DOCKETED	
Docket Number:	19-IEPR-03
Project Title:	Electricity and Natural Gas Demand Forecast
TN #:	227214
Document Title:	Distributed Generation Forecast Input and Modeling Updates
Description:	Presentation by Sudhakar Konala of CEC
Filer:	Raquel Kravitz
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	3/1/2019 11:42:06 AM
Docketed Date:	3/1/2019

Distributed Generation Forecast

Input and Modeling Updates

Sudhakar Konala

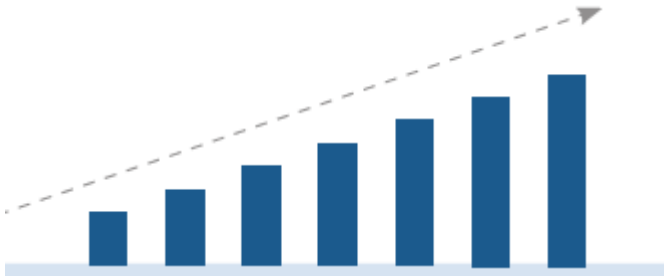
Demand Analysis Office

Energy Assessments Division

Sudhakar.Konala@energy.ca.gov

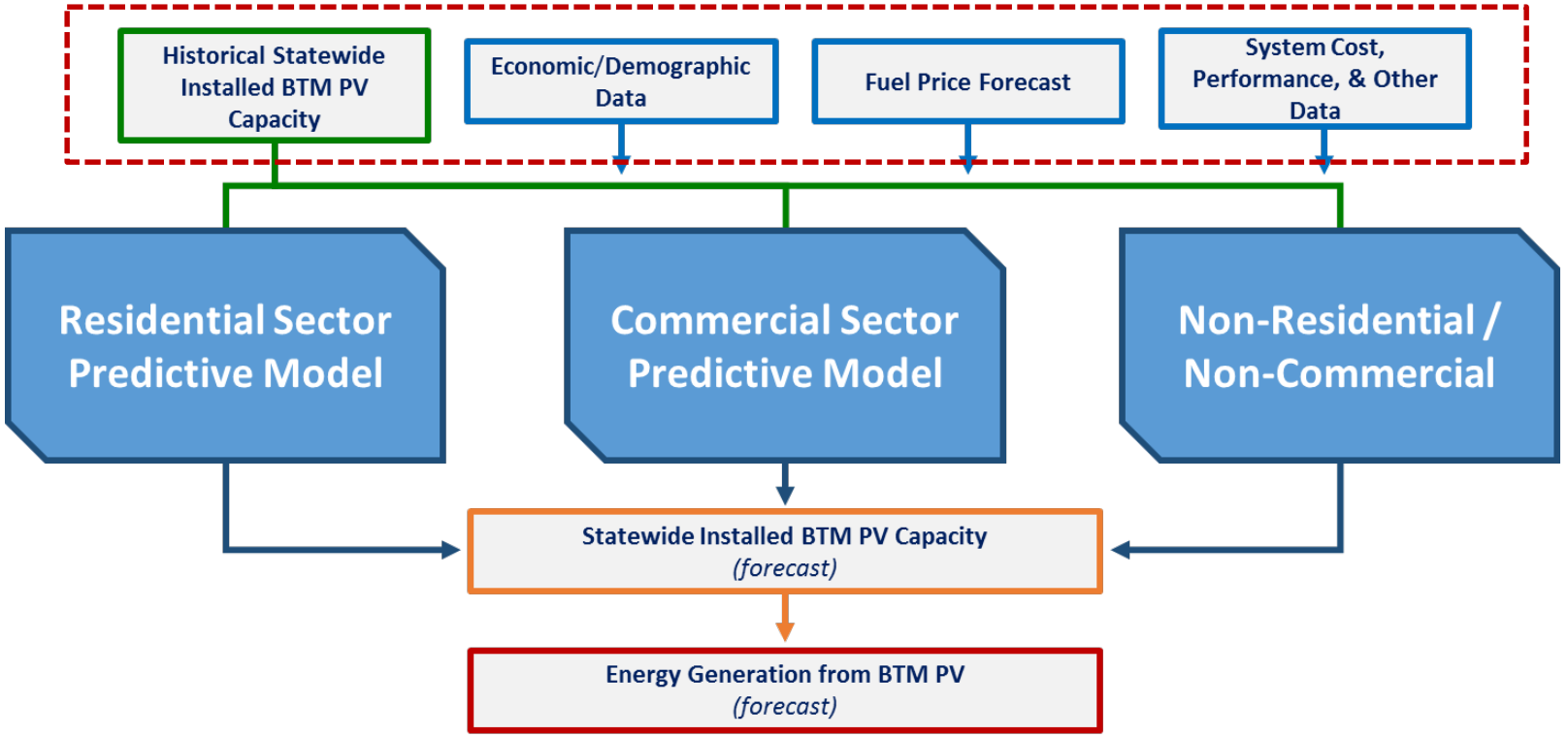
Overview

- **Updated Input Data**
  - Update PV installation data
    - New data sets: IEPR Form 1.8 / CEC 1304-B
  - Update non-PV self-generation data
- **Model / Methodology Changes**
  - AAPV incorporated in baseline PV forecast
  - PV Energy Generation
  - Energy Storage
- **PV Roadmap**

