Slice of Day – Loss of Load Studies and Translation for RA proceeding

August 14, 2022

Energy Division and Astrapé Consulting

California Public Utilities Commission

Questions

- We invite clarifying questions at regular intervals throughout this presentation
- All attendees have been muted. **To ask questions**:
  - In Teams:
    - Please “raise your hand”
    - Host will call on you, and you can unmute.
    - Please “lower your hand” and mute yourself afterwards
  - For those with phone access only:
    - Dial *3 to “raise your hand”. Once you have raised your hand, you'll hear the prompt, "You have raised your hand to ask a question. Please wait to speak until the host calls on you“
    - Teams host will unmute your microphone and you can proceed to ask your question
    - Dial *3 to “lower your hand”
- If you are not able to use audio to ask a question, you may type into the “Q&A” feature of this Teams presentation, though priority will be given to stakeholders who have “raised their hand” and use audio
- Should time not permit attention to every question, or if you would like to ask questions or comment informally, please email Energy Division staff.

Agenda/overview of presentation

Topic	Timing	Presenter
Introduction & context	5 min	Jaime Gannon
Calculation of PRM for SOD construct from LOLE study Demonstration	15 min	Kevin Carden
Details on Inputs and Methodology • Key updates since IRP PSP modeling • Monthly versus Annual LOLE study, Calibration with Pcap	15 min	Donald Brooks
Process and timing for 2024 LOLE study • Questions/Next Steps • Opportunities for stakeholder comment	15 min	Donald Brooks

Intro and Context

Jaime Gannon
Energy Division

R.21-10-002 September 2, 2022 Scoping Memo

- Recognizes that both Tracks of the proceeding include considerations of the appropriate RA PRM.
- Implementation Track – Phase 3
  - Consider modifications to the Planning Reserve Margin (PRM) for the 2024 RA year and beyond, including Energy Division's recent loss of load expectation (LOLE) study in the Integrated Resource Planning (IRP) proceeding, or a future LOLE study for RA to be submitted into this proceeding no later than January 2023.
- RA Reform – Phase 2
  - e. Appropriate PRM with single PRM initially for all months and hours informed by a loss of load expectation study, including National Resources Defense Council's calibration tool.
    - **i. ….The Reform Track will consider how to convert/calibrate the results of a LOLE study to the slice-of-day RA framework.(1) Therefore, "appropriate PRM" in the Reform Track refers to converting the LOLE modeling results to the hourly RA framework counting rules.**

(1) Energy Division recently presented 2024 LOLE study results in the Integrated Resource Planning Modelling Advisory Group and such results may be used to inform the discussions in the Reform Track workstreams.

Goal/Objective

- Provide stakeholders with a methodology to calculate a planning reserve margin for a slice-of-day RA framework from an annual LOLE study
- Provide stakeholders with further details regarding a future LOLE study for the RA proceeding including:
  - Inputs and assumptions
  - Methodology
  - Process

