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2023 IEPR Forecast Overview

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Why does CEC forecast energy demand?

Warren-Alquist Act

Established the CEC

Public Resources Code 25301(a)

Requires the CEC to "conduct assessments and forecasts of all aspects of energy industry supply, production, transportation, delivery and distribution, demand, and prices."

CA Energy Demand Forecast

- Foundational for procurement and system planning in the state
- Used by:
  - CPUC for Integrated Resource Planning
  - CAISO for transmission system planning
  - CPUC / utilities for resource adequacy requirements
  - IOUs for planning
- 15+ year system-level forecast of electricity and gas demand
  - Annual electricity and gas consumption
  - 8760 hourly electricity loads
  - ‘Additional Achievable’ scenarios for energy efficiency, building electrification, and transportation electrification that capture a range of uncertainty
  - 1-in-2, 1-in-5, 1-in-10, and 1-in-20 year net electricity peak

2023 IEPR Forecast Timeline

- Aug 15: Inputs and Assumptions Workshop
- Aug 18: Load Modifier Inputs and Assumptions Workshop
- Nov 15: Load Modifier Results Workshop
- **Dec 6: Annual Energy Forecast Workshop**
- TBD: Peak Electricity Demand Forecast Workshop
- Jan 2024: Forecast adoption

Demand Analysis Working Group (DAWG)

Climate Change

Improving incorporation of climate change in the forecast

- Incremental updates, with full implementation for 2025 IEPR
- Shift from using historical weather data to using climate projections
- Use of new variables such as heat index
- Probabilistic hourly forecast

State goal to achieve economywide carbon neutrality by 2045

- Strategies to achieve this goal that impact energy demand include:
  - Energy efficiency
  - Building electrification
  - Transportation electrification
  - Renewable energy
  - Load flexibility
- As relevant regulations and programs are developed, these must be incorporated into the forecast

Recent Building Electrification Updates

State goals:

- Climate-ready and climate-friendly homes
  - 3 million by 2030
  - 7 million by 2035
- 6 million heat pumps installed by 2030
  - October 10, 2023: Top global building appliance manufacturers and distributors committed

Zero- and low- NOx appliance standards:

- CARB rulemaking process began in May 2023; expected to be finalized in 2025
- BAAQMD adopted in March 2023
- SCAQMD rulemaking anticipated to start in 2024

Zero-Emission Appliance Standards: Uncertainties

Regulatory uncertainty:

- Regional regulatory differences
- Regulatory timelines
- Scope of sectors and fuel type

Adoption and compliance uncertainty:

- Adoption rate and behavioral responses
- Compliance rate
- Readiness
  - Manufacturer capacity
  - Grid capacity
  - Impacts to the gas and electric systems

Scenario Design Focus

- **2022 and After:** focus on uncertainties in implementation of decarbonization and electrification policies
  - Additional Achievable framework expanded to transportation (2022) and building electrification (2021)
- **Prior to 2022:** focused on economic and demographic scenarios

AA Scenario Framework

Increasing uncertainty

Scenario	Guidelines
1	Firm commitments not included in the baseline forecast
2	Will occur, but some uncertainty around impacts
3	Reasonable to occur with greater uncertainty about penetrations/volume of impact
4	Likely to occur but still in planning phase
5	More speculative programs, perhaps in early planning phases
6	Programs that could exist in the future and would be required to meet some policy goals

2023 Electricity Forecast Framework

Name ⟶	Planning Forecast	Local Reliability Scenario
Example Use Cases ⟶	**Resource Adequacy CPUC IRP**	**CAISO TPP**
Economic, Demographic, and Price Scenarios	Baseline	Baseline
Additional Achievable Energy Efficiency Scenario	Scenario 3	Scenario 2
Additional Achievable Fuel Substitution Scenario	Scenario 3	Scenario 4
Additional Achievable Transportation Electrification Scenario	Scenario 3	Scenario 3

IEPR Gas Forecast

- Updated every two years
- Annual gas demand
- Consistent with the electricity demand forecast
- Does not include gas for electricity generation
- Framework
  - Baseline econ/demo and prices
  - Additional achievable scenarios for energy efficiency and fuel substitution
- Referenced by the gas utilities for planning
  - Typically use a different combination of scenarios than used for electricity system planning

Forecast Approach

Forecast Planning Areas

Electricity Planning Areas

1. Pacific Gas and Electric
2. Southern California Edison
3. San Diego Gas & Electric
4. Northern California Non-California ISO (NCNC)
5. Los Angeles Department of Water and Power
6. Imperial Irrigation District
7. Burbank/Glendale
8. Valley Electric Association