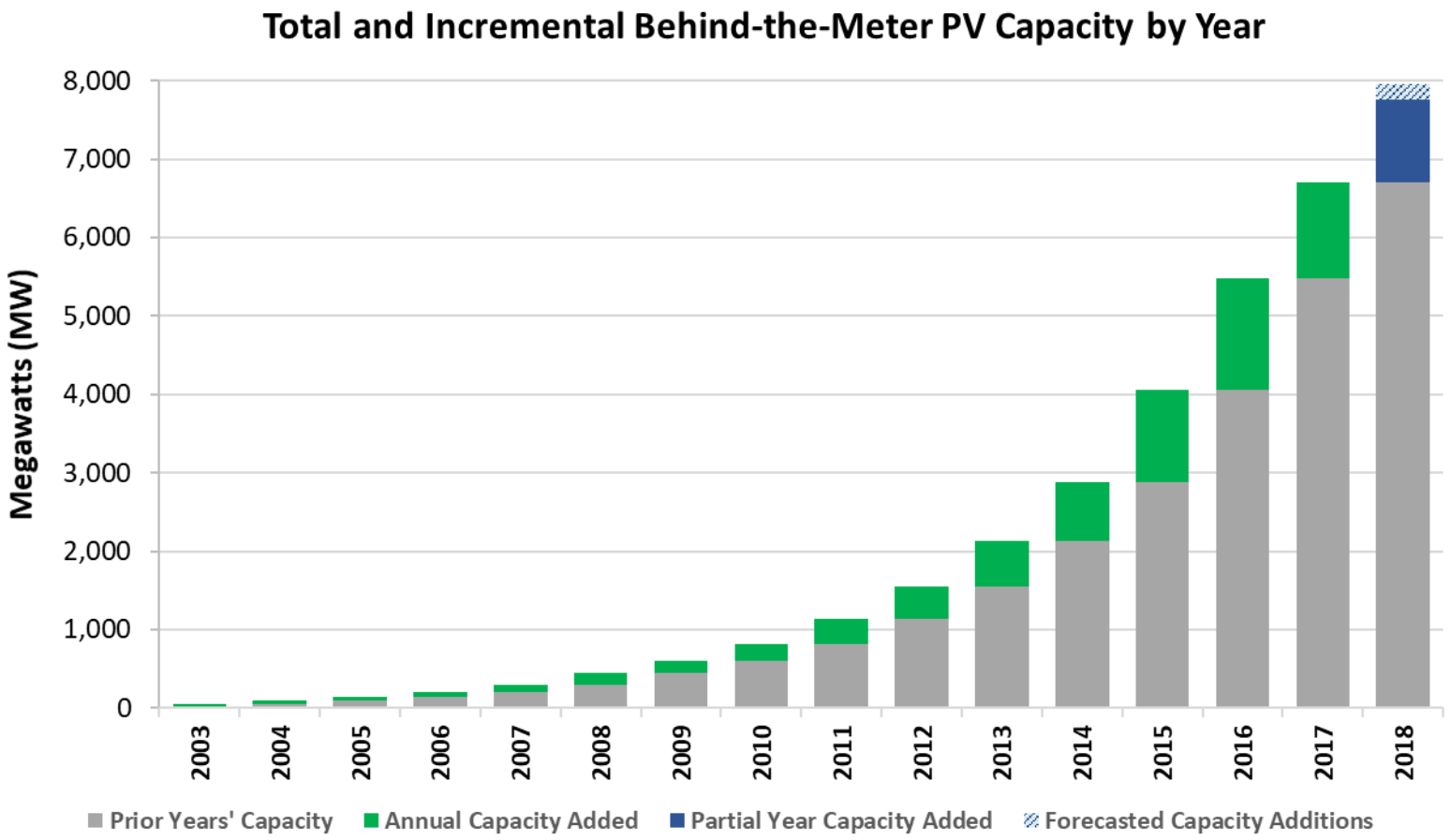


UPDATED DATA / INPUTS

Energy Commission PV Model Inputs

