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2025 California Energy Demand Annual Consumption and Sales Forecasts

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Acronyms, Initialisms, and Abbreviations

AAEE – Additional Achievable Energy Efficiency

AAFS – Additional Achievable Fuel Substitution

AATE – Additional Achievable Transportation Electrification

AGWP – Agriculture and Water Pumping

BTM – Behind-the-Meter

CEC – California Energy Commission

CED / CEDU – California Energy Demand Forecast [Update]

DG – Distributed Generation

FZ – Forecast Zone

IEPR – Integrated Energy Policy Report

ITC – Investment Tax Credit (for Solar PV)

GW – GigaWatt [power]

GWh – GigaWatt hours [energy]

kW – KiloWatt [power]

kWh – KiloWatt hours [energy]

MAPE – Mean Absolute Percentage Error

MKRP – Mojave-Kern River Pipeline

MW – MegaWatt [power]

MWh – MegaWatt hours [energy]

PA – Planning Area

PCA – Principal Components Analysis

PV – Photovoltaic

QFER – Quarterly Fuel and Energy Reports

Selfgen / SG – Self Generation

SL – Streetlighting

TCU – Transportation, Communication, Utilities

TWh – TeraWatt hours [energy]



Forecasting Process: Critical Inputs



Changes to Forecast Inputs

Input	Directional Change from CEDU 2024	Electricity Sales Impact	Gas Sales Impact
Demographics			
• Population	↓	↓	↓
• Households	↑	↑	↑
Economics			
• Short-Term (2024-2028)	↓	↓	↓
• Long-Term (2028-2045)	≈	≈	≈
Rates			
• Electricity Rates	↑	↓	N/A
• Gas Rates	↑	N/A	↓
Self-Gen (ITC Removal)	↓	↑	N/A



Changes to Forecast Inputs (continued)

Input	Directional Change from CEDU 2024	Electricity Sales Impact	Gas Sales Impact
Data Centers	↑	↑	N/A
Known Loads	↑	↑	N/A
Cannabis	↓	↓	N/A
Baseline Transportation (EV tax credit removal)	↓	↓	N/A
Committed Savings	↓	↓	↓
AA Load Modifier Updates			
• AAEE	↑	↓	↓
• AAFS	↓	↓	↑
• AATE	↓	↓	↓



Comparison of Statewide Economic and Demographic Drivers

Changes in Growth Rates in Economic and Demographic Drivers

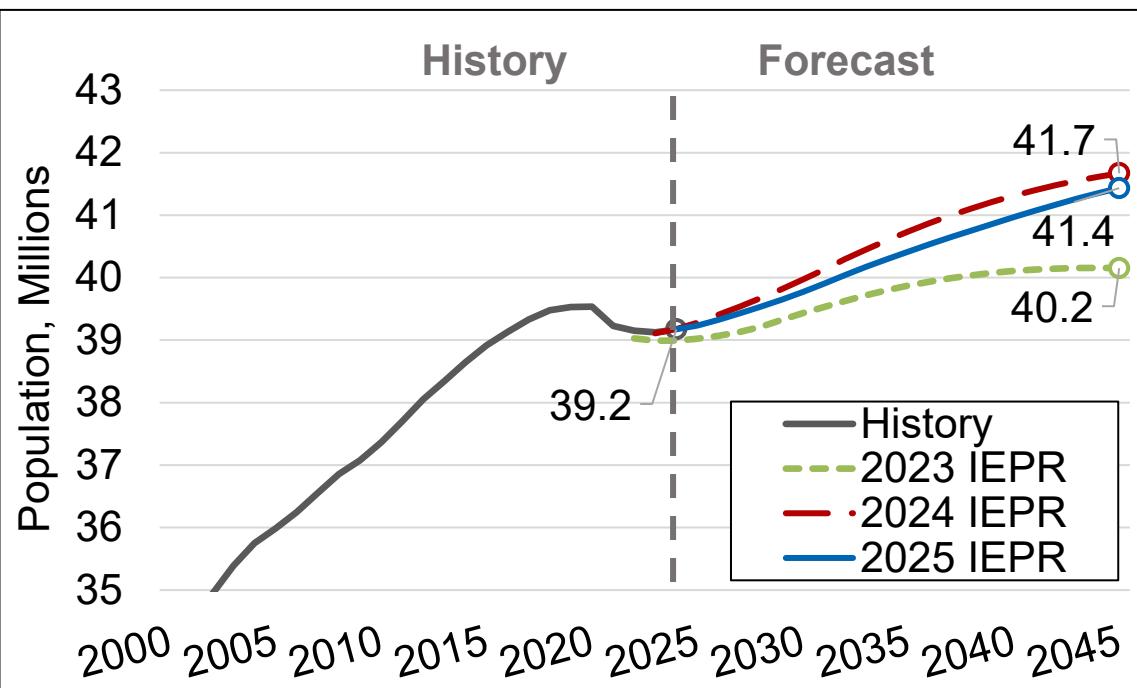
Economic/ Demographic Driver	2024-2028			2028-2045			2024-2045		
	2024 IEPR	2025 IEPR	change	2024 IEPR	2025 IEPR	change	2024 IEPR	2025 IEPR	change
Gross State Product	1.8%	1.6%	-0.1%	1.8%	1.9%	+0.1%	1.8%	1.8%	+0.1%
Per Capita Personal Income	1.9%	1.6%	-0.3%	1.7%	1.9%	+0.2%	1.7%	1.8%	+0.1%
Manufacturing Output	2.5%	1.7%	-0.7%	2.6%	2.7%	+0.1%	2.6%	2.5%	-0.1%
Commercial Employment	0.4%	0.3%	-0.1%	0.2%	0.3%	+0.1%	0.2%	0.3%	0.0%
Population	0.3%	0.2%	-0.1%	0.3%	0.3%	0.0%	0.3%	0.3%	0.0%
Number of Households	0.6%	1.0%	+0.3%	0.6%	0.8%	+0.2%	0.6%	0.8%	+0.2%



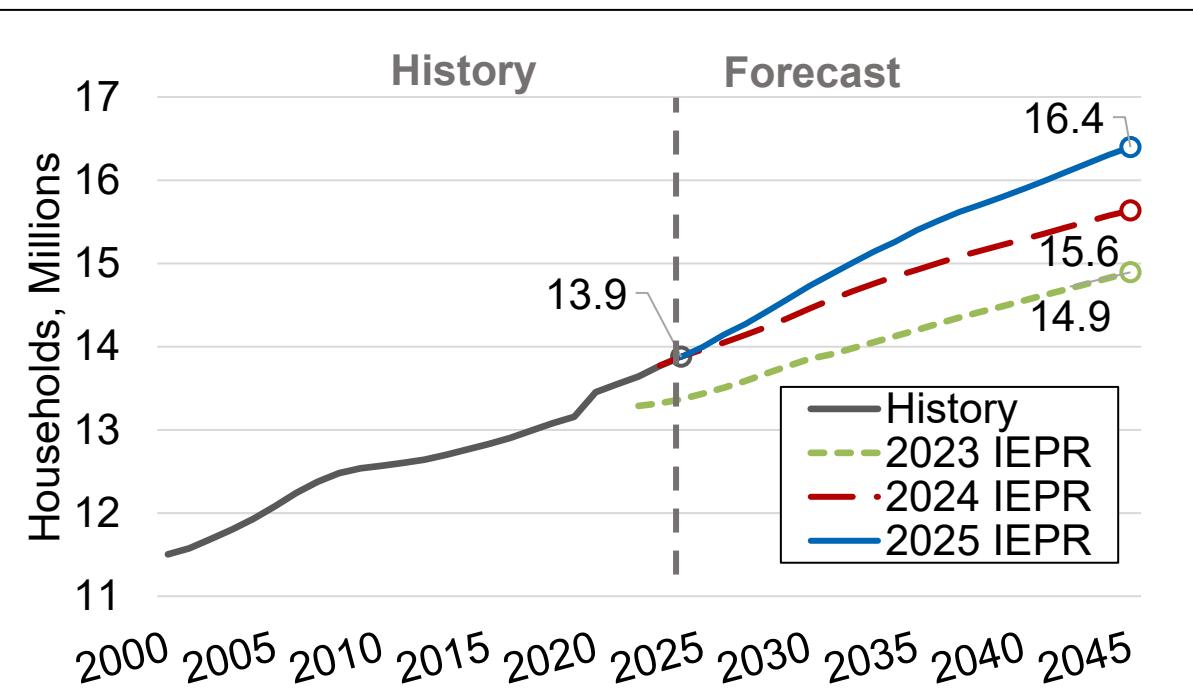
Comparison of Statewide Households and Population

- Decrease in persons-per-household

Population



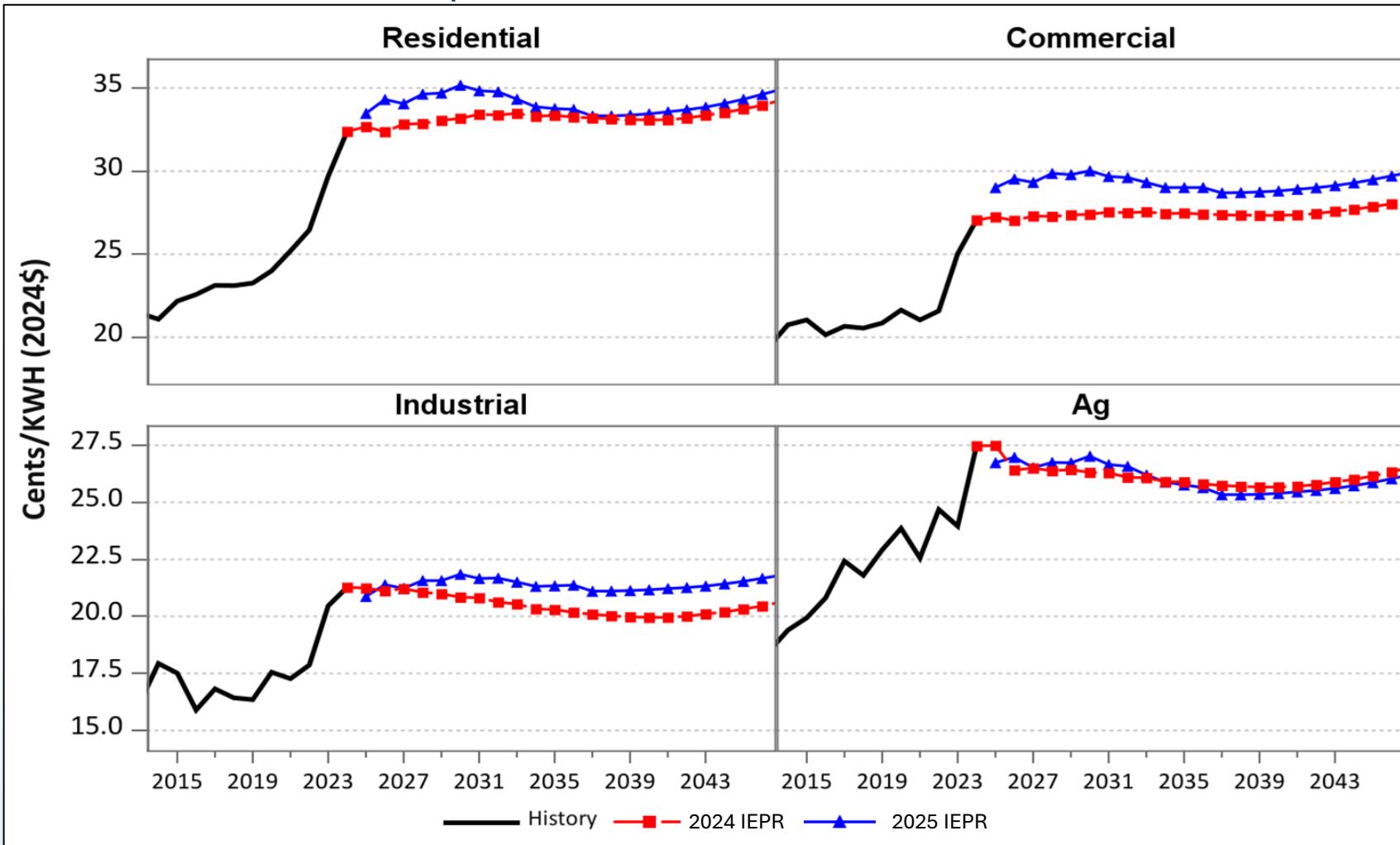
Households





Comparison of Statewide Average Electricity Rates

- Rates are calculated using updated revenue requirement projections and the sales forecast from the previous demand forecast iteration.

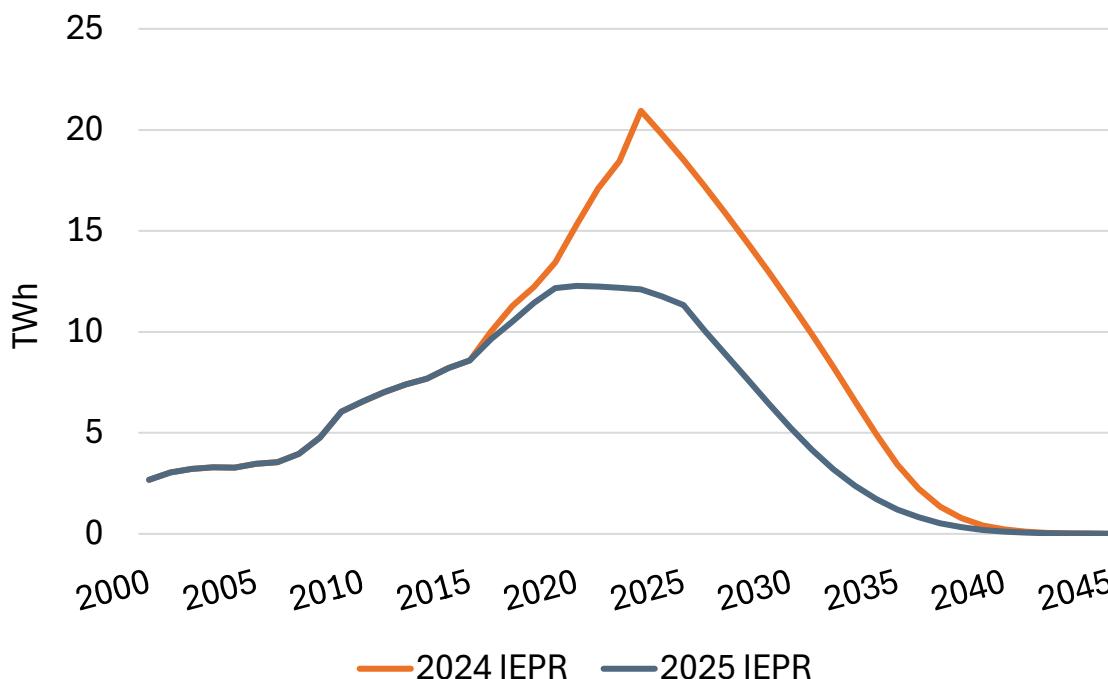




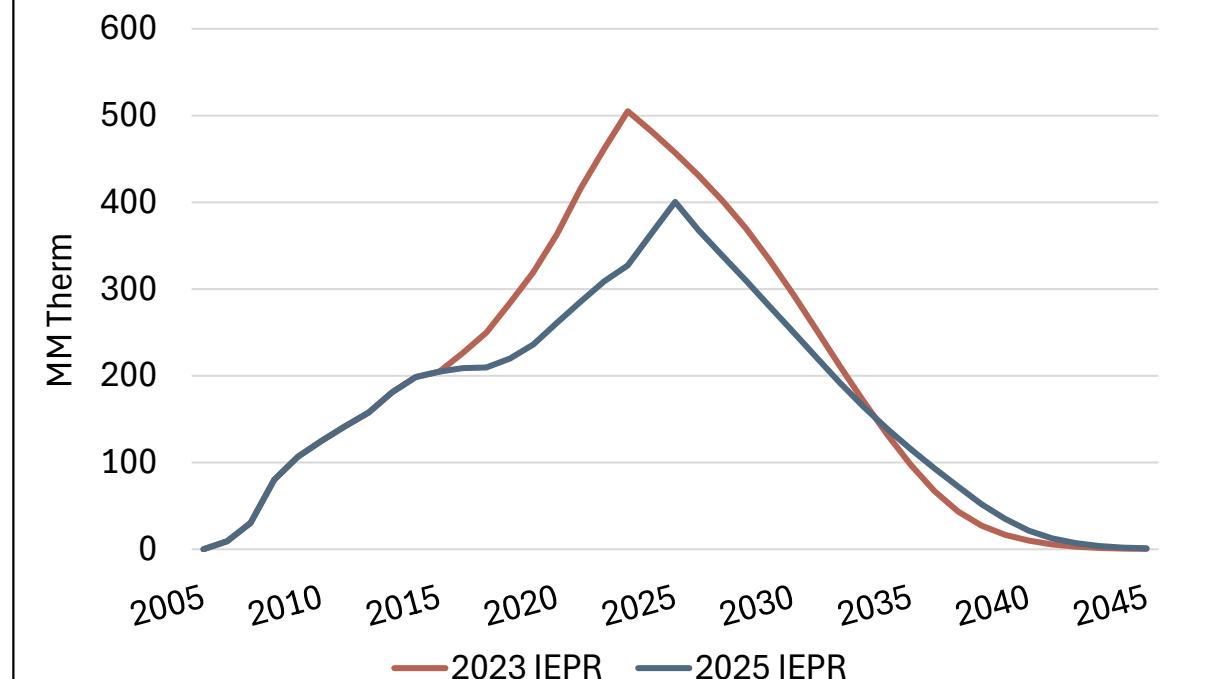
Statewide Committed Programs Savings

- Many programs will expire over the forecast period, which causes demand to increase.
- Correction to Committed Programs Savings resulting in slower decaying efficiency savings, leading to less load growth.
- No exogenous adjustments for Committed Standards Savings this cycle.

Electricity Programs Impacts



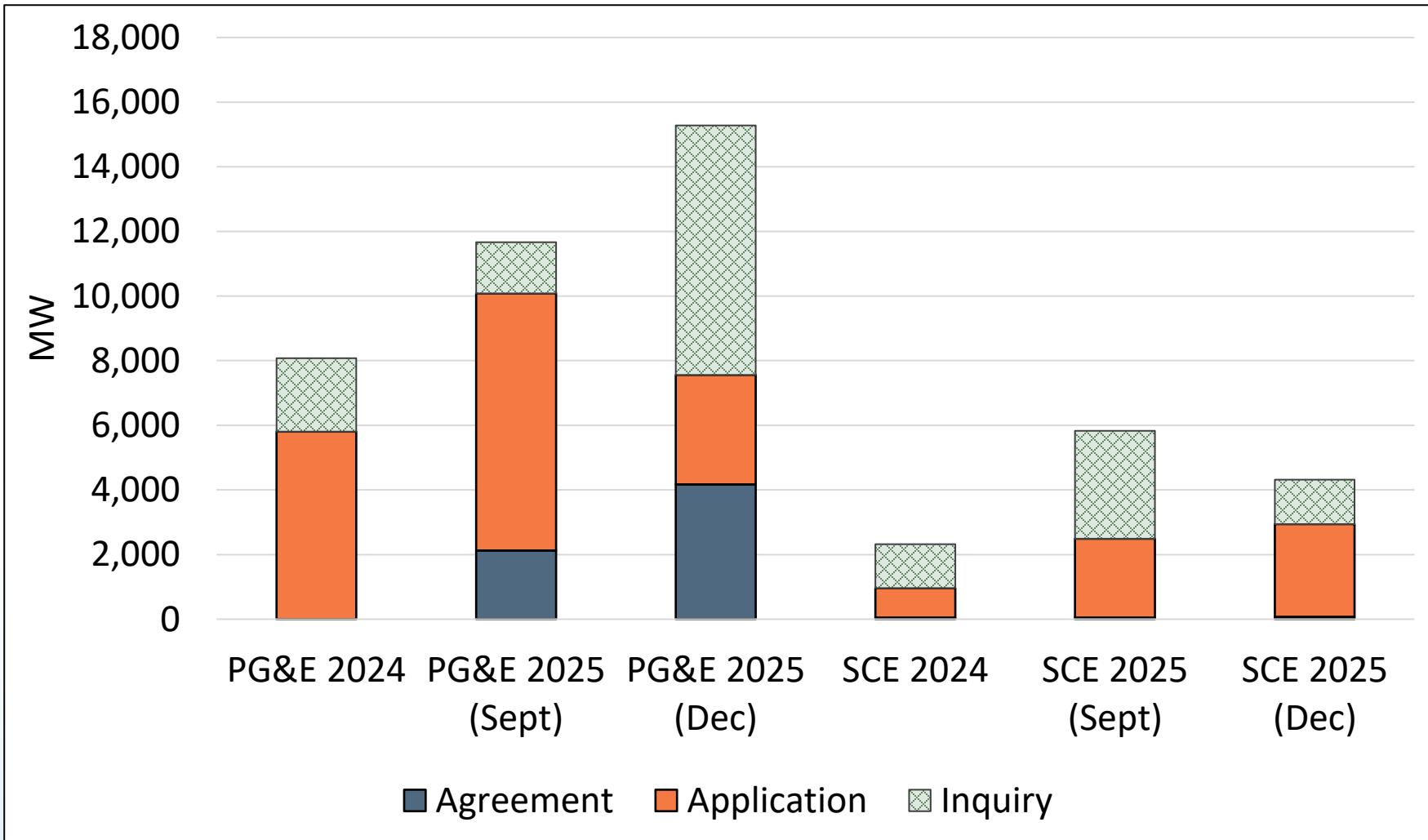
Gas Programs Impacts





Data Center Update

- Current forecast results use the September data from all utilities.