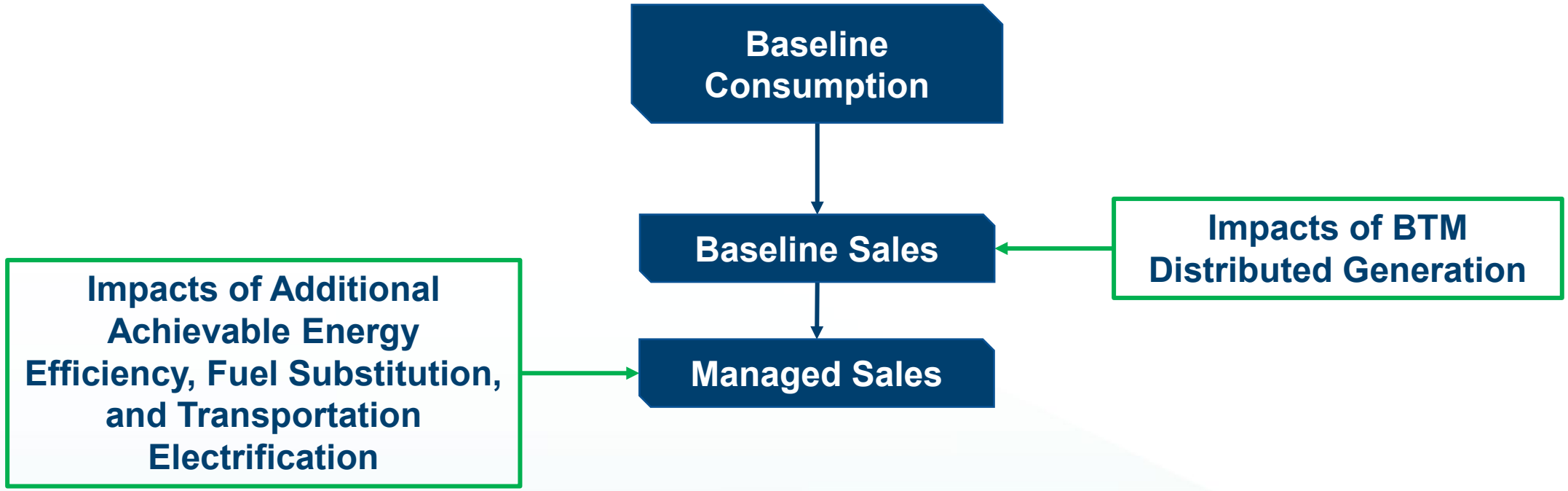
Gas Planning Areas

1. Pacific Gas and Electric
2. Southern California Gas Company
3. San Diego Gas & Electric
4. Other

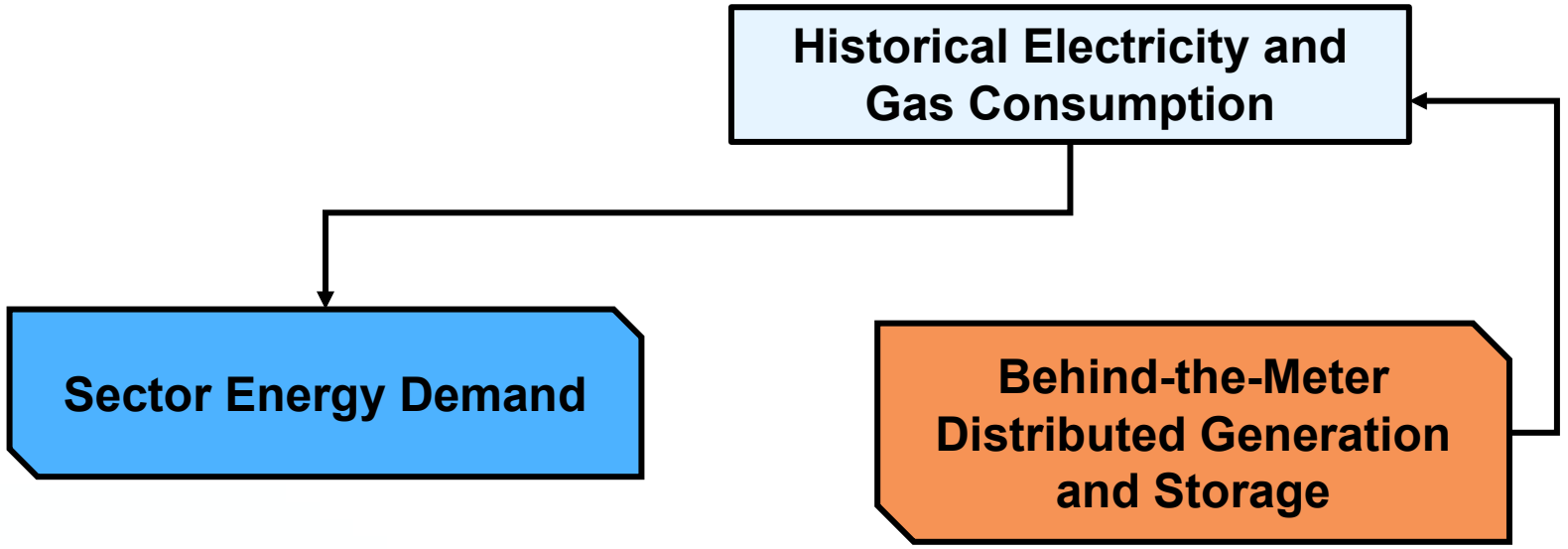
Forecast Zones

Planning Area	Forecast Zone
PG&E TAC Area	1. Greater Bay Area
	2. North Coast
	3. North Valley
	4. Central Valley
