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CEC Demand Scenarios Project

Inputs For Senate Bill 100 Analysis

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Acronyms & Initialisms

AAEE – Additional Achievable Energy Efficiency
AAFS – Additional Achievable Fuel Substitution
Ag + WP – Agriculture and Water Pumping
BTM – Behind-the-meter
BUGL – Burbank/Glendale Planning Area
CAISO – California Independent System Operator
CARB – California Air Resources Board
CEC – California Energy Commission
Comm - Commercial
DER – Distributed Energy Resource
DF – Demand Flexibility
D-Flex – Demand Flexibility Model
dGen – Distributed Generation Model
DSM- Demand Scenarios Model
FSSAT – Fuel Substitution Scenario Analysis Tool
GHG – Greenhouse Gas
H2 – Hydrogen
HHU – High Hydrogen Use (Policy Scenario)
IEPR – Integrated Energy Policy Report
IID – Imperial Irrigation District
Ind – Industrial
IOU – Investor-Owned Utilities
LADWP – Los Angeles Department of Water and Power
MDHD – Medium- and Heavy-Duty
NCNC – Northern California Non-CAISO Planning Area
OGV – Ocean-Going Vessel
PGE – Pacific Gas & Electric
PV – Photovoltaics (usually rooftop)
POU – Publicly-Owned Utilities
Res - Residential
SCE – Southern California Edison
SDGE – San Diego Gas and Electric
TAC – Transmission Access Charge (areas that often cover large utility regions)
TE – Transportation Electrification
TCU – Transportation, Communications, and Utilities

Demand Scenarios Project Overview

Purpose	Longer-term project using forecasting tools to explore potential policy and planning impacts on energy demand
Time Horizon	To 2050
Scope	Reflects a full set of fuel types
Number of Scenarios	Three primary scenario types with various sensitivities
Methods	Use CEC demand forecast and load modifier projection tools, augmented by a contractor modeling tool to provide complete coverage of all fuels and all sectors.
Outputs	Sectoral demand projections by fuel with corresponding GHG emissions.

Primary Scenario Types of the Demand Scenarios Project

Reference Scenario (Not Part of SB 100)

- CEC-adopted 2023 IEPR planning demand forecast, extended to 2050

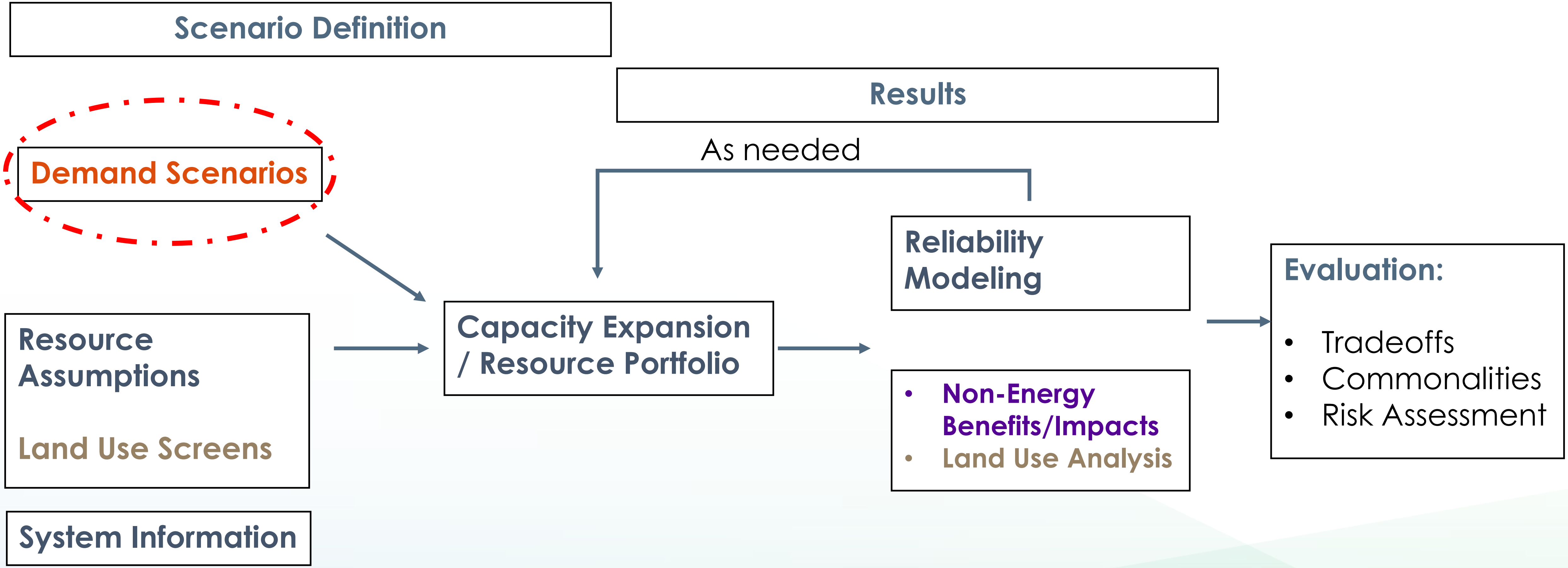
Policy Scenario

- New policies in development or with a development pathway
- Impacts of federal subsidies for industrial electrification and hydrogen use
- Three sets of projections used in SB 100
  - Policy Scenario
  - Policy Scenario (High DER/DF)
  - Policy Scenario (High Hydrogen Use)

