

CPUC Perspectives on Electric Sector Decarbonization

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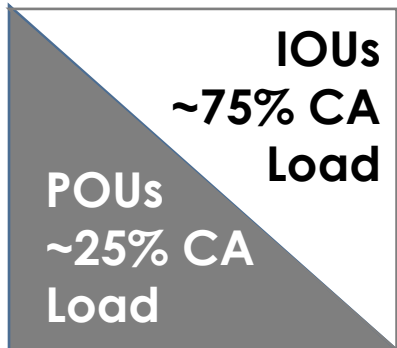


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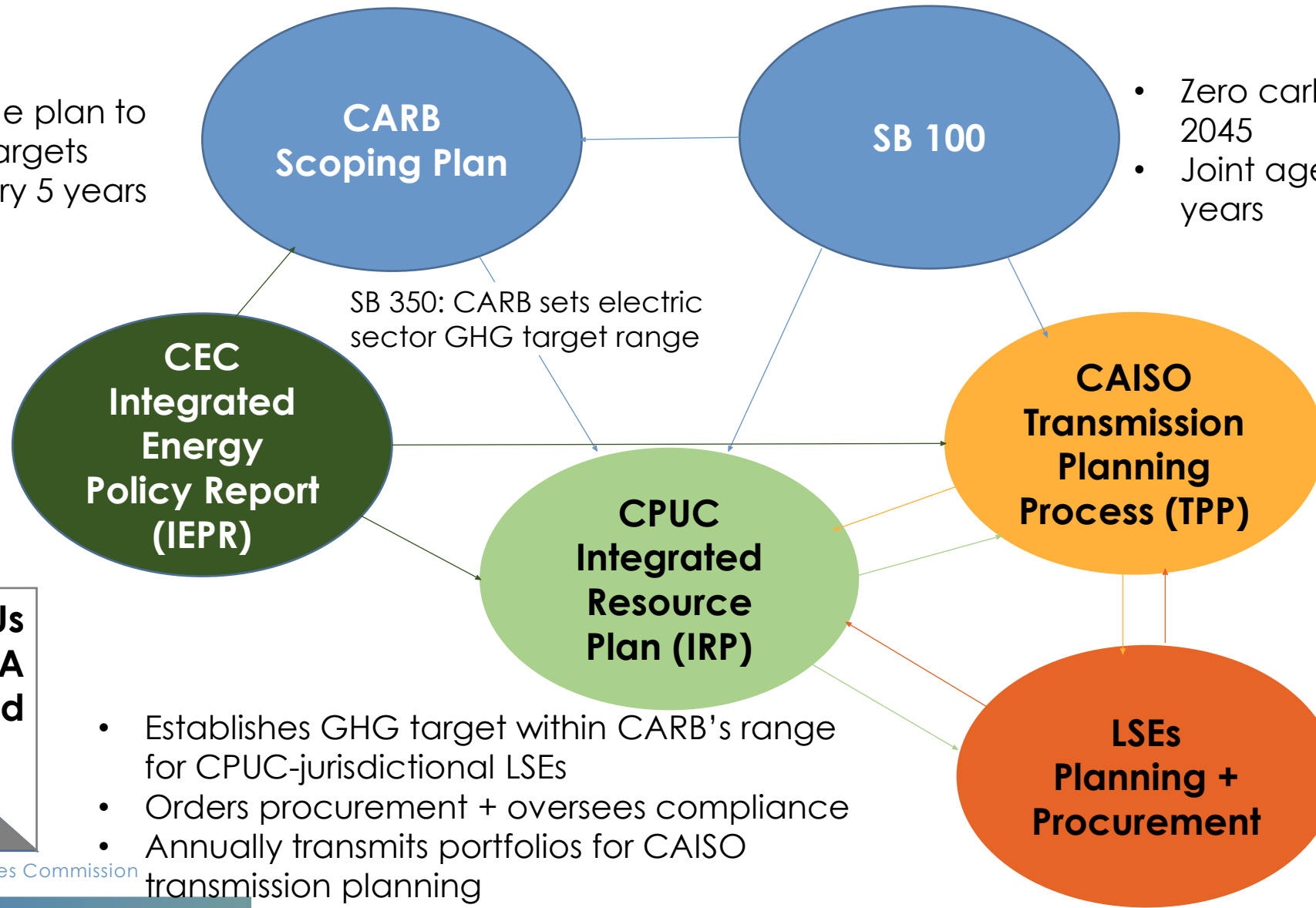
California's Electricity Planning Ecosystem

