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# CPUC's Integrated Resource Planning (IRP) Process

IEPR Commissioner Workshop on Use of the Forecast in Electricity System Planning

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California Public Utilities Commission

# Agenda

1. Background
   a. Overview of the CPUC's IRP Process
   b. How the IEPR Forecast fits into an IRP Cycle
2. How IRP Modeling Uses the IEPR Forecast
   a. IEPR in TPP Base Cases
   b. IEPR in Representative Sensitivities

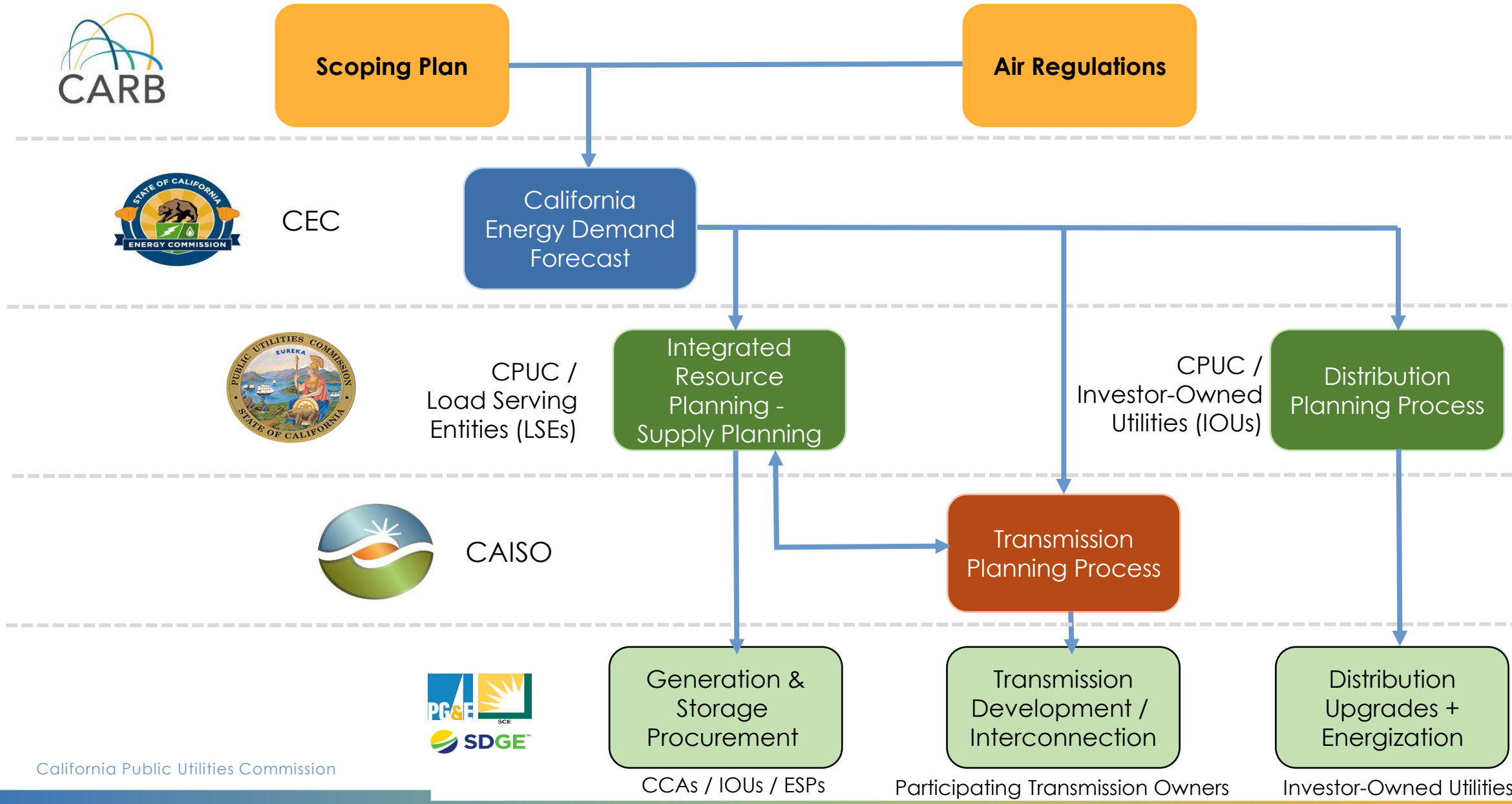
# Goals

- Provide overview of CPUC's IRP process and its role in transmission planning
- Describe how the IEPR forecast is used in IRP, including:
  - The CPUC-CEC-CAISO MOU and the "single forecast set" agreement
  - Where IEPR fits into an IRP cycle
  - How IEPR vintages differ among state planning process
- How IRP Modeling uses the IEPR forecast

