DOCKETED	
Docket Number:	19-IEPR-07
Project Title:	Electricity Sector
TN #:	229969-3
Document Title:	Integrated Resource Planning (IRP)
Description:	Presentation by Molly Sterkel, California Public Utilities Commission
Filer:	Raquel Kravitz
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	10/6/2019 4:40:51 PM
Docketed Date:	10/7/2019

Integrated Resource Planning (IRP)

IEPR Commissioner Workshop on Offshore Wind

October 3, 2019

California Public Utilities Commission

Outline

- Existing System On Track to Meet 2030 Goal
- California's IRP Background and Framework
- IRP Modeling and Assessment of Resource Needs
- Next Steps for IRP and Offshore Wind

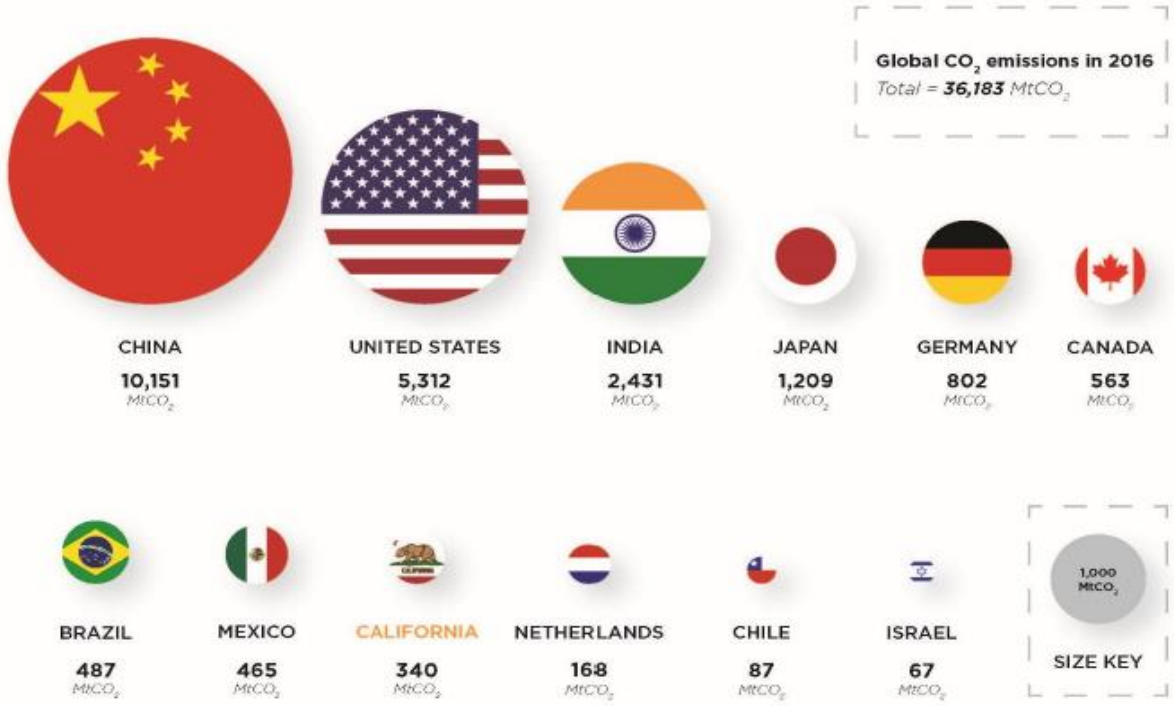
- Appendix
  - Key IRP Terminology

Existing System On Track to Meet 2030 Goal

- On track to meet the electric sector target of 30-53MMT by 2030 with existing policy:
  - As of 2016: 83MMT and at least 30% RPS for the electric sector
  - SB100 puts the electric sector on track for 60% RPS and approx. 45MMT by 2030 (based on 2017 Reference System Plan modeling)
  - The Commission's 42 MMT by 2030 target will likely be achieved with existing, known resource types, already proven in CA
- "Deep decarbonization" scenarios (i.e., below ~36 MMT by 2030) may require new technologies and/or market transformation
- Electric sector has fragmented
  - Who and how will procurement of long lead time and large-scale resources be performed? For example:
    - Pumped storage hydro
    - 3000MW of offshore wind

California's Emissions Trajectory

Figure 2: California Represents About 1 Percent of Global Carbon Dioxide Emissions in 2016



Source: California Energy Commission using data from http://www.globalcarbonatlas.org

Note: MMTCO2e is million metric tonnes (1,000 kg or 2,204.6 lbs.) of CO_2 equivalent. U.S. emissions include emissions from California.

