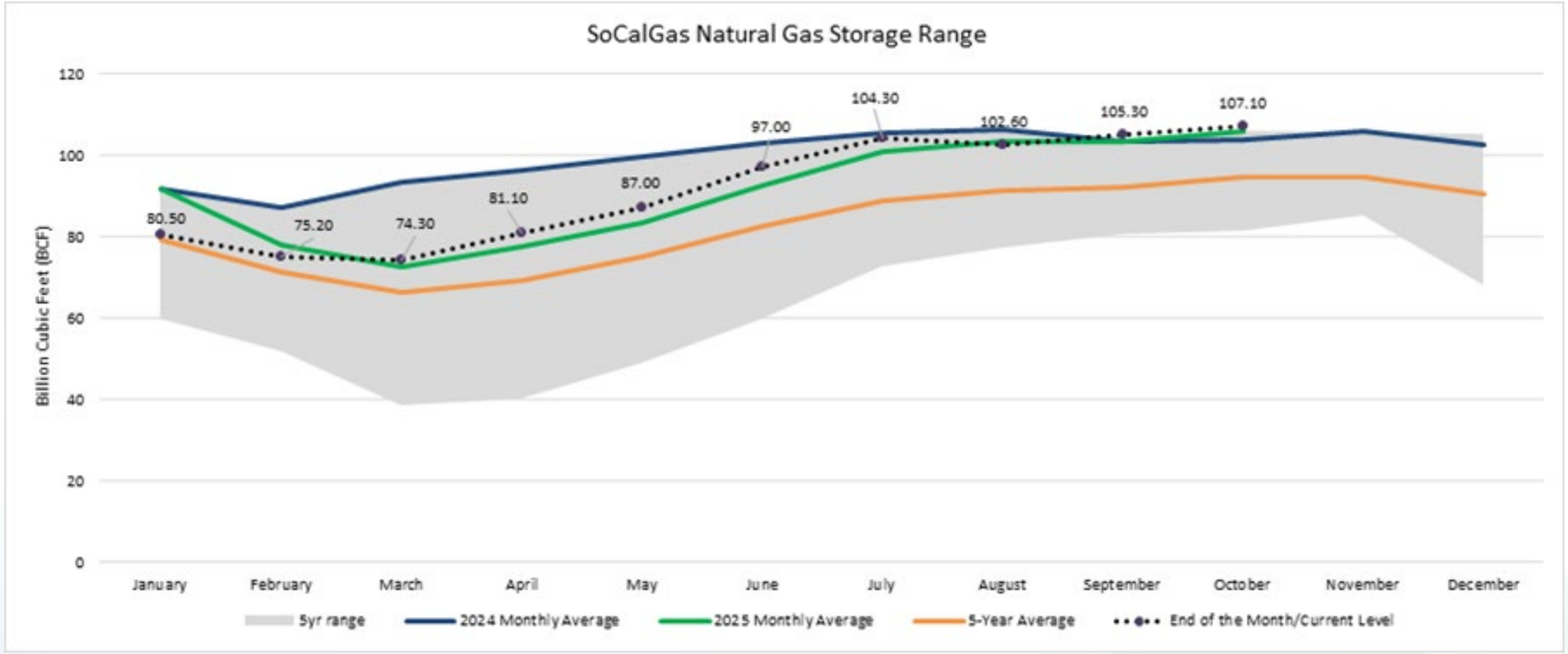


PG&E Gas Storage



Sources: PG&E, CEC

SoCalGas Storage



Source: SoCalGas, CEC

Thank you!

