

DOCKETED	
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Behind-the-Meter Distributed Generation Forecast Results

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List of Acronyms and Initialisms

ATB – Annual Technology Baseline

BTM – Behind-the-Meter

CapEx – Capital Expenditure

CEC – California Energy Commission

CHP – Combined Heat and Power

DG – Distributed Generation

dGen – Distributed Generation Market Demand Model

IEPR – Integrated Energy Policy Report

ITC – Investment Tax Credit

MW – Megawatt

NBT – Net Billing Tariff

NEM – Net Energy Metering

NREL – National Renewable Energy Laboratory

PG&E – Pacific Gas and Electric

PV – Photovoltaics

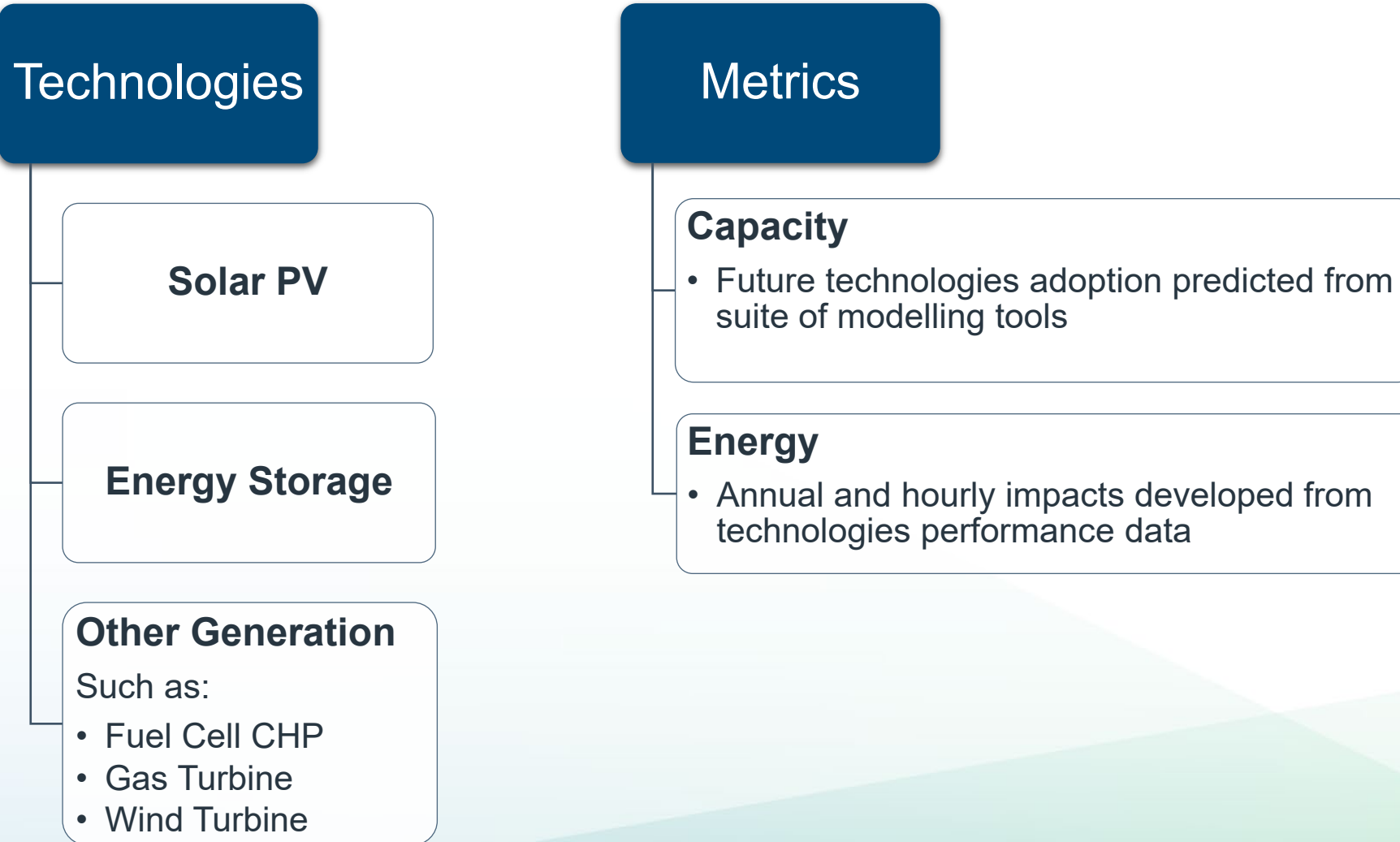
R&D – Research and Development

SCE – Southern California Edison

SGIP – Self-Generation Incentive Program



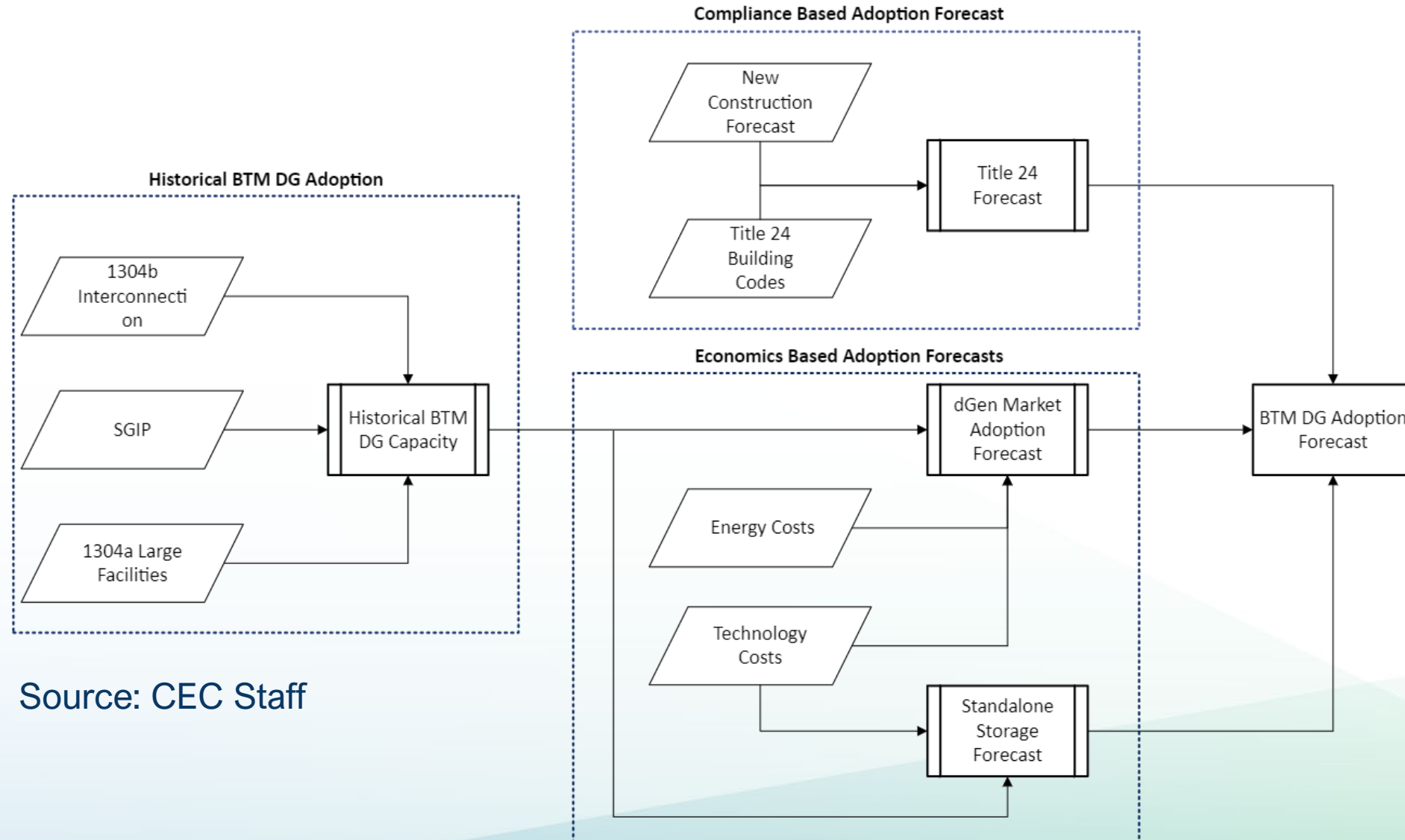
What BTM Distributed Generation Model Forecasts



Source: CEC Staff



Adoption Modelling Architecture



Source: CEC Staff



Why Forecast BTM Distributed Generation

- BTM DG technologies affect electricity demand served by utilities
 - Impacts at annual and hourly levels
- BTM PV generation currently accounts for over 10% (and growing) of overall statewide consumption
- Growth in BTM PV generation will offset future electricity demand
- BTM energy storage adoption affects peak demand
 - Avoids time-of-use rates by dispatching during on-peak period (4-9 pm)



PV and Storage Forecast Drivers

- BTM capacity forecast is developed using:
 - Interconnection data
 - Factors that influence future adoption, such as:
 - Payback period, which is driven by:
 - System costs
 - Import tariffs (i.e. energy costs)
 - Export tariffs (i.e. NBT vs. NEM)
 - Incentives
 - Title 24 Building Standards



PV and Storage 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	x	✓
Net Energy Metering Aggregation	x	✓

Source: CEC Staff



Input Updates



Drivers of Forecast Uncertainties

- Investment Tax Credit (ITC)
 - Eliminated in recent federal legislation
- Tariffs
 - Not currently included in forecast due to significant uncertainty
- NREL's Annual Technology Baseline (ATB) for BTM PV and storage

NREL ATB CapEx Forecast Scenarios

Cost Scenario	Technology	R&D Investment Levels
Conservative	Comparable to today	Decreasing
Moderate "Expected Level"	Current innovations widespread	Constant
Advanced	Theoretical innovations successful	Increasing

