



California ISO

Grid Modernization in a World of High Levels of Distributed Energy Resources

Peter Klauer

Senior Advisor, Smart Grid Technology

SFAE Workshop 2019

San Francisco

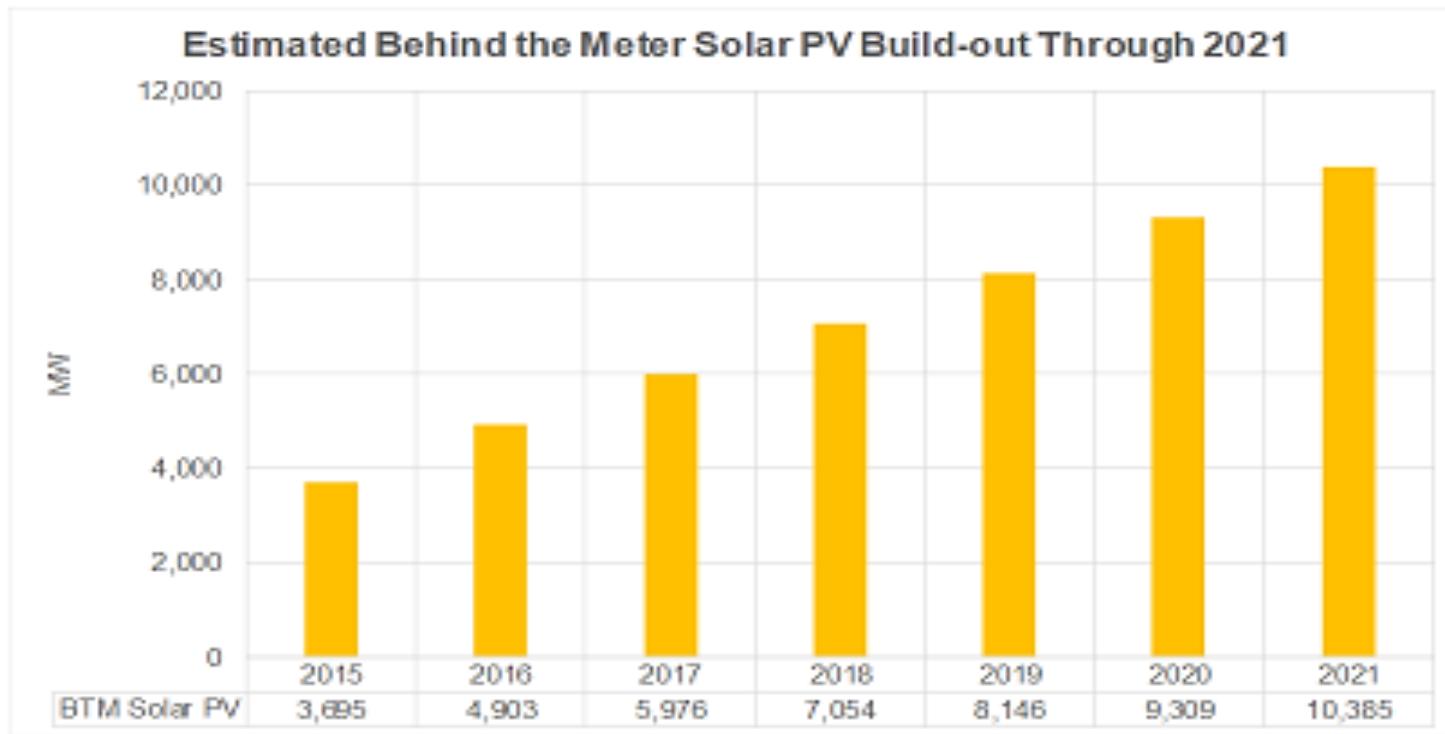
May 9, 2019

Growth of DER is part of a major transformation of the electric industry.