- Economy-wide plan to reach GHG targets
- Updated every 5 years

- Demand forecast for infrastructure planning
- Updated annually



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SB 350: CARB sets electric sector GHG target range

- Zero carbon electricity by 2045
- Joint agency report, every 4 years

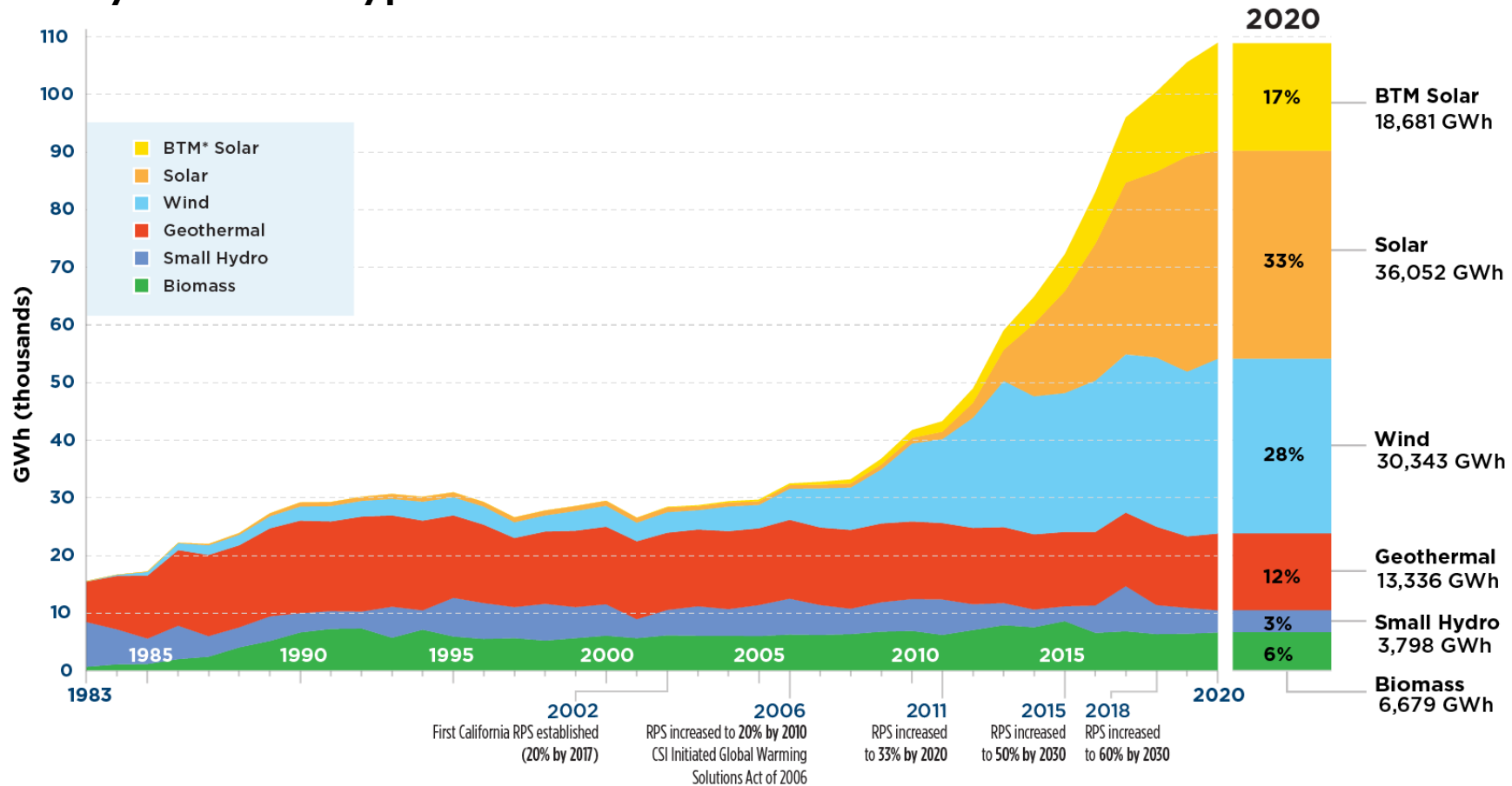
- Assess transmission needs
- Conceptually approves new projects
- Updated annually

