California Energy Commission

Historical BTM PV and Storage Adoption Trends in California

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August 21, 2024

List of Acronyms and Initialisms

BTM – Behind-the-meter

BUGL – Burbank and Glendale

CAISO – California Independent System Operator

CED – California Energy Demand

CEDU – California Energy Demand Update

DG – Distributed Generation

IID – Imperial Irrigation District

IOU – Investor-Owned Utility

LADWP – Los Angeles Department of Water and Power

LBNL – Lawrence Berkely National Laboratory

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

Presentation Overview

- **Historical Adoption Trends**
  - Historical PV & storage capacity
  - Improvements and differences from CED 2023

- **Historical Application Trends**
  - Historical monthly applications for PV
  - Historical residential storage attachment rates
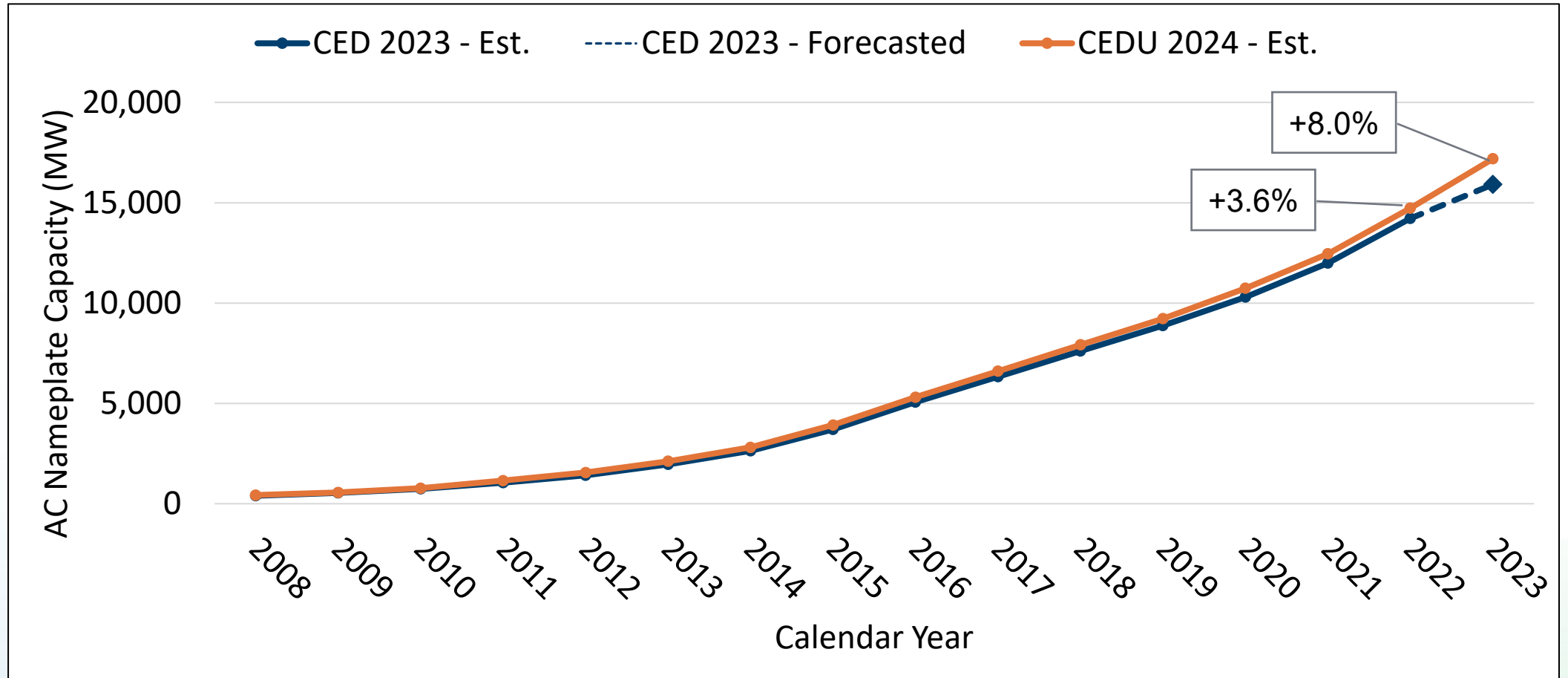
Historical BTM PV Adoption

Historical BTM PV Adoption Updates

- **Our process remains relatively unchanged from last year**
  - Historical PV and storage capacity is determined from data collected under California Code of Regulations, Title 20, Division 2, Chapter 3, Section 1304(b)
- **Improved data reporting**
  - Utilities submitted more complete data or resubmitted data upon request
  - Less estimation and probabilistic assignment
- **Improved data analysis**
  - Improved reporting of interconnection agreement types allowed for a refined historical capacity estimate
  - More time to communicate with utilities
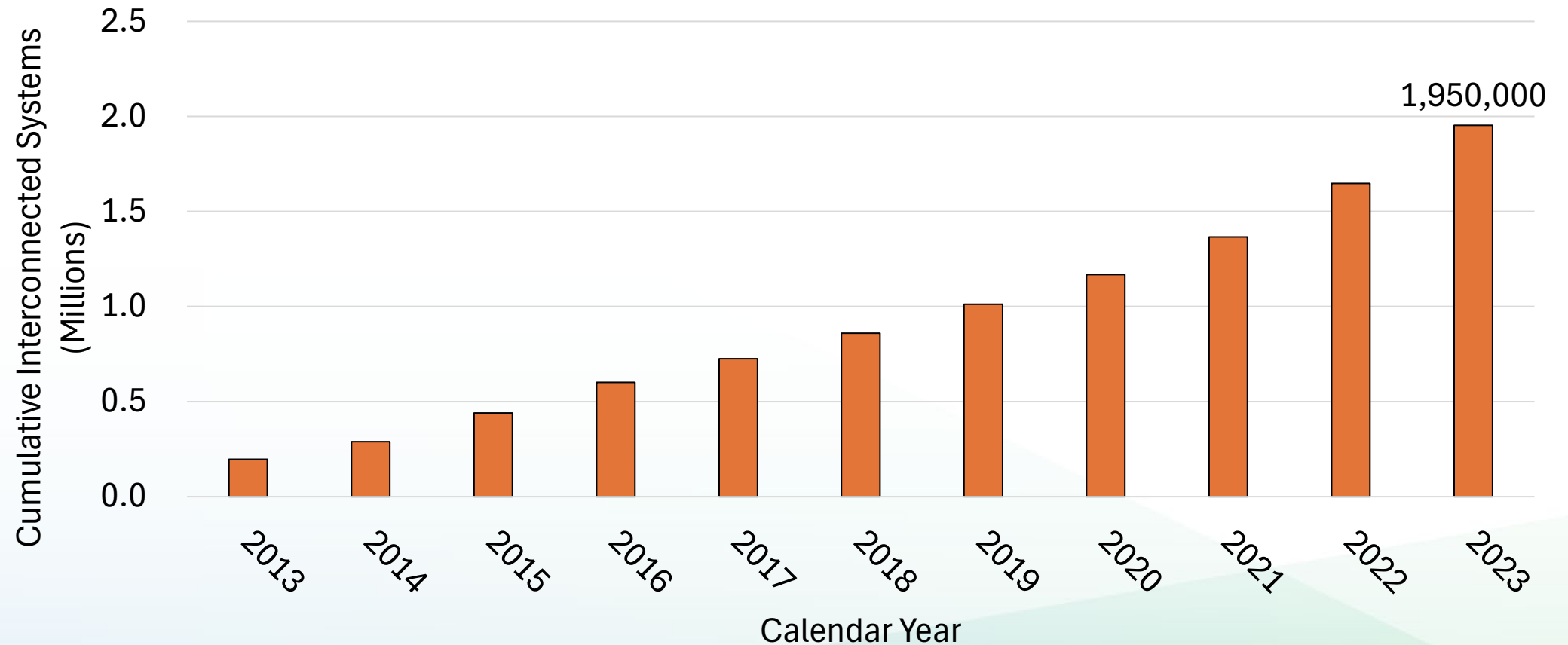
Historical BTM PV Adoption: Statewide

