2023 IEPR Forecast Overview and Model Updates

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California Energy Demand Forecast 2023, 2023-2040 (CED 2023)

Timeline

- Aug 15: Inputs and Assumptions Workshop
- Aug 18: Load Modifier Inputs and Assumptions Workshop
- Nov 15: Load Modifier Results Workshop
- Dec 6: Final Forecast Workshop
- Jan 2024: Forecast adoption

Demand Analysis Working Group (DAWG)

energy.ca.gov/programs-and-topics/topics/energy-assessment/demand-analysis-working-group-dawg

Today's Agenda

- Forecast Overview
- CED 2023 Updates
- Energy Consumption Historical Data
- Economic and Demographic Data and Projections
- Production Cost Modeling
- Retail Electricity Rates Forecast Assumptions

Aug 18 Load Modifier Inputs and Assumptions Workshop Agenda

Updates to:

- Distributed generation
- Climate change
- Hourly load model
- Additional Achievable Energy Efficiency
- Additional Achievable Fuel Substitution
- Transportation Forecast

CA Energy Demand Forecast (CED)

- 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
  - Scenarios for energy efficiency, building electrification, and transportation electrification
  - 1-in-2, 1-in-5, 1-in-10, and 1-in-20 year net electricity peak

Extreme Weather Events

- Extreme weather events are occurring more frequently

- Increased uncertainty in planning

- Planning must continuously adapt

- Historical weather data no longer sufficient for predicting future weather patterns

- Aug 18 presentation will discuss updates to the forecast to improve incorporation of climate change impacts

Reducing GHG Emissions

- California 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

Changes to Forecasted Net Peak

Planning Forecast Net Peak Demand for the 2018-2022 IEPRs
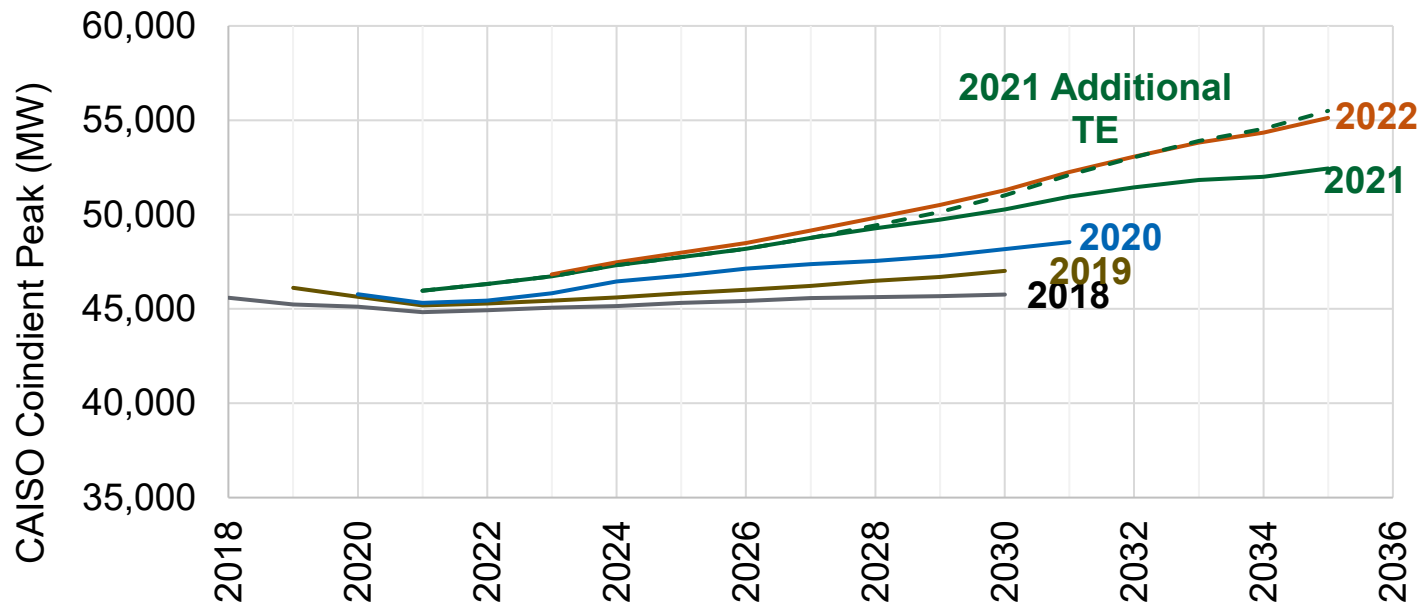
Changes are due to:

