PDR for Behind-the-Meter Storage

CAISO DDEMI
Working Group
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SUNRUN

TESLA

CALIFORNIA SOLAR + STORAGE ASSOCIATION
smart local energy

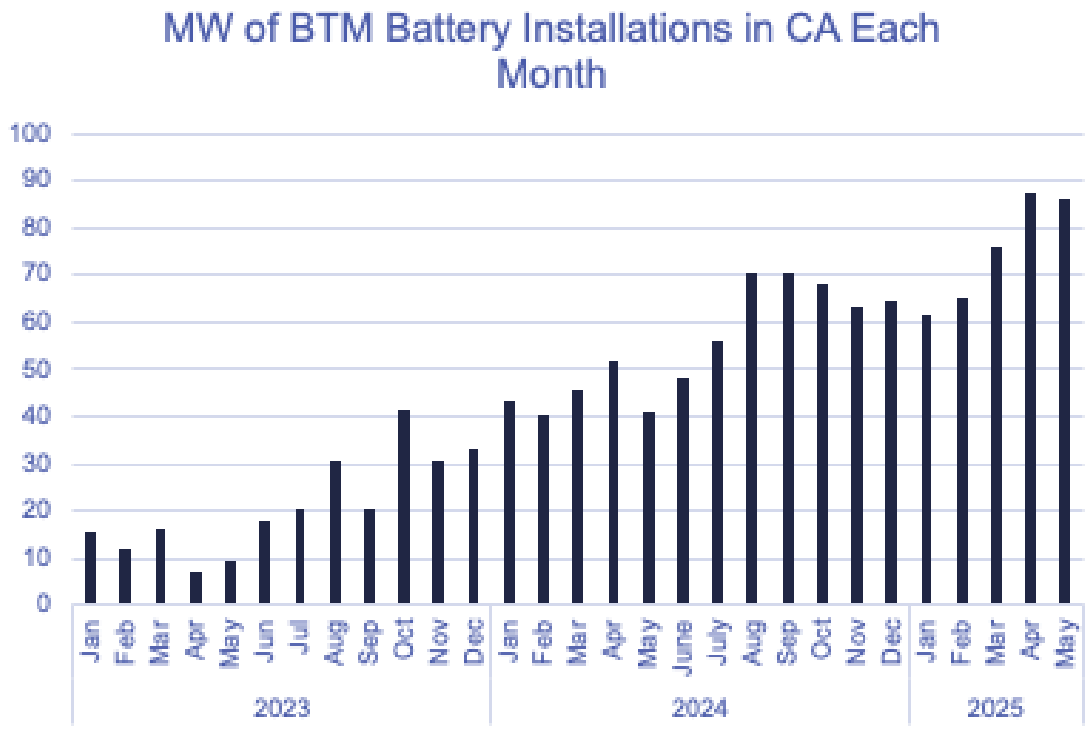
Significant Behind-the-Meter Storage Capacity Already Exists in California

- Over **2,500 MW** of customer-sited battery storage is online—comparable to **Diablo Canyon** nuclear plant capacity.
- More than **50%** of new rooftop solar systems are now paired with batteries, up from ~20% in 2023; companies like Sunrun are deploying nearly **all solar with storage**.



