Ensuring energy adequacy through resource adequacy

Energy Adequacy Session
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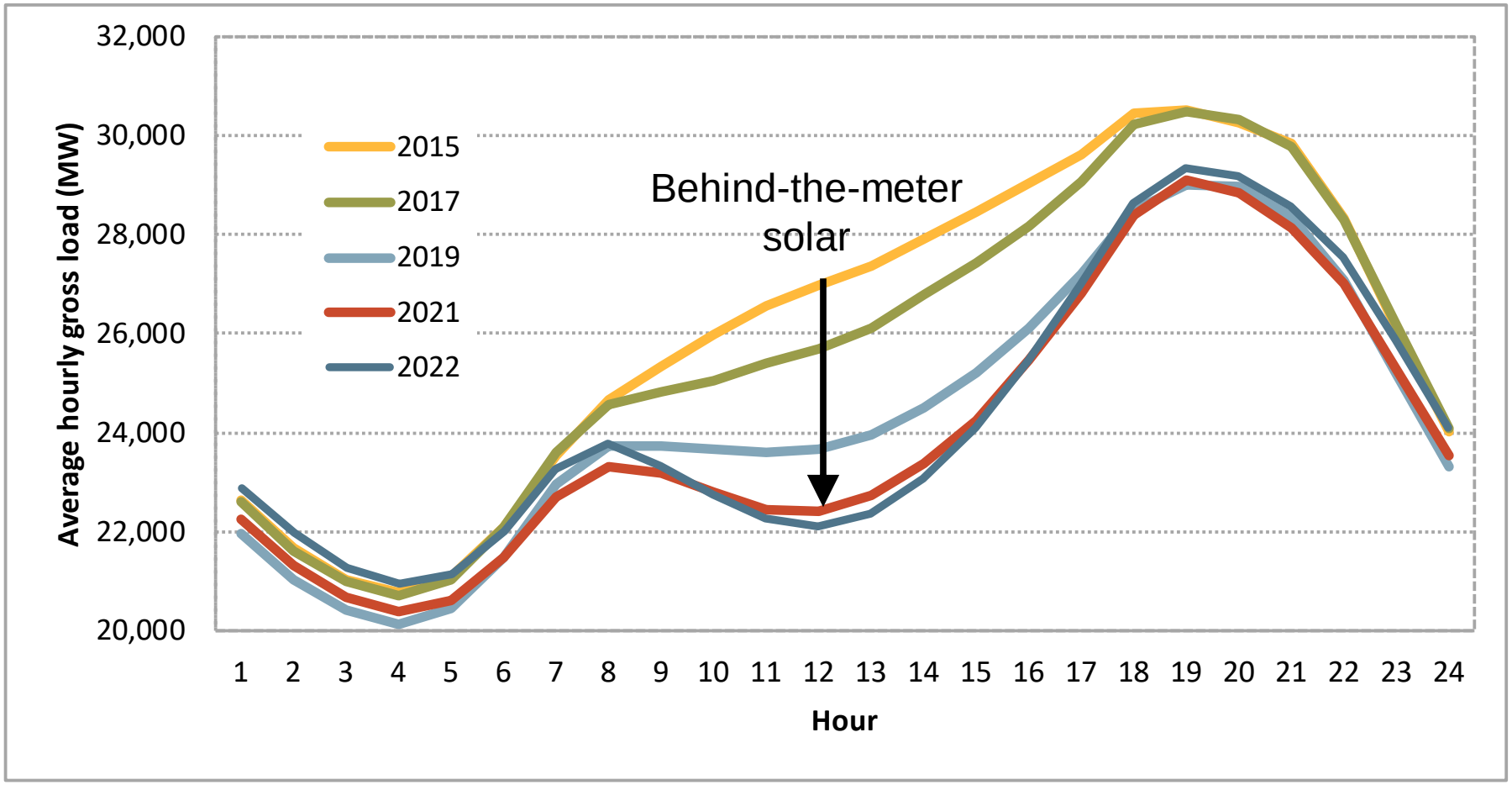
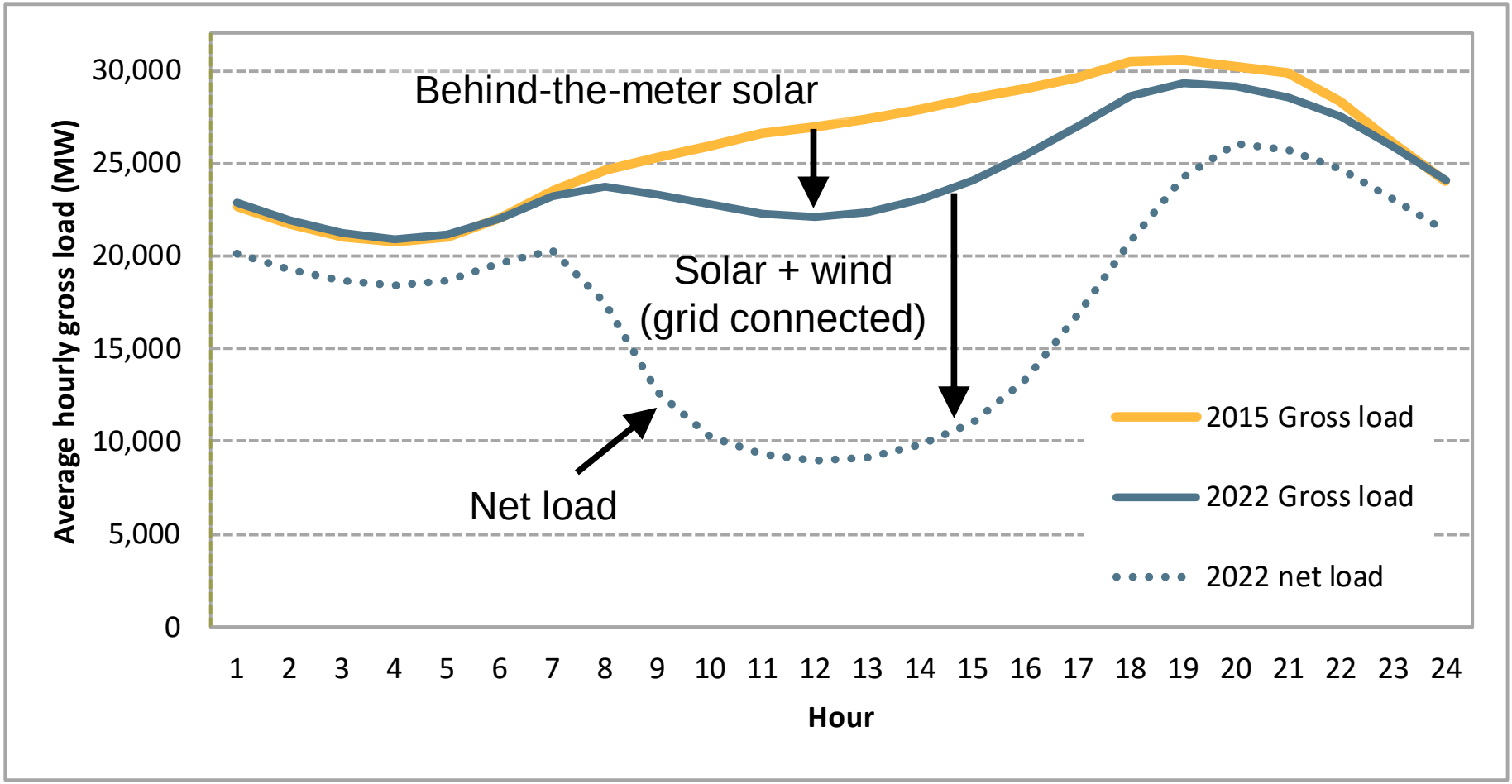
Overview