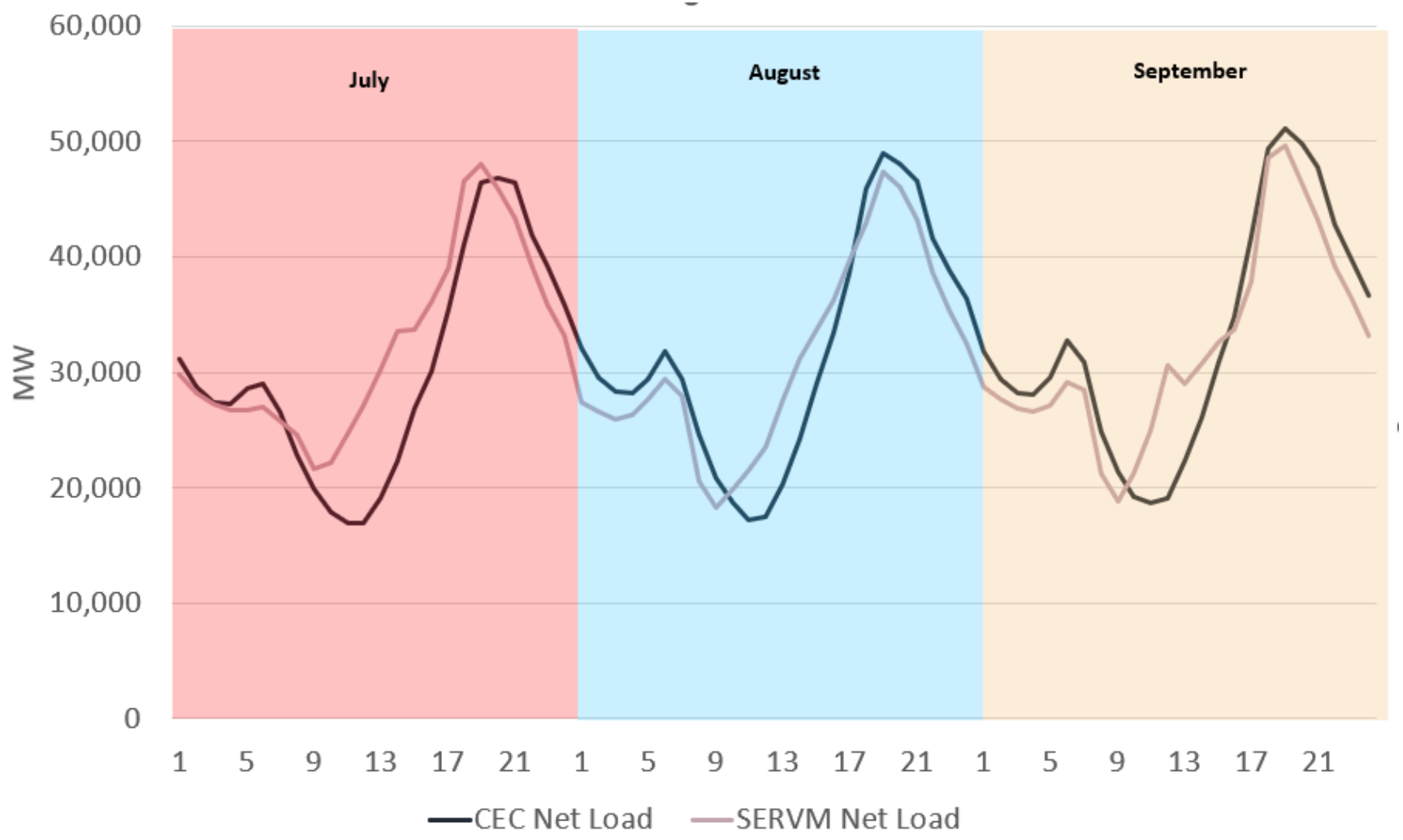
Calculation of PRM for SOD construct from LOLE study Demonstration