SoCalGas Stochastic Model

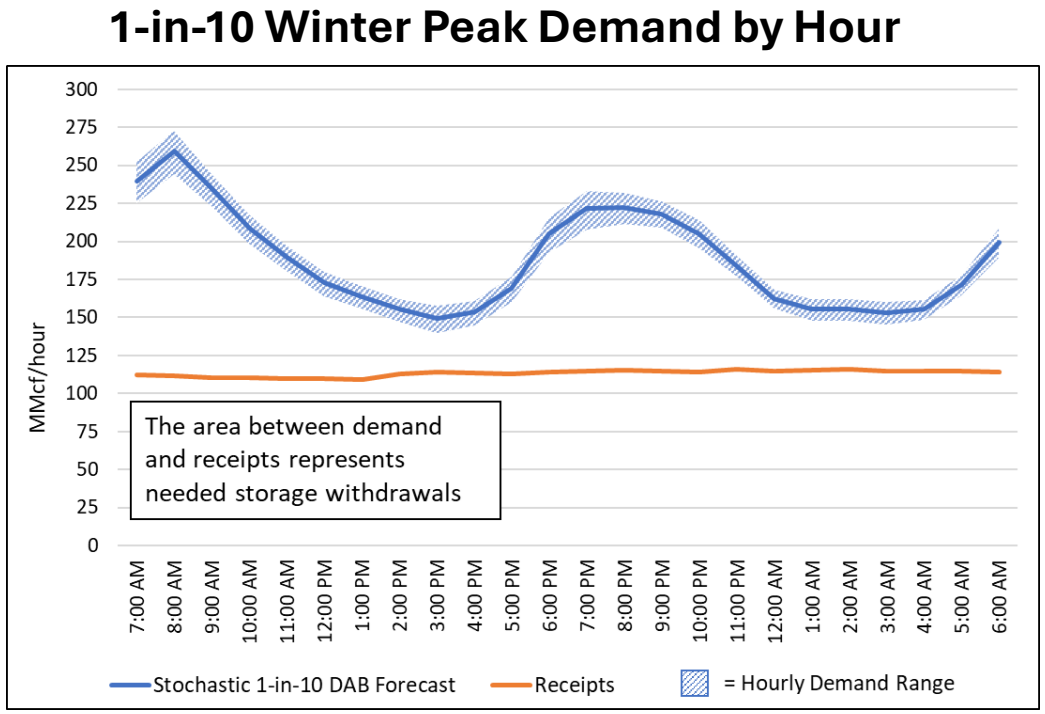
Joe Long, Aspen Environmental

Winter Assessment 2025-2026 Hourly Stochastic Gas Balance Analysis

Joe Long, Energy Economist
Aspen Environmental Group
Energy Policy And Market Analysis
November 3, 2025

Defining the Hourly Stochastic Model

- Same methodology as previous seasonal assessments
- Simulates winter peak load from historical hourly demand distributions
- Applies stochastic range to the 1-in-10 forecast and extreme peak day plus forecast
- Variation is highest in peak hours
- Produced for SoCalGas. Need hourly data to extend analysis to PG&E



Presenting the Hourly Gas Balance Results

- Creates hourly supply-demand balance using the stochastic load profile
- Shows required withdrawals when receipts don't meet demand
- Shows zero curtailments in both cases assuming sufficient storage withdrawals
- Aligns with the hydraulic and peak day results

Stochastic Hourly Gas Balance Results for the Winter 1-in-10 Peak Day

Units in MMcf	1-in-10 Winter Peak Day																								Total
Hour	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	0	1	2	3	4	5	6	
Demand	240	259	234	208	190	173	164	155	149	153	169	205	221	222	218	205	184	162	155	155	153	155	171	199	4504
Receipts	112	112	111	110	110	110	109	113	114	114	113	114	115	115	115	114	116	115	115	116	115	115	114	114	2720
Required Withdrawals	127	148	124	98	80	63	54	43	35	40	56	91	107	107	103	91	68	48	40	39	38	41	57	85	1784
Curtailment*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