- Background
  - Large increase in solar and battery storage driving need for changes in resource adequacy
  - Critical “net peak” hours are now hours 18-22
- Current resource adequacy framework
  - Availability of many resources relatively low in net peak hours
    - Solar and wind
    - Demand response
    - Batteries?
- New “slice of day” resource adequacy framework

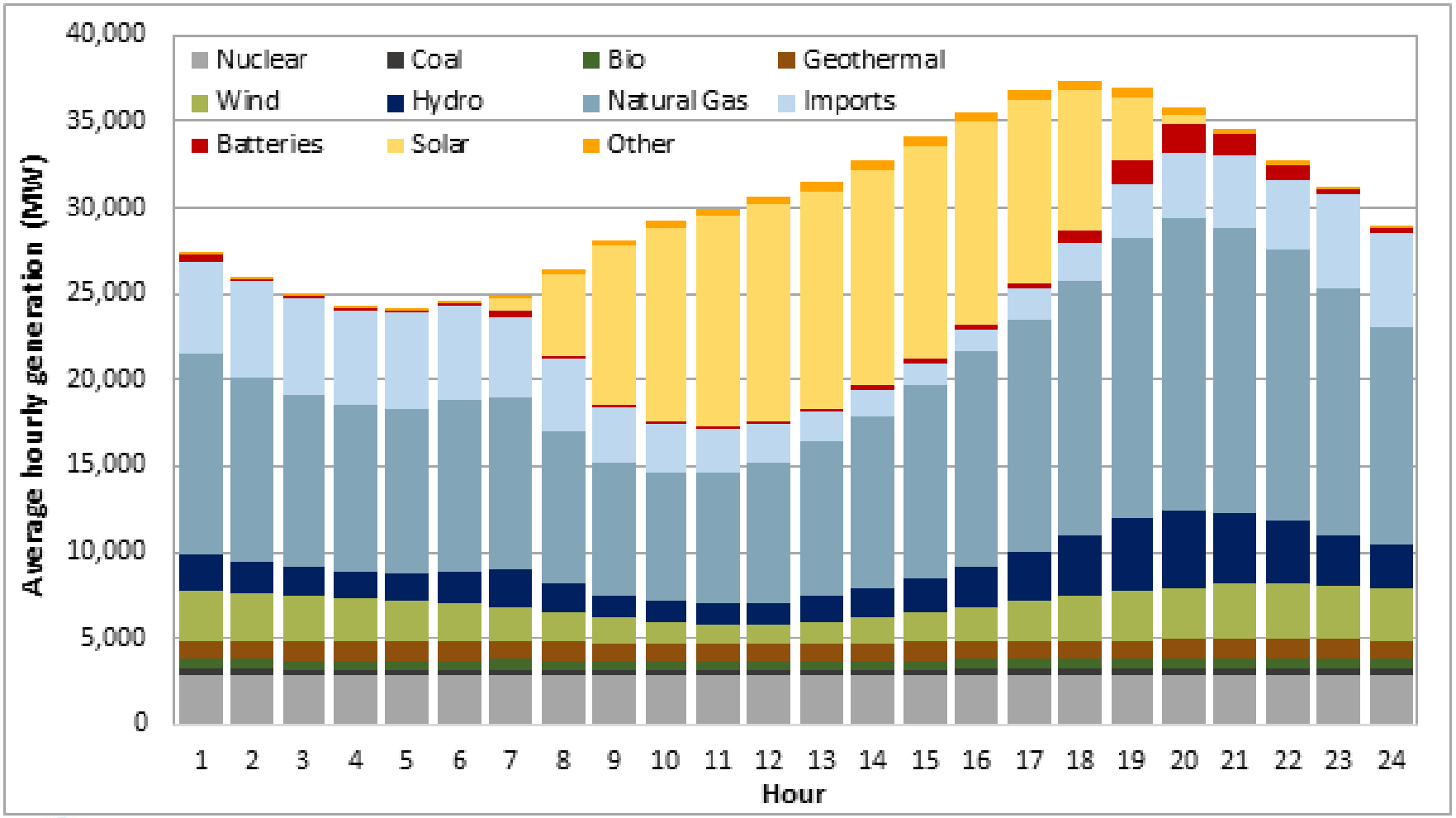
CAISO system load has been re-shaped by significant behind-the-meter solar over last decade.



