DOCKETED	
Docket Number:	23-SB-100
Project Title:	SB 100 Joint Agency Report
TN #:	258321
Document Title:	DER Augmentation Sensitivity, Behind-the-Meter Energy Storage
Description:	N/A
Filer:	J Padilla
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	8/6/2024 1:36:10 PM
Docketed Date:	8/6/2024

California Energy Commission

Title: DER Augmentation Sensitivity, Behind-The-Meter Energy Storage

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Date: 8/7/2024

List of Acronyms and Initialisms

BTM – Behind-the-meter

BUGL – Burbank and Glendale

CAISO – California Independent System Operator

DG – Distributed Generation

dGen – Distributed Generation Market Demand Model

DER – Distributed Energy Resource

DF – Demand Flexibility

IID – Imperial Irrigation District

IOU – Investor-Owned Utility

LADWP – Los Angeles Department of Water and Power

LESR – Limited Energy Storage Resource

MW – Megawatt

NBT – Net Billing Tariff

NCNC – Northern California Non-California ISO

NEM – Net Energy Metering

PA – Planning Area

PG&E – Pacific Gas and Electric

POU – Publicly Owned Utility

PV – Photovoltaics

SCE – Southern California Edison

SDG&E – San Diego Gas & Electric

SMUD – Sacramento Municipal Utility District

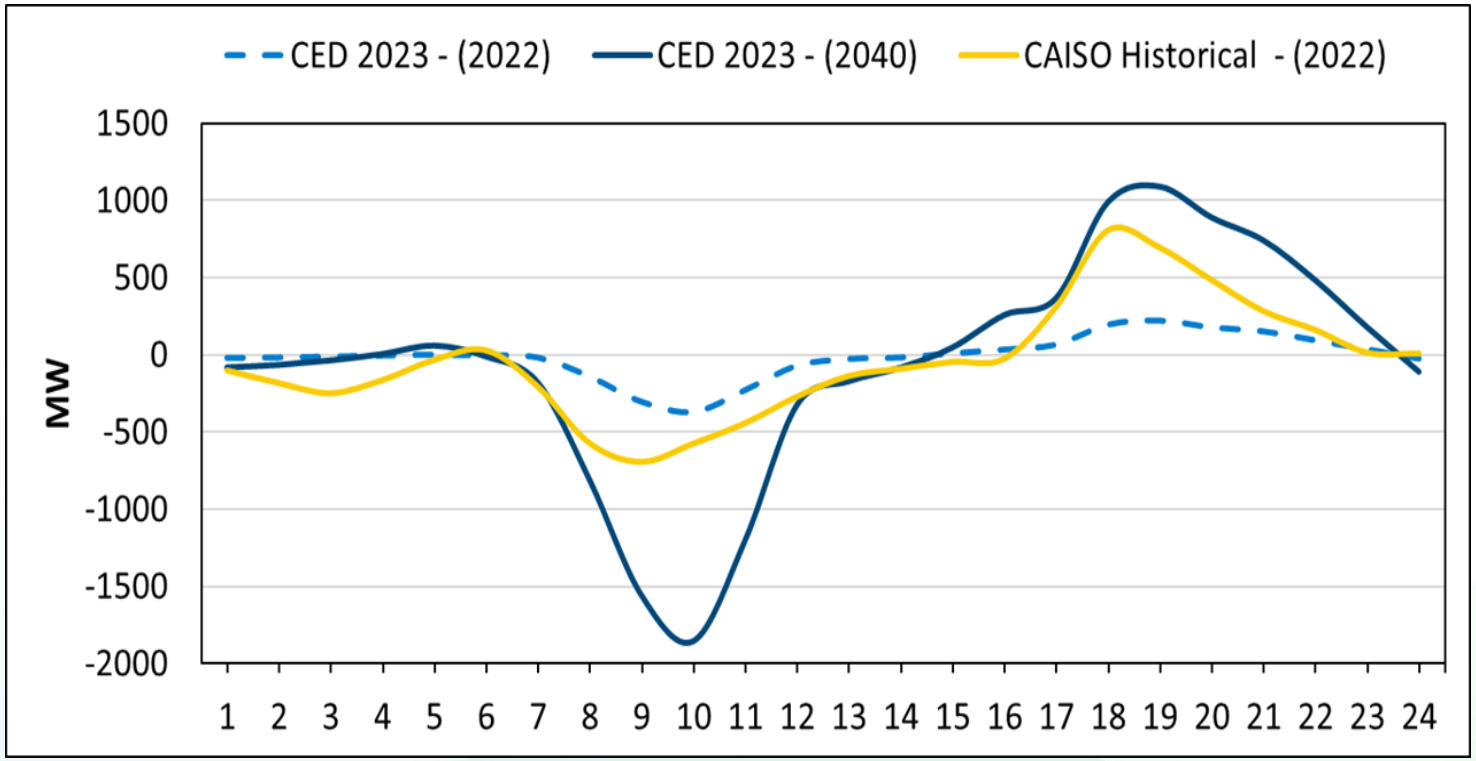
Objective and Key Takeaway

- **Objective:**
  - Quantify the amount of additional BTM storage capacity that will be paired with existing BTM solar PV to support the Augmented DER/DF scenario developed for SB100.
- **Key Takeaway:**