- Establishes GHG target within CARB's range for CPUC-jurisdictional LSEs
- Orders procurement + oversees compliance
- Annually transmits portfolios for CAISO transmission planning

- Plans filed per SB 350 + CPUC guidance
- Procurement in compliance w/ CPUC directives


Where we are today: Clean Energy Build-out So Far


Figure: Total Renewable Generation Serving California Load by Resource Type




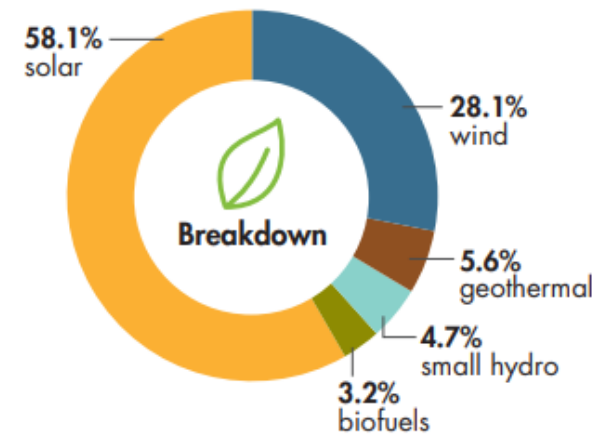
Where we are today: Breaking Clean Energy Records

- In 2020, California's generation mix was approx. 60-65% carbon-free
- Since July 2020, more than **3,800 MW nameplate** (2,000 MW NQC) of new renewables and storage have come online.
- **2021: A record year for renewables in California**

 **Solar peak *NEW!***
12,913 MW
Mar 31, 2021 at 3:03 p.m.
Previous record:
12,335 MW, Mar 1, 2021

 **Wind peak *NEW!***
5,497 MW
Mar 13, 2021 at 6:33 p.m.
Previous record:
5,318 MW, Apr 30, 2020

 **Peak renewables serving load *NEW!***
92.5%
Mar 13, 2021 at 12:32 p.m.
Previous record:
89%, Feb 27, 2021



- On March 13, 2021, at 12:32pm, **92.5%** of CAISO load was met by renewables
- As of October 2021, more than **25,000 MW** (nameplate) of renewables have been installed, roughly half the total installed capacity in CAISO territory.

Near- and mid-term planning and procurement activities at CPUC

- In Nov. 2019, CPUC ordered **3,300 MW** of reliability procurement for years **2021-2023** (D.19-11-016)
- In March 2020, CPUC adopted a “Reference System Plan” for CPUC-jurisdictional LSEs showing a need for ~18,000 MW of new nameplate capacity by 2026 (D.20-03-028)
- In June 2021, CPUC ordered **11,500 MW NQC of clean energy resources** for years **2023-2026**, including 2,000 MW from long duration storage (eight hours or greater duration) and clean firm resources such as geothermal (D.21-06-035)*
 - Responds to more extreme weather events and the need to replace over 3,700 MW of retiring natural gas plants and 2,200 MW from Diablo Canyon Power Plant.
 - Does not allow fossil generation to qualify.