IRP in California

- Integrated Resource Planning (IRP) has traditionally been the domain of a single vertically integrated utility
- California today presents a more complex landscape:
  - Multiple Load Serving Entities (LSEs) including utilities, community choice aggregators (CCAs) and competitive retail service providers
  - Multiple state agencies (CPUC, Energy Commission, Air Resources Board) and California Independent System Operator (CAISO)
  - Partially deregulated market
- The value proposition of integrated resource planning is to reduce the cost of achieving GHG reductions and other policy goals by looking across individual LSE boundaries and resource types to identify solutions to reliability, cost, or other concerns that might not otherwise be found

Statutory Basis of IRP at CPUC

The Commission shall…

PU Code Section 454.51

Identify a diverse and balanced portfolio of resources… that provides optimal integration of renewable energy in a cost-effective manner

PU Code Section 454.52

...adopt a process for each load-serving entity…to file an integrated resource plan…to ensure that load-serving entities do the following…

- Meet statewide GHG emission reduction targets
- Comply with state RPS target
- Ensure just and reasonable rates for customers of electrical corporations
- Minimize impacts on ratepayer bills
- Ensure system and local reliability
- Strengthen the diversity, sustainability, and resilience of the bulk transmission and distribution systems, and local communities
- Enhance distribution system and demand-side energy management
- Minimize air pollutants with early priority on disadvantaged communities

IRP Framework

- California's goal is to reduce statewide greenhouse gas (GHG) emissions 40% below 1990 levels by 2030.
- The California Air Resources Board (CARB) established a statewide GHG planning target range for the electric sector of 30 – 53 MMT by 2030
- Commission Decision (D.18-02-018) established IRP as a two-year planning cycle designed to ensure LSEs are on track to achieve GHG reductions and ensure electric grid reliability at least cost while meeting the state's other policy goals.
  - Year One: "top-down" systemwide perspective
  - Year Two: "bottom-up" aggregated LSE perspective

IRP Framework

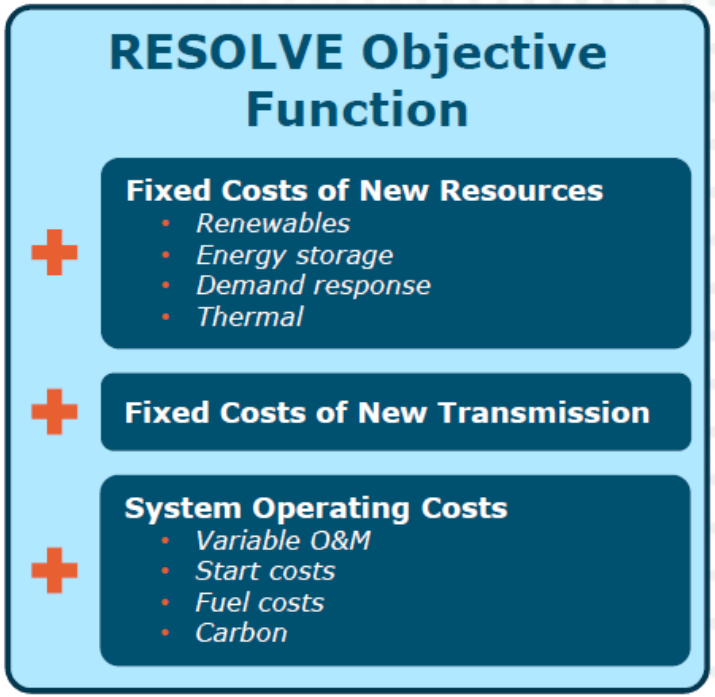
- Year One
  - GHG planning targets set for electric sector
  - CPUC creates Reference System Plan & LSE filing requirements
    - RSP: integrated resource plan that includes an optimal portfolio of future resources for serving load in the CAISO balancing authority area and meeting multiple state goals, including meeting GHG reduction and reliability targets at least cost
- Year Two
  - LSEs develop plans
  - CPUC reviews and modifies LSE plans and aggregates as Preferred System Plan
    - PSP: aggregate of integrated resource plans submitted by LSEs regulated by CPUC that is informed by the Reference System Plan and achieves same state goals as the Reference Plan

