sunrun

NCEP: Operational Considerations for Distribution-Level Markets

December 7th, 2020 | ANNE HOSKINS

Agenda

01 | Rolling Blackouts in California

02 | Potential of Distributed Energy Resources

03 | Progress Without Full Coordination

04 | We Must Coordinate

California Rolling Blackouts

RealClear Energy

California Has Plenty of Electricity, It's Just Not Being Used

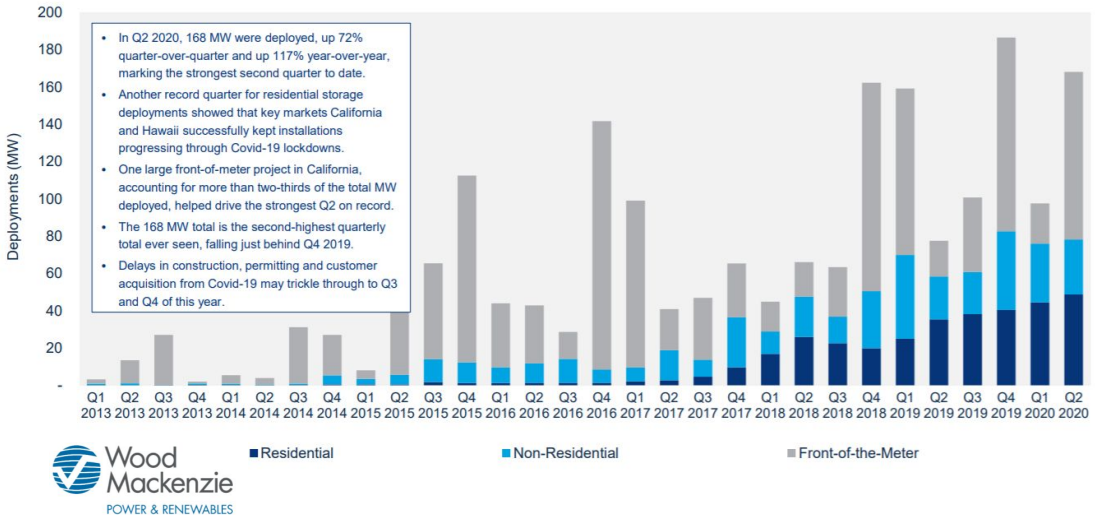
By Jon Wellinghoff

"Across California, more than 30,000 distributed batteries discharged between 3pm and 9pm, on August 14th, contributing 147 Megawatts of capacity to the grid. This made the blackouts less severe. More than 530 Megawatts of distributed batteries exist on the grid, which is more than enough to make up for single point failures from our centralized fossil powered electricity grid."

npr

California Issues 1st Rolling Blackouts Since 2001 As Heat Wave Bakes Western U.S.