- Transportation electrification policies added in the 2021 ATE and 2022 CEDU
- AAFS included as of CED 2021
- Changes to peak normalization process to better reflect climate change
- Impact from BTM PV diminishes in later years as the peak hour shifts later in the day
- Economic, demographic, and rate projections as well as other baseline model updates

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
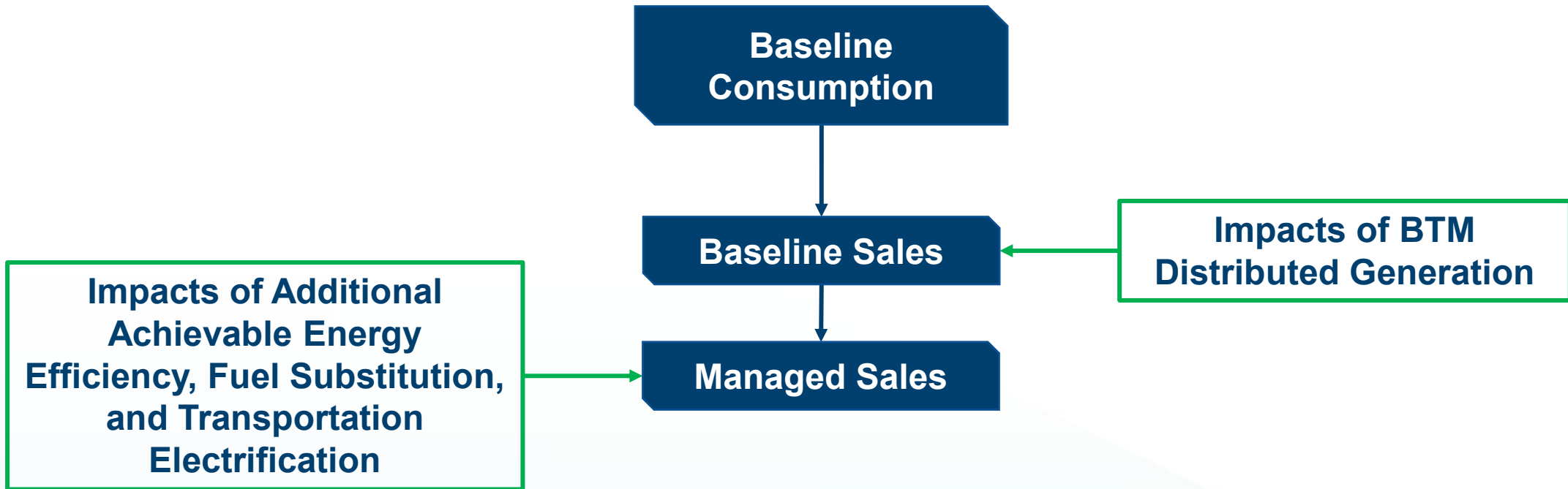3. San Diego Gas & Electric
4. Other

