



California Energy Commission

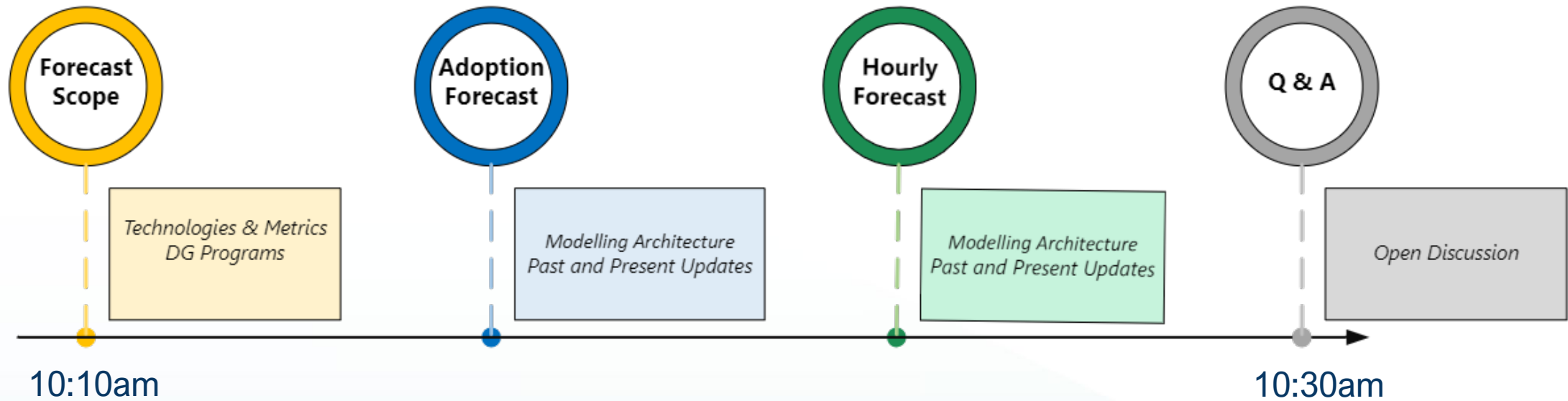
Title: Behind-The-Meter Distributed Generation Forecast Framing