Residential Battery Resources: A Pillar of Decarbonization and Wholesale Value

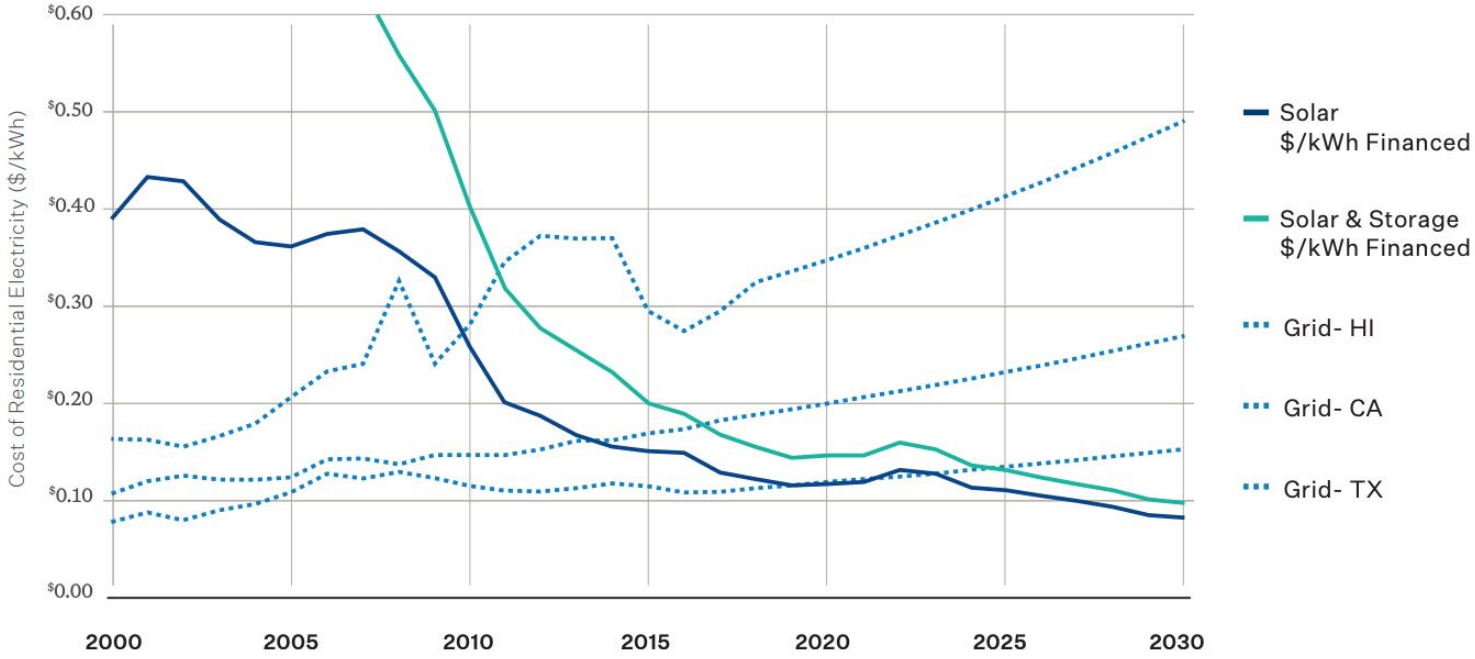


- Q2 2020: 168 MW | 288 MWh
- Q2 2020 was the strongest Q2 on record
- More than 3 million homeowners have invested in fossil generators with higher cost / disadvantages vs. energy storage
- The residential market has shown remarkable resiliency in the face of Covid-19 lockdowns, with California and Hawaii markets driving growth

Wood Mackenzie: "U.S. residential storage market marked its fifth consecutive record-setting quarter."

With Scale the Cost of Technology Declines

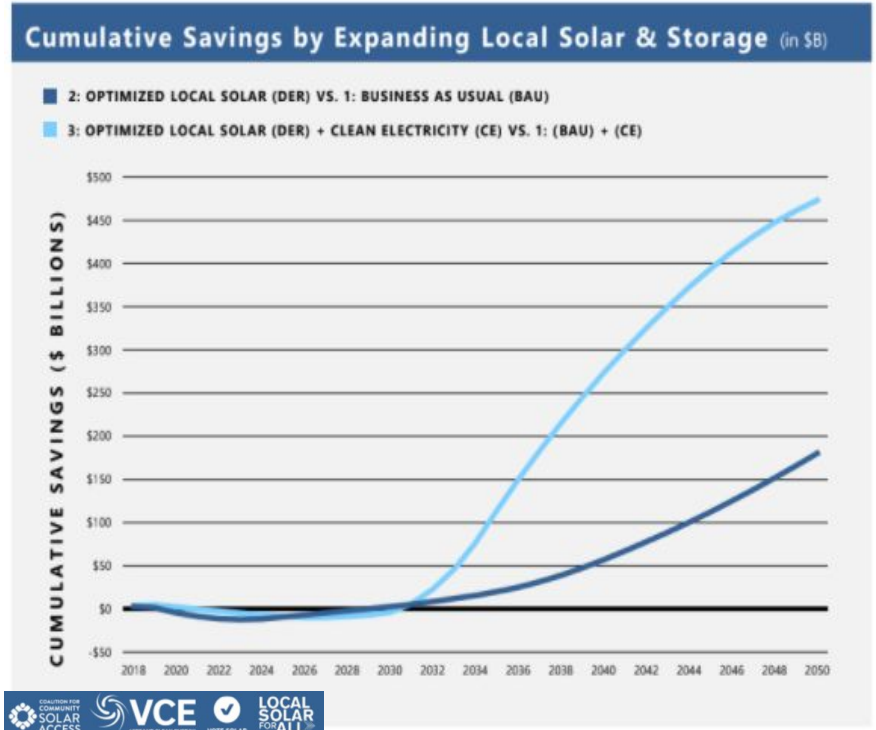
Actual and Predicted Cost of Solar and Batteries Compared to Utility Rates