Source: CEC Staff



PV and Storage Adoption Scenarios

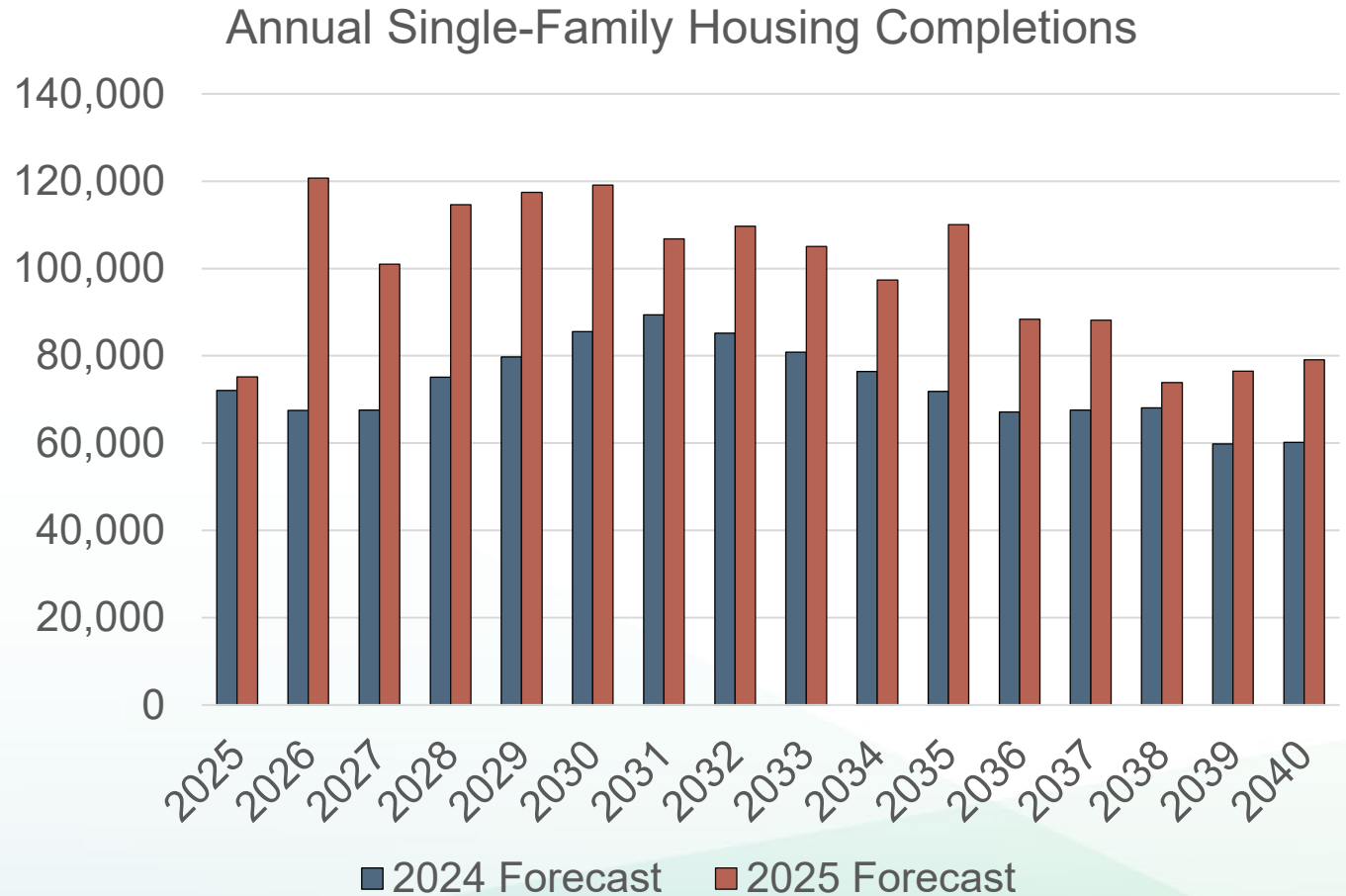
Scenario	CapEx Costs	Storage Retrofit	ITC
Low	Conservative	None	None
Mid	Moderate	None	None
Mid (Plus ITC)	Moderate	None	Reinstituted 2030-2040
High	Advanced	NEM contract turnovers	None

Source: CEC Staff



Higher New Housing Forecast

- Directly affects PV additions via Title 24 standards
- Cumulatively 420,000 more single-family home completions forecast between 2025 and 2040
- Higher short-term housing forecast due to increase in smaller household formations
- Decrease in longer-term due to aging population





Updated New Construction Storage Assumptions

- Forecast previously assumes no residential Title 24 PV installations paired with storage
 - Storage isn't required; therefore, builders would not include to keep costs down
- CEC's Building Standards team reports a small amount of storage paired with residential new construction
 - Industry contacts indicate a storage attachment rate of about 5%
 - Applied to mid and low cases in 2025 forecast
 - LBNL study estimates 17% pairing rate
 - Used in high case only
 - ~30 MW storage added annually