- Estimated 17,000 MW of BTM PV capacity statewide by end of 2023

Source: CEC Staff

Historical BTM PV Adoption: Interconnected Systems

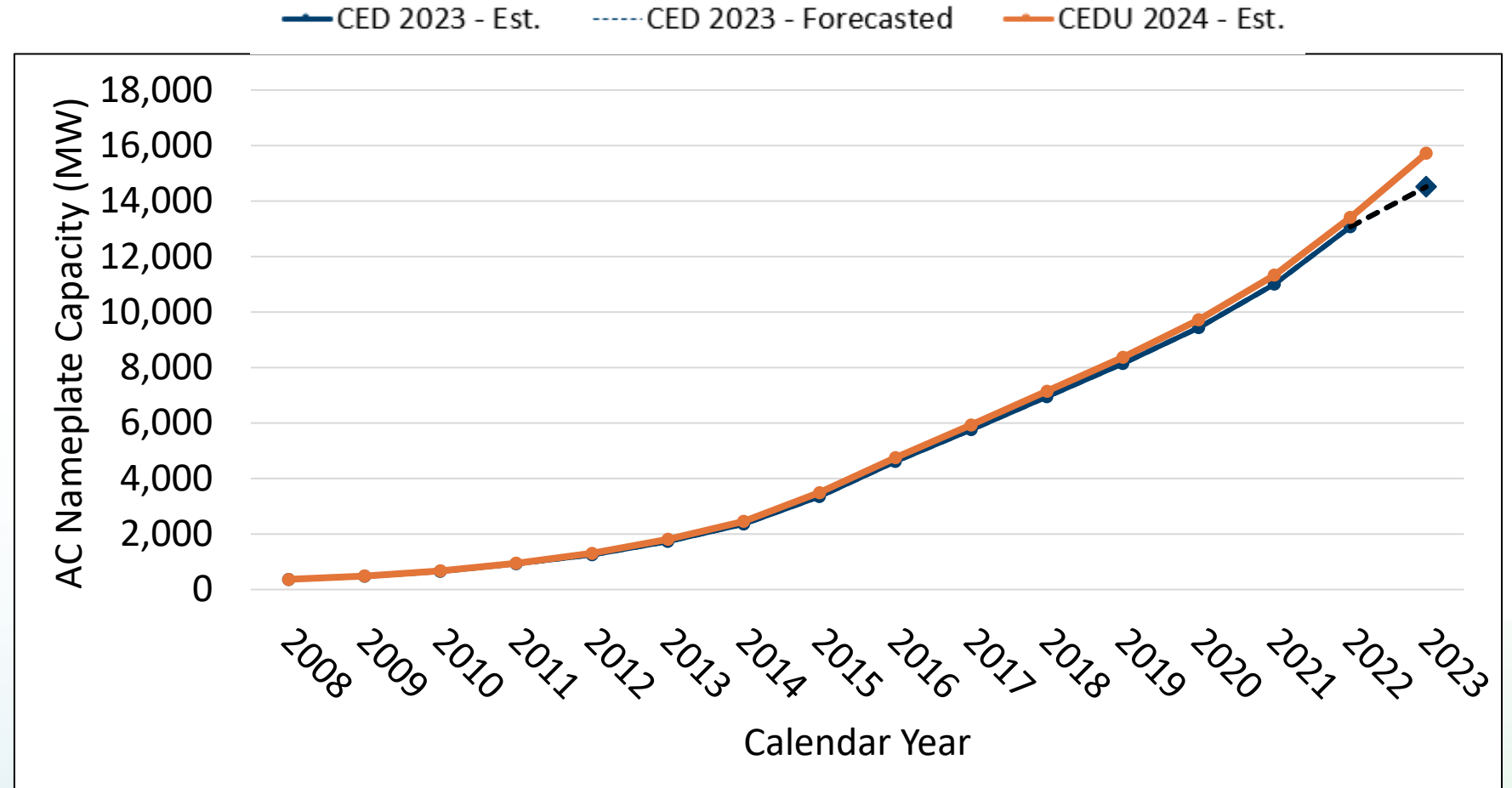- Estimated 1.95 million PV systems statewide. One third of those were interconnected in 2022 and 2023.

Source: CEC Staff

Historical BTM PV Adoption: CAISO

- This estimate covers PG&E, SCE, and SDG&E CEC planning areas.

Year	CED 2023 (MW)	CEDU 2024 (MW)
2021	11,005	11,327
2022	13,078	13,410
2023	**14,516**	15,723

Source: CEC Staff

Historical BTM PV Adoption Chart Notes

- Estimates comprise CEC Planning Areas
  - Additional charts for other CEC Planning Areas are provided in the slide deck appendix
- CED estimates includes NEM and Rule 21 Non-Export interconnection agreements

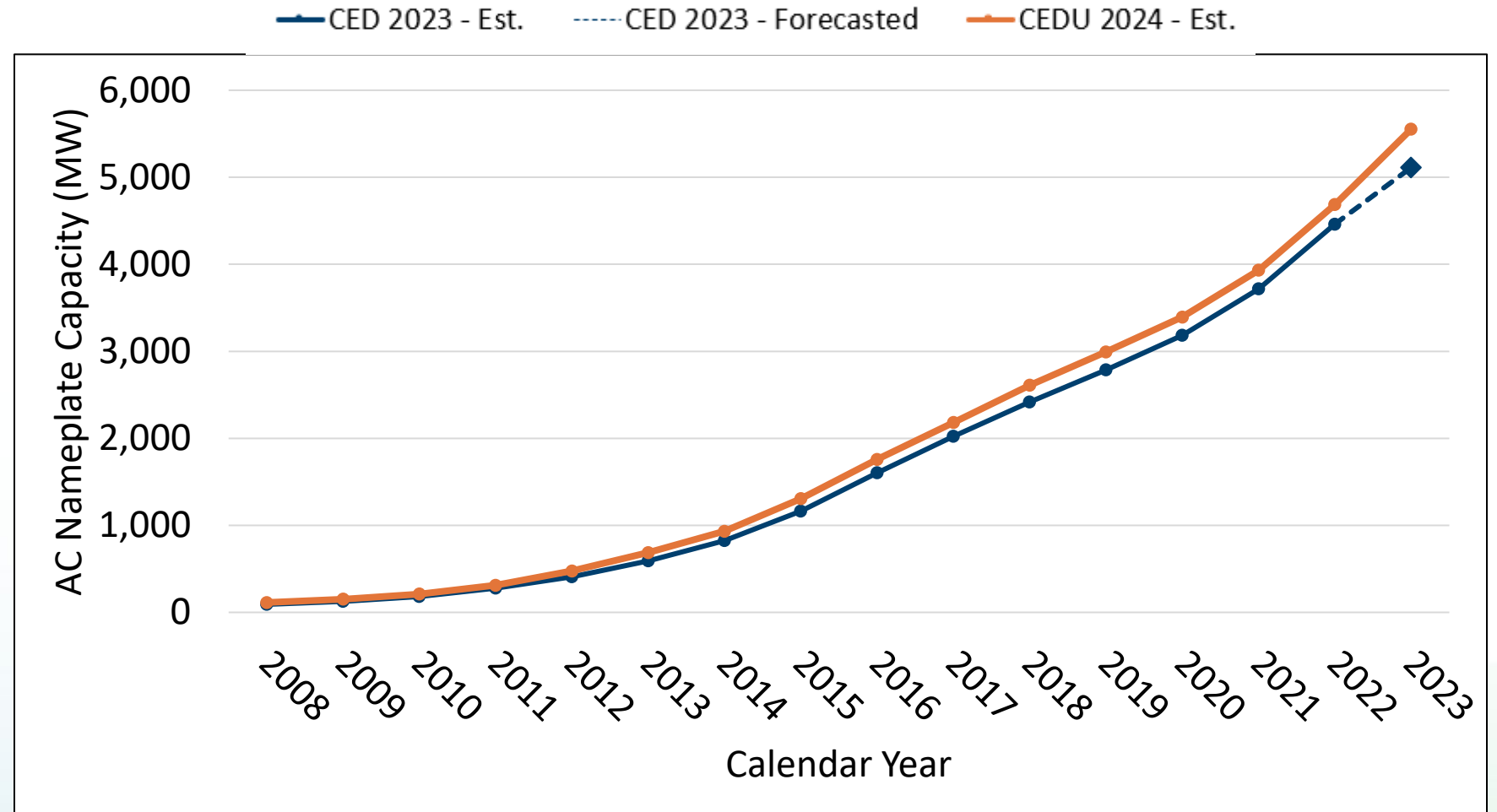# Historical BTM PV Adoption: PG&E Planning Area

Year	CED 2023 (MW)	CEDU 2024 (MW)
2021	5,696	5,780
2022	6,802	6,895
2023	**7,454**	8,103

Source: CEC Staff
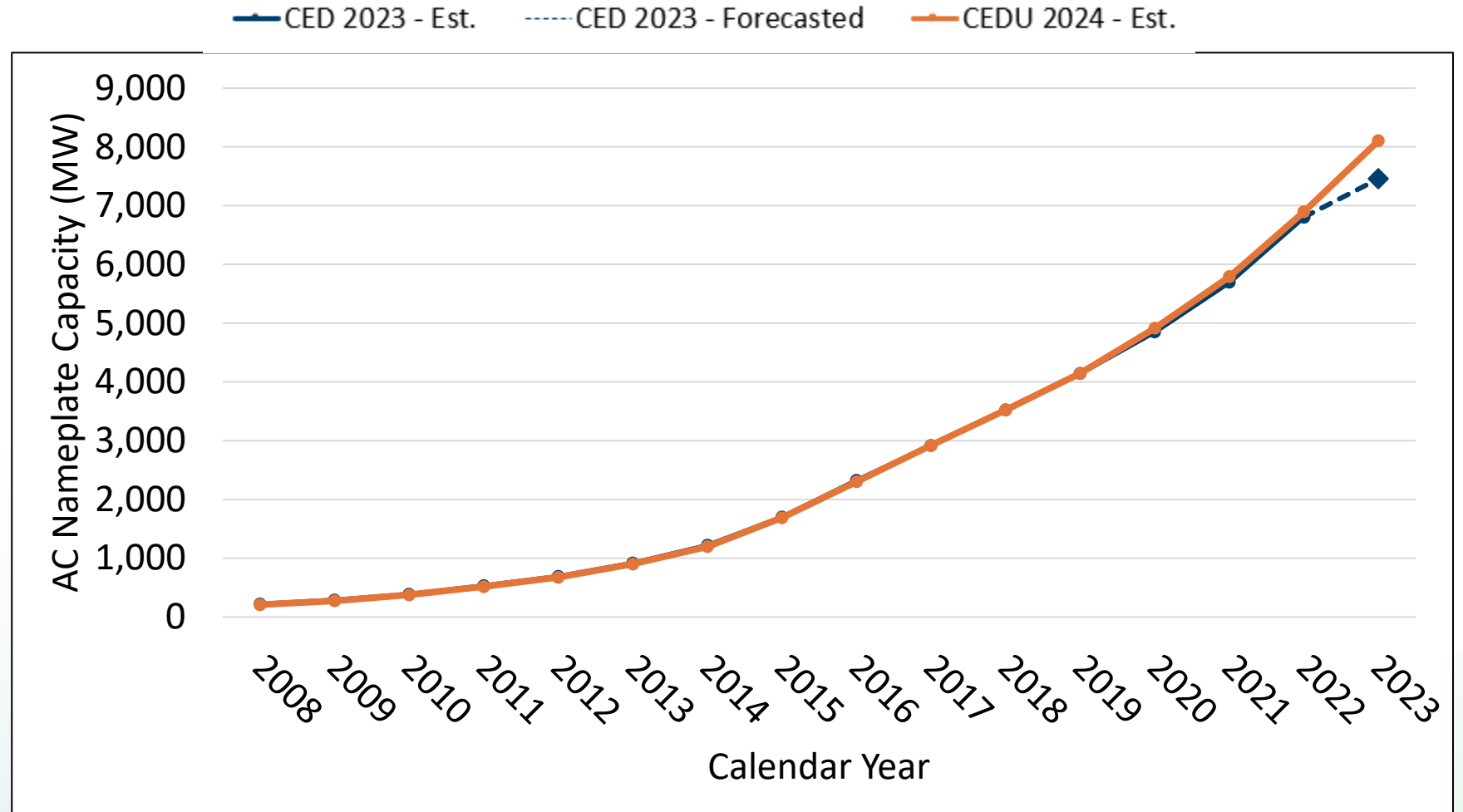
Historical BTM PV Adoption: SCE Planning Area

Year	CED 2023 (MW)	CEDU 2024 (MW)
2021	3,718	3,930
2022	4,462	4,685
2023	**5,112**	5,552

Source: CEC Staff

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Historical BTM PV Adoption: SDG&E Planning Area

Year	CED 2023 (MW)	CEDU 2024 (MW)
2021	1,591	1,608
2022	1,814	1,831
2023	**1,950**	2,068

Legend: CED 2023 - Est., CED 2023 - Forecasted, CEDU 2024 - Est.