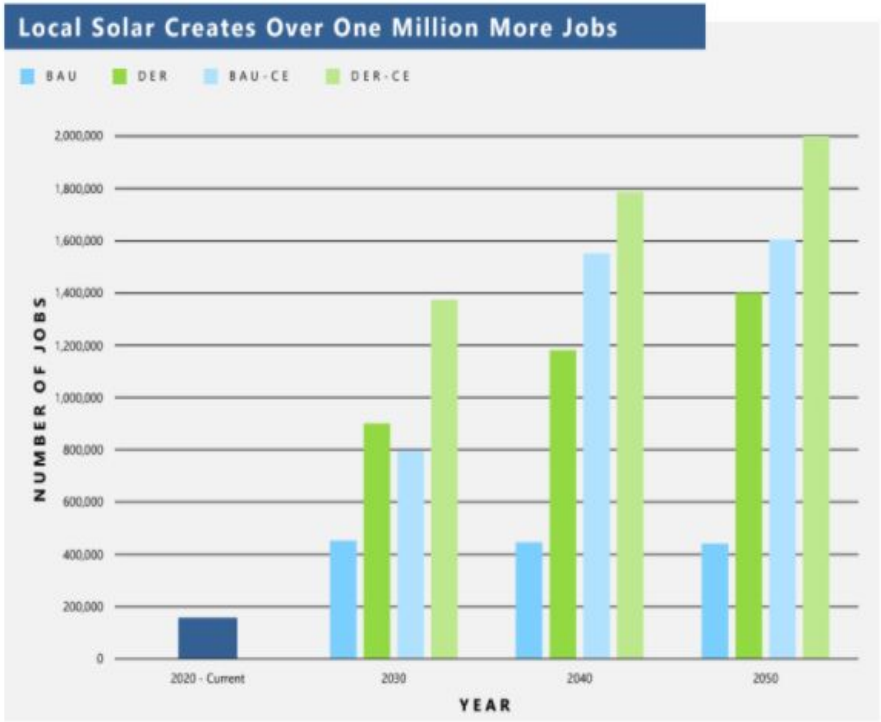


This graph compares the historical and future cost to deliver a kilowatt-hour of electricity to a residential customer from rooftop solar, rooftop solar paired with energy storage, or from the grid in Hawaii, California and Texas. When all-in delivery costs are considered, the trend towards cost advantage of distributed resources becomes clear.[3]