Presenter: Alex Lonsdale, Distributed Generation Forecast Supervisor

Date: August 21, 2024



DG Forecast Framing Agenda





List of Acronyms and Initialisms

BTM – Behind-the-meter

CHP – Combined Heat and Power

DAWG – Demand Analysis Working Group

DG – Distributed Generation

dGen – Distributed Generation Market Demand Model

DER – Distributed Energy Resource

IEPR – Integrated Energy Policy Report

MW – Megawatt

NCNC – Northern California Non-California ISO

NBT – Net Billing Tariff

NEM – Net Energy Metering

NREL – National Renewable Energy Laboratory

PA – Planning Area

POU – Publicly Owned Utility

PV – Photovoltaics

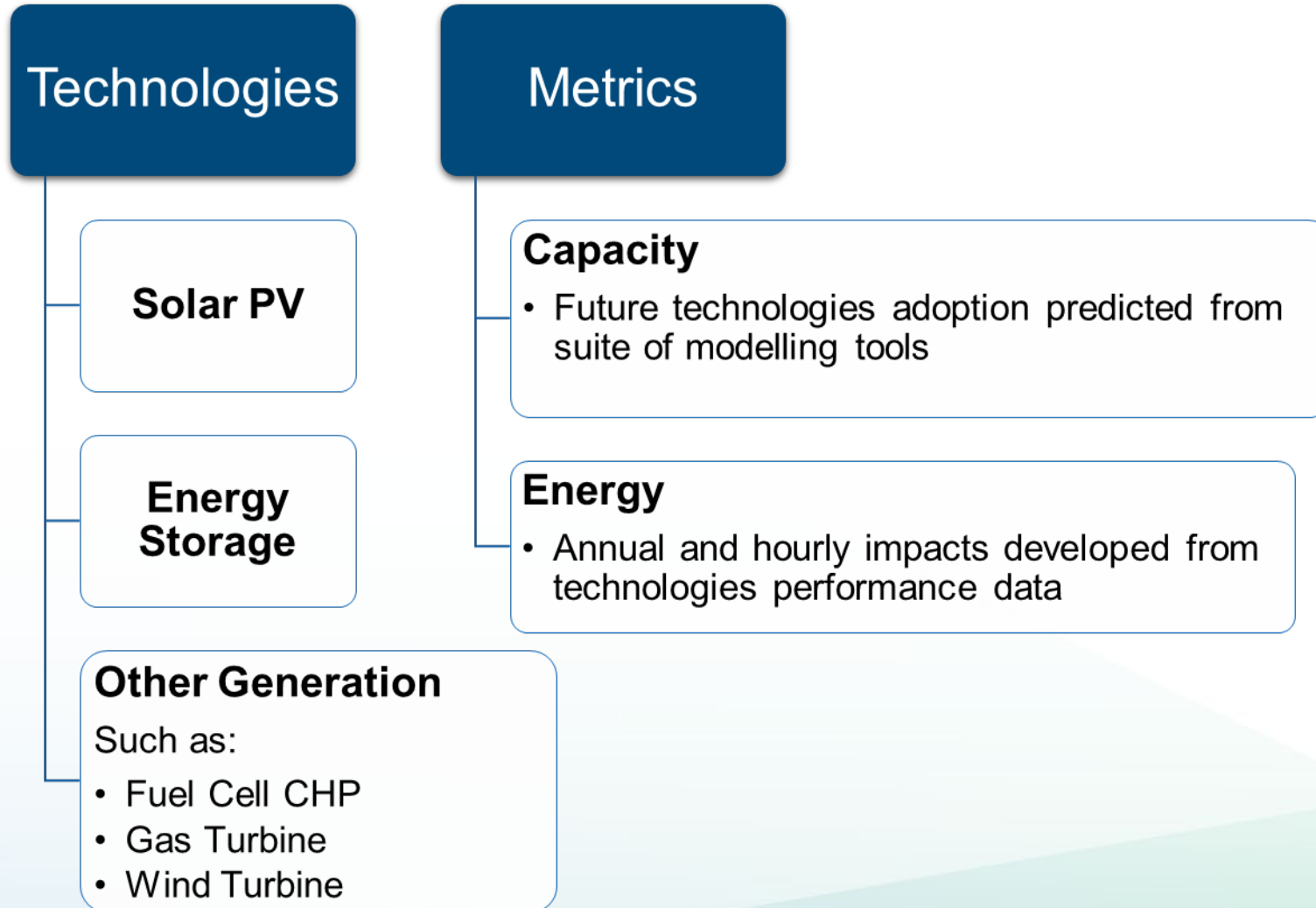
SGIP – Self Generation Incentive Program



Forecast Scope



Technologies & Metrics



Source: CEC Staff



Distributed Generation Programs

- **Economics Based Adoption Forecast:**
 - Program requirements and economics related to DG adoption are factored into the forecast
- **Compliance Based Adoption Forecast:**
 - Forecast adheres to Title 24 and does not account for program requirements, or the economics associated with DG adoption