Capacity Expansion Modeling (Year One)

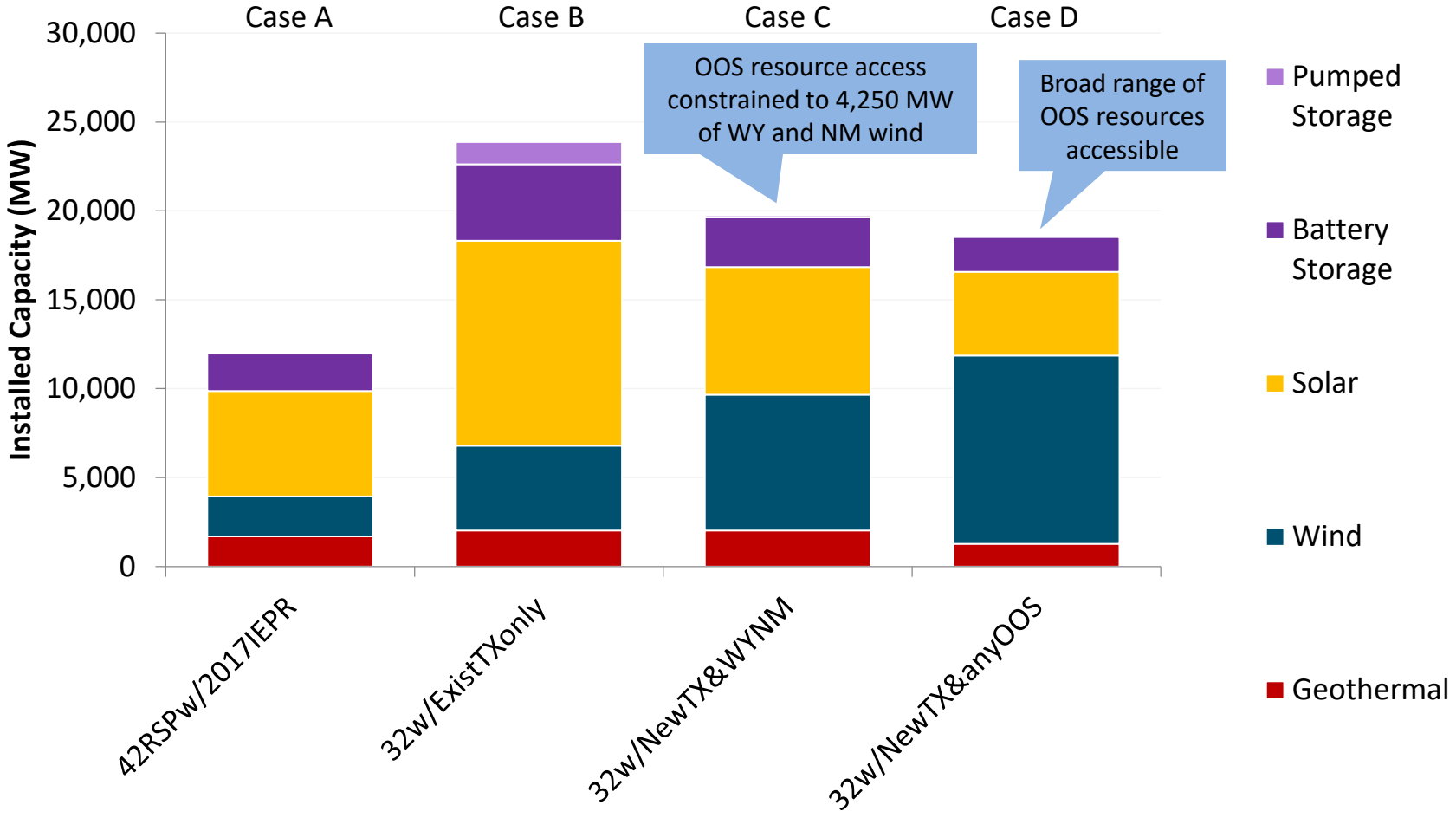
- Key planning steps include:
  - **Capacity expansion modeling** – identify optimal portfolios of resources
  - **Production cost modeling** – more granular, to verify reliability, costs and emissions
- Capacity expansion modeling solves for the least-cost portfolio to meet GHG and reliability constraints
- Input assumptions considered include:
  - Electricity demand forecast, reliability needs, and other requirements
  - Technology costs e.g. wind farm
  - Policy choices e.g. GHG target