X-axis: Calendar Year (2008–2023)
Y-axis: AC Nameplate Capacity (MW)

Source: CEC Staff
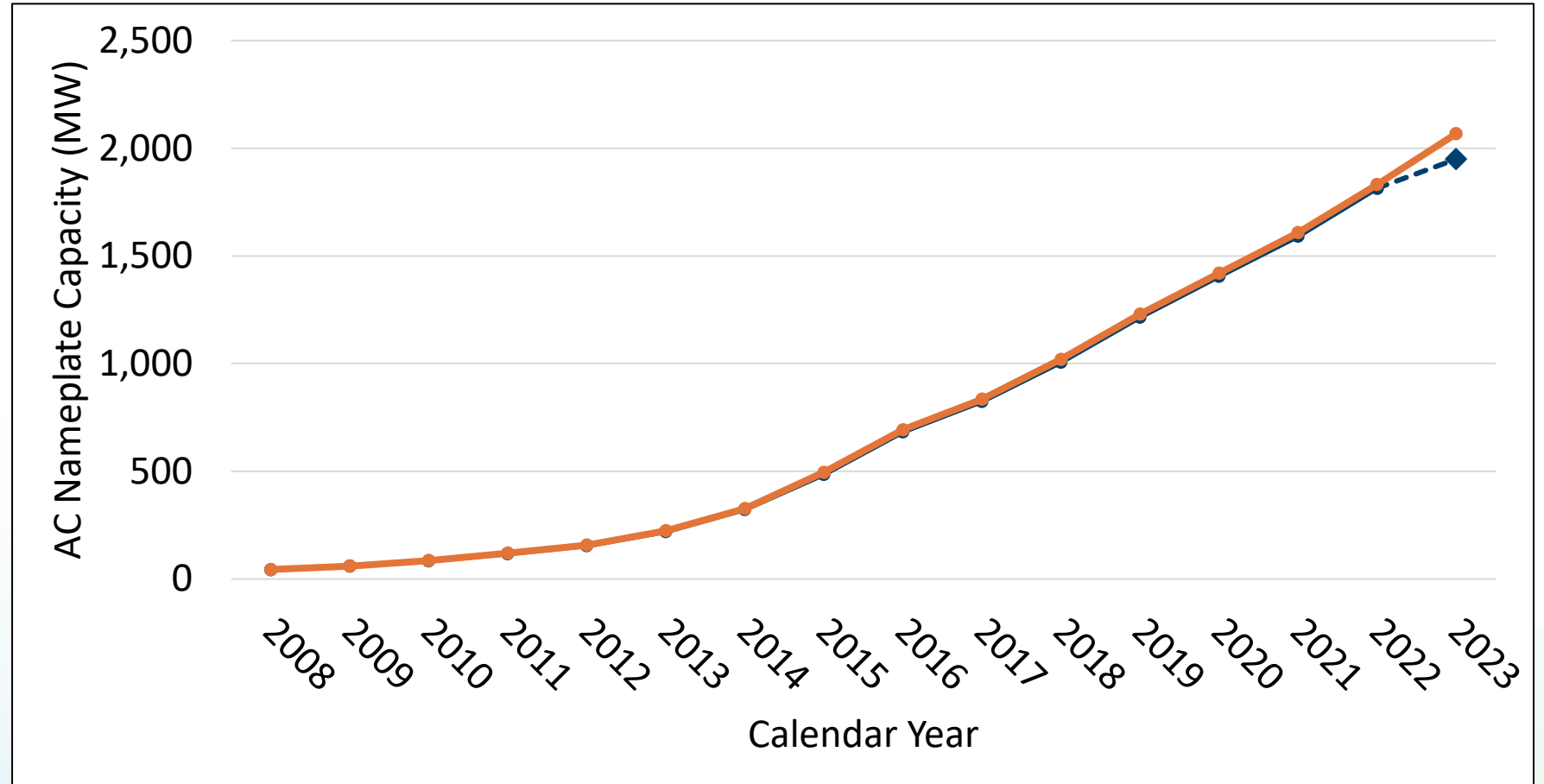
Historical BTM Storage Adoption

BTM Storage Adoption Chart Notes

- Three changes account for differences in storage results
  - Inclusion of more Rule 21 non-export systems
  - Improved reporting of storage system nameplate capacity
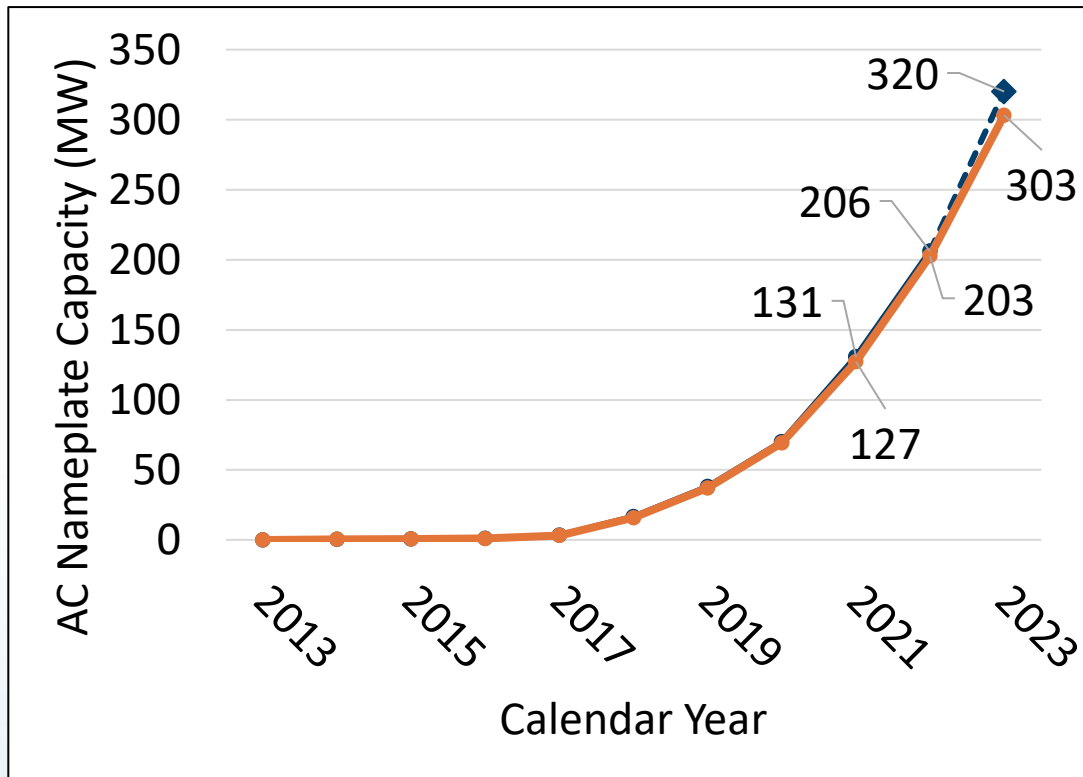 - Clarification of anomalies in the datasets

Historical BTM Storage Adoption: SDG&E Planning Area by Sector

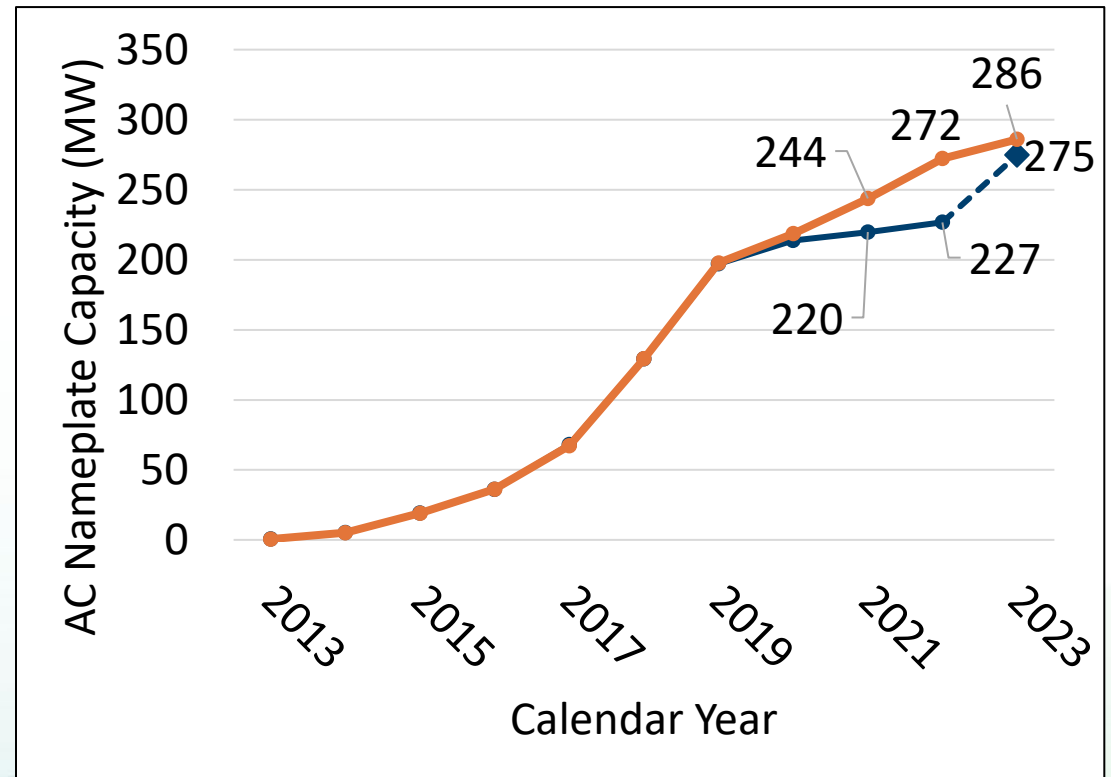- Estimated 202 MW of BTM storage capacity in SDGE planning area