Enhanced Policy Scenario (Not Part of SB 100)

- Additional standards, programs, policies and assumptions beyond the Policy Scenario

SB 100 2025 Report Scenario Analysis



Scenario Modeling Framework

Sectors	Inputs	Models/Tools
Res, Com, Ind	Baseline Forecast	Sector Models
Res, Com, Ind	Energy Efficiency Impacts	AAEE /AAFS Programmatic Tool
Res, Com, Ind	AAFS: Programmatic Impacts	AAEE /AAFS Programmatic Tool
Res, Com, Ind	AAFS: Combustion Control Measures	FSSAT Tool
Transportation	Baseline Forecast	Transportation Models
AG +WP	Baseline Forecast	Agricultural Model
AG +WP	Energy Efficiency Impacts	AAEE/AAFS Programmatic Tool
TCU	Baseline Forecast	TCU Model
PV & Storage	Baseline Forecast	dGen, Title 24, Standalone Storage Models

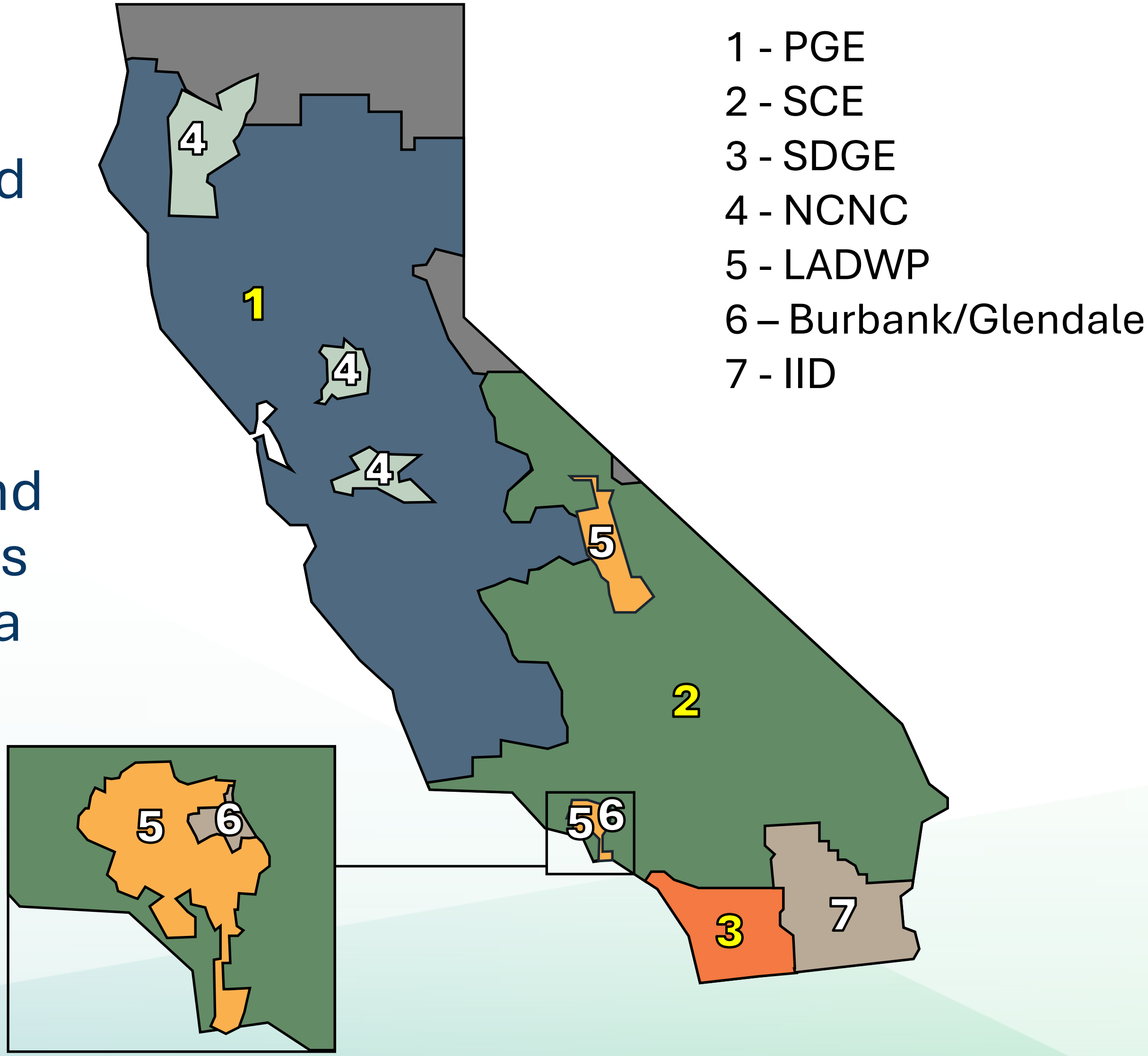
Scenarios Developed for SB 100

	Demand Scenario		SB100 Supplemental Assessments	
Scenario Number	**Scenario Name**	**Major Scenario Specifications**	**D-Flex Assumptions**	**Electrolysis Load From H2 Projections**
