

**DOCKETED**

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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

<b>Purpose</b>	Longer-term project using forecasting tools to explore potential policy and planning impacts on energy demand
<b>Time Horizon</b>	To 2050
<b>Scope</b>	Reflects a full set of fuel types
<b>Number of Scenarios</b>	Three primary scenario types with various sensitivities
<b>Methods</b>	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.
<b>Outputs</b>	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

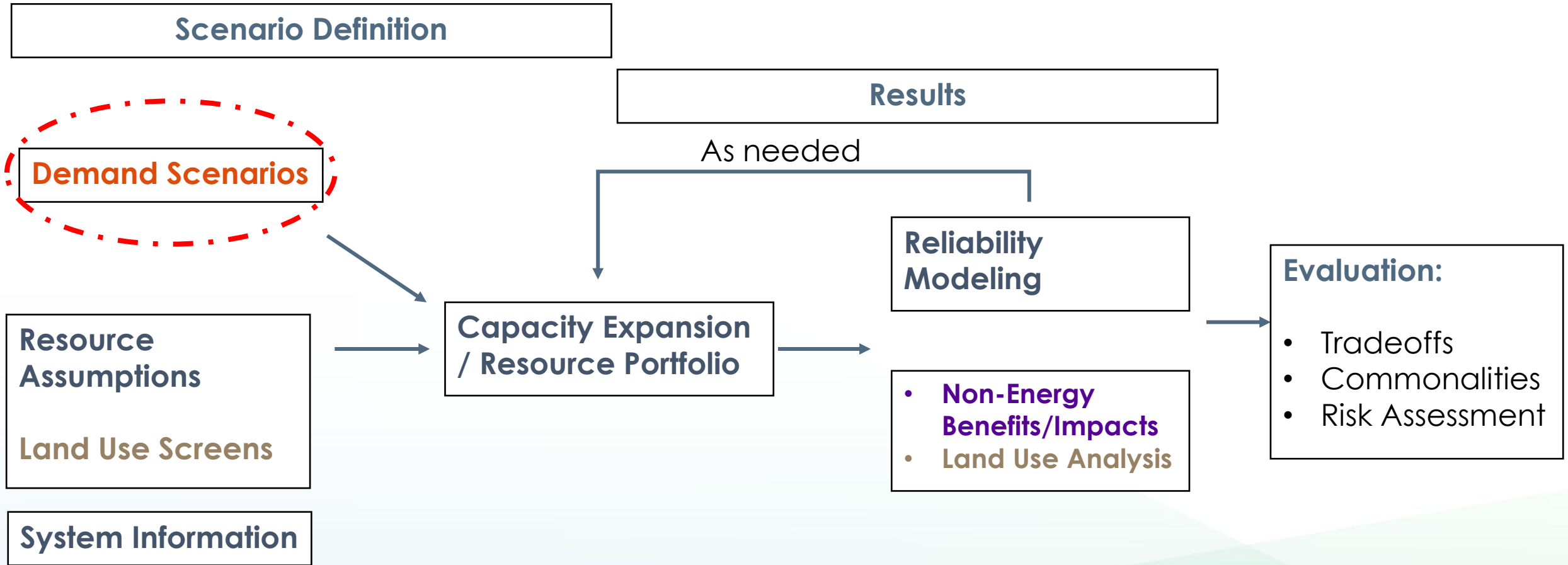
- New policies in development or with a development pathway
- Impacts of federal subsidies for industrial electrification and hydrogen use
- Three sets of projections used in SB 100
  - Policy Scenario
  - Policy Scenario (High DER/DF)
  - Policy Scenario (High Hydrogen Use)