	5. Southern Valley
	6. Central Coast
SCE TAC Area	7. LA Metro
	8. Big Creek West
	9. Big Creek East
	10. Northeast
	11. Eastern
Northern California Non-California ISO (NCNC)	13. SMUD
	14. Turlock Irrigation District
	15. Remainder of BANC

Forecast Terminology

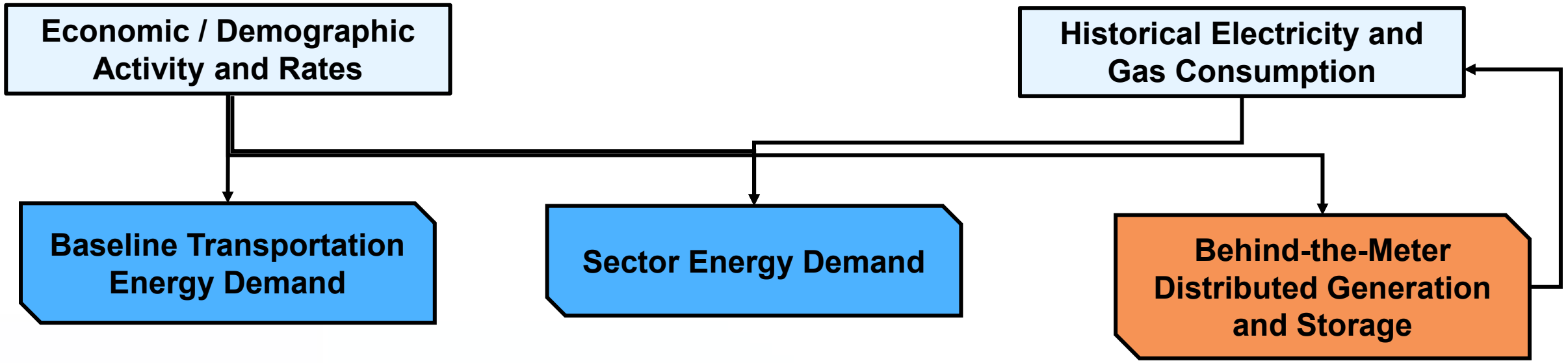


Energy Demand Model System (1)