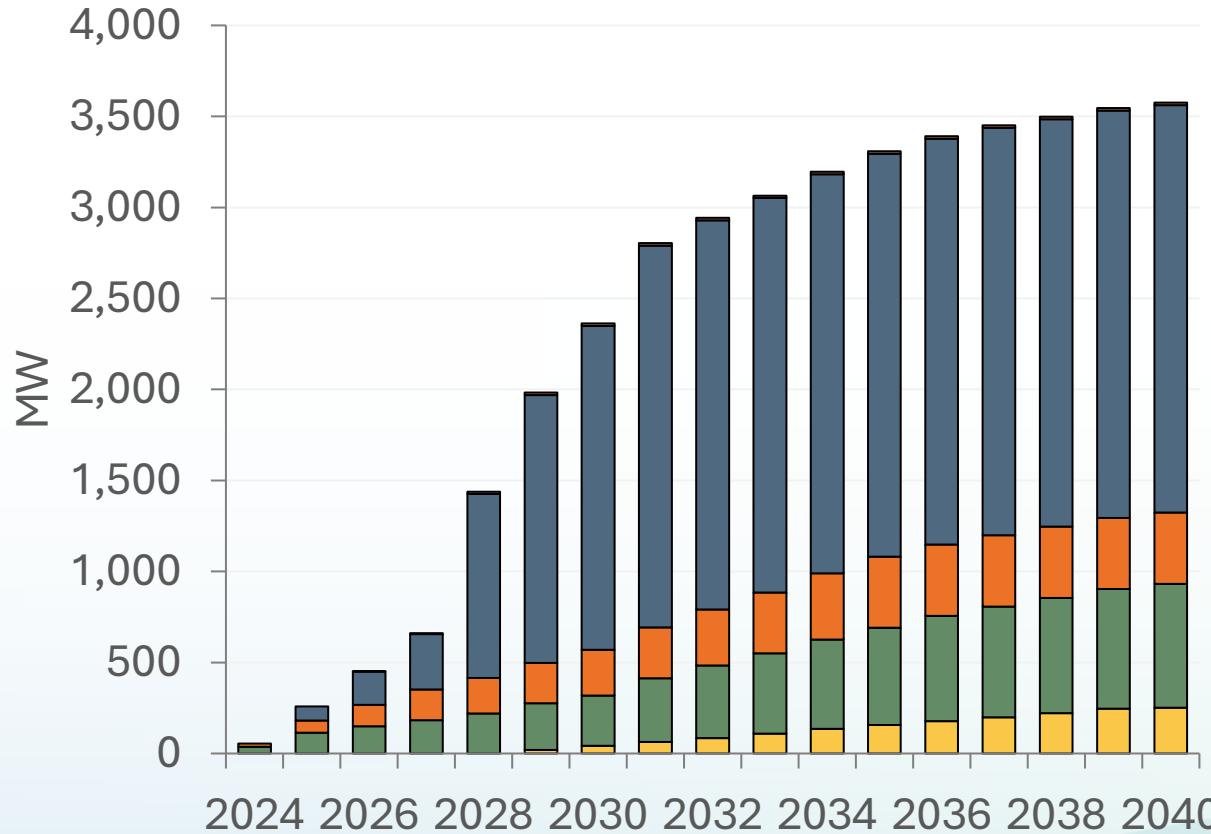
Source: CEC (with data inputs from PG&E and SCE)



Statewide Data Center Max Demand Mid Case

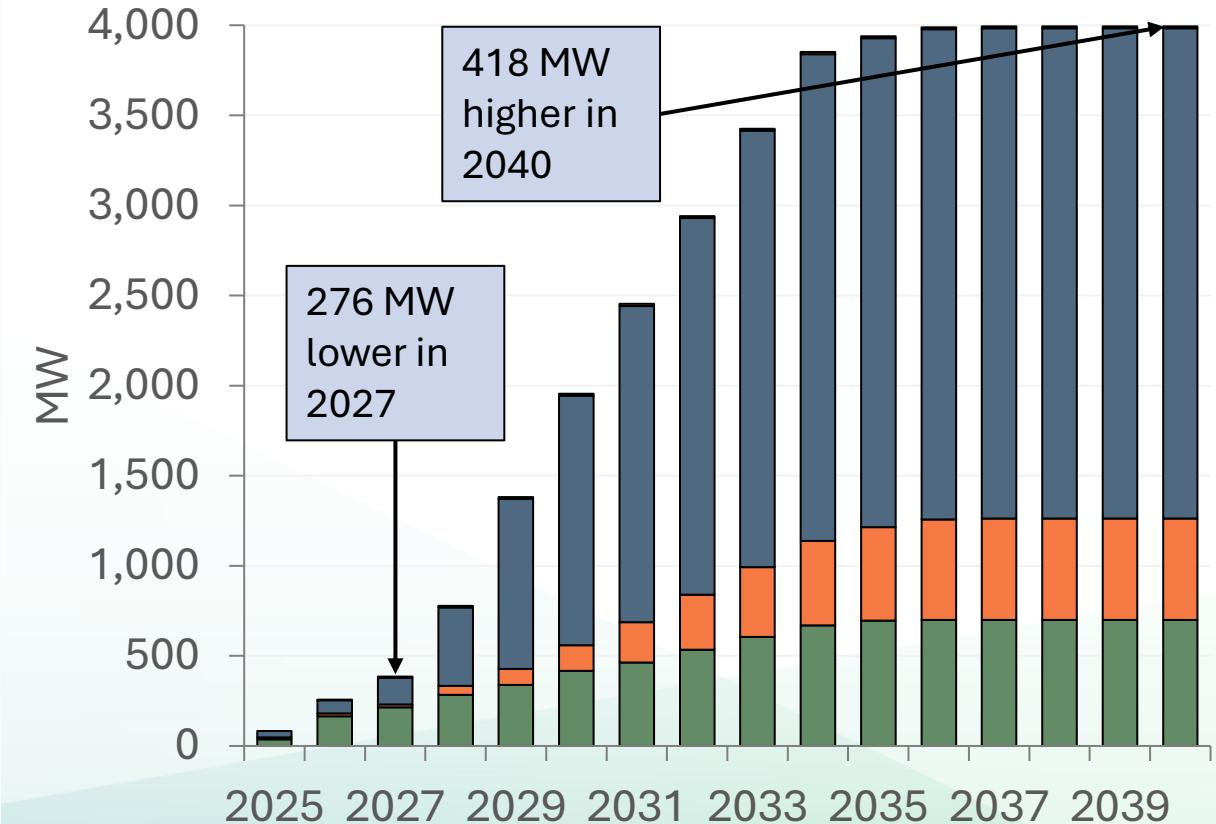
2024 IEPR Mid Case

■ City of San Jose ■ SVP ■ SCE ■ PG&E ■ City of Palo Alto



Draft 2025 IEPR Mid Case

■ SVP ■ SCE ■ PGE ■ City of Palo Alto ■ City of Burbank ■ SDGE

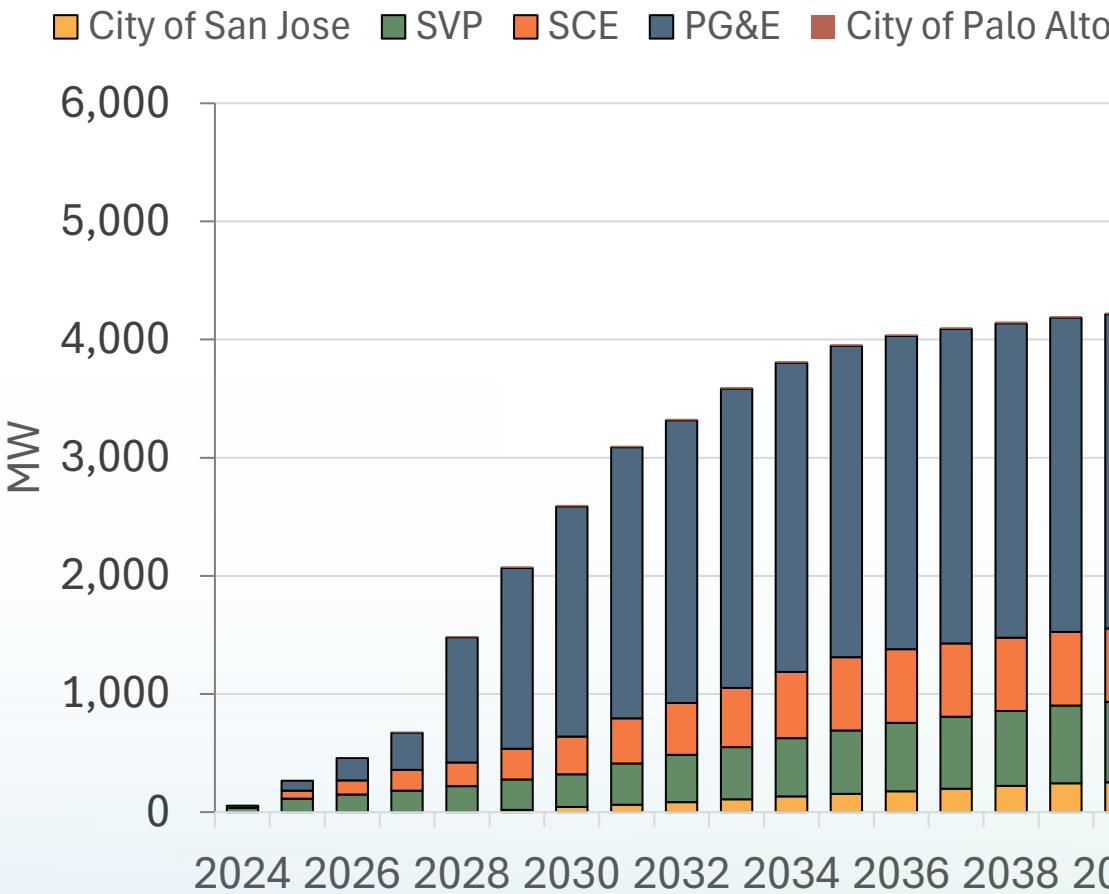


Source: CEC (with data inputs from PG&E, SVP, Palo Alto, San Jose, SCE, Burbank, SDG&E)

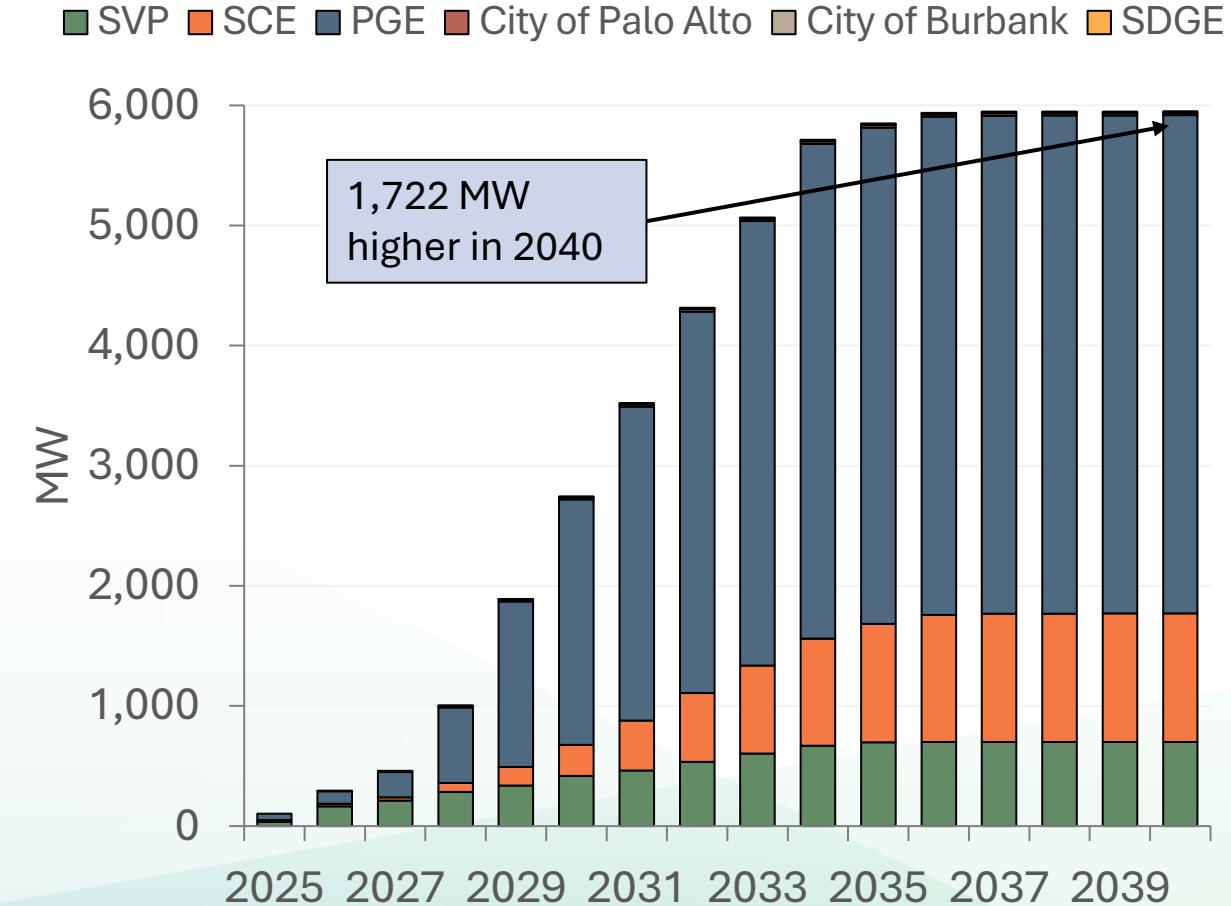


Statewide Data Center Max Demand High Case

2024 IEPR High Case



Draft 2025 IEPR High Case





Baseline Demand Forecast: Statewide Electricity Consumption and Sales



Baseline Electricity Cases

- Mid Case used as a basis for Planning Scenario
- High Case used as a basis for Local Reliability Scenario

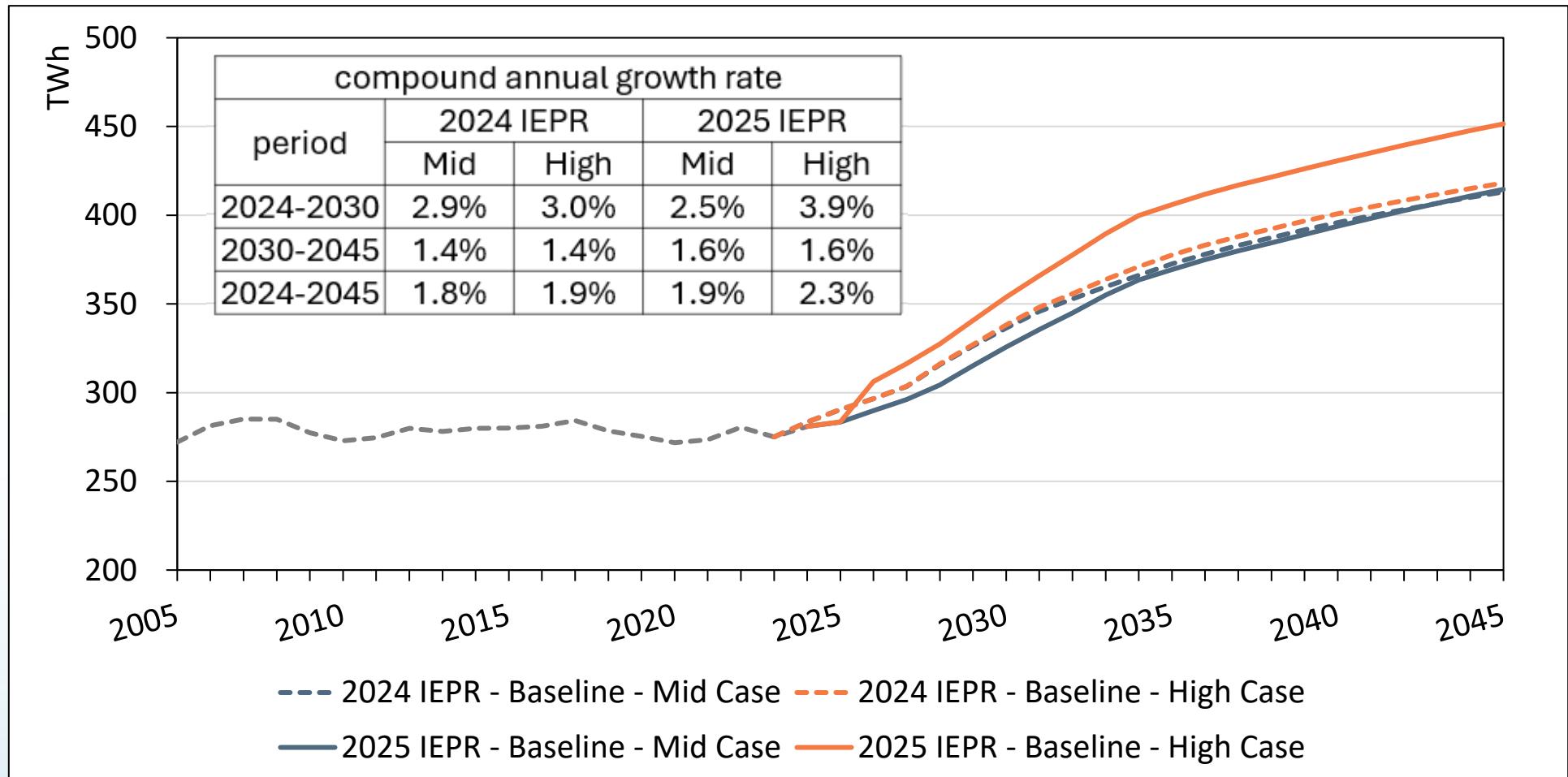
Components of Baseline Forecast

Input Variable	Mid Case Baseline	High Case Baseline
Econ/Demo	Mid	Mid
Data Center scenario	Mid	High
Known Loads included	No (TBD)	Yes
Self-Generation scenario	Mid	Low



Statewide Baseline Electricity Consumption

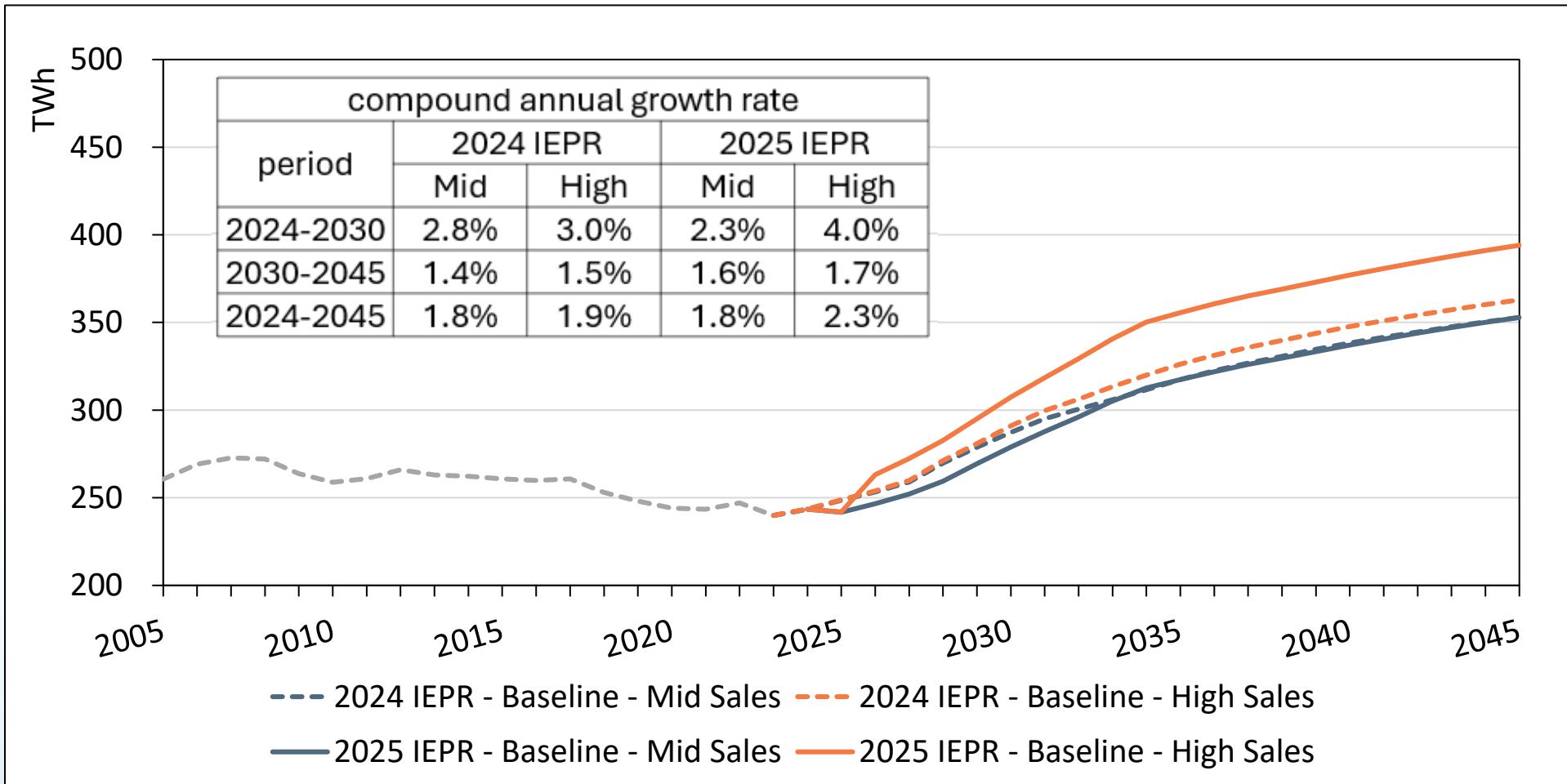
- Lower economic growth projections cause the forecast to be initially lower than the 2024 IEPR.
- Known loads and data centers cause the high case to exceed the 2024 IEPR (33 TWh in 2045).





Statewide Baseline Electricity Sales

- Similar trends as consumption chart, although self-gen is lower than in the 2024 IEPR.
- Mid Case Sales in 2045 is almost identical to the 2024 IEPR, High Case Sales are 31 TWh higher.