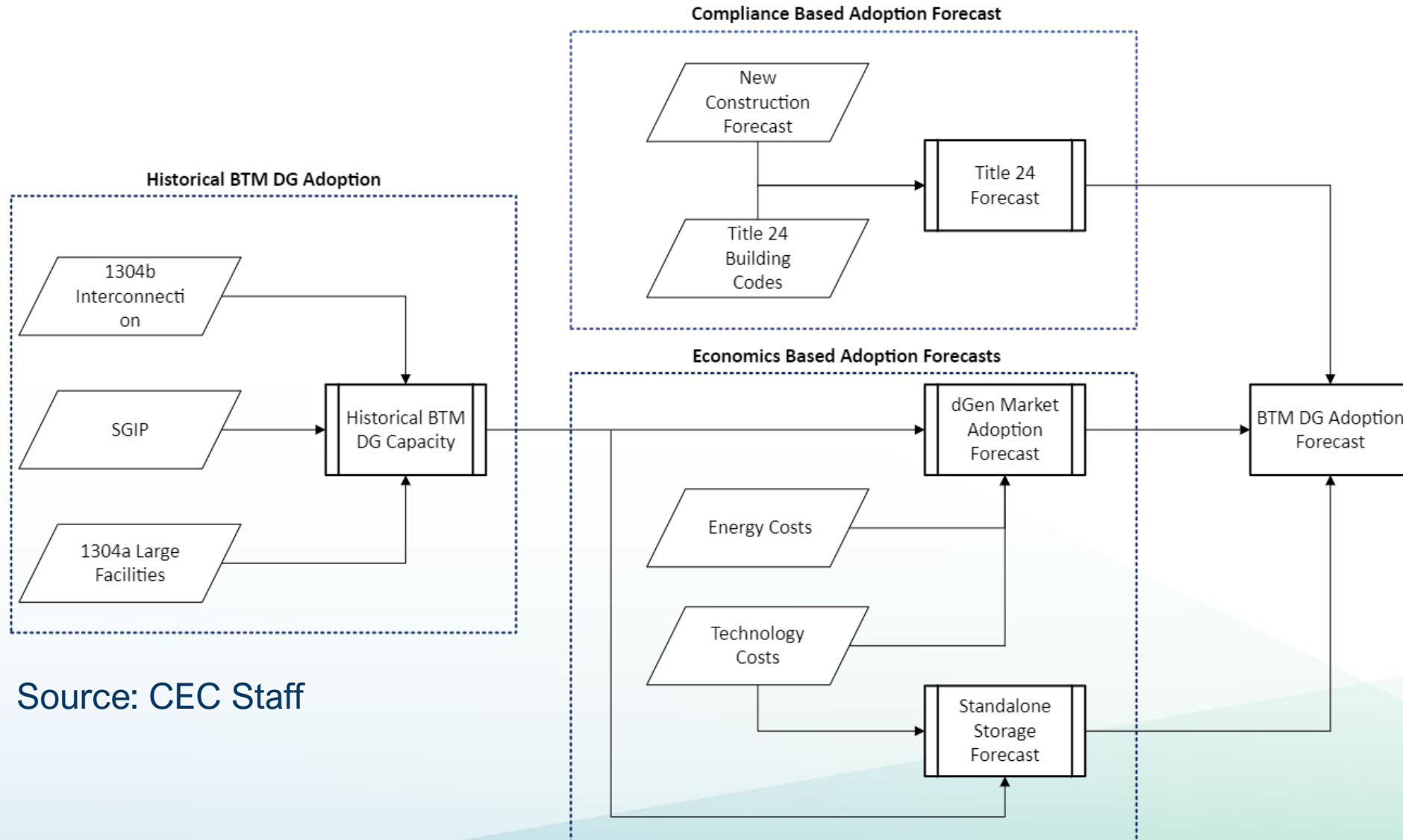
Renewable DG Program	Economics Based Forecast	Compliance Based Forecast
Net Billing Tariff	✓	✓
Virtual Net Energy Metering	✗	✓
Net Energy Metering Aggregation	✗	✓
Community Solar	✗	✗
Renewable Energy Self-Generation Bill Credit Transfer	✗	✗



Adoption Forecast



Adoption Modelling Architecture



Source: CEC Staff



Past Updates: 2023 IEPR

- Worked with NREL to develop CA-specific dGen model
 - Captures shift from NEM to NBT
- CEC staff developed a regression model to predict standalone storage adoption
 - Previous forecast tool didn't distinguish between paired and standalone storage adoption
- Additional details provided in 2023 DAWG presentations

Installation Type	BTM DG Adoption Model	Standalone Solar PV	Standalone Energy Storage	Paired Solar PV + Energy Storage
Retrofit	dGen	✓	✗	✓
	Standalone Storage	✗	✓	✗

Source: CEC Staff



Present Updates: 2024 IEPR

- Scenarios
 - Develop low, mid, and high adoption forecasts to account for uncertainty in forecast drivers