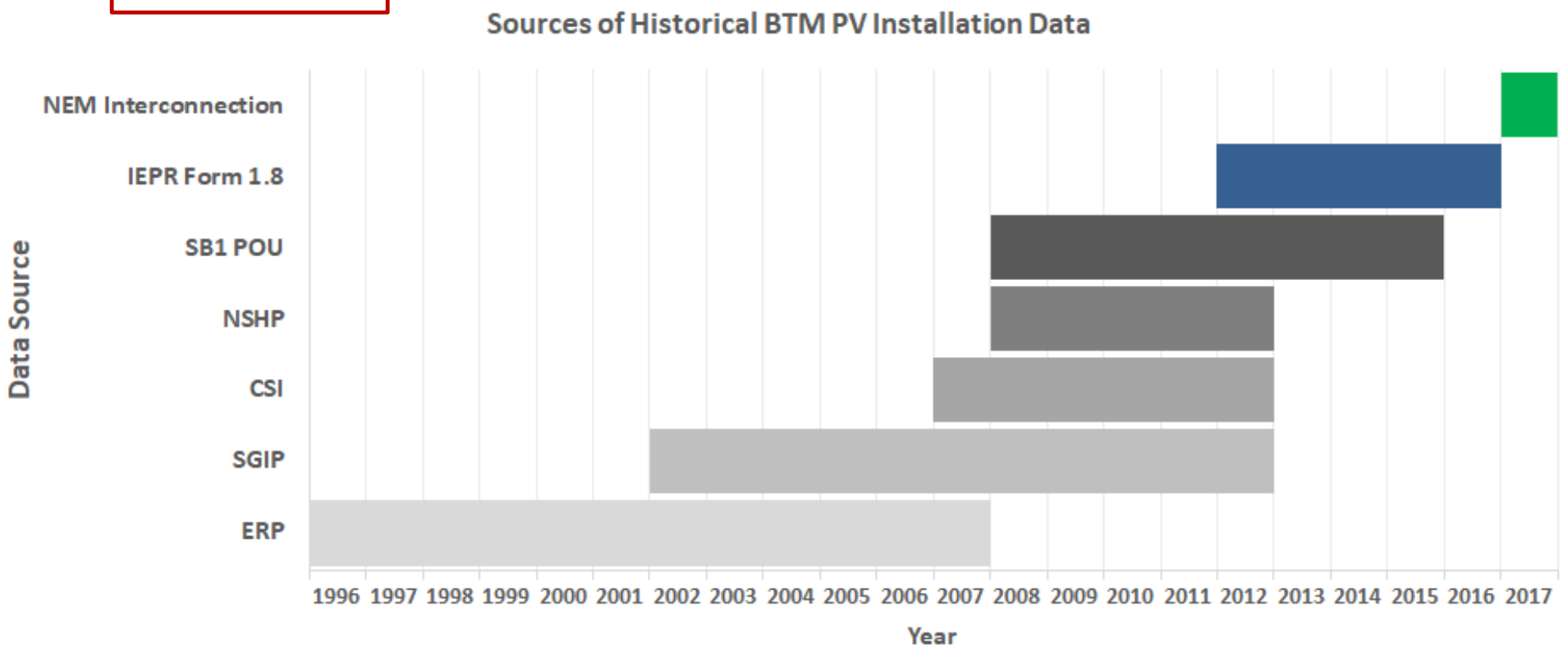


Historical Statewide PV Installations



Where Did Installation Data Come From?

