Behind-the-Meter Distributed Generation Forecast Results

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List of Acronyms and Initialisms

AB – Assembly Bill

ACS – American Community Survey

BTM – Behind-the-Meter

CEC – California Energy Commission

CHP – Combined Heat and Power

CPUC – California Public Utilities Commission

DG – Distributed Generation

dGen – Distributed Generation Market Demand Model

DGStats – California Distributed Generation Statistics

KW – Kilowatt

IEPR – Integrated Energy Policy Report

IOU – Investor-Owned Utility

ITC – Investment Tax Credit

LBNL – Lawrence Berkeley National Laboratory

MW – Megawatt

NBT – Net Billing Tariff

NEM – Net Energy Metering

PV – Photovoltaics

Why Forecast BTM Distributed Generation

- BTM distributed generation technologies affect electricity demand served by utilities, both at the annual and the hourly level
- BTM Solar PV generation currently accounts for approximately 10% (and growing) of overall statewide consumption
- The growth in BTM Solar PV generation will offset a larger amount of future electricity demand
- BTM energy storage adoption affects peak demand because it's used to avoid time-of-use rates by dispatching during on-peak period (4-9 pm)
- Thus, BTM distributed generation has a significant effect on the overall demand forecast

What BTM Distributed Generation Model Forecasts

Technologies

Solar PV

Energy Storage

Other Generation

Such as:

- Fuel Cell CHP
- Gas Turbine
- Wind Turbine

Metrics

Capacity

- Future technologies adoption predicted from suite of modelling tools

Energy

- Annual and hourly impacts developed from technologies performance data

Source: CEC Staff

Distributed Generation Forecast Drivers

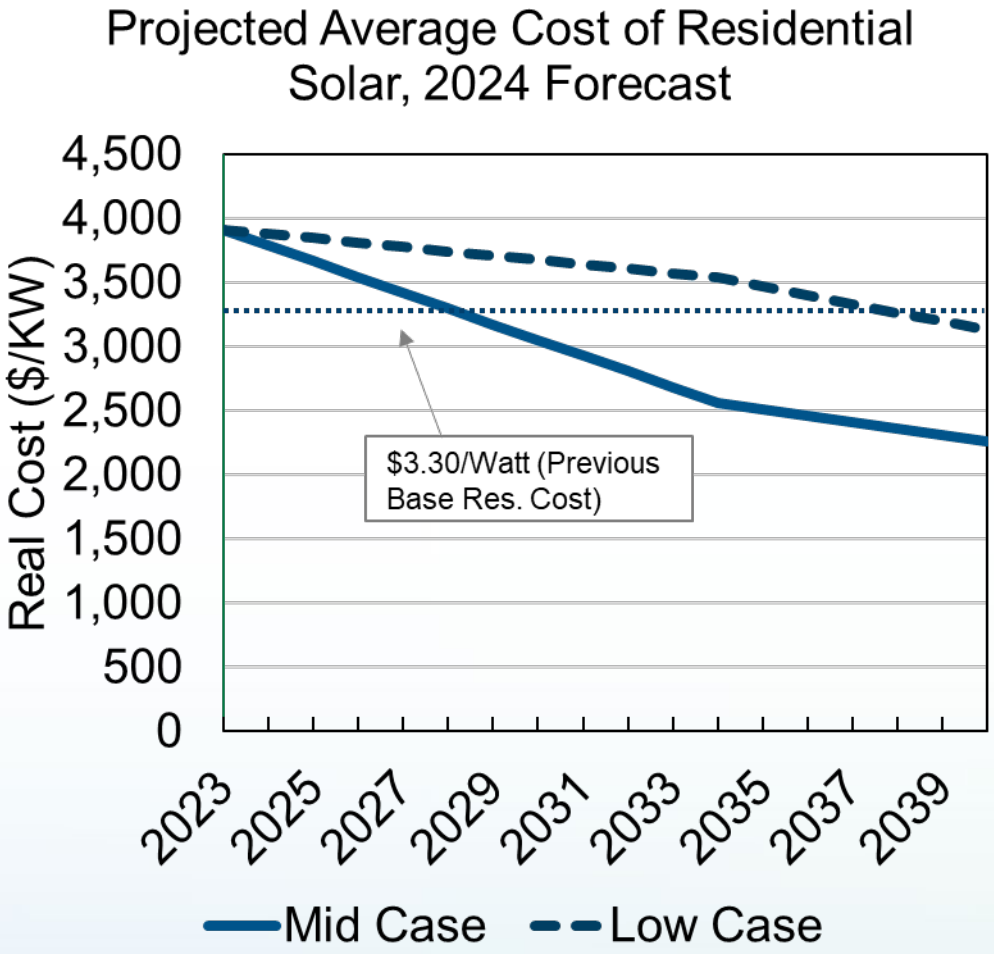
- BTM capacity forecast is developed using:
  - Interconnection data
  - Factors that influence future adoption, such as:
    - System costs
    - Energy costs
    - Incentives
    - Statewide building standards (Title 24)

Input Updates

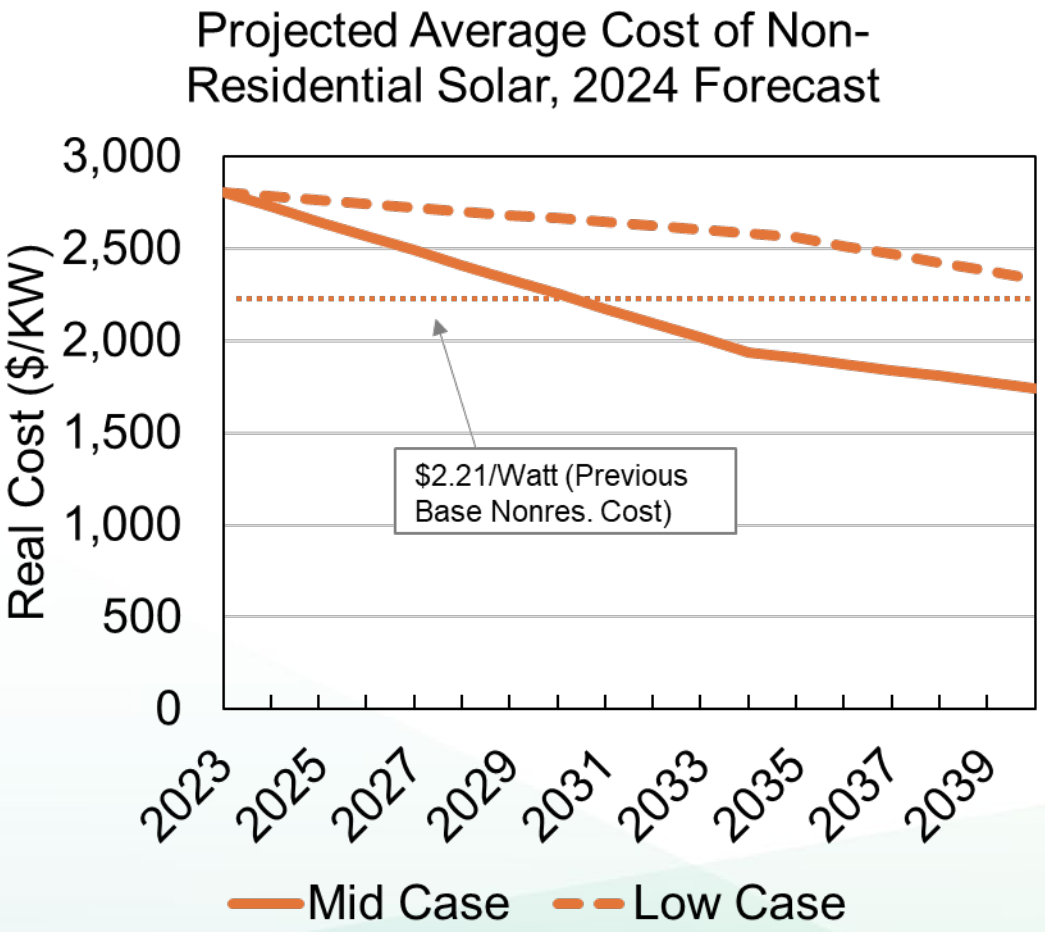
Updates to Base Year Technology Costs

- 2024 base year cost derived from LBNL's Tracking the Sun data from DGStats
  - Real-world data
  - Incorporates all costs including installation and dealer markup
  - Updated annually
- IEPR base year cost
  - Residential: $3.91/W
  - Nonresidential: $2.81/W
- Only total cost is reported, meaning staff cannot isolate components of combined system cost or dealer markup
  - Data is self-reported; however, staff is confident in its accuracy at an aggregate level