Kevin Carden
Energy Division

Translating SERVM Portfolio to Slice of Day

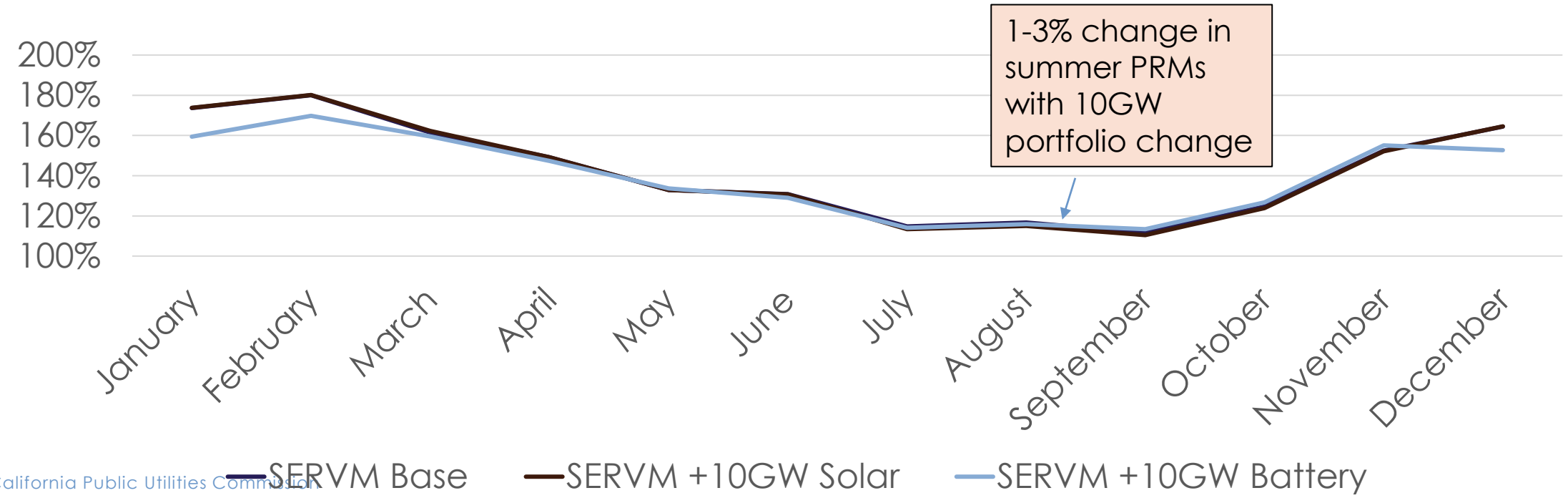
- Construct SERVM portfolio that meets 0.1 LOLE
- Define the SERVM resources in a slice of day tool
  - Conventional resources input at nameplate
  - Storage resources' capacity input at nameplate
    - Energy constraint aggregated
  - Wind/Solar profiles input via exceedance method
- Input managed load
  - Peak day of every month
- Solve for the highest monthly load multiplier that the reliability compliant portfolio can support
- Test system reliability by applying minimum monthly reserves in all months