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

Forecasting Climate Zones
California, 2016

Legend:
- 0 - Other
- 1 - Greater Bay Area
- 2 - North Coast
- 3 - North Valley
- 4 - Central Valley
- 5 - Southern Valley
- 6 - Central Coast
- 7 - LA Metro
- 8 - Big Creek West
- 9 - Big Creek East
- 10 - Northeast
- 11 - Eastern
- 12 - SDG&E
- 13 - SMUD Service Territory
- 14 - Turlock Irrigation District
- 15 - Rest of BANC Control Area
- 16 - LADWP Coastal
- 17 - LADWP Inland
- 18 - Burbank/Glendale
- 19 - Imperial Irrigation District
- 20 - Valley Electric
- County Boundary

Source: California Energy Commission

Forecast Terminology

Energy Demand Model System (1)

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                                    │  Historical Electricity and │◄──┐
                                    │     Gas Consumption         │   │
                                    └─────────────────────────────┘   │
                                              │                       │
                    ┌─────────────────────────┘                       │
                    ▼                                                  │
         ┌──────────────────────┐         ┌──────────────────────────┐│
         │  Sector Energy Demand│         │    Behind-the-Meter      ││
         │                      │         │ Distributed Generation   ├┘
         └──────────────────────┘         │      and Storage         │
                                          └──────────────────────────┘
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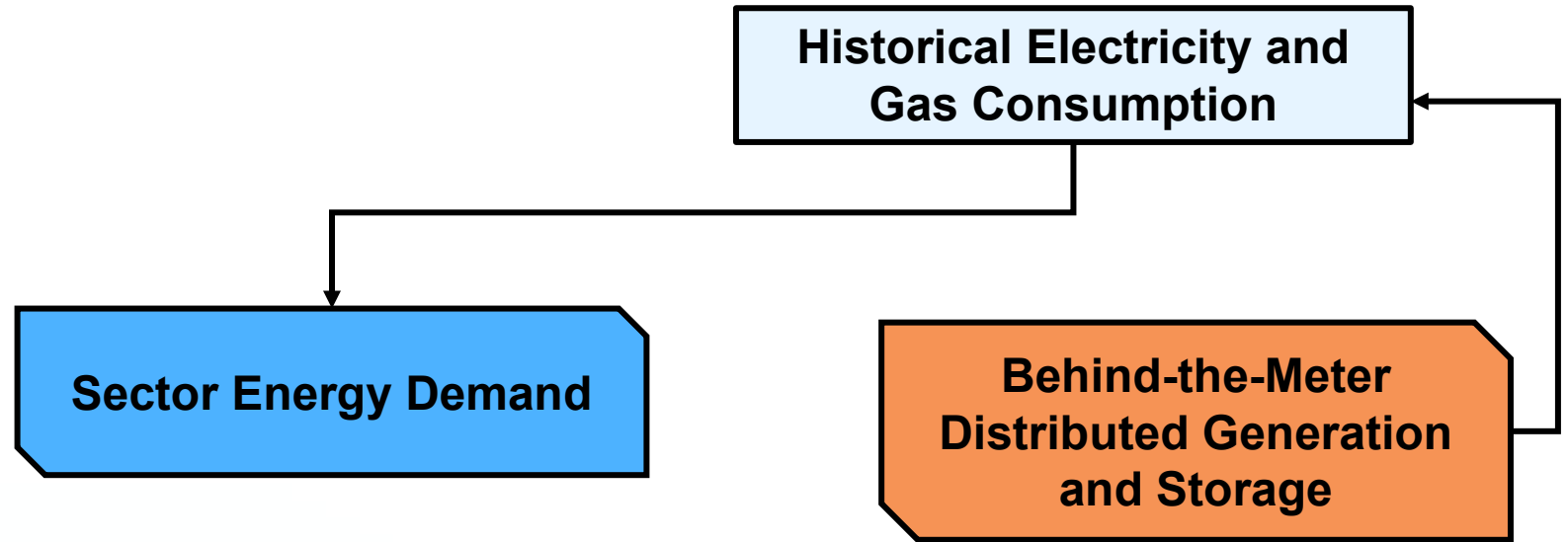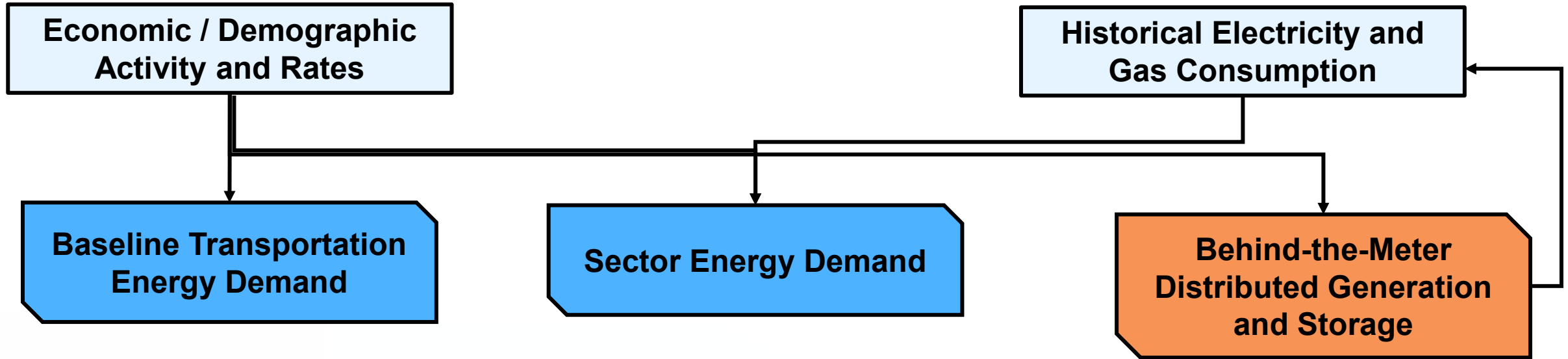
- Historical energy demand starts with latest sales data from QFER
- Estimates of historical self-generation are added to historical sales data to estimate historical consumption
- Historical consumption data are provided to end use and NAICS based forecast models
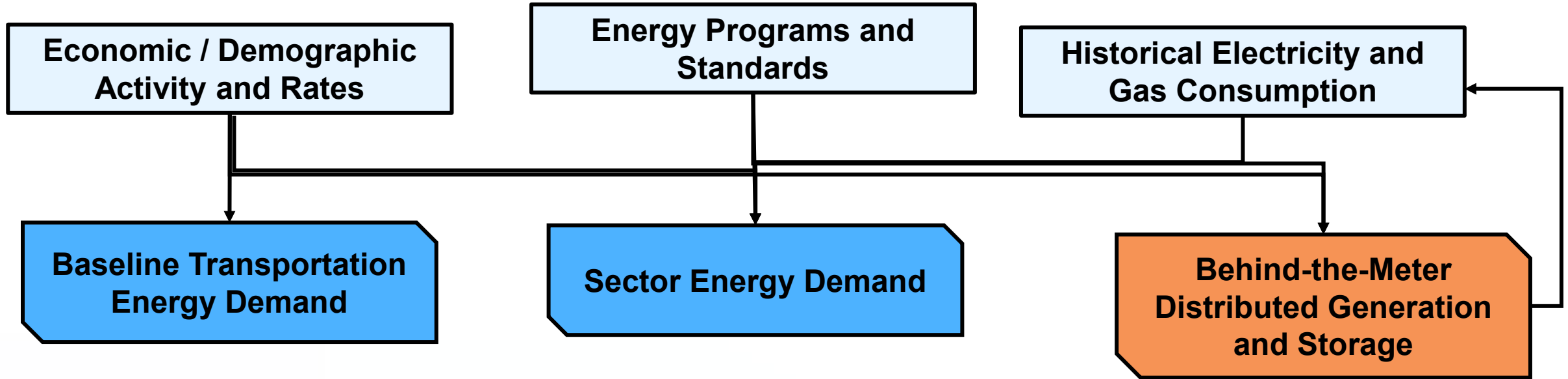
Energy Demand Model System (2)