Effect of Base Year Cost Change on Forecast Costs



Source: CEC Staff



Source: CEC Staff

Changes to Modeling Demographics

- CEC staff separated customers by income level and housing tenure (i.e. renters vs. owners) in dGen model
- According to ACS, over 25% of single-family homes are renter-occupied and assumed unable to adopt BTM DG
- 18% of single-family homeowners are designated low income and considered less likely to adopt
- Changes in demographic modeling have reduced number of potential adopters, causing a downward effect on capacity forecasted

Planning Area	Renters	Owners	Share of Renters
PGE	824,251	2,420,087	25.4%
SCE	967,857	2,818,161	25.6%
SDGE	174,355	499,718	25.9%
POUs	188,278	444,863	29.7%
Statewide	2,154,741	6,182,829	25.8%

Added Income-Graduated Fixed Charge

- In 2024, the CPUC approved a new Income-Graduated Fixed Charge for all IOU customers
- Originally mandated by AB 205 in 2022, and will go into effect in late 2025/early 2026
- Fixed charge (~$24/month) will be up to $12/month lower for low-income customers
- Volumetric charges for electricity will be reduced by about $.05/kWh, making BTM DG slightly less beneficial

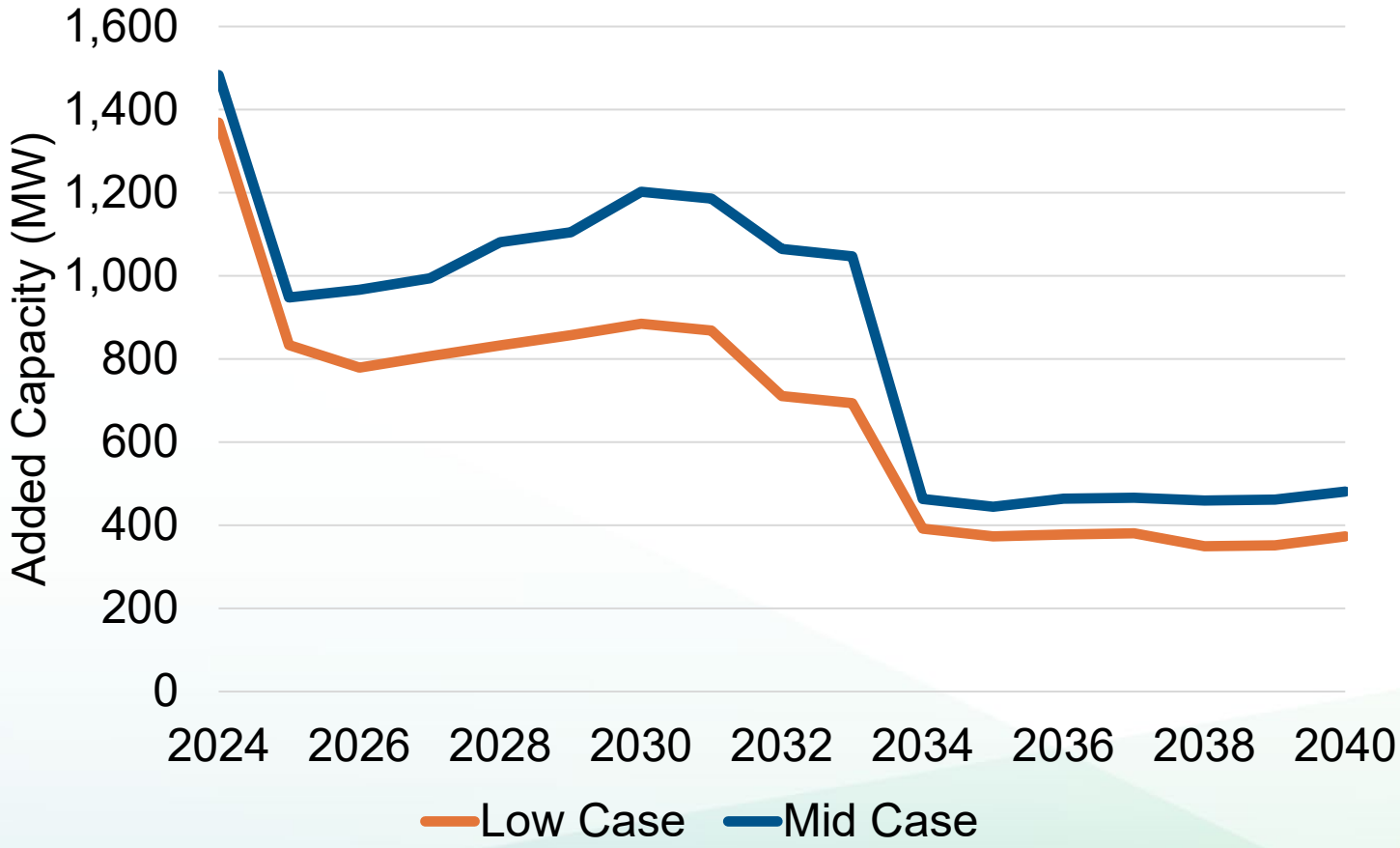
Title 24 Requirement Updates

- CEC's 2025 Building Energy Efficiency Standards are incorporated into this year's forecast
  - Updates will go into effect in 2026
- Nonresidential PV and storage requirements based on:
  - Building type
  - Climate zone
  - Roof space
  - Conditioned floor area
- Proposed changes include:
  - Minor adjustment of building- and zone-specific constant (in watts per ft^2) in calculations of requirements
  - Addition of new building types (Events & Exhibits, Sports & Recreation, Religious Worship)