Translating SERVM Portfolio to Slice of Day

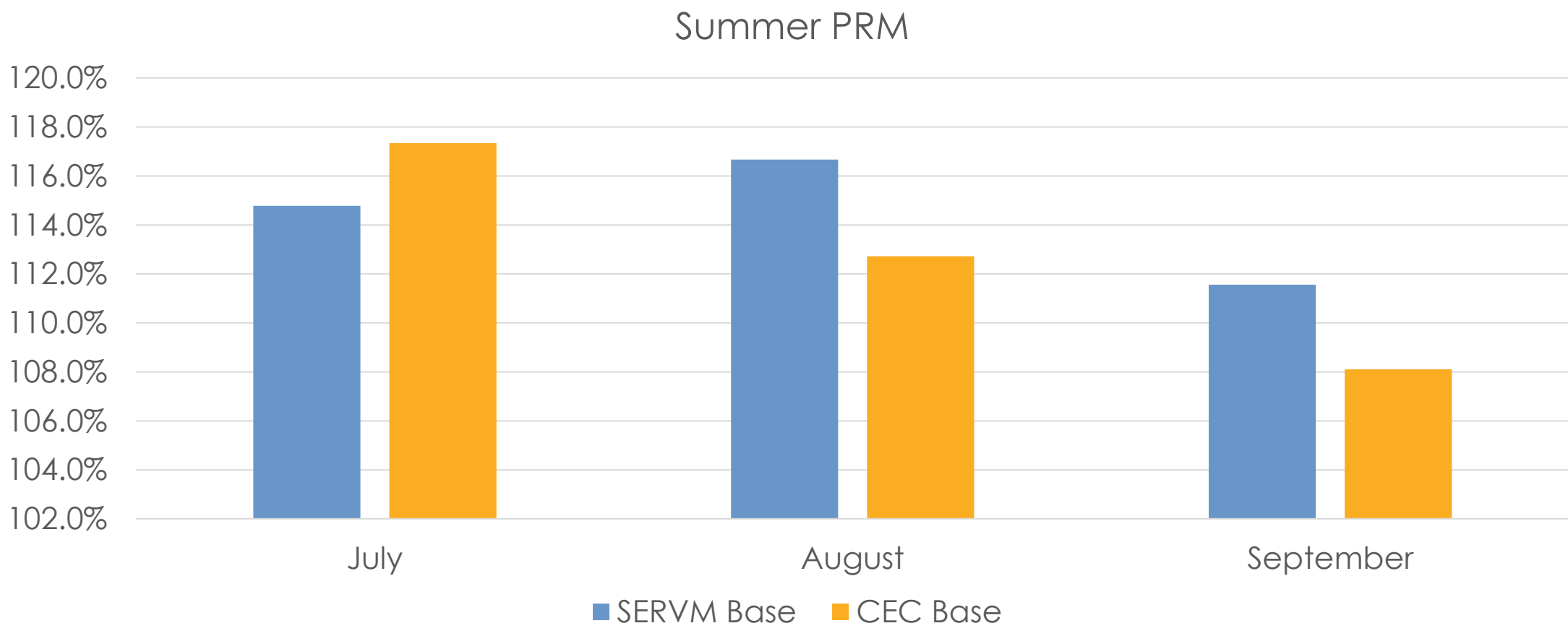


Alternate Portfolios Tested in SERVM and SoD

- 2024 Expected Case Tuned to 0.1 LOLE
- High Solar (+10GW utility scale solar)
- High Battery (+10GW 4-hr battery)