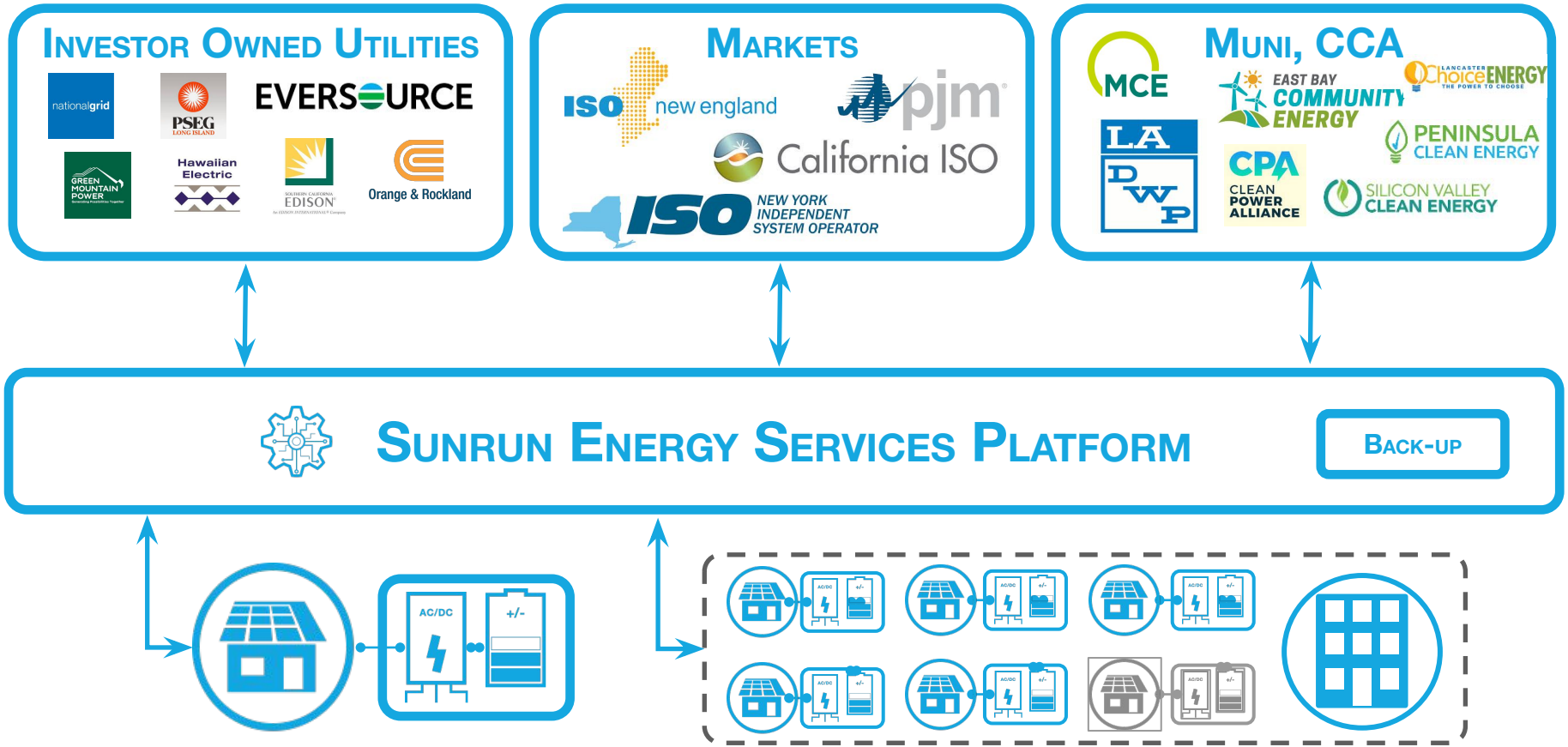
Why Local Solar for All Costs Less: Roadmap for the Lowest Cost Grid

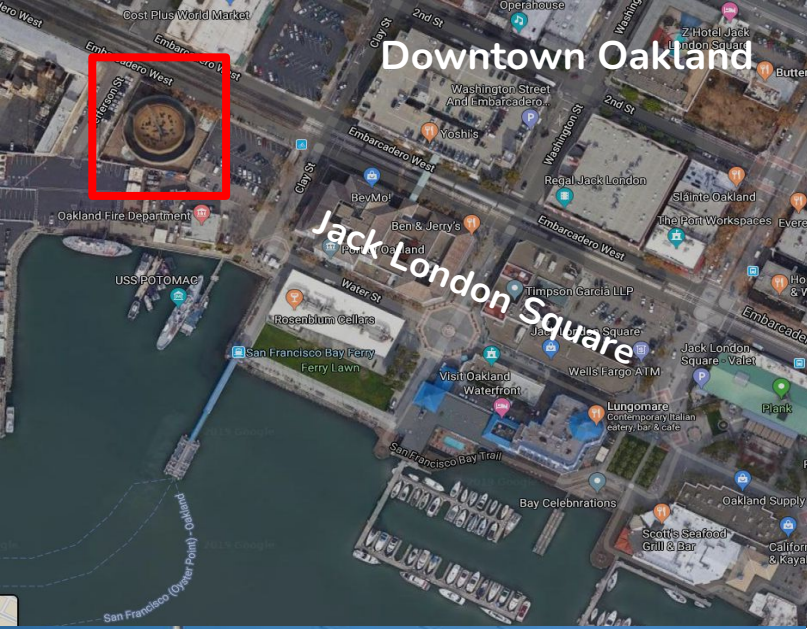
Why Local Solar for All Costs Less: Roadmap for the Lowest Cost Grid