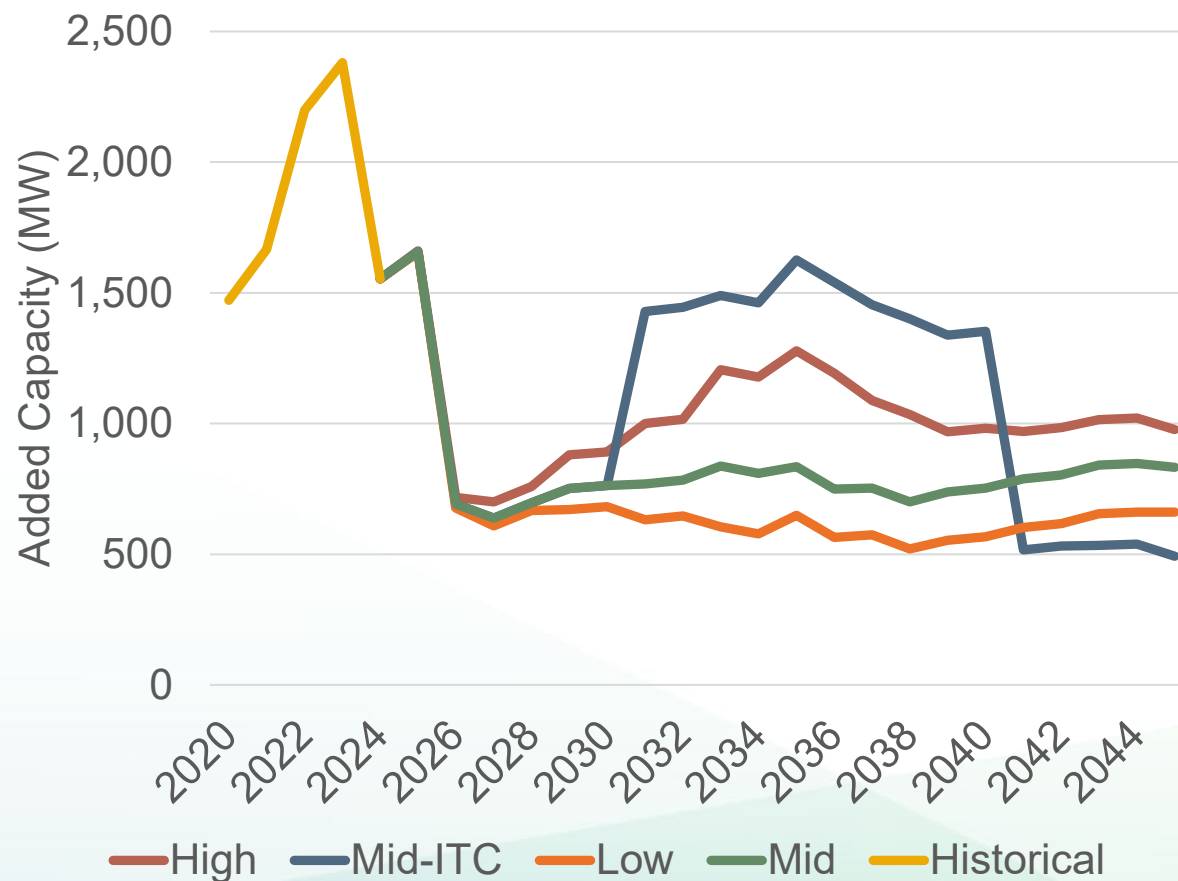


2025 IEPR Forecast Draft Results



PV Additions by Case

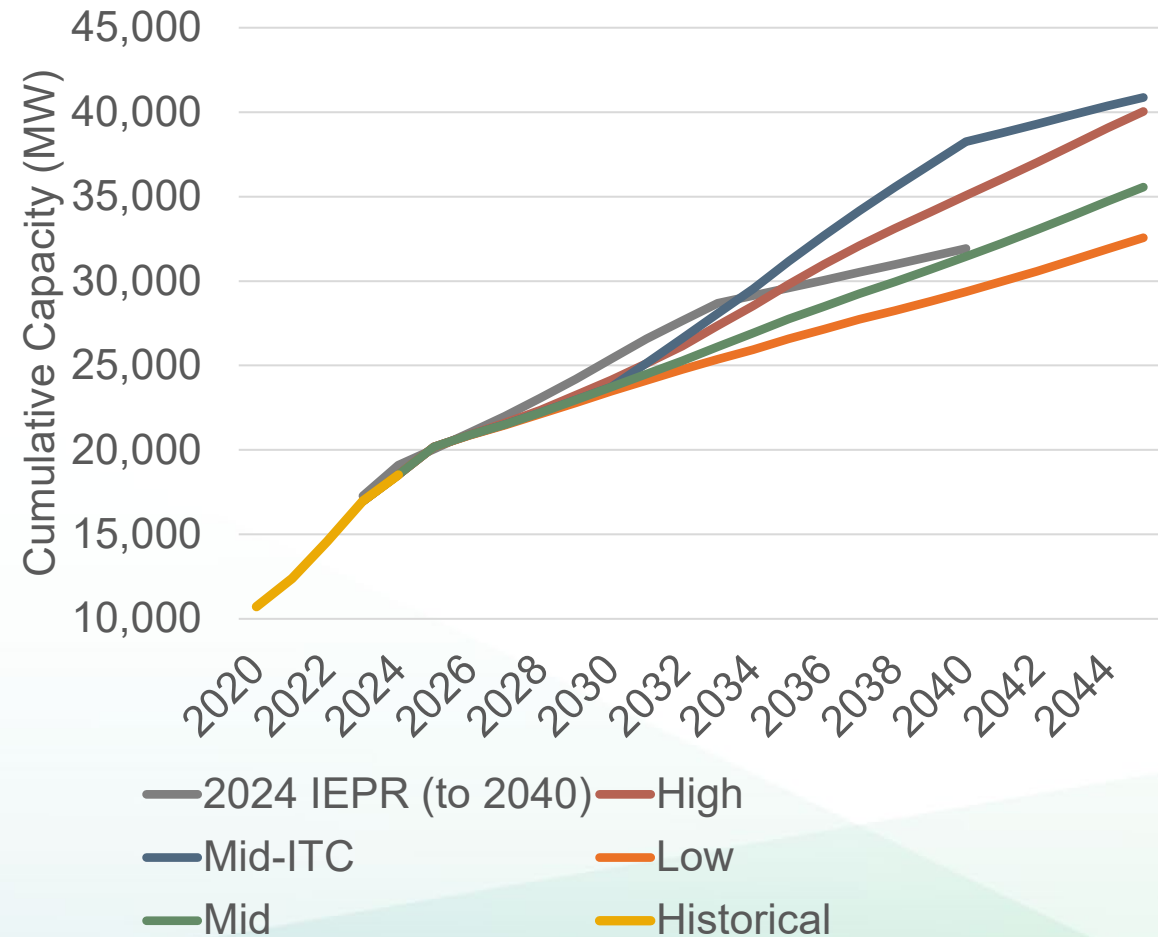
- Elimination of ITC leads to 50% reduction in adoption rates in all cases starting in 2026
- Reintroduction of tax credit in Mid-ITC case leads to 2025 levels of added capacity in 2035
- In 2045, mid case additions are approximately 25% higher than in the low case





