

SOUTHERN CALIFORNIA EDISON RESIDENTIAL STORAGE PROJECT

Mark S. Martinez
Senior Portfolio Manager
Southern California Edison

International OpenADR Symposium
San Francisco, CA
June 11-13, 2019

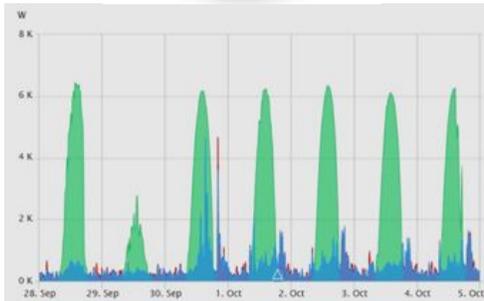
SCE's Emerging Markets and Technologies Program

- Designed to investigate and assess emerging technologies and systems to enhance customer engagement of demand response (DR) and dynamic pricing programs
- Accelerating the availability of cost effective enabling DR technologies and their communication protocols for wholesale market tariffs and retail programs
- Supporting and developing DR protocols and systems for Title 24 new construction Codes and Standards to mitigate GHG emissions through efficient electrification and load shifting
- Authorized by the California Public Utilities Commission and implemented by Southern California Edison through 2022

Emerging Technology Roadmap Framework

- **Foundational technologies** and/or system capabilities that can support existing utility business operations
- **Emerging technologies** that may be required to support near term forecast scenarios for high penetration of new end uses
- Developing future technological assessments for **speculative and or disruptive technologies** and or capabilities
 - These include low cost energy storage deployments “behind the meter” and future distributed ledger transactive energy markets

Market Update: Residential-Sited Storage



- Global Deployment Update – Systems in Operation

- Germany: 110,000 units
- Japan: 70,000 units
- Australia: 35,000 units
 - To install 70k+ units in 2019?

- Leading the Charge

- CA leads residential and C&I markets
- HI a leader in residential also
- NY developing new incentives, permitting still an issue
- MA SMART Program to incentivize solar + storage

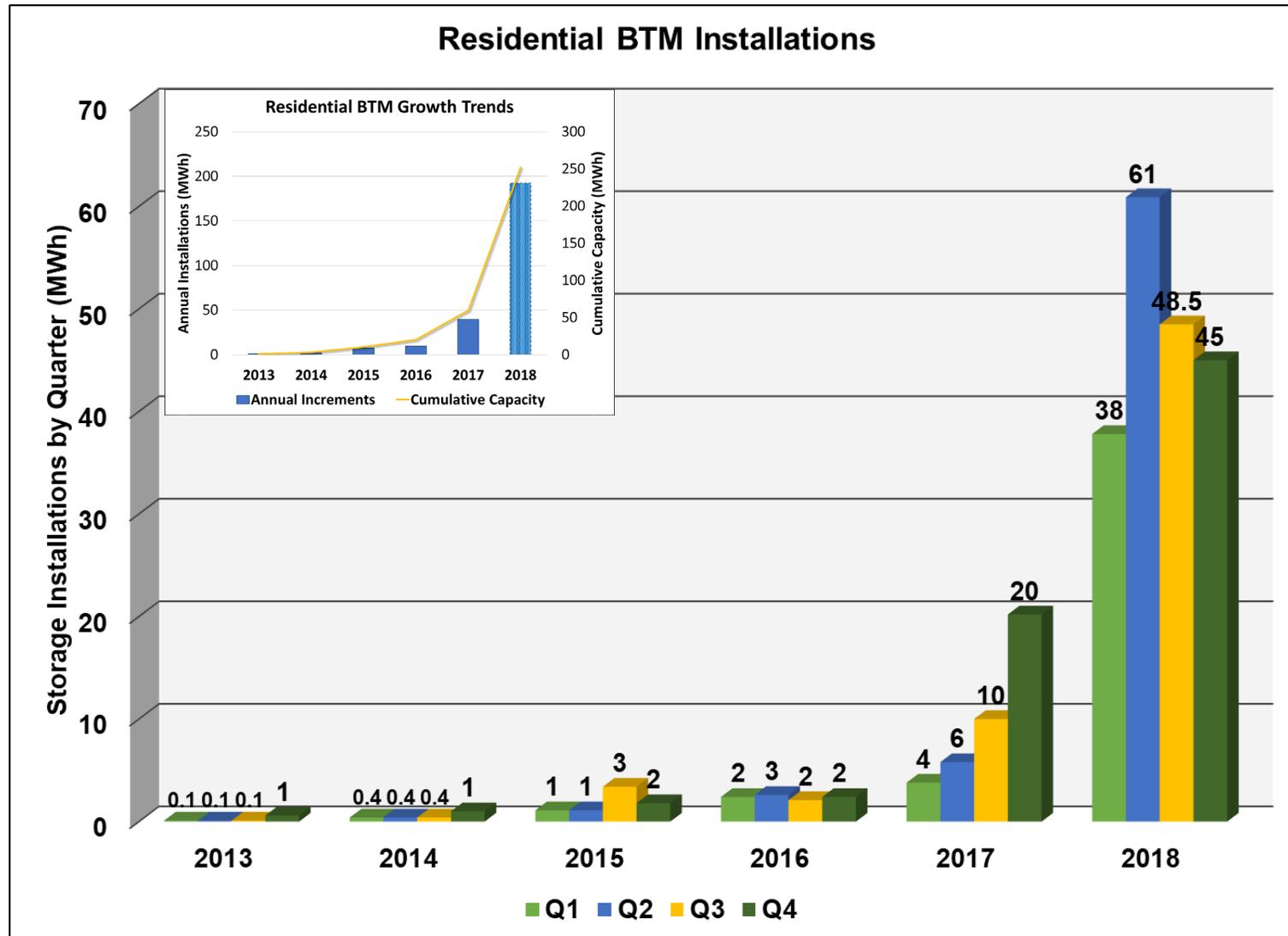
Self-Generation Incentive Program (SGIP) extension refreshes funding to \$800M.



