

Long Duration Energy Storage within Slice-of-Day

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Today's Agenda

- **Storage in SOD, so far**
 - Critical parameters and checks
 - Limitations of the SOD framework
- **Representing Long-Duration Energy Storage (LDES)**
 - Seasonal Charging Scheme
- **Multi-Day Reliability**
 - Statistical Hedges
 - Redefining the Maximum Cumulative Capacity (MCC) buckets

Storage in SOD – Parameters and Checks

- **As of today, storage is set to be represented within SOD as a resource defined by the following parameters:**
 - Maximum power output sustainable over the non-contiguous number of hours shown (MW)
 - Maximum continuous energy (MWh)
- **Energy storage will be able to be shown flexibly over the course of the 24-hour showing period, in conformance with the abovementioned parameters**

Storage in SOD – Parameters and Checks

- **Load-serving entities (LSEs) that use energy storage to meet their RA requirements will be required to show sufficient excess hourly capacity (energy) to charge the shown storage, inclusive of charge and discharge efficiency losses**
 - Critically, the storage showing and the compliance of charging sufficiency verification is done **on the basis of a 24-hour showing**
 - Charging sufficiency verification does not imply showing the charging hours, only showing sufficient excess hourly capacity **within the same 24-hour showing**

Storage in SOD – Limitations of the SOD framework

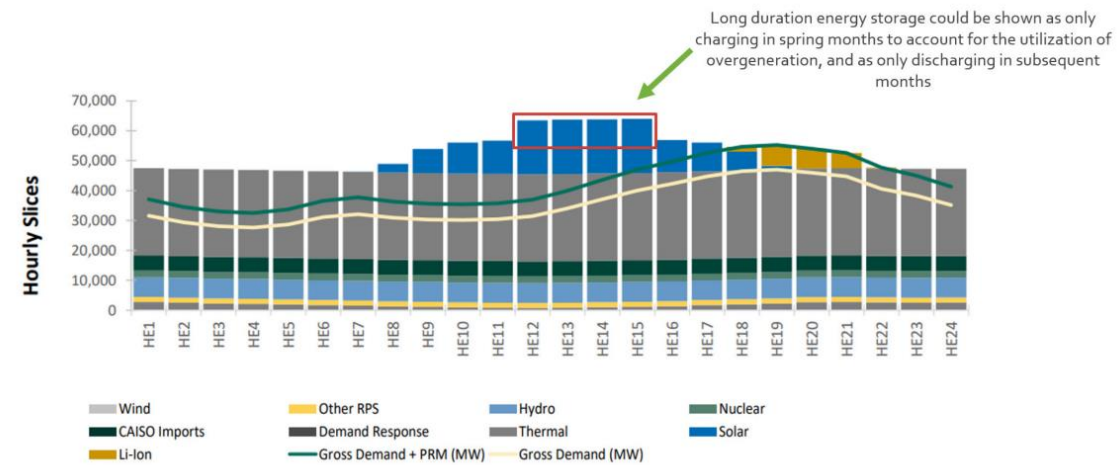
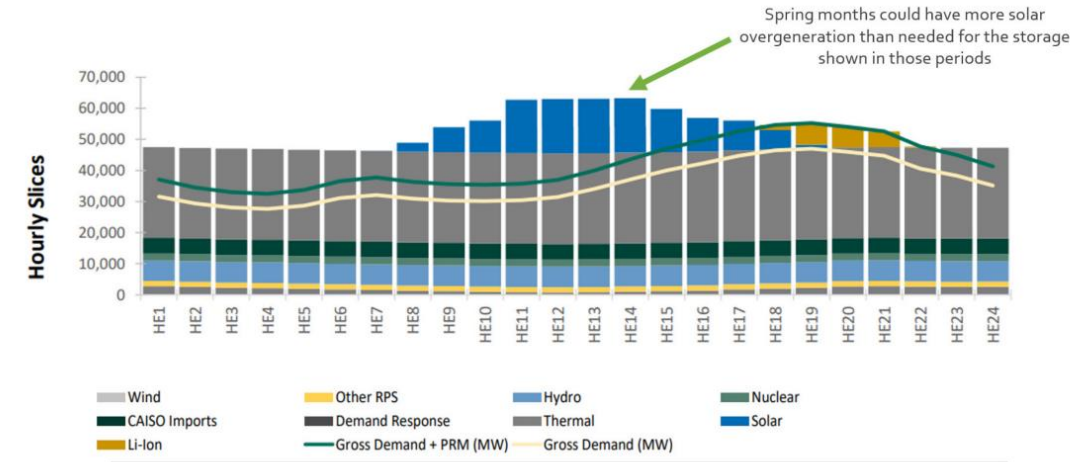
- **The 24-hour nature of the SOD framework is an important and necessary step away from planning for a fraction of the day and towards meeting load in every single hour**
- **The SOD framework, paired with the inclusion of charging sufficiency verification, creates complexities for the representation of LDES, particularly those with operational timeframes in excess of 24 hours**
 - Assets with durations in excess of 10 hours may not complete a full charge/discharge cycle in 24 hours
 - LDES can provide arbitrage across days or even weeks, something that is not captured fully in the framework but has a significant impact on reliability
- **Parties have also suggested that the framework may not be well-equipped to mitigate multi-day reliability events**
 - In this context, D.22-06-050 requested parties to consider redefining the MCC buckets for this purpose