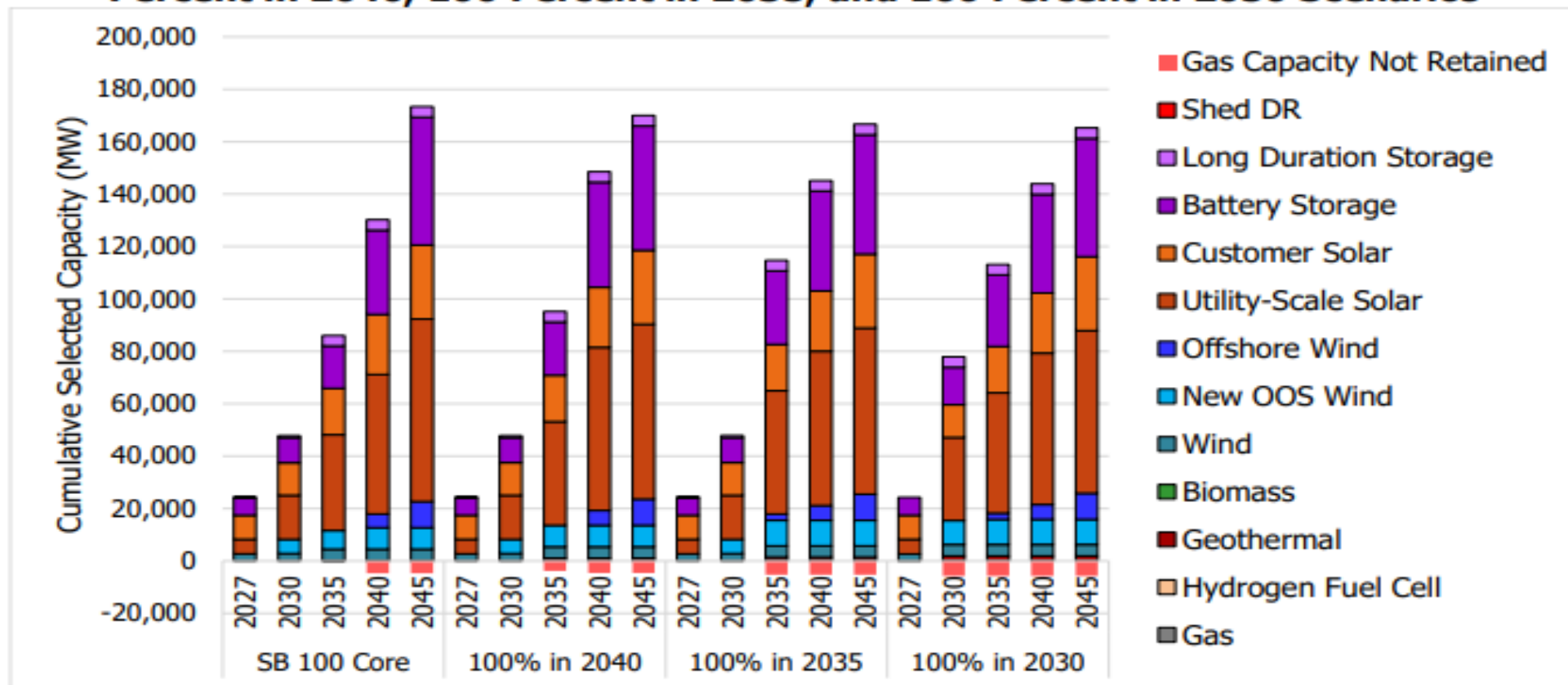
*While the order specifies procurement of 11,500 MW of NQC, the total nameplate capacity of these resources is expected to exceed 14,000 MW depending on the technologies implemented in compliance with the order.

Long-term planning activities (2030 and beyond)

- SB 100 sets a 2045 goal of powering **100% of retail electricity** sold in California and state agency electricity needs with **renewable and zero-carbon resources**
- CPUC, in coordination with its sister agencies, uses the 2045 target to ensure our current planning and procurement decisions support the transition toward full electric sector decarbonization
- In Dec. 2021, CPUC is expected to adopt a Preferred System Plan that:
 - Establishes a (potentially new) **electric sector GHG reduction target for 2030** to keep the state on track to achieve its 2045 goals.
 - Approves a planning portfolio showing **over 40,000 MW of new clean energy** needed by 2032 to achieve that target.