Residential
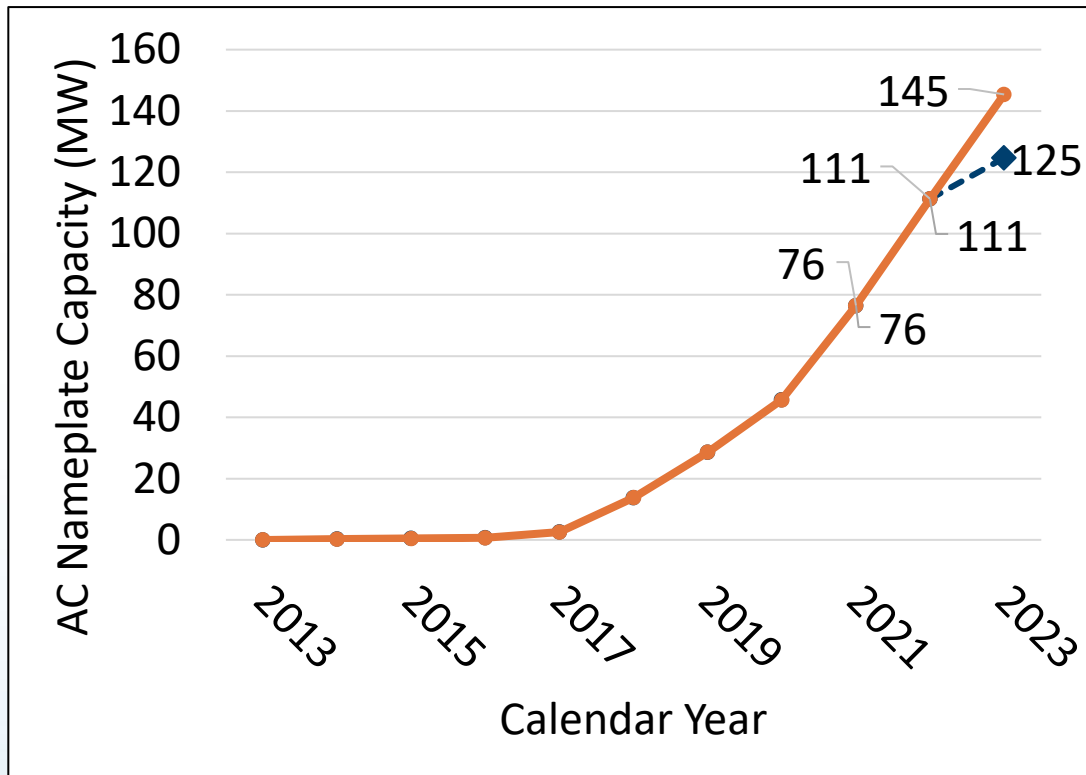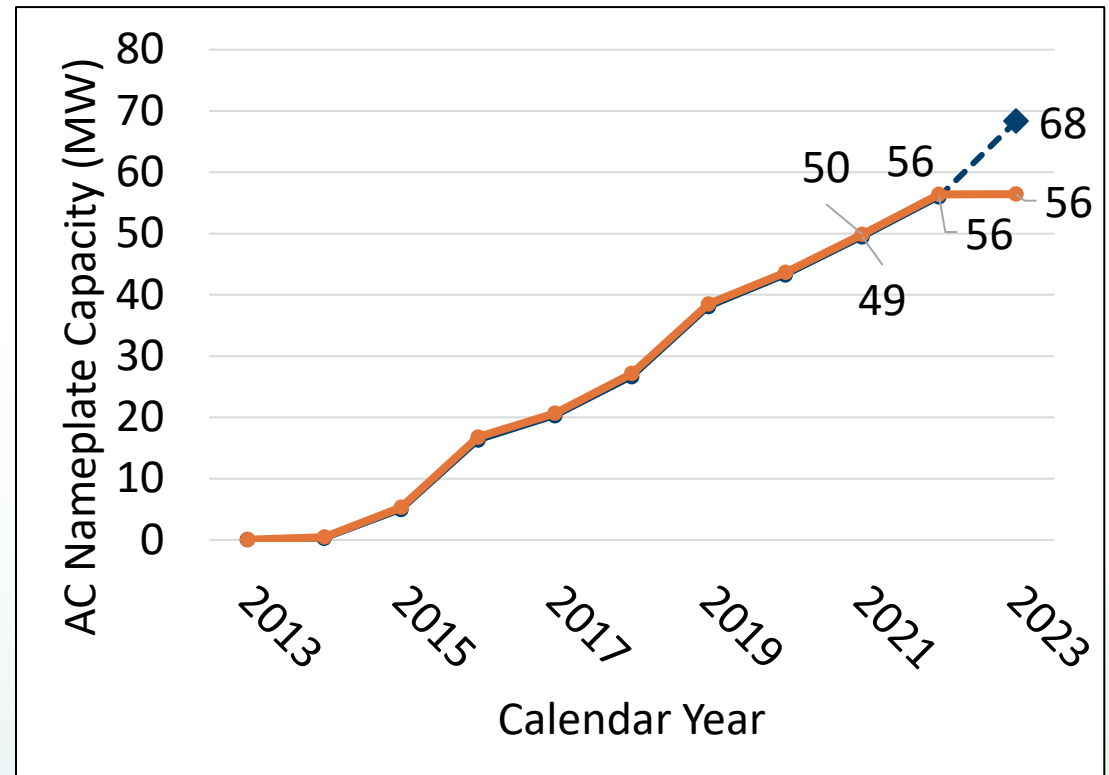
Non-Residential

Historical BTM Storage Adoption: SCE Planning Area by Sector

- Estimated 589 MW of BTM storage capacity in SCE planning area

Residential

Non-Residential

Historical BTM Storage Adoption: PG&E Planning Area by Sector

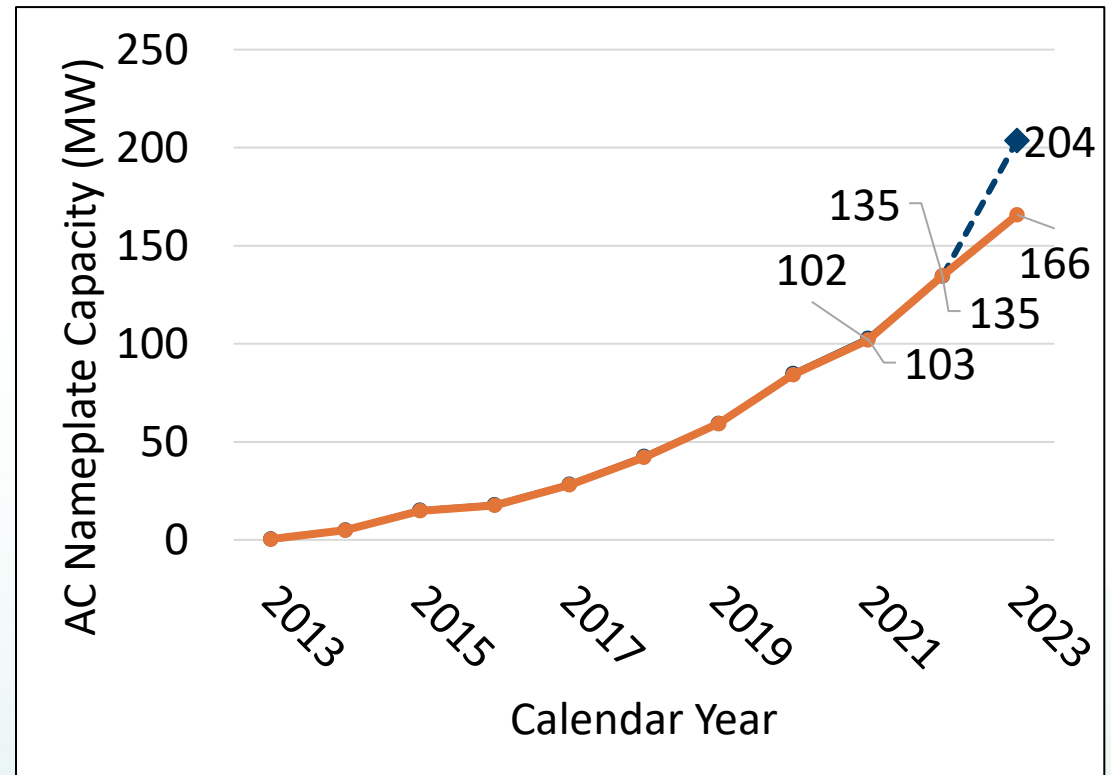- Estimated 699 MW of BTM storage capacity in PG&E planning area