Baseline Demand Forecast: Statewide Electricity Consumption by Sector



Forecasting Process: Sectors and Models

Sector Model Types

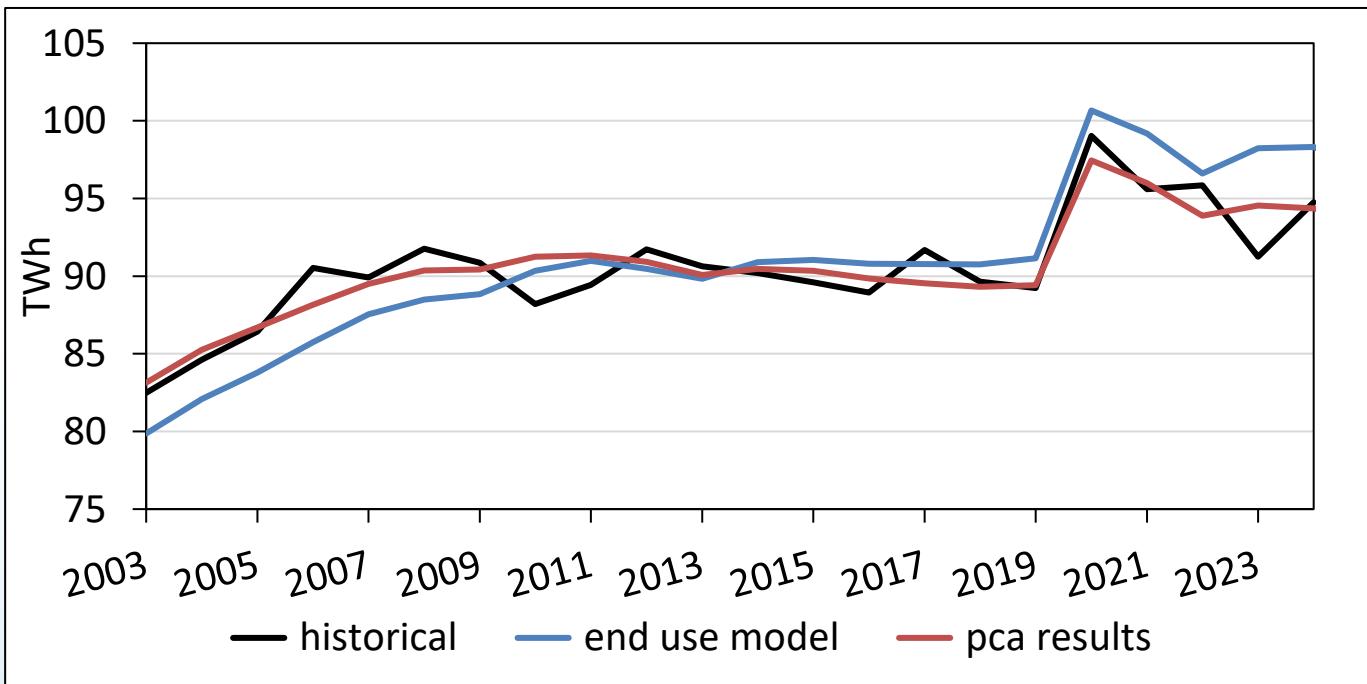
Sector	Model Type
Residential	End Use Model Calibrated by QFER (PCA) and Econometric Model
Commercial	New Econometric Model (End Use Model in work for 2026)
Industrial (Mfr + Mining & Cons)	Econometric by NAICS code <i>(2023 results calibrated with 2025 inputs)</i>
Ag / Cannabis / Water Pumping	Econometric by NAICS code New Cannabis data
TCU / Streetlighting	Trend Analysis by NAICS code

Source: CEC staff



Residential Calibration with PCA

- Principal components analysis (PCA) enables adjustment of individual end-use consumption estimates from the residential models.
- End use data is translated into uncorrelated components, so that meaningful adjustment factors can be estimated via regression.
- As a result, the sum of all end uses better matches historical consumption data for each forecast zone.
- Refer to: <https://www.energy.ca.gov/media/12061>



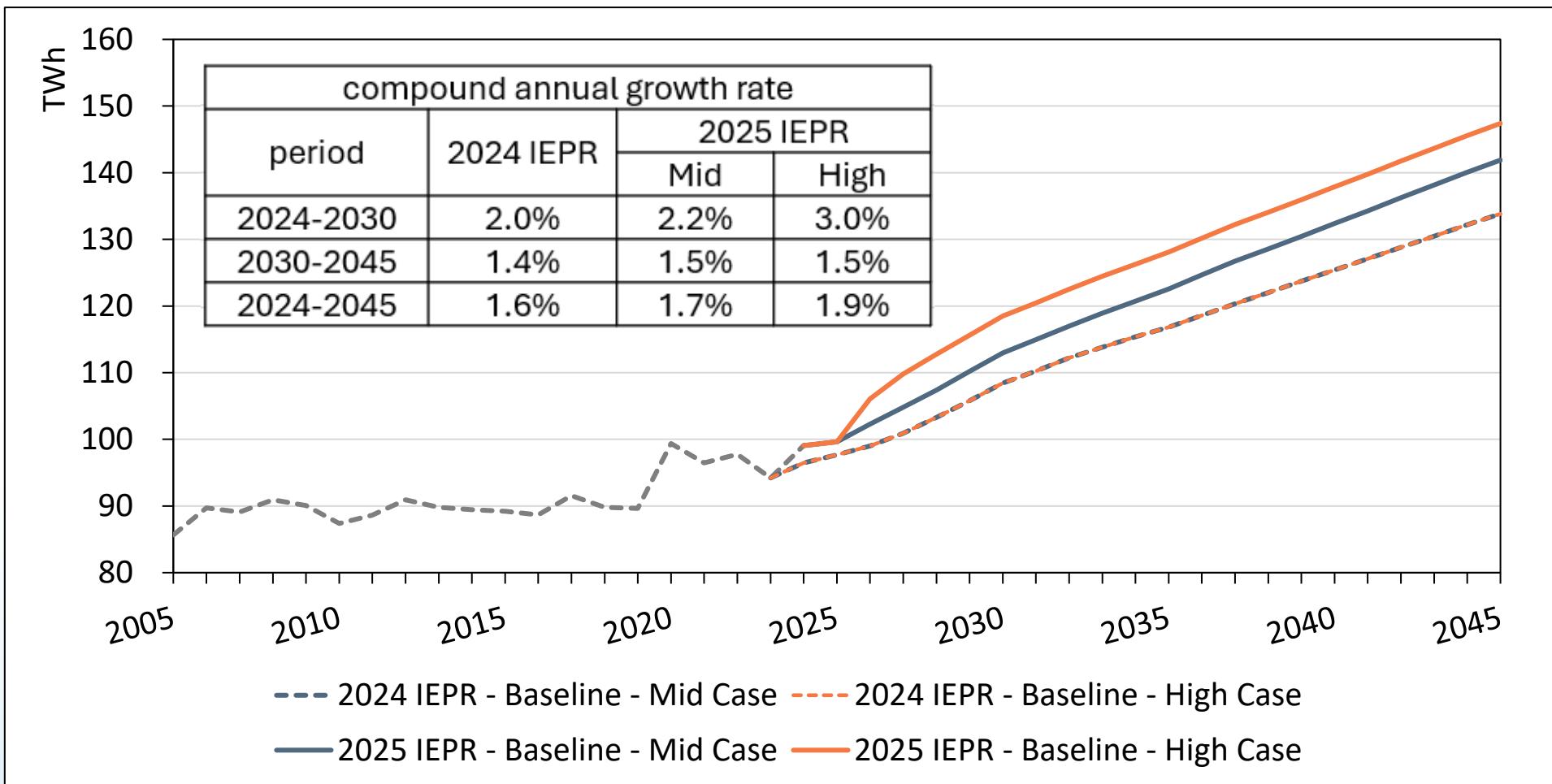
Source: CEC staff

PA Name	PA	Zone	MAPE	
			Res Model	PCA
PGE	1	1	3.3	1.2
PGE	1	2	7.8	1.1
PGE	1	3	3.0	1.3
PGE	1	4	3.7	1.3
PGE	1	5	6.6	1.1
PGE	1	6	5.6	0.9
SCE	2	7	8.6	1.6
SCE	2	8	9.9	2.1
SCE	2	9	3.5	2.2
SCE	2	10	4.5	2.7
SCE	2	11	5.4	2.4
SDGE	3	12	7.2	1.7
NCNC	4	13	2.9	1.8
NCNC	4	14	10.5	1.8
NCNC	4	15	6.2	1.7
LADWP	5	16	10.0	1.7
LADWP	5	17	2.1	1.8
BUGL	6	18	5.7	2.4
IID	7	19	14.8	3.6



Statewide Baseline Residential Electricity Consumption

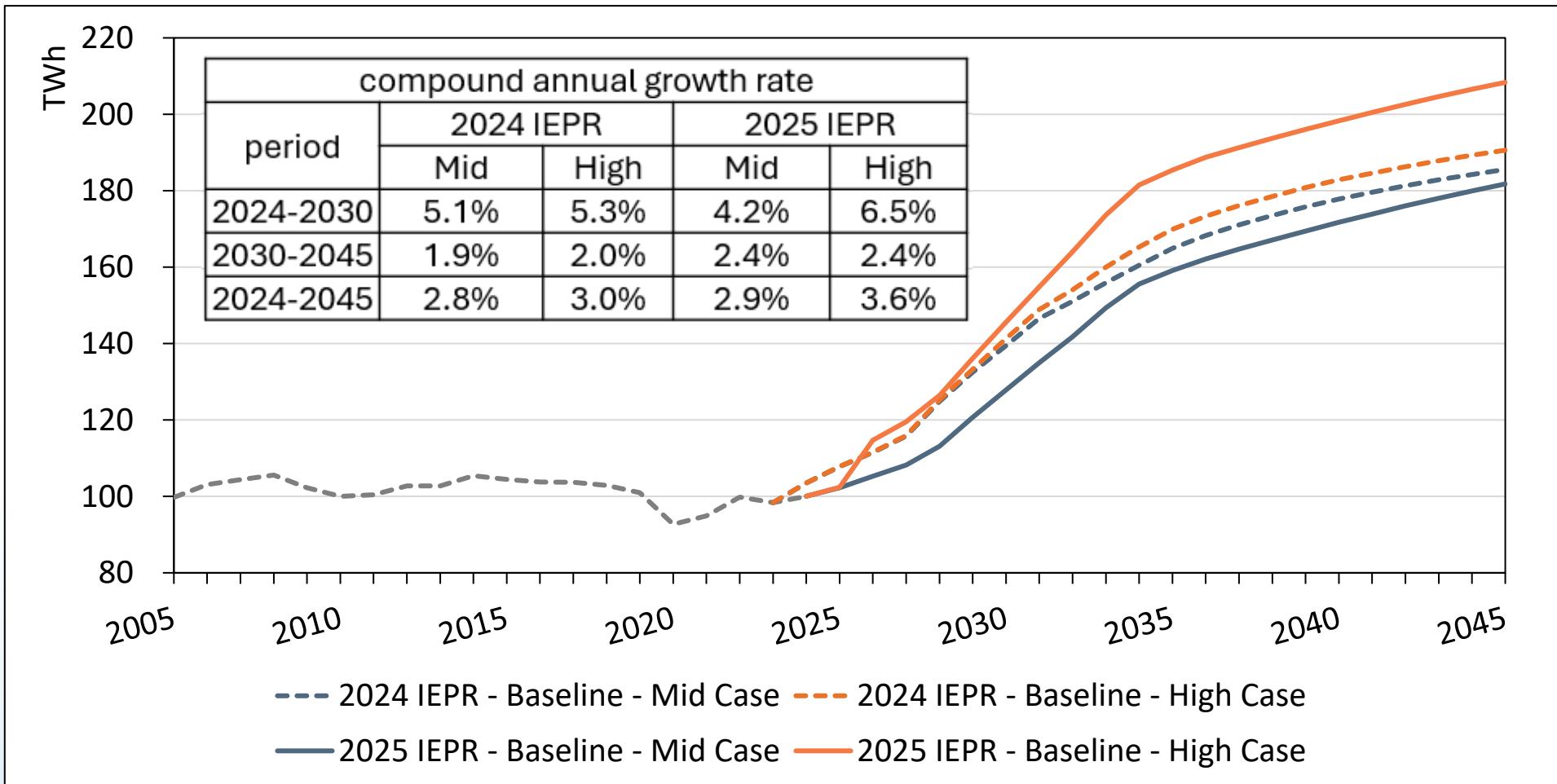
- 2025 IEPR residential electricity consumption is higher compared to 2024 IEPR, due to a decrease in persons-per-household, and to the addition of known loads to the high case.





Statewide Baseline Commercial Electricity Consumption

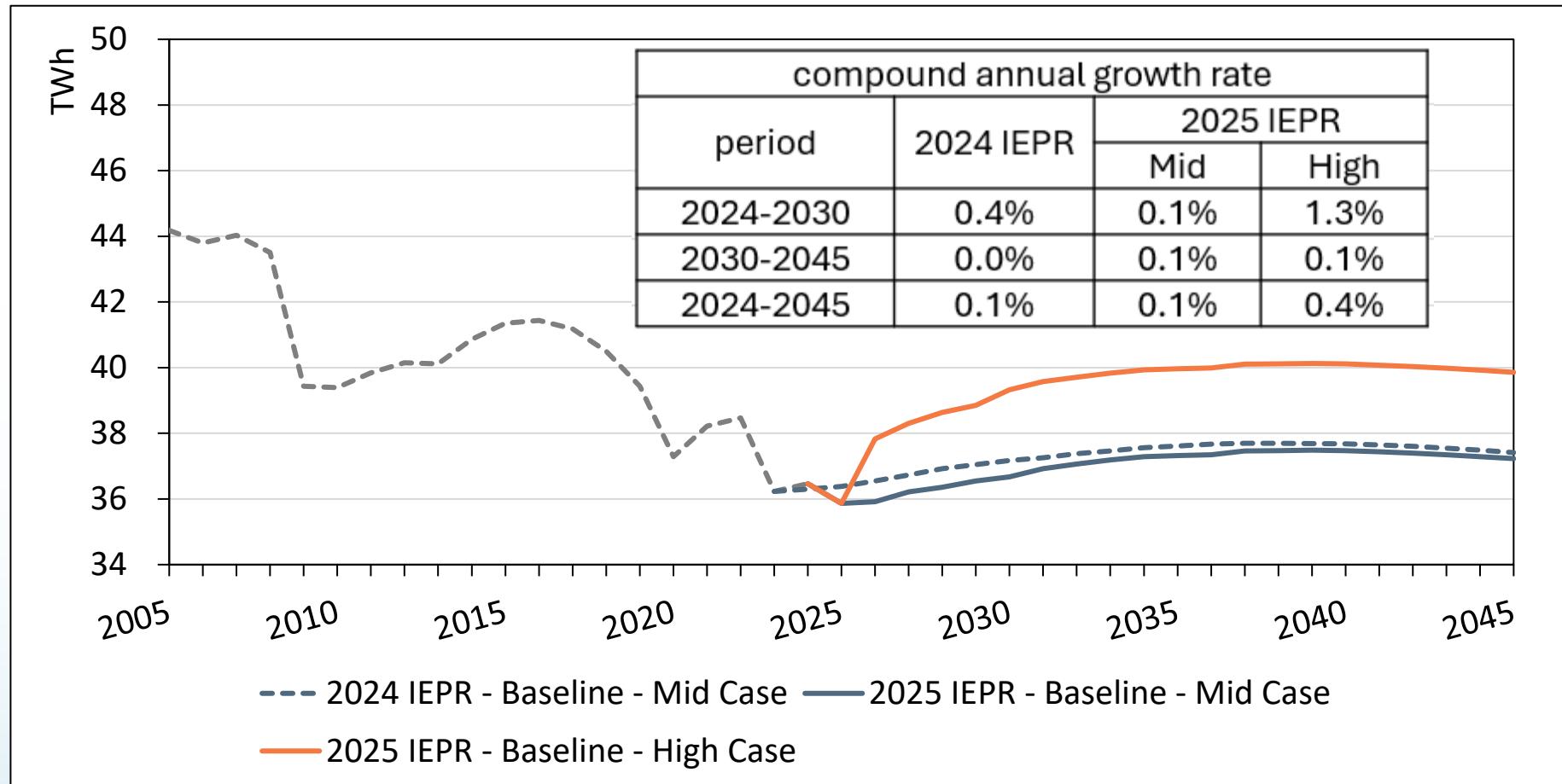
- Economic uncertainty bring the forecasts down compared to last year.
- Data Centers and Known Loads cause the high case to be much higher.





Statewide Baseline Industrial Manufacturing Electricity Consumption

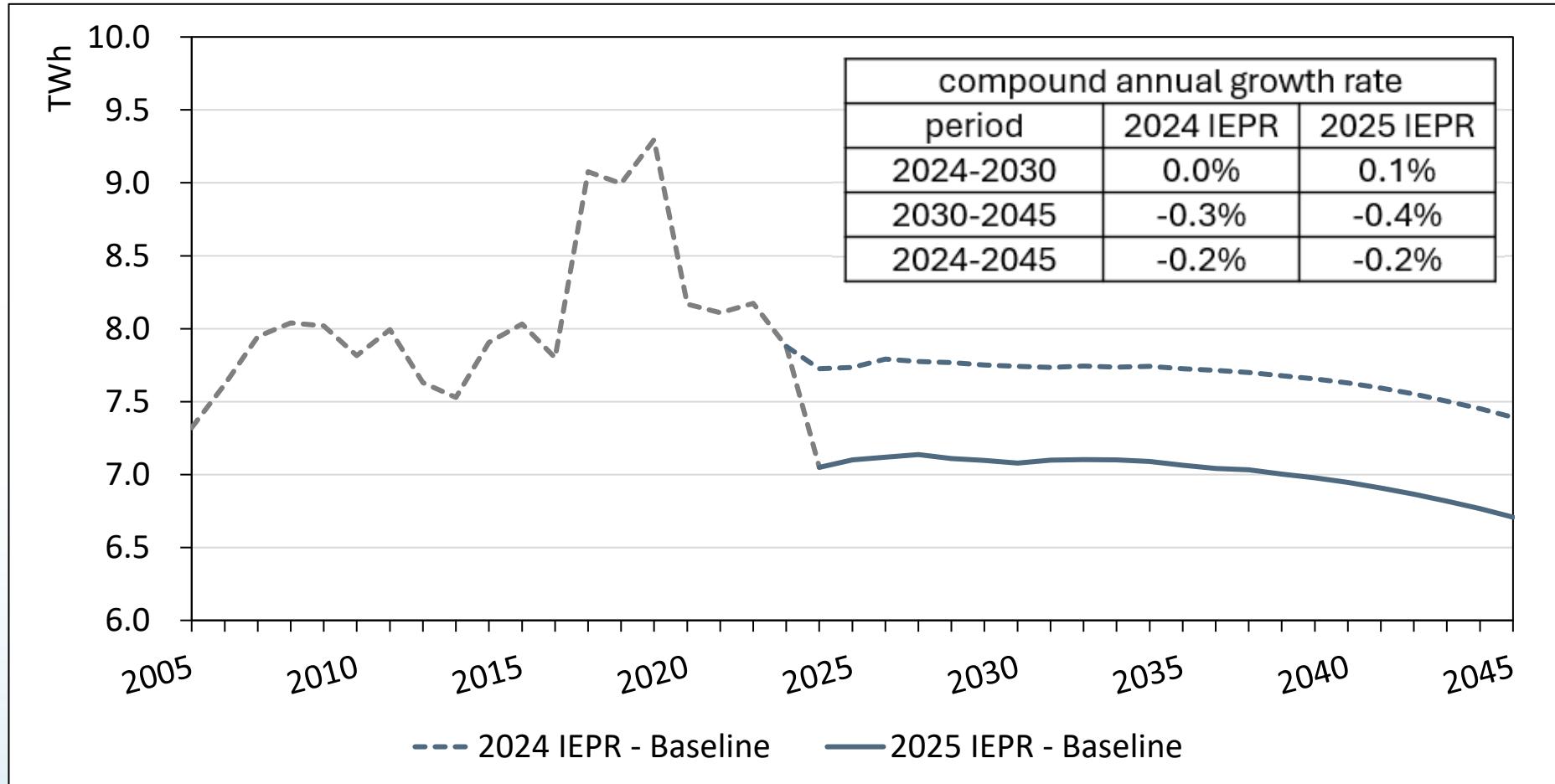
- Small decline in consumption compared to 2024 IEPR, due to economic outlook and rates.
- Addition of known loads to the high case.