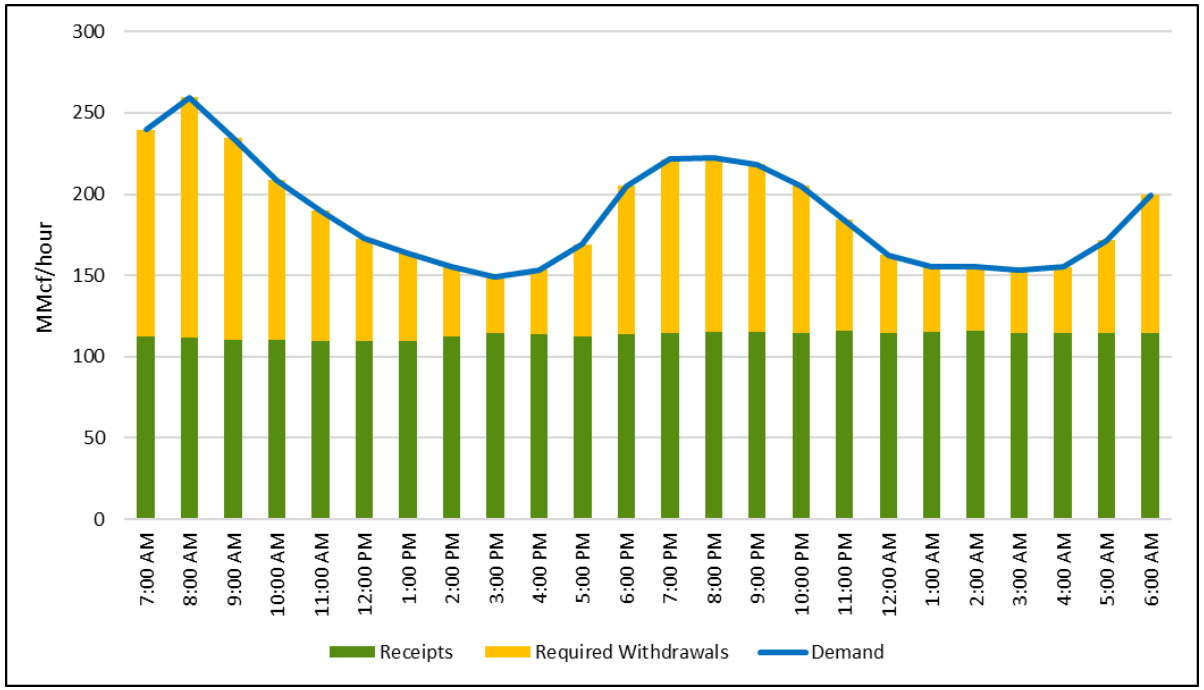
Stochastic Hourly Gas Balance Results for the Extreme Peak Day Plus

Units in MMcf	1-in-35 plus 1-in-10 Noncore Extreme Peak Day																								Total
Hour	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	0	1	2	3	4	5	6	
Demand	249	269	242	215	195	178	169	161	156	159	175	213	230	230	224	212	189	167	160	160	158	160	176	206	4652
Receipts	112	112	111	110	110	110	109	113	114	114	113	114	115	115	115	114	116	115	115	116	115	115	114	114	2720
Required Withdrawals	137	158	131	105	85	68	59	48	41	45	62	99	115	114	109	97	73	52	45	44	43	45	61	92	1932
Curtailment*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