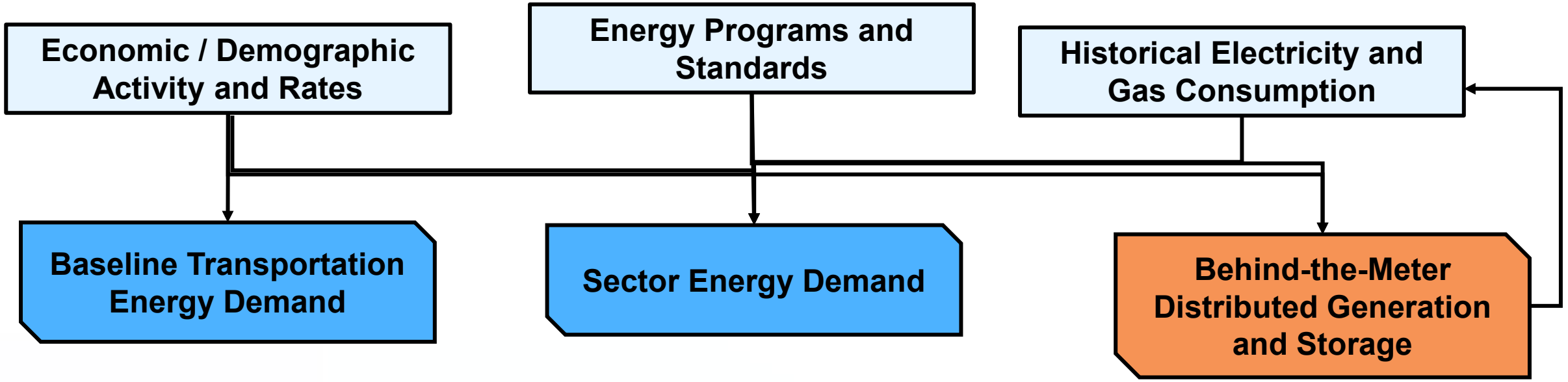
- Historical energy demand starts with latest sales data from QFER
- Estimates of historical distributed generation are added to historical sales data to estimate historical consumption
- Historical consumption data are provided to end use and NAICS based forecast models

Energy Demand Model System (2)



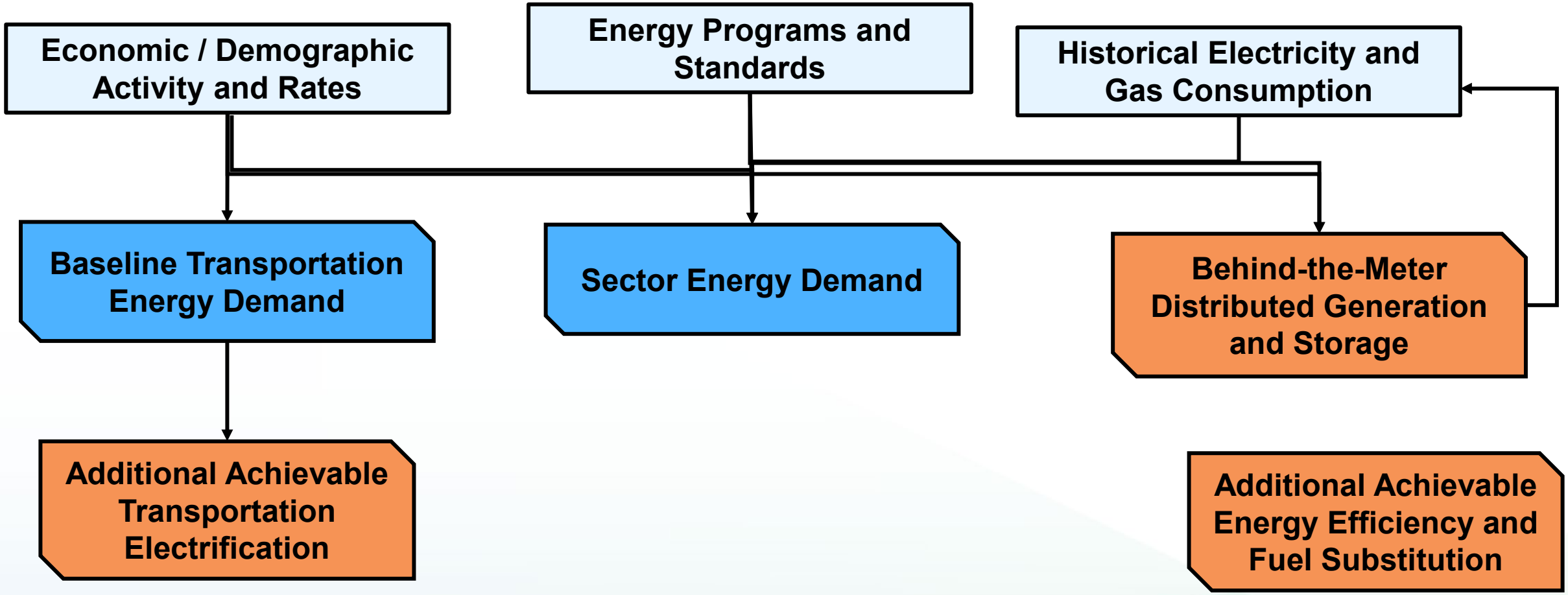
- Economic and demographic assumptions along with rate forecasts are inputs to the sector, distributed generation, and transportation models