- Key Market Drivers

- Reliability concerns and increased environmental awareness
- TOU rate deployments
- Demand limiting

Growth of Residential Customer-Sited Storage

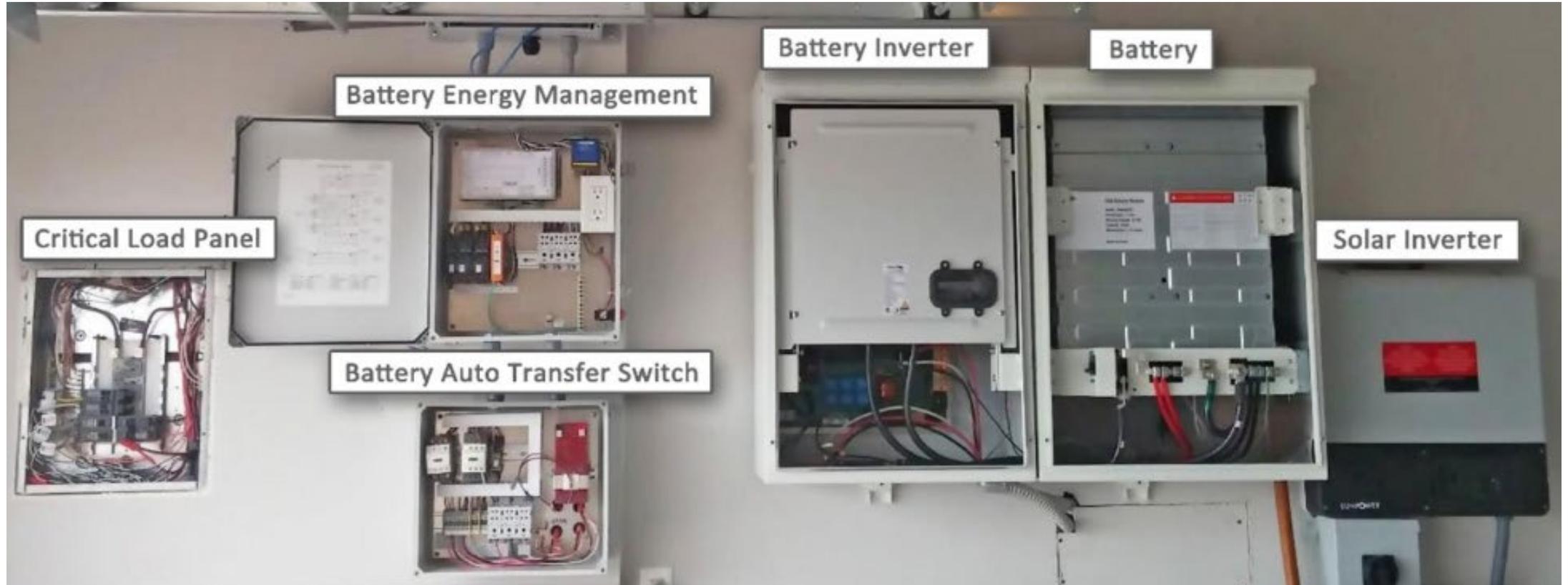


In Q4 2018:

- 123% YOY increase
- 7% QOQ decrease
- California accounts for 50% of deployments in 2018
- Hawaii accounts for 17% of deployments in 2018

(Data Source: U.S. Energy Storage Monitor Q4 2018)

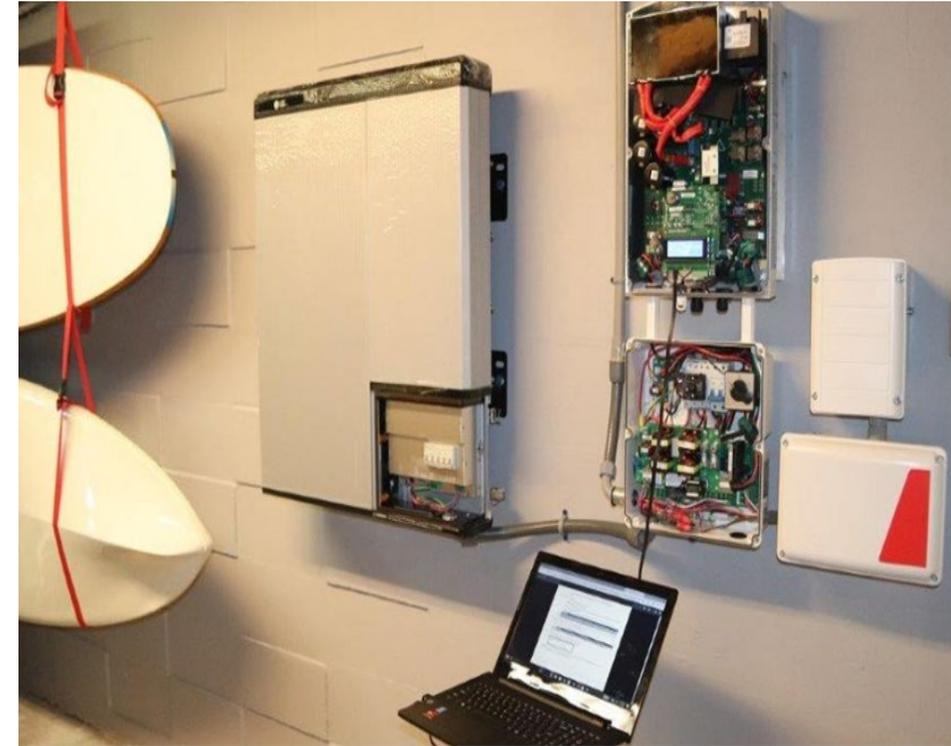
Battery Energy Storage (BES) System Architecture



“It’s not just a battery but an energy storage system”

SCE Residential Storage Project Goals

- Operational research on existing products to provide storage visibility and response based on an OpenADR signal
- Compare and benchmark current, state-of-the-art communications technologies and services for utilities and battery management.
- Assess communications security requirements associated with OpenADR 2.0b
- Field demonstrate how OpenADR 2.0b signals will be used for monitoring and control of multi-family project site and three homes involved with another CEC project.