# Background

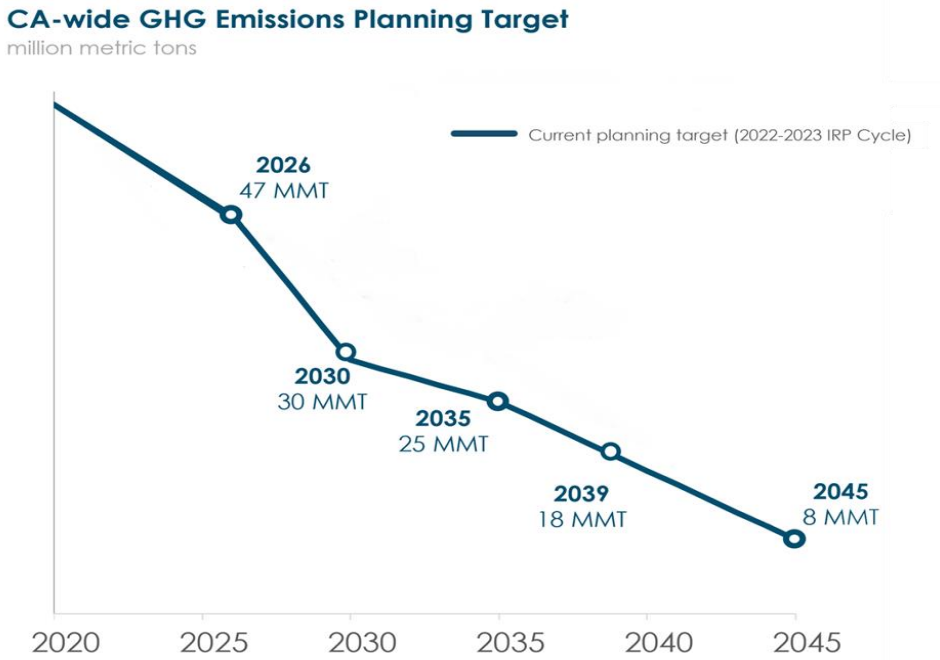
# Overview of the CPUC's IRP Process

# California Statewide Energy Planning Processes – High Level Overview



# CPUC & Integrated Resource Planning

- CPUC established the **Integrated Resource Planning** process for setting electricity resource planning targets for CPUC-Jurisdictional LSEs in CAISO's BAA
  - Consistent with SB 350 (2015) and SB 100 (2018)
  - Designed as a multi-step analytical planning process with input from load-serving entities and stakeholders
- IRP intends to achieve a resource portfolio that achieves:
  - Reliability
  - Greenhouse Gas Emission (GHG) reductions and clean energy procurement
  - Least cost
- Most recently adopted IRP "Preferred System Plan", which plans for a portfolio that could reduce GHGs by 58% in 2035 compared to 2020 levels




**Source**: CPUC February 2024 Preferred System Plan Portfolio, https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-power-procurement/long-term-procurement-planning/2022-irp-cycle-events-and-materials

# What does the CPUC's IRP Cycle look like?

## 1st Step of IRP Cycle

### 1. Set LSE Plan Filing Requirements

- CPUC conducts modeling to determine reliability, GHG, and other filing requirements for LSEs to use in their planning
- Use CARB Scoping Plan to derive range of GHG emissions levels for electric sector

## 2nd Step of IRP Cycle

### 2. LSE Plan Development & Review

- LSE portfolios reflect state goals and Filing Requirements
- LSE plans submitted to CPUC in the IRP proceeding
- CPUC checks aggregated LSE plans for GHG, reliability, and cost goals