1	Policy Scenario	AAEE 3, AAFS 4, FSSAT 4, Policy Scenario TE, 2023 IEPR PV & Storage	Moderate	Moderate levels of hydrogen driving electrolysis energy
2	Policy Scenario (Augmented DER & DF)	Policy Scenario Supplemented with AAEE 4 & Higher BTM Storage	High	Moderate levels of hydrogen driving electrolysis energy
3	Policy Scenario (High Hydrogen Use)	Policy Scenario modified to substitute some hydrogen for electricity in MDHD Trucking in the Transportation sector	Moderate	Higher levels of hydrogen driving electrolysis energy

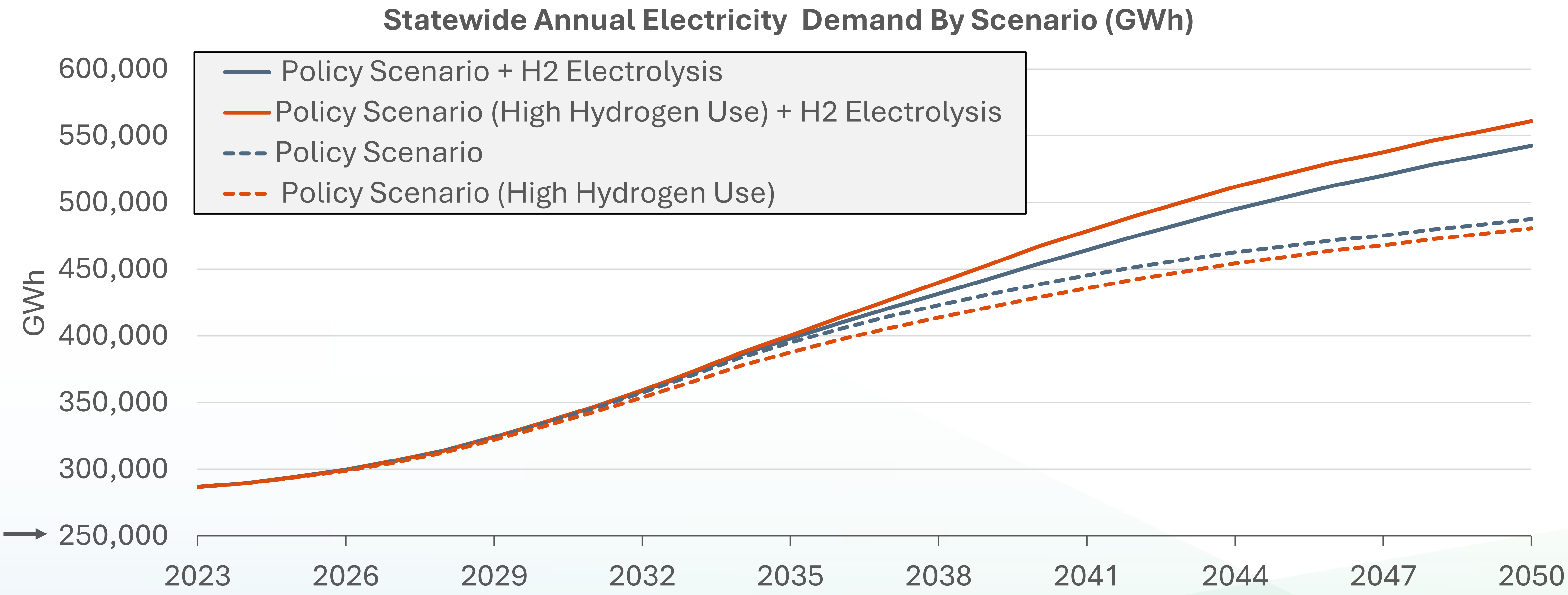
Note: Neither of the SB 100 Supplemental Assessments are included in the hourly 8760 loads by planning area for any Demand Scenario. These are separate inputs into the PCM which will determine their hourly impacts through the dispatch process.

Results Across Scenarios

- Results described here focus on annual electric energy and hourly electricity load with losses.
- Unlike IEPR demand forecasts that produced hourly loads for only CAISO and its three TAC areas, this analysis includes four additional POU planning areas, for a total of seven planning areas.