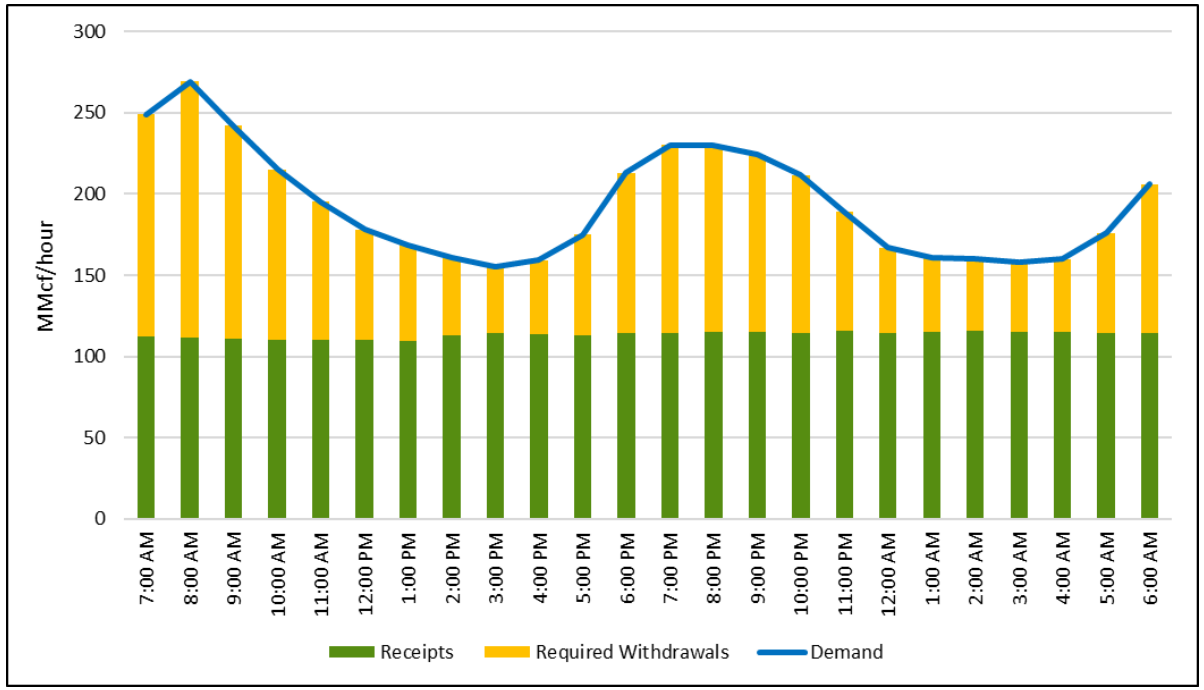
Graphical Depiction of Hourly Results

- Graphics below show the winter 1-in-10 and extreme peak day plus cases
- Extreme peak day plus case requires slightly higher withdrawals
- Shows zero curtailment in both cases assuming sufficient hourly withdrawals

Winter 1-in-10 Peak Day: 4,504 MMcf



Extreme Peak Day Plus: 4,662 MMcf



Public Q&A (1/3)

Eric Sanchez, CEC

CPUC Reliability Analysis

Khaled Abdelaziz, CPUC

SoCalGas Winter Reliability

Part of the First Aliso Canyon Biennial Assessment issued on 10/1/2025

November 3, 2025

Khaled Abdelaziz, PhD, PE
Natural Gas Modeling Lead
Energy Resource Modeling, Energy Division

California Public Utilities Commission

First Aliso Canyon Biennial Assessment Overview

- Assessment includes four analyses:
  - Demand reduction analysis.
  - Gas balance reliability analysis.
  - Hydraulic modeling analysis.
  - Economic analysis.
- Each analysis examines the problem from a different perspective and thus reaches a slightly different conclusion.
- Concludes that the Aliso Canyon inventory maximum can be reduced by 10 Bcf without jeopardizing reliability, but economic effects are less predictable.

Analysis 1
Gas Demand Reduction Analysis

Analysis 1
Gas Demand Reduction Analysis

Winter	1-in-10 Peak Day Demand Forecast (MMcfd)	Threshold for Considering Aliso Canyon Closure (MMcfd)	Difference from Threshold (MMcfd)	Aliso Canyon Maximum Inventory (Bcf)
2024-25	4,618	4,121	497	68.6
2025-26	4,562	4,121	441	TBD
2026-27	4,489	4,121	368	TBD
2027-28	4,435	4,121	314	TBD
2028-29	4,377	4,121	256	TBD
2029-30	4,295	4,121	174	TBD
2030-31	4,197	4,121	76	TBD

Demand is forecast to decrease primarily due to electrification and a drop in demand from gas-fired electric generators.

Analysis 1
Gas Demand Reduction Analysis

- Forecast demand is above the required threshold for both winters, so Aliso Canyon is still needed.
  - Winter 2025-26: peak demand is 4,562 MMcfd.
    - 441 MMcfd above the 4,121 MMcfd threshold.
  - Winter 2030-31: peak demand is 4,197 MMcfd.
    - 76 MMcfd above the 4,121 MMcfd threshold.
- Analysis is a yes-or-no question and doesn't determine a minimum inventory level.

Winter 2025-26	Winter 2030-31
Closure not Possible	Closure not Possible

Analysis 2
Gas Balance Reliability Analysis

Using Stochastic Daily Mass Balance Model Developed by Staff

Analysis 2
Gas Balance Reliability Analysis

- Pipeline Capacities Assumptions. 85 Percent utilization for the Northern and Southern Zones, and 100% for Wheeler Ridge Zone.