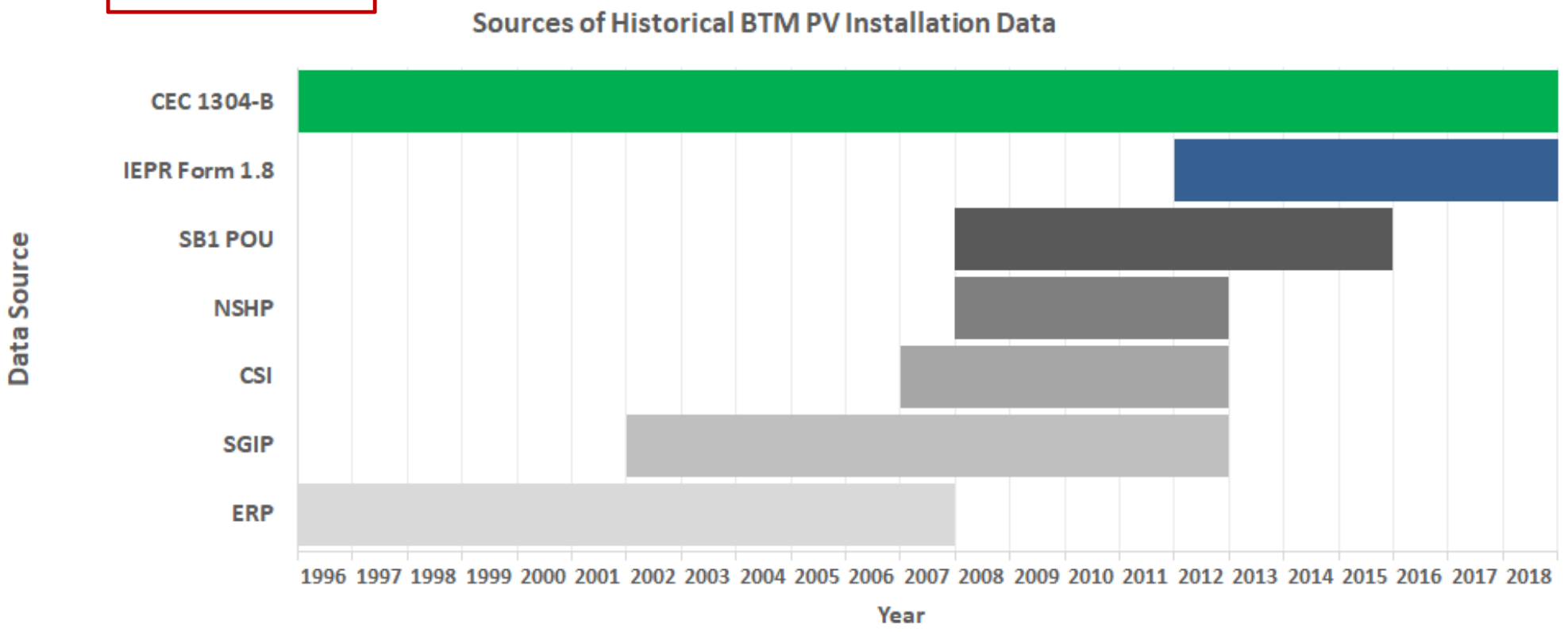
CEDU 2018



Sources: Net Energy Meeting (NEM) Currently Interconnected Dataset, CEC IEPR Form 1.8, SB1 POU, New Solar Homes Partnership (NSHP), California Solar Initiative (CSI), Self-Generation Incentive Program (SGIP), Emerging Renewables Program (ERP).

Where Will Installation Data Come From?