2024 Forecast Results

PV Additions by Case

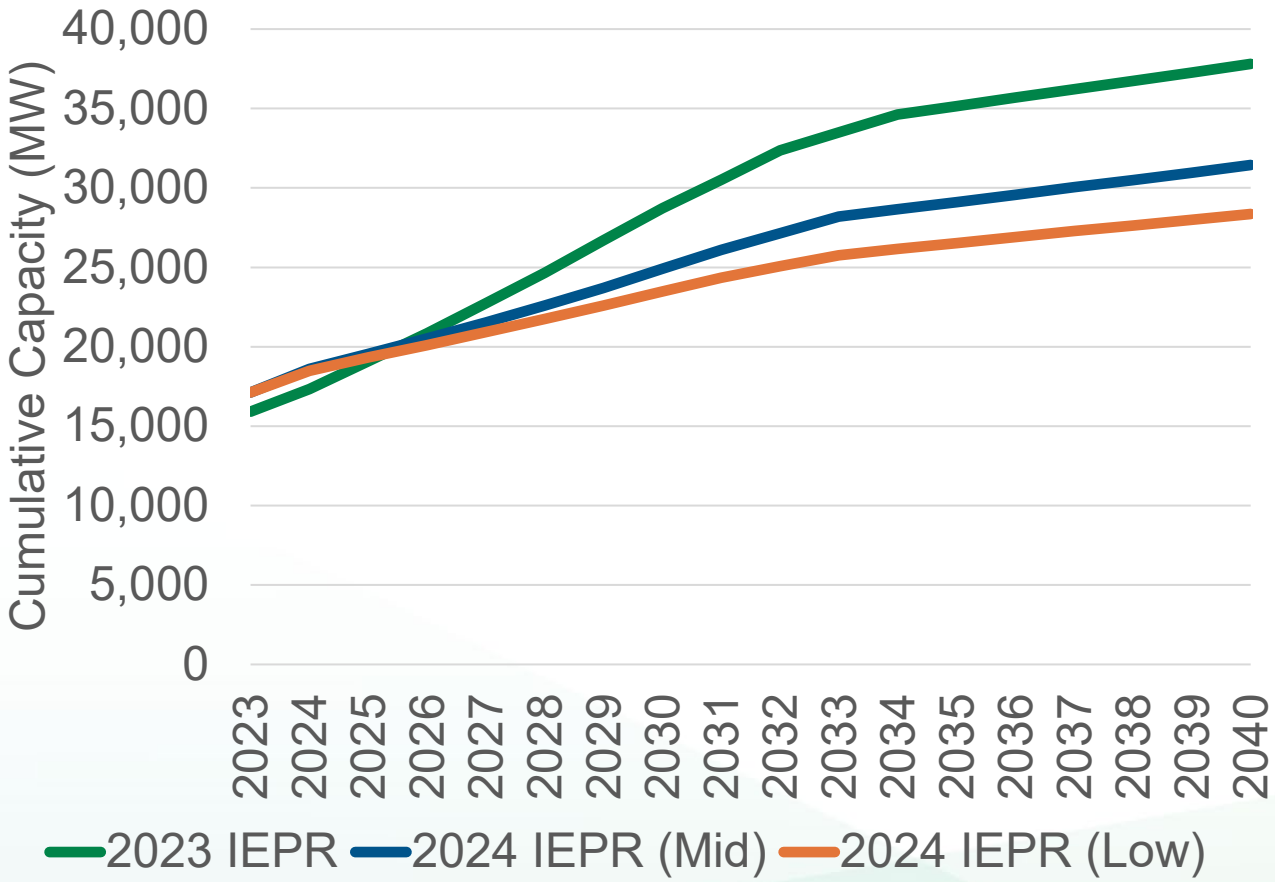
- Greater PV cost reductions lead to higher adoption rates in mid case
- In 2033, mid case additions are over 50% higher than in the low case
- Expiration of ITC leads to an approximately 50% reduction in PV adoption in both cases



Source: CEC Staff

PV Forecast Update Comparison

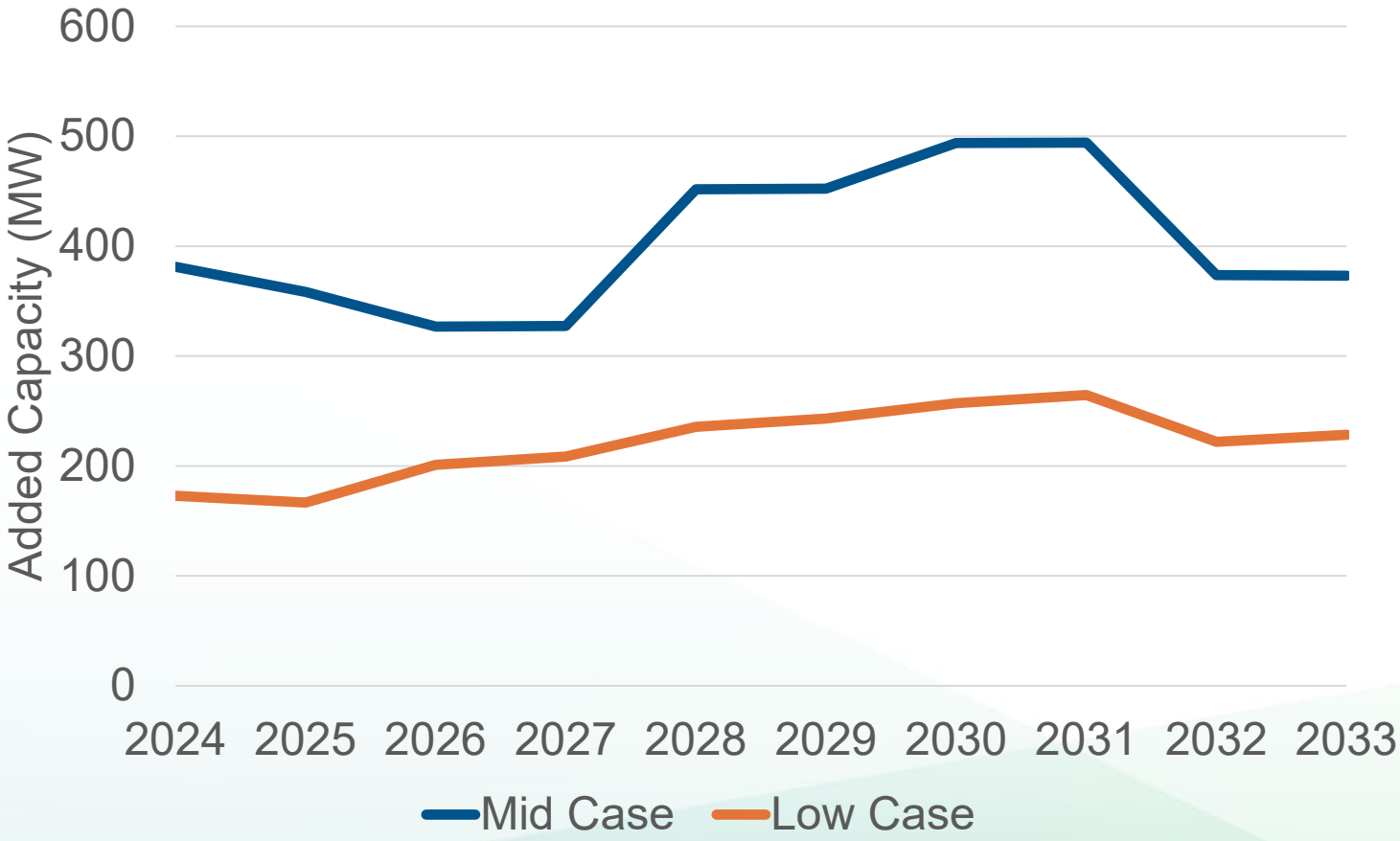
- Lower PV adoption forecasts are driven by changes in methodology and inputs:
  - Higher technology cost inputs
  - Single-family home renters modeled as unable to adopt
  - Quicker saturation of owner-occupied homes
- In 2040:
  - Mid case is 17%, or 6,400 MW, lower than 2023 forecast
  - Low case is 25%, or 9,500 MW, lower than 2023 forecast