Zone	Nominal Capacity	2025-26 Derated Capacity for Gas Balance Reliability	2025-26 Derated Capacity for Gas Balance Reliability	2030-31 Derated Capacity for Gas Balance Reliability
	MMcfd	MMcfd	MMcfd	MMcfd
Outages	None	L4000 and L4002 Outages	At Receipt Points	At Receipt Points
Wheeler Ridge	765.0	765.0	765.0	765.0
Cal Production	70.0	70.0	70.0	70.0
Southern	1,210.0	1,028.5	1,028.5	1,028.5
Northern	1,590.0	935.0	1351.5	1,351.5
Total	**3,635.0**	**2,798.5**	**3,215.0**	**3,215.0**
Assume		**2,800**	**3,200**	**3,200**

Analysis 2
Gas Balance Reliability Analysis

Winter 2025-26	Winter 2030-31
Reduction Possible	Further Reductions Possible

Winter 2025-26:

- An Aliso inventory level of at least 44% is needed to maintain reliability if pressure reductions on L4000 and L4002 had persisted throughout the winter.
- Without outages that reduce receipt capacity to less than 3,200 MMcfd, a 1% Aliso inventory level is needed to maintain reliability.

Winter 2030-31 (Preview):

- Aliso Canyon inventory is not needed by to maintain reliability.
- Result depends on the implementation of three major upgrades, outages assumptions, and expected demand reduction

The gas balance reliability analysis is a necessary but not sufficient test of the pipeline-storage reliability because it does not conserve energy, nor it does consider withdrawals for cost mitigation.

Gas Balance Reliability Analysis 11/1/2025-10/31/2026 & 11/1/2031–10/31/2031

	Storage Well Utilization Factor (Percent)					
	2025-26			2030-31		
Pipeline Supply (MMcfd)	60%	80%	100%	60%	80%	100%
2,700	Failure	85%	44%	44%	1%	0%
2,800	Failure	73%	44%	15%	0%	0%
2,900	100%	44%	44%	1%	0%	0%
3,000	85%	44%	1%	0%	0%	0%
3,100	73%	15%	1%	0%	0%	0%
3,200	73%	4%	1%	0%	0%	0%
3,300	44%	1%	0%	0%	0%	0%
3,400	15%	1%	0%	0%	0%	0%
3,500	1%	0%	0%	0%	0%	0%

Analysis 3
Hydraulic Modeling Analysis

Using Synergi Gas 4.9.5, a Commercial Pipeline Software by DNV

Analysis 3
Hydraulic Modeling Analysis

- Pipelines capacity assumptions for winter peak day demand.

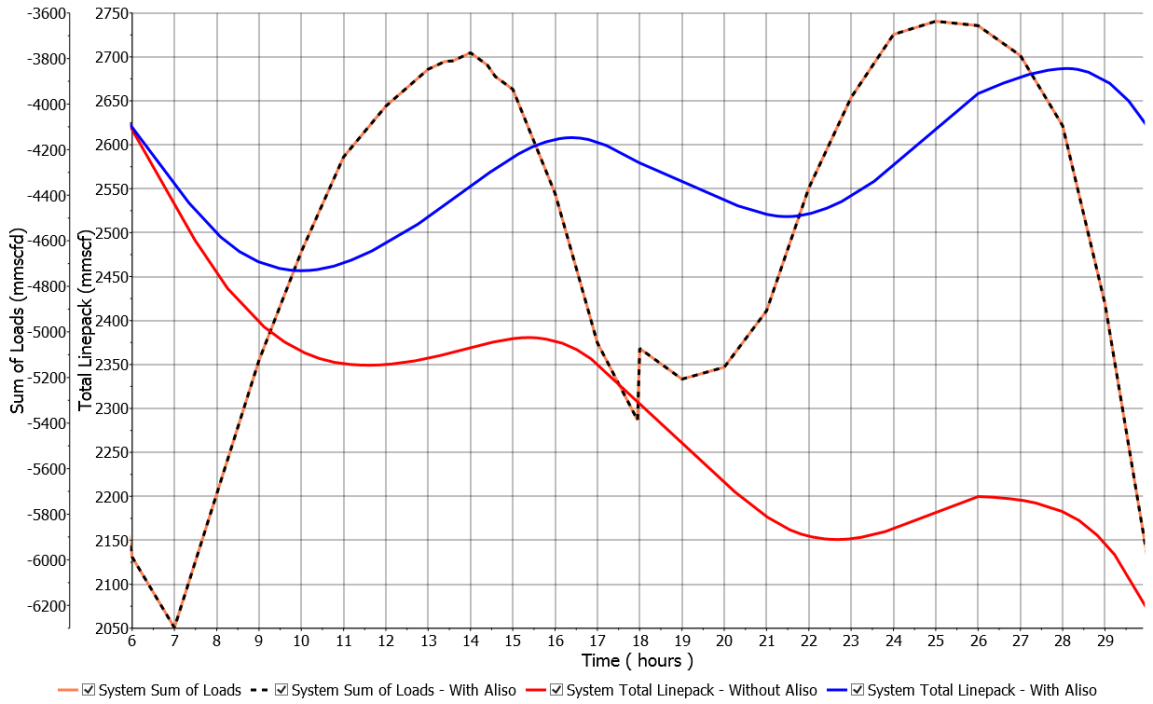
Zone	Nominal Capacity	2025-26 Derated Capacity	2030-31 Derated Capacity
	MMcfd	MMcfd	MMcfd
Wheeler Ridge	765.0	765.0	765.0
Cal Production	70.0	70.0	70.0
Southern	1,210.0	1,028.5	1,028.5
Northern	1,590.0	1,351.5	1,351.5
Total	**3,635.0**	**3,215**	**3,215**