Residential
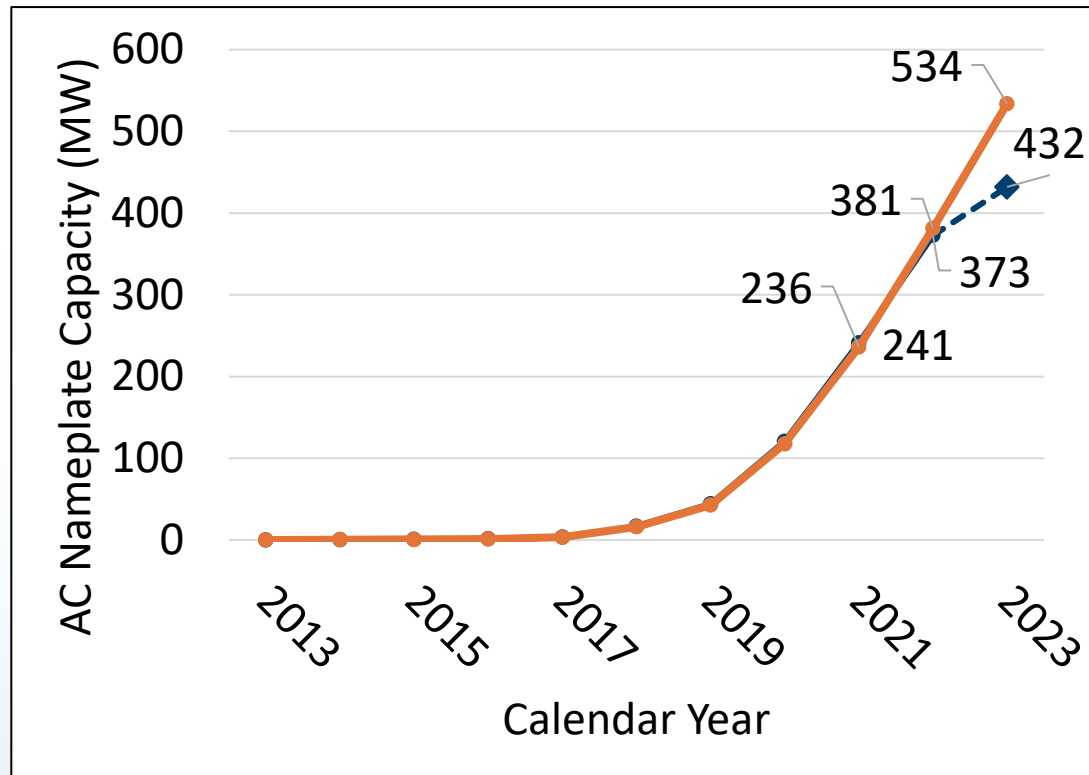
Non-Residential

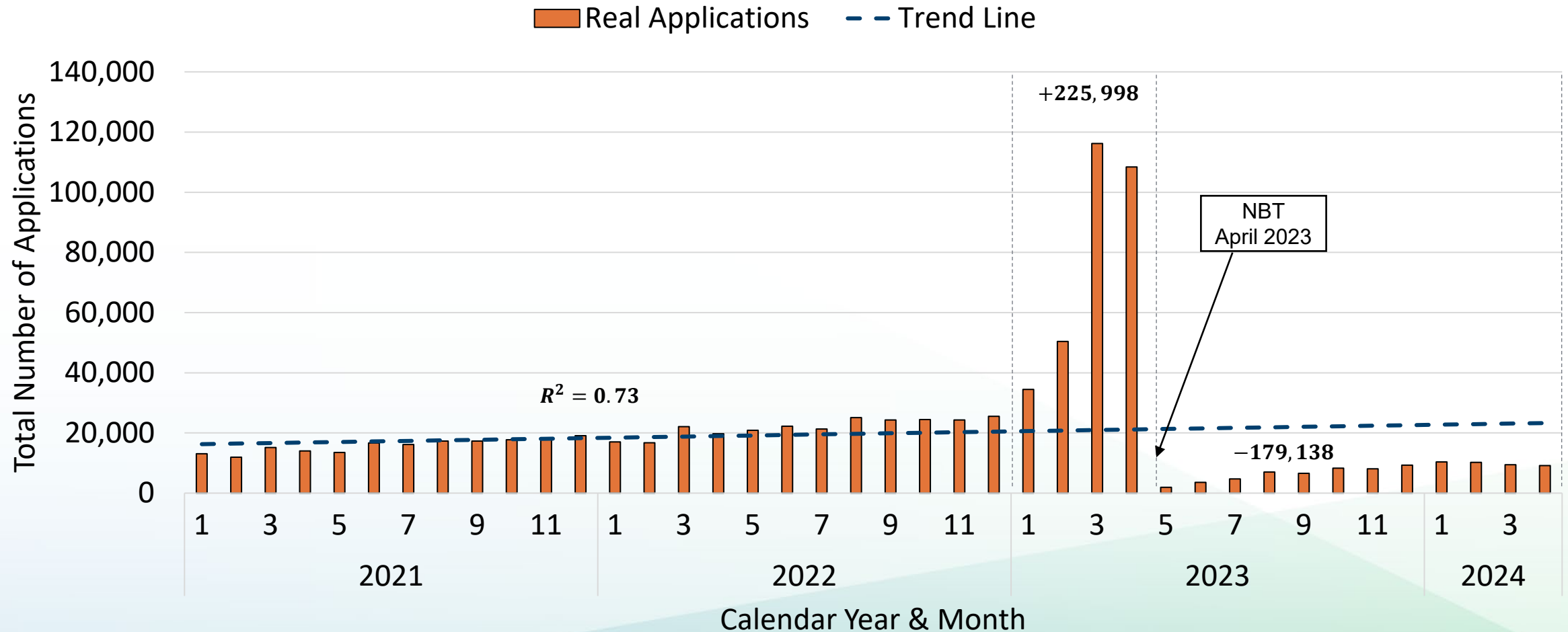# Historical BTM PV Applications

Historical BTM PV Application Chart Notes

- Includes CPUC's interconnected and pending application datasets
  - Data is through April 2024, the last complete month in all datasets
  - The Interconnected Applications Data Set has been cleaned to include NEM, NBT, and Rule 21 non-export BTM systems
- Estimates comprise IOU service territories
- Due to data limitations we were unable to determine attachment rates in SDG&E service territory
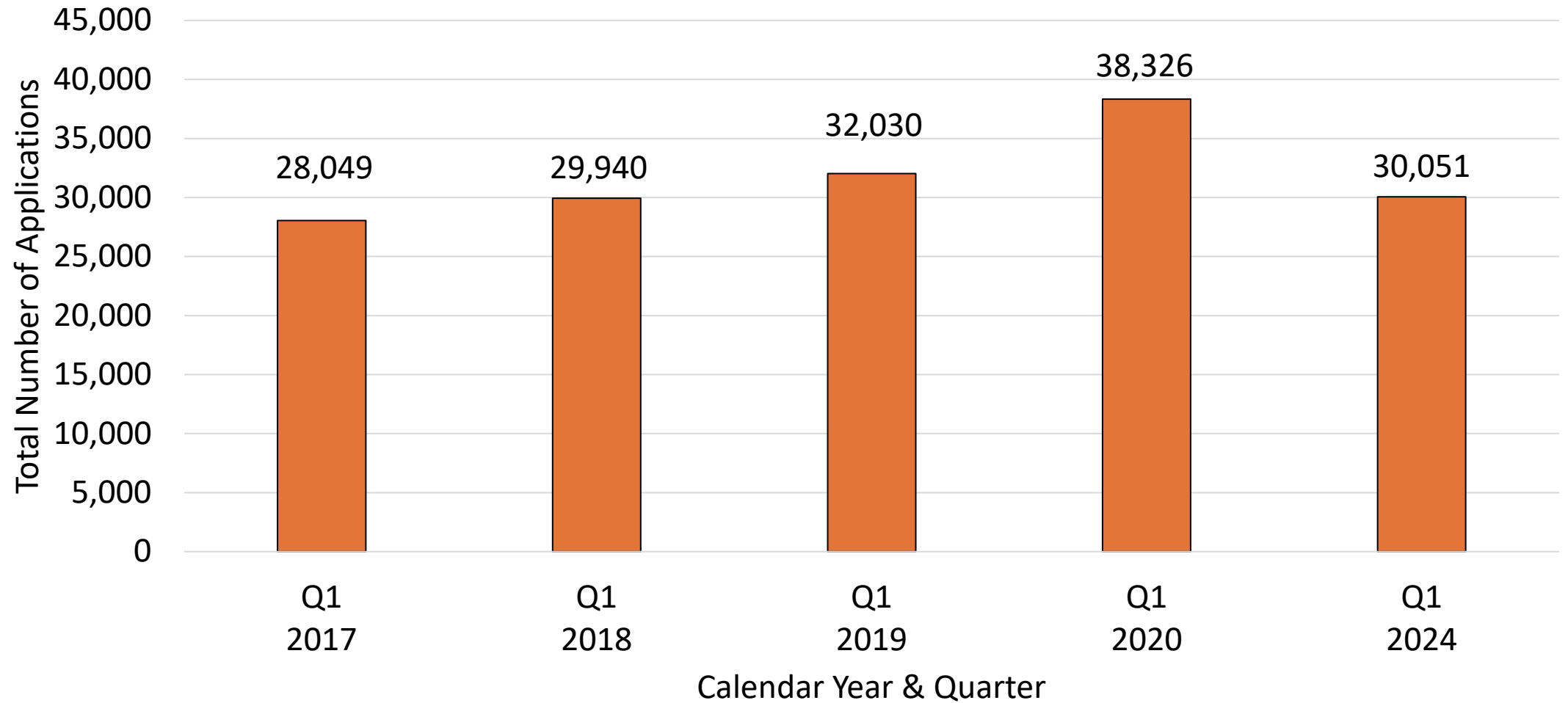- Additional charts for individual IOUs are in the slide deck appendix