CED 2019



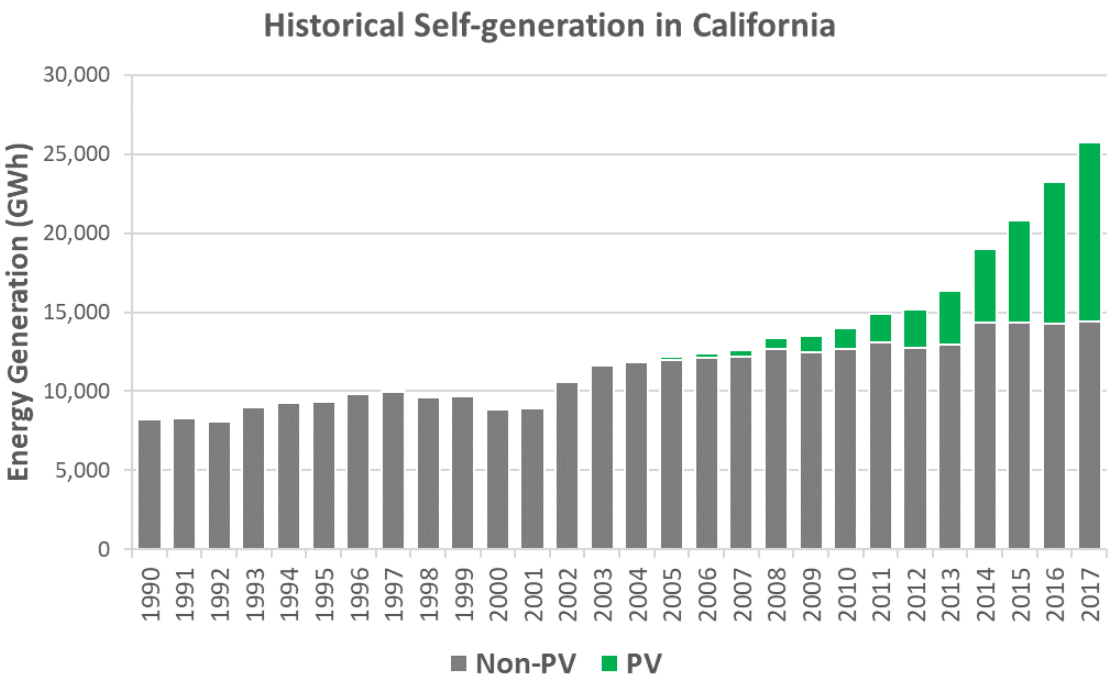
Sources: Net Energy Meeting (NEM) Currently Interconnected Dataset, CEC IEPR Form 1.8, SB1 POU, New Solar Homes Partnership (NSHP), California Solar Initiative (CSI), Self-Generation Incentive Program (SGIP), Emerging Renewables Program (ERP).

PV Installation Data by Utility

	Historical PV Data Through…	
Utility	**CEDU 2018**	**CED 2019**
PG&E	Dec 2017	Dec 2018
SCE	Dec 2017	Dec 2018
SDGE	Dec 2017	Dec 2018
LADWP	Dec 2016	Dec 2018
SMUD	Dec 2017	Dec 2018
Imperial Irrigation District	Dec 2016	Dec 2018
Modesto Irrigation District	Dec 2016	Dec 2018
Turlock Irrigation District	Dec 2016	Dec 2018
Anahiem, City of	Dec 2016	Dec 2018
Riverside, City of	Dec 2016	Dec 2018
Silicon Valley Power	Dec 2016	Dec 2018
Roseville Electric	Dec 2016	Dec 2018
City and County of San Francsico	Dec 2016	Dec 2018
Pasadena Water and Power	Dec 2016	Dec 2018
Glendale Water and Power	Dec 2016	Dec 2018
Palo Alto, City of	Dec 2016	Dec 2018
Redding, City of	Dec 2016	Dec 2018
Burbank Water and Power	Dec 2016	Dec 2018
Utilities (all other)	Dec 2016	Dec 2018

Self-Generation Forecast Update

- **Three separate forecasts**
  - PV
  - Non-PV
  - Storage
- **Non-PV Self-generation**
  - Update with 2018 data
  - Data sources
    - Large systems: QFER CEC 1304
    - Smaller systems: SGIP
  - Growth has been flat since 2014