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┌─────────────────────────┐                    ┌─────────────────────────┐
│ Economic / Demographic  │                    │ Historical Electricity  │
│   Activity and Rates    │                    │   and Gas Consumption   │
└─────────────────────────┘                    └─────────────────────────┘
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Baseline Transportation Energy Demand

Sector Energy Demand

Behind-the-Meter Distributed Generation and Storage

- Economic and demographic assumptions along with rate forecasts are inputs to the sector, distributed generation, and transportation models
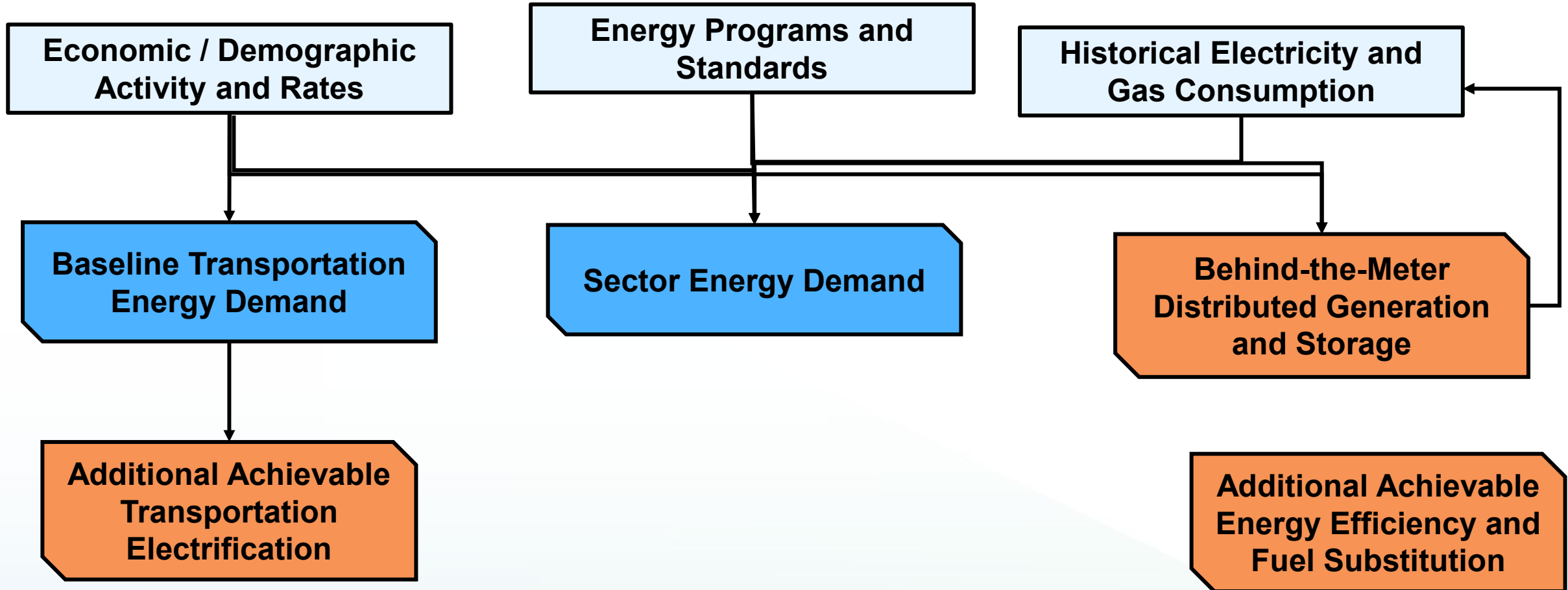
Energy Demand Model System (3)