- **The electric industry is undergoing comprehensive transformation characterized by:**
 - The shift to renewable energy resources and away from conventional fossil-fuel generation at all scales
 - “Grid edge” adoption of diverse distributed energy resources and a trend toward decentralized power systems (e.g. microgrids)
 - Decline of the traditional centralized, one-way power flow paradigm and associated revenue models and rate structures
 - Electrification of transportation and other large energy uses
 - New operational challenges for distribution utilities to manage high DER penetration

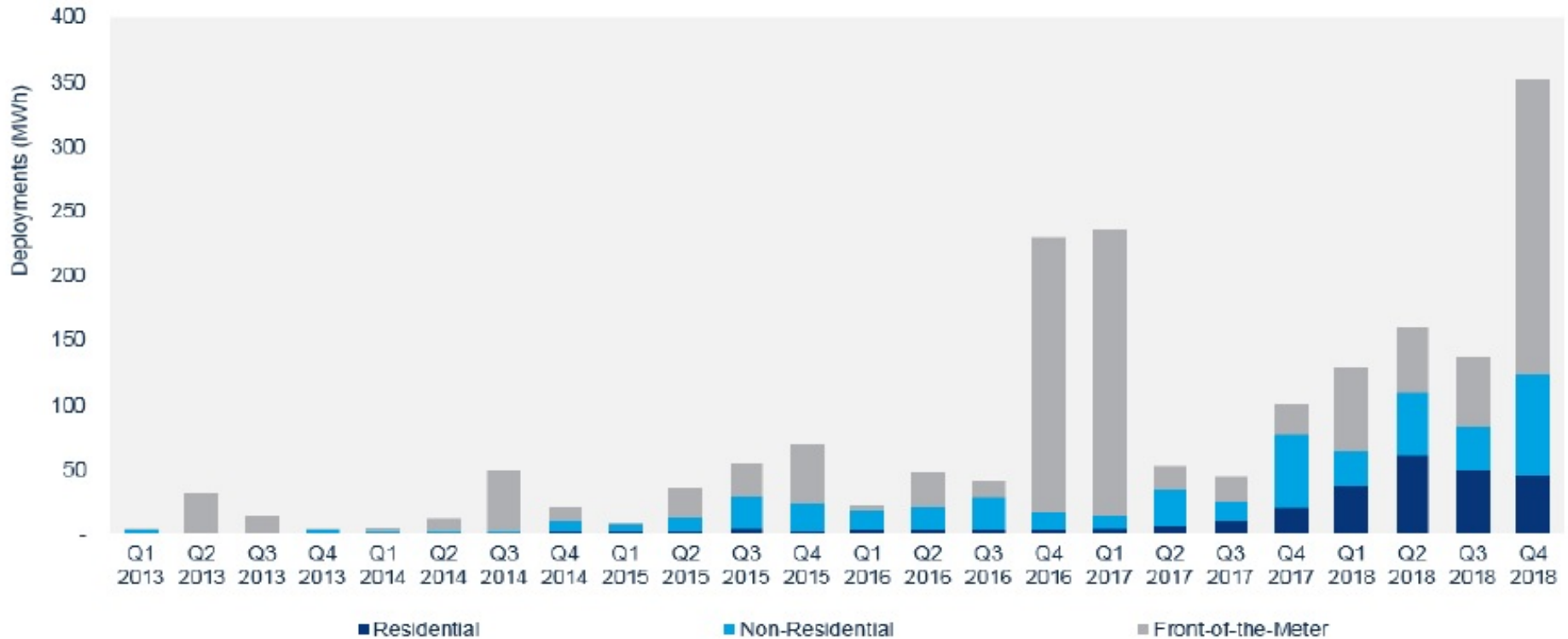
Distributed energy resource growth is transforming our energy supply and how the grid functions.