Battery Sharing Economy for Customer & Grid





Replacing Gas-Peaker Plants with VPPs

Case Study: Replacing Oakland Peaker Plant

- Sunrun is helping to replace 1970s jet fuel-fired power plant, in West Oakland, CA

Communities most impacted by Oakland Power Plant will benefit from clean energy transition

- Sunrun will install rooftop solar and battery systems on more than 500 low-income housing units.

- Environmental justice community will gain bill savings, resilience, lower pollution

HECO/OATI Grid Services Program: 1,000 Sunrun Brightboxes in a Virtual Power Plant

Capacity Grid Services

Day-ahead notification

Up to 4 hour duration

Dispatched by HECO

Availability: 5 - 9 pm

Fast Frequency Response

Autonomous, deployed in 10 cycles

Triggered locally at 59.7 Hz

30 min or until grid stabilized

24/7 availability

Kukui Hele Pō

1,000 Sunrun Brightbox Customers

$200 enrollment incentive

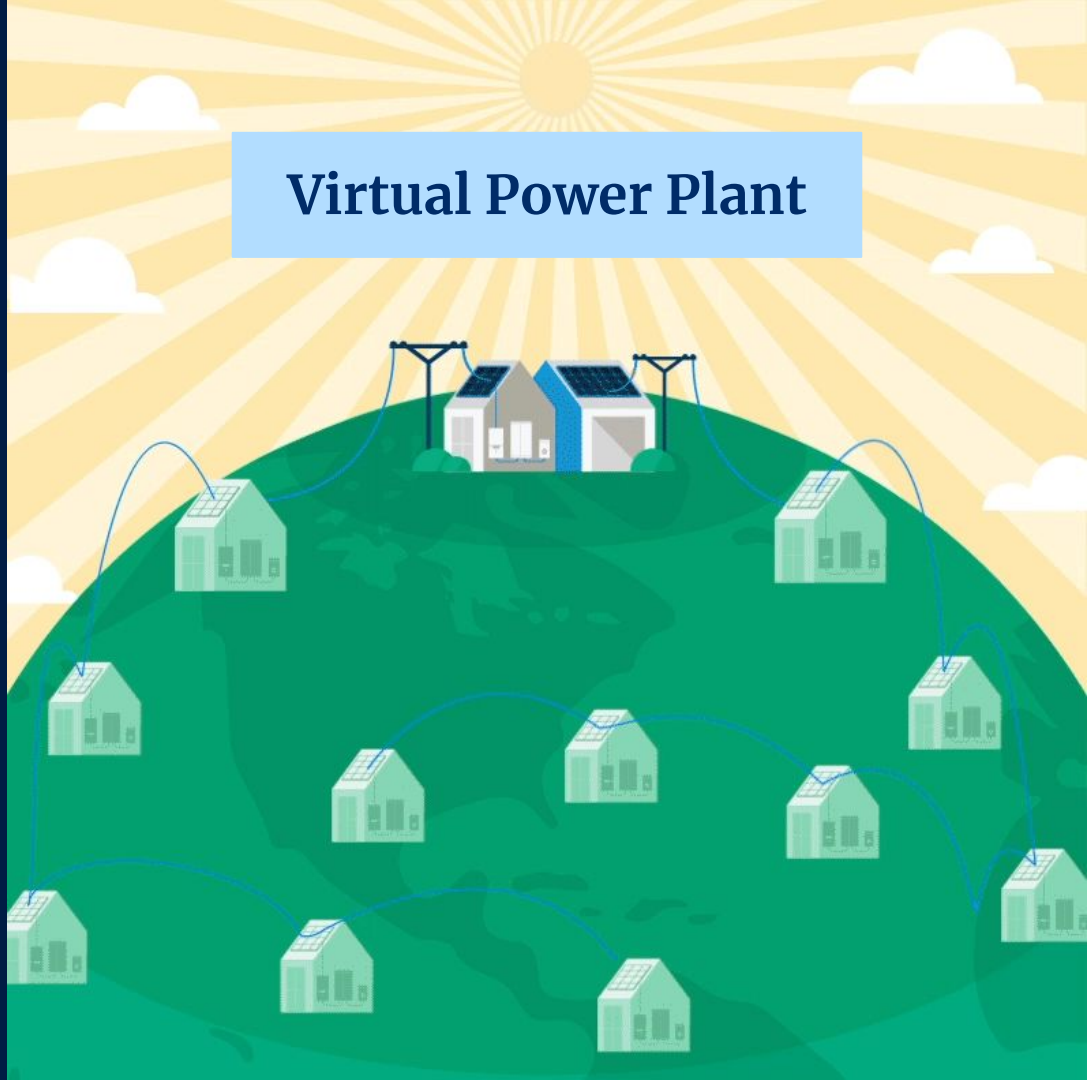
$50 donation to ‘Aha Punana Leo Charity

Customer bill credits

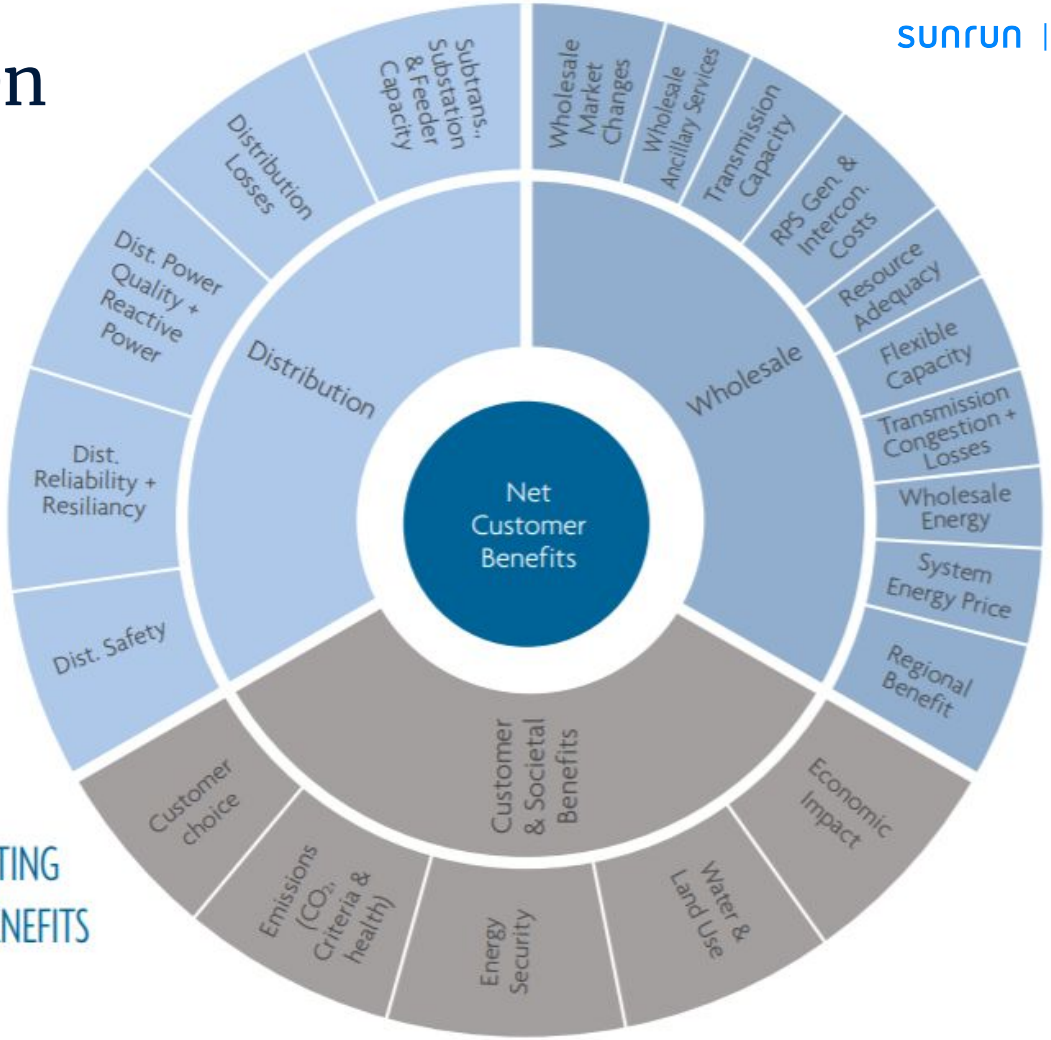
Sunrun’s Partnership with SCE

- Thousands of Sunrun batteries at people’s homes will provide five megawatts of capacity to the grid during heat waves or other times the grid is strained.

- The same solar-powered home batteries also provide reliable backup power to households if the power goes out.



Multiple Benefits When Coordinated



GRIDWORKS

FIGURE 4.