PV Forecast Update Comparison

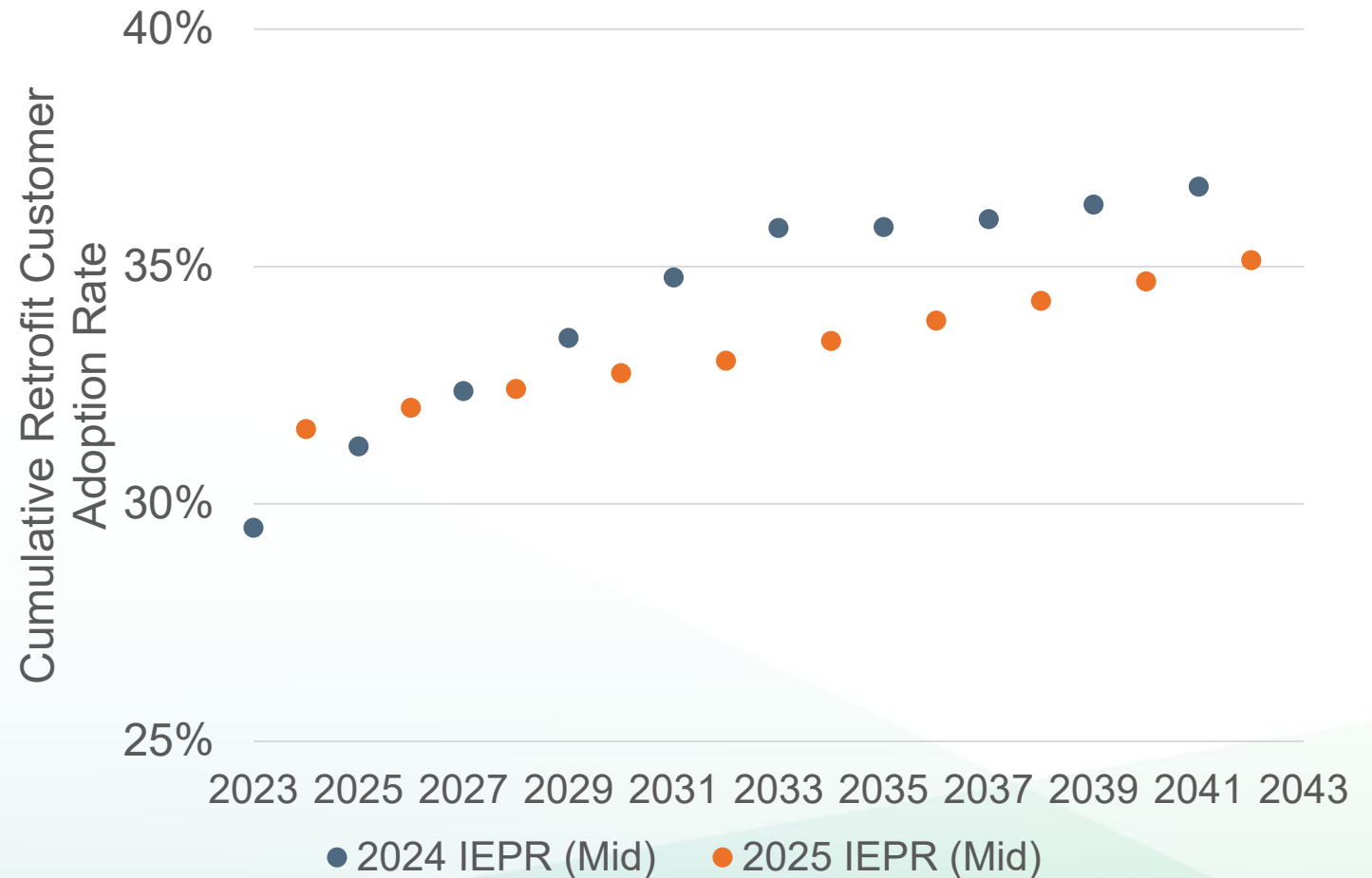
- PV adoption forecasts are lower in early part of forecast, but are similar towards end of forecast
- In 2030:
 - Mid case is 1,670 MW (7%) lower than 2024 mid case
 - Low case is 1,910 MW (8%) lower than 2024 mid case
- In 2040:
 - Mid case is 480 MW (1.5%) lower than 2024 mid case
 - Low case is 2,560 MW (8%) lower than 2024 mid case