Statewide Baseline Industrial Mining & Construction Electricity Consumption

- Decline in historical consumption in year 2024.
- No known loads – all are assumed to be in Industrial Manufacturing

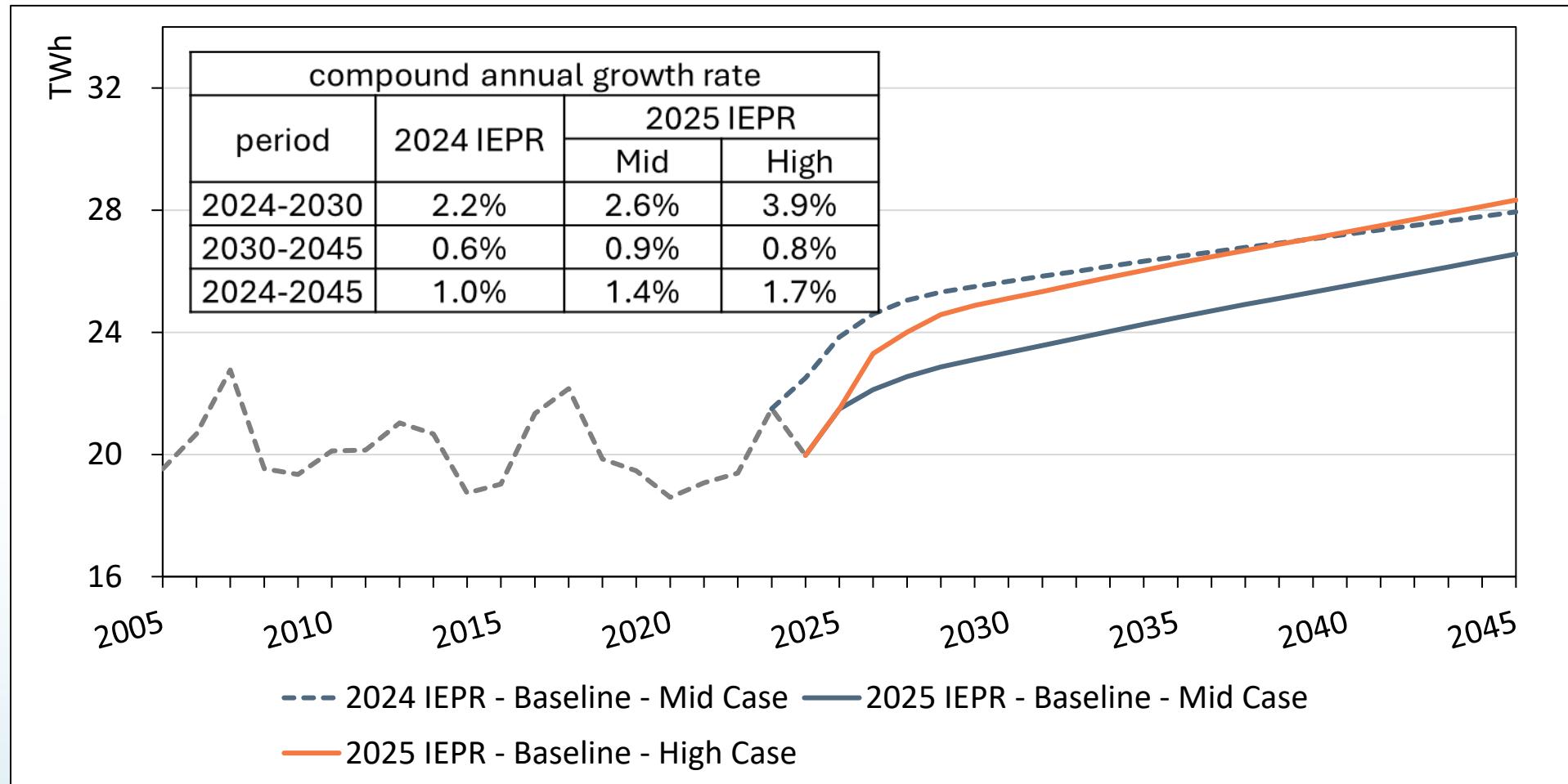


Source: CEC staff



Statewide Baseline Ag and Water Pumping Electricity Consumption

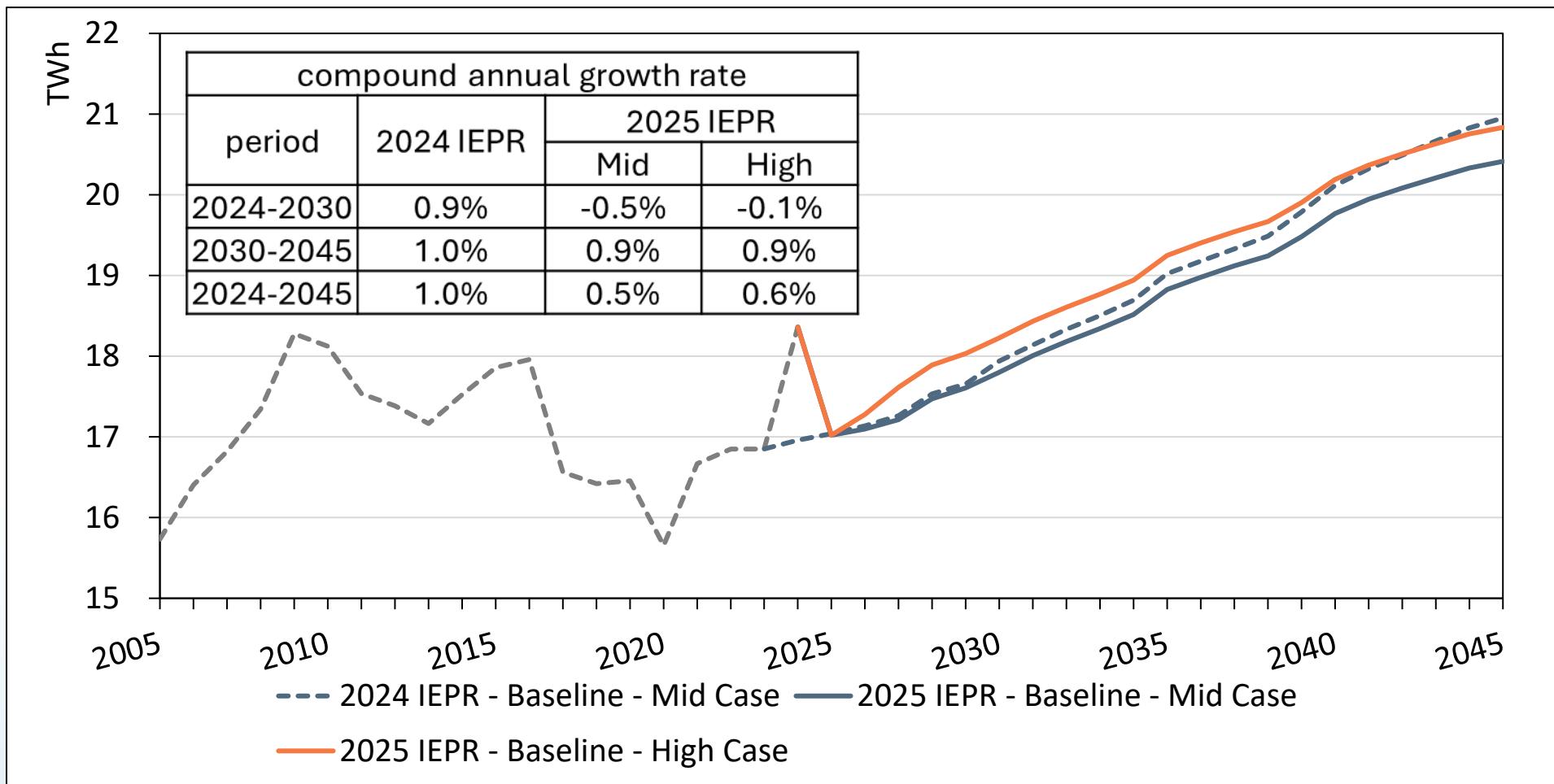
- 2024 IEPR was higher due to cannabis cultivation and water pumping.
- 2025 IEPR is lower due to improvement in the cannabis methodology and updated sales data.





Statewide Baseline TCU & SL Electricity Consumption

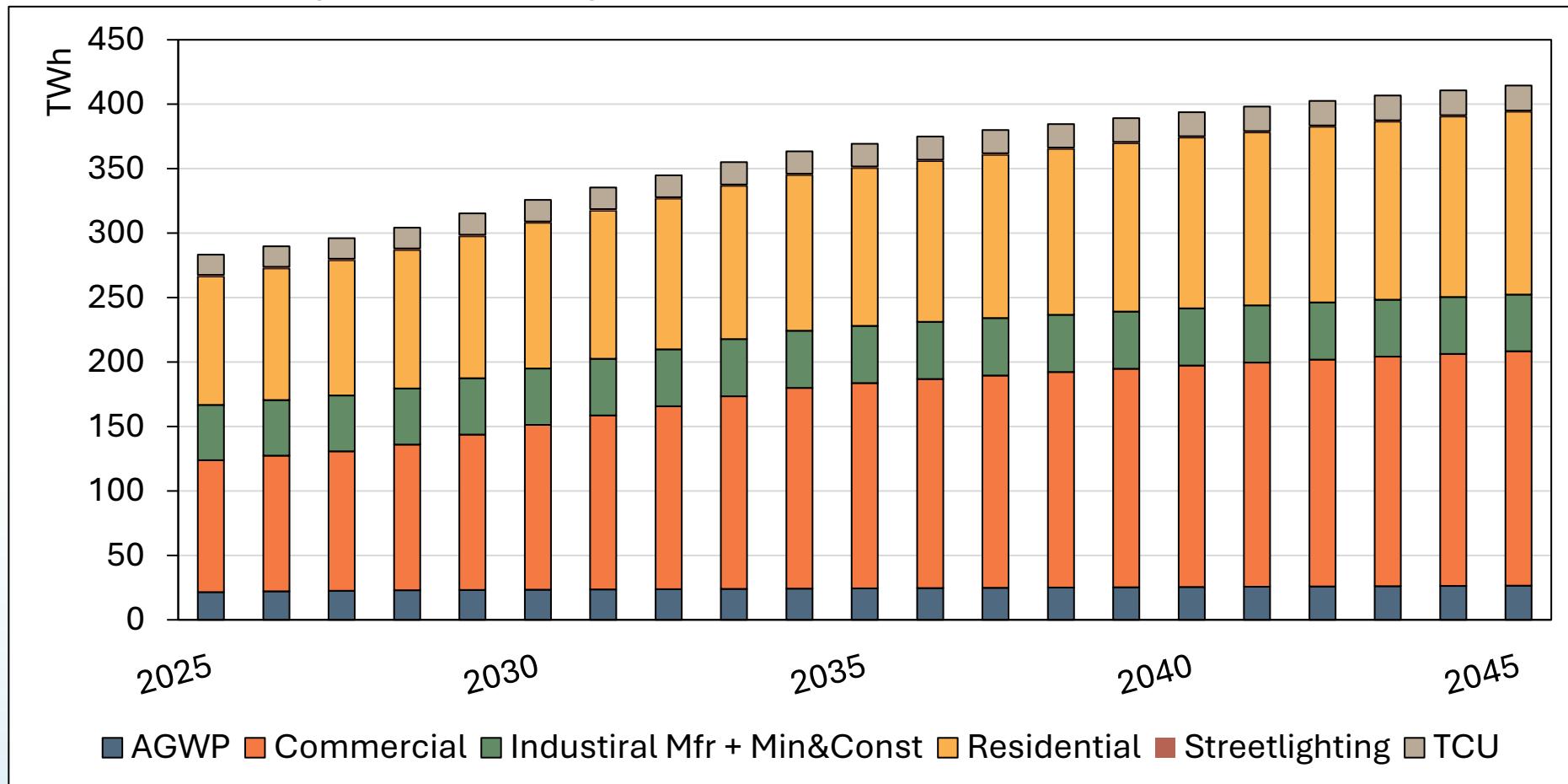
- 2025 IEPR baseline TCU and Streetlighting forecast has a similar growth rate to the 2024 IEPR.





Statewide Baseline Mid Case Electricity Consumption Forecast by Sector

- The share of commercial electricity consumption grows the most over the forecast period, from 36% in 2025 to 44% in 2045.
- Industrial consumption is relatively flat, therefore the share declines from 15% to 11%.



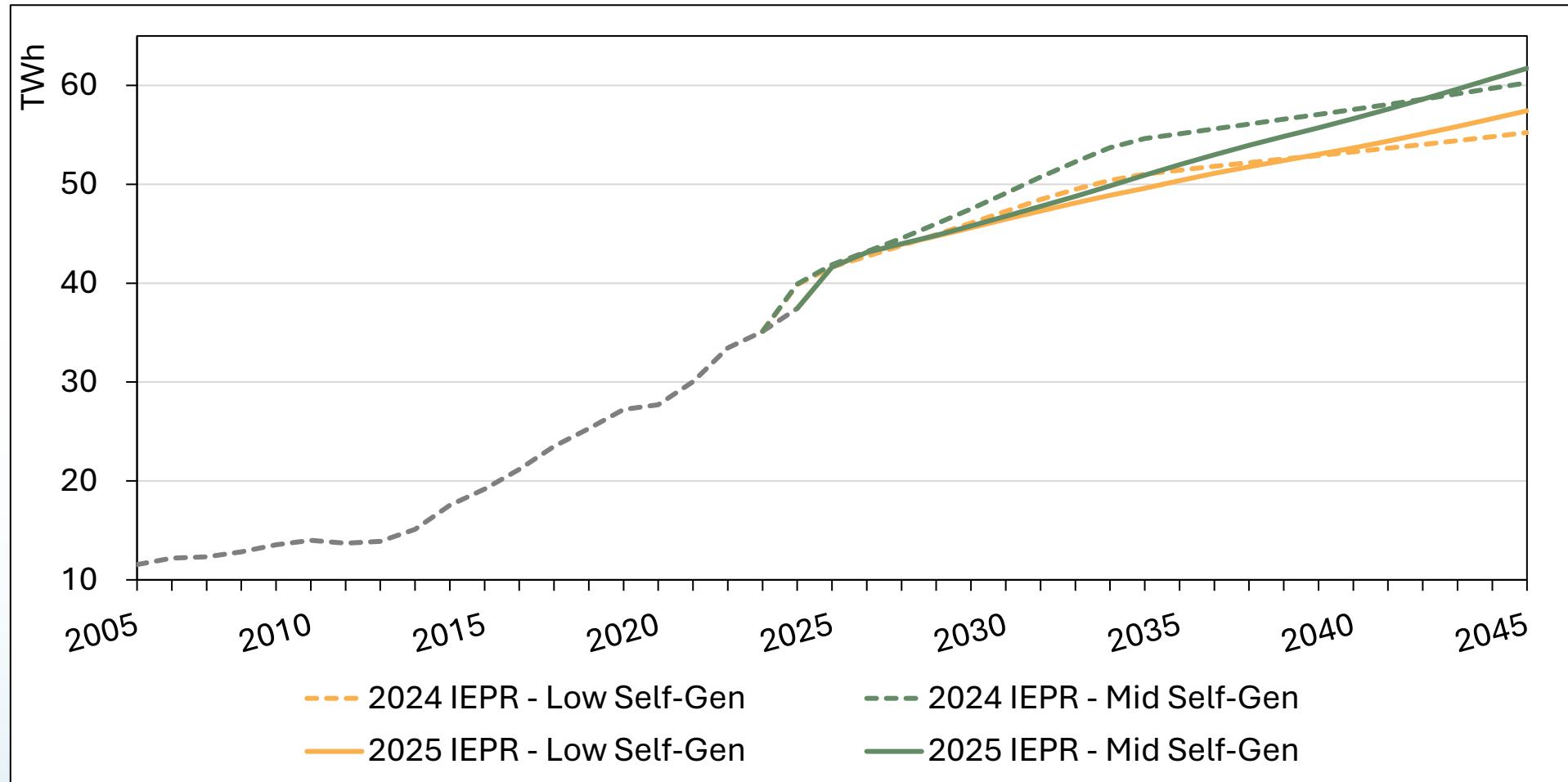


Baseline Demand Forecast: Statewide Self-Generation



Statewide Electricity Self-Generation Forecasts

- Self generation in 2025 IEPR shows slower growth than 2024 IEPR.

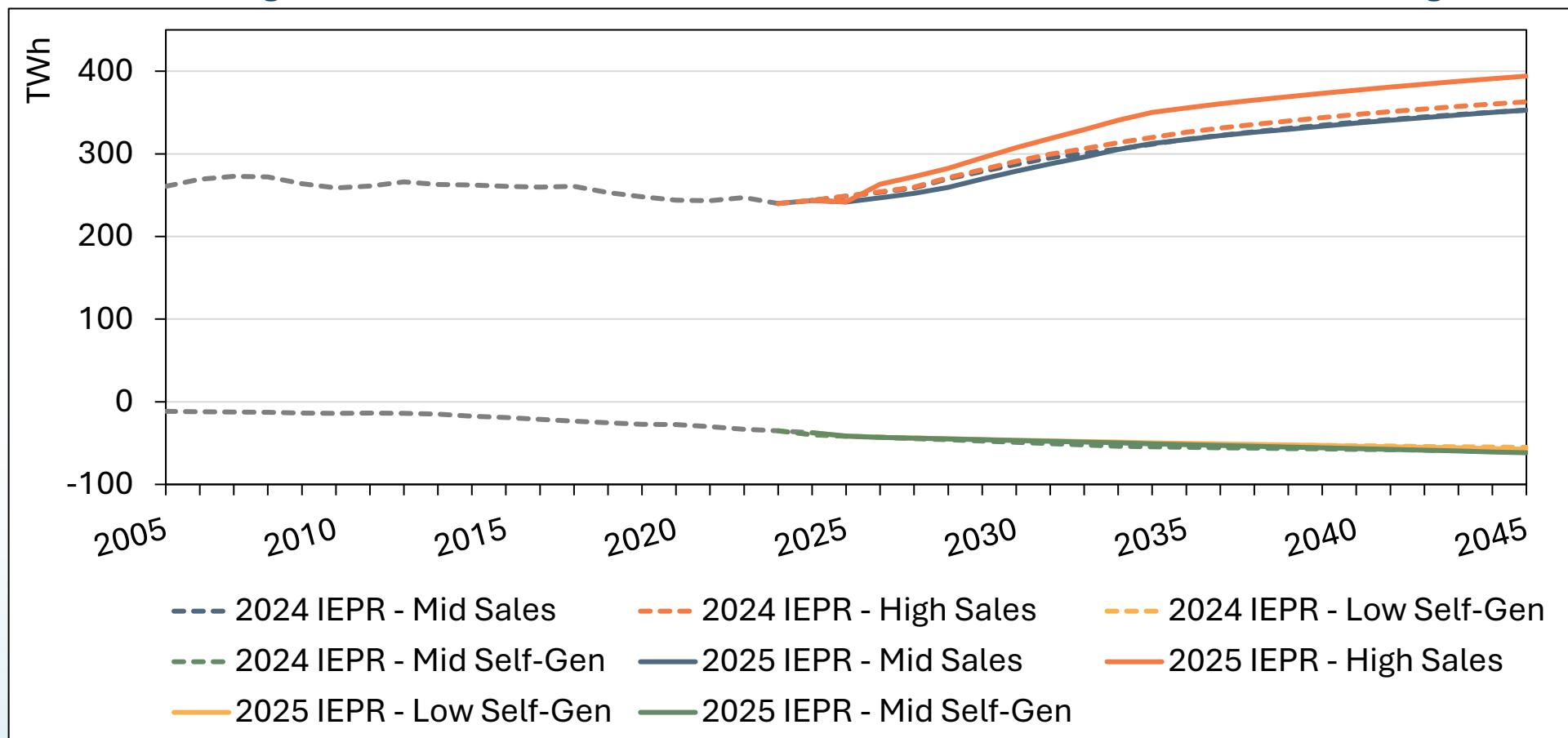


Source: CEC staff



Statewide Electricity Forecasts: Baseline Sales and Self-Gen

- In 2045, 2025 IEPR baseline mid case sales are 353 TWh, almost identical to 2024 IEPR. High case baseline sales are 394 TWh, about 31 TWh (8.6%) higher than the 2024 IEPR.
- Without self-generation, forecasted sales in 2045 would be 456 TWh, about 16% higher.



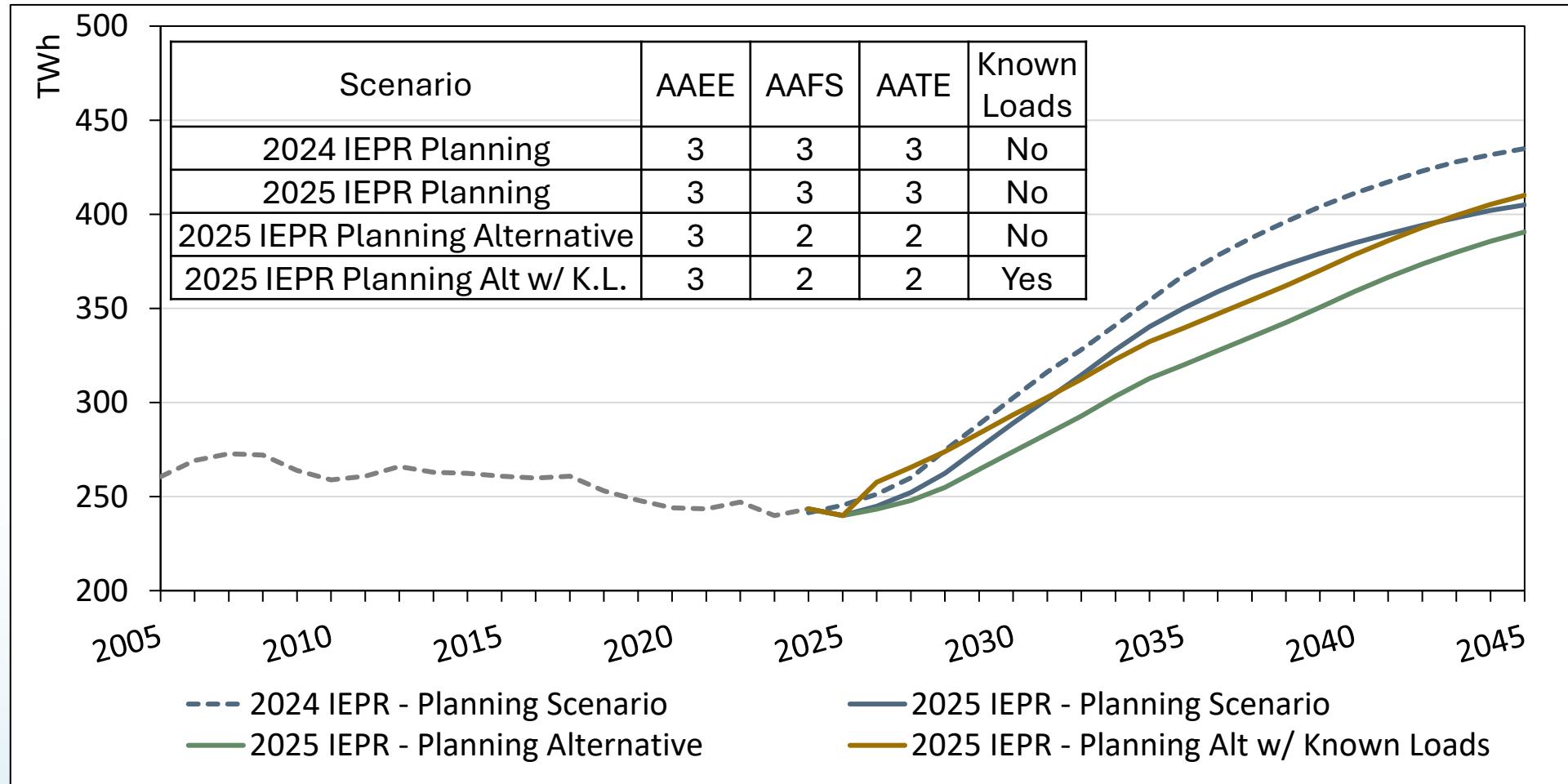


Managed Demand Forecast: Statewide Electricity Sales Scenarios



Statewide Electricity Forecasts: Managed Sales – Planning

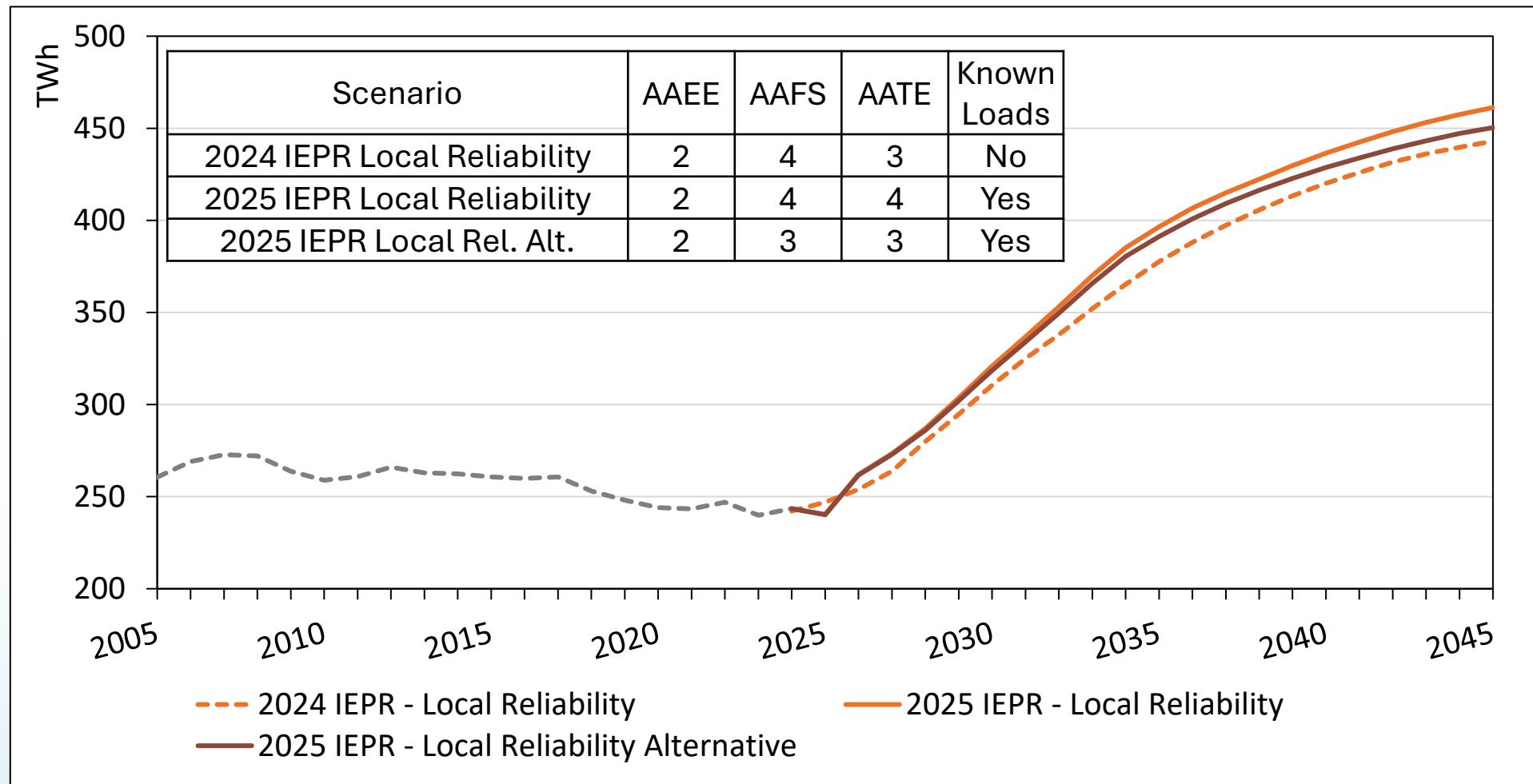
- Scenarios considered for 2025 IEPR Planning Forecast