Source: CEC Staff

Storage Additions by Case

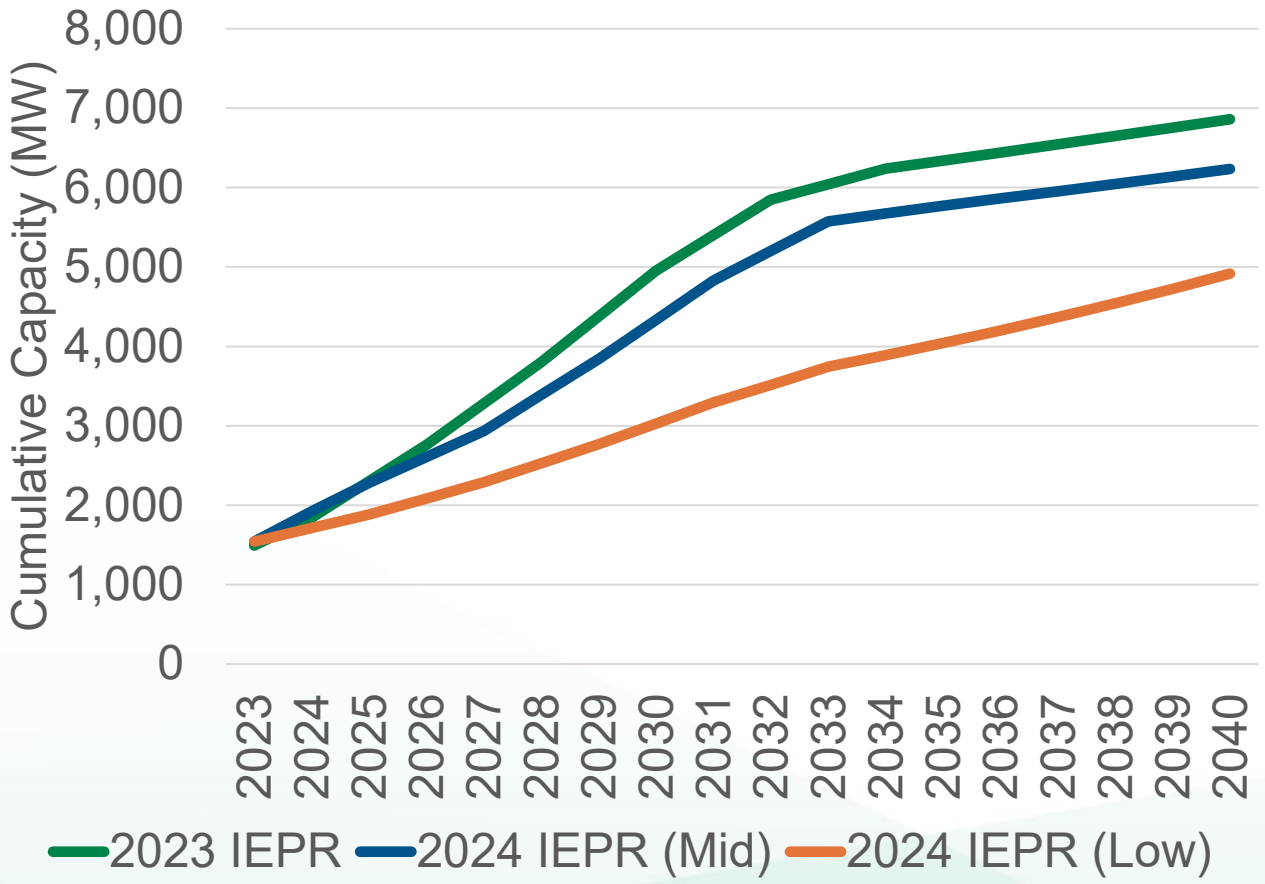
- Like PV, lower storage costs in mid case drive greater adoption
- In 2031, mid case added capacity is 87% higher than in the low case



Source: CEC Staff

Storage Forecast Update Comparison

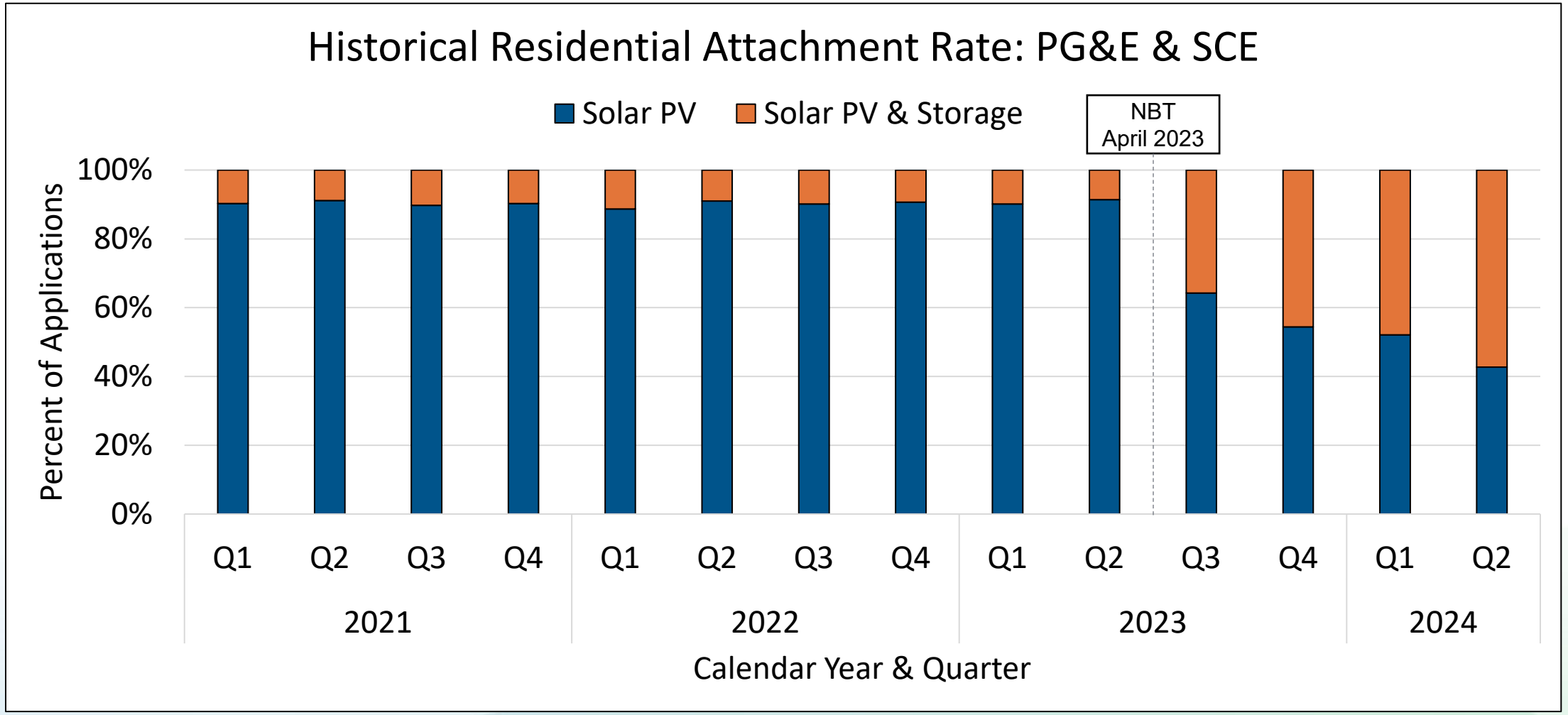
- Forecast storage adoption is lower than the 2023 forecast due to changes in methodology and inputs:
  - Higher technology cost inputs
  - Single-family home renters modeled as unable to adopt
  - Quicker saturation of owner-occupied homes
- In 2040:
  - Mid case is 9%, or 630 MW, lower than 2023 forecast
  - Low case is 28%, or 1,900 MW, lower than 2023 forecast