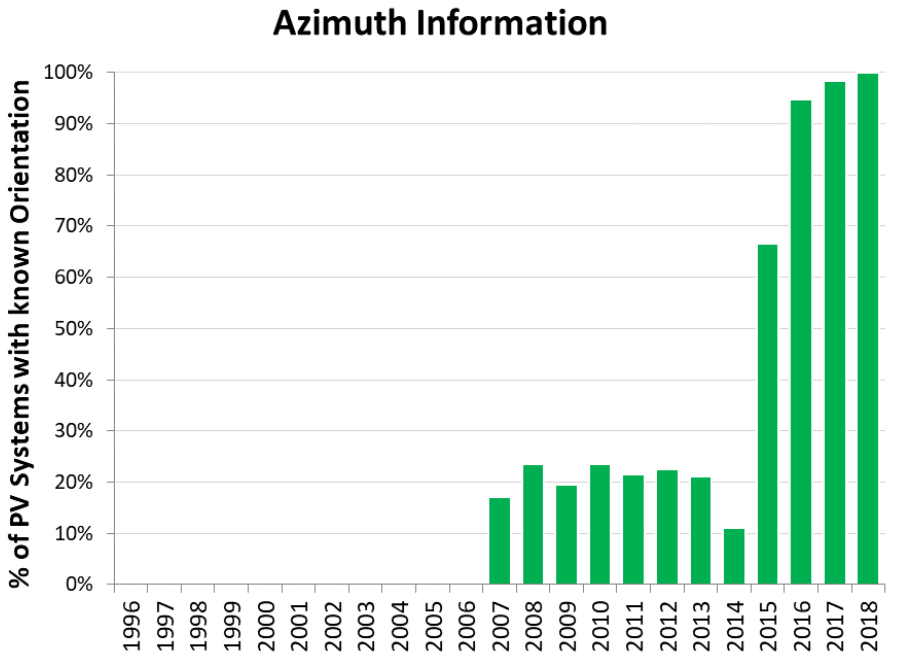
MODEL / METHODOLOGY CHANGES

AAPV Incorporated in Baseline PV Forecast

- Additional achievable photovoltaic (AAPV) adoption
  - Accounts for PV system requirements for new homes (2019 Title 24 standards)
  - Baseline forecast: a certain percentage of new homes adopt PV systems
  - AAPV = difference between PV adoptions for new homes due to 2019 Title 24 regulations vs. new home PV adoptions already in baseline forecast
- For 2019, AAPV will be incorporated into baseline PV forecast
  - Forecast of PV adoption for new homes based on regulatory compliance
- Revisit / update assumptions from 2018 AAPV forecast
  - Expected level of compliance
  - Average PV system size for new homes

Updating PV Generation Methodology

- Historically, array tilt and azimuth information for PV systems was not available.
  - Limited staff's ability to model generation
- Since 2016, IOUs have collected tilt and azimuth.
  - Orientation for 65% of systems is known
  - Staff will revisit PV energy generation
  - Update to reflect orientation data



Source: Net Energy Meeting (NEM) Currently Interconnected Dataset

Energy Storage Modeling Changes

- Several Issues with modeling Energy Storage
  - Limited historical data
  - Residential storage is not yet economically competitive by itself
  - PV + Storage vs. PV alone
- Storage forecast has relied on a trend analysis
- For CED 2019 Revised Forecast…
  - Staff will revisit competiveness of PV + Storage vs. PV alone when forecasting storage adoption.
  - Staff plans to build an hourly storage model to incorporate effects of storage on peak demand.

BEHIND-THE-METER PV FORECAST ROADMAP

NREL dGen Contract Overview

- Distributed Generation Market Demand (dGen) model
  - A bottom-up market-penetration model
  - Stimulates potential adoption of distributed energy resources for residential, commercial, and industrial entities in the U.S.
  - Capable of producing more disaggregate geospatial forecast

- In an effort to improve its forecasting ability and support future work, EAD sought to have NREL adapt their dGen model for the California market.
  - EAD contracted with NREL to adapt dGen for California market and deliver model results to EAD.
  - Approved: June 2017 Business Meeting

Plan For Utilizing dGen Model

Energy Commission PV Model

CED 2019 Prelim Forecast
DAO staff runs CEC model

CED 2019 Revised Forecast
DAO staff runs CEC model

CEDU 2020 Forecast
DAO staff runs CEC model

dGen Model

CED 2019 Prelim Forecast
NREL staff runs dGen → PV results delivered to CEC

NREL completes dGen modeling work.

CED 2019 Revised Forecast
NREL staff runs dGen → PV results delivered to CEC
- dGen contract term completed

NREL open sources dGen using U.S. DOE funding.

***~Oct 2020:** NREL transfers dGen to Energy Commission*

CED 2021 Forecast
DAO staff runs dGen