Capacity Expansion Modeling (Year One)

- **RESOLVE allows portfolio optimization across a long time horizon (10-20 years)**
- **Fixed costs capture capital, financing, and fixed O&M associated with new physical infrastructure**
- **Operational detail focuses on primary drivers of renewable integration challenges**
- **RESOLVE may select portfolio from a variety of potential "solutions," including:**
  - Renewable overbuild
  - Energy storage
  - Advanced demand response
  - Conventional gas generation
  - Gas retrofits

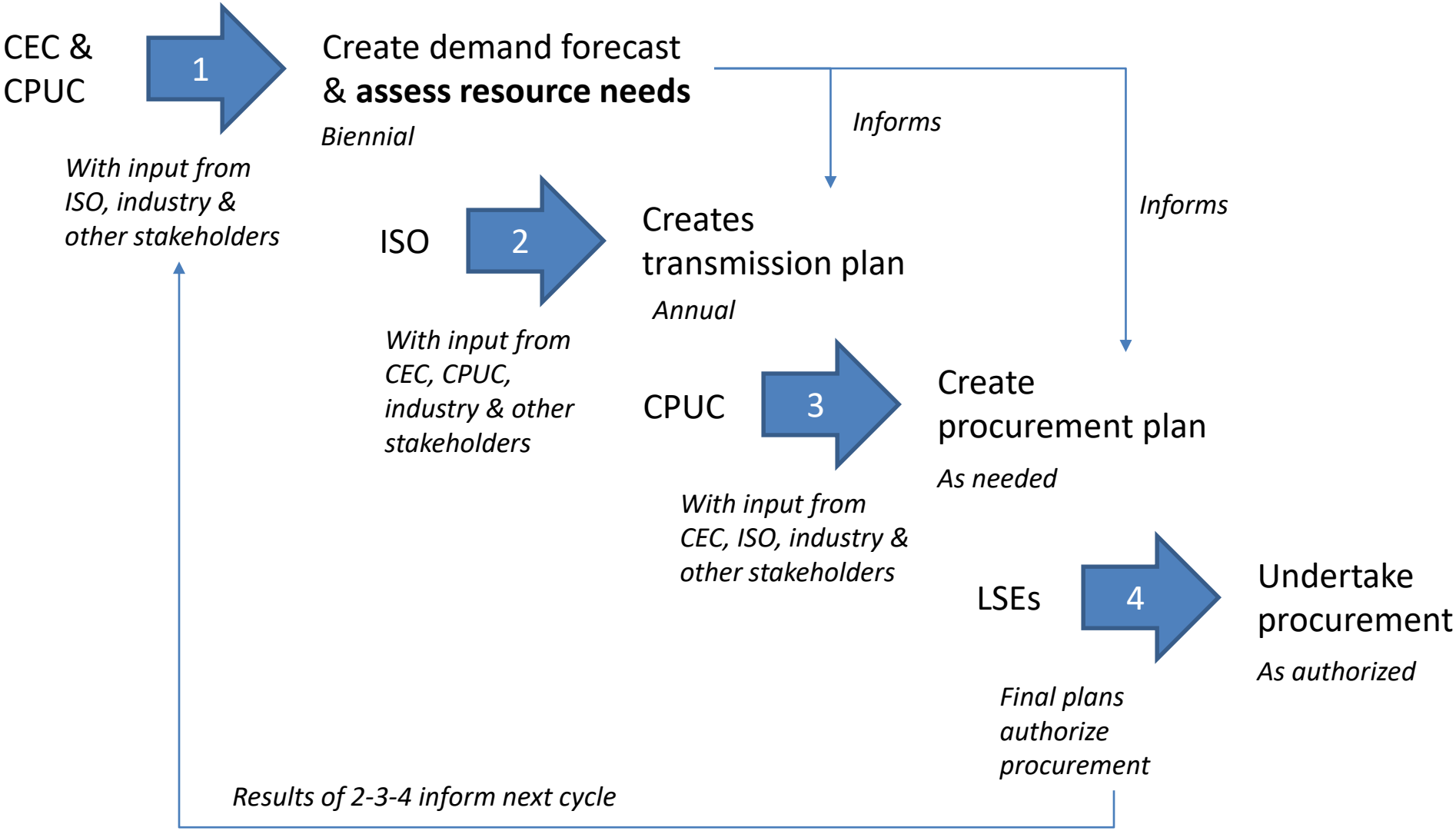