Looking Ahead: Resource Build Rates (SB 100 Study)

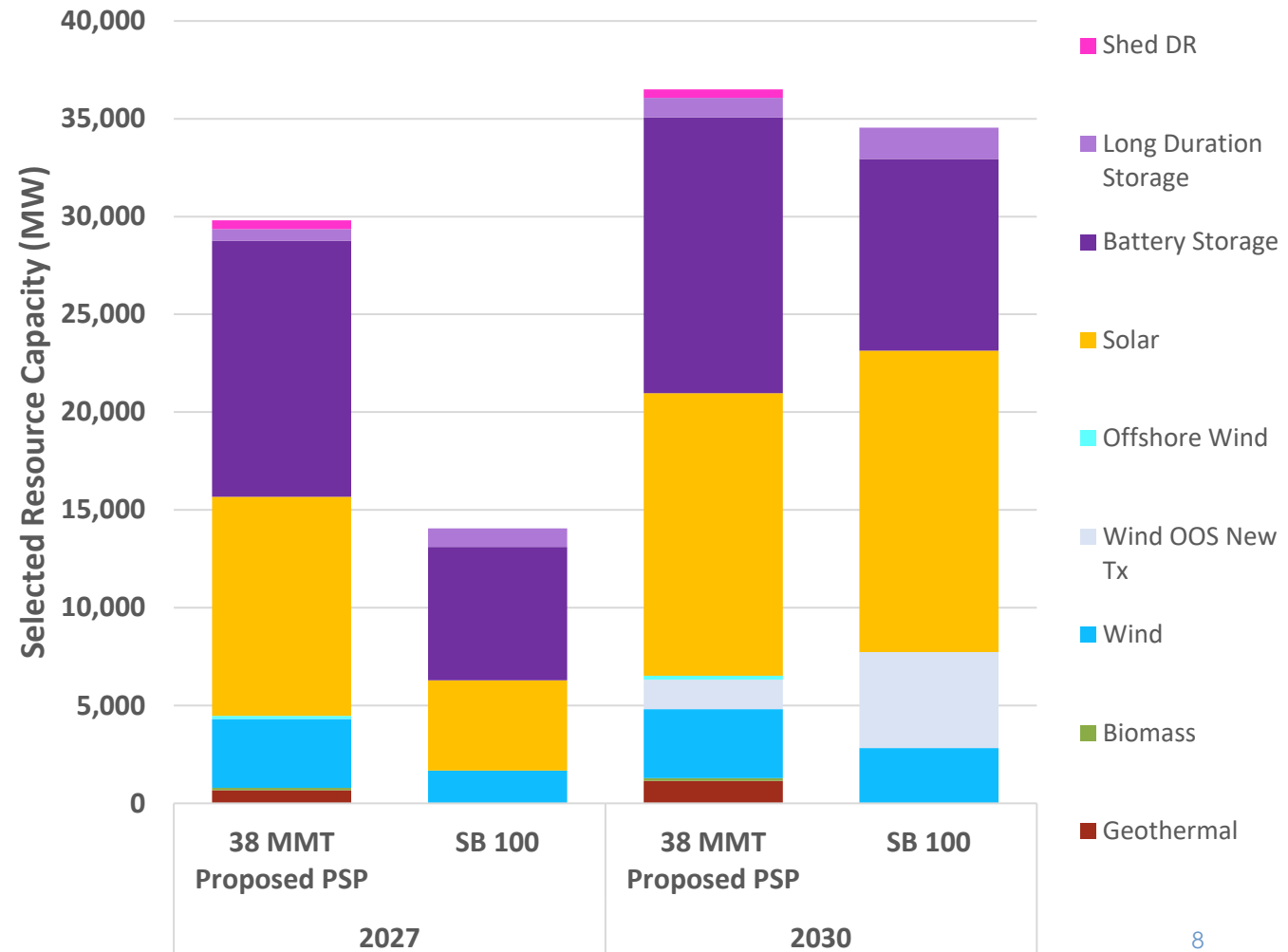
Figure 9: Cumulative Capacity Additions for the SB 100 Core (2045 SB 100), 100 Percent in 2040, 100 Percent in 2035, and 100 Percent in 2030 Scenarios