  - Over **4,300 MW** of BTM energy storage capacity could be retrofitted from NEM service turnover by 2042.
    - There's long-term potential to increase load flexibility in California if electricity customers choose to retrofit BTM energy storage to their existing BTM PV systems.

Behind-The-Meter Storage Relevance

- BTM storage is a flexible demand-side resource capable of
  - Storing electric generation during periods of low electric demand and excess solar generation
  - Discharging energy and reducing stress on the electric grid during peak periods
- Chart compares average BTM storage profiles to historical average Front-of-the-meter CAISO LESR profile in 2022.

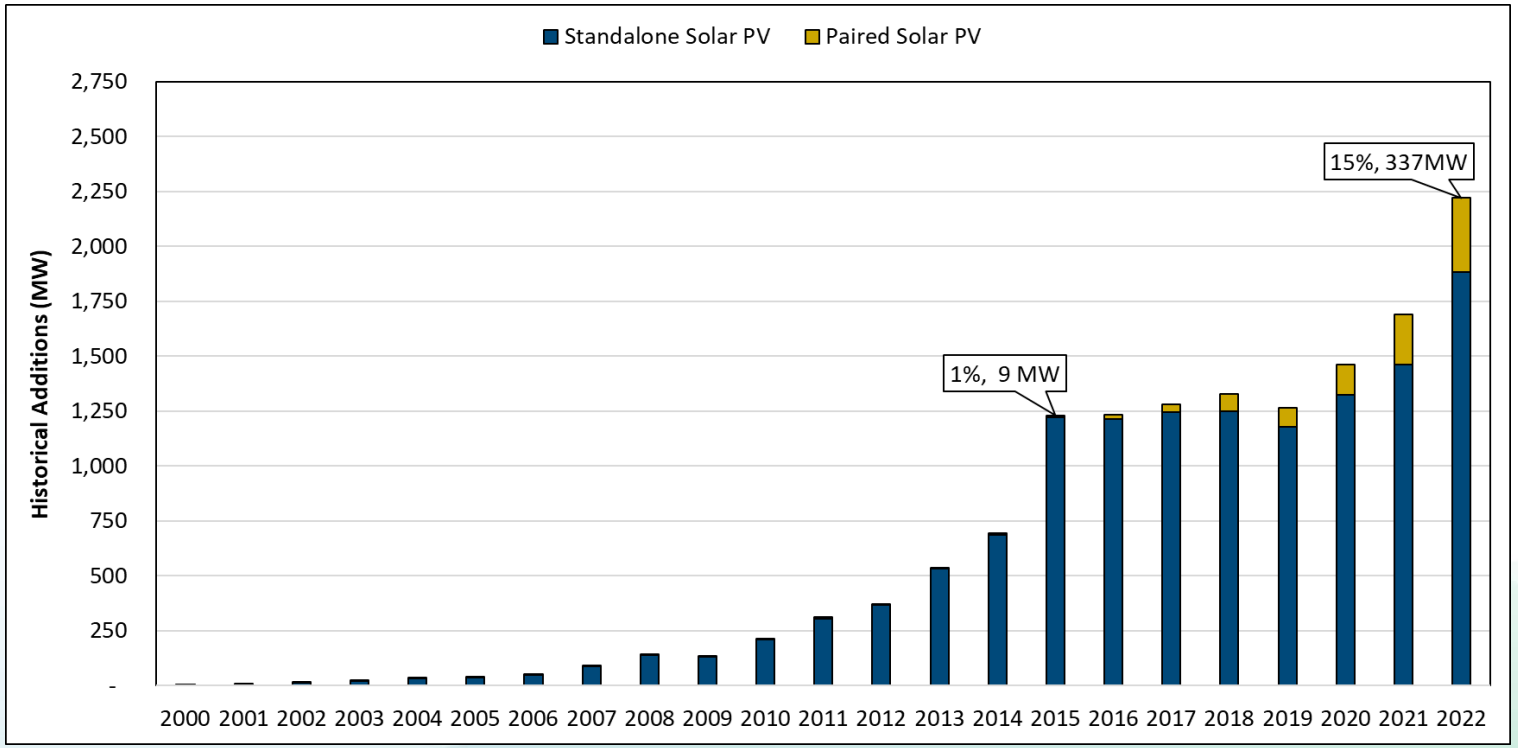
CAISO Storage Profiles: Average Weekday in September