## 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

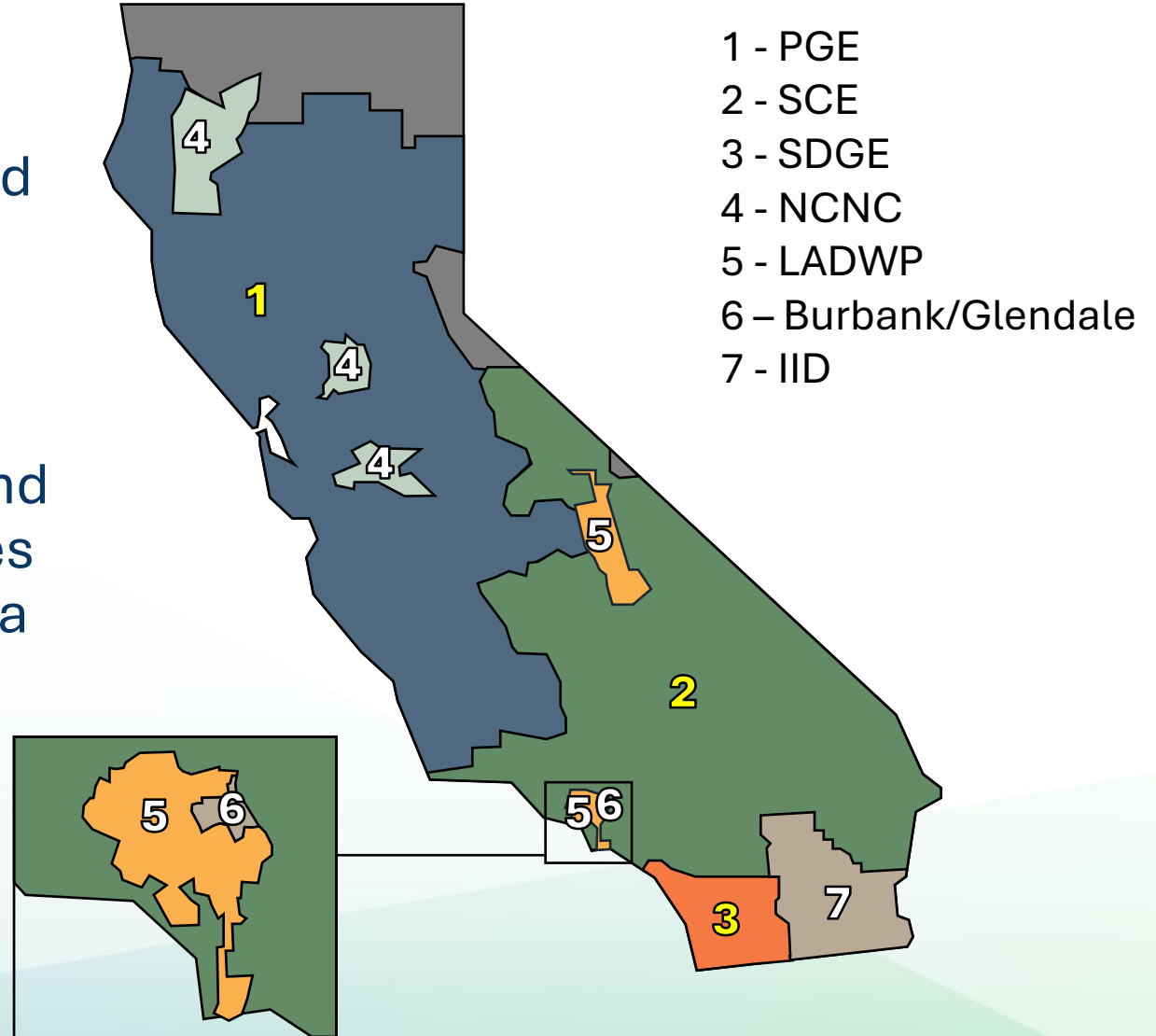
Scenario Number	Demand Scenario		SB100 Supplemental Assessments	
	Scenario Name	Major Scenario Specifications	D-Flex Assumptions	Electrolysis Load From H2 Projections
1	Policy Scenario	AAEE 3, AAFS 4, FSSAT 4, Policy Scenario TE, 2023 IEPR PV & Storage	Moderate	Moderate levels of hydrogen driving electrolysis 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