Hydraulic Modeling Analysis
Winter 2025-26 and Winter 2030-31 Results

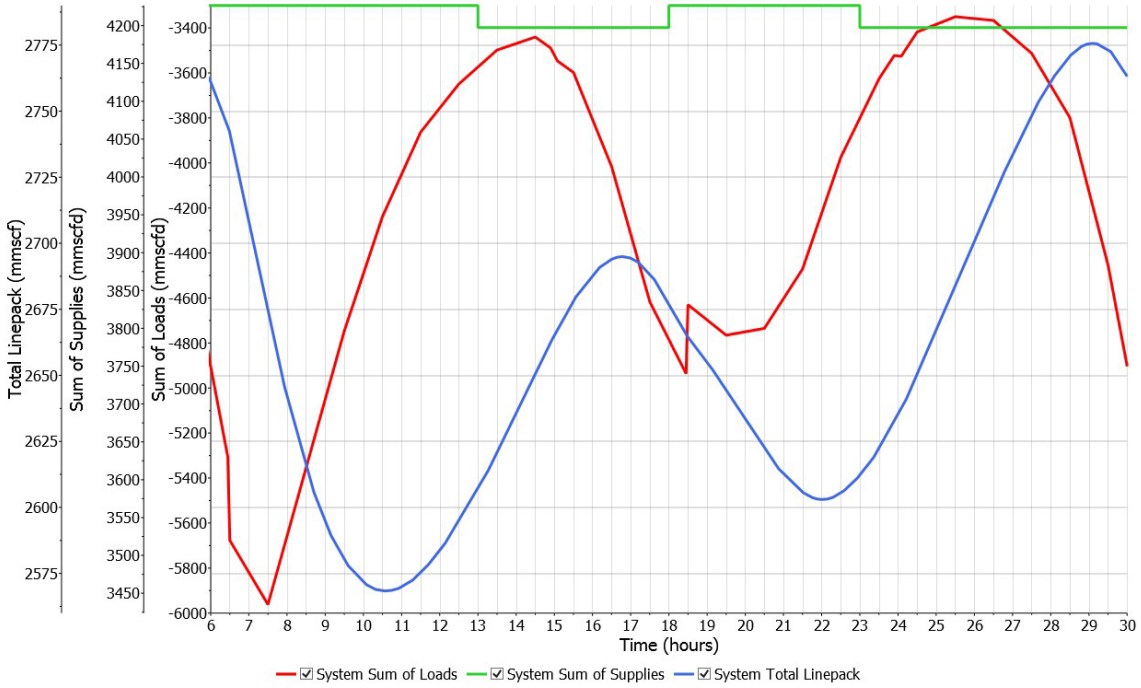
- Winter 2025-26: The hydraulic flow modeling was successful, but only with 550 MMcfd withdrawal from Aliso Canyon throughout the day.
  - This withdrawal rate is higher than the 441 MMcfd shortfall indicated by Analysis 1.
- Winter 2030-31: The hydraulic flow modeling indicates that Aliso Canyon is not needed for reliability provided that:
  1. Planned upgrades to the natural gas system are fully commissioned before winter 2030-31
  2. There are no unplanned outage conditions, and
  3. Reductions in gas demand occur as forecasted.