Source: CEC Staff

Background: Historical Adoption

- BTM PV + storage adoption continues to increase in California.
  - In 2022, **15%** of installed BTM PV capacity was paired with BTM energy storage.
- While BTM PV + storage adoption is increasing, CEC staff estimate there was **13,395 MW** of standalone BTM PV in California by 2022.
- Labels in the chart below include shares and MW of PV capacity paired with storage (Share, Added PV capacity).



Source: CEC Staff

Background Cont.

- CPUC's NEM 2.0 decision (D.16-01-044) states NEM 1.0 and NEM 2.0 service expires **20 years** from the customer's interconnection date.
  - All NEM BTM PV moves to NBT by calendar year 2043.
- CPUC's NBT decision (D.22-12-056) states:

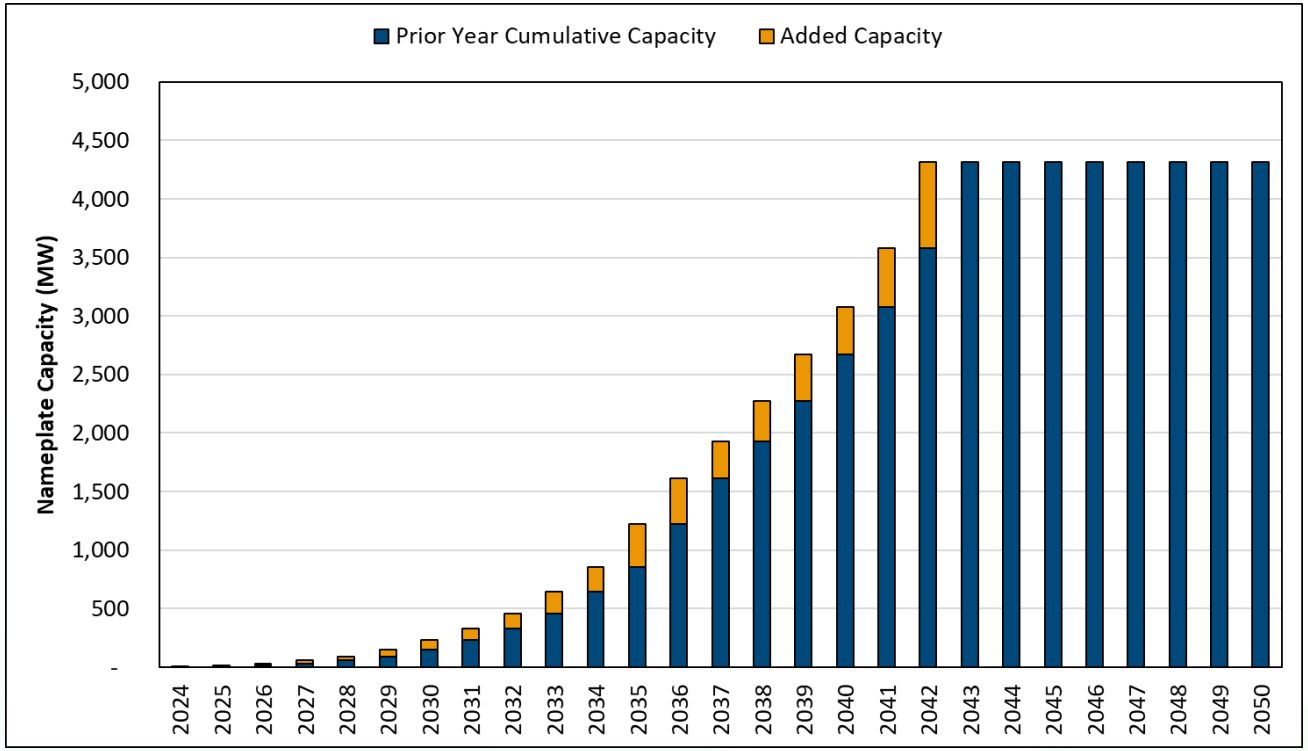
  "The updated billing structure is designed to optimize grid use by the tariff's customers and incentivize the adoption of combine solar and storage systems."
  - Changes to the tariff encourage first-time tariff customers to purchase paired systems and NEM customers to retrofit storage when transitioning to NBT.
  - CEC demand forecast tools capture PV + storage adoption for new tariff customers, but don't capture storage attachment for existing NEM customers.

Methodology

1. Quantify standalone BTM PV capacity added in each historical year from interconnection data (CEC form 1304b)
2. Calculate total standalone BTM PV capacity taking service under NBT based on 20-year NEM service term
    a. Assuming POU customers' tariffs expire in 20 years to mitigate complexity with regards to tracking solar programs
3. Use dGen forecast results to assign the percent of customers that will retrofit BTM energy storage to existing PV
4. Calculate total nameplate storage capacity using storage sizing factors derived from historical interconnection data

NEM Contract Turnover: BTM Energy Storage Results

- Over **4,300 MW** of BTM energy storage capacity could be retrofitted from NEM service turnover by 2042.
- **80%** of standalone BTM PV capacity in California was installed from 2017-2022.
    - In result, there's a lack of near-term growth in BTM energy storage retrofits from NEM service expiration.