# Results Across Scenarios

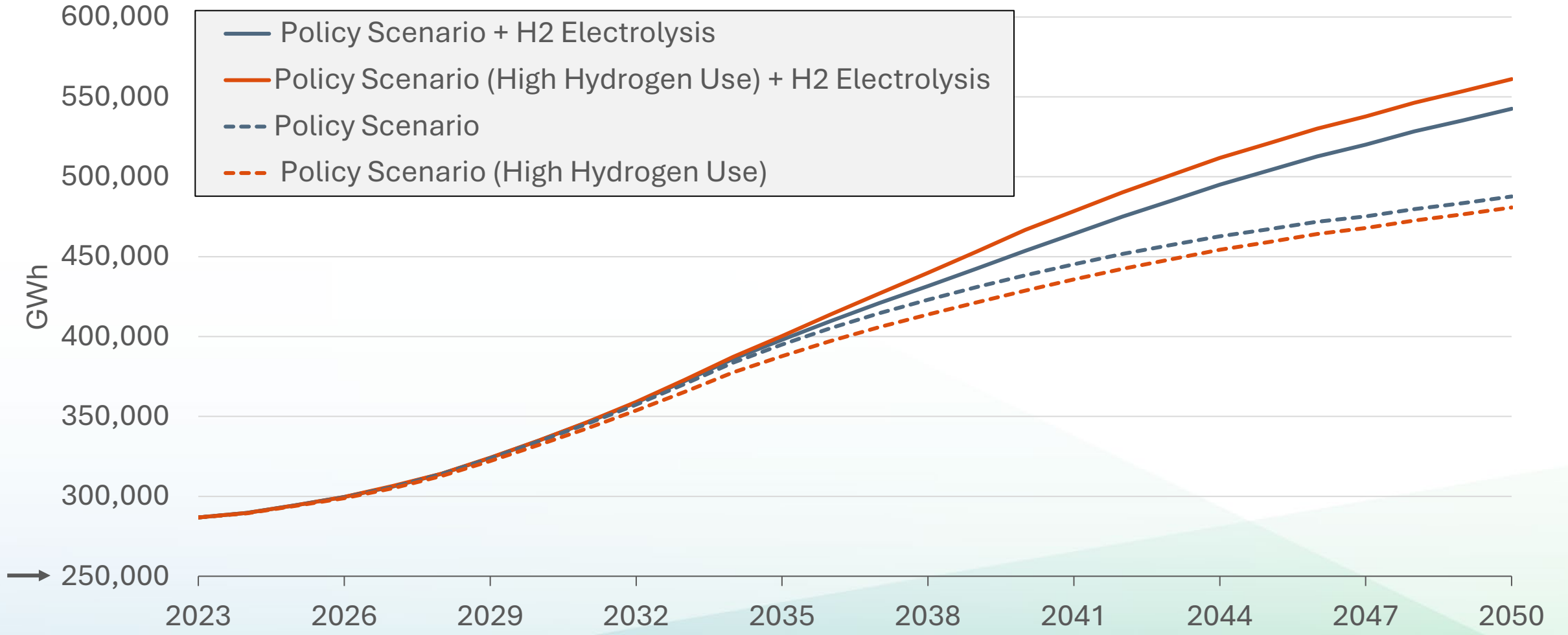
- Results described here focus on annual electric energy and hourly electricity load with losses.
- Unlike IEPR demand forecasts that produced hourly loads for only CAISO and its three TAC areas, this analysis includes four additional POU planning areas, for a total of seven planning areas.