Energy Demand Model System (3)



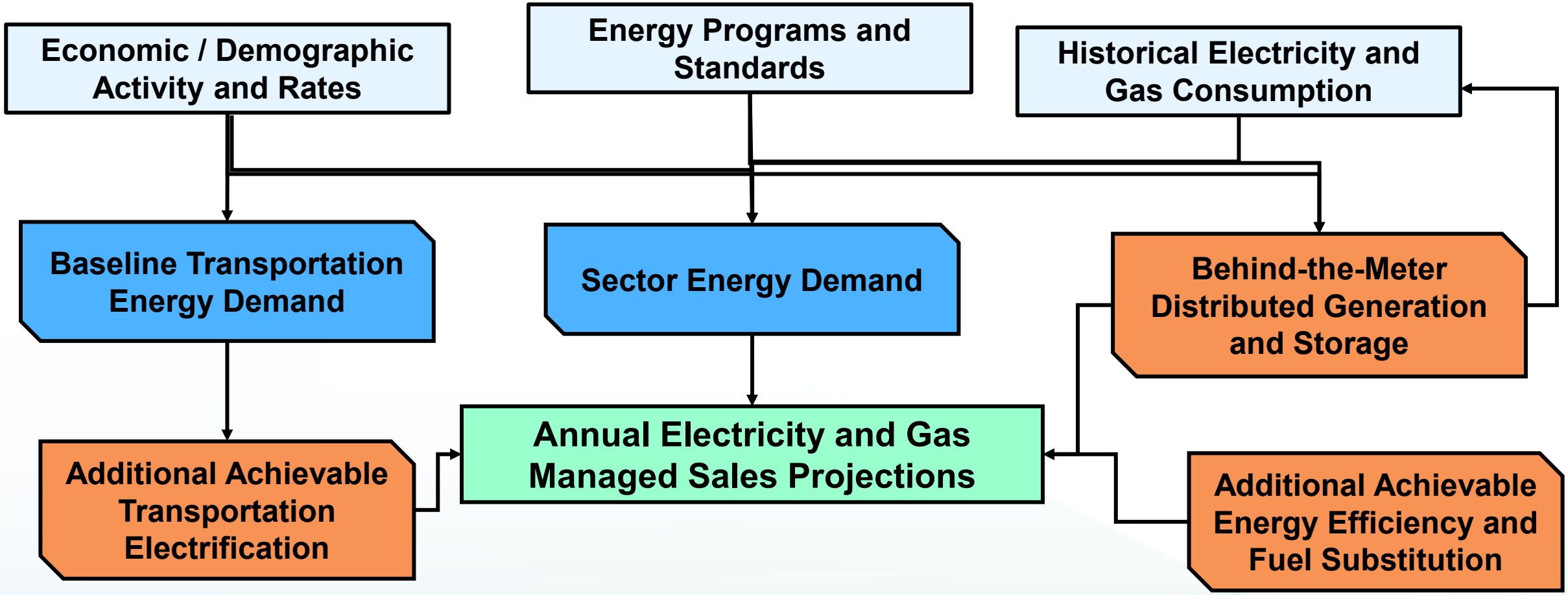
- Latest energy programs and standards estimates are provided to sector end use models
- BTM PV and storage projections consider Title 24 mandates for new construction

Energy Demand Model System (4)