- 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
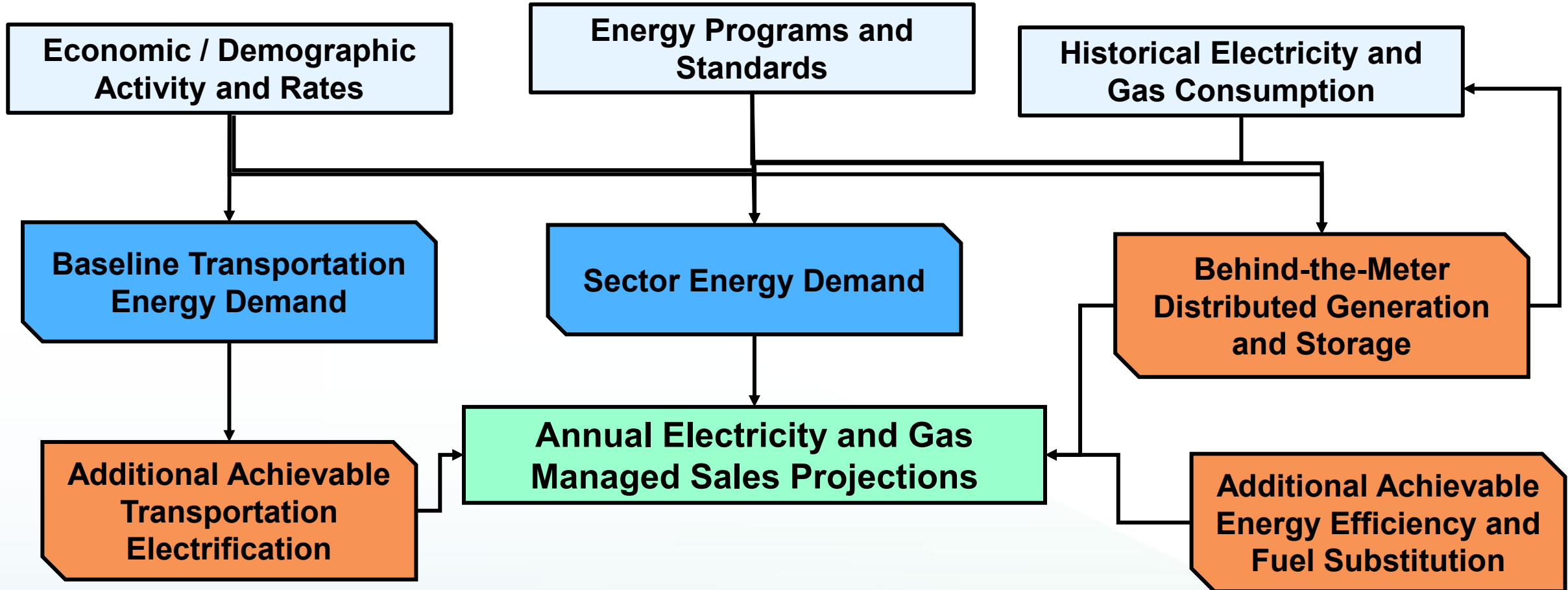
Energy Demand Model System (4)

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┌─────────────────────────┐   ┌─────────────────────────┐   ┌─────────────────────────┐
│ Economic / Demographic  │   │ Energy Programs and     │   │ Historical Electricity  │
│ Activity and Rates      │   │ Standards               │   │ and Gas Consumption     │
└─────────────────────────┘   └─────────────────────────┘   └─────────────────────────┘
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Baseline Transportation Energy Demand