DER VALUE COMPONENTS RESULTING IN CUSTOMER NET BENEFITS

MORE THAN SMART

Transmission & Distribution Operations Coordination

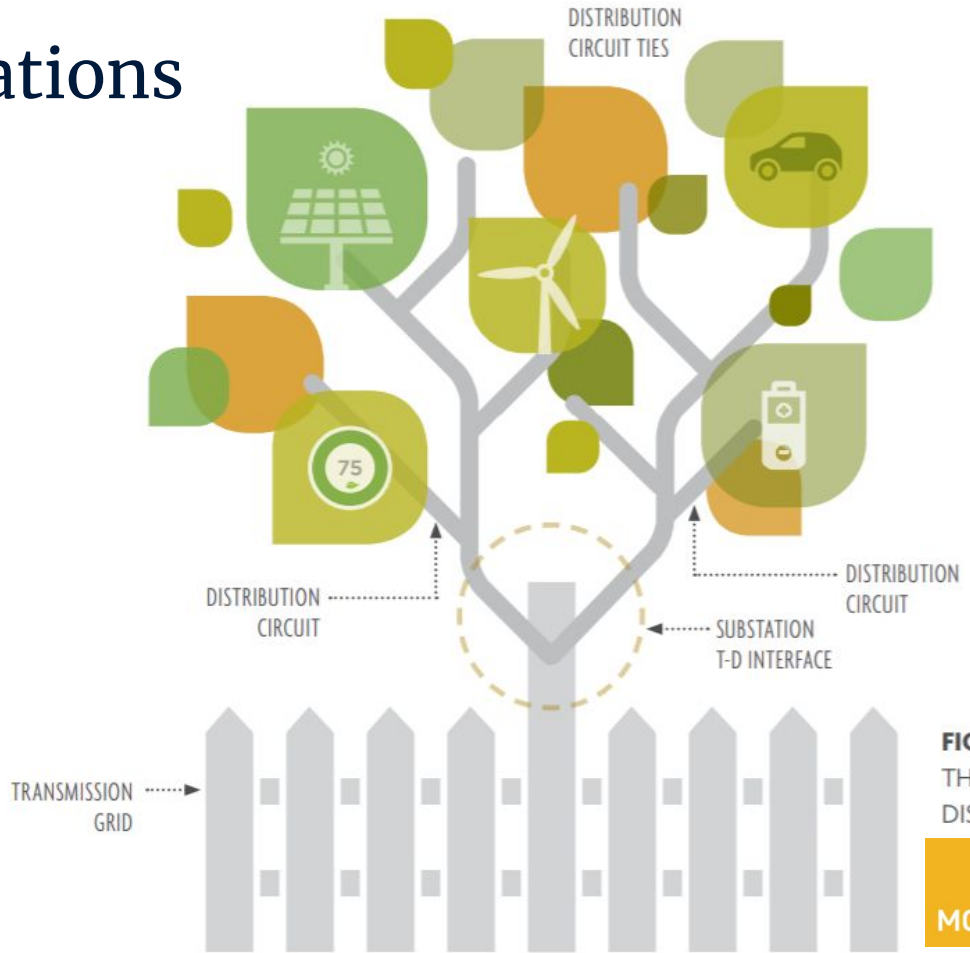