### 3. CPUC Creates Preferred System Plan

- CPUC validates GHG, cost, and reliability of aggregated LSE plans
- CPUC provides procurement and policy guidance

**Preferred System Plan Decision**

## End of IRP cycle and beyond

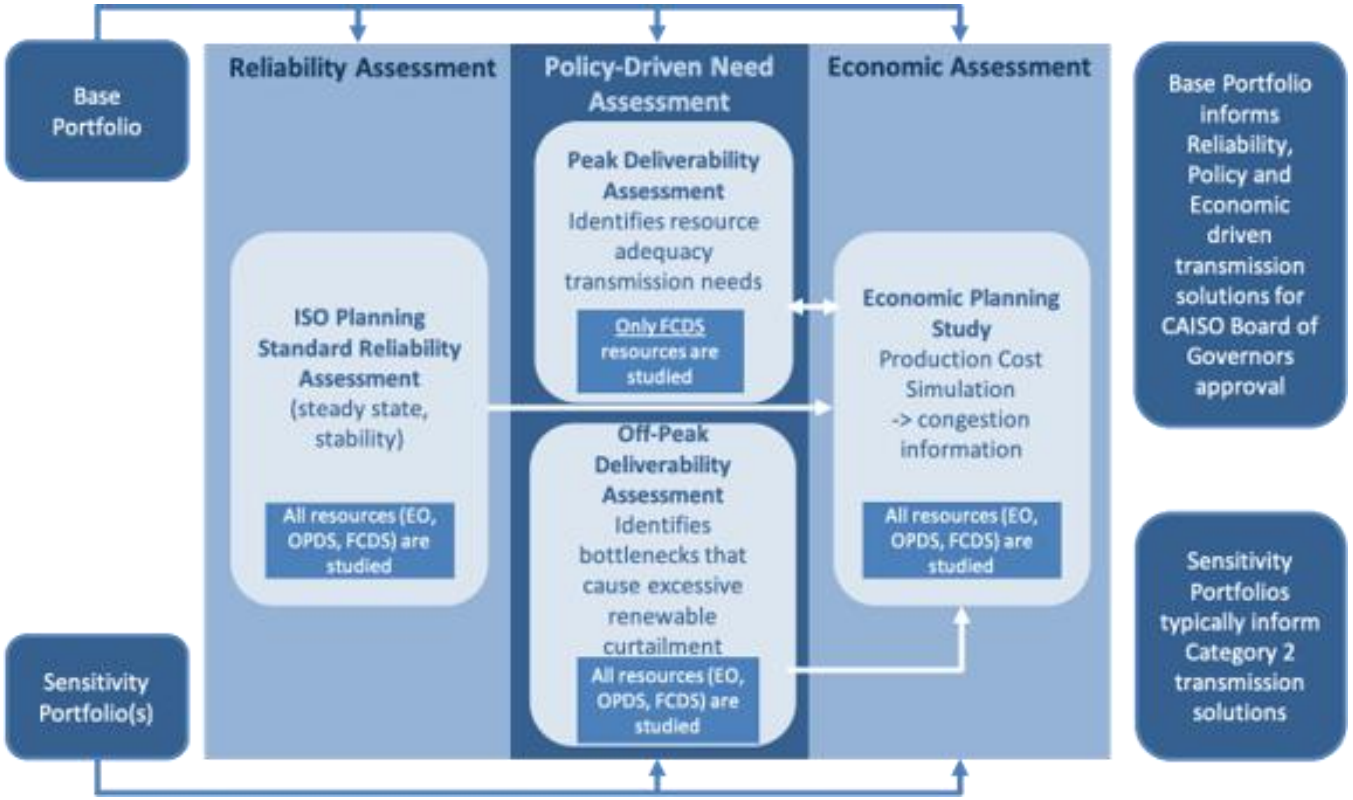
### 4. Procurement and Policy Implementation

- LSEs take action, including procurement
- CPUC monitors progress and decides if additional action is needed