Rapid Growth of Distributed Battery Storage in California

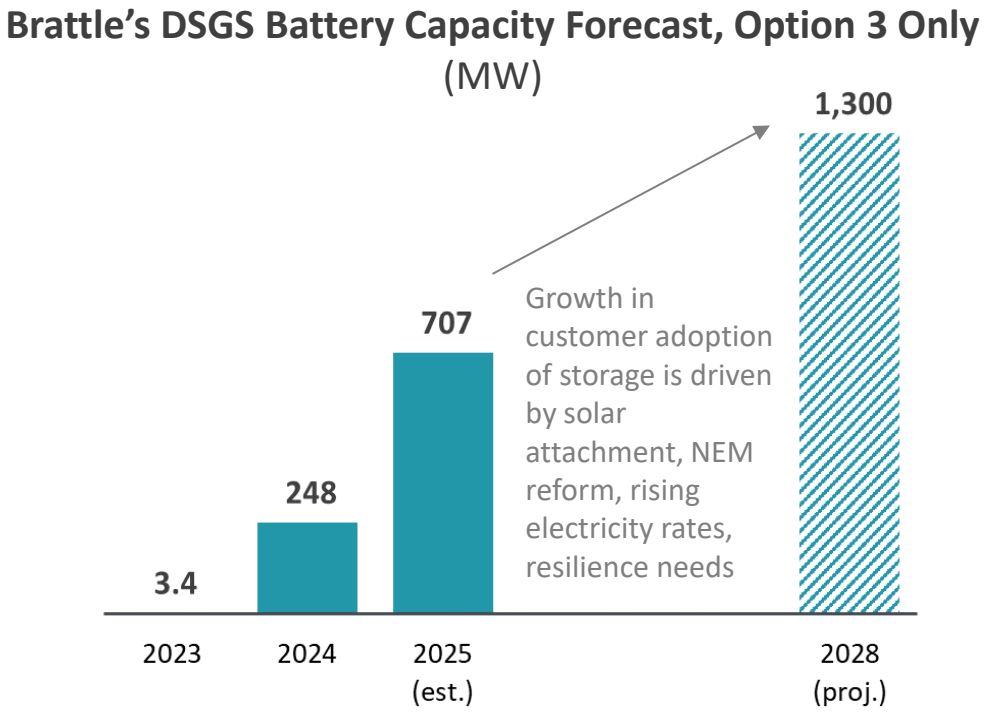
- More than **50 MW** installed **each month** for the past year
- By 2040, the CEC forecasts over **6,000 MW** of distributed battery storage—more than double today's capacity.
- However, if current trends continue (at least 50 MW per month), CA will have over **9,000 MW** of BTM storage capacity online by 2040



Significant Capacity Already Active in VPPs and Ready for CAISO Participation

- Industry wants more opportunities to use BTM storage to provide grid services, but the programs must be designed with behind-the-meter, distributed, aggregated resources
- Currently over **700 MW** of BTM batteries participating in **DSGS**. Rapid growth due to streamlined, simple rules, enrollment process, payment structure, etc.
    - Option 3 designed specifically for BTM batteries

Over 700 MW of BTM battery capacity is participating in DSGS in 2025



Notes: Historical (2023, 2024) capacity based on reported enrollments. 2025 enrolled capacity is as of July 2025 from Olivine. Final 2025 capacity will be available at the end of the program season. 2028 enrollment projections assume one half of residential CEC IEPR mid-case forecasted distributed battery capacity participates in DSGS Option 3. All values reflect historical or estimated enrollment capacity that is subject to program baseline and accreditation protocols.

BTM Storage Participation in CAISO Market—Proxy Demand Resource

Current Primary Value Stream:

- **Resource Adequacy (RA)**—requires CAISO market participation

Current CAISO Market Participation Pathway:

- Most BTM storage uses the **PDR** model, which is most compatible with BTM storage interconnection
- Participates in **CAISO Day-Ahead** and **Real-Time** energy markets
- Complies with RA Resource **Must Offer Obligation (MOO)** requirements

Key Barriers with PDR Model:

1. **Net exports excluded** from performance evaluation in DR/PDR
2. **No device-level metering** enabled to measure BTM storage performance **at the aggregated level**

Issue 1: Net exports from BTM storage excluded from performance evaluation in DR/PDR

Performance Measurement

PDR performance for the resource will be measured in aggregate based on individual location load curtailment only and **must not include measured export of energy** from any of these individual locations.