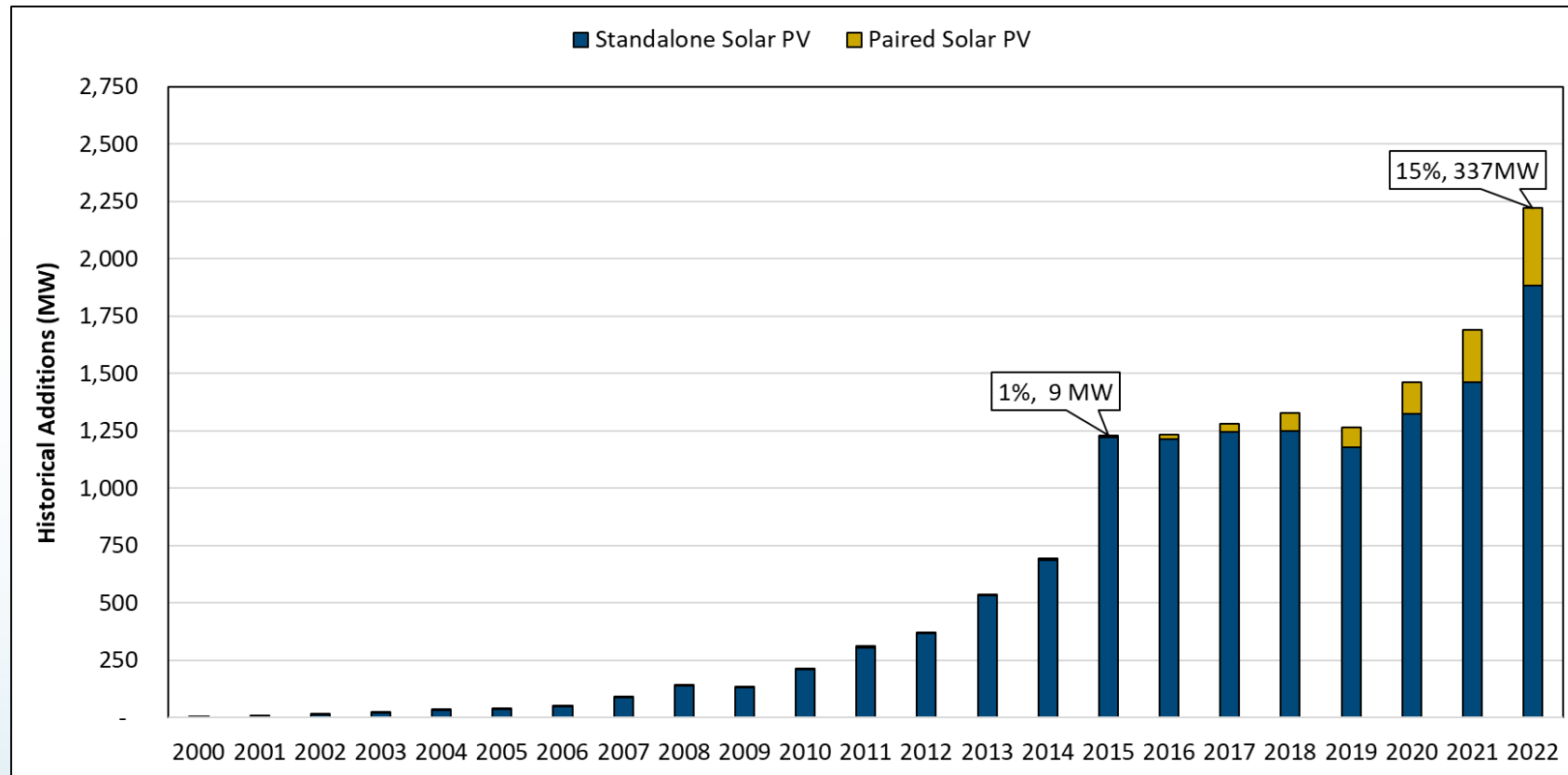
Forecast Model	Planned Updates
dGen	Agent specification will include income and occupancy (renter vs. owner)
	Electricity rates compiled from 2023 billing data
	Base year technology costs derived from DG stats data
Title 24	BTM DG additions will comply with 2025 energy code starting in 2026
All	Historical BTM DG capacity updated through calendar year 2023

Source: CEC Staff



2024 IEPR Forecast: Additional Consideration

- Seeking active participant input on incorporating the SB100 DER Augmentation Sensitivity for BTM storage in this year's high DG scenario
- While BTM PV + storage adoption is increasing, CEC staff estimate there were **13,395 MW** of standalone BTM PV in California by 2022



Source: CEC Staff



Background

- 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 combined solar and storage systems.”