Statewide Electricity Forecasts: Managed Sales – Local Reliability

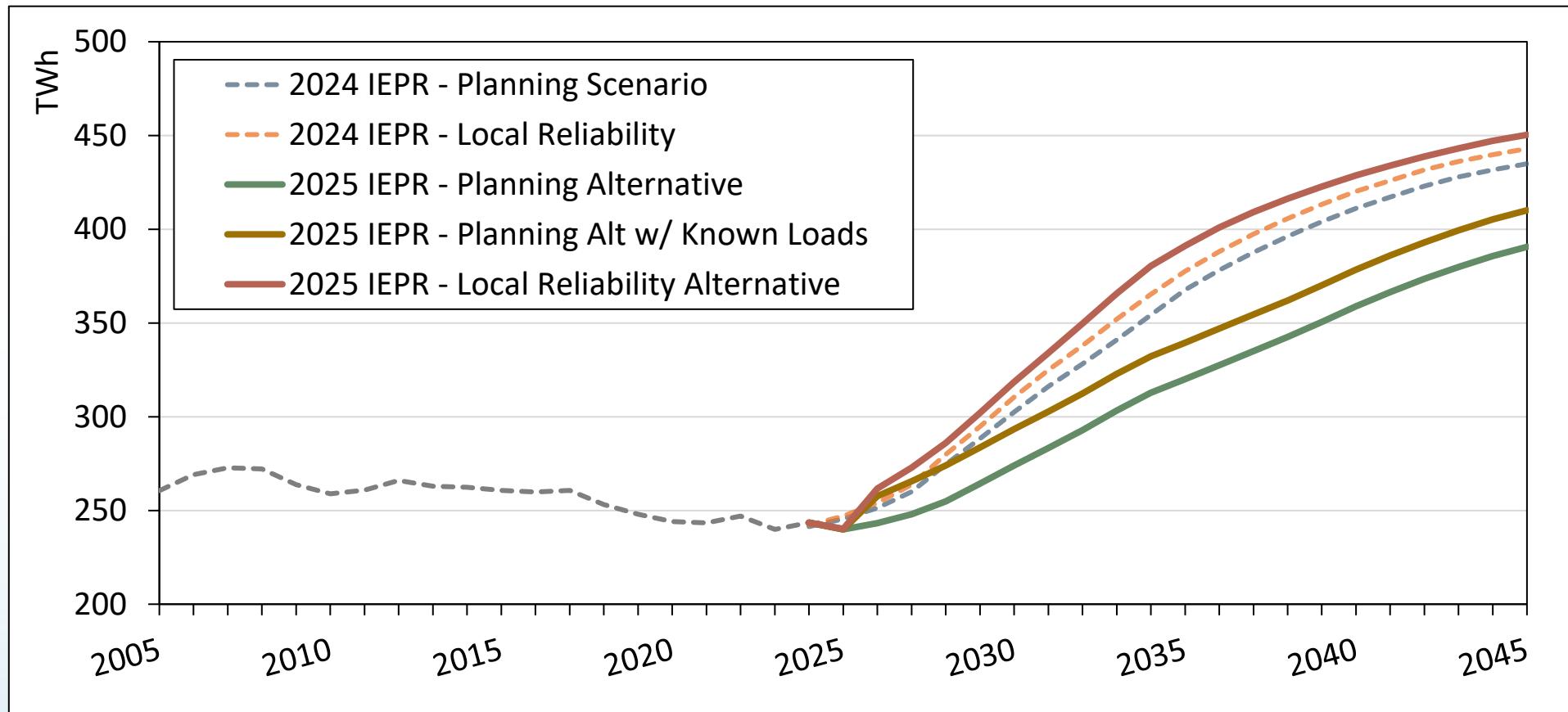
- Scenarios considered for 2025 IEPR Local Reliability Forecast





Statewide Electricity Forecasts: Managed Sales Compared

- The Alternative Local Reliability Scenario is 25 TWh higher (10%) than the Alternative Planning Scenario in 2027, and 60 TWh higher (15%) in 2045.
- With known loads added to Alternative Planning Scenario, the difference is 7.4 TWh (3%) in 2027, and 40 TWh (10%) in 2045.

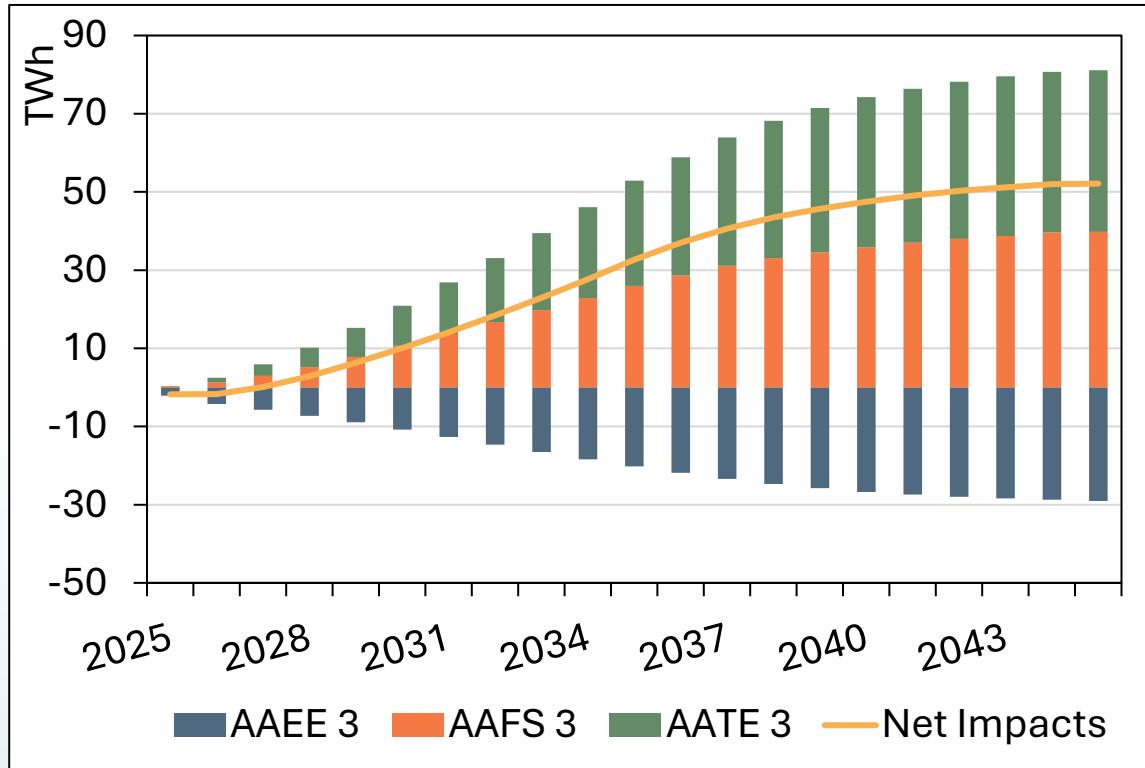




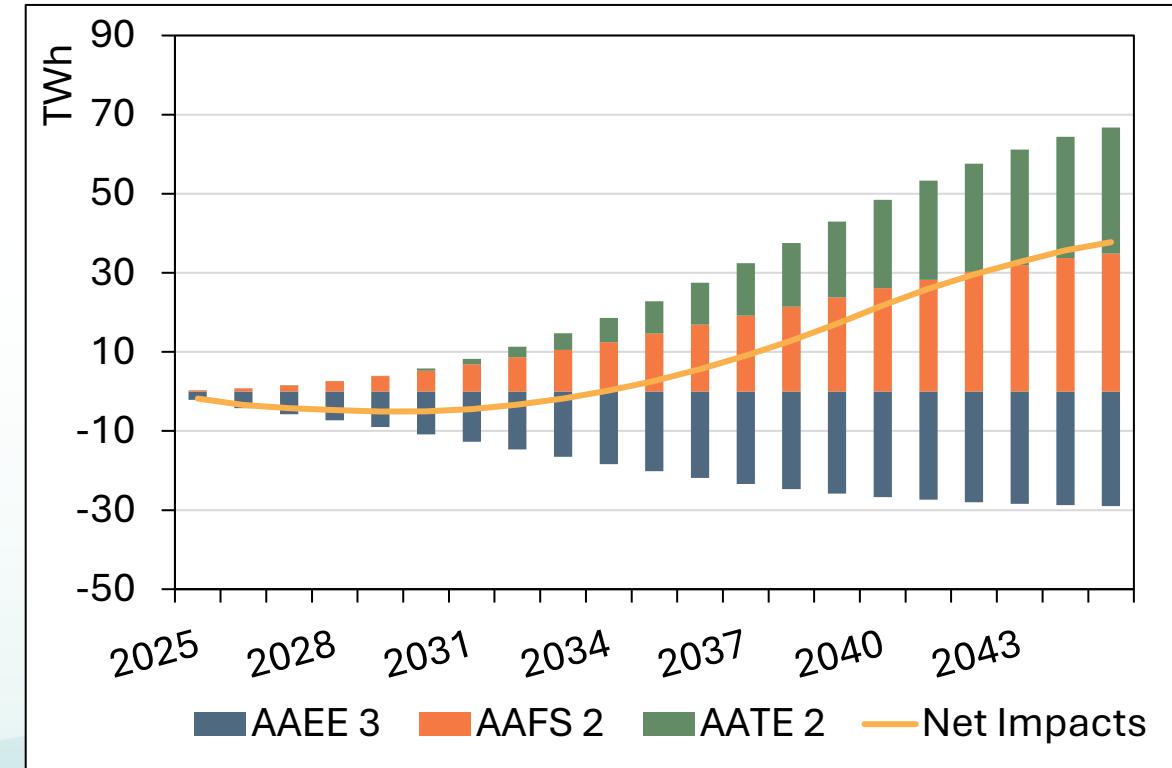
Statewide Electricity Forecasts: Load Modifying Scenarios – Planning

- Planning net impacts reach 52.1 TWh in 2045, 15% increase to Baseline mid case.
- Alternative Planning net impacts reach 37.7 TWh in 2045, 11% increase to Baseline mid case.

2025 IEPR Planning Load Modifiers



2025 IEPR Alternative Planning Load Modifiers



Source: CEC staff

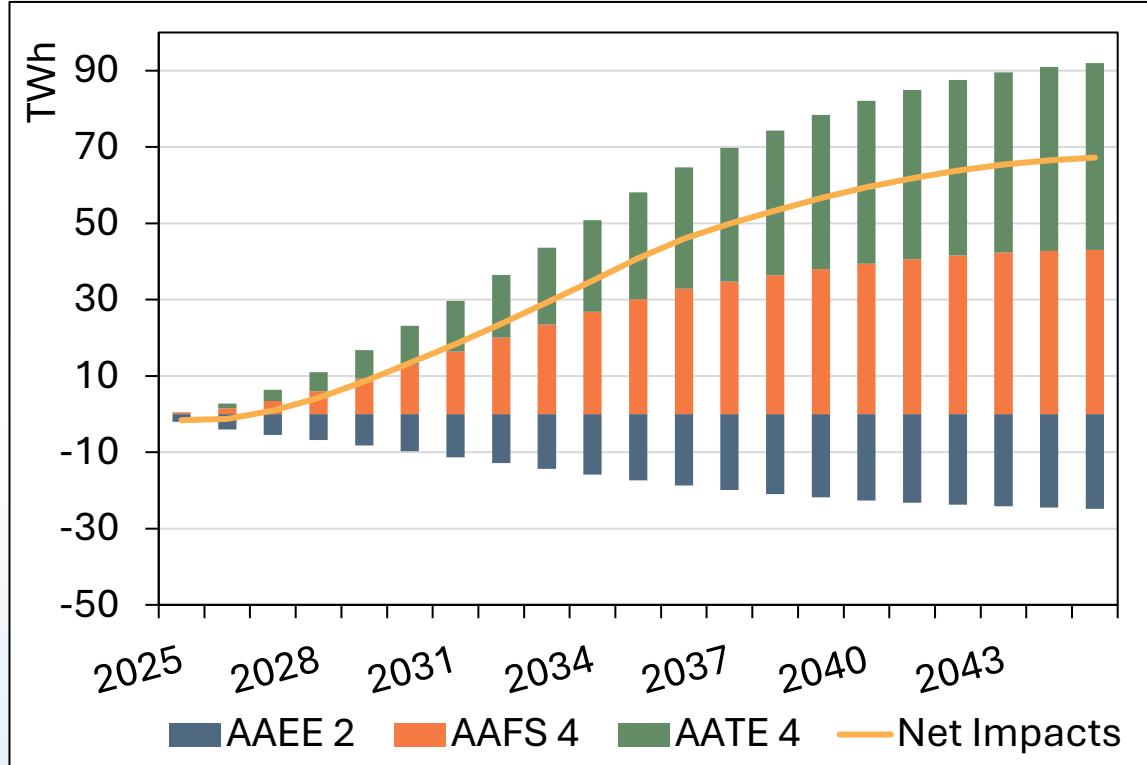


Statewide Electricity Forecasts:

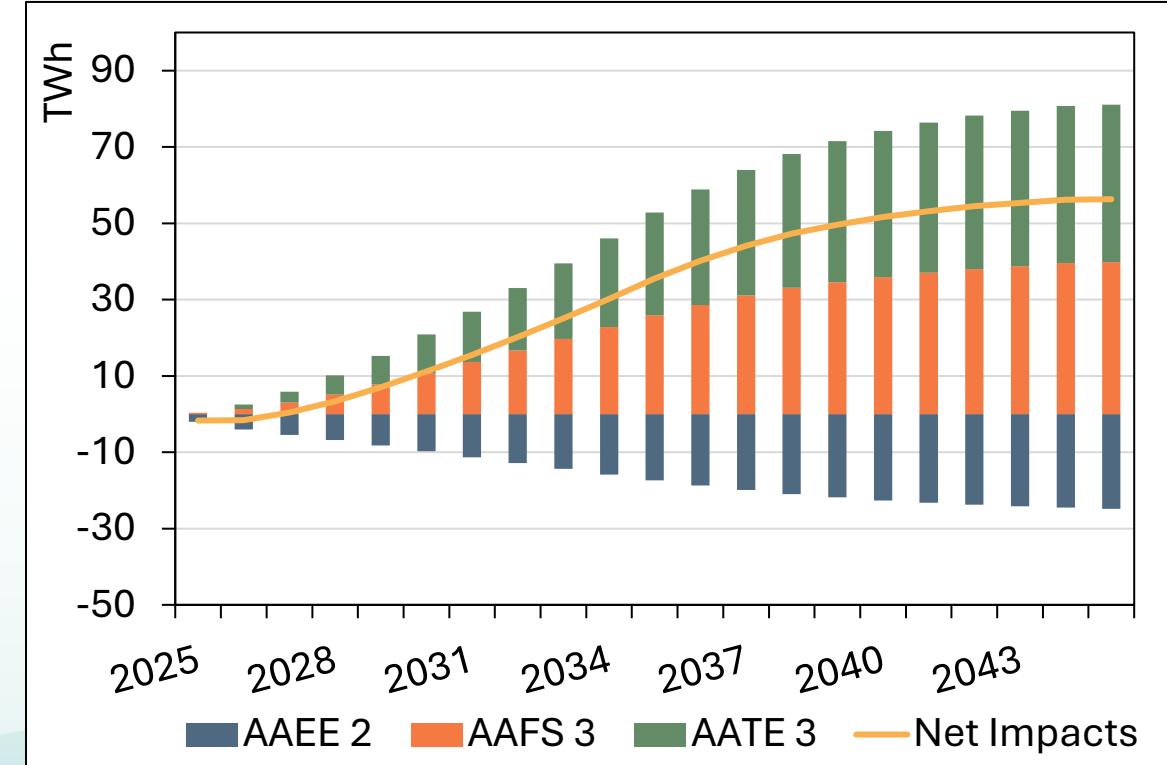
Load Modifying Scenarios – Local Reliability

- Local Reliability net impacts reach 67.2 TWh in 2045, 17% increase to Baseline high case.
- Alternative Local Reliability net impacts reach 56.3 TWh in 2045, 14% increase to Baseline high case.

2025 IEPR Local Reliability Load Modifiers



2025 IEPR Alternative Local Reliability Load Modifiers



Source: CEC staff

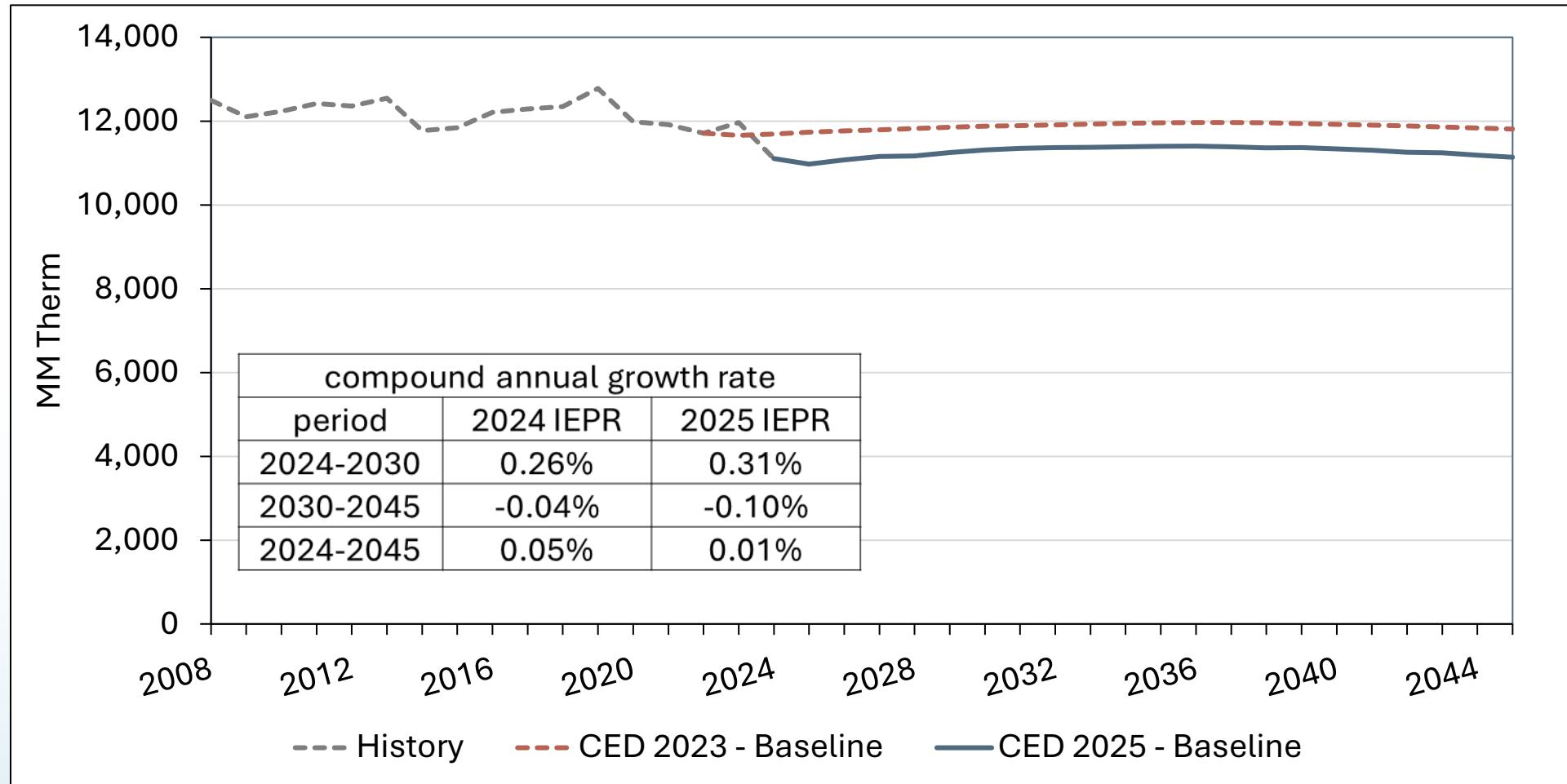


Baseline Demand Forecast: Statewide Gas Sales by Sector



Statewide Baseline Gas Sales

- Lower recent historical data and lower economic growth projections cause the forecast to be lower than the 2024 IEPR.