Source: CEC staff and E3 analysis

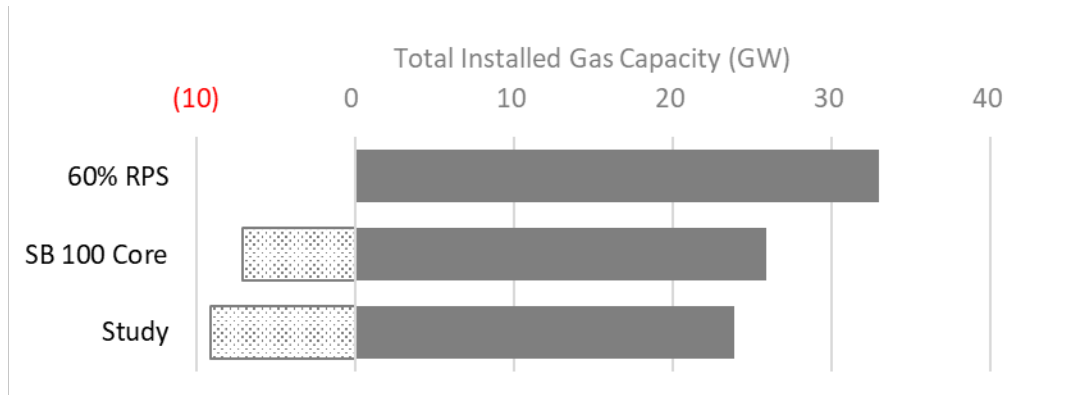
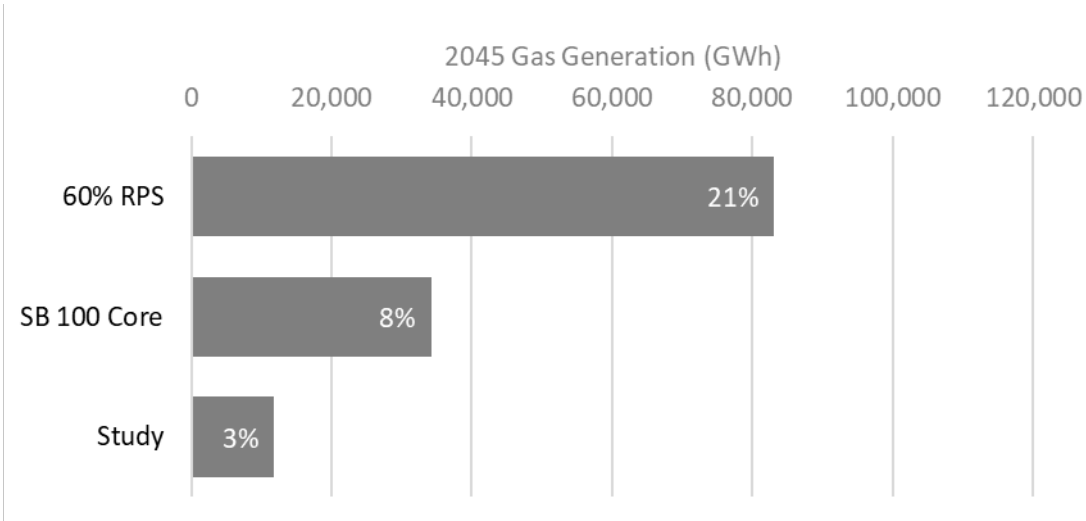
New Resource Build-out Trajectory

- The CPUC proposed a [Preferred System Plan \(PSP\) via Ruling in August](#) that would establish an electric sector GHG target of **38 MMT** in 2030
- The proposed PSP by 2030 is broadly consistent with the build-out trajectory of SB 100 and **90% zero carbon electricity by 2035**
 - Near-term build-out in the proposed PSP is higher than the SB 100 scenario because it includes recently ordered IRP procurement (11,500 MW NQC or ~14,000 MW nameplate by 2026) via [D.21-06-035](#)



Fossil usage declining, but some gas capacity still needed for reliability in 2045

SB 100 Scenarios - Reference Demand - Year 2045



Relying on natural gas for a small fraction of total generation avoids the need for large investments in infrequently used capacity, helping to achieve ~92% clean electricity by 2045 while keeping costs down.