Source: CEC Staff

BTM PV is Increasingly Paired with Storage

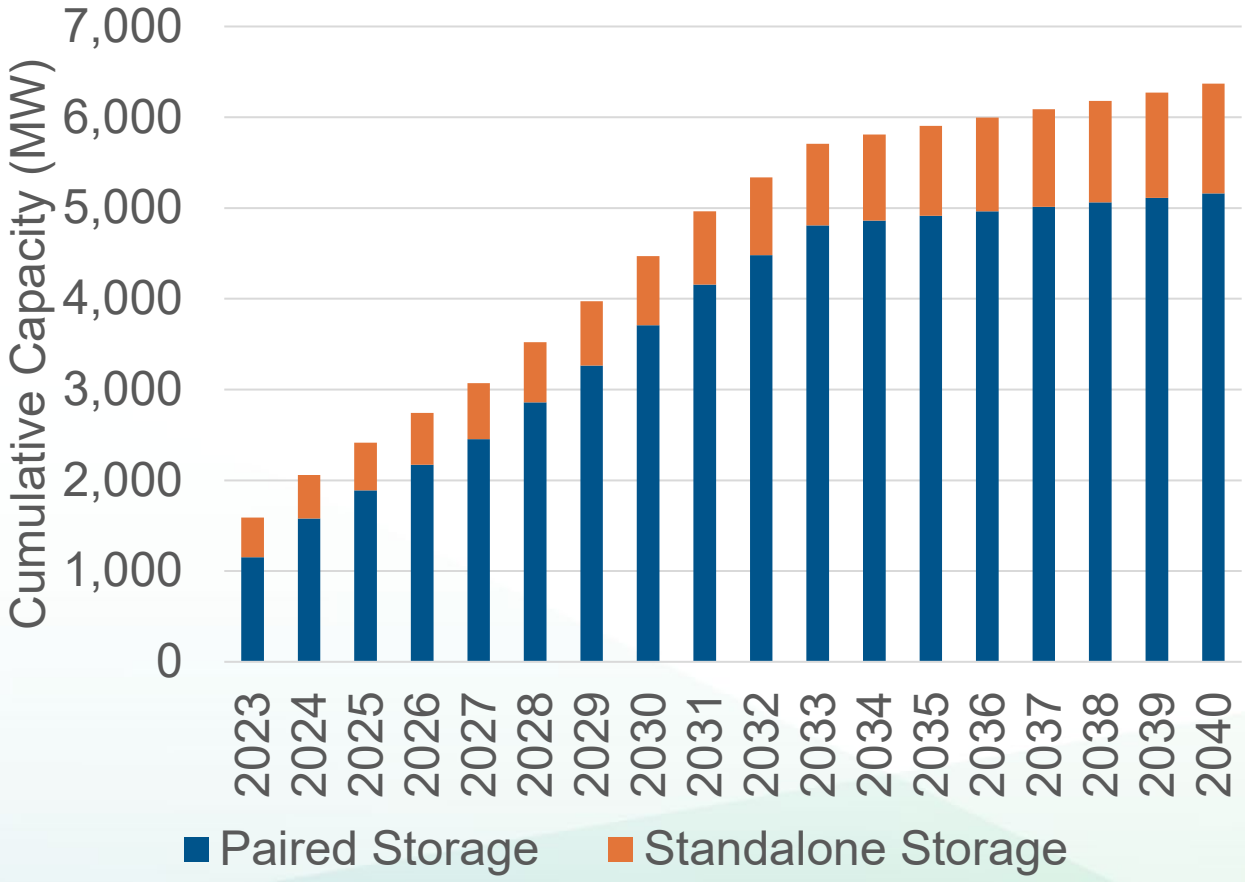
- Includes NEM and NBT systems



Source: CEC Staff

Mid Case Storage Forecast by Configuration

- Over 70% of storage installations are currently paired with a PV system
- 16% of storage capacity added between 2024 and 2040 is standalone
- Standalone storage is forecast to have increased growth until ITC expires



Source: CEC Staff

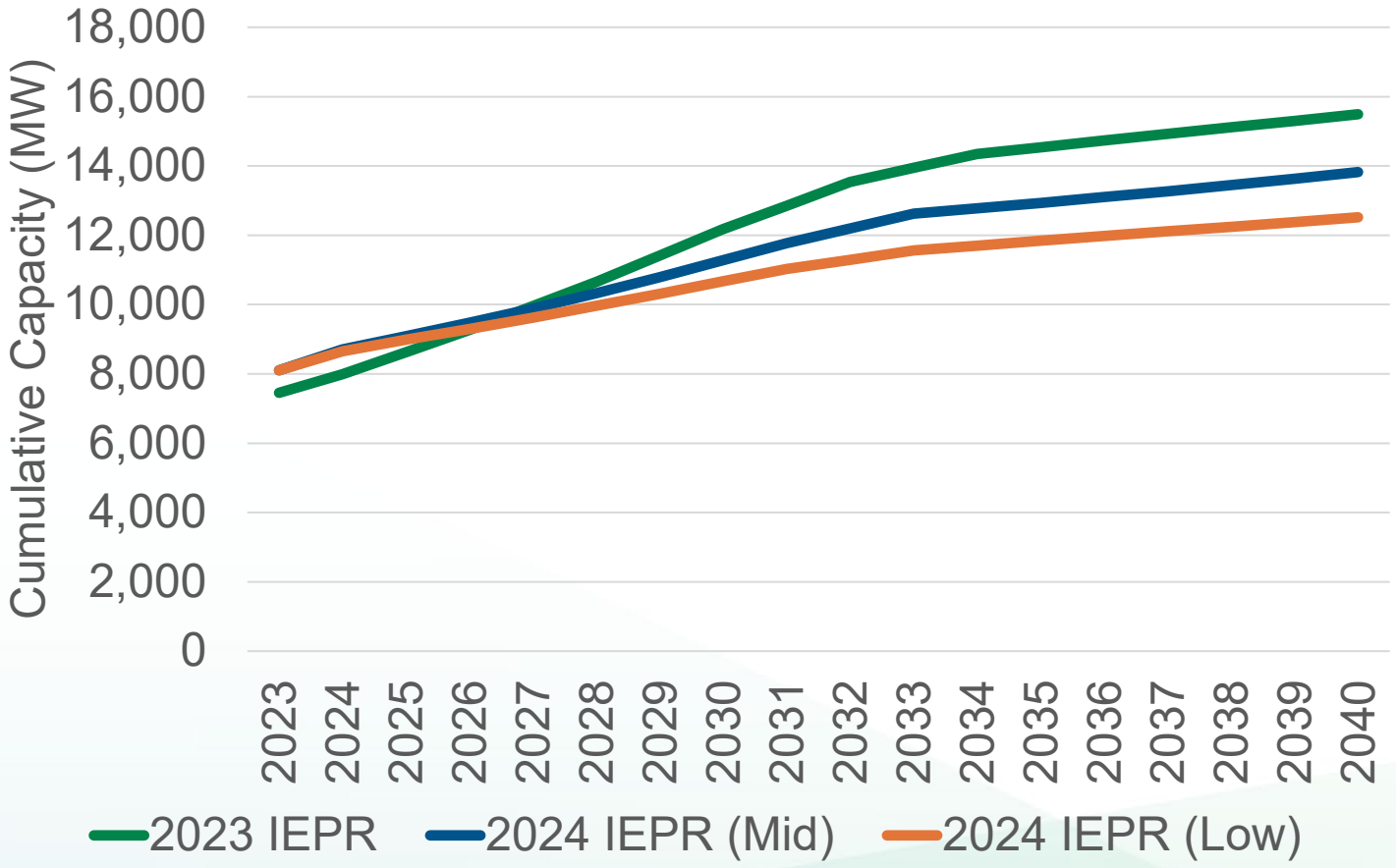
Thank You!

Supplemental Slides

PV Forecast Comparison: PG&E Planning Area

- In 2040:
  - Mid case is 11%, or 1,700 MW, lower than the 2023 forecast
  - Low case is 19%, or 3,000 MW, lower than the 2023 forecast

	Capacity (MW)		
Year	2023 IEPR	2024 IEPR (Mid)	2024 IEPR (Low)
2023	7,454	8,103	8,103
2025	8,625	9,091	8,985
2030	12,182	11,283	10,670
2035	14,540	12,929	11,840
2040	15,492	13,823	12,518