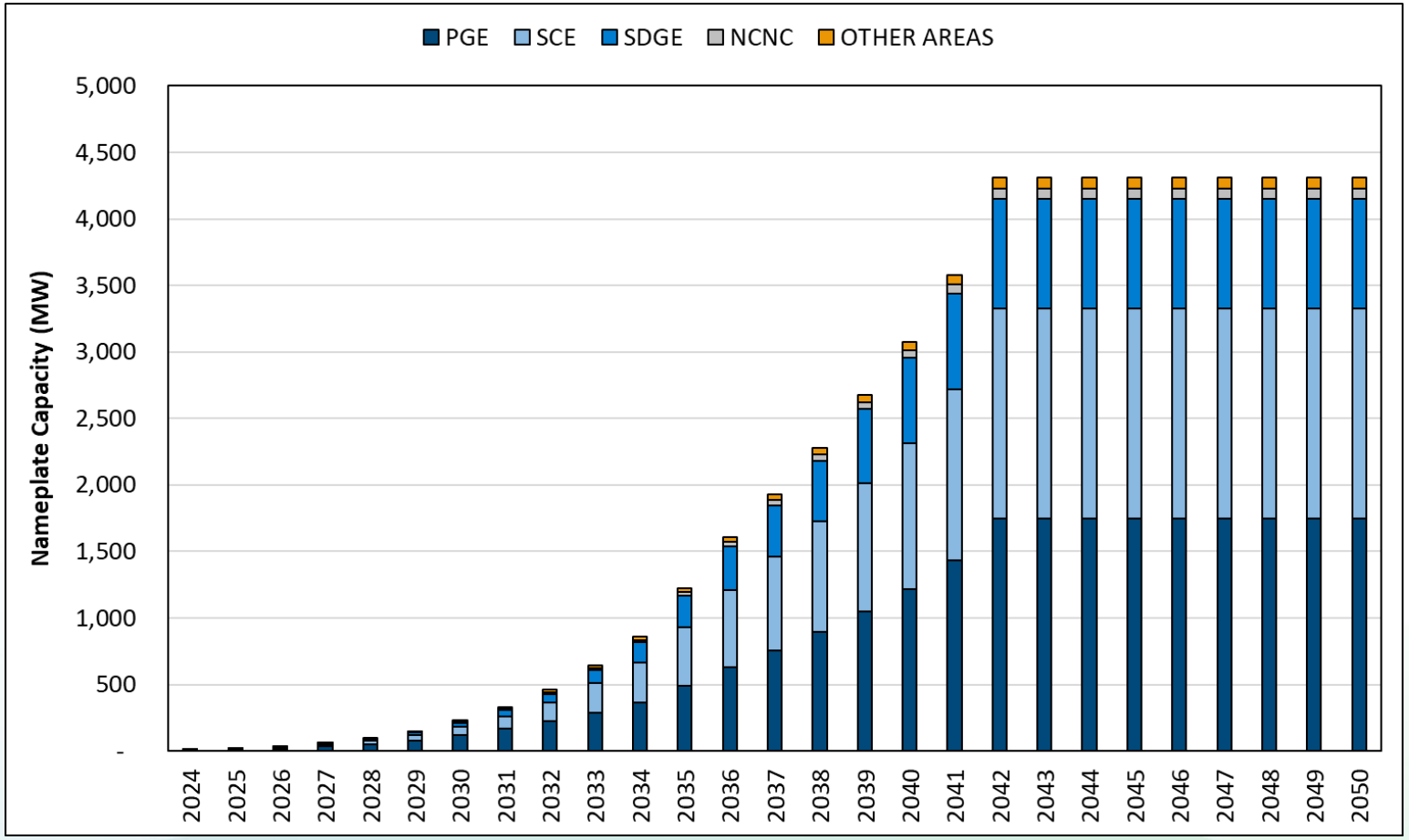
Source: CEC Staff

BTM Energy Storage Results by Planning Area

- As of 2022, approximately **92%** of BTM PV in California is interconnected within IOU Pas.
  - In 2042, about **96%** of forecasted BTM energy storage additions from NEM expiration are within IOU PAs.