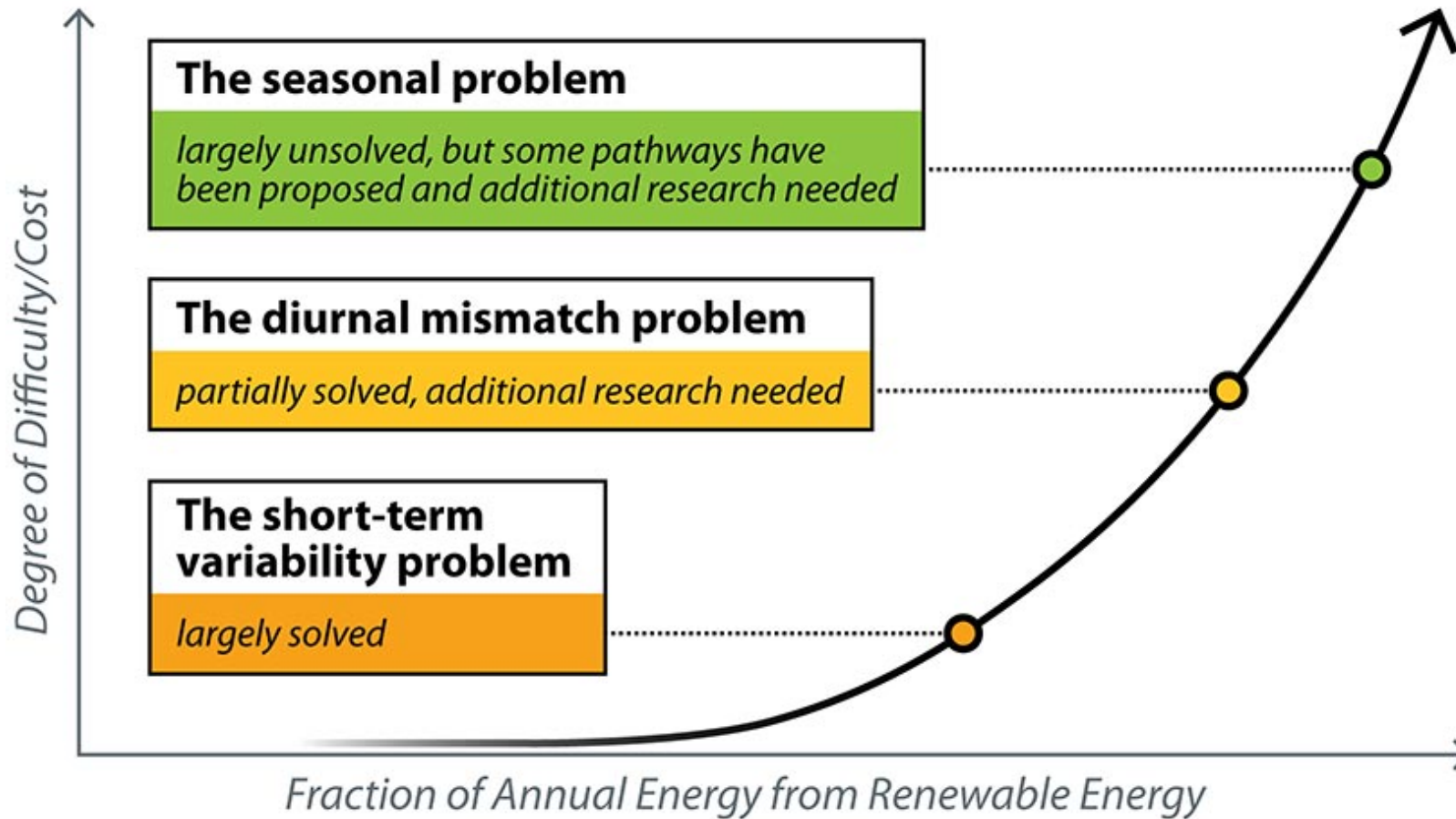
Scenario Definitions

60% RPS: Counter-factual scenario where 60% RPS from 2030 to 2045 is the only clean energy constraint.

SB 100 Core: 100% of retail electric sales served by renewable and zero carbon sources by 2045.