Market Penetration is Lower Post-ITC Expiration

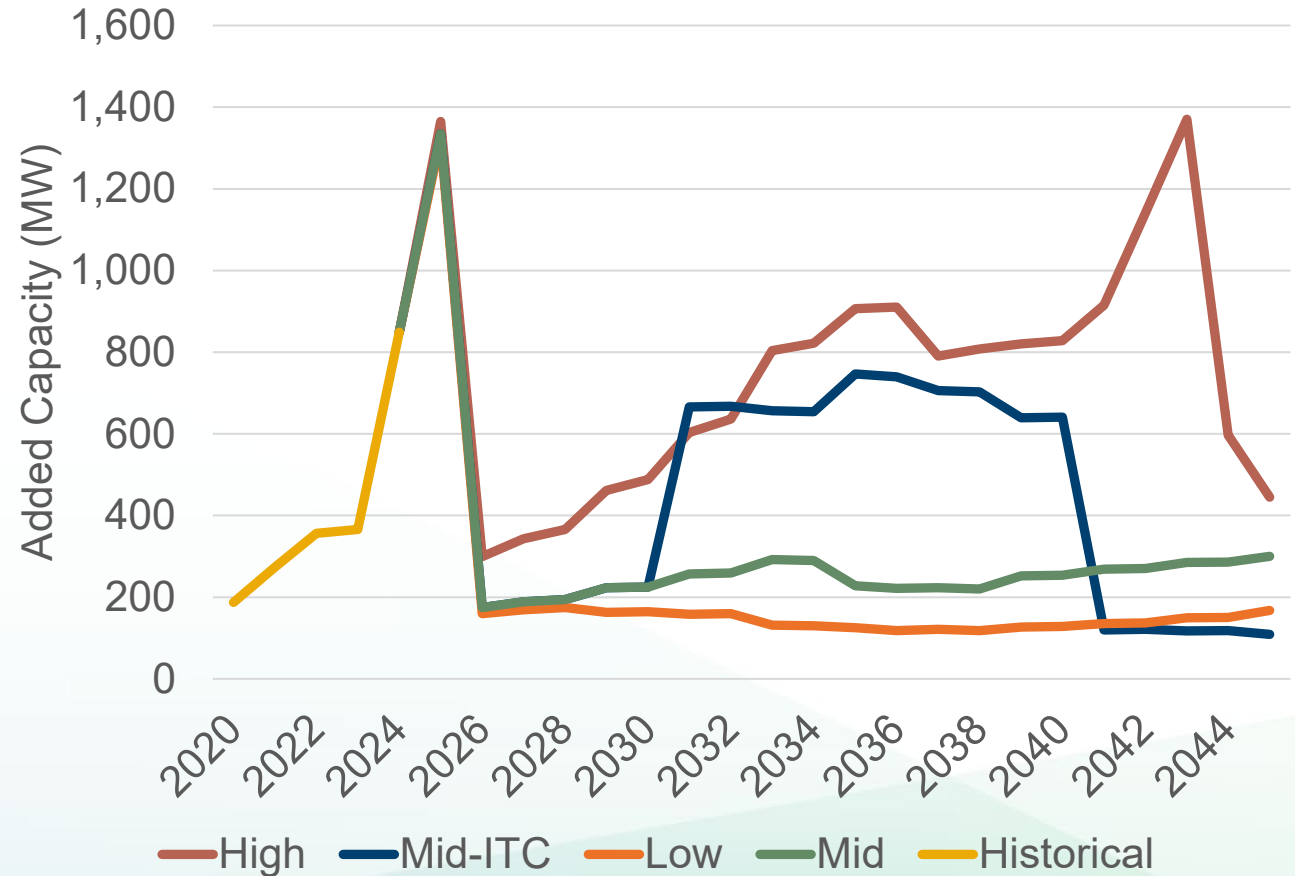
- Fewer households will adopt after ITC expires
- Higher annual adoption rate post-2035 in 2025 forecast due to less market saturation