**Portfolio(s) transmitted to CAISO for Transmission Planning Process**

# IRP Role in the CAISO's Transmission Planning Process

- TPP relies on CPUC developed resource portfolios and CEC developed load scenarios
  - In accordance with new CPUC-CEC-CAISO Dec. 2022 MOU, which replaced and expanded on the May 2010 MOU between the CAISO and the CPUC
- The CPUC typically transmits multiple distinct portfolios developed in the IRP process:
  - Reliability and Policy-Driven Base Case portfolio
  - Policy-Driven Sensitivity portfolio(s)
- Historically has focused on grid needs up to 10-years into the future but per Code § 454.57 (SB 887, 2022), portfolios passed to the CAISO will model out at least 15 years



# How the IEPR Forecast fits into an IRP Cycle

# CPUC-CEC-CAISO MOU

- In 2010, the CPUC, CEC, and CAISO entered into a memorandum of understanding (MOU) to coordinate on renewable generation planning and transmission planning
  - The MOU established the **"single forecast set,"** which seeks to, "use [IEPR Forecast] consistently in the transmission planning and resource procurement cycles to the extent possible given the sequencing of the different processes"
- Since then, the entities have taken additional measure to enhance coordination of load forecasting (CEC), resource planning (CPUC), and transmission planning (CAISO) and updated the MOU in 2022

# Where the IEPR is used in the CPUC's IRP cycle

**Abbreviation key**
- Load Serving Entity (LSE)
- Preferred System Plan (PSP)
- Transmission Planning Process (TPP)

LSEs are instructed to use specific IEPR forecast for preparing their IRPs, consistent with the interagency "single forecast set" agreement
- For 2022-23 IRP Cycle, LSEs were instructed to use the **2021 IEPR mid case**

1. LSE Plan Filing Requirements → 2. LSE Plan Development & Review → 3. CPUC Creates Preferred System Plan → 4. Procurement and Policy Implementation

CPUC validates GHG, cost, and reliability of aggregated LSE plans. Capacity expansion modeling and production cost modeling done to support developing a PSP portfolio relies on the updated available IEPR forecast
- For the 2022-23 IRP Cycle (2023 PSP/24-25 TPP), the PSP relied on the **2022 IEPR mid case**