- The trend line was calculated by regressing on application volume from January 2017 to December 2022

Real Applications — Trend Line

$R^2 = 0.73$

$+225,998$

NBT April 2023

$-179,138$

Total Number of Applications

Calendar Year & Month

2021   2022   2023   2024

Source: CEC Staff

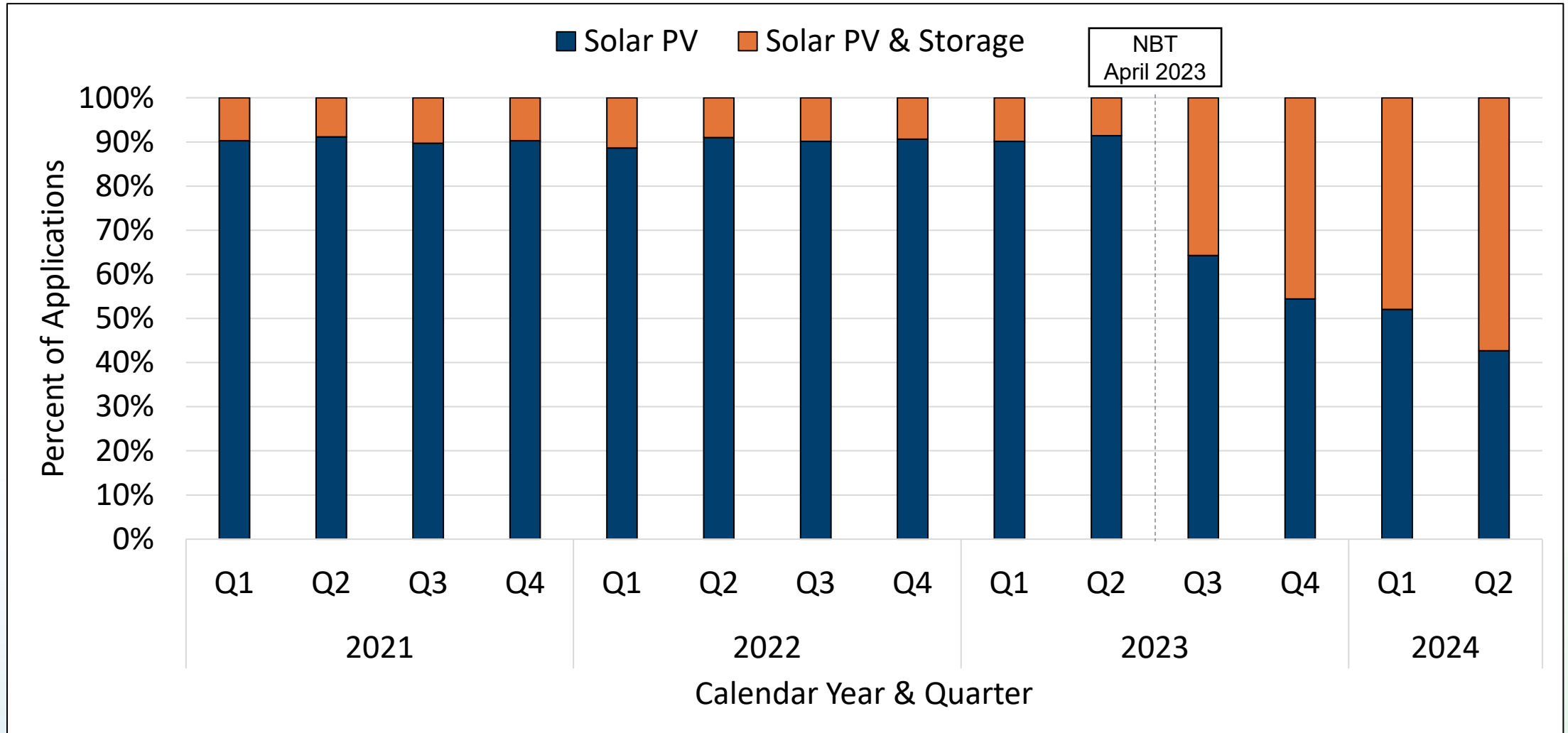# Historical PV Application Comparison

Source: CEC Staff

Historical Residential Attachment Rate: PG&E & SCE

- Includes NEM and NBT systems

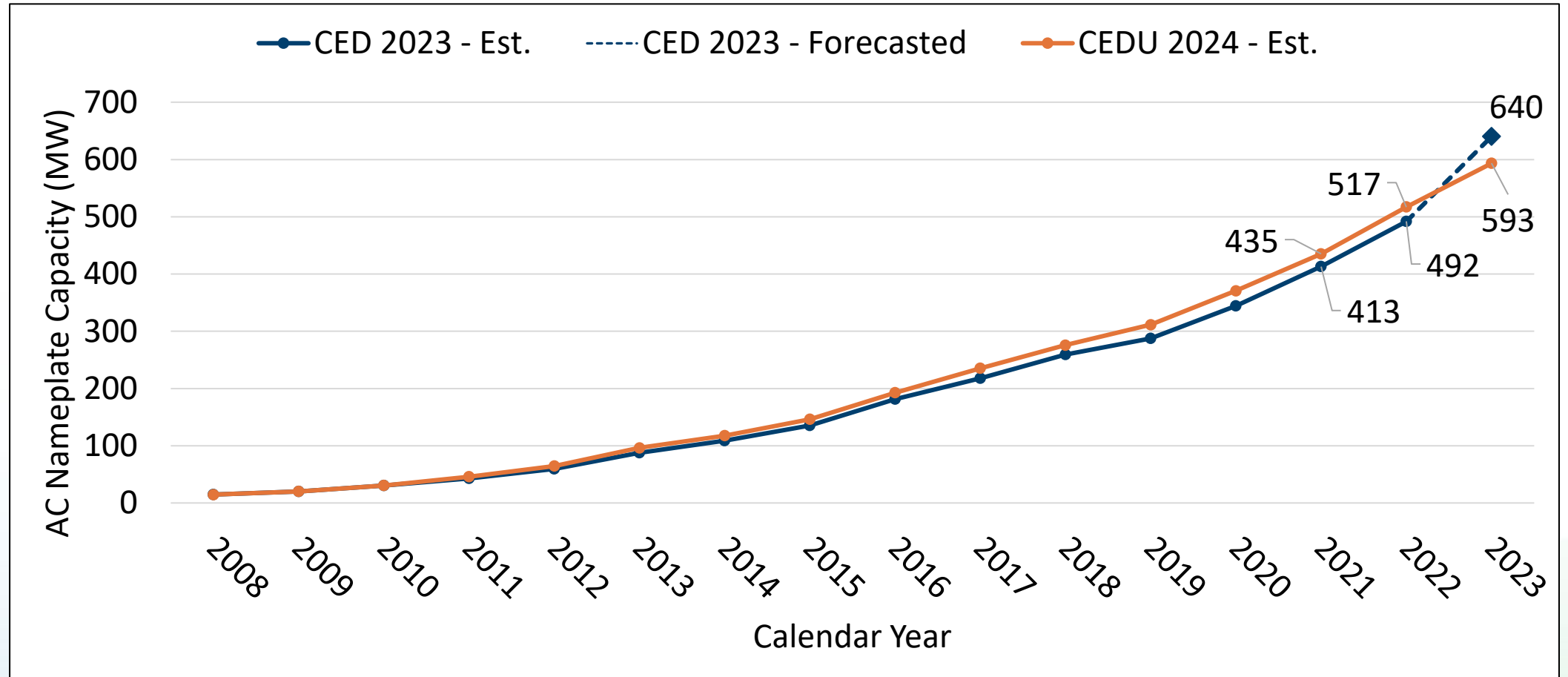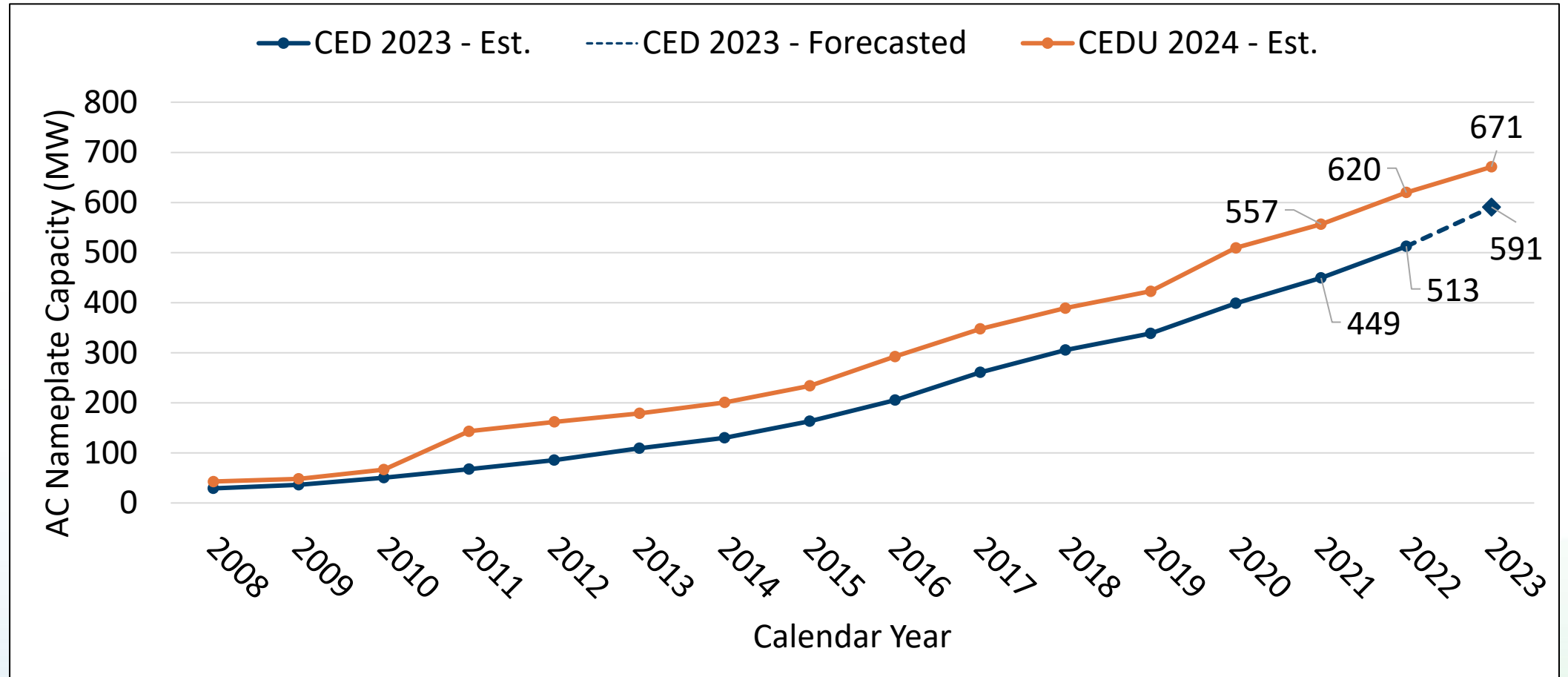# Thank You!