Gas Forecasting Process: Sectors and Models

Sector Model Types

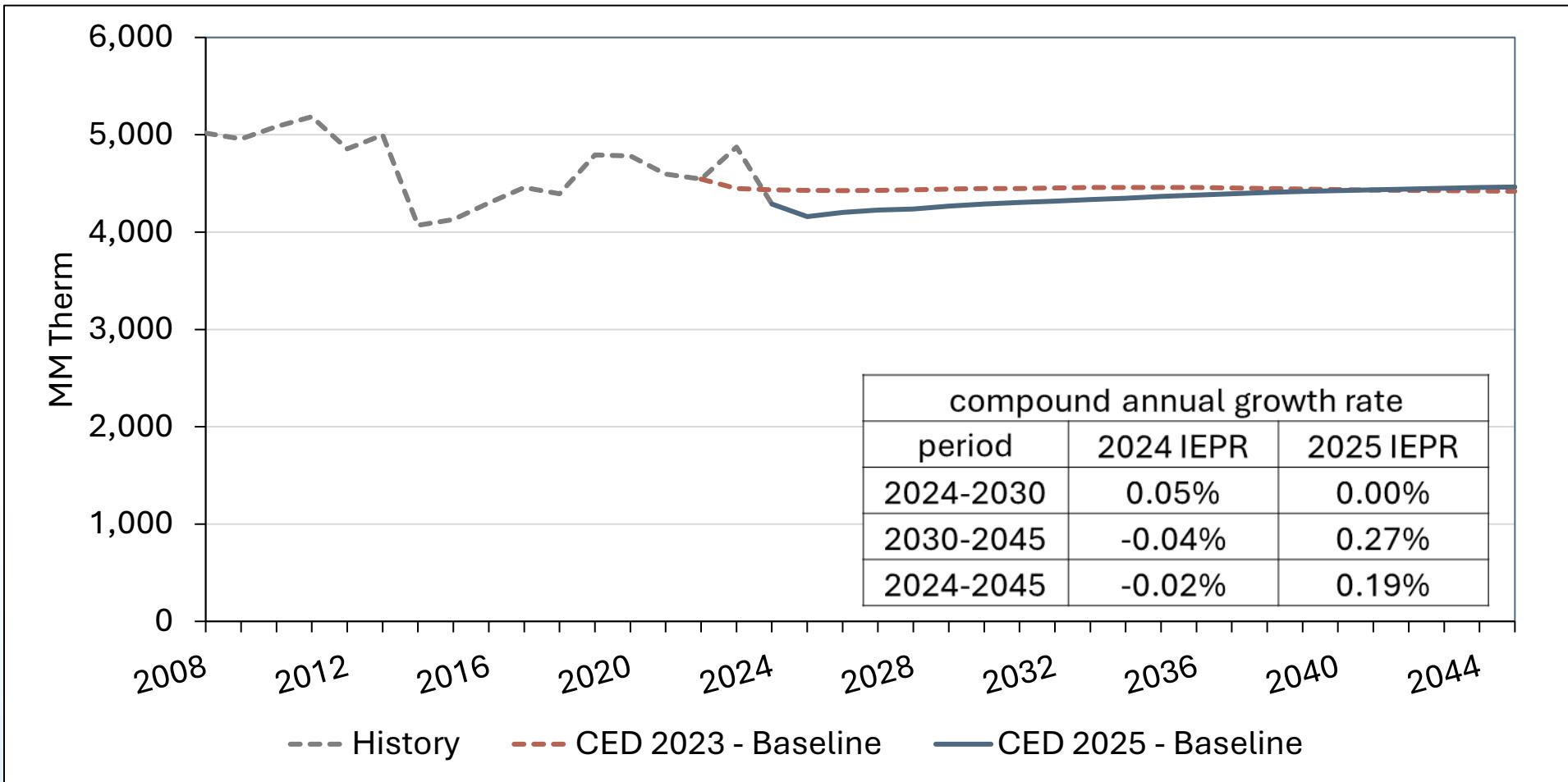
Sector	Model Type
Residential	End Use Model Calibrated by Econometric Model
Commercial	New Econometric Model (End Use Model in work for 2026)
Industrial (Mfr + Mining & Cons)	Econometric by NAICS code <i>(2023 results calibrated with 2025 inputs)</i>
Agriculture	Average of recent history
TCU	Trend Analysis by NAICS code

Source: CEC staff



Statewide Residential Gas Sales

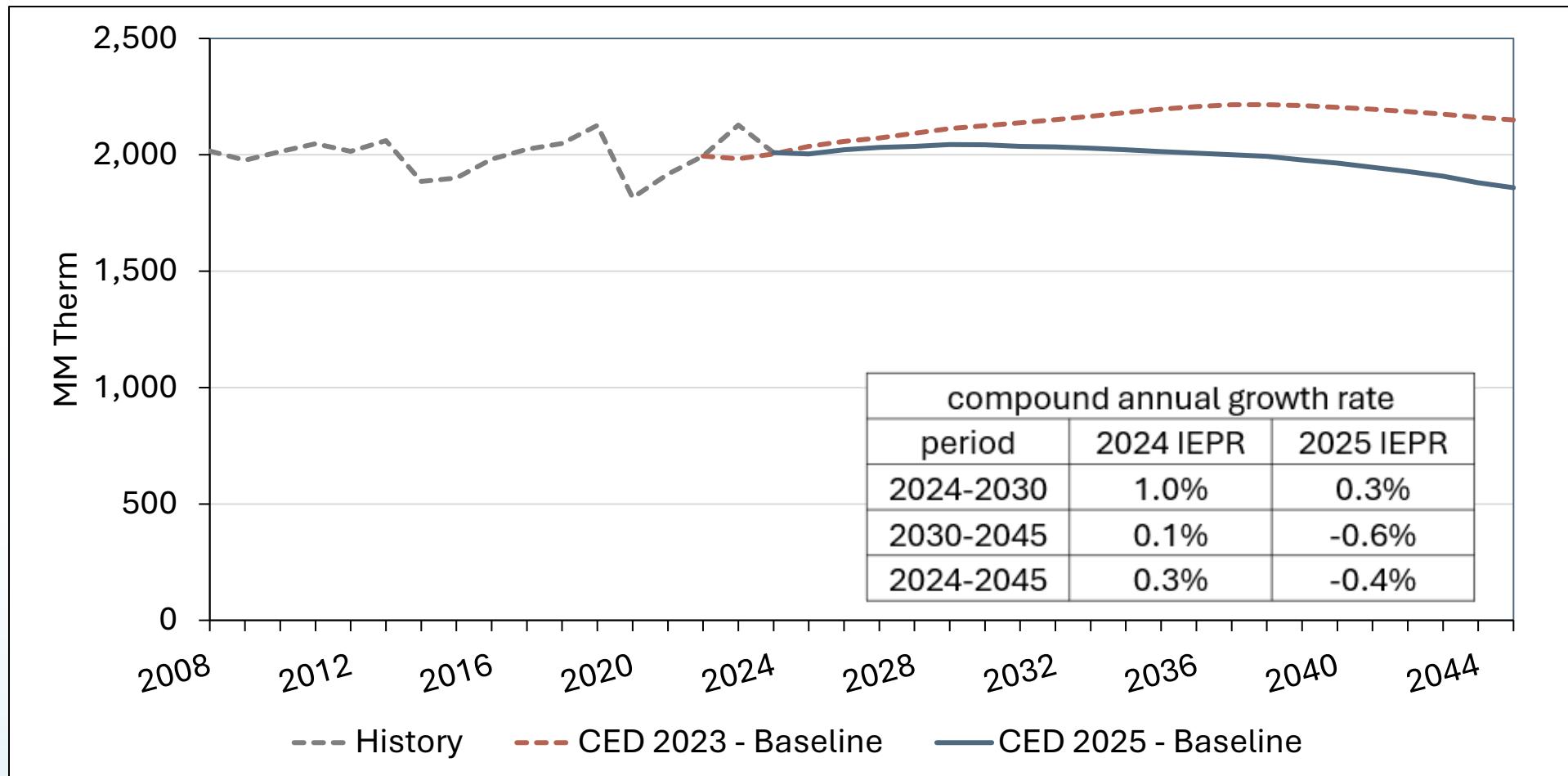
- Initial decrease due to economic conditions, later increase due to increase in household.





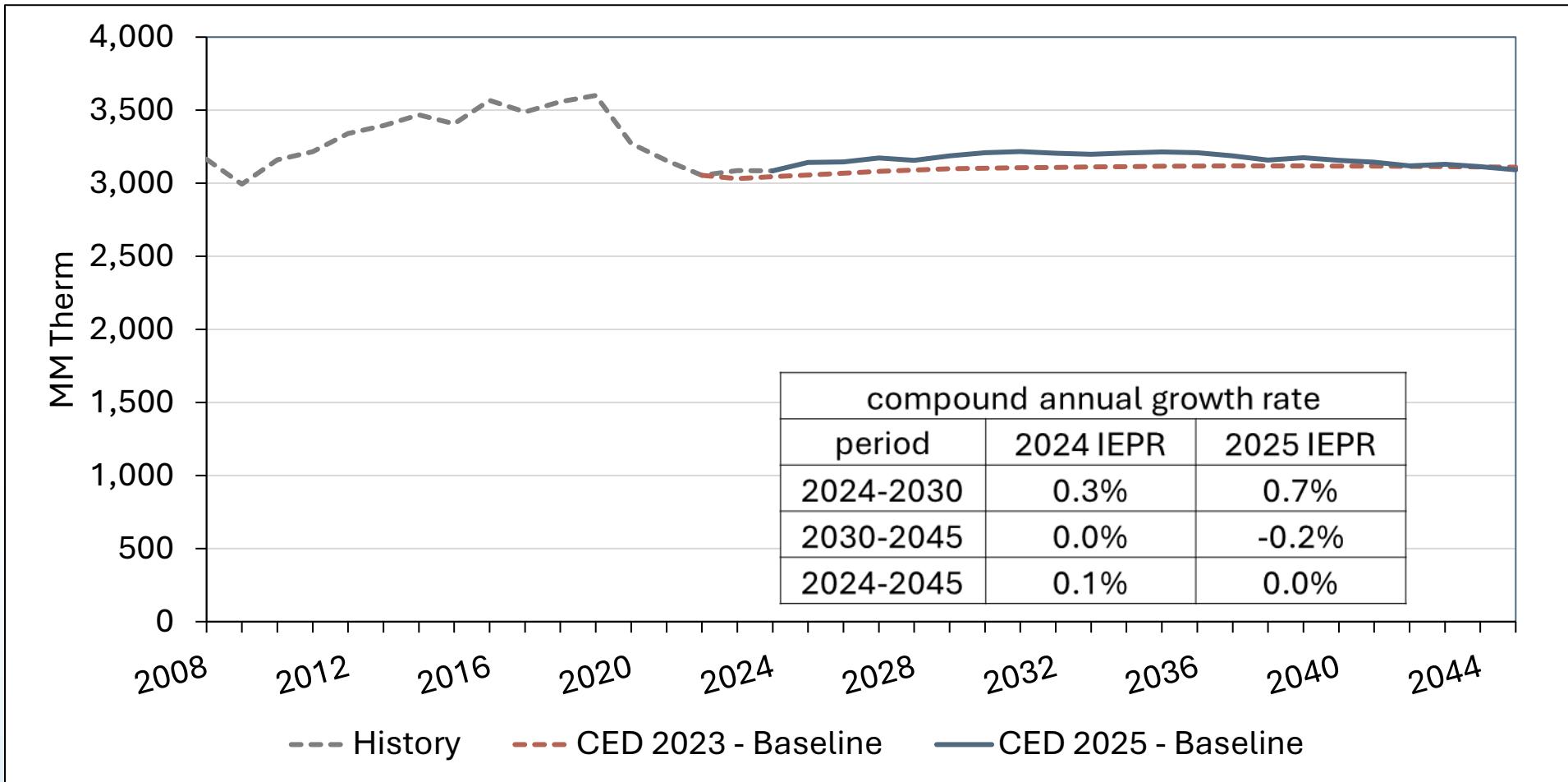
Statewide Commercial Gas Sales

- Decrease in economic conditions, increase in rates.





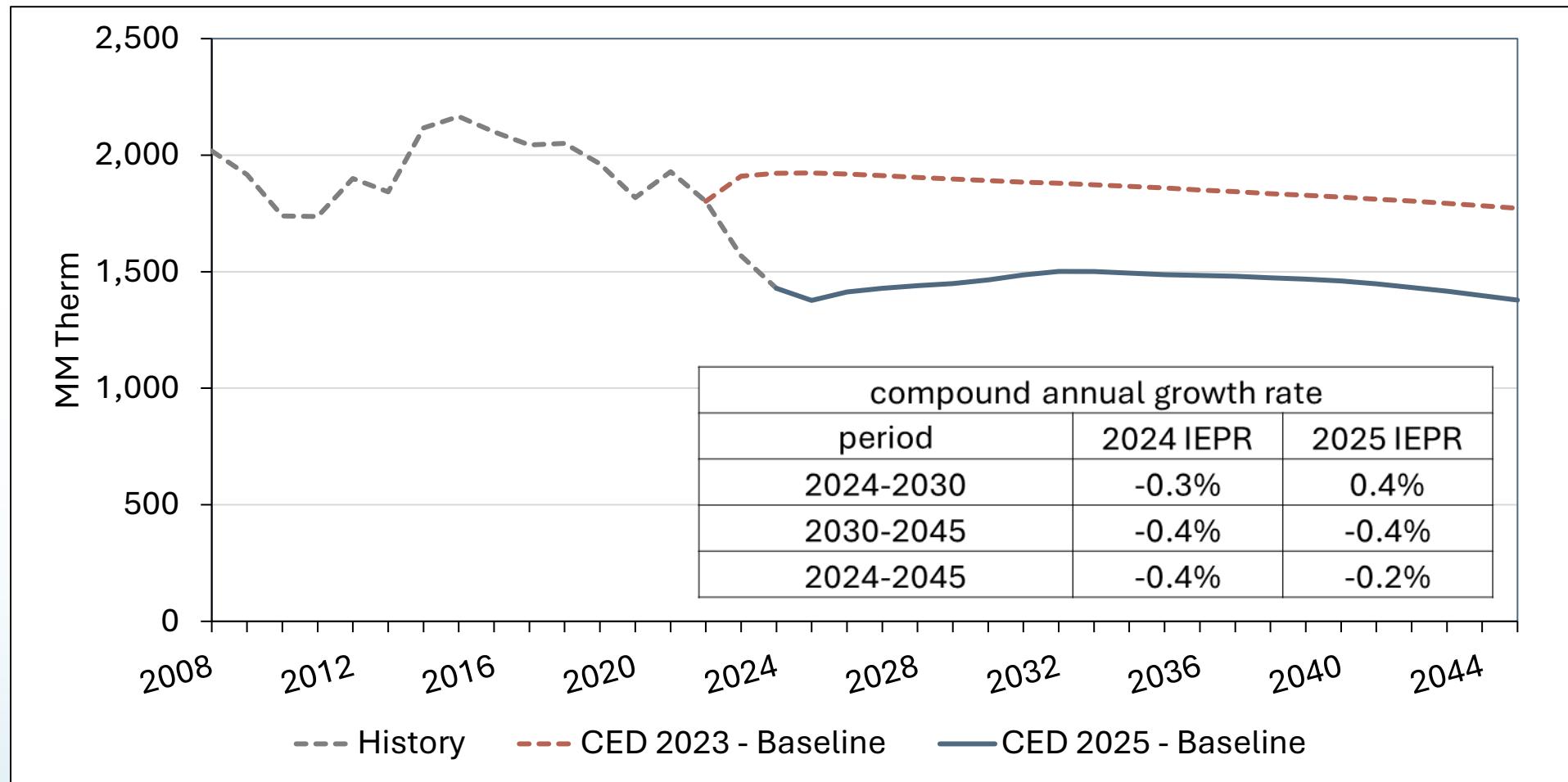
Statewide Industrial Manufacturing Gas Sales