Example of 2030 Selected Resource Mix Comparison



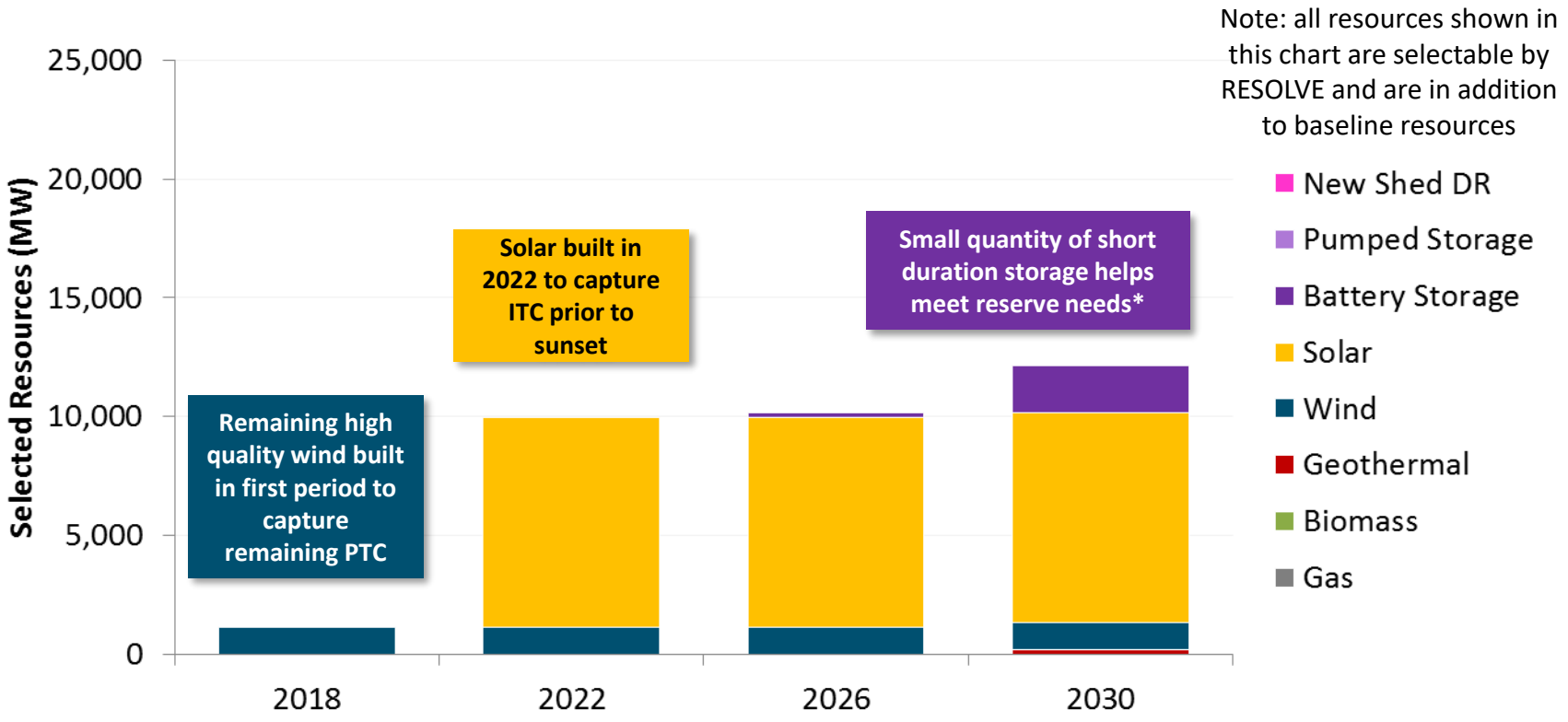
- With a more stringent GHG target, significant amounts of new GHG-free energy were selected (comparing case A to the other cases); across cases, some geothermal was selected even when access to broad range of OOS resources was allowed
- As access to OOS resources was more constrained, RESOLVE selected more in-state resources, mainly solar and storage
- With less diversity from OOS wind, more battery storage and some pumped storage were selected