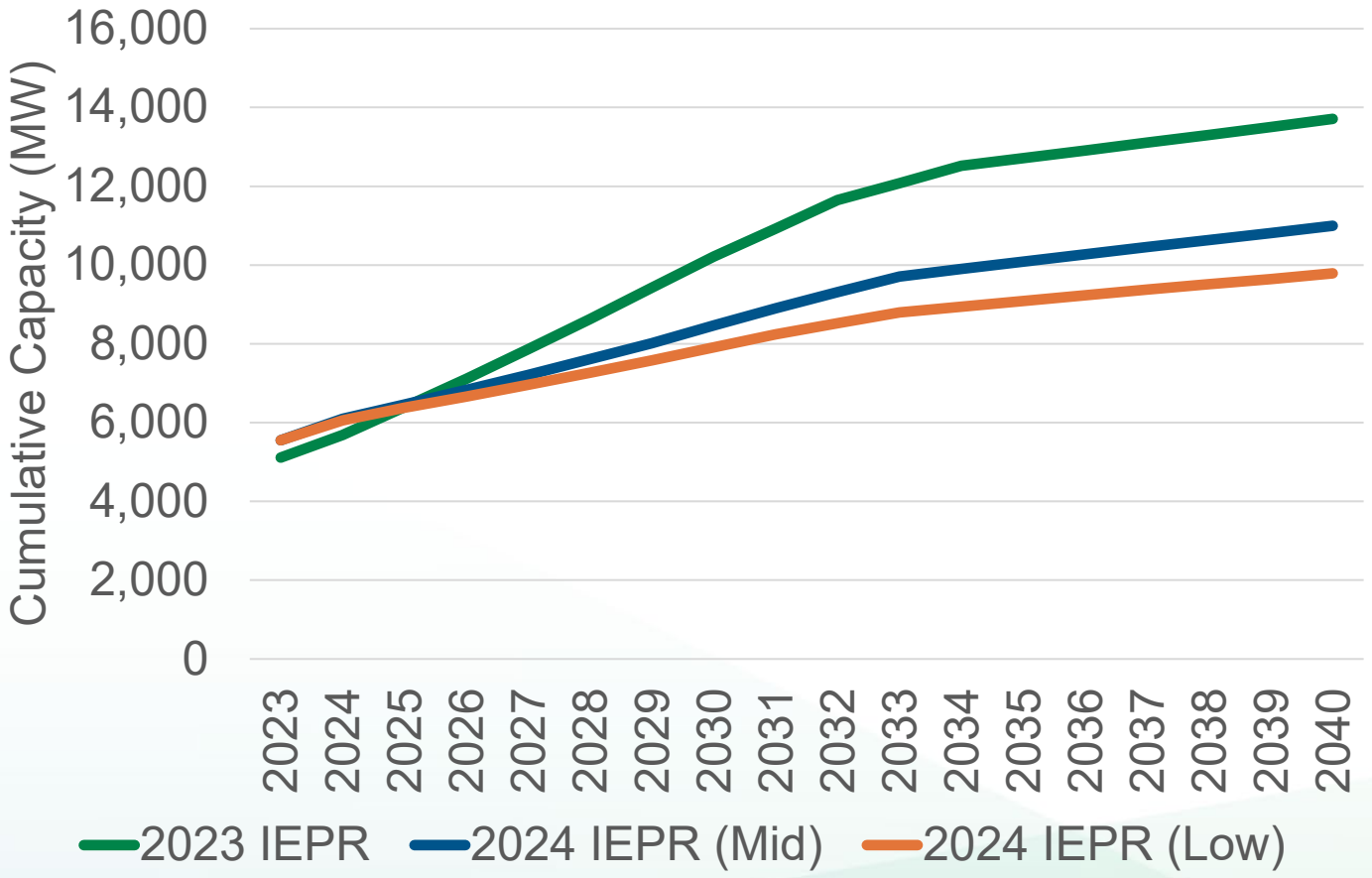


Source: CEC Staff

PV Forecast Comparison: SCE Planning Area

- In 2040:
  - Mid case is 20%, or 2,700 MW, lower than the 2023 forecast
  - Low case is 28%, or 3,900 MW, lower than the 2023 forecast

	Capacity (MW)		
Year	2023 IEPR	2024 IEPR (Mid)	2024 IEPR (Low)
2023	5,112	5,552	5,552
2025	6,397	6,462	6,376
2030	10,212	8,464	7,914
2035	12,713	10,088	9,088
2040	13,710	10,996	9,789

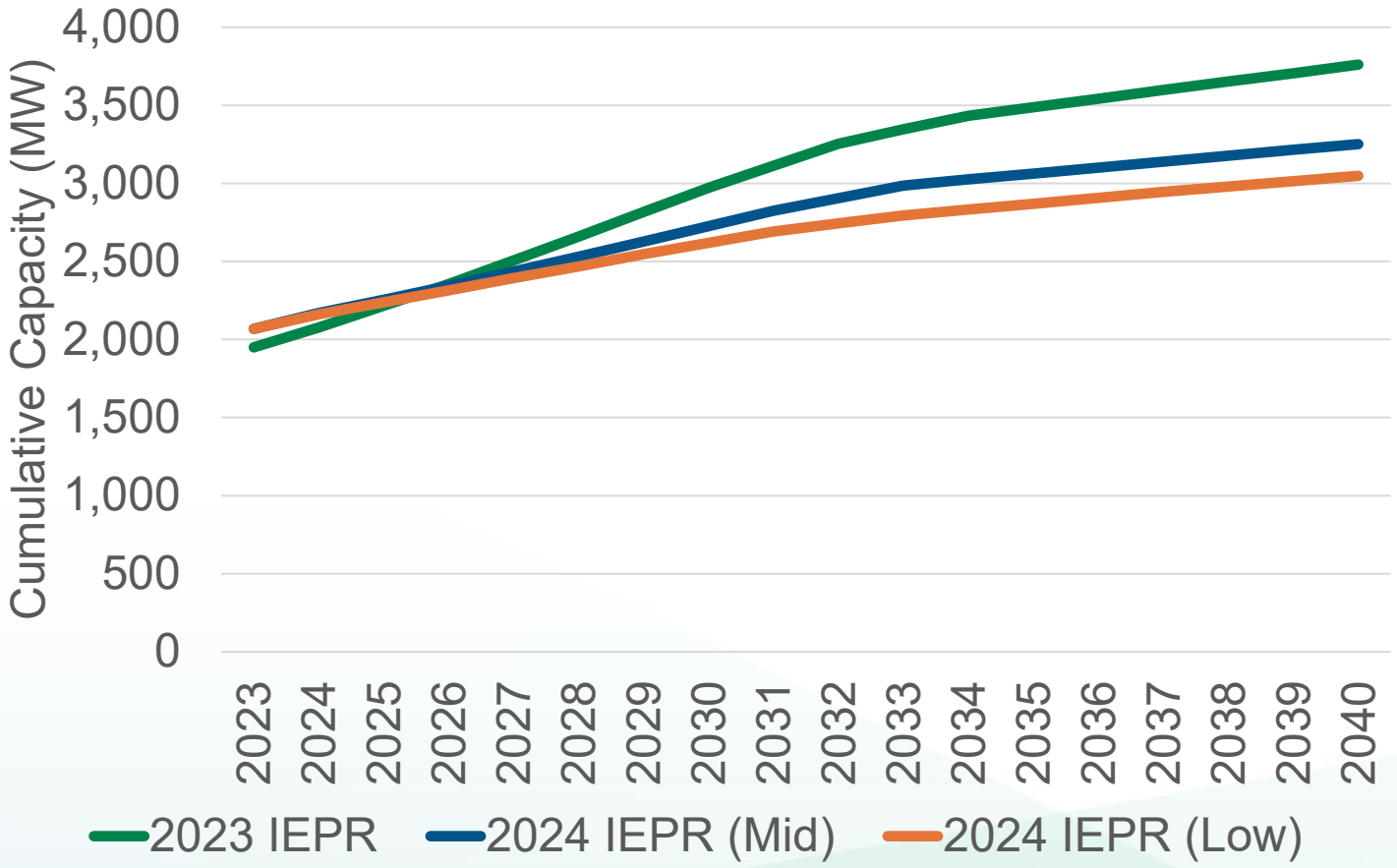


Source: CEC Staff

PV Forecast Comparison: SDG&E Planning Area

- In 2040:
  - Mid case is 14%, or 510 MW, lower than the 2023 forecast
  - Low case is 19%, or 710 MW, lower than the 2023 forecast

	Capacity (MW)		
Year	2023 IEPR	2024 IEPR (Mid)	2024 IEPR (Low)
2023	1,950	2,068	2,068
2025	2,217	2,255	2,238
2030	2,972	2,726	2,619
2035	3,487	3,062	2,869
2040	3,760	3,251	3,048