Test Site #1

Mosaic Gardens Pomona

PIKA 60 kWh battery

34 kW PV

Low Income Multifamily Housing

Mosaic Gardens Pomona

Battery: (4) Harbor Smart Battery SB15P

Inverter: (3) PIKA islanding inverter
X11402

Optimizers: (15) PIKA PV link S2500

Subcontractor: Promise Energy

Current Status:

- Major construction complete; building permit approved.
- Communication lines from batteries / inverters to cloud under construction.
- Awaiting final commissioning of both interconnection and software profiles to assess distribution grid impacts.



RATES

3 sites; 2 with PV, 1 with no generation – grid charge/discharge

LG Battery (10kWh nominal) with SolarEdge Inverters

Single family residential dwellings

CEC Grant to Universal Devices and TeMix; transactive energy management schema

RATES - Moorpark

Battery: (3) RESU 10H

Inverter: (3) SolarEdge 7600A

Subcontractor: Promise Energy

Current Status:

- Major construction complete; building permits approved.
- Rule 21 application in process
- Inverter portals have been transferred to RATES subcontractor for control of batteries via the inverter API.
- Control of batteries to be aligned with virtual tariff simulating real time pricing



Possible Storage Communication Scenarios

1. Vendor and Customer

- BES is used for local services (e.g., manage roof-top solar photovoltaic[PV], mission-critical applications)

2. Vendor, Third-party Service Provider, and Customer

- BES is used, as a managed energy service, for integrated customer systems (e.g., manage solar PV and daily peak load management)

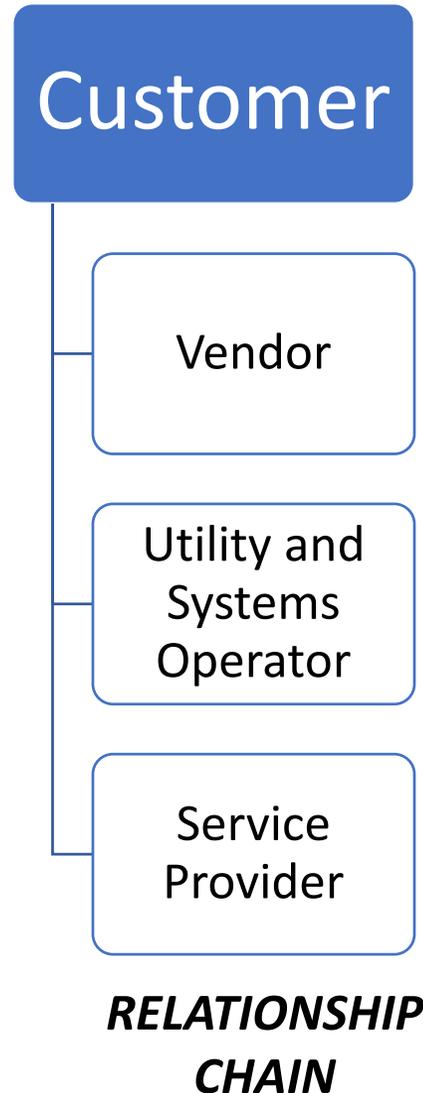
3. Utility and Systems Operator and Customer

- BES is used to directly provide grid services (e.g., day-ahead and ancillary services demand response [DR] programs)