Slide Deck Appendix
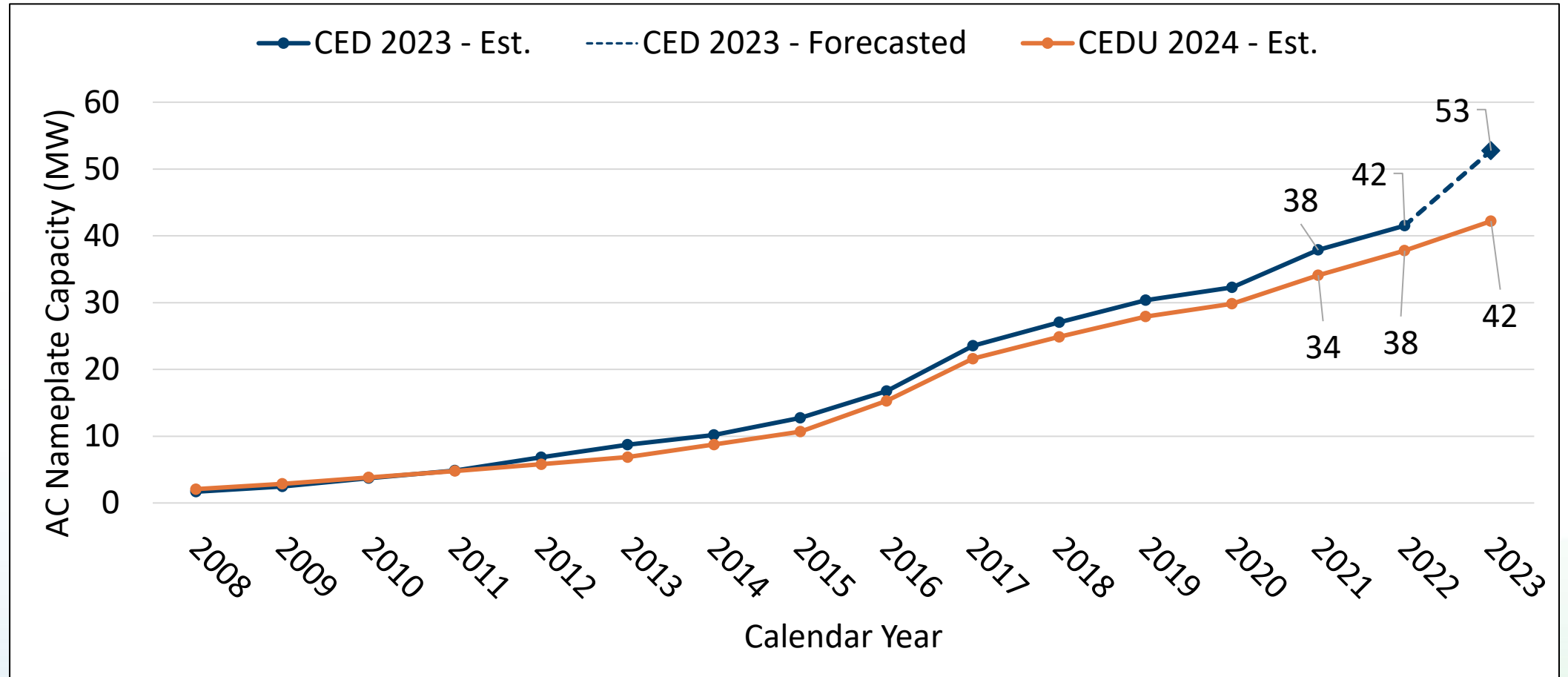
Historical BTM PV Adoption: LADWP Planning Area

Legend: CED 2023 - Est. | CED 2023 - Forecasted | CEDU 2024 - Est.

Y-axis: AC Nameplate Capacity (MW)
X-axis: Calendar Year (2008–2023)

Data labels: 640, 517, 593, 435, 492, 413

Historical BTM PV Adoption: NCNC Planning Area

Source: CEC Staff

Historical BTM PV Adoption: BUGL Planning Area

Source: CEC Staff

Historical BTM PV Adoption: IID Planning Area

Source: CEC Staff
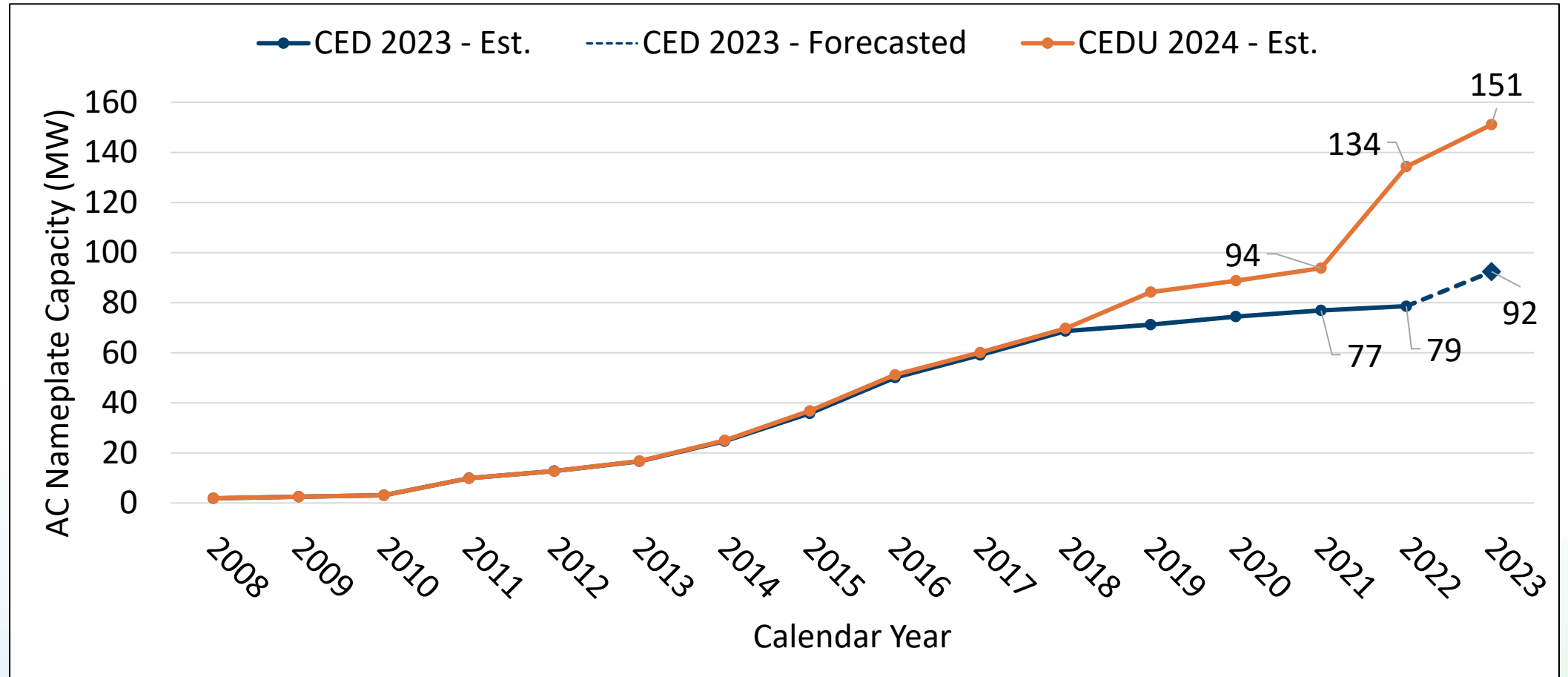
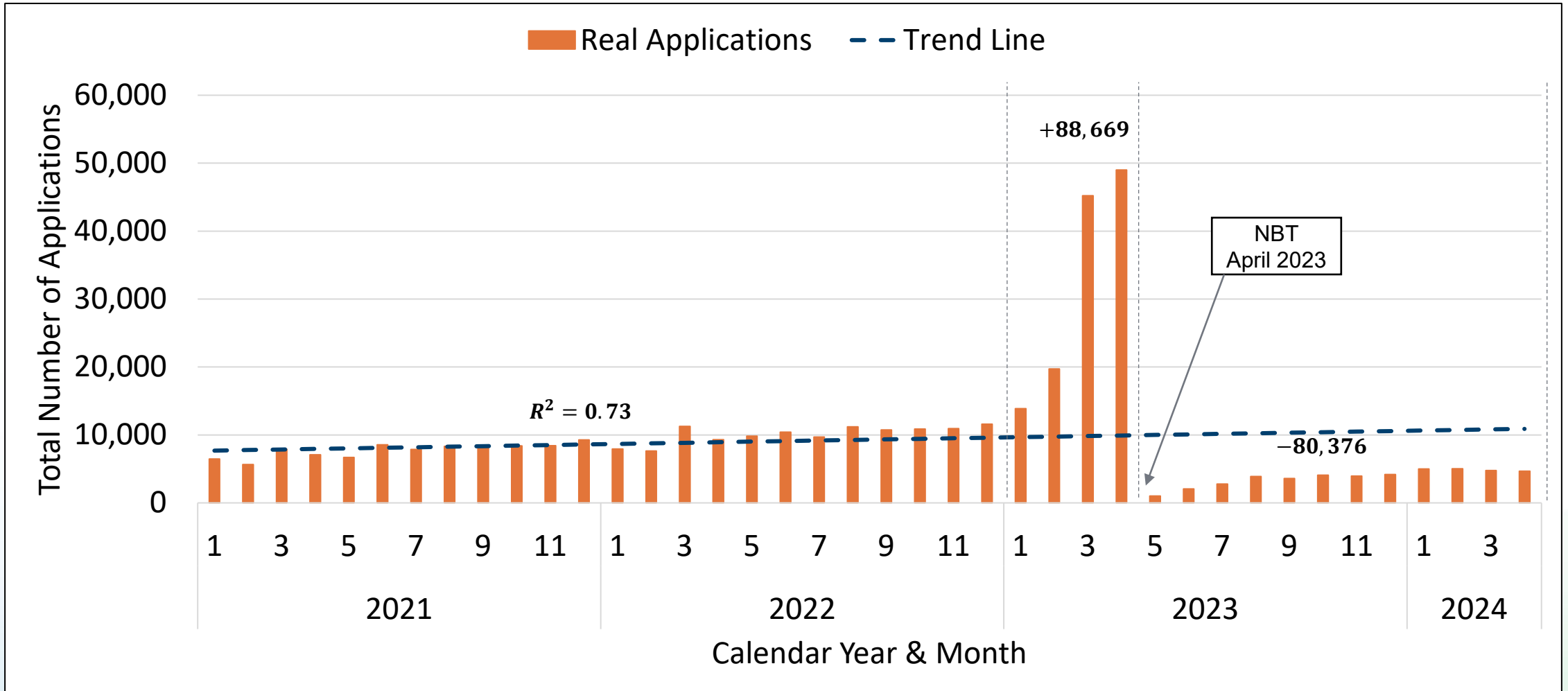# Historical BTM PV Adoption: OTHER Planning Area