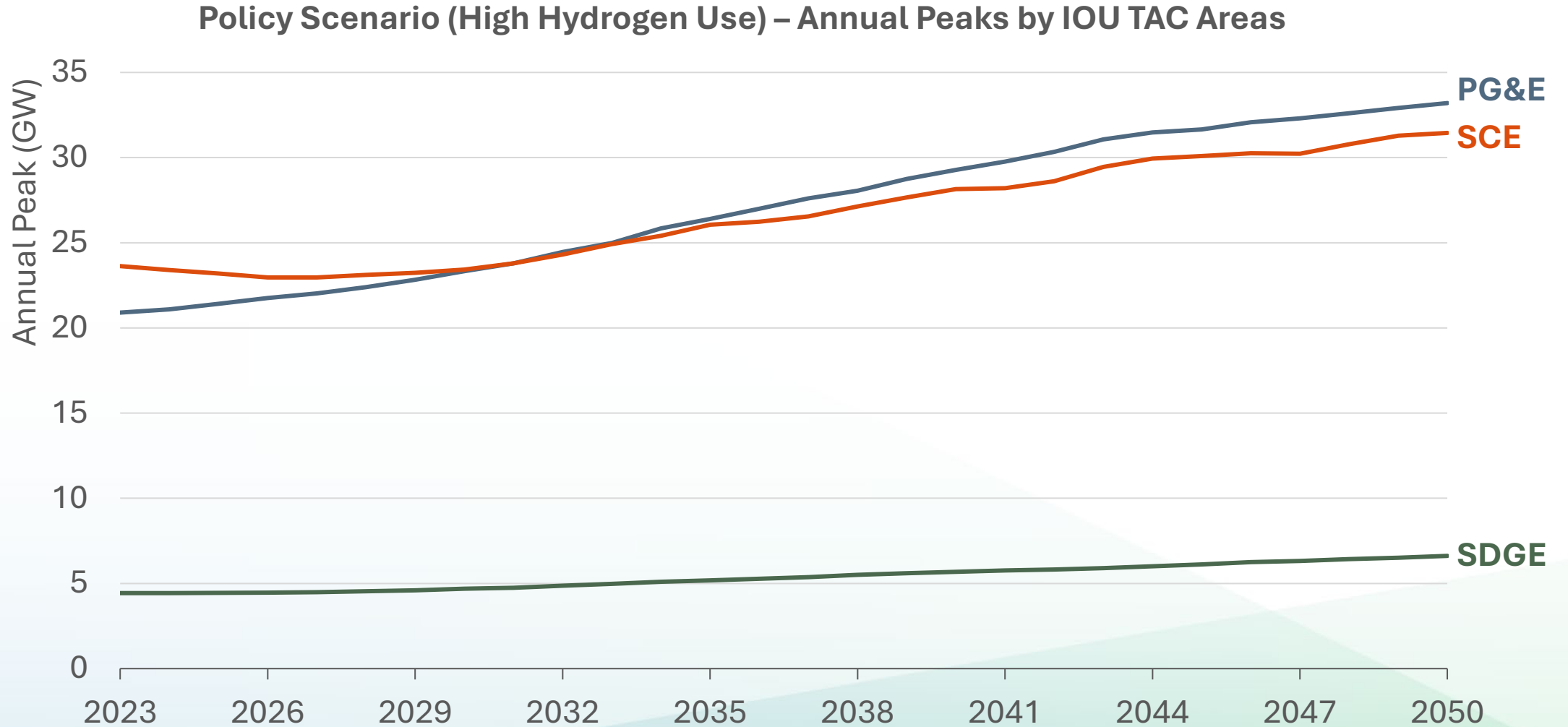
# Statewide Annual Electricity Demand

## Statewide Annual Electricity Demand By Scenario (GWh)





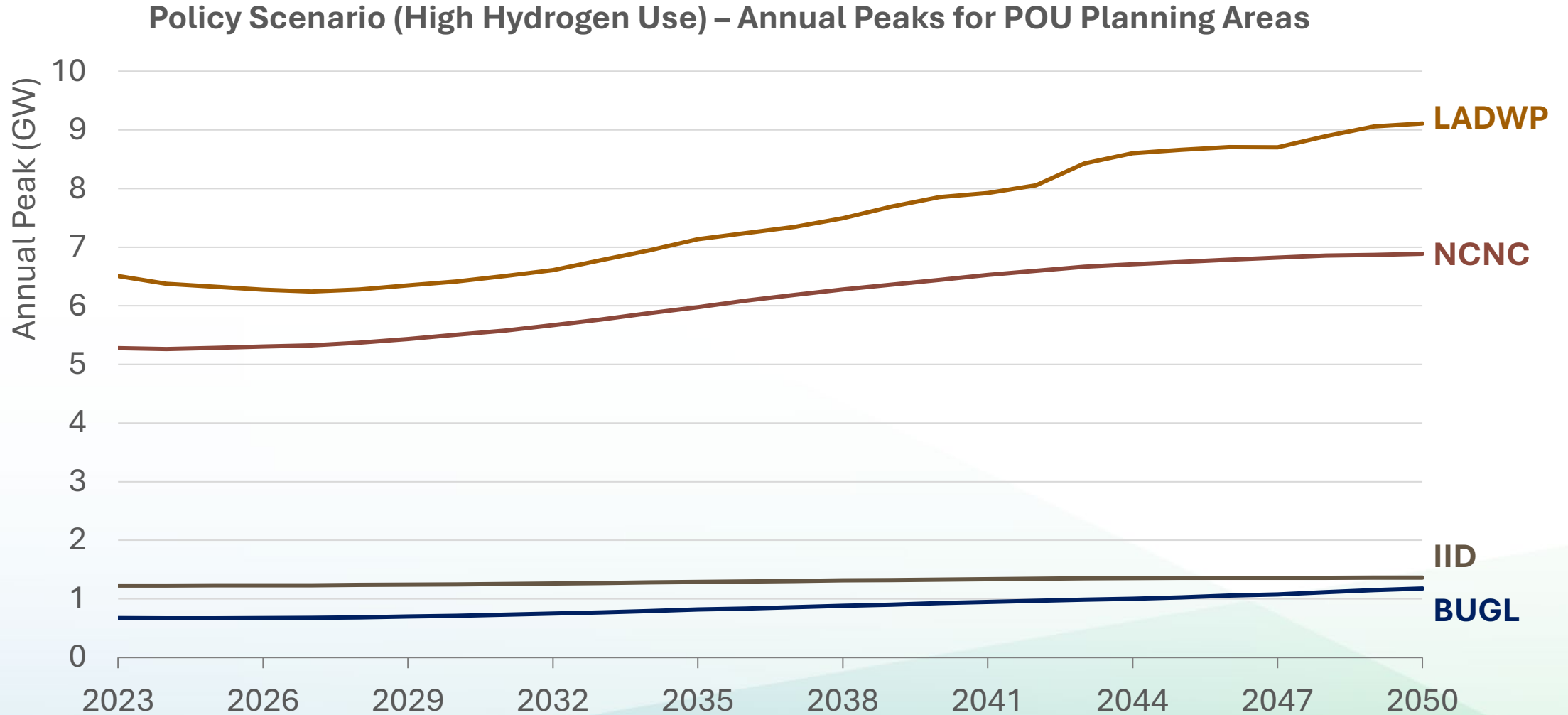
# Example: Annual Peaks for IOU Planning Areas