 - CEC demand forecast tools capture PV + storage adoption for new tariff customers, but don't capture storage attachment for existing NEM customers



Methodology

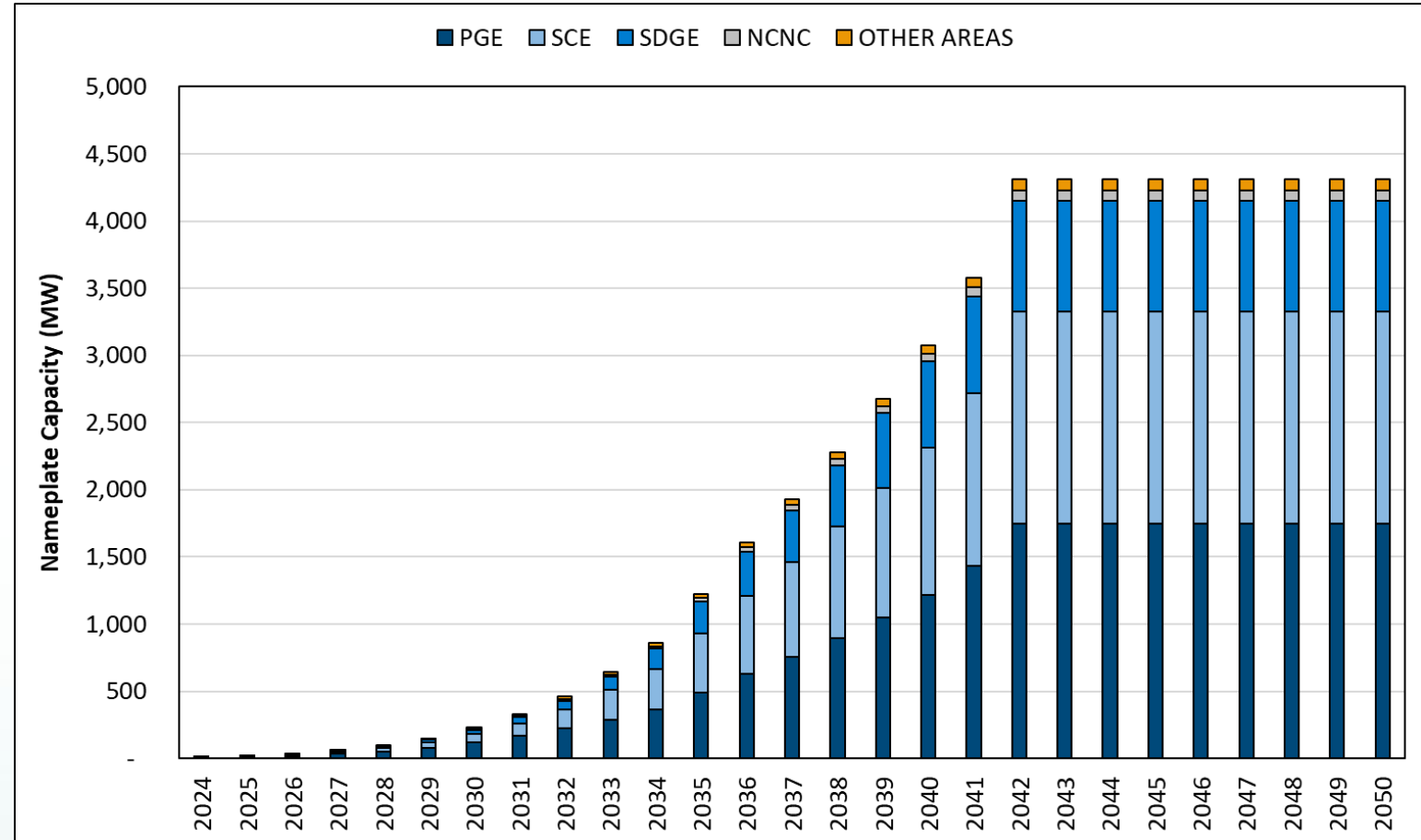
1. Quantify standalone BTM PV capacity added in each historical year from interconnection data (CEC form 1304b)
2. Calculate total standalone BTM PV capacity taking service under NBT based on 20-year NEM service term
 - a. Assume 20-year term for POU's
3. Use dGen forecast results to assign the percent 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



BTM Energy Storage Sensitivity Results by Planning Area

- Adding this feature to the IEPR framework substantially increases total BTM storage capacity
 - Over **4,300 MW** of BTM energy storage capacity could be retrofitted from NEM service turnover by 2042.