Behind-the-Meter



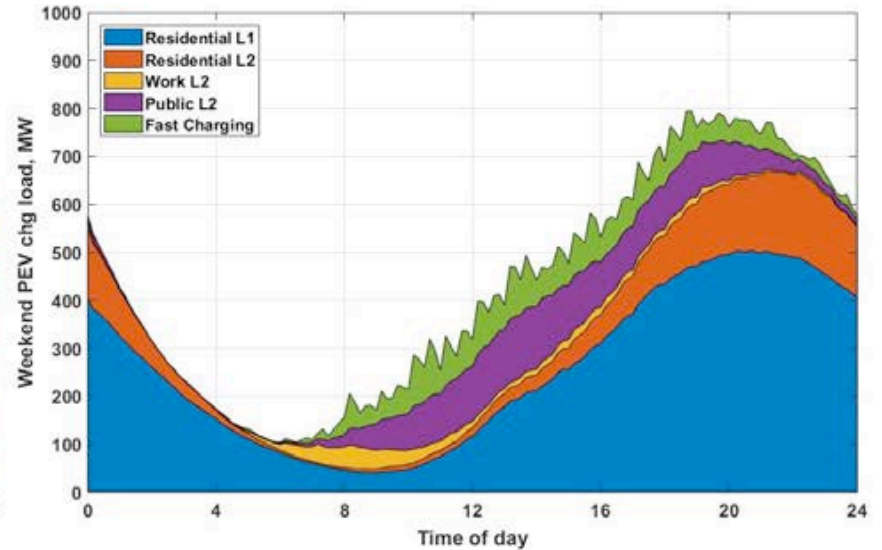
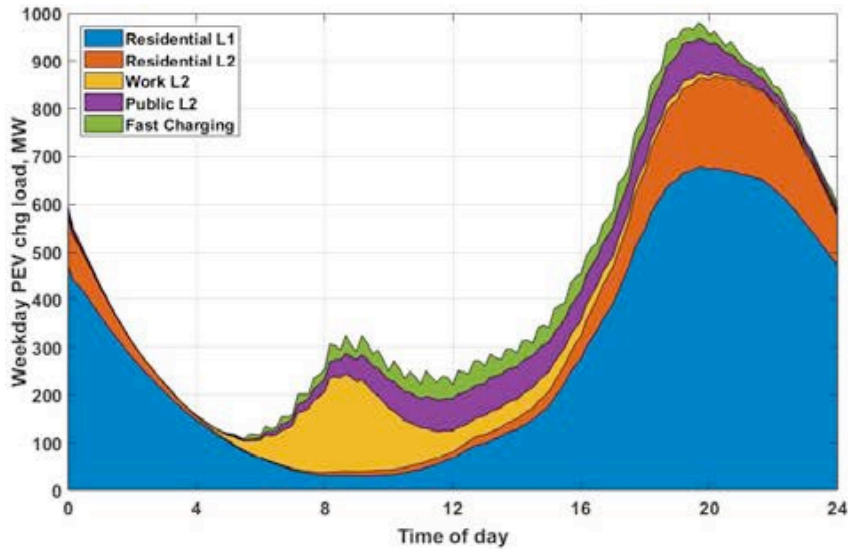
US Energy Storage Deployments