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



# Example: Annual Peaks for POU Planning Areas

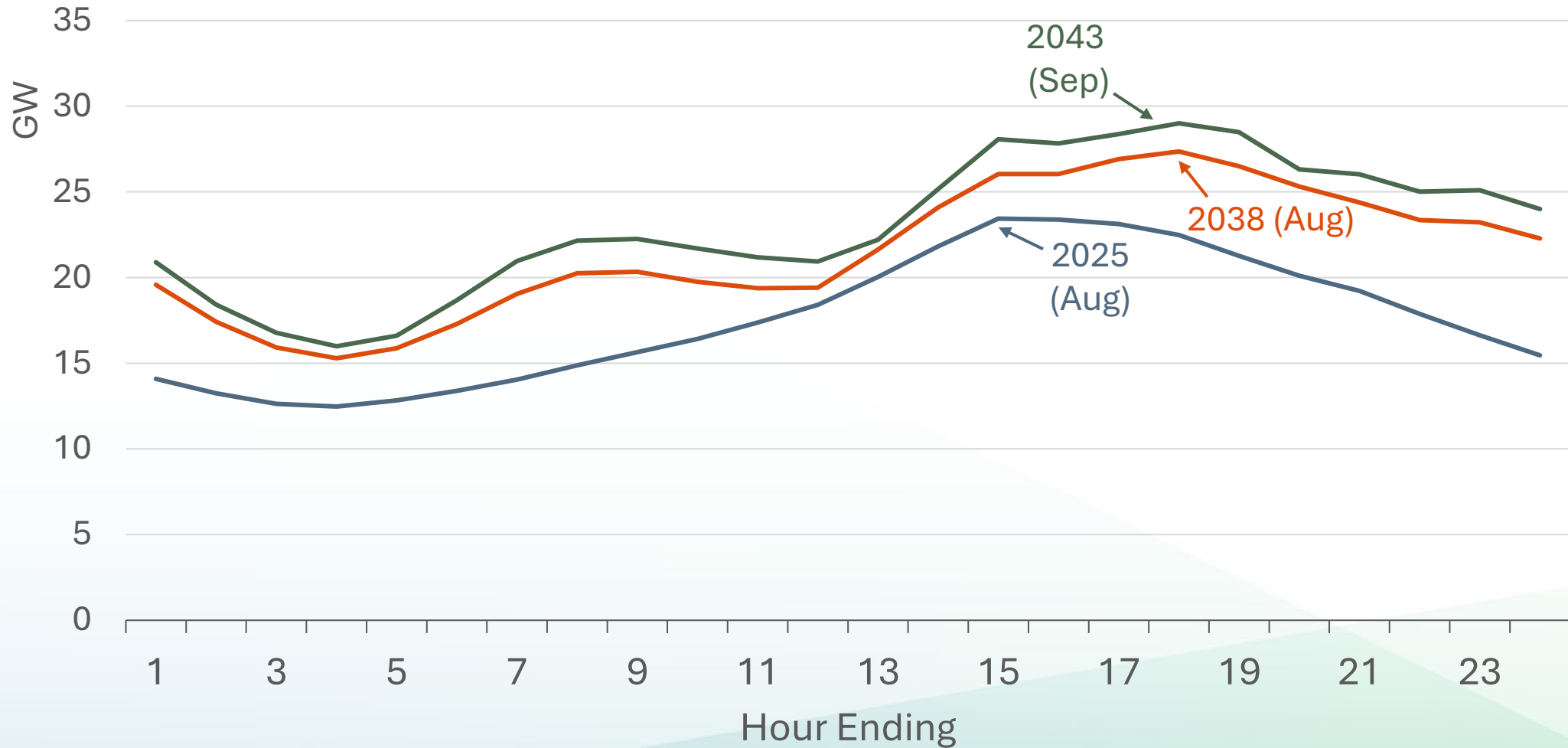


Note: Does not include additional potential peak load from hydrogen electrolysis, to be modeled by the PCM