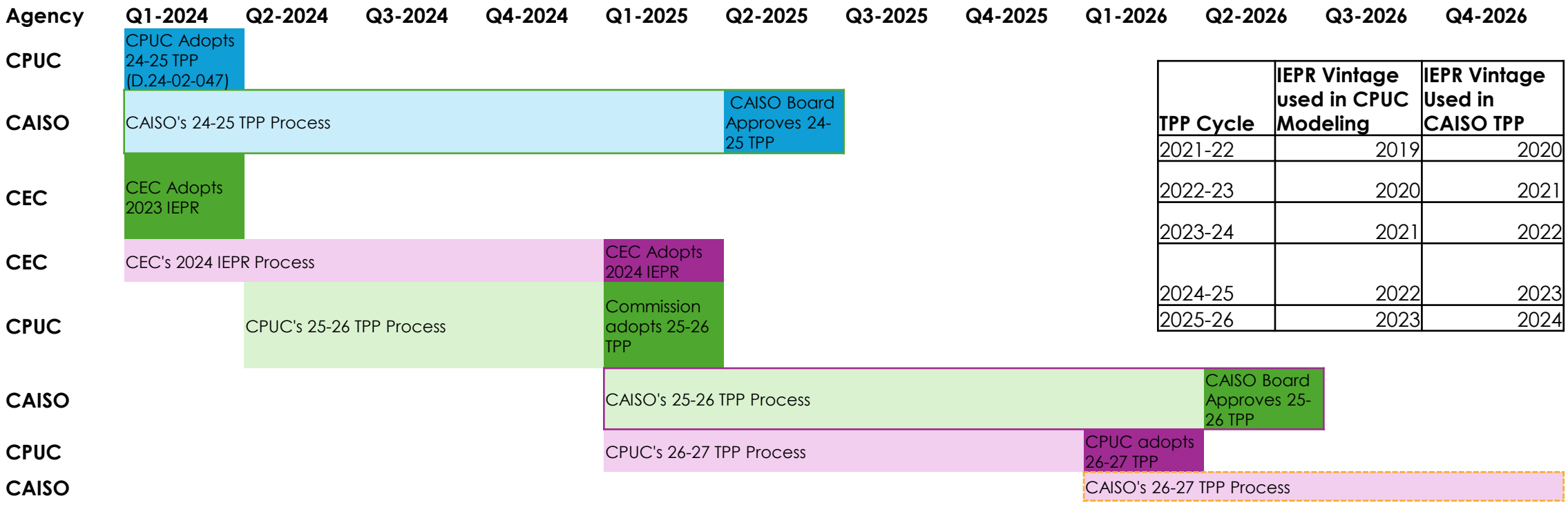
PSP/TPP Decision

Portfolio(s) transmitted to CAISO for TPP

For 24-25 TPP, CAISO is using the **2023 IEPR**

# IEPR Vintages in State Planning Processes

- CPUC begins modeling with the most currently adopted IEPR forecast (T) and adopts a TPP portfolio that is modeled with that IEPR
- The CPUC passes the TPP portfolio to the CAISO. The CAISO conducts its TPP process with the most currently adopted IEPR forecast (T+1)




| TPP Cycle | IEPR Vintage used in CPUC Modeling | IEPR Vintage Used in CAISO TPP |
|---|---|---|
| 2021-22 | 2019 | 2020 |
| 2022-23 | 2020 | 2021 |
| 2023-24 | 2021 | 2022 |
| 2024-25 | 2022 | 2023 |
| 2025-26 | 2023 | 2024 |

# How IRP Modeling Uses the IEPR Forecast

# How IEPR is use in IRP modeling

- IRP's adopted portfolios typically rely on IEPR California Energy Demand Forecast
  - Components used in IRP modeling include:

CAISO Baseline & non-CAISO loads

Baseline Light Duty EVs

Additional Light Duty EVs (AATE-LDV)

Baseline Medium Heavy Duty EVs

Additional Medium-Heavy Duty EVs (AATE-MHDV)

Building Electrification (AAFS)

Building Electrification (FSSAT)

BTM Storage Losses

Energy Efficiency (AAEE)

- IRP models use both energy consumption forecast and demand modifiers and demand-side generation from IEPR

# IEPR in TPP Base Cases

# 25-26 TPP Proposed Base Case vs. 24-25 TPP vs. 23-24 TPP

| | 25-26 TPP Proposed Base Case | 24-25 TPP | 23-24 TPP |
|---|---|---|---|
| IEPR Vintage | 2023 | 2022 | 2021 ATE |
| 2035 | | | |
| Peak load (GW) | 67.5 | 64.0 | 66.5 |
| Annual energy demand (TWh) | 332 | 322 | 336 |
| Total resources selected (GW) | 62.9 | 56.8 | 73.0 |
| Gas selected (GW) | - | - | 0.1 |
| Gas not retained (Negative = not retained) | - | - 2.7 | - |
| 2040 | | | |
| Peak load (GW) | 74.4 | 70.0 | 74.9 |
| Annual energy demand (TWh) | 386 | 364 | 404 |
| Total resources selected (GW) | 98.8 | 81.0 | 106.6 |
| Gas selected (GW) | - | - | 4.8 |
| Gas not retained (Negative = not retained) | - | - 2.7 | - |
| Annual Costs Net Present Value (NPV) | | | |
| Est. Annual Costs ($MM)* | $228,677 | $222,515 | $263,099 |