CAISO operation and market now focused on “net load” (or load not met by wind and solar)



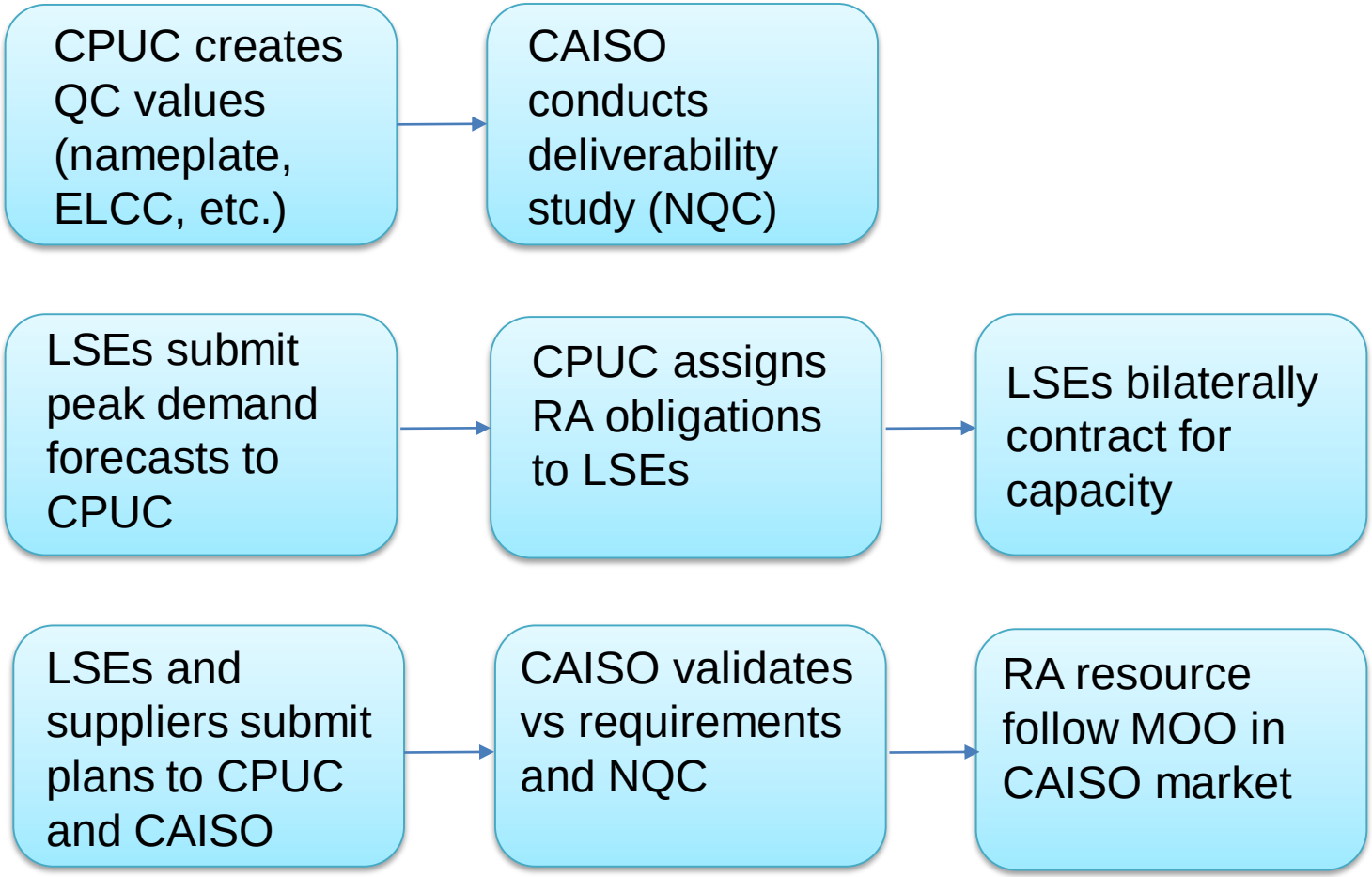
CAISO fuel mix comprised of about 30% solar and wind in 2022 (excluding “behind-the-meter” solar)