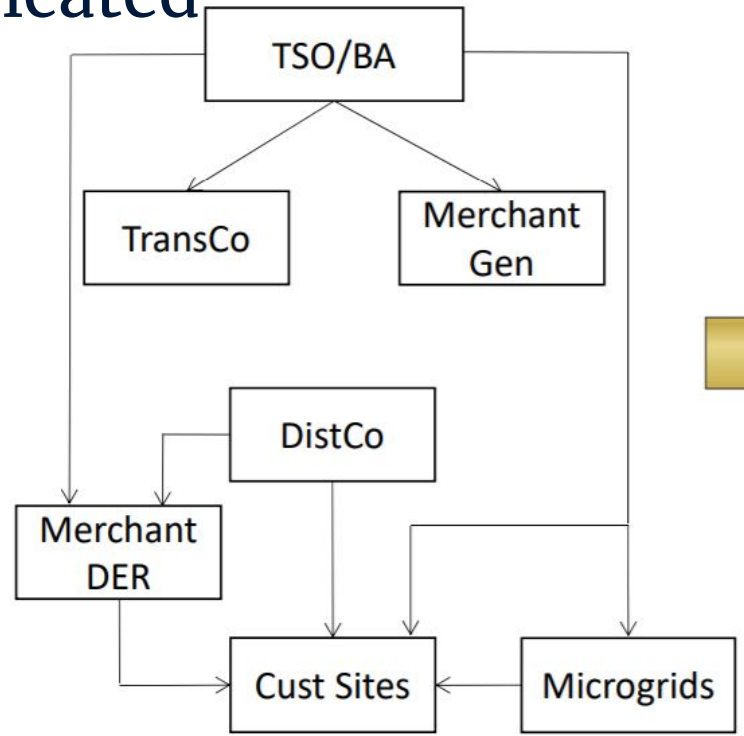
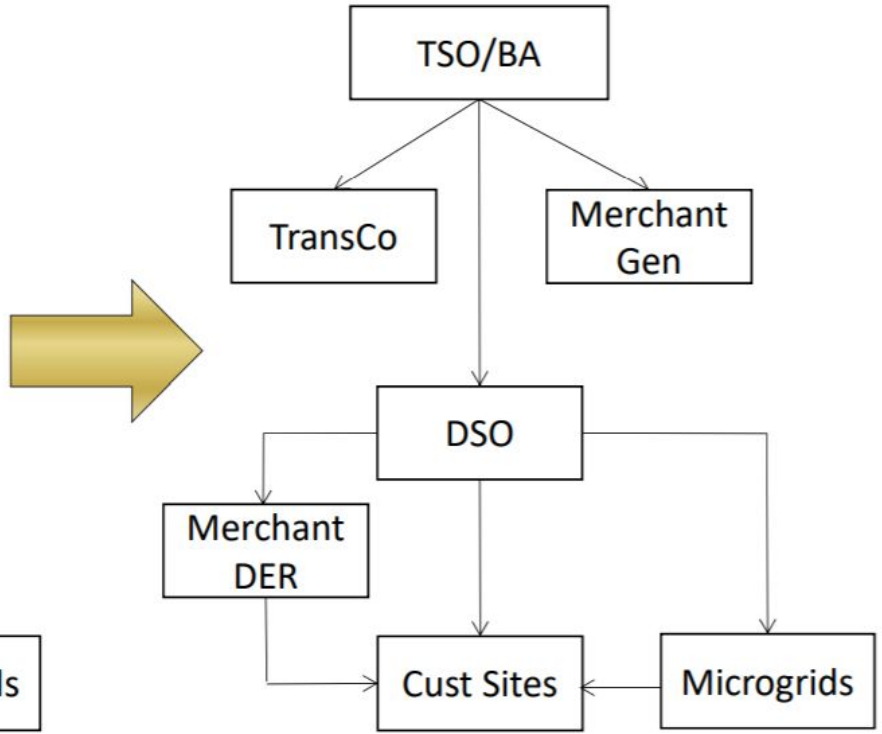


FIGURE 1. STRUCTURE OF THE TRANSMISSION AND DISTRIBUTION SYSTEMS

MORE THAN SMART