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

Selected Annual Peak Day Hourly Loads For SCE Policy Scenario

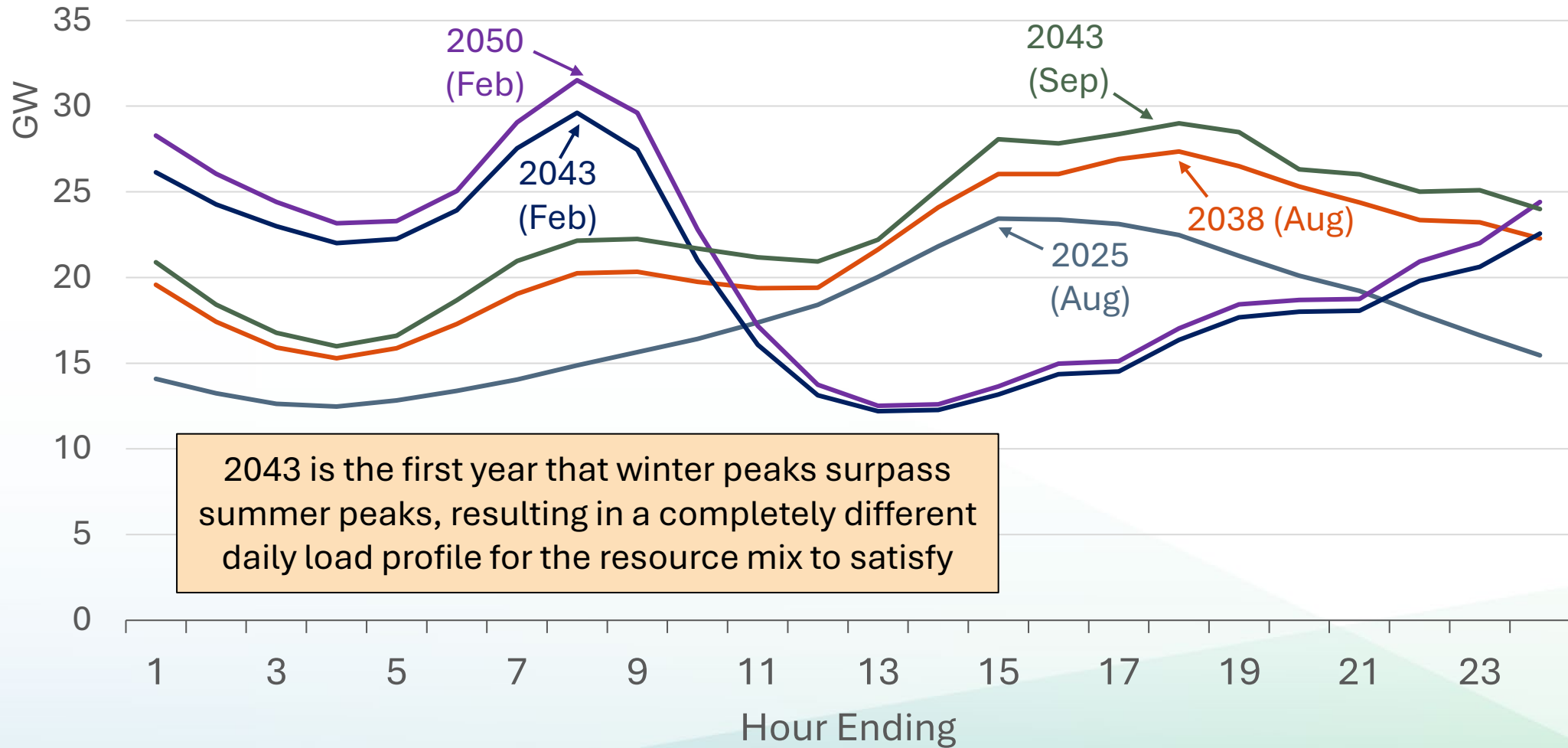


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# Evolution of Hourly Loads On Annual Peak Days - SCE TAC Area