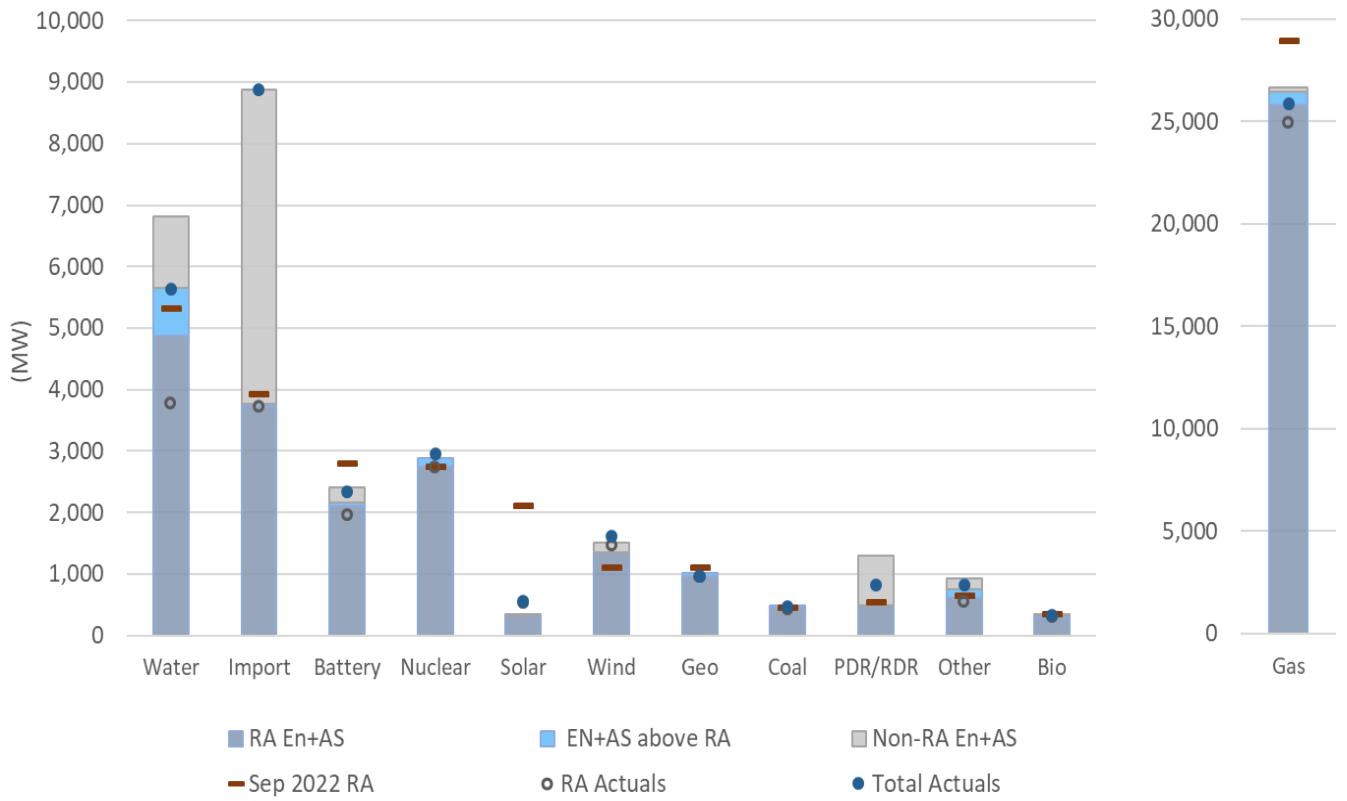
Current resource adequacy framework

- Capacity requirements set based on peak demand (gross vs net load)
  - Separate requirements for system, local areas, and flexible capacity
- Capacity ratings depend on resource:
  - Deliverable nameplate (e.g. gas)
  - Historic production during HE17 to HE21(e.g. hydro)
  - Effective Load Carrying Capacity (e.g. wind, solar, storage)
- Availability of many resources relatively low (compared to RA ratings) in critical summer net peak hours

Current resource adequacy framework



September 6, 2022 Net peak (6:58pm). Real-time supply vs resource adequacy capacity



Source: *Summer Market Performance Report September 2022,* by California ISO, 2022 (http://www.caiso.com/Documents/SummerMarketPerformanceReportforSeptember2022.pdf)