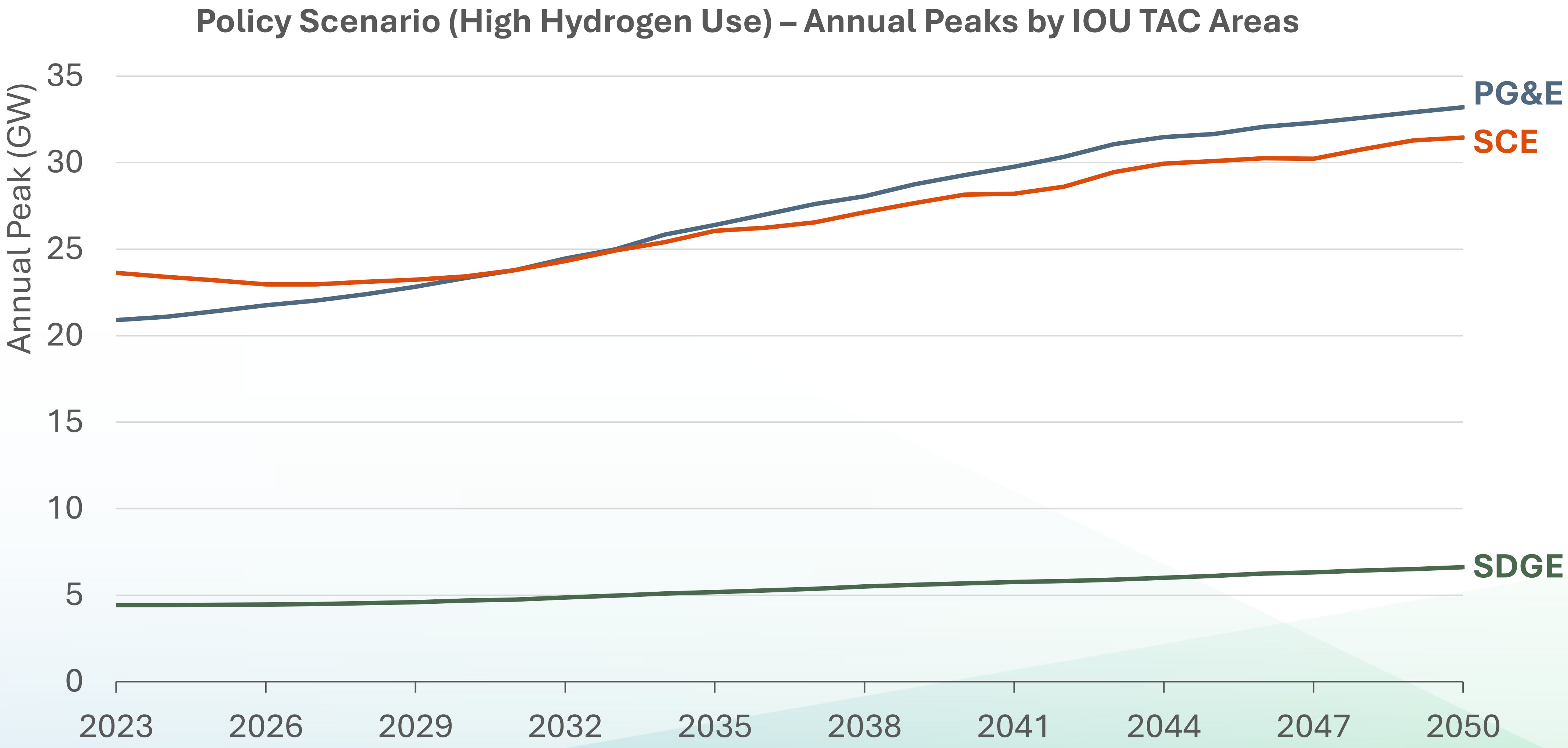


Statewide Annual Electricity Demand



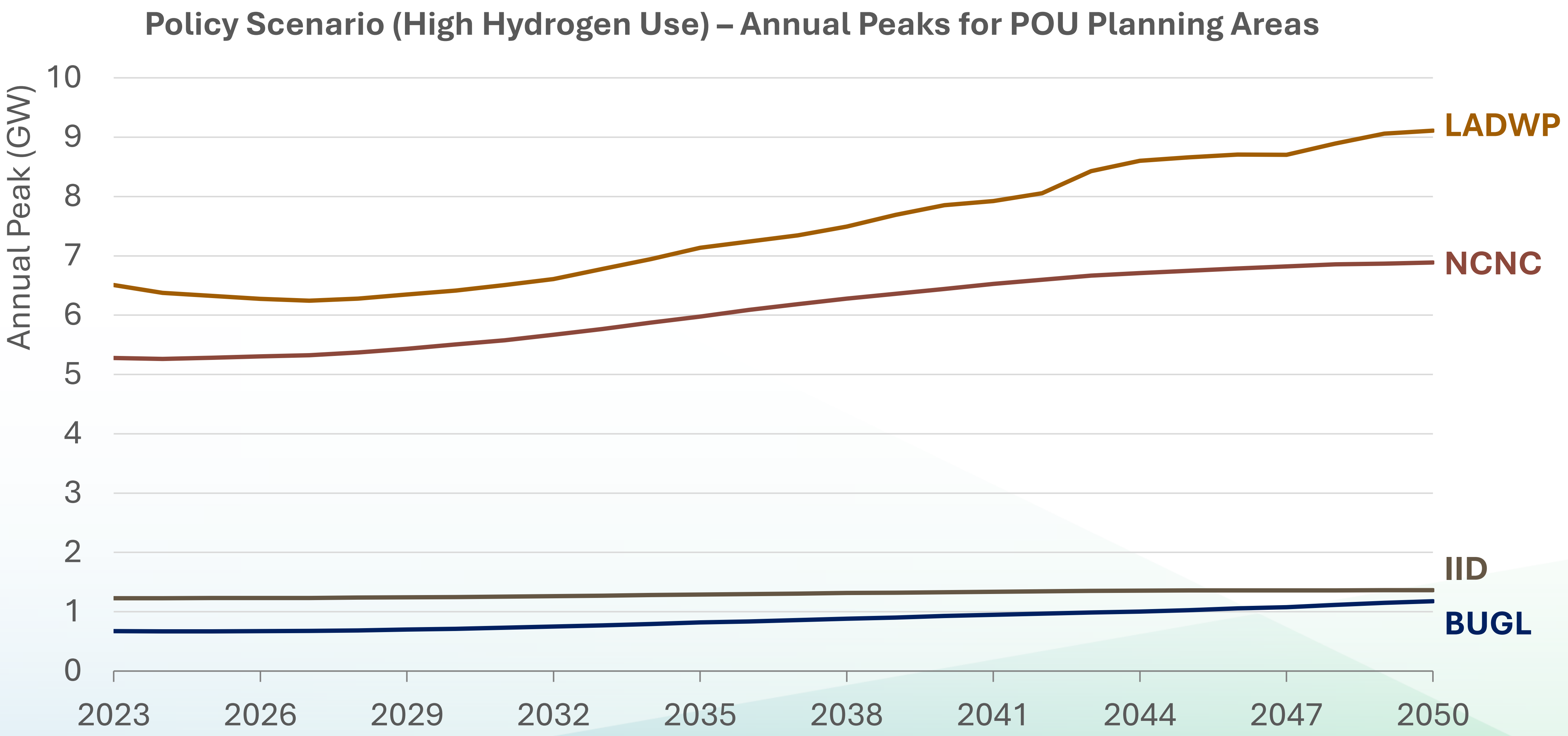
Note: The H2 electrolysis load is not included in the hourly 8760 loads by planning area for any Demand Scenario. This is a separate input into the PCM which will determine the hourly