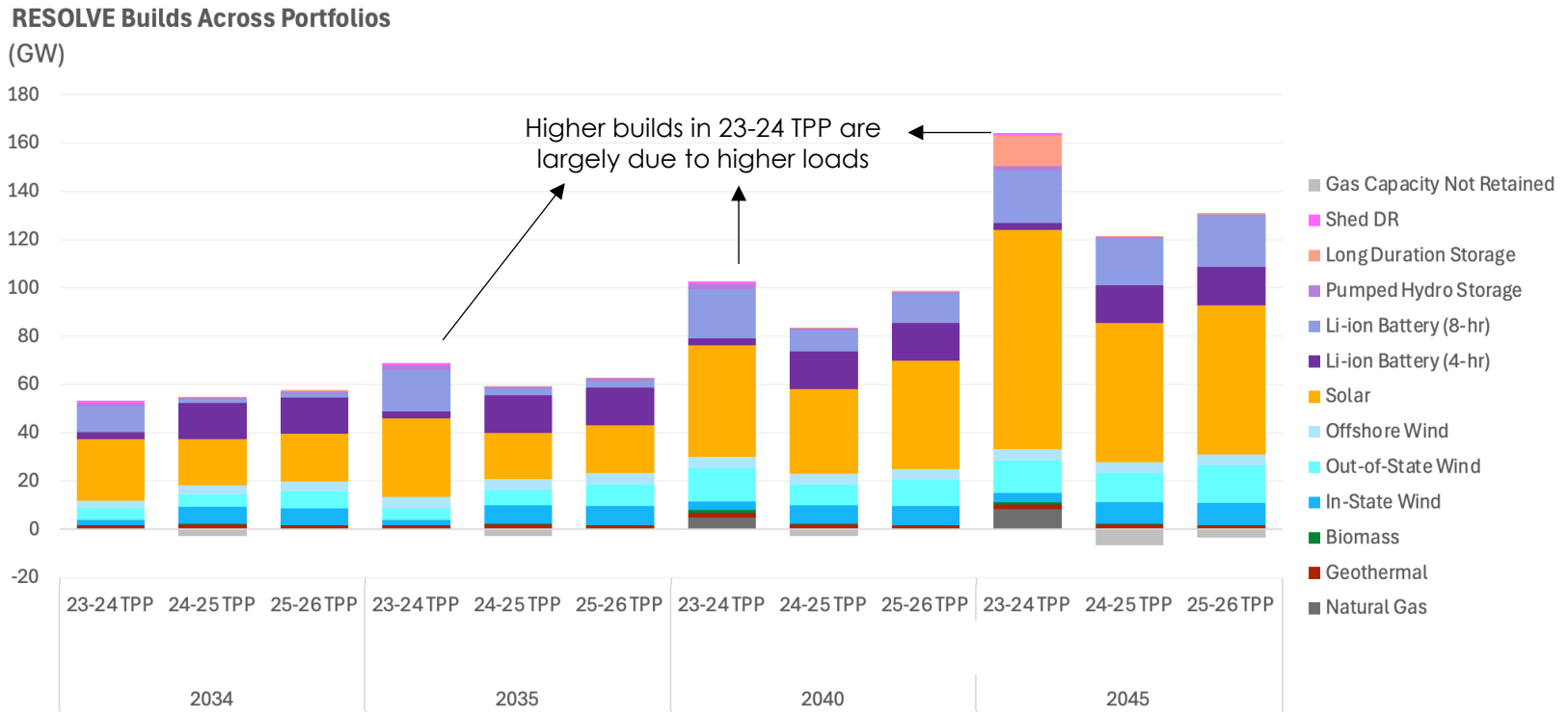
*Note: 2023 builds in 23-24 TPP are removed in results shown to enable more consistent comparison; costs for 23-24 TPP converted from 2019$ to 2022$*



All loads are for CAISO
*Excludes non-optimized costs, which represent ~75-80% of system costs

# Comparison of Planned & Selected Capacity (GW)

- Differences in resource buildout are driven by differences in **load**, **resource economics**, and **GHG targets**
- The 2021 IEPR (used in 23-24 TPP) has significantly higher (8-12%) annual loads by 2045, which combined with different resource economics modeled, results in **significantly larger amounts of solar and long duration storage in 23-24 TPP***
- The **23-24 TPP** has a less stringent GHG target by 2045 (15 MMT vs. 8 MMT), allowing for **new gas build**