Statewide Industrial Mining & Construction Gas Sales

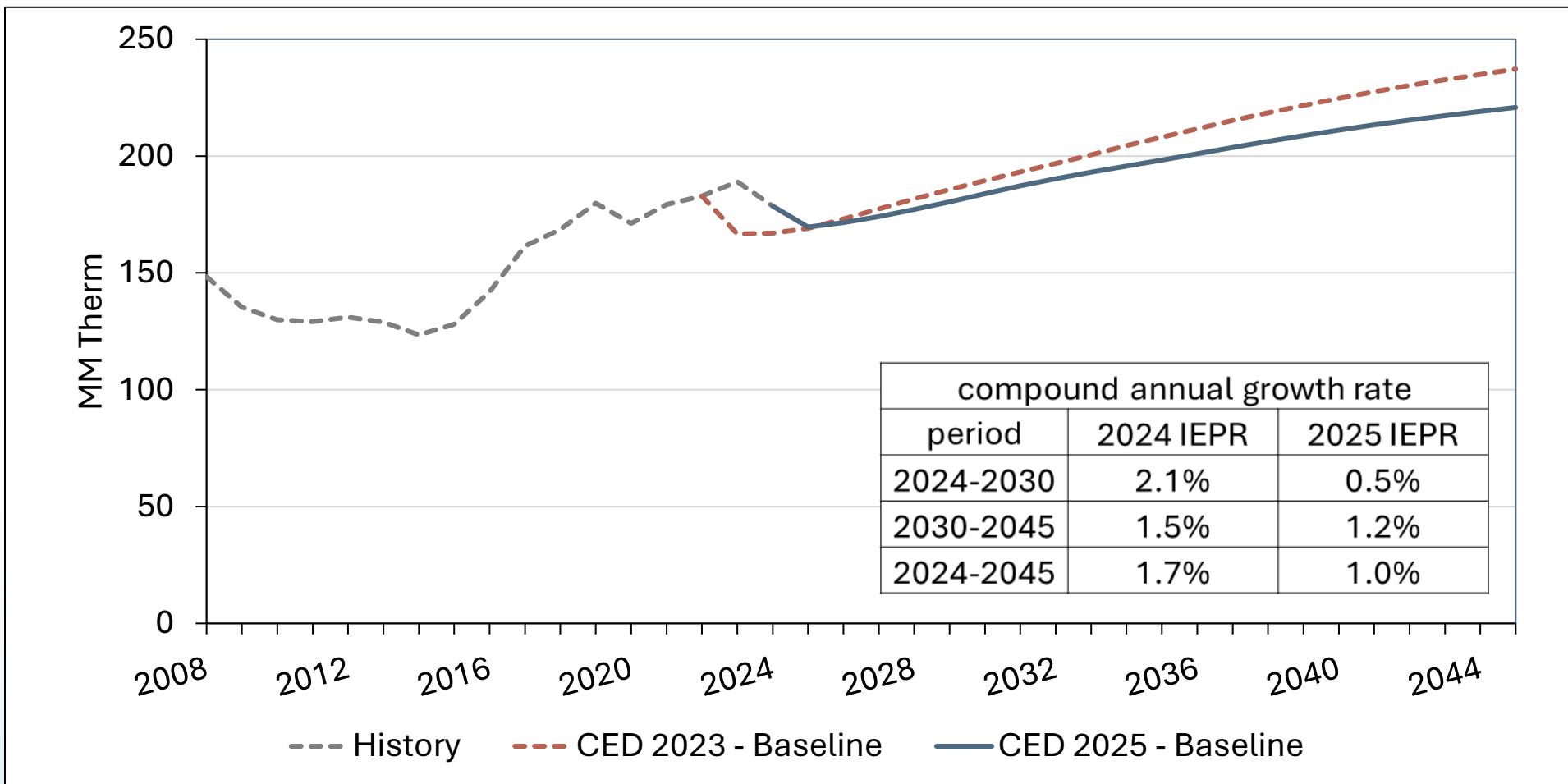
- Decrease in oil and gas projects





Statewide TCU Gas Sales

- Increases with population



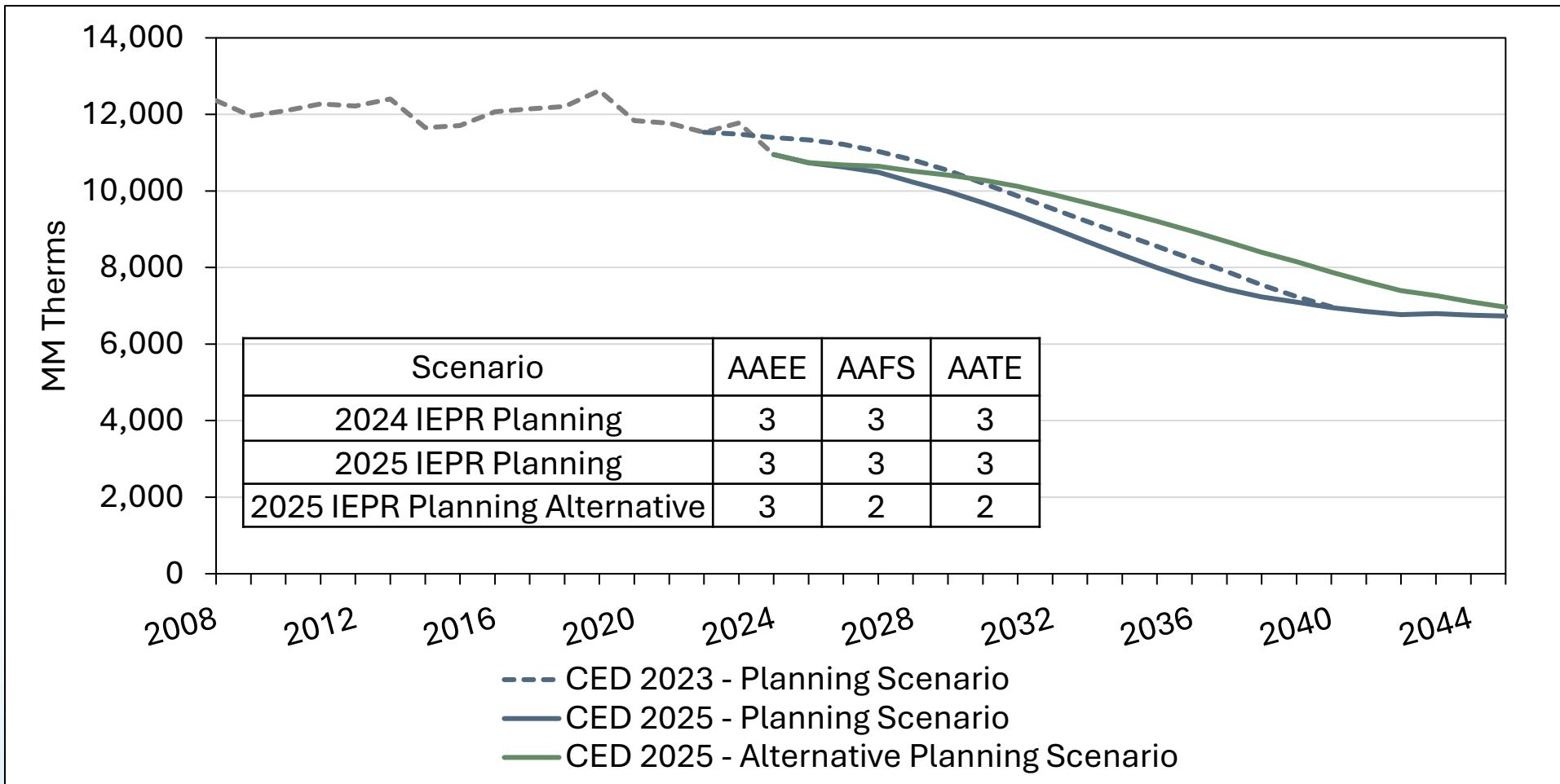


Managed Demand Forecast: Statewide Gas Sales Scenarios



Statewide Gas Forecasts: Electricity Planning Scen. applied to Gas Sales

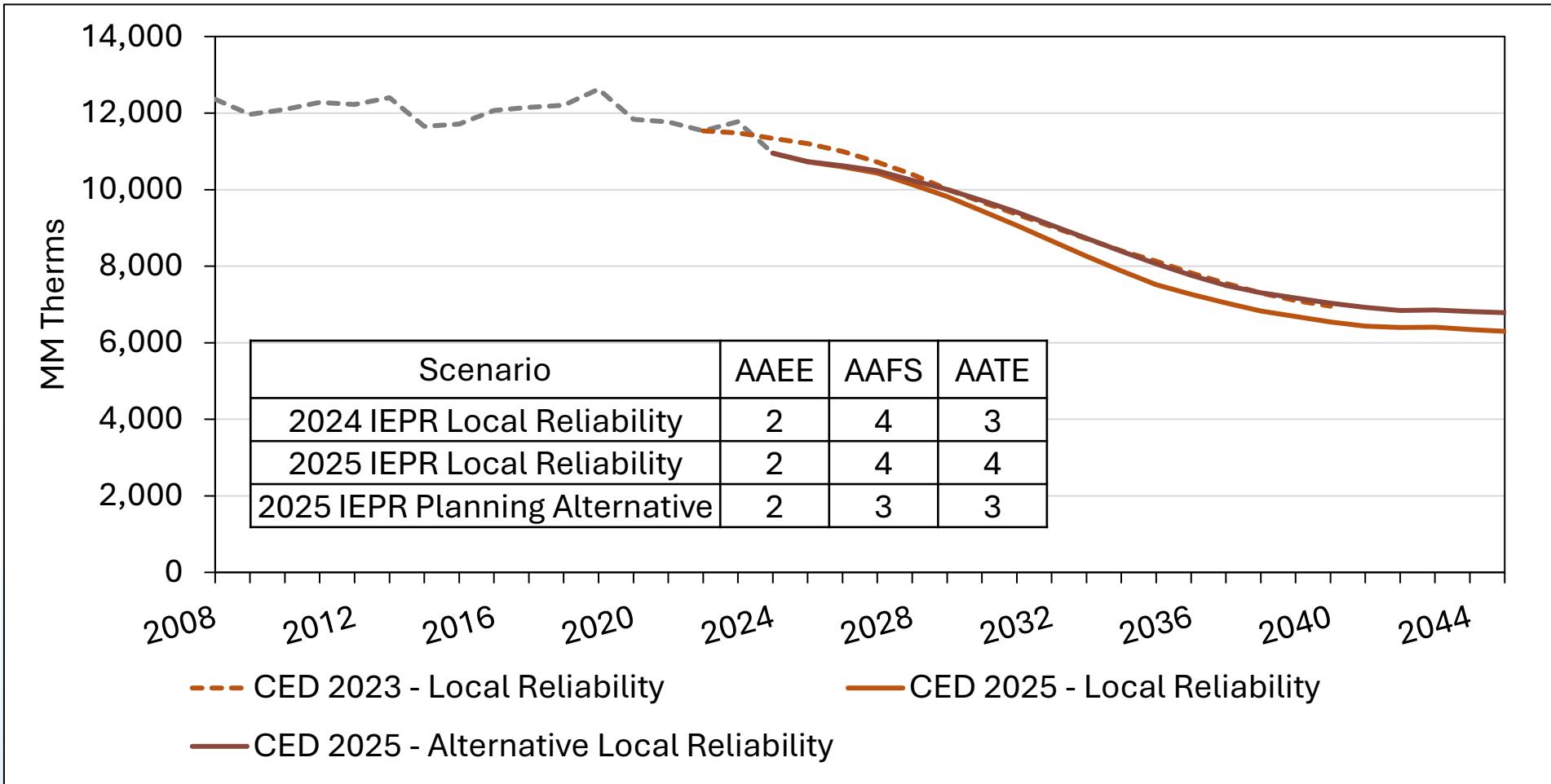
- Gas impacts of scenarios considered for Electricity Planning Forecast