impacts through the dispatch process. The PCM dispatch will meet the annual H2 electrolysis requirement.

Example: Annual Peaks for IOU Planning Areas



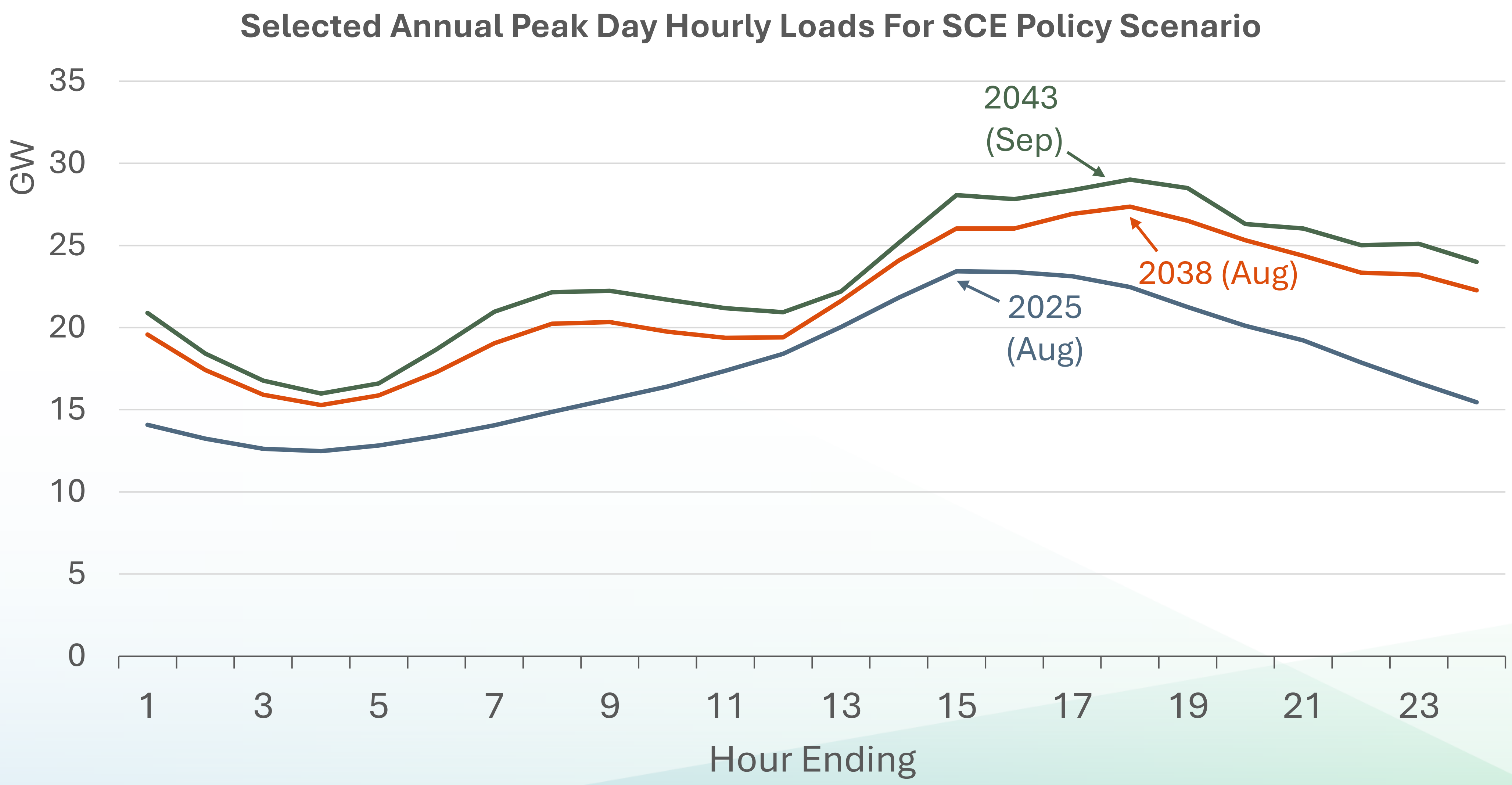
Note: Does not include additional potential peak load from hydrogen electrolysis, to be modeled by the PCM