Sector Energy Demand

Behind-the-Meter Distributed Generation and Storage

Additional Achievable Transportation Electrification

Additional Achievable Energy Efficiency and Fuel Substitution

- Additional Achievable scenarios are developed for Energy Efficiency, Fuel Substitution, and Transportation Electrification
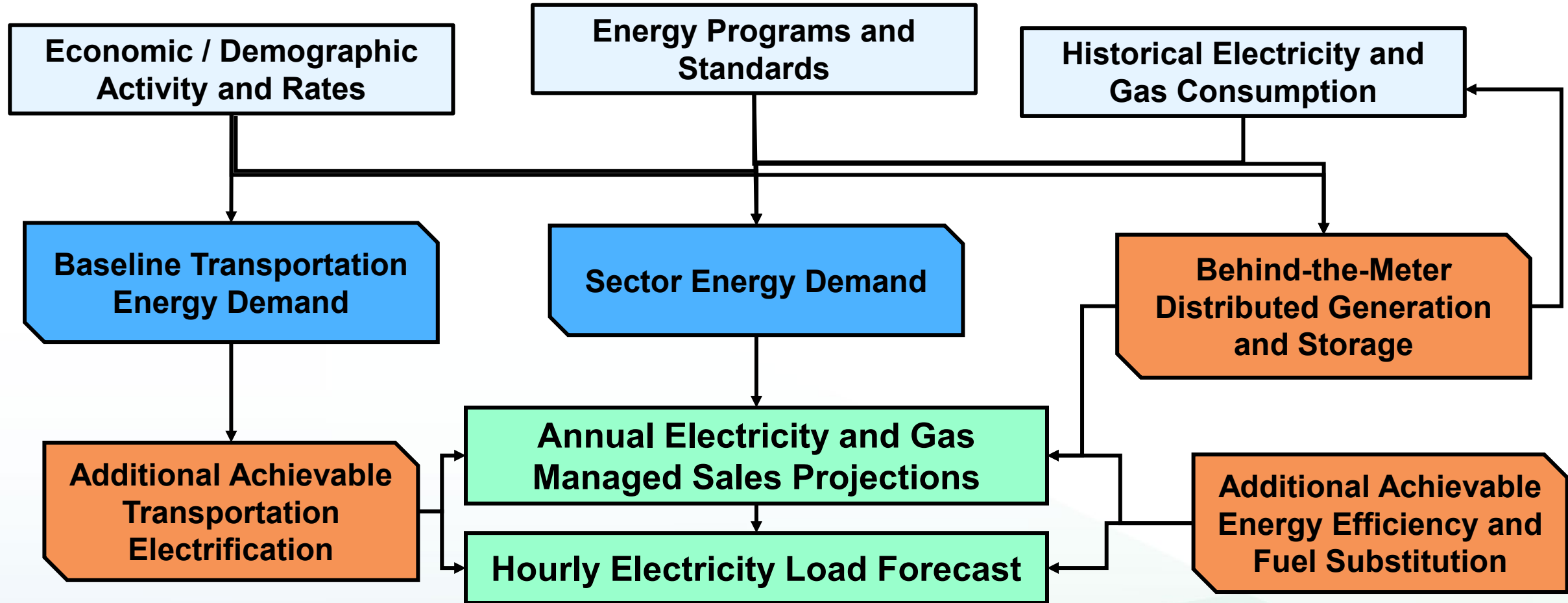
Energy Demand Model System (5)

- 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 Load Model
- Hourly load modifier profiles are integrated to create the managed hourly load forecast

2023 CED Updates

2023 CED Updates

- Forecast to 2040
  - Supports CAISO's Transmission Planning Process, per SB 887
  - Extend to 2050 for long-term demand scenarios

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

Input Updates

Historic Energy Consumption
- – Additional history, 2022 sales and consumption

Economic and Demographic Activity
- – Moody's economic projections - May 2023
- – Department of Finance
  - – Population projections - July 2023
  - – Households derived from population by CEC staff

Rates
- – Update historical rates
- – Updated assumptions for future rate impacts

Baseline Forecast

- Refurbished residential end-use model

- Climate change
    - Integrate new climate simulation data
    - Recharacterize normal and extreme peak events

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
  - Improve characterization of CARB's proposed zero-emission appliance standard

- Transportation Electrification
  - Account for Clean Miles Standard (eVMT)

Thank You!