Source: CEC Staff
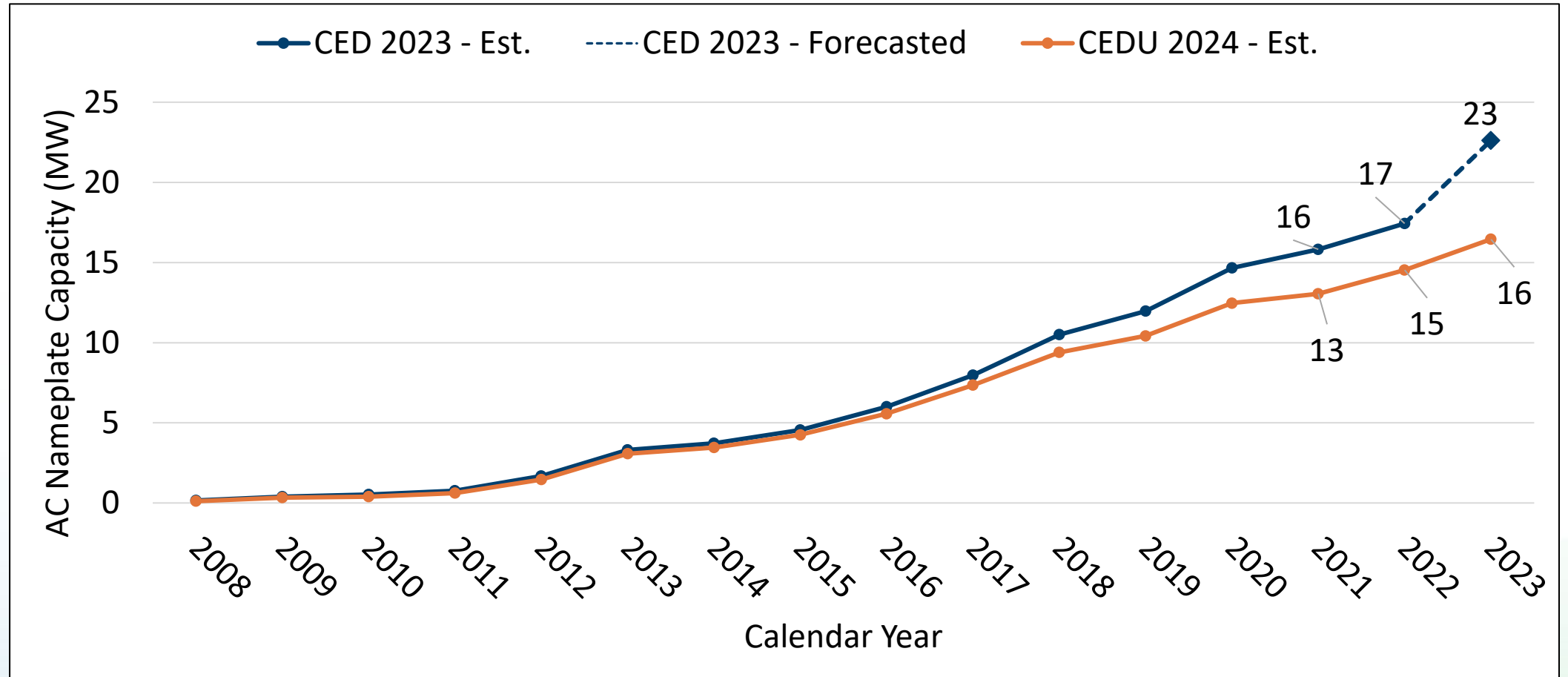
Historical PV Applications by Month: PG&E Service Territory

- The trend line was calculated by regressing on application volume from January 2017 to December 2022

Source: CEC Staff

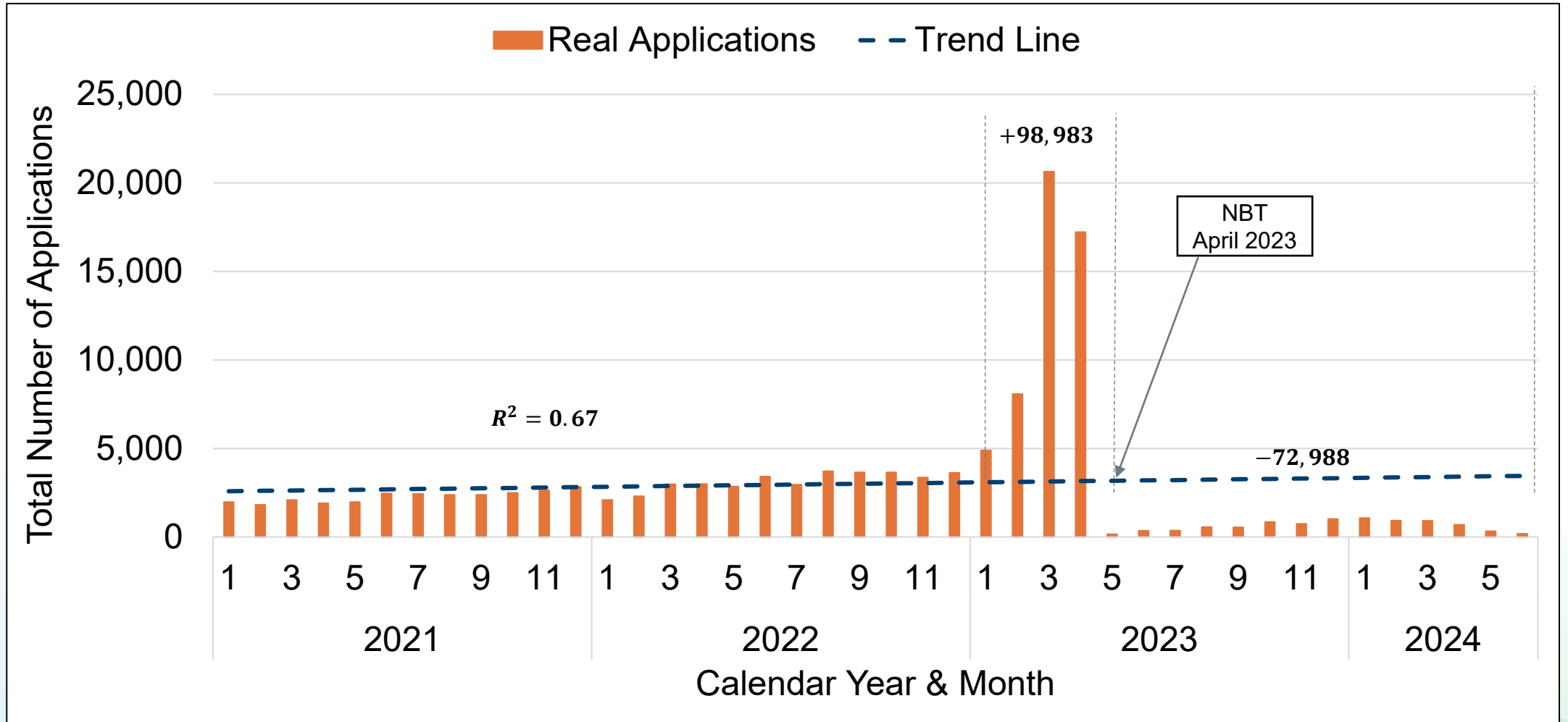# Historical PV Applications by Month: SCE Service Territory

- The trend line was calculated by regressing on application volume from January 2017 to December 2022

Historical PV Applications by Month: SDG&E Service Territory

- The trend line was calculated by regressing on application volume from January 2017 to December 2022

Source: CEC Staff