Selected Annual Peak Day Hourly Loads For SCE Policy Scenario



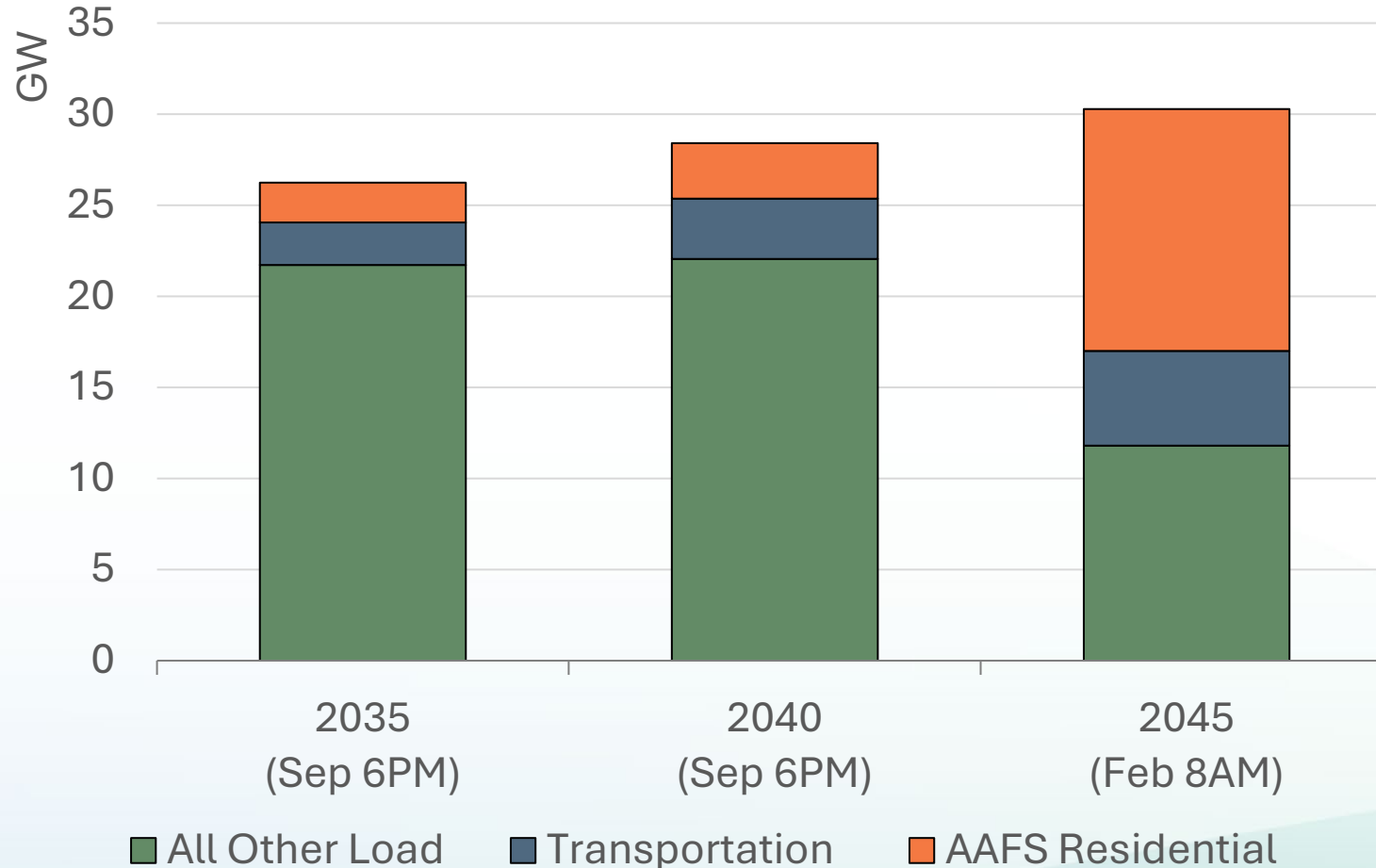
2043 is the first year that winter peaks surpass summer peaks, resulting in a completely different daily load profile for the resource mix to satisfy