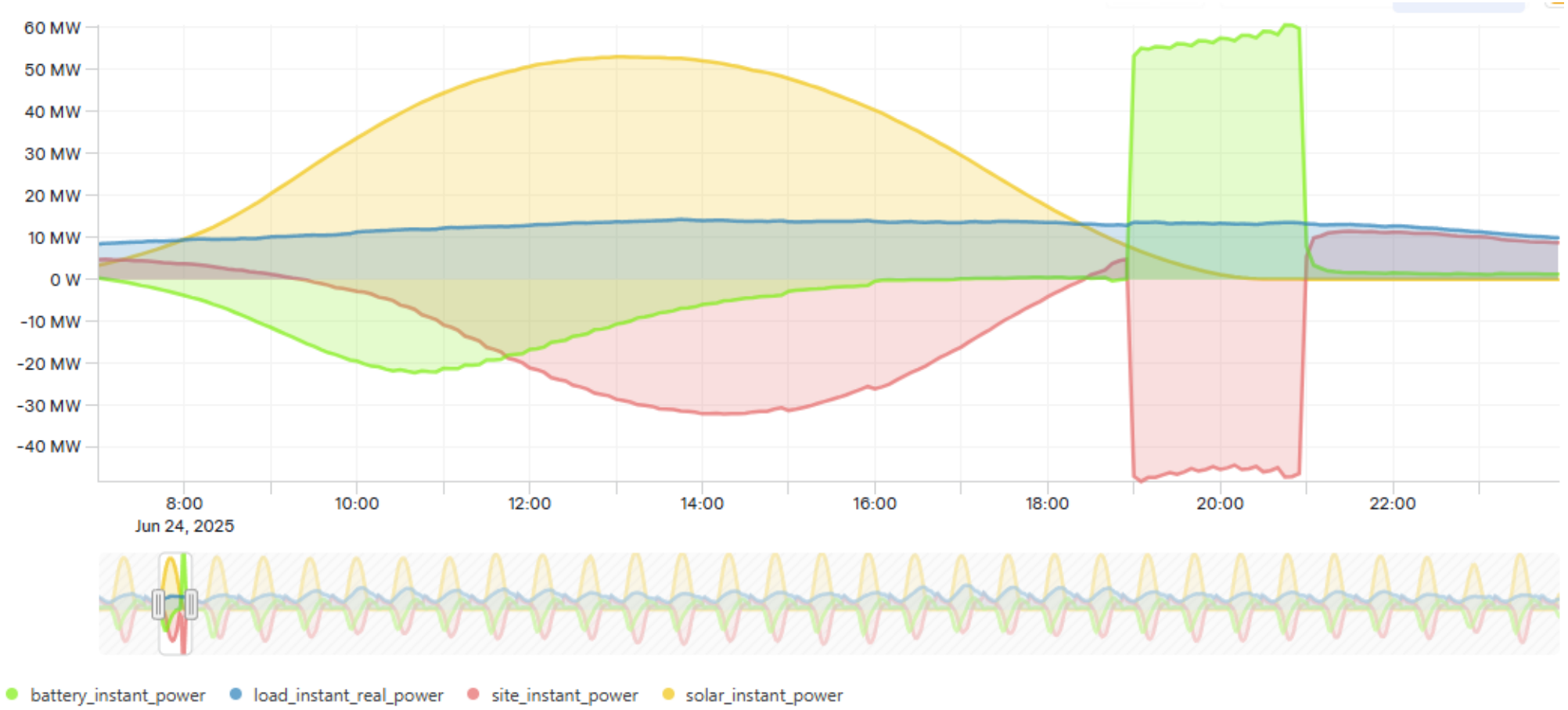
- *BPM for Demand Response, Section 2.1 Product Overview*