Inter-agency coordination (Years One & Two)



Reference System Portfolio: 42 MMT by 2030

- Model selects ~9 GW of new utility-scale solar; 1,100 MW in-state wind; and 2,000 MW battery storage in addition to expected baseline of EE, DR, storage, renewables, hydro, gas, and nuclear
- Few additional resources needed for balancing (no new gas or pumped storage; 200 MW geothermal)



* Short-duration services could be provided by "Shimmy DR" resources, which were not modeled explicitly but may have resource potential up to 300 MW.

Next Steps for IRP and Offshore Wind

- Draft “Inputs & Assumptions” for 2019-2020 cycle raised offshore wind as a possible new resource for consideration in sensitivity analysis in IRP, if adequate data is available
- Drivers for resource selection in IRP: contribution to reliability, cost, GHG emission reduction, air quality and impact on disadvantaged communities
- IRP modeling in progress
  - Offshore wind included in 2045 “framing study”, with results to be released soon
  - Offshore wind sensitivity analysis, for inclusion in main IRP process (planning horizon through 2030) still in progress; findings should be available by end-2019
- Robust results vs. other resources, and more stringent GHG target, needed for inclusion in portfolio/s to be studied in TPP, to lead to transmission and procurement

Questions?

Contact Information:
Molly Tirpak Sterkel
Program Manager, Infrastructure Planning and Permitting Branch
CPUC Energy Division
Merideth.Sterkel@cpuc.ca.gov
415-703-1873

Important links:
IRP Events and Materials
Modeling Advisory Group
Modeling Projects
Modeling Data

Appendix

Key IRP Terminology

- CAISO: California Independent System Operator
- CARB: California Air Resources Board
- CEC: California Energy Commission
- CPUC / "Commission": California Public Utilities Commission
- LSE: Load serving entity
  - IOU: Investor-owned utility
  - CCA: Community choice aggregator
  - ESP: Energy service provider

- IEPR: Integrated Energy Policy Report; includes demand forecasts

- Reference System Plan (RSP): integrated resource plan that includes an optimal portfolio of future resources for serving load in the CAISO balancing authority area and meeting multiple state goals, including meeting GHG reduction and reliability targets at least cost
- Preferred System Plan (PSP): aggregate of integrated resource plans submitted by LSEs regulated by CPUC that is informed by the Reference System Plan and achieves same state goals as the Reference System Plan

- TPP: Transmission Planning Process facilitated by the CAISO

- RPS: Renewable Portfolio Standard

- GHG: greenhouse gases
- MMT: million metric tons