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

SCE Load Breakdown at Peak Hour



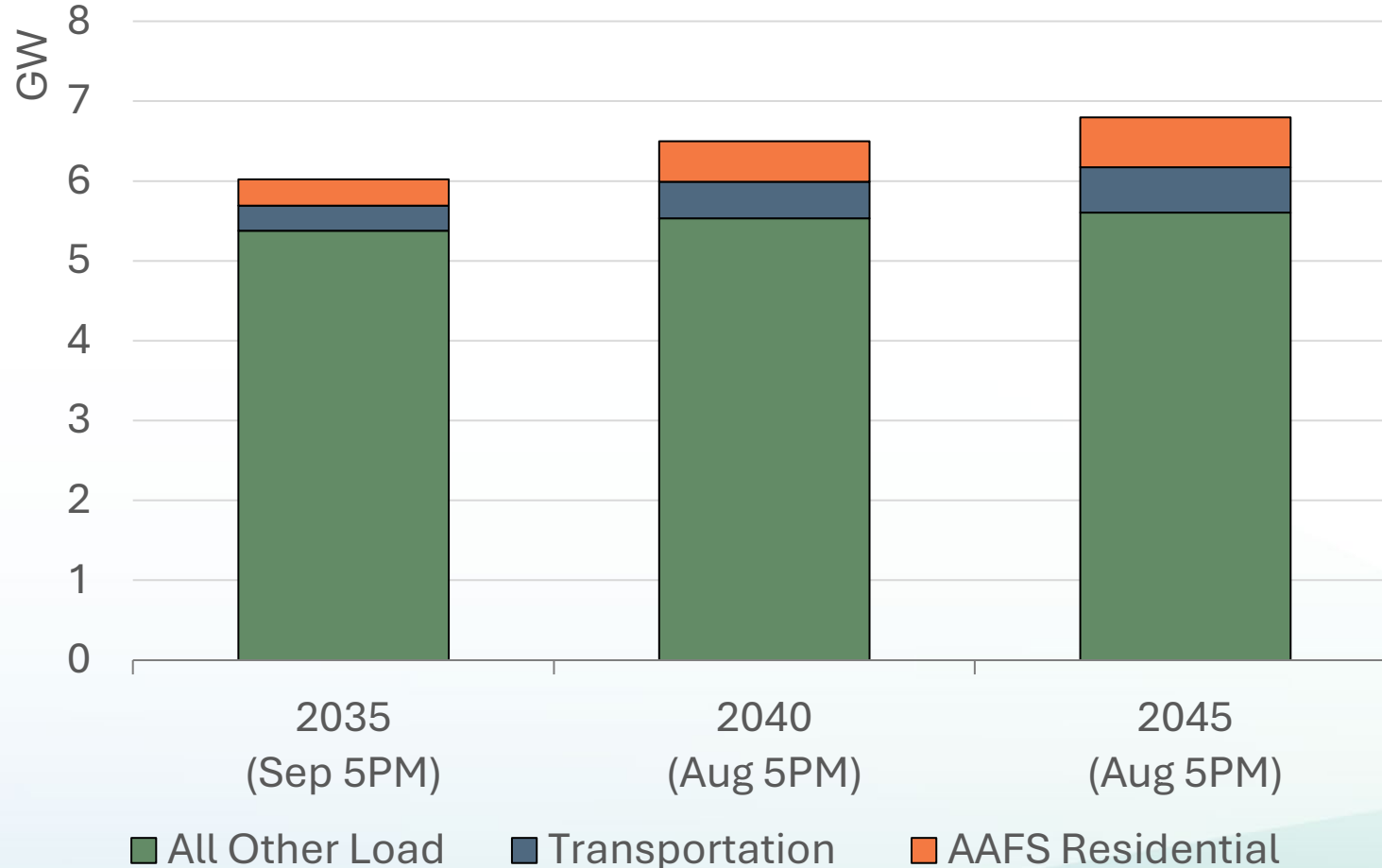
In SCE territory by 2045, the peak hour has shifted to **February** (8AM), with fuel substitution (mostly heat pumps) representing the largest source of load

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



# NCNC – Generally Stable Load Mix

### NCNC Breakdown Load at the Peak Hour



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

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- 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.



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# Thank You!