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



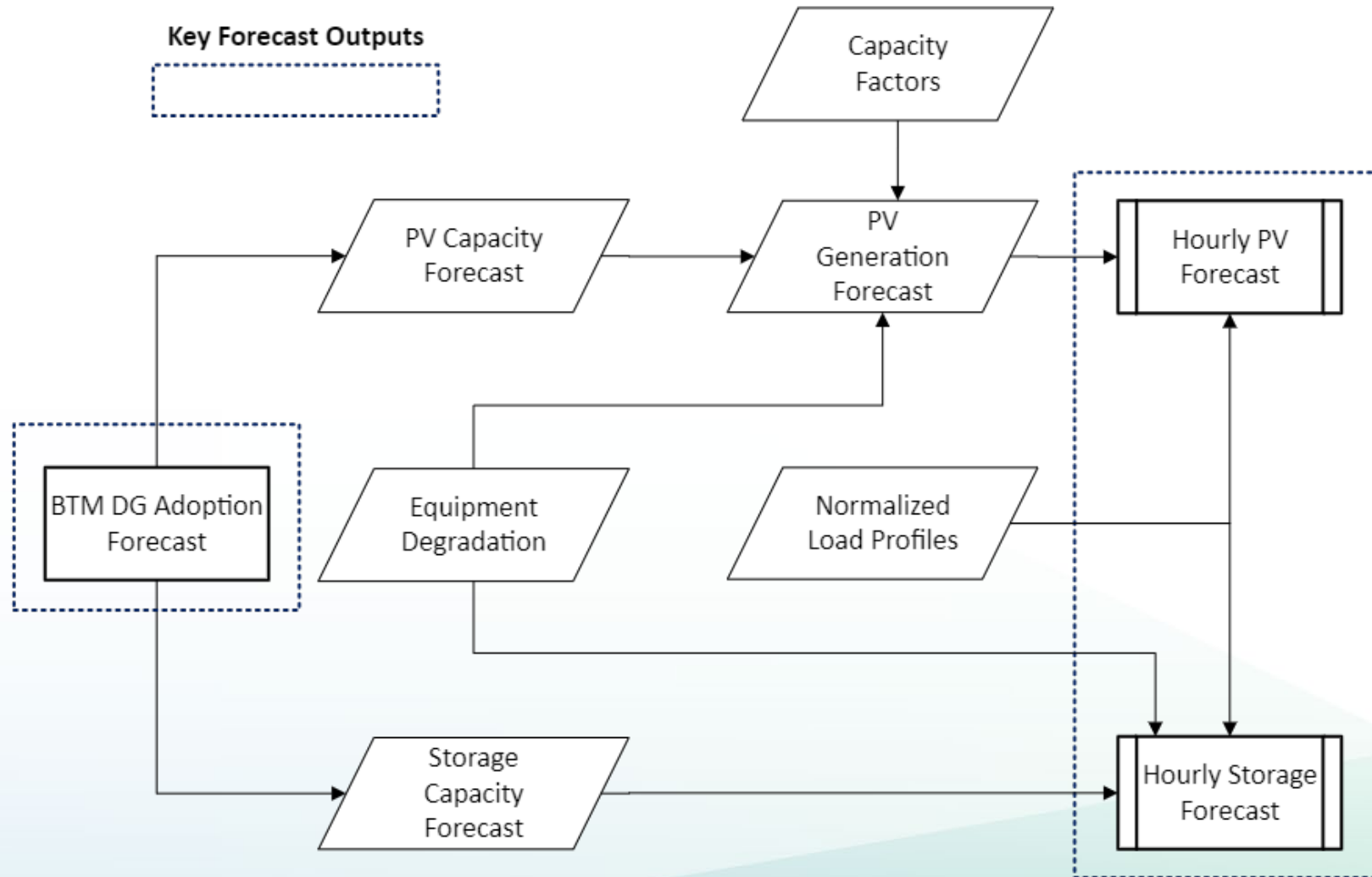
Source: CEC Staff



Hourly Forecast



Hourly Modeling Architecture





Past Updates: 2023 IEPR

- Addressed differences in BTM energy storage charge and discharge assumptions across planning areas
 - See past DAWG and IEPR meetings for additional details
- PV updates were limited due to timing of historical data acquisition

Technology	Update
Storage	Residential profiles from System Advisor Model (SAM)
	Non-residential BTM storage profiles from 2021-2022 SGIP Energy Storage Impact Evaluation
PV	Revised historical shapes for Hourly Load Model estimation

Source: CEC Staff



Present Updates: 2024 IEPR

- Staff plan to limit hourly updates to BTM PV
- Additional hourly BTM PV details presented in following presentation

Technology	Planned Updates
PV	Historical and forecast normalized profiles
	Historical and forecast capacity factors

Source: CEC Staff



Questions or Comments?