Year	PG&E	SCE	SDG&E
2030	119	62	32
2035	487	446	234
2042	1,744	1,581	823

***Values are MW nameplate capacity**



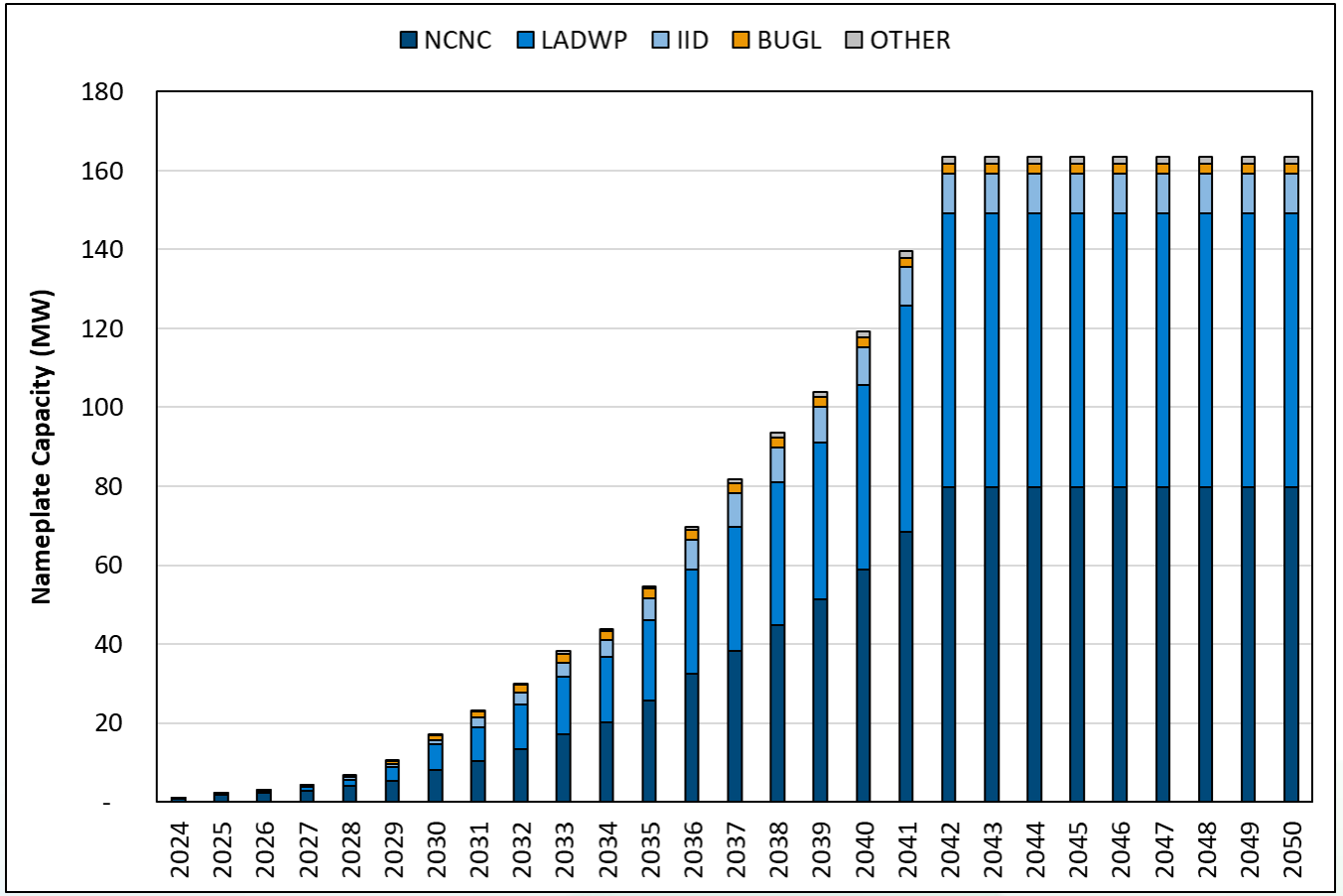
Source: CEC Staff

BTM Energy Storage Results by POU Planning Area

- In 2042, **90%** of forecasted POU PA energy storage capacity is in NCNC and LADWP planning areas.
  - **77%** of NCNC energy storage capacity is attributed to SMUD service territory.

Year	NCNC	LADWP	IID	BUGL
2030	8	7	1	1
2035	26	20	6	2
2042	80	69	10	2

***Values are MW nameplate capacity**



Source: CEC Staff

Thank you!