Resource availability under current resource adequacy framework (during 35 critical hours in 2022)

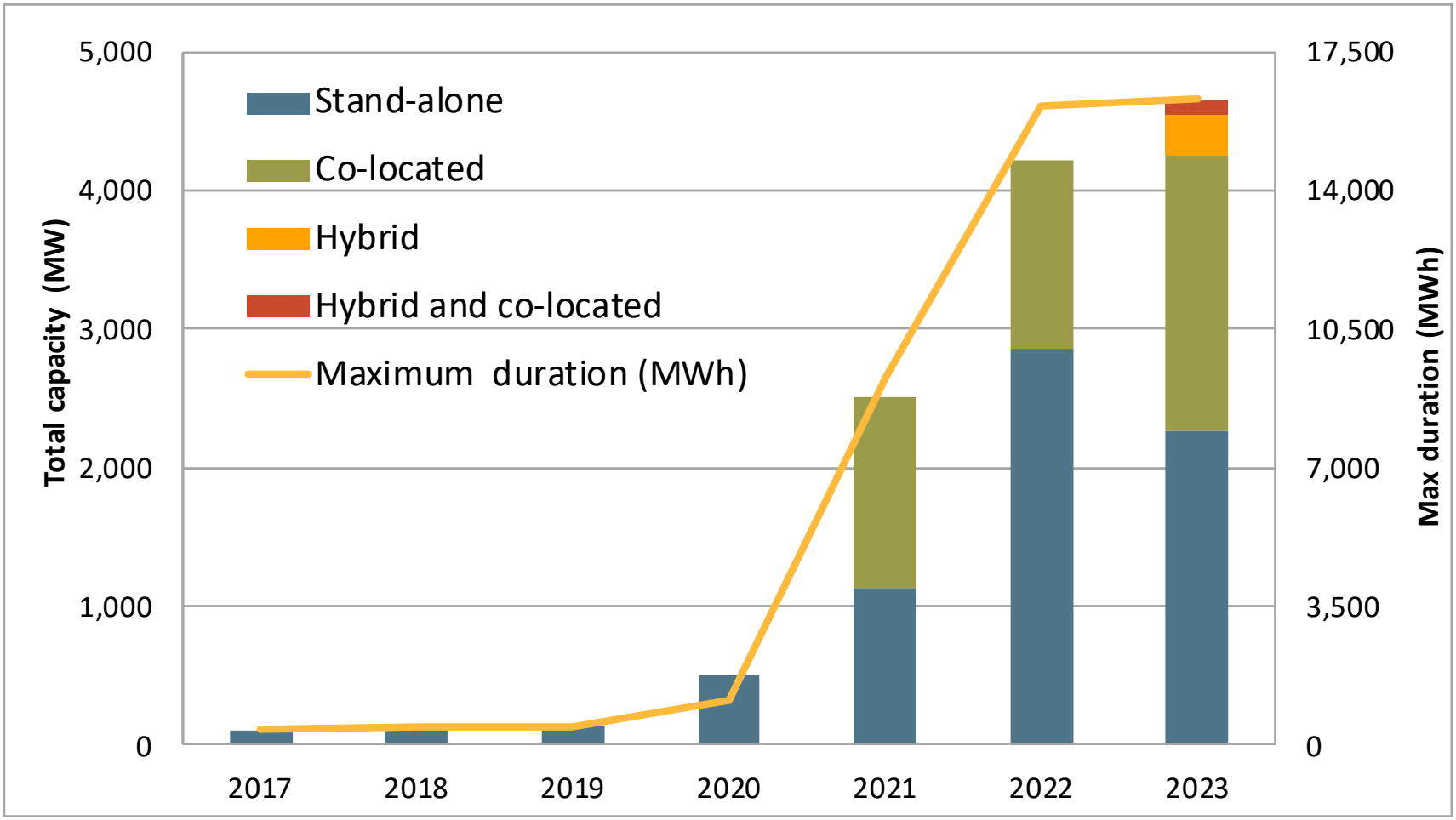
Procured RA resource capacity and bid availability* during "EEA Watch+" hours

Fuel Category	Pmax total	NQC total	Procured capacity	DA bids and self-schedules	RT bids and self-schedules
Gas	29,835	29,083	28,413	93%	90%
Solar	13,495	2,085	2,036	51%	57%
Hydro	8,334	6,005	5,335	93%	92%
Wind	7,448	1,157	1,141	56%	80%
Imports	3,444	3,444	3,444	91%	91%
Storage	3,163	2,819	2,774	92%	92%
Nuclear	2,935	2,915	2,774	100%	100%
Utility DR+	1,441	1,234	1,345	17%	63%
Supply plan DR	1,389	475	417	67%	51%
Other	4,725	3,287	3,044	93%	91%
Total	**76,209**	**52,504**	**50,723**	**88%**	**87%**