Source: Energy Storage News 3/6/19

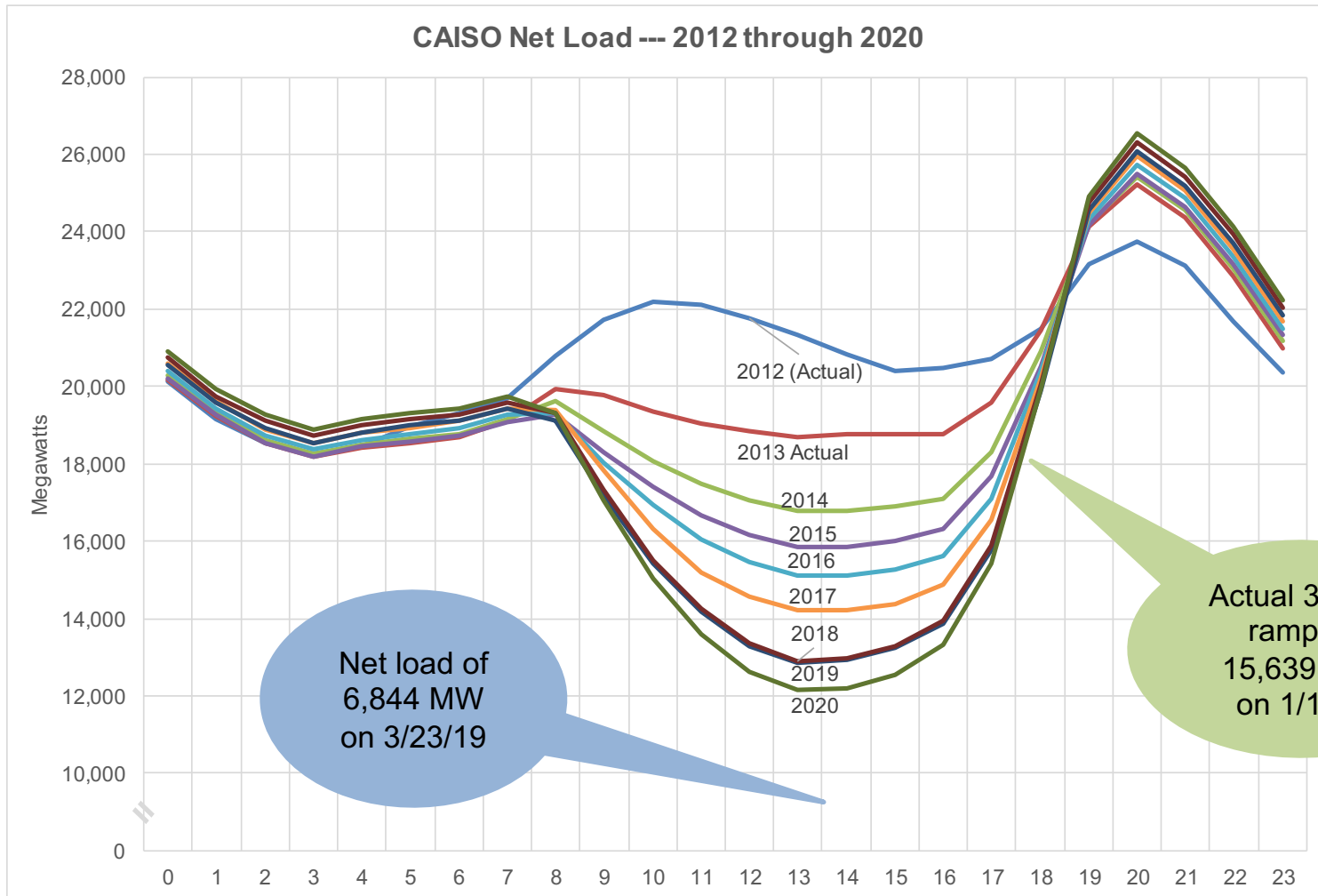


PEV Charging Load Profile Forecast in 2025

Source: CEC-600-2018-001



The duck turns 10 years old: Actual results are approximately four years ahead of the original estimate



A critical problem related to Smart Buildings and Grid Modernization that needs a near-term, collaborative solution is:

The difficulty or inability for Distributed Energy Resources (DER) to engage with and provide services to the utility or the ISO

- Load Curtailment
- Load Management
- Distribution Deferral
- Voltage Support
- ISO Market Services

3-5 Year Effort

A critical problem related to Smart Buildings and Grid Modernization that needs a near-term collaborative solution is:

Demonstrating that Distributed Energy Resources (DER) can be controlled and managed to provide services to the utility or the ISO

- Perform analysis and determine characteristics of potential services
- Implement a control system that allow the DER to respond to grid signals or rate structures

Questions

Stay connected



@California_ISO



Download ISO Today
mobile app



Sign up for the
Daily Briefing at
www.caiso.com