Winter 2025-26	Winter 2030-31
Inventory Reduction Possible	Further Inventory Reductions Possible

Hydraulic Modeling Analysis
Winter 2025-26 and Winter 2030-31Results



Hydraulic Modeling Simulation Results for 1-in-10 Peak day demand in Winter 2025-26



Hydraulic Modeling Simulation Results for 1-in-10 Peak day demand in Winter 2030-31

Analysis 4
Economic Analysis

Using Set Thresholds

Analysis 4
Economic Analysis

- If SoCal Citygate forward gas prices for the upcoming winter are high relative to national or past levels, the economic analysis would recommend maintaining the current Aliso inventory, even if other analyses suggest it can be decreased.
- Reflects only current conditions; does not predict price impact of changes to storage levels.
- For winter 2025-26 forward prices are not 50% above national and historical levels.
- Thus, the analysis doesn't lead to a recommendation to maintain the current Aliso Canyon inventory.

	SoCal Citygate forward price % above Henry Hub	Upcoming winter gas price % above past 3 winters	Upcoming winter gas price % above past 2 winters
Winter 2025-2026	39%	-40%	36%
Threshold to Preclude Aliso Reduction	50%	50%	NA

Current Context

- Gas prices are expected to increase both nationally and in Southern California in winter 2026-27 due to increased LNG exports.
  - Nationally, LNG exports are forecast to increase from 11.9 Bcfd in 2024 to 16.0 Bcfd in 2026, outpacing growth in U.S. gas production.
  - In June, the EIA predicted that average prices at Henry Hub will increase from $2.20/MMBtu in 2024 to $4.90/MMBtu in 2026.
  - Sempra's Energía Costa Azul LNG export facility is expected to go into service in spring 2026.
    - The Baja California facility is expected to increase gas demand in the region by 425 MMcfd, increasing competition for the interstate pipelines that serve Southern California.

Final Recommendation and Conclusions Winter 2025-26

- The demand reduction analysis indicates that Aliso should not be closed.
- Both the gas balancing reliability analysis and the hydraulic modeling analysis indicate that the Aliso inventory could be reduced.
- The economic analysis doesn't meet the "red flag" thresholds set in the decision.
- The four analyses support a recommendation to reduce the maximum inventory by 10 Bcf, the maximum allowed by D.24-12-076, from 68.6 to 58.6 Bcf.
- Given the expected rise in LNG exports and natural gas prices in 2026-27, the CPUC may wish to consider a smaller inventory reduction as a precautionary measure.

Forward Look: Winter 2030-31

- The demand reduction analysis supports the need for Aliso.
- Both the gas balancing reliability analysis and the hydraulic modeling analysis show that Aliso is not needed for reliability.
  - These results are contingent on expected future events, including planned upgrades to the gas system.
- The economic analysis is not conducted for winter 2030-31 because gas prices that far in the future are too speculative.
- The winter 2030-31 analysis does not impact the staff recommendation.

Questions?

Public Q&A (2/3)

Eric Sanchez, CEC

Panel: Utility and ISPs: Planning for Winter (2025 and Beyond)

Moderator: Ning Zhang, CEC

Panelists: James Chen, PG&E

Nate Taylor, SoCalGas

Dave Marchese, Caliche Storage (Central Valley Gas Storage)

Public Q&A

Public Q&A (3/3)

Eric Sanchez, CEC

Public Comment

Zoom App/Online

- Click “raise hand”

Telephone

- Press *9 to raise hand
- Press *6 to mute/unmute

When called upon

- CEC will open your line
- Unmute on your end
- Spell name and state affiliation, if any
- 3 minute or less per speaker, 1 speaker per entity

3-MINUTE TIMER

Closing Remarks

Thank You!