



### **Behind-the-Meter Distributed Generation Forecast Results**

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## What is the BTM Distributed Generation Forecast?

- Energy Commission forecasts capacity of distributed generation sources
- Main technologies are Solar Photovoltaic (PV) and Energy Storage
- Capacity forecast developed using:
  - Interconnection data
  - Factors that will influence future adoption, such as:
    - System costs
    - Energy costs
    - Incentives
    - New construction



### **Input Updates**



## Summary of Updates to dGen Model

- NREL staff previously ran dGen model using 2022 inputs
- Results were shared at August DAWG meeting
- Since then, Energy Commission staff has updated base year capacity data, the rate switch table, and forecasts of both installation costs and electricity rates
- Updated results show new curve, which will be analyzed later in presentation





- To estimate the cost of solar, staff used CPUC's adoption of \$3.30/Watt as the current cost of installing a residential solar system in California
- Staff then used NREL's Annual Technology Baseline (ATB) data to model rate of change in costs throughout forecast period



- Payback period influences PV adoption decisions
- Recent updates to PV cost and electricity rate forecast affected payback period calculation
- Payback period is 1-2 years quicker on average for solar plus storage installations
- Payback period expected to decrease until phase out of ITC in mid-2030s





- Staff worked with Building Standards department to get data on residential Title 24 installations
- Staff analyzed data to estimate average size by forecast zone
- Average sizes were higher than previously thought, leading to increase in Title 24 capacity
- Commercial model used updated Commercial Floorspace Forecast, which was higher than previous iterations; thus, commercial adoption is also increased





#### **2023 Forecast Results**







- Forecast shows steady adoption rate until mid 2030s
- Forecast levels off slightly after 2034 due to elimination of Investment Tax Credit (ITC) incentive
- Adoption rate increases again in 2040s due to continuous decrease in cost of installation



- Majority of installed solar is forecast to be from retrofits of existing buildings
- Because Title 24 installations are based on compliance, they do not level off with expiration of credit
- Forecast shows majority of installed solar after credit expiration will be Title 24 compliance installations



Added Solar Capacity by Installation Type





- Majority of installed solar is residential
- Through 2022, that number was about 70%
- By 2040, that number is projected to be 60%

■ Residential ■ Commercial ■ Industrial ■ Mining ■ Ag & Water Pump ■ TCU



- Forecast is run at zone level
- Majority of PV capacity is in IOU territory (PG&E, SCE, and SDG&E)

 PG&E and SCE forecast to have similar cumulative capacity by end of forecast

Solar Capacity Forecast by Planning Area 40,000 Capacity (MW) 35,000 30,000 25,000 20,000 P 15,000 Cumulative 10,000 5,000 2022 2025 2028 2031 2034 2037 2040 LADWP ■SCE ■SDG&E SMUD ■PG&E Other





• Storage forecast shows similar trend to PV

- Forecast storage adoption is also affected by elimination of ITC incentive in 2034
- Adoption increases at a greater rate than PV as increased electricity rates and changes to excess solar compensation (NBT) both incentivize storage adoption





Source: CEC Staff

- Currently, paired storage is over 80% residential
- Standalone storage is over 80% nonresidential
- 90% of residential storage capacity is paired
- 70% of non-residential storage capacity is standalone



- Majority of storage installations are paired with a PV system
- However, there still is a sizeable market for standalone storage installations, particularly in the non-residential sector
- Because standalone storage is now eligible for a tax credit, it is forecast to have increased growth until the credit expires in 2034, though still much less prevalent than paired storage
- Growth is more modest post-2034







Majority of currently installed storage is residential; however, the percentage is lower than for PV

 Through 2022, storage was just under 65% residential

# **Storage Forecast by Planning Area**

- Storage distribution by planning area is similar to that seen in PV forecast
- Over 95% of currently installed storage capacity is in IOU territory
- Share of cumulative capacity in IOU territory forecast to be about 90% by end of forecast, most of that being in PG&E or SCE territory

Storage Capacity Forecast by Planning Area 7,000 Capacity (MW) 6,000 5,000 4,000 3,000 Cumulative 2,000 1,000 2039 2022 ■PG&E ■SCE ■ SDG&E LADWP SMUD Other



#### **Thank You!**





### **Supplemental Slides**



# How Models Are Developed







## **Energy Demand Model System**