Example: Annual Peaks for POU Planning Areas



Note: Does not include additional potential peak load from hydrogen electrolysis, to be modeled by the PCM

Evolution of Hourly Loads On Annual Peak Days - SCE TAC Area



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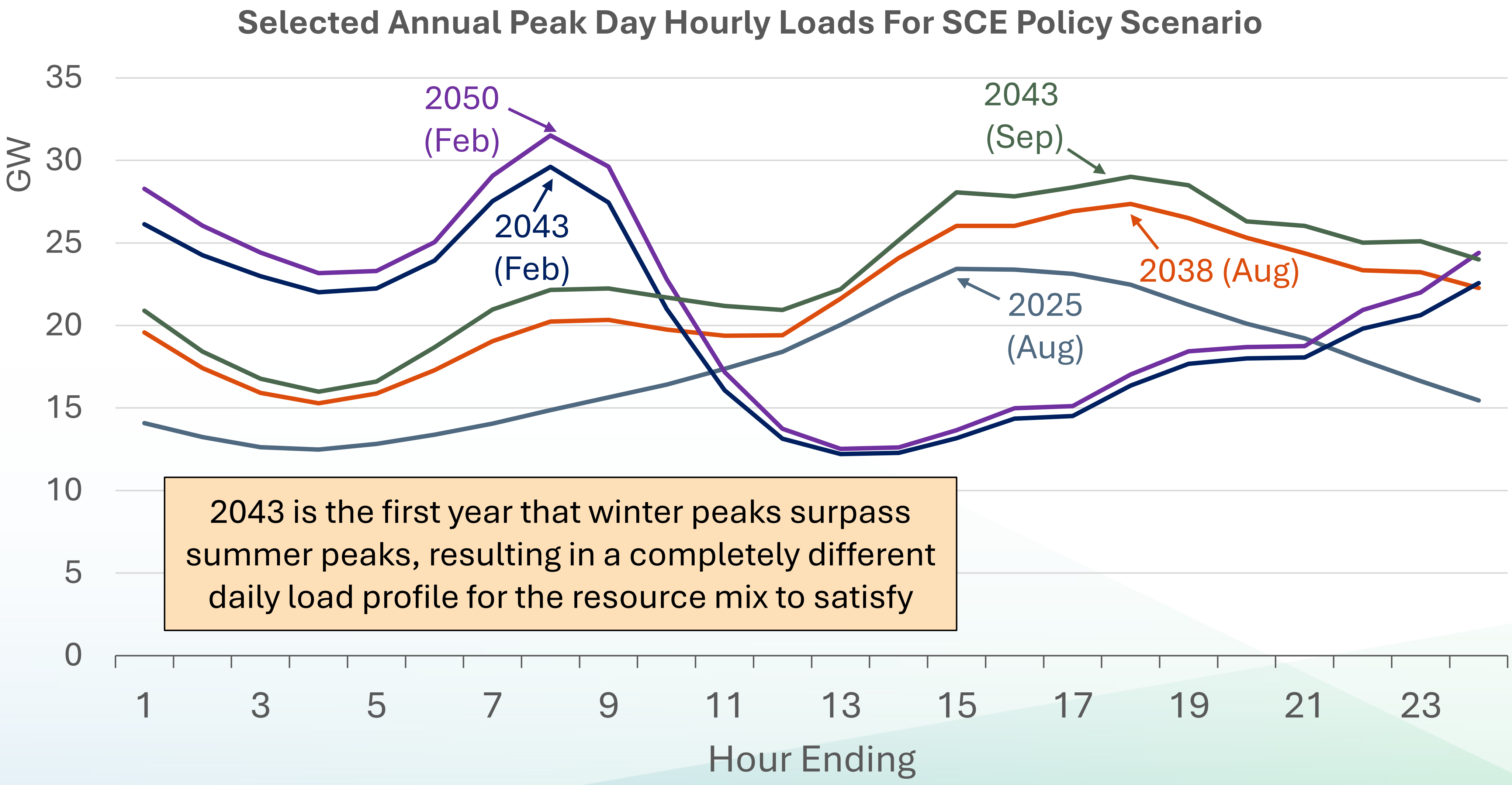
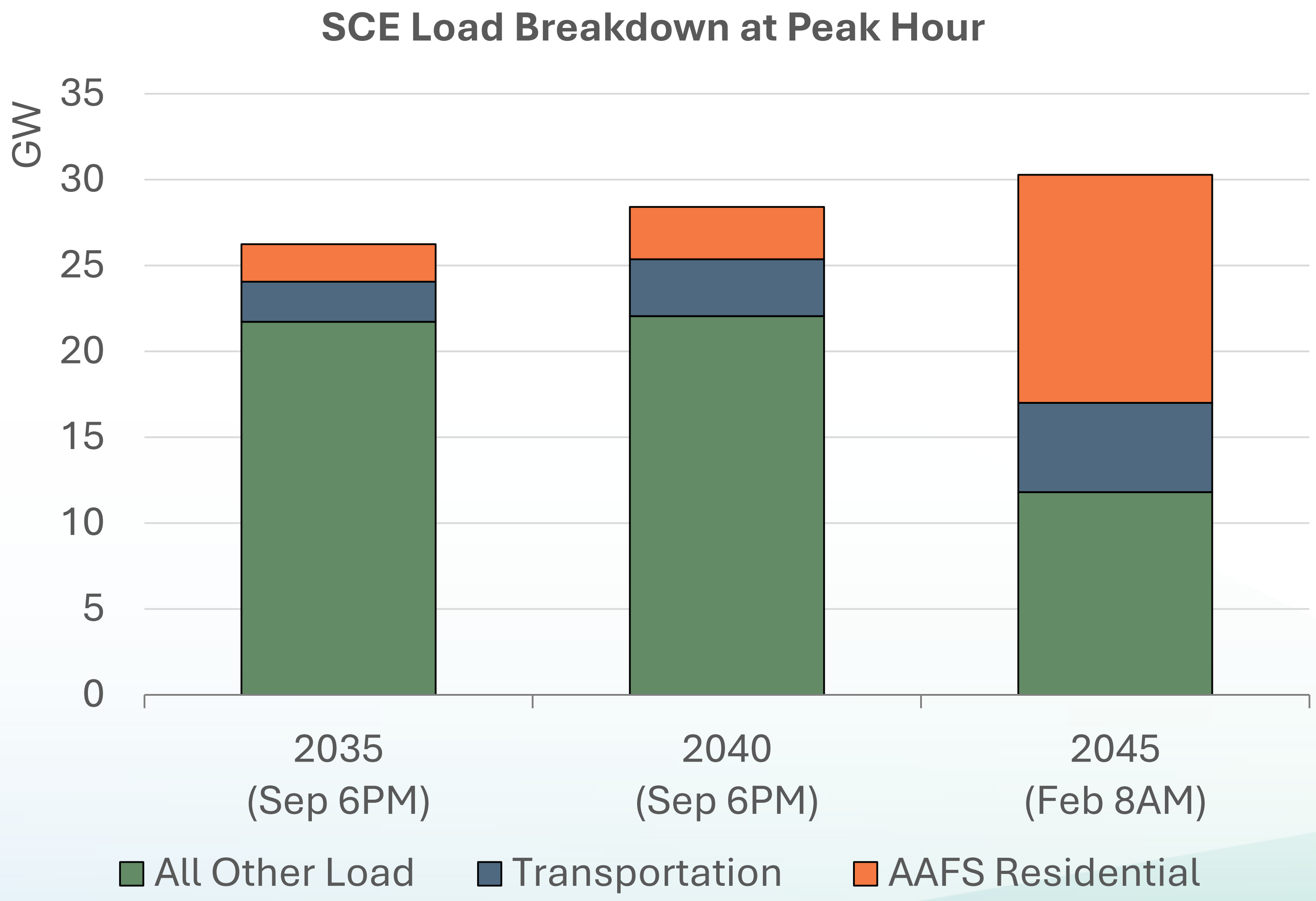


Note: Does not include additional potential peak load from hydrogen electrolysis, to be modeled by the PCM