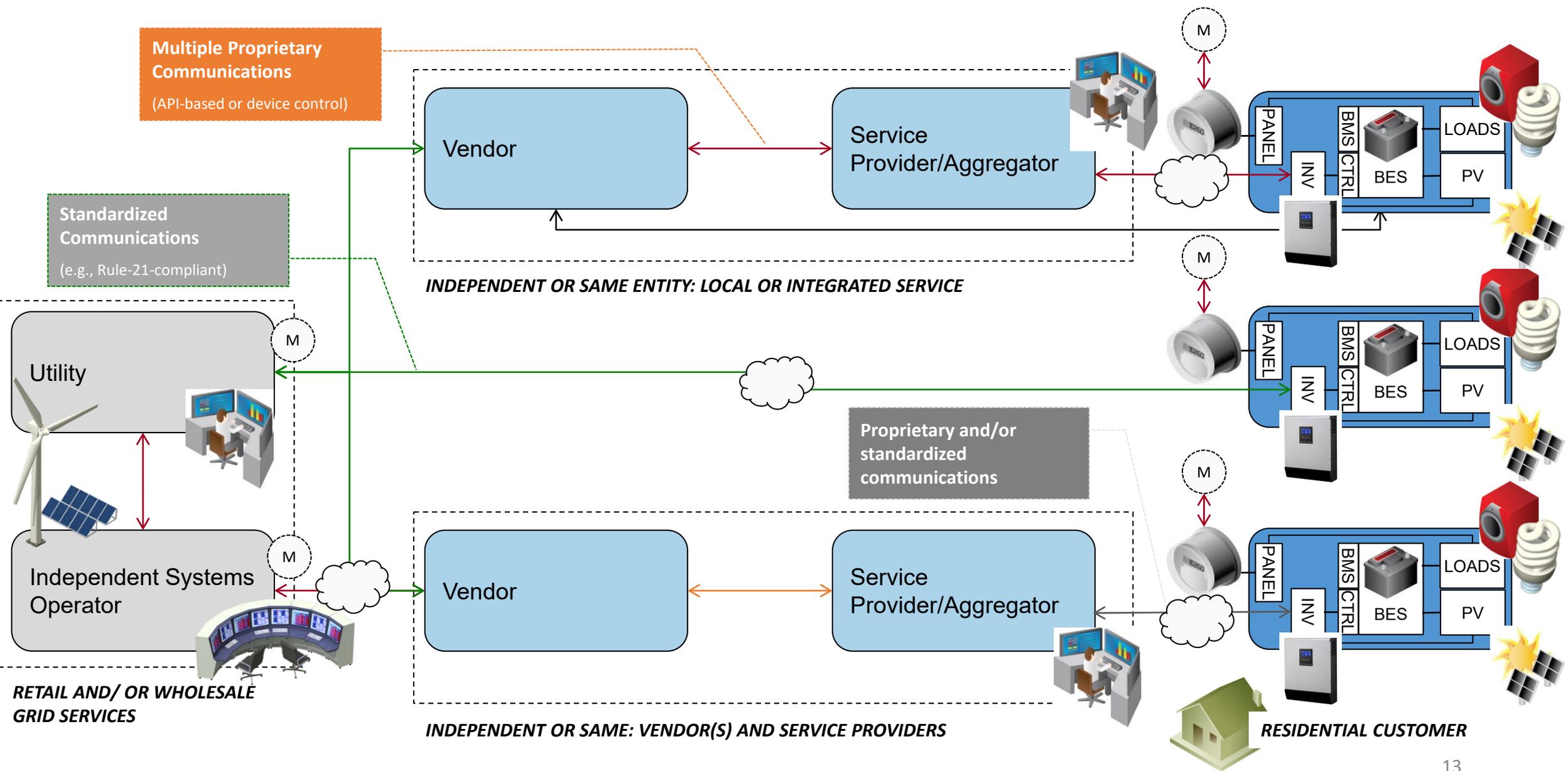
4. Utility, Vendor/Service Provider, and Customer

- BES is used to provide local and third-party grid services

These scenarios represent the present state-of-art deployments. Generally, the scenarios apply to distribution grid-installed BES



Utility, Vendor/Service Provider, and Customer (An Integrated View)



OpenADR – Secure and Open BES Communications

The emergence of energy storage gives us an opportunity to transform BES as a grid resource, located at the “right place” and to provide grid services at the “right time”.

- **Information and communication technologies (ICT)** and services are necessary to support these BES grid resource objectives.
- **Communications** support monitoring and control capabilities through OpenADR 2.0b can facilitate the grid services that the BES systems can provide to electric utilities and grid operators, reliability and with dynamic visibility.
- **Standards-based communications** enhance BES value to provide multiple benefits simultaneously and to seamlessly integrate utility, wholesale market, and third-party systems.

Thank You!

Mark S. Martinez

Senior Portfolio Manager
Emerging Markets and Technologies
Southern California Edison

Mark.S.Martinez@sce.com