Storage Additions by Case

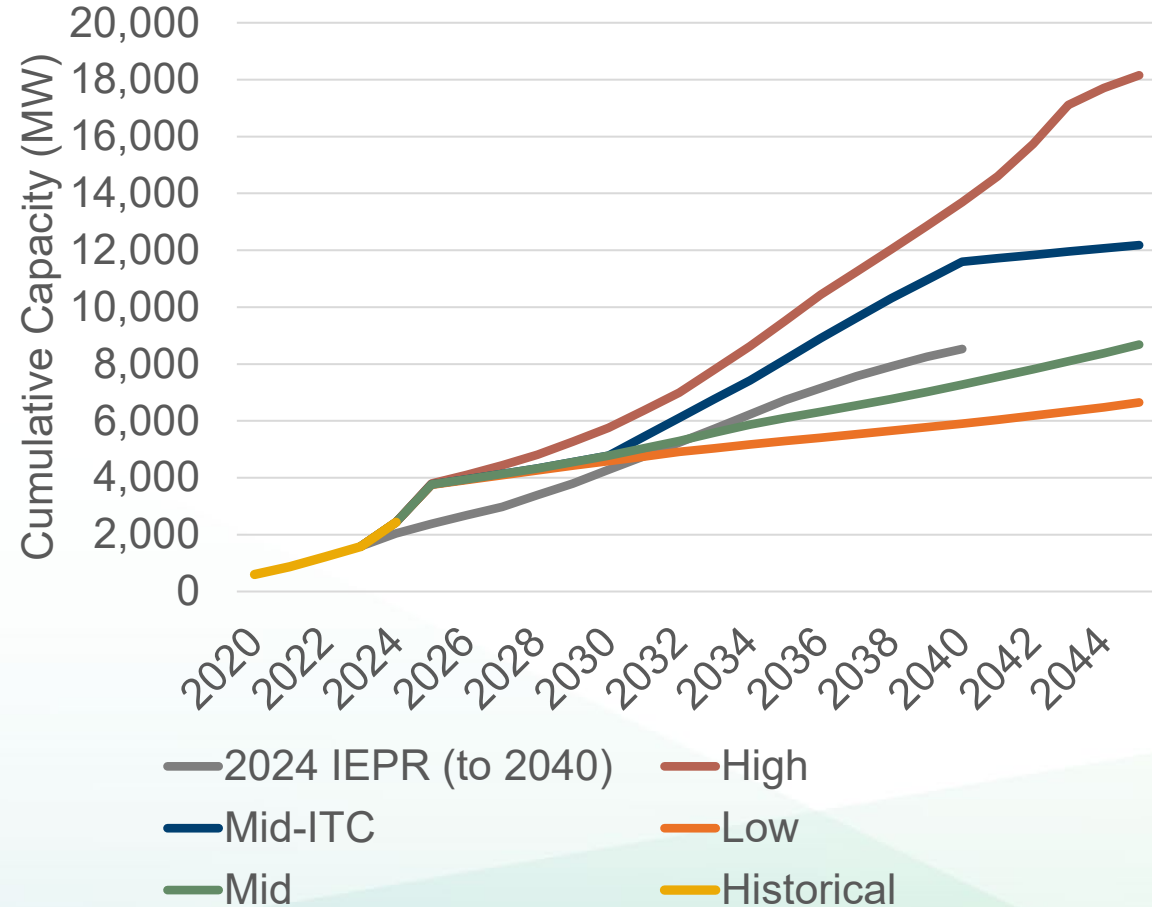
- Expiration of ITC leads to over 80% decrease in annual capacity additions
- Greater PV cost reductions lead to higher adoption rates in mid and high case
- Significant increase in added capacity are due to:
 - ITC reintroduction, in Mid-ITC case
 - NEM turnover, in High Case





Storage Forecast Update Comparison

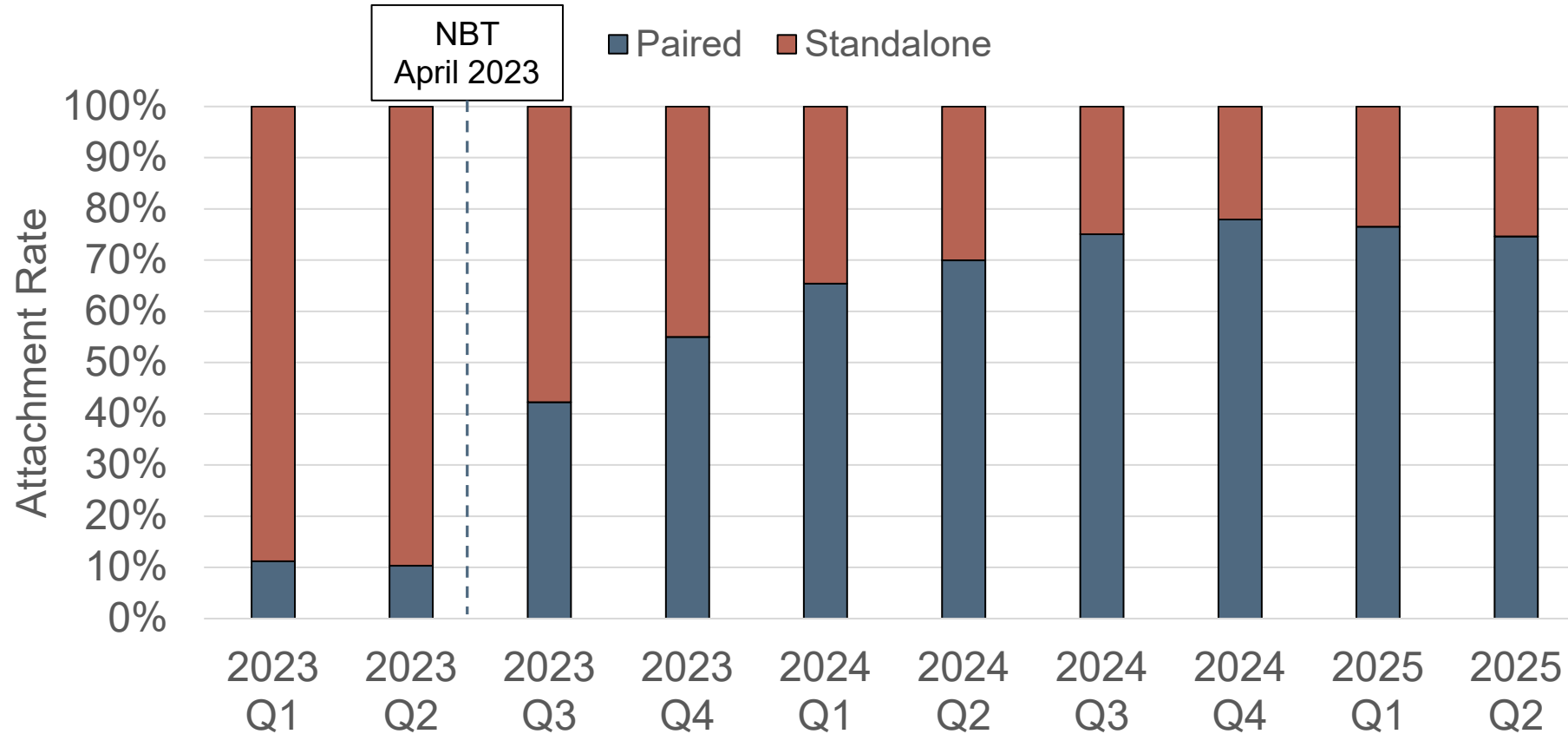
- Storage capacity is higher in near-term due to higher-than-expected installations in 2025
- Cumulative capacity is lower in longer term due to earlier ITC elimination
- In 2030:
 - Mid case is 500 MW (12%) higher than 2024 mid case
 - Low case is 310 MW (7%) higher than 2024 mid case
- In 2040:
 - Mid case is 1,260 MW (15%) lower than 2024 mid case
 - Low case is 2,600 MW (31%) lower than 2024 mid case