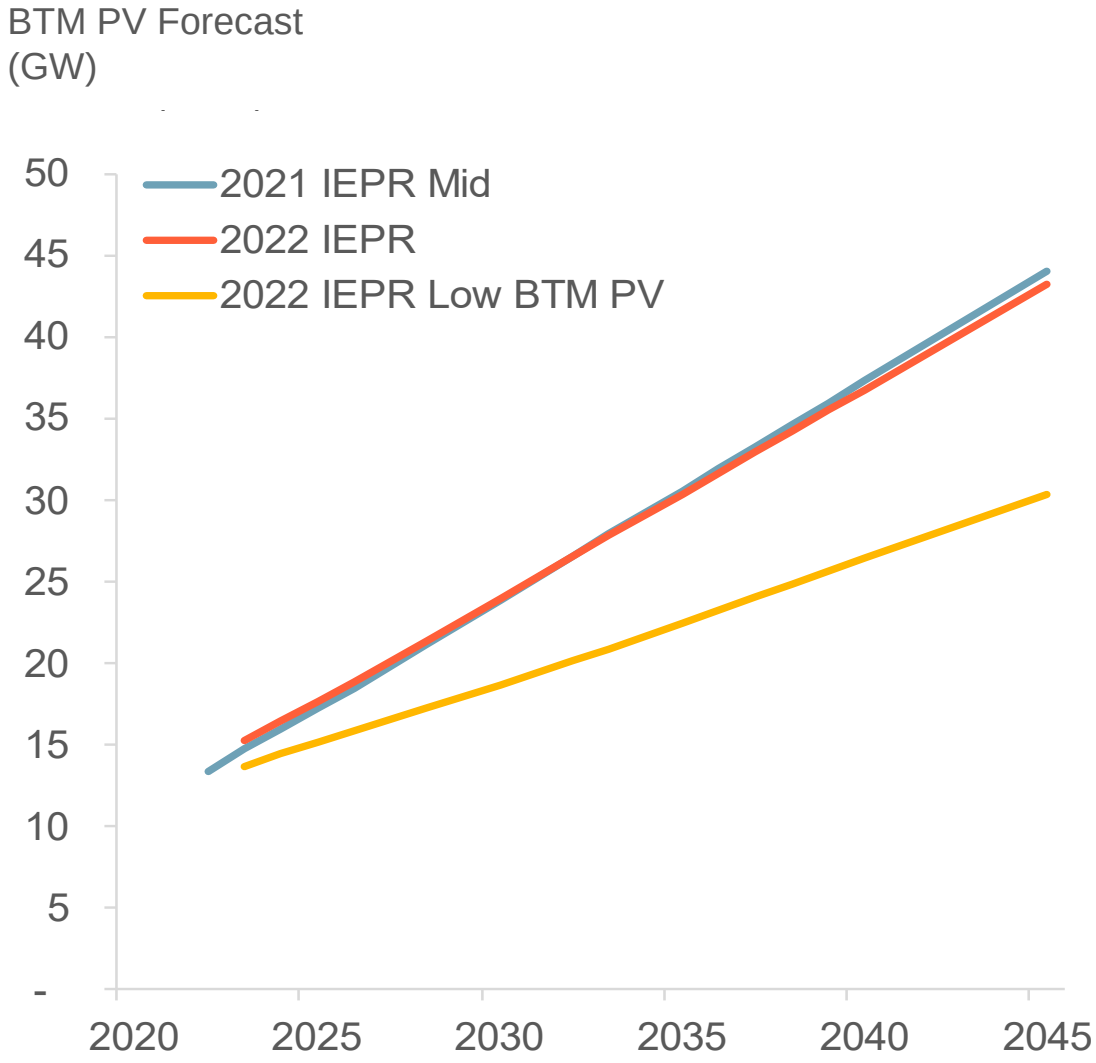

*Note: 23-24 TPP modeled 4-hr and 8-hr batteries in aggregate; these are separated for the purpose of this analysis based on the average battery duration of the 23-24 TPP portfolio*
*Note: 2023 builds and other baseline differences in 23-24 TPP are removed in results shown to enable more consistent comparison*
**Long Duration Storage in the 23-24 TPP are 8-hour Flow Batteries, which were not subject to transmission constraints. Biomass was also not subject to transmission constraints in the 23-24 TPP*
***2045 is not used in the TPP planning portfolio*

# IEPR in Representative Sensitivities

# Resource Availability Sensitivities

## Low BTM PV Growth

- IRP modeling also routinely considers sensitivity analyses
- The 2022-23 IRP Cycle included a sensitivity that tested what replacement resources are needed if customer-sited, behind-the-meter (BTM) solar growth is lower than expected
  - There is ~30% less capacity by 2045 in the Low BTM PV forecast



# Questions?