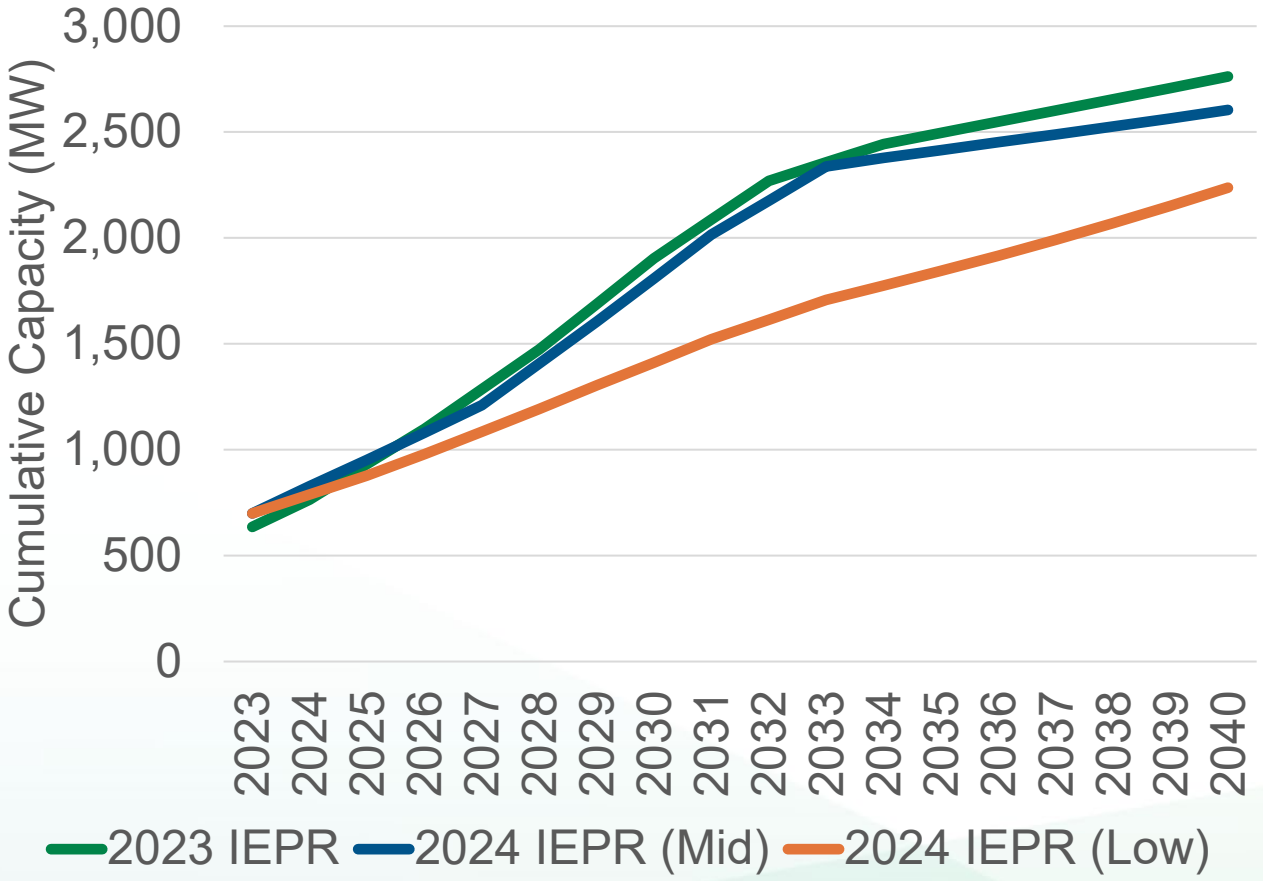


Source: CEC Staff

Storage Forecast Comparison: PG&E Planning Area

- In 2040:
  - Mid case is 6%, or 160 MW, lower than the 2023 forecast
  - Low case is 19%, or 520 MW, lower than the 2023 forecast

	Capacity (MW)		
Year	2023 IEPR	2024 IEPR (Mid)	2024 IEPR (Low)
2023	636	699	699
2025	932	951	877
2030	1,903	1,809	1,411
2035	2,496	2,415	1,845
2040	2,762	2,604	2,237

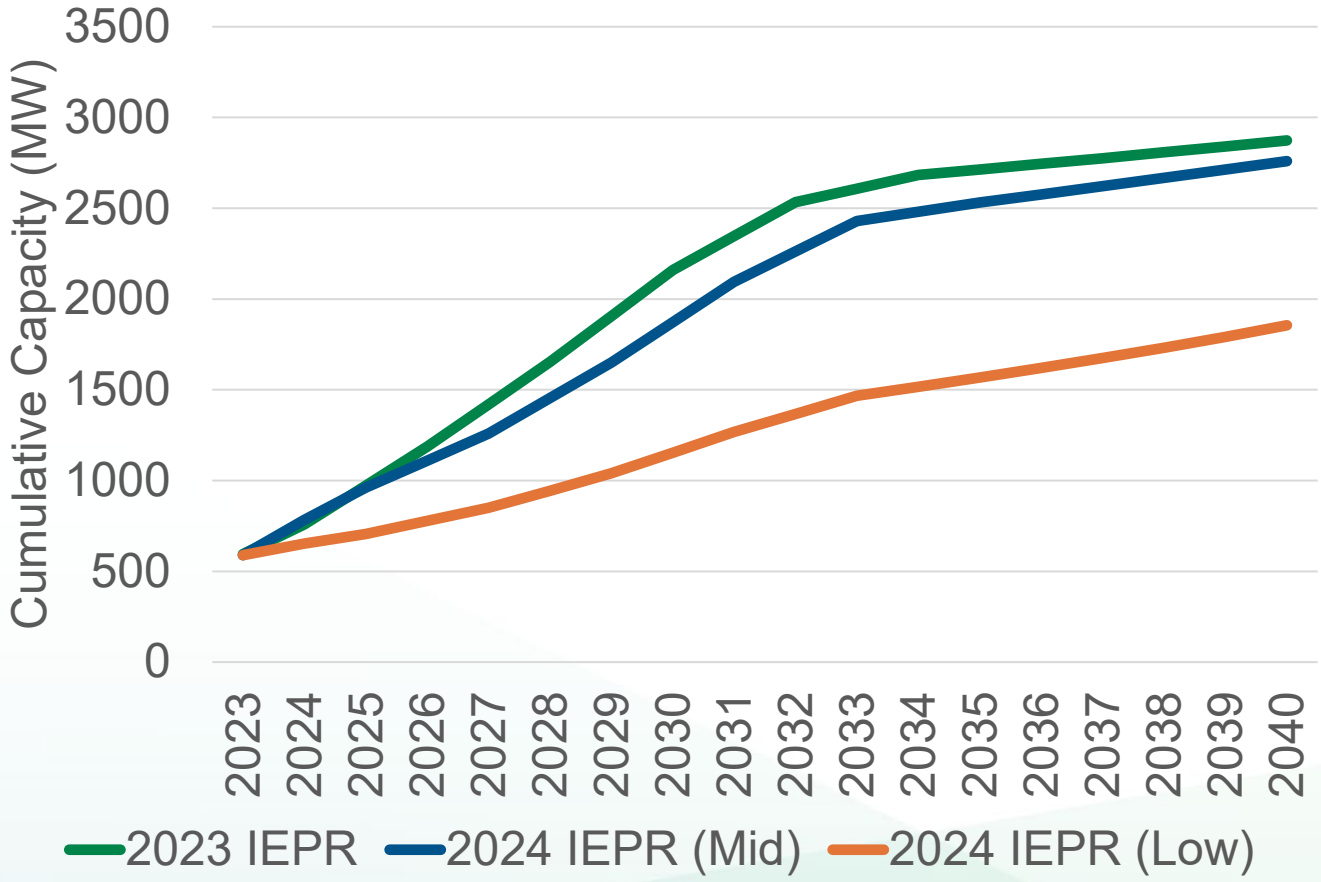


Source: CEC Staff

Storage Forecast Comparison: SCE Planning Area

- In 2040:
  - Mid case is 4%, or 110 MW, lower than the 2023 forecast
  - Low case is 35%, or 1,000 MW, lower than the 2023 forecast

	Capacity (MW)		
Year	2023 IEPR	2024 IEPR (Mid)	2024 IEPR (Low)
2023	595	589	589
2025	972	961	706
2030	2,161	1,873	1,153
2035	2,713	2,531	1,567
2040	2,874	2,760	1,855