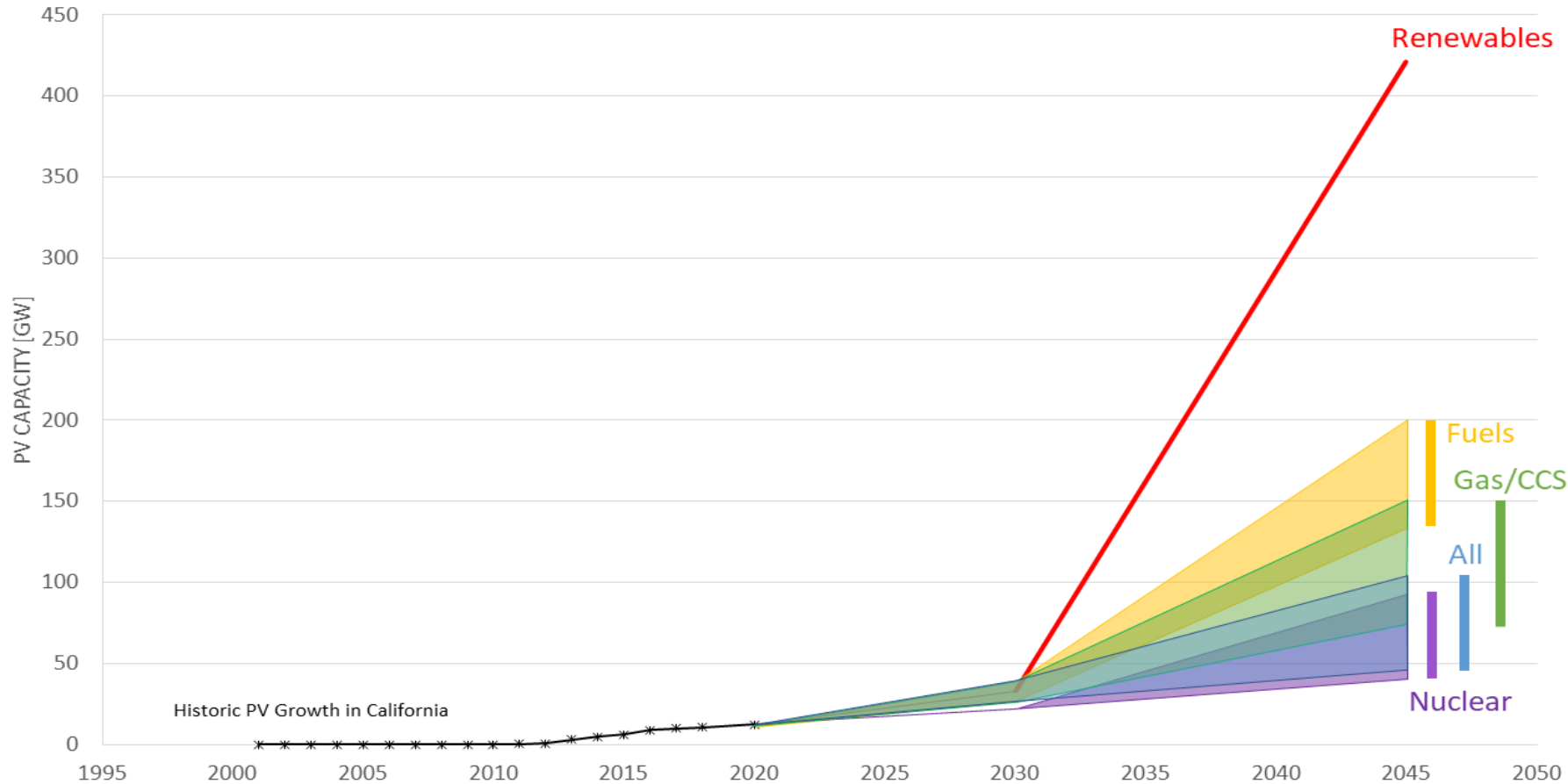
SB 100 Study: Same as SB 100 Core but with expanded load coverage to include storage and T&D losses.

Full decarbonization of the grid will require innovation



Technological and economic barriers to full decarbonization remain high.

Getting to a zero emissions grid without “clean firm” resource types will be difficult



- Clean firm resources could reduce resource build-out needs by 50% or more by 2045 to fully decarbonize the grid.
- Without clean firm power, the CAISO system would need a renewables build-out equivalent to half the existing generation capacity of the entire United States.