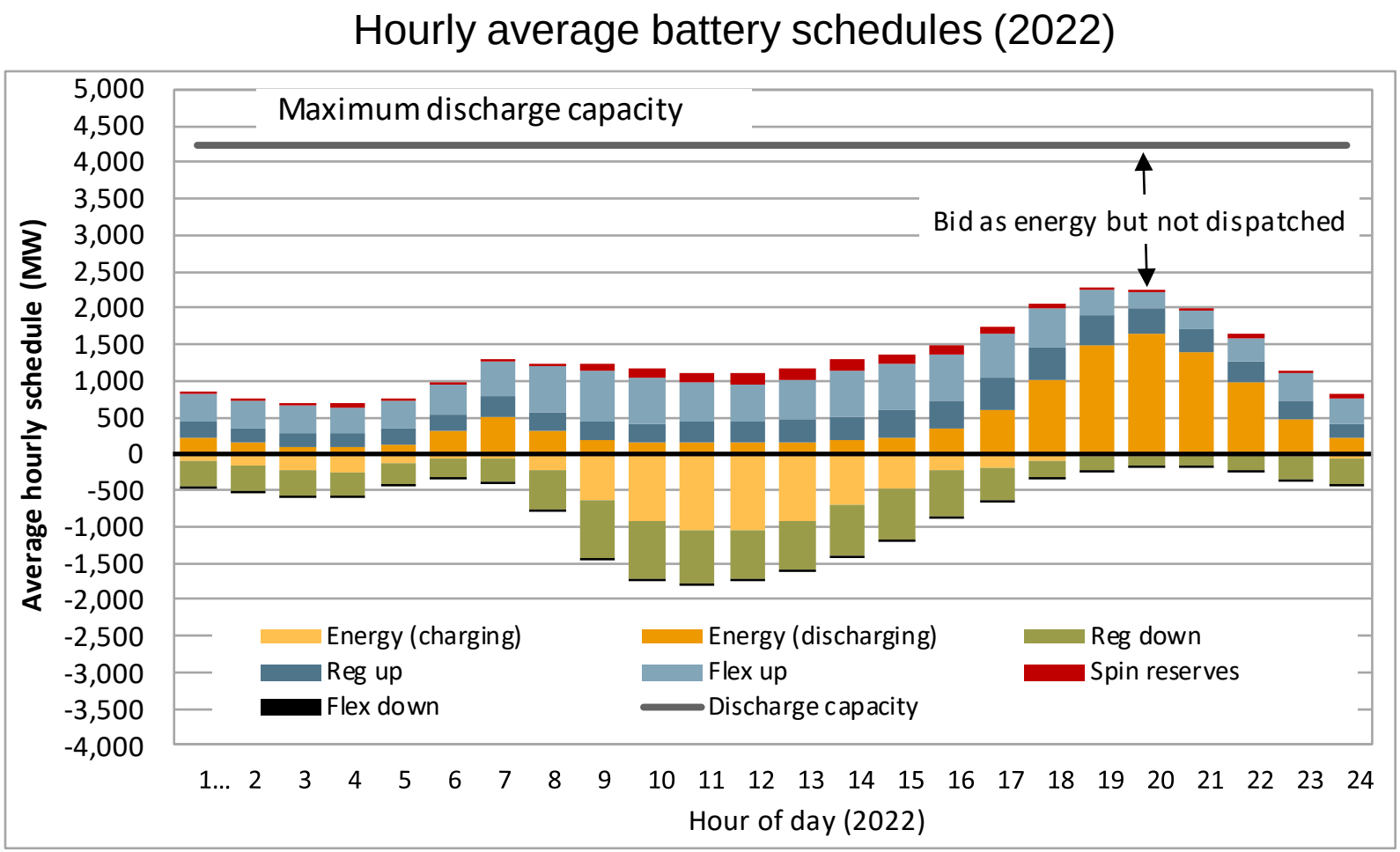
* Bids and self-schedules are capped at individual resource RA values