Representing LDES

- **CESA staff considers that energy storage with durations ≤ 10 hours are likely to be easily reflected in the proposed SOD paradigm**
- **Resources with longer durations and those with operational timeframes above 24 hours (multi-day and/or seasonal storage) might prove more complex to represent**
 - CESA staff considers that the key limitation regarding these assets relates to the charging sufficiency verification
 - If discharge can be represented across a showing period, we need to find a way to demonstrate charging

Representing LDES – Seasonal Charging Scheme

- If an LSE has storage assets with an operational timeframe in excess of 24 hours, it should be able to make use of the seasonal charging scheme:
 - The seasonal charge scheme is a mechanism that would allow LSEs to take excess hourly capacity from one showing period to another
 - This captures the dynamic of moving spring-month overgeneration to provide charging sufficiency for energy storage assets shown in summer or winter months
 - This solution would allow for carryover excess energy to be used in future seasons (showings) for storage charging
 - In essence, this would not set a “use it or lose it” approach for excess generation and allow for “banking” of these RA attributes across different showing periods



Multi-Day Reliability

- **Previously in the RA proceeding, CESA argued that the likelihood of multi-day reliability events is better addressed in planning venues such as the Integrated Resource Planning (IRP) proceeding**
 - Modeling different outlier scenarios in IRP would ensure development of sufficient resources
 - While capturing the likelihood of multi-day reliability events is better done through IRP, CESA still considers that RA may need a framework that incents procurement of resources able to provide reliability across days
- **Previously, parties have suggested reflecting the need for some base level of capacity with availability above 4 hours to account for multi-day reliability events**
 - CESA is open to exploring this path

Multi-Day Reliability – MCC Buckets

- Redefining the MCC buckets could reflect the need for some base level of LDES or firm generation to account for multi-day reliability events
 - Today, the CPUC limits the fraction of use- or energy-limited resources that may be used by an LSE to meet System RA through the MCC buckets
 - D.22-06-050 directed parties to ensure LDES resources are properly valued across the slice-of-day framework in coordination with the elimination of the MCC buckets

Category	Availability	Maximum Cumulative Capacity for Bucket and Buckets Above
DR	Varies by contract or tariff provisions, but must be available Monday – Saturday, 4 consecutive hours between 4 PM and 9 PM, and at least 24 hours per month from May – September.	8.3%
1	Monday – Saturday, at least 100 hours per month. For the month of February, total availability is at least 96 hours. January - February, May - December, 4 consecutive hours between 4 PM - 9 PM. March - April, 4 consecutive hours between 5 PM - 10 PM.	17.0%
2	Every Monday – Saturday. January - February, May - December, 8 consecutive hours that include 4 PM - 9 PM. March-April, 8 consecutive hours that include 5 PM - 10 PM.	24.9%
3	Every Monday – Saturday. January-February, May - December, 16 consecutive hours that include 4 PM - 9 PM. March-April, 16 consecutive hours that include 5 PM - 10 PM.	34.8%
4	Every day of the month. Dispatchable resources must be available all 24 hours.	100% (at least 56.1% available all 24 hours)

Multi-Day Reliability – MCC Buckets

- **Similar to SCE’s proposed Minimum Availability Categories, minimum requirements for assets with availability above 4 hours could be set to minimize multi-day reliability risks**
 - Percentages could establish minimum, rather than maximum, caps by duration
 - Consistent with MCC buckets today, categories could include 24, 16, and 8 hours
 - Percentages could be derived from minimum load
 - Other options?
 - By LSE?

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