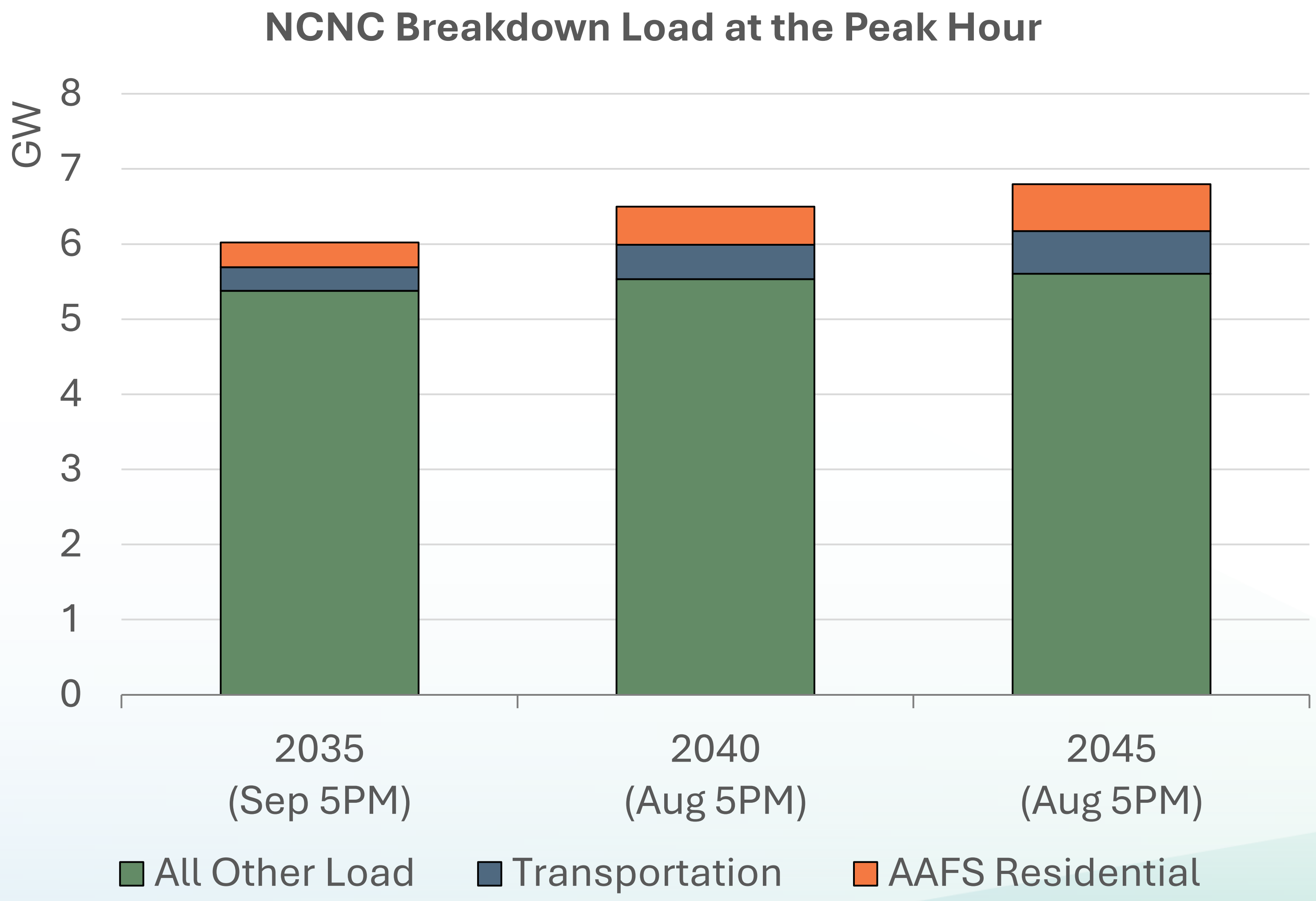
SCE – Load Mix Sufficient To Change From Summer To Winter Peaking



In SCE territory by 2045, the peak hour has shifted to **February** (8AM), with fuel substitution (mostly heat pumps) representing the largest source of load

Note: Does not include additional potential peak load from hydrogen electrolysis, to be modeled by the PCM

NCNC – Generally Stable Load Mix



In NCNC Territory, the peak hour consistently stays in the summer, with AAFS and Transportation having regular load patterns

Note: Does not include additional potential peak load from hydrogen electrolysis, to be modeled by the PCM

Electrification Impacts On Hourly Load Patterns

- Historically, all seven planning areas have had summer peaks.
- In the past decade, BTM rooftop photovoltaic systems have reduced load in mid afternoon and shifted the time of planning area net load peaks later in the day.
  - Further growth in rooftop PV would continue this trend.
- Transportation electrification adds battery charging load in the evening and night.
- Building electrification will add load in all hours
  - Greater impact is nighttime space heating load concentrated in the winter.

Takeaways & Next Steps

- The shift to winter peaking should be considered through supply planning studies and processes.

- The Demand Scenarios project will develop demand projections for all fuel types /all sectors. Despite expected decline in usage for fossil fuels projections of demand are important inputs into studies of production and distribution of these fuels.

- Complete Demand Scenario Project results are expected in October-November 2024.

Thank You!