+ Utility DR NQC is RA credits and the procured capacity includes adders

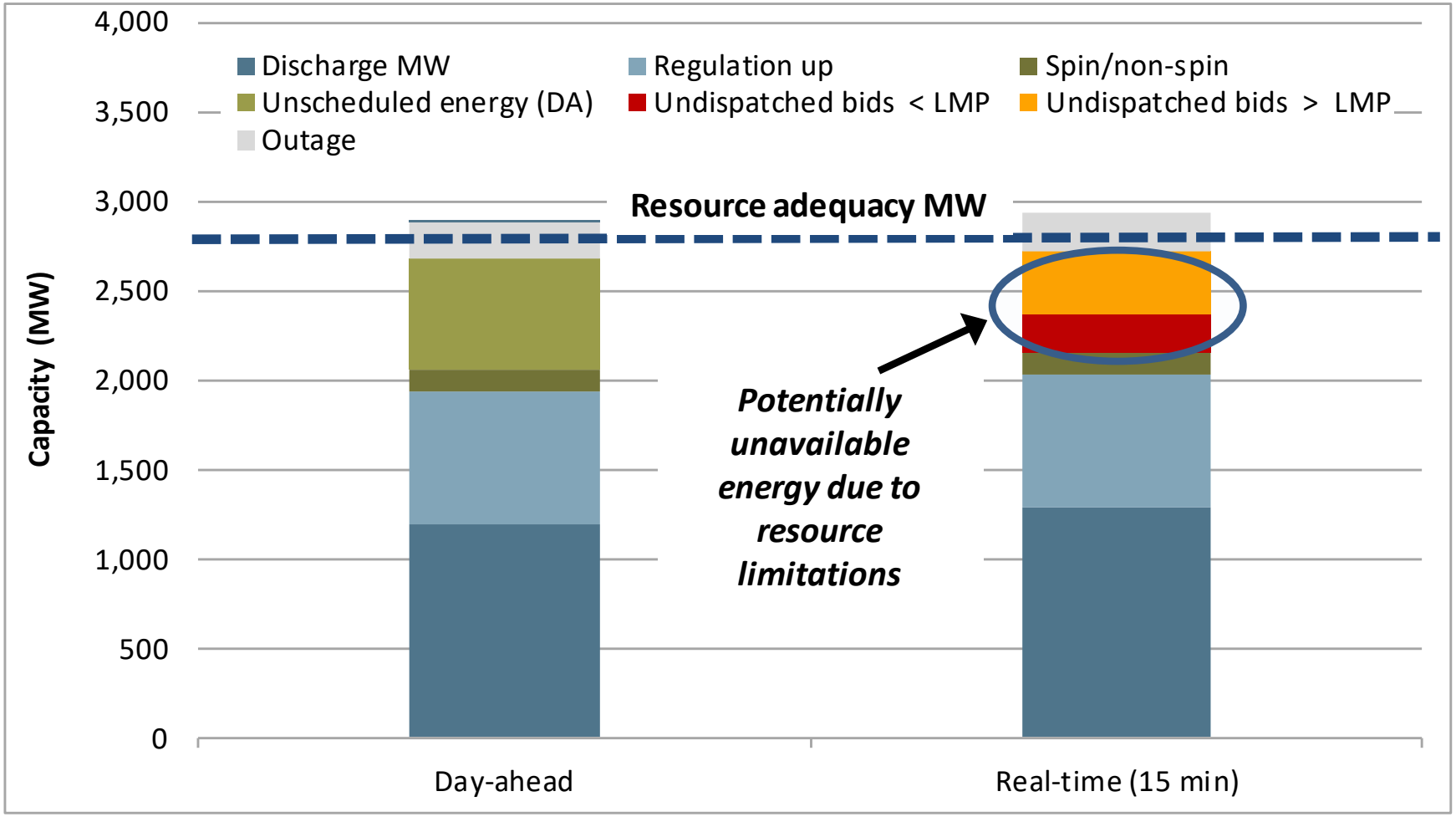
Most batteries being designed so that they can discharge at maximum capacity for 4 hours.



Batteries provided average of 4.4% of energy during hour ending 20 during 2022.



Up to 20% battery capacity may not be available in critical net peak hours due to resource and energy limitations.