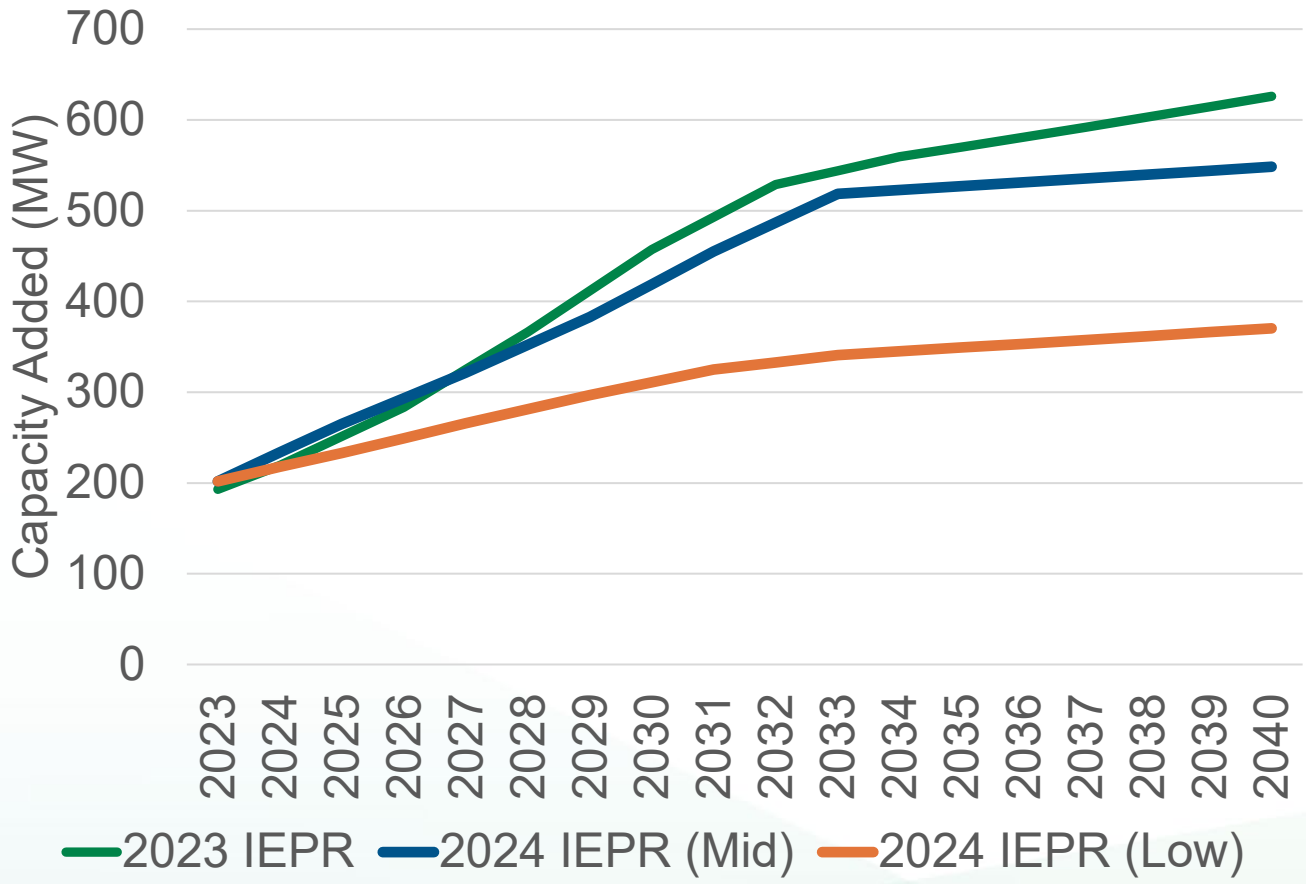


Source: CEC Staff

Storage Forecast Comparison: SDG&E Planning Area

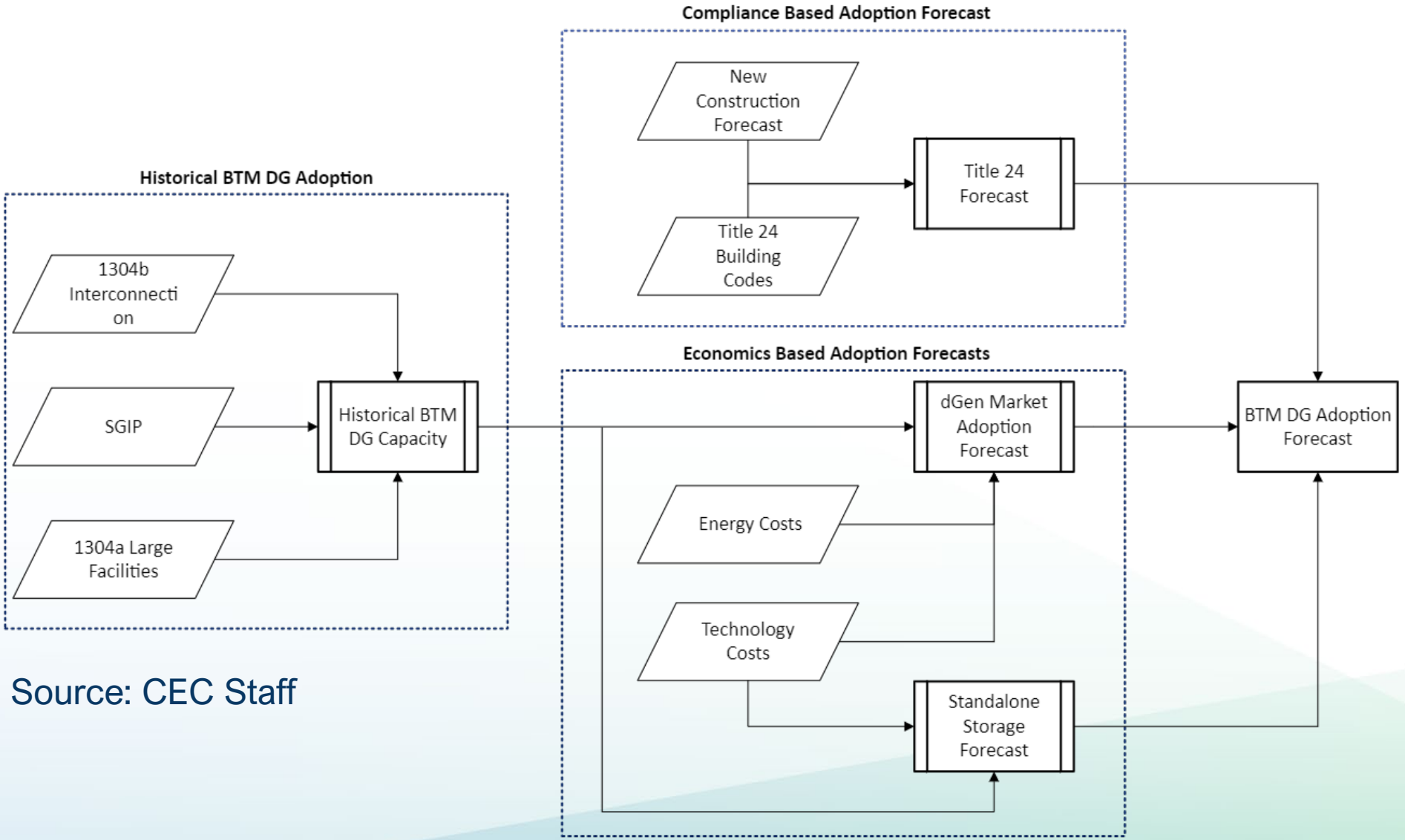
- In 2040:
  - Mid case is 12%, or 80 MW, lower than the 2023 forecast
  - Low case is 40%, or 260 MW, lower than the 2023 forecast

	Capacity (MW)		
Year	2023 IEPR	2024 IEPR (Mid)	2024 IEPR (Low)
2023	193	202	202
2025	251	265	233
2030	457	419	311
2035	570	527	349
2040	626	548	370



Source: CEC Staff

Adoption Modelling Architecture



Source: CEC Staff