Statewide Gas Forecasts: Electricity Local Rel. Scen. applied to Gas Sales

- Gas impacts of scenarios considered for Electricity Local Reliability





Questions

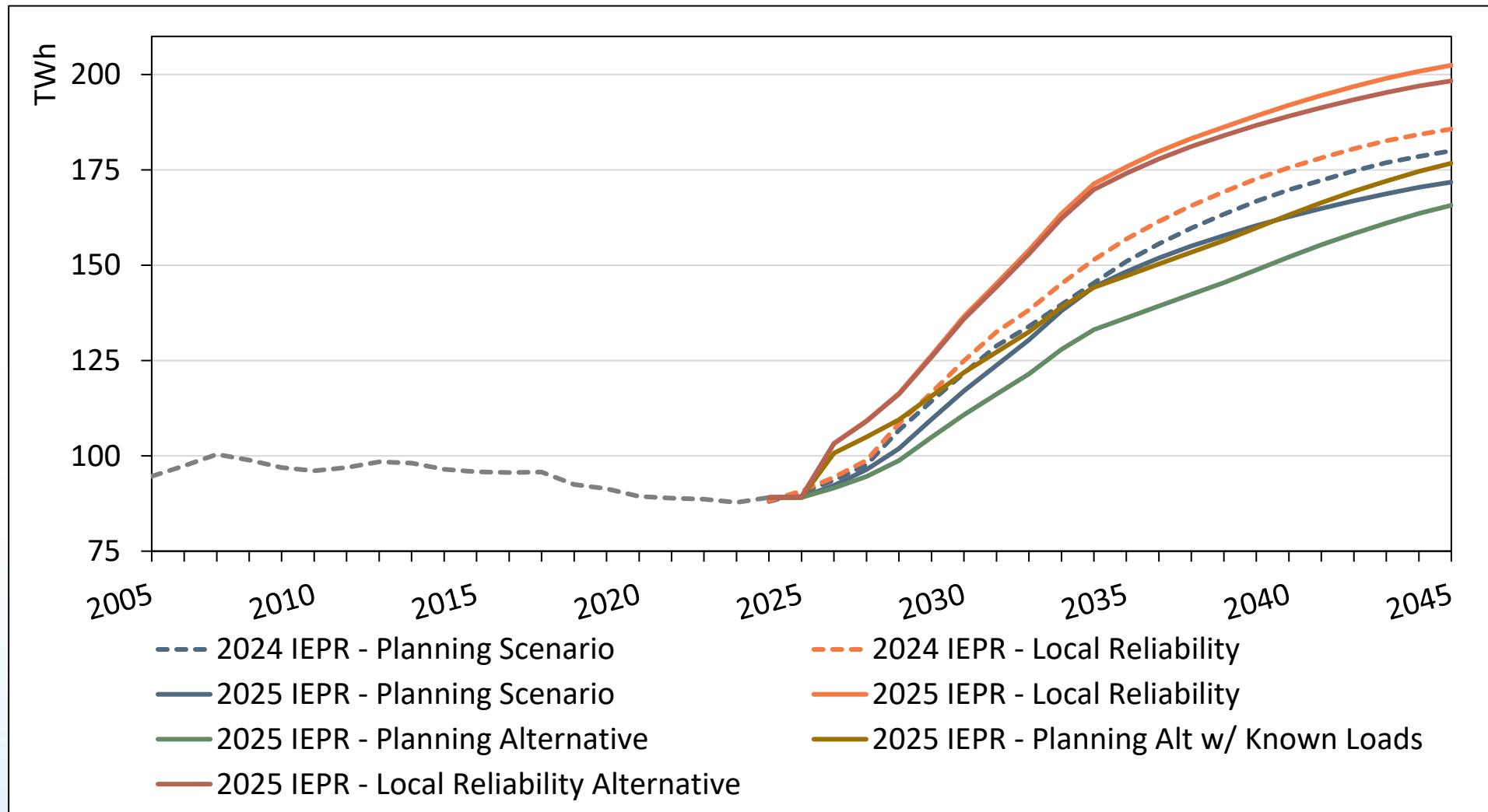
Email: Mathew.Cooper@Energy.ca.gov



Appendix – Managed Electricity Sales Forecasts by Planning Area

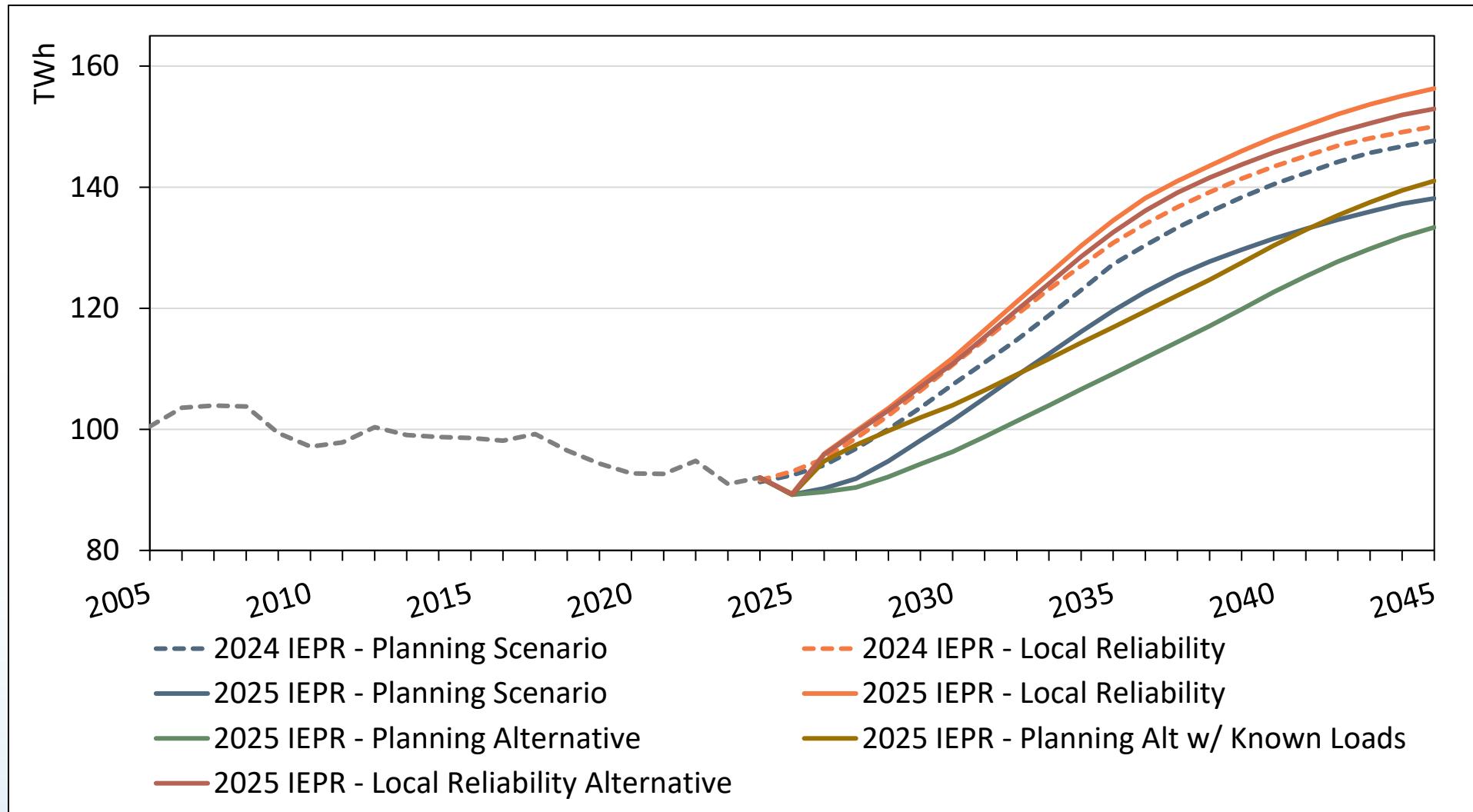


Electricity Sales Forecast: PG&E Planning Area



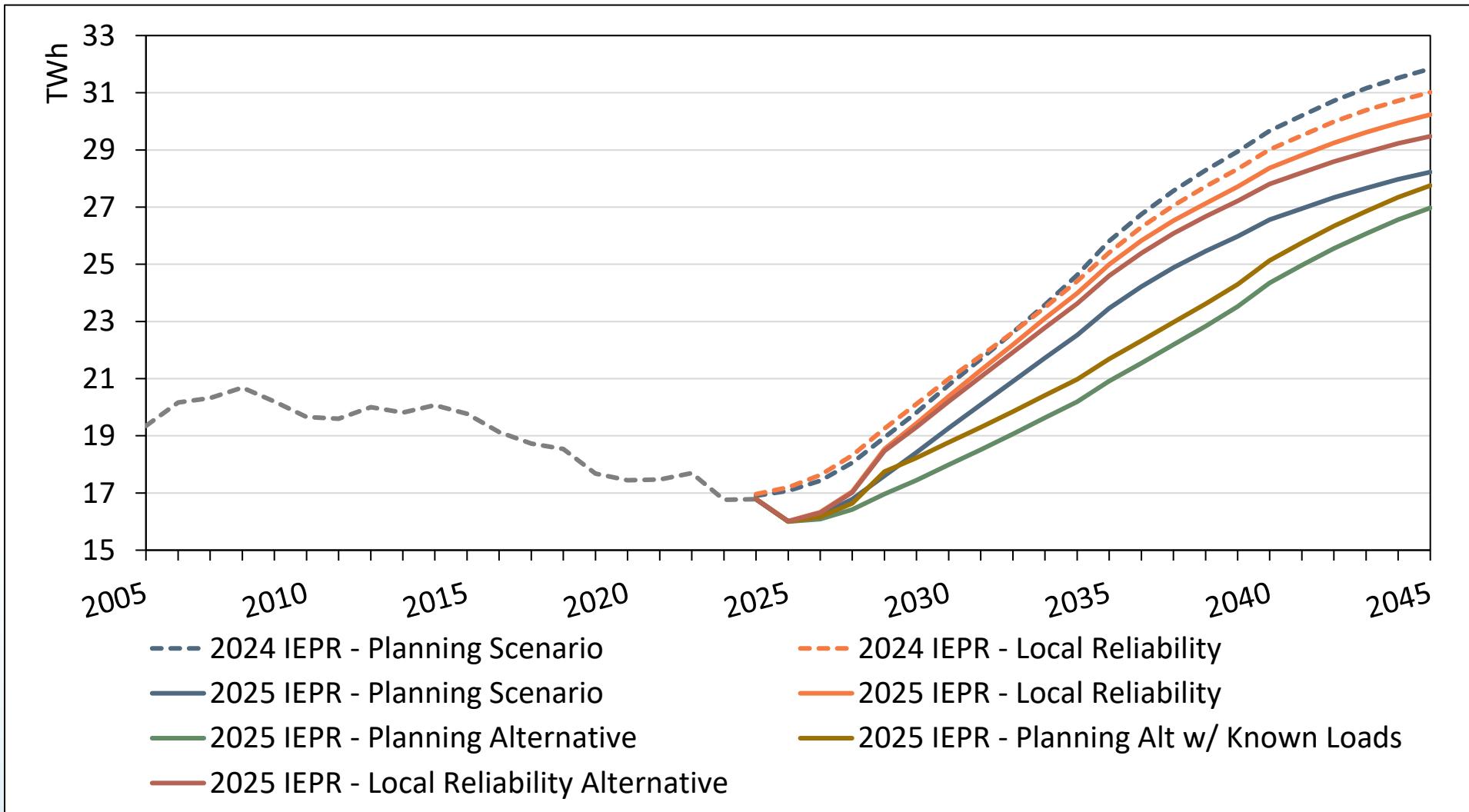


Electricity Sales Forecast: SCE Planning Area



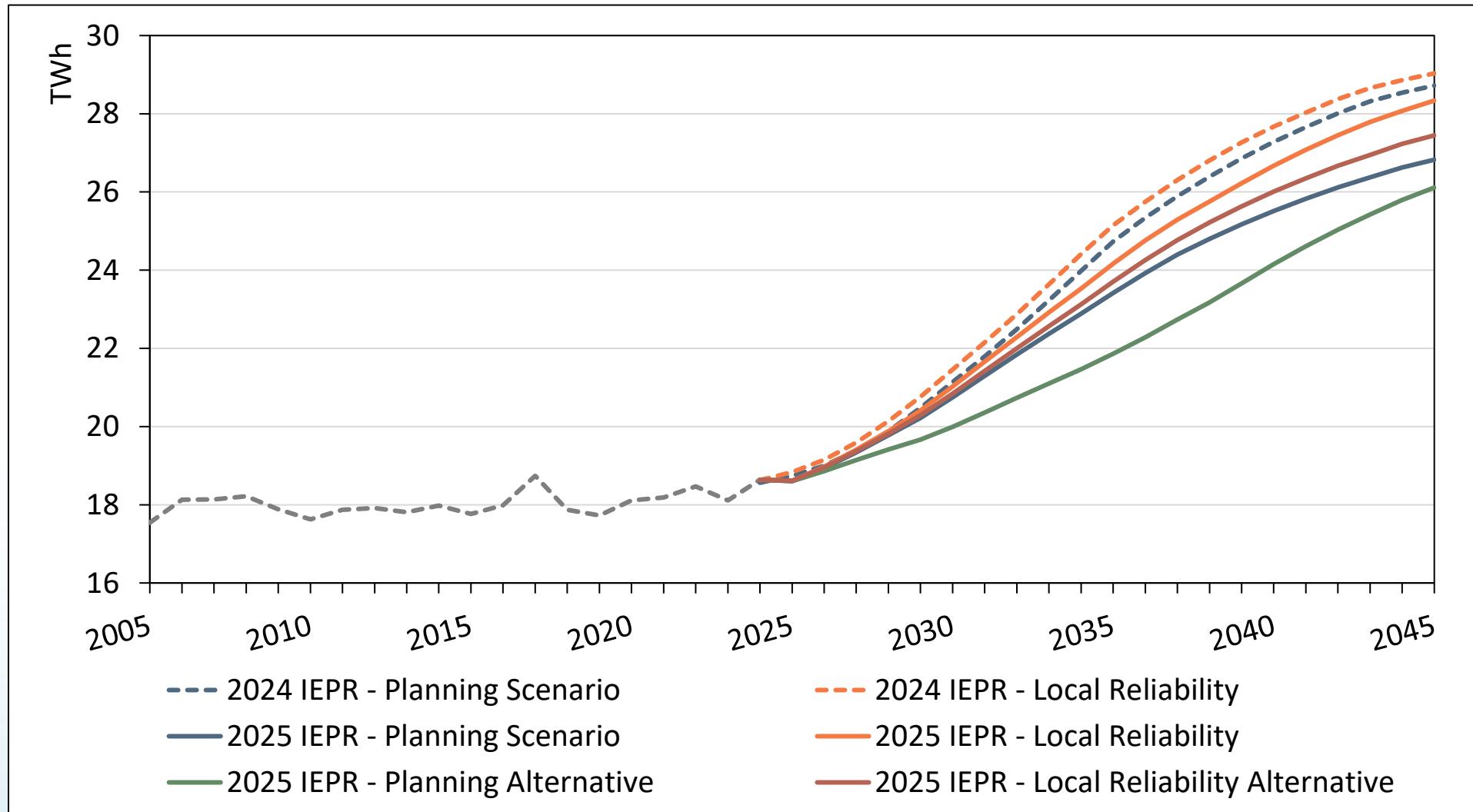


Electricity Sales Forecast: SDG&E Planning Area



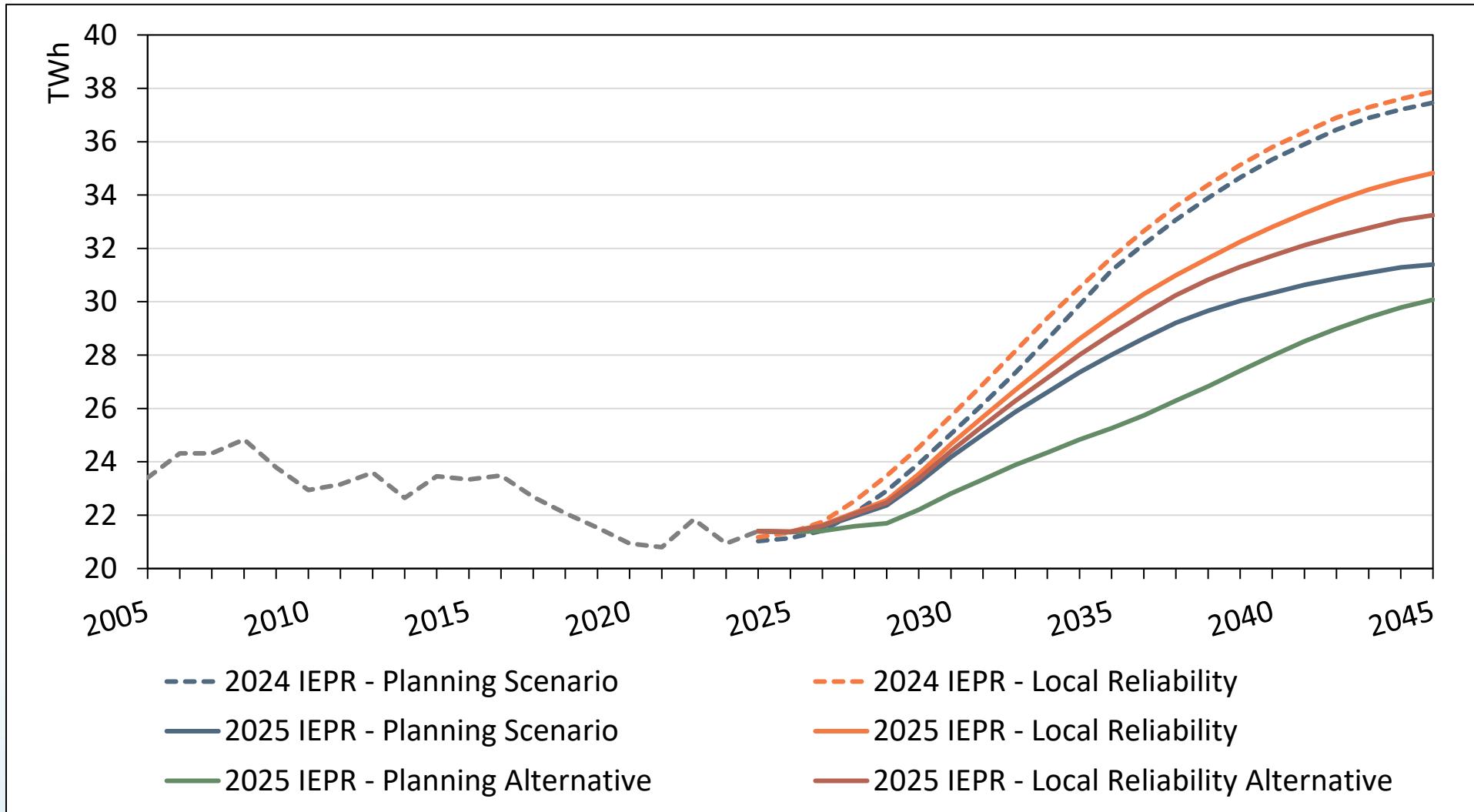


Electricity Sales Forecast: NCNC Planning Area



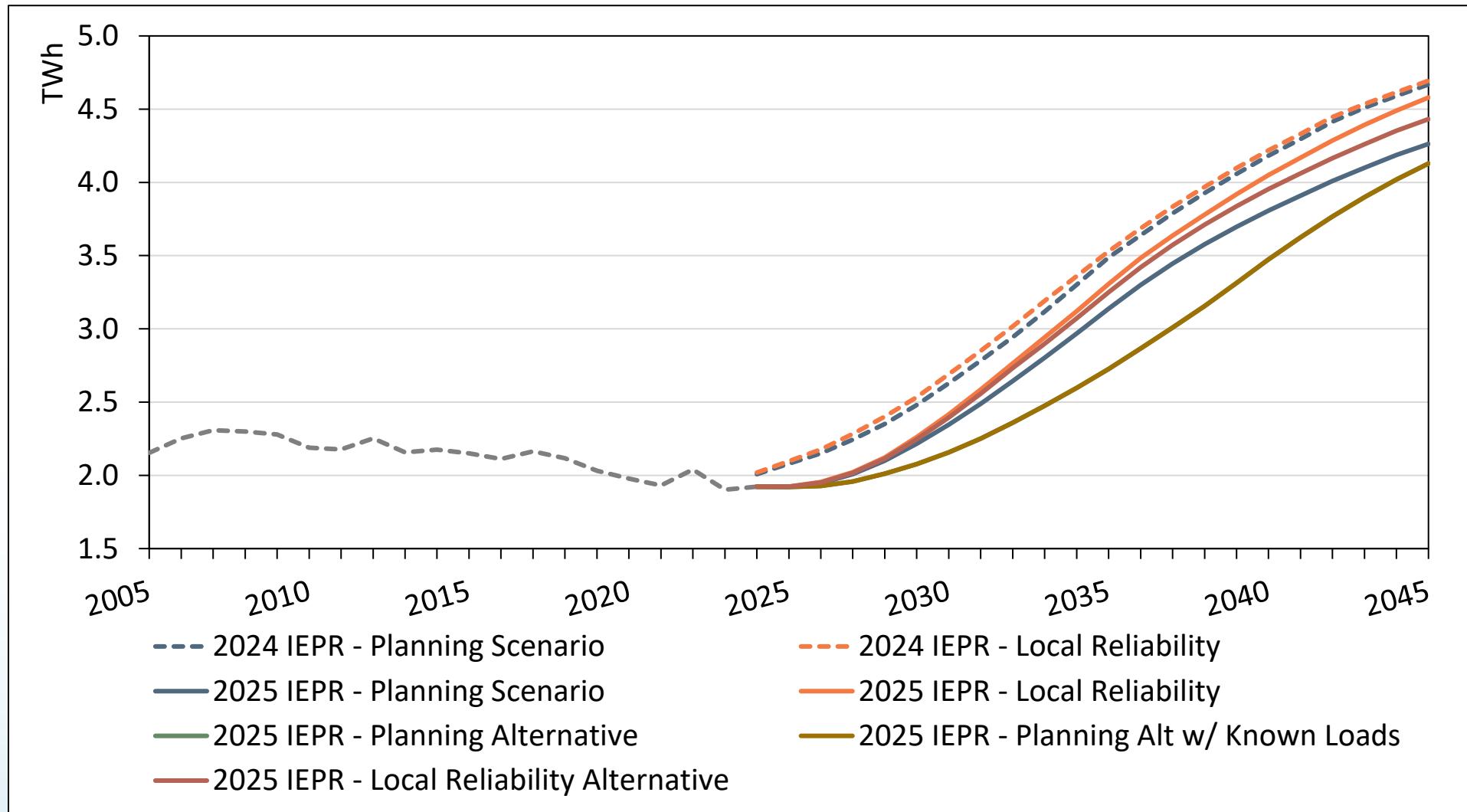


Electricity Sales Forecast: LADWP Planning Area



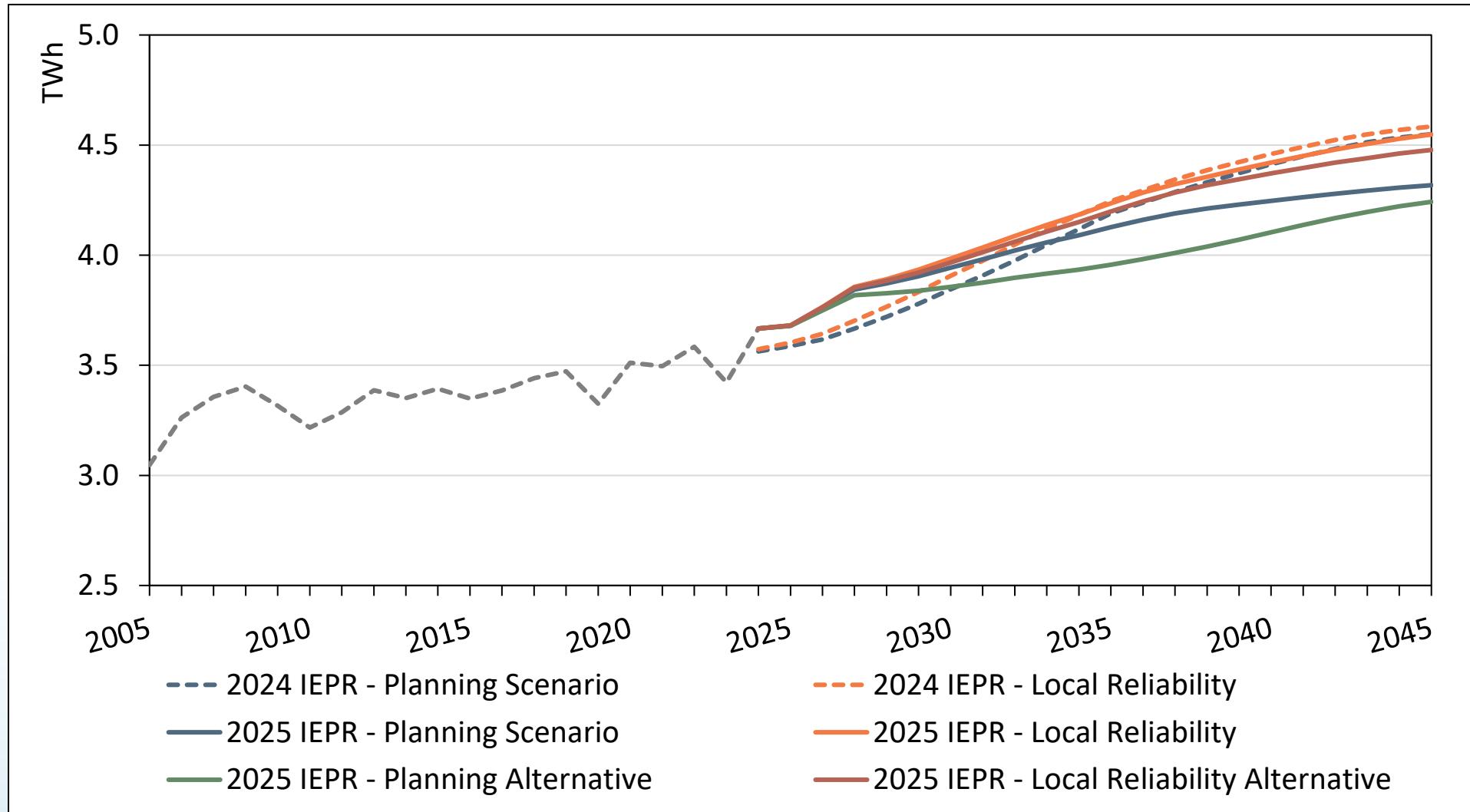


Electricity Sales Forecast: BUGL Planning Area





Electricity Sales Forecast: IID Planning Area

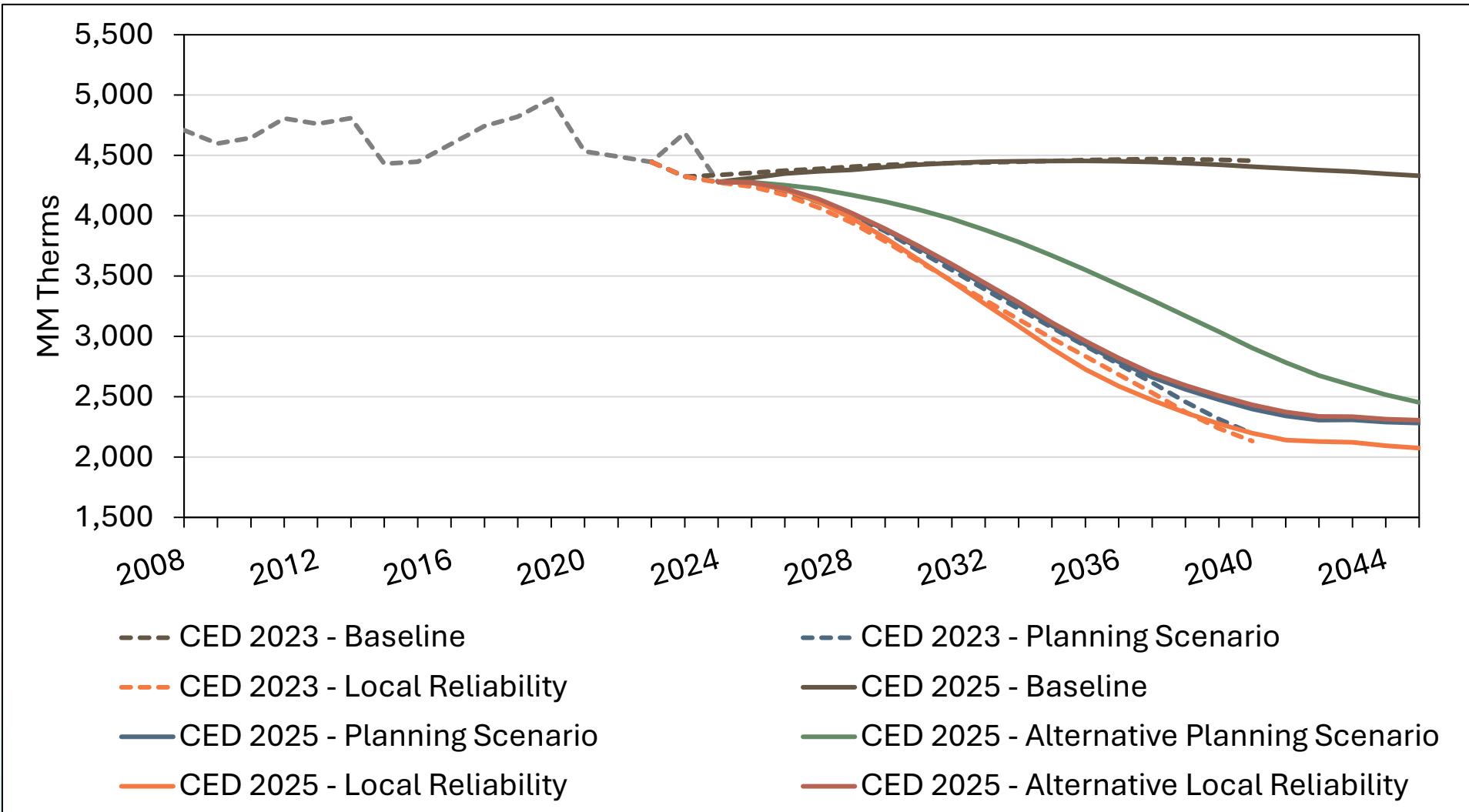




Appendix – Managed Gas Sales Forecasts by Planning Area

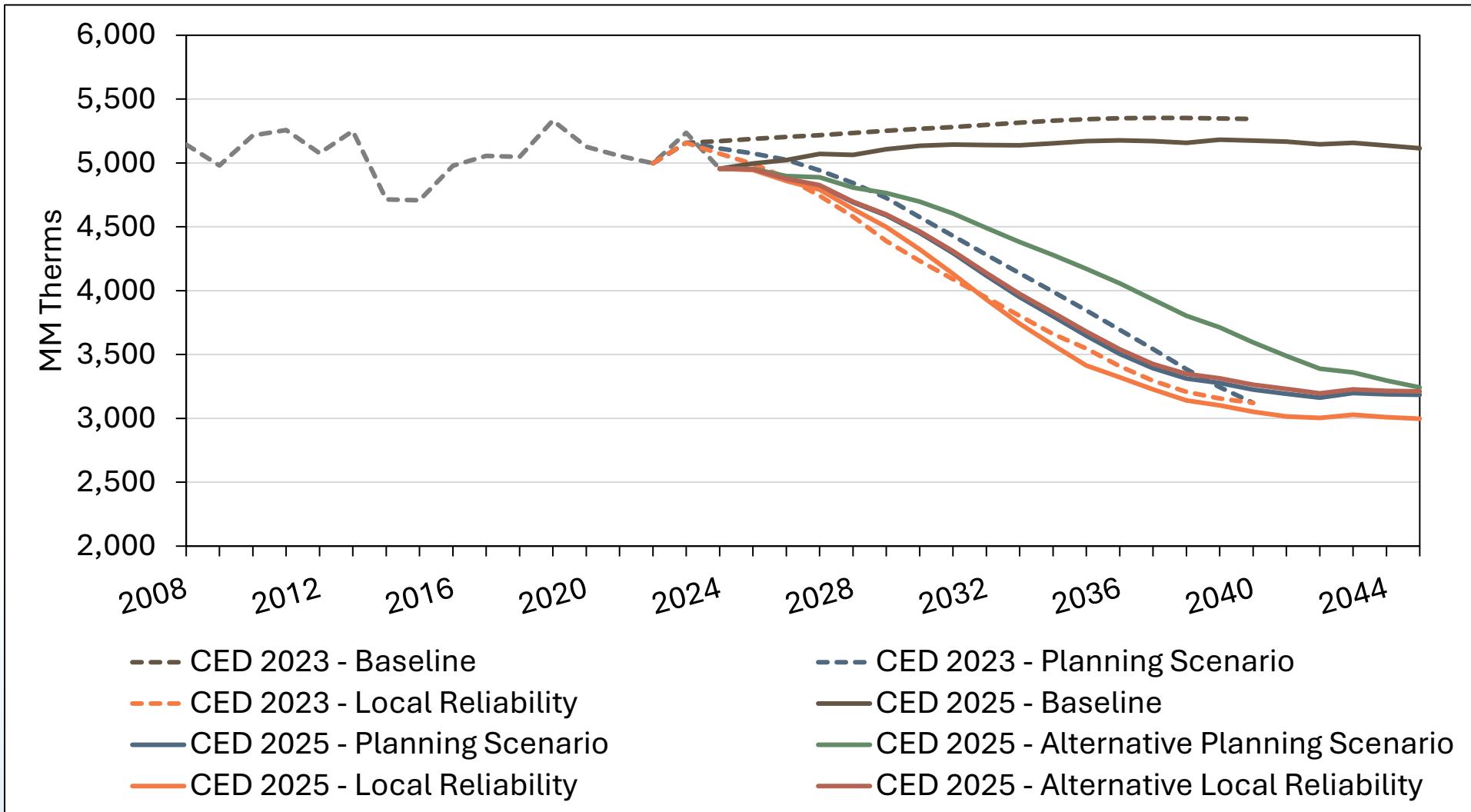


Gas Sales Forecast: PG&E Planning Area



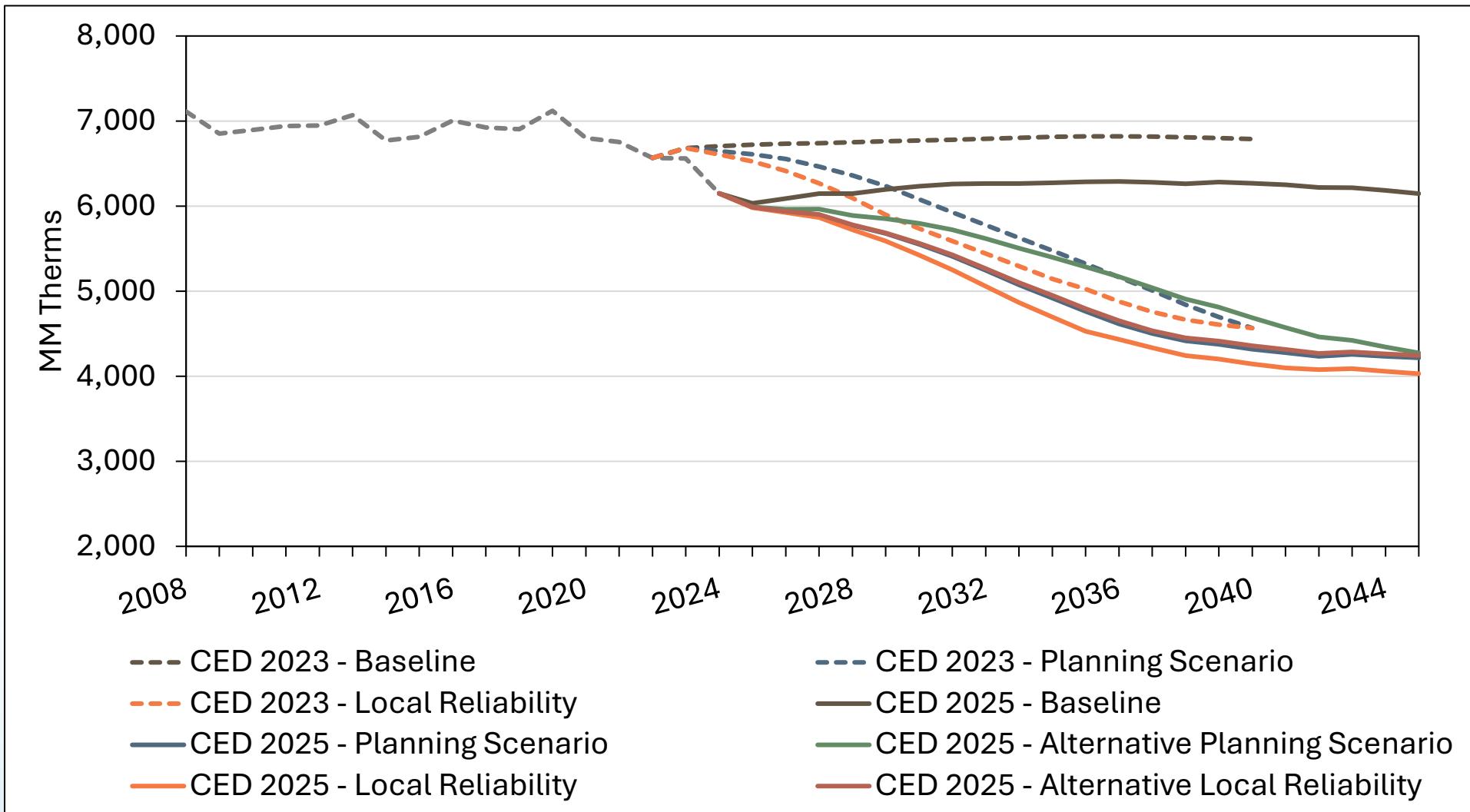


Gas Sales Forecast: SCG Planning Area (without MKRP)





Gas Sales Forecast: SCG Planning Area (with MKRP)





Gas Sales Forecast: SDG&E Planning Area