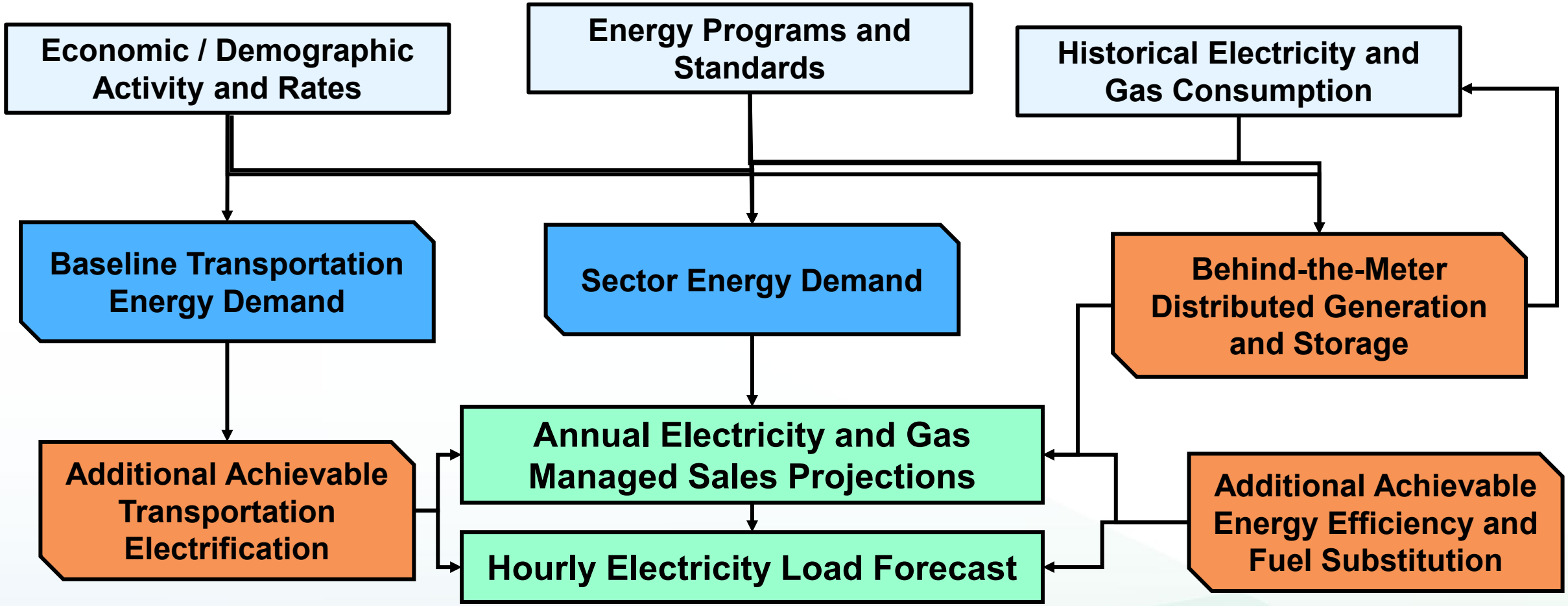
- Additional Achievable scenarios are developed for Energy Efficiency, Fuel Substitution, and Transportation Electrification

Energy Demand Model System (5)



- Load modifier results are combined with baseline consumption to create managed sales forecast scenarios

Energy Demand Model System (6)



- Electricity Results are fed into the hourly electricity load forecast
- Hourly load modifier profiles are integrated to create the managed hourly load forecast

2023 IEPR Forecast Updates

Input Updates

Historical Energy Consumption

- 2022 sales and consumption added to the historical dataset

Economic and Demographic Activity

- Moody's economic projections - May 2023
- Department of Finance
  - Population projections - July 2023
  - Household projections – September 2023

Rates

- Updated historical rates
- Updated assumptions for future rate impacts

Baseline Forecast

- Forecast to 2040
  - Supports CAISO's Transmission Planning Process, per SB 887
  - Extend to 2050 for long-term demand scenarios
- Refurbished residential end-use model
- Climate change
  - Integrate new climate simulation data

BTM PV and Storage Updates

- New Method for Determining Historical Capacity
  - Slightly lower estimate of PV capacity
  - Higher estimate for storage capacity
- New Market Adoption and Standalone Storage Models
- Net Billing Tariff (NBT)
- Federal Investment Tax Credit (ITC) extension

Additional Achievable Modifiers

- Efficiency and Fuel Substitution
  - Refresh Title 24
  - Update program accounting
  - Inclusion of CARB's zero-emission appliance standard (pre-rulemaking) in the Planning Forecast
    - Updated assumptions in collaboration with CARB
- Transportation Electrification
  - Account for Clean Miles Standard (eVMT)

2023 DAWG Meetings on Inputs, Assumptions, and Methodology

Forecast Area	Jun 1	Jul 31	Aug 8	Oct 26
Climate Change Methodology	X			
Electricity Rates				X
Transportation		X		X
Additional Achievable Energy Efficiency and Fuel Substitution				X
Behind-the-Meter Distributed Generation			X	X
Residential Sector End-Use Model			X	X

Link to DAWG Meetings

Next Steps

- Draft IEPR posted for public comment
  - Does not contain forecast results
- TBD: IEPR workshop on the hourly electricity demand results
- Dec 29: Written comments due
- Jan 2024: Forecast results posted and proposed for adoption
- Feb 2024: Final IEPR posted and proposed for adoption

Thank You!