Storage Pairing Has Increased, But May Be Leveling Off

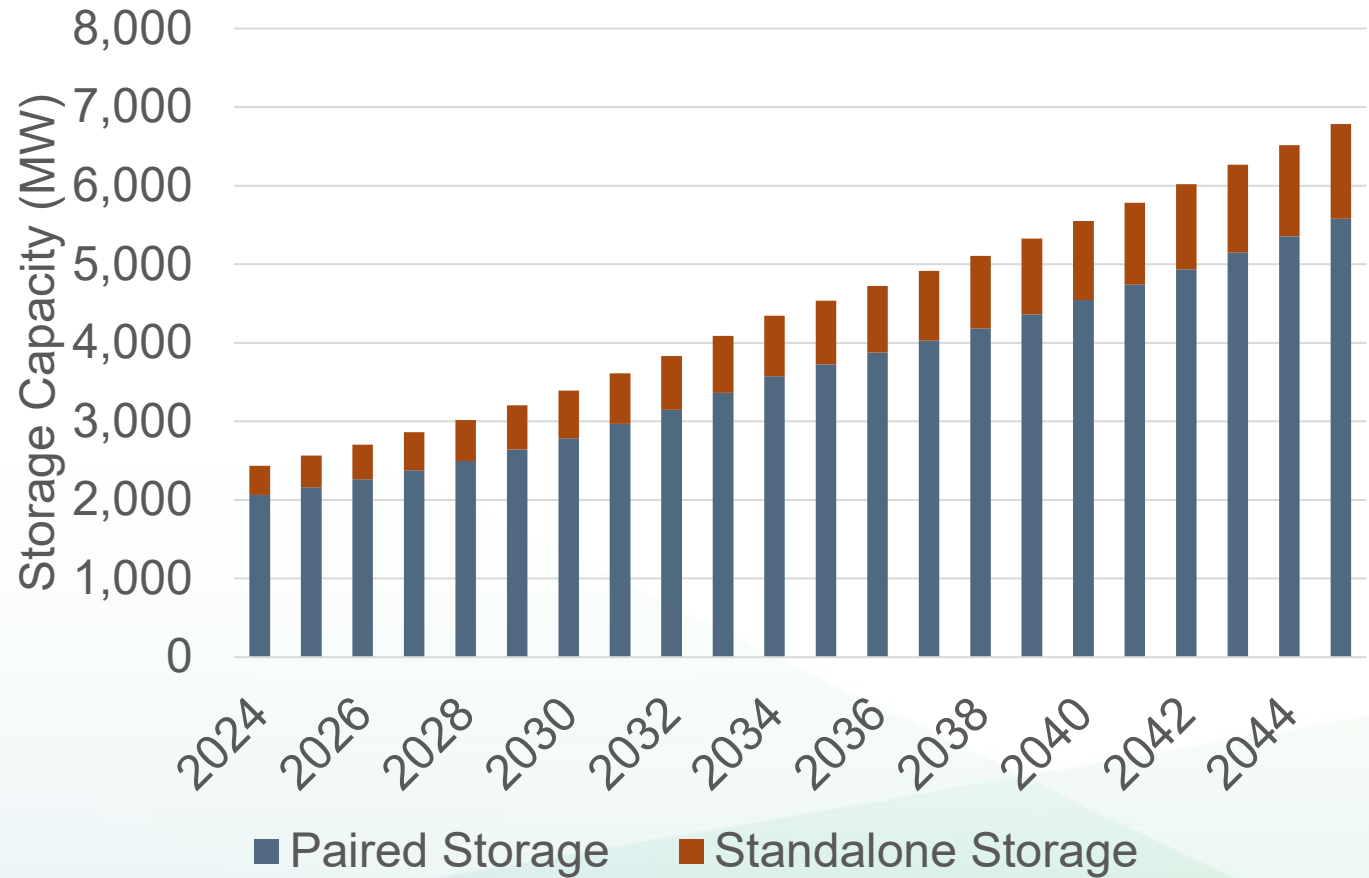
Historical Residential Attachment Rate: PG&E & SCE





Mid Case Storage Forecast by Configuration

- Over 70% of storage installations are currently paired with a PV system
- Only 18% of storage capacity added between 2024 and 2050 is standalone
- Majority of standalone storage installations are in nonresidential sector





Thank You!