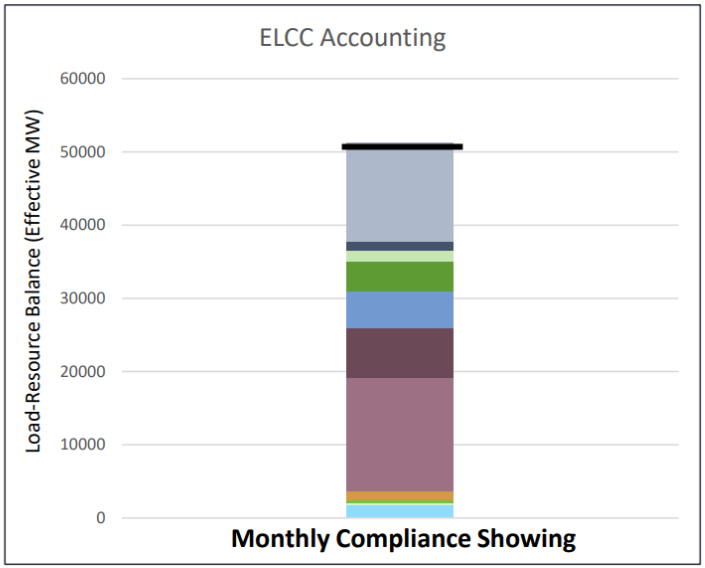


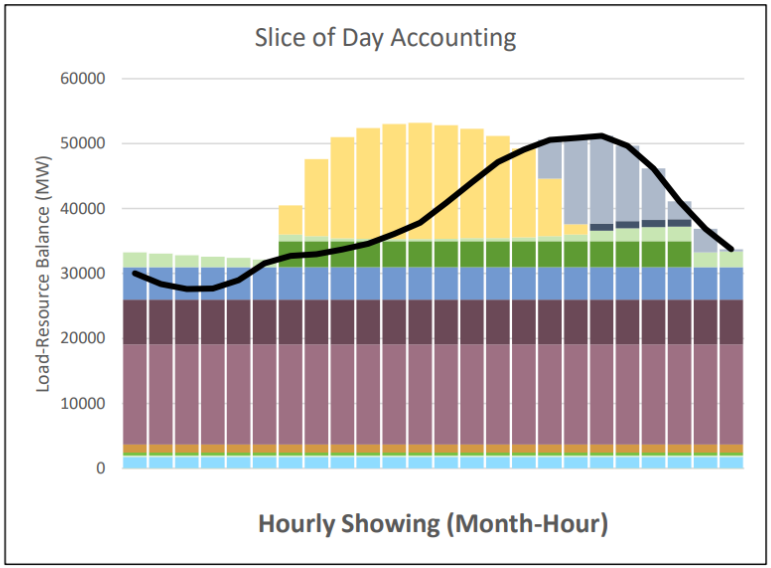
New slice-of-day framework

- LSEs show they have procured sufficient capacity to cover 24-hour obligations
  - Need excess capacity for storage
- Counting rules for solar and wind switch to “exceedance” methodology on worst days
- Storage can be shown for multiple cycles per day
- Test run for 2024 RA compliance year
  - Year-ahead showings due Nov 30
  - Full adoption for 2025 compliance year

New slice-of-day framework

Moving from ELCC to Slice of Day

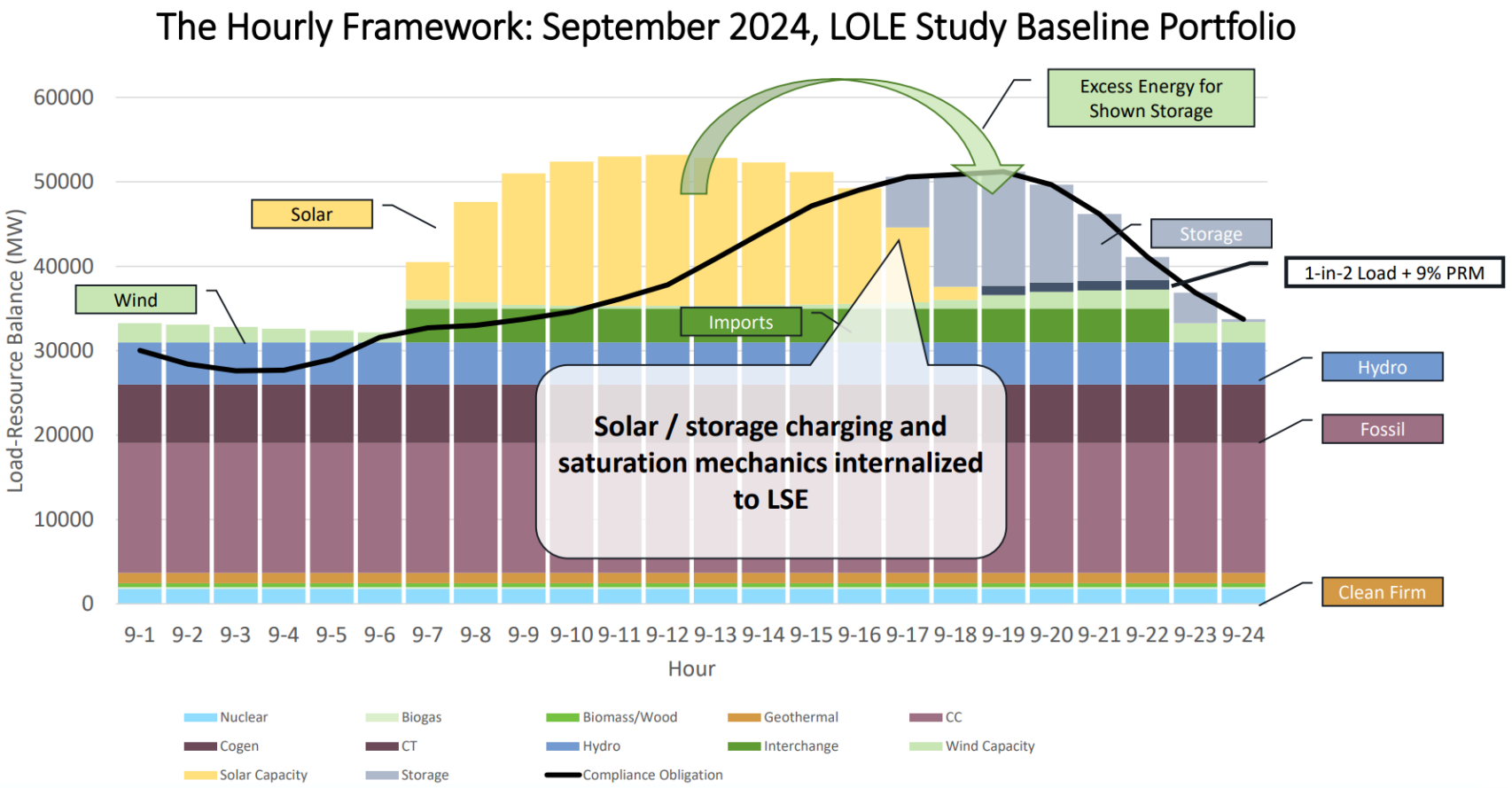




Slice of Day disaggregates monthly capacity values into month-hour capacity values using probabilistic modeling and statistics.

Source: Papas, Nick (2023). *Resource Adequacy Reform in California: Slice of Day* [PowerPoint slides]. OMS. PowerPoint Presentation (misostates.org)

New slice-of-day framework



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