Meter Data Adjustment

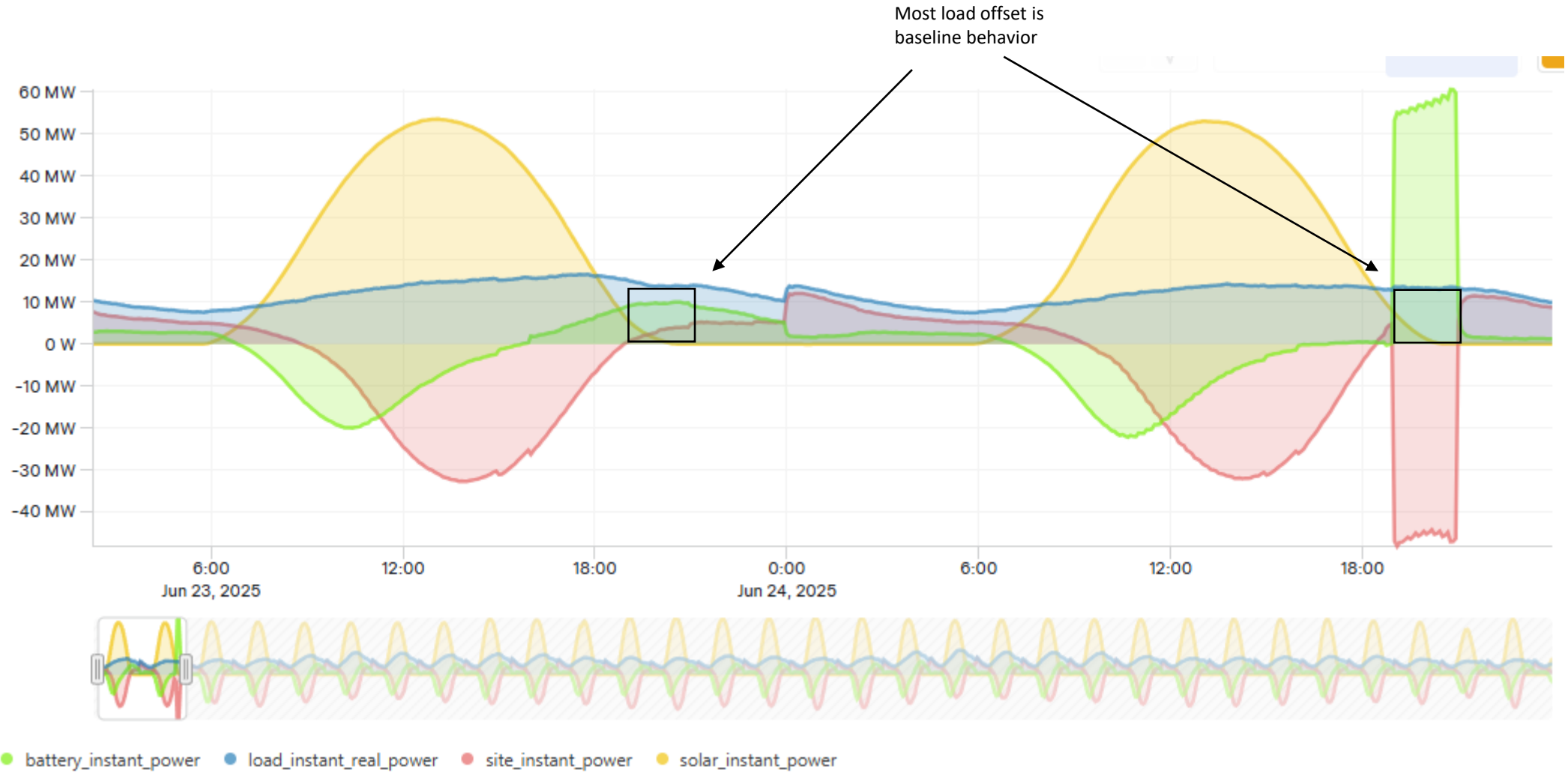
Meter data intervals in which there is a net export of energy, at any underlying PDR location, must be set to zero when using a Customer Load Baseline methodology.

- *BPM for Demand Response, Section 2.1 Product Overview*

Without the ability to account for export as part of the performance, battery value can be reduced by 80%



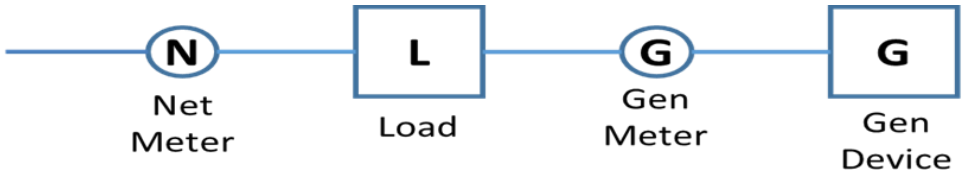
Without the ability to account for export as part of the performance, battery value can be reduced by 80%



Issue 2: No device-level metering enabled to measure BTM storage performance at the aggregated level

Device-Level Performance Measurement Needed to Allow the Aggregation Level Performance Reporting

- BTM storage can operate independently from customer load
- Meters at the battery inverter can enable direct performance measurement
- Performance should be measured at the aggregation level



Flaws in Metering Generator Output (MGO) Approach

- MGO allows for device level performance measurement
- However, MGO also excludes BTM export from performance evaluation
- *BPM for Demand Response, Section 5.1 Metering Generator Output*

Revisit Metering Accuracy Requirements for BTM Storage

Revenue-grade meters with 0.2 Accuracy Class per ANSI C12 standards pose compliance challenges, especially for residential storage OEMs.

- *BPM for Metering, Section 12 PDR and RDRR*

Thank You!

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