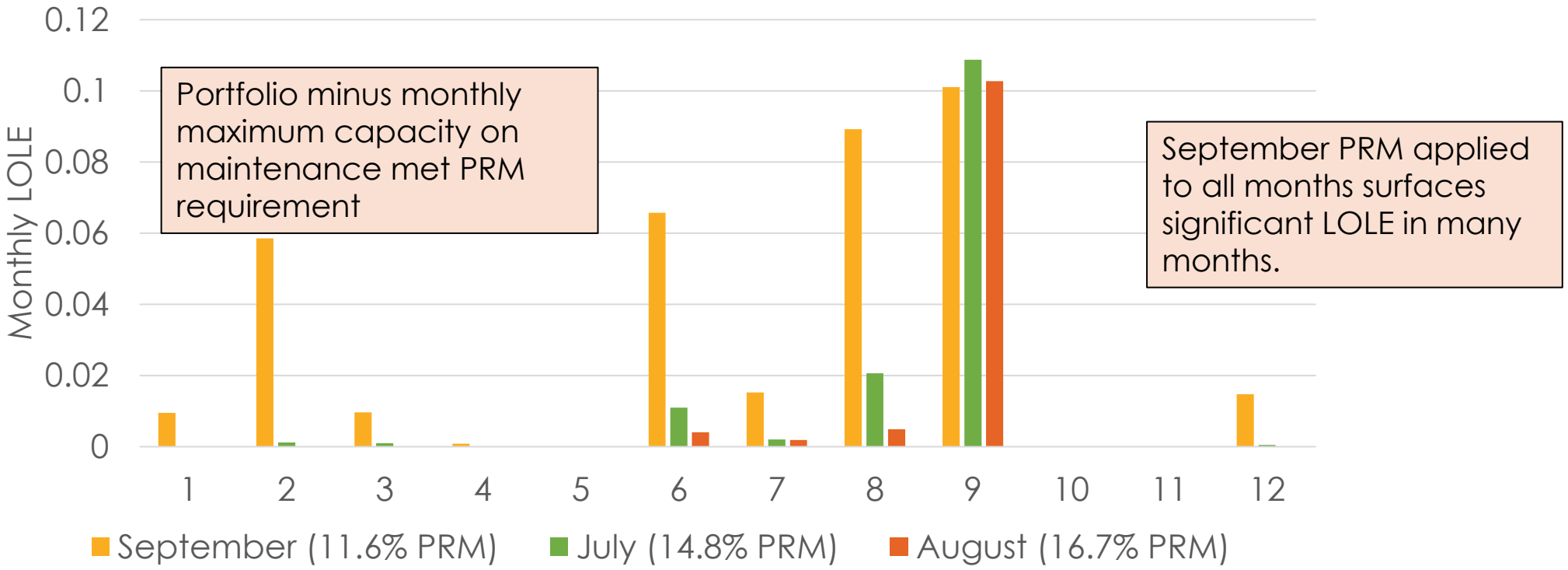


Impact of CEC vs SERVM Net Load Profiles



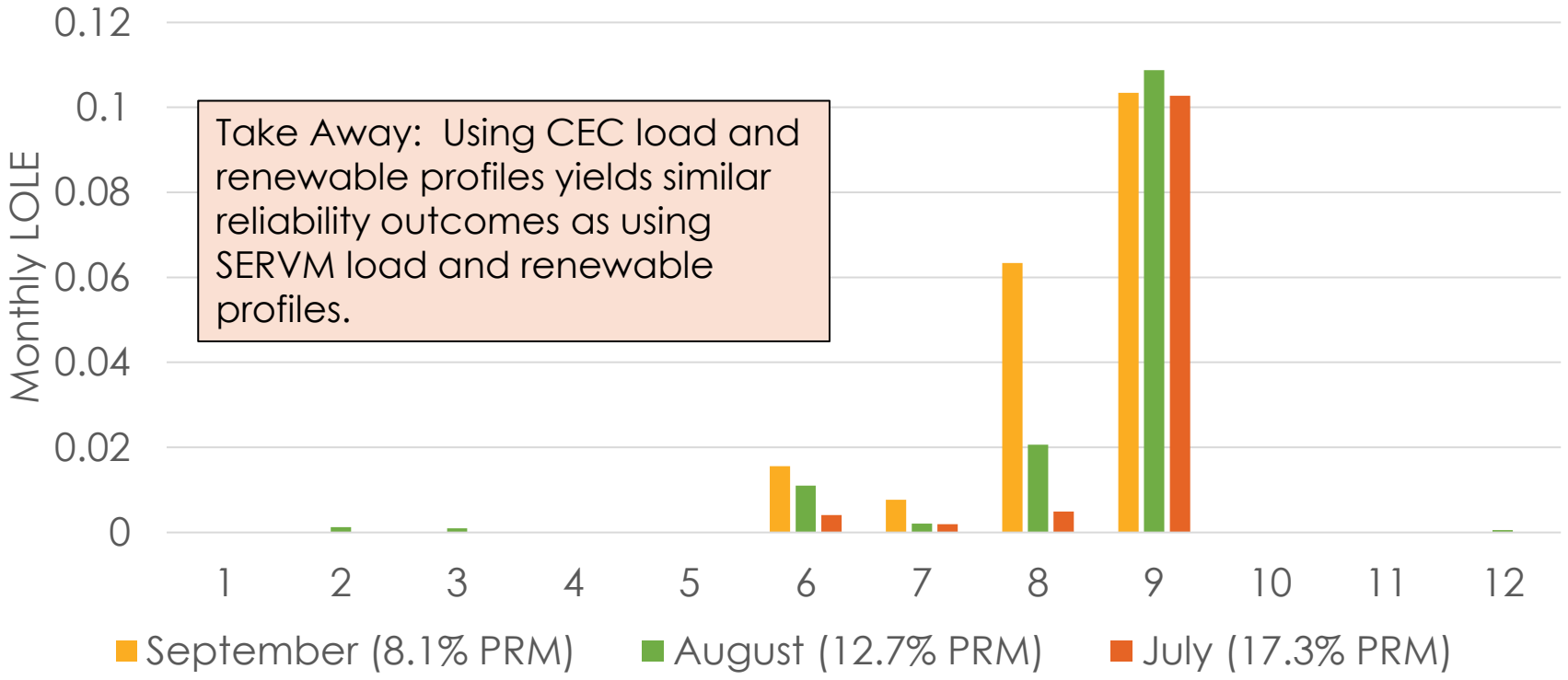
Stress Testing

- Apply September PRM to all months
- Apply July or August PRM to all other months



Stress Testing

- Apply CEC-Based September PRM to all months
- Apply CEC-Based July or August PRM to all other months



Next Steps

- Calibration of CEC and SERVM load forecasts
- Treatment of perfect capacity in SERVM to SoD translation
- Exploring implications of multiple reserve margin obligations

Details on Inputs and Methodology

Key updates since July IRP MAG

Donald Brooks
Energy Division

Key data updates since July IRP MAG

- Staff updated baseline with new units since PSP (BaselineReconcile)
  - Staff used latest public CAISO information (CAISO Master Generating Capability List) and LSE August 1 IRP filings to add/update the existing Baseline in SERVM and in RESOLVE.
  - BASELINE includes resources that are ONLINE or DEVELOPMENT in the LSE's IRP filings, not including PLANNED_NEW or REVIEW.
  - Staff also performed updates such as replacing generic names with actual CAISO IDs and updated inservice dates as well as other updates.
  - Increases in thermal capacity reflect small additions to existing plants and one cogen repower

The updated 2022 Baseline List will be posted to the CPUC website here:

Unified RA and IRP Modeling Datasets 2022 (ca.gov)

BASELINE additions since IRP PSP by unit category

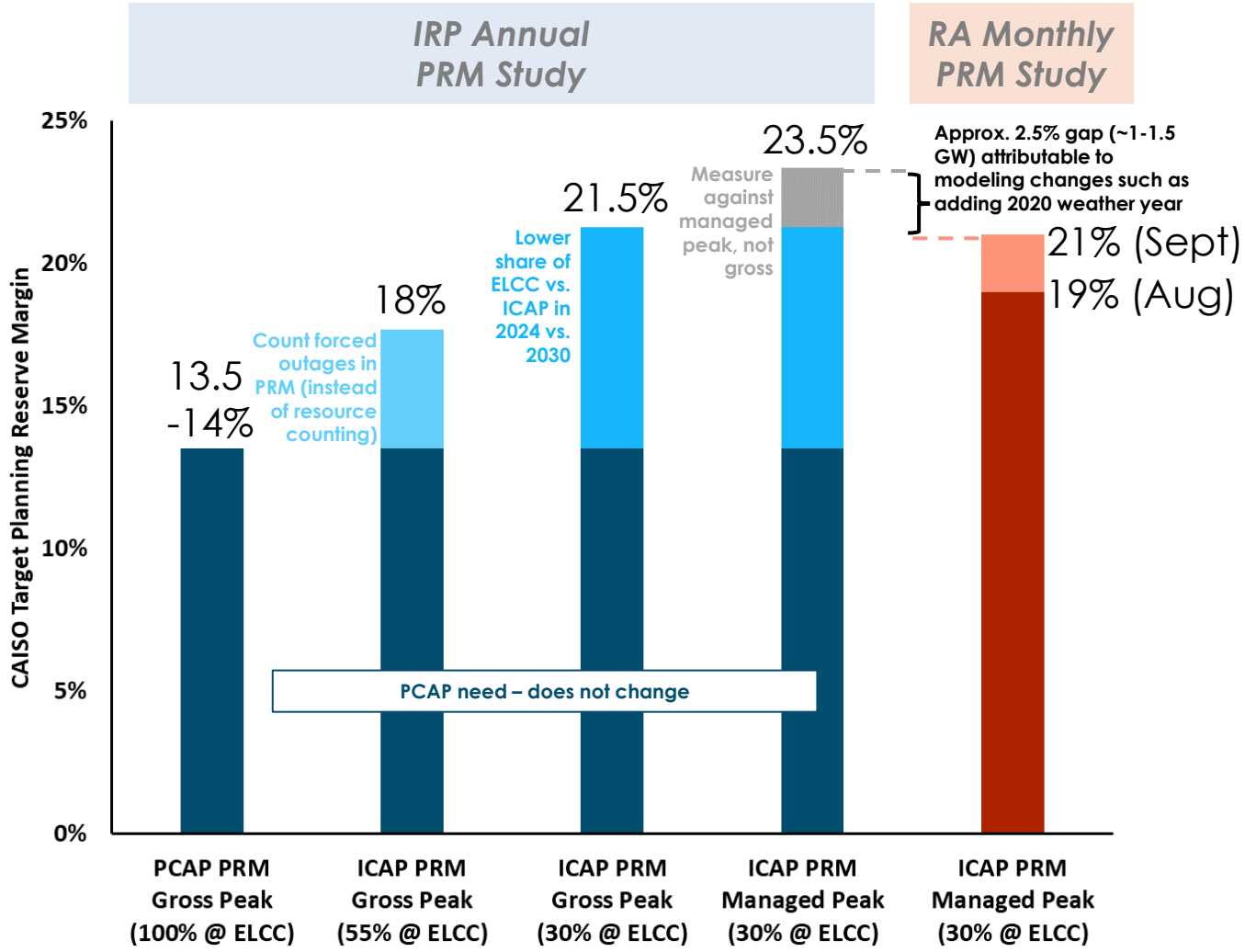
Unit Category	CAPMAX MW
Battery Storage	4,444.24
Biogas	2.99
Biomass/Wood	26.72
cogen	4.90
CT	69.60
DR	11.60
Geothermal	139.00
Hybrid_BattStorage	956.00
Hybrid_Solar_1Axis	1,734.00
Solar_1Axis	875.20
solar_Fixed	37.50
Solar_tbd	122.00
Wind	1,475.72
(blank)	
Grand Total	**9,899.47**

Key data updates planned for RA LOLE study

- Imports/Exports calibration
  - Staff updated peak and energy forecasts for regions outside of California (WECC BA regions) from most recent 2030 Anchor data set
  - Staff intend to calibrate external regions to be more balanced, and more accurately reflect likely import and export patterns so all of WECC can be modeled with weather variability.
  - In IRP for the PSP staff simply simulated the CAISO footprint using a static import/export profile from non-CAISO areas
- Staff updated IEPR demand forecast to include High Electrification scenario
  - PSP used Mid Electrification scenario

Impacts of including 2020 weather year – more extreme weather

- Staff's February 2022 LOLE and ELCC Study[1] for the resource adequacy (RA) proceeding focused on defining a monthly ICAP and UCAP PRM above the CAISO managed peak
  - 2024 PRM = ~19-21% ICAP PRM over CAISO managed peak (for Jul-Sep)
- Since the RA study, this IRP study found up to an extra ~2.5% ICAP PRM (or approximately 1-1.5 GW) required over CAISO managed peak to address extreme weather in 2020 captured by adding weather years through 2020 to the model (and other less significant updates)



1. Available at: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M452/K750/452750851.PDF

Conclusions from IRP LOLE work

- The work performed for IRP incorporated recent extreme weather from 2018-2020 into SERVM's existing weather year dataset
  - Result is to increase the total reliability need by ~1-1.5 GW relative to the RA proceeding study reported in February 2022
  - More extreme weather creates greater demand variability
- In IRP, RESOLVE portfolios from the updated IRP modeling were found to be more reliable relative to 0.1 LOLE
  - Planned updates as part of this cycle's I&A to RESOLVE's PRM and resource ELCCs are expected to better align RESOLVE inputs with SERVM LOLP modeling fundamentals

Details on Inputs and Methodology

Monthly versus Annual LOLE study, Calibration with PCap

Donald Brooks
Energy Division

Plans for LOLE study to support SOD implementation

- Staff will be continuing to perform LOLE reliability studies through the fall of 2022 to support IRP and RA proceedings.
  - 2024 Study Year ANNUAL LOLE study similar to IRP.
- Staff will perform a LOLE study of 2024
- Calibrate LOLE to 0.1 using installed resources (BASELINE) and Perfect Capacity to increase resource fleet to meet 0.1. As more resources are planned to be online in 2024, it is likely as of now we will need to add PCap to reach 0.1 LOLE target in 2024 given only the existing BASELINE.
- No use of RESOLVE or future planned resources. Meant to test reliability of current fleet near term, not planned future fleet.

Process and timing for 2024 LOLE study

- Questions/Next Steps

- Opportunities for stakeholder comment

Donald Brooks

Energy Division

Questions/Next Steps

- Staff intend to complete the LOLE study of 2024 compliance year and present results in later workshops.
  - Per scoping memo- January 2023 deadline to be considered in Implementation Track Phase 3
  - Parties should send informal stakeholder comments and suggestions about study methodology and assumptions to: donald.brooks@cpuc.ca.gov
  - Staff will continue to solicit ideas for how to translate the results of a LOLE study into the SOD framework.
  - Next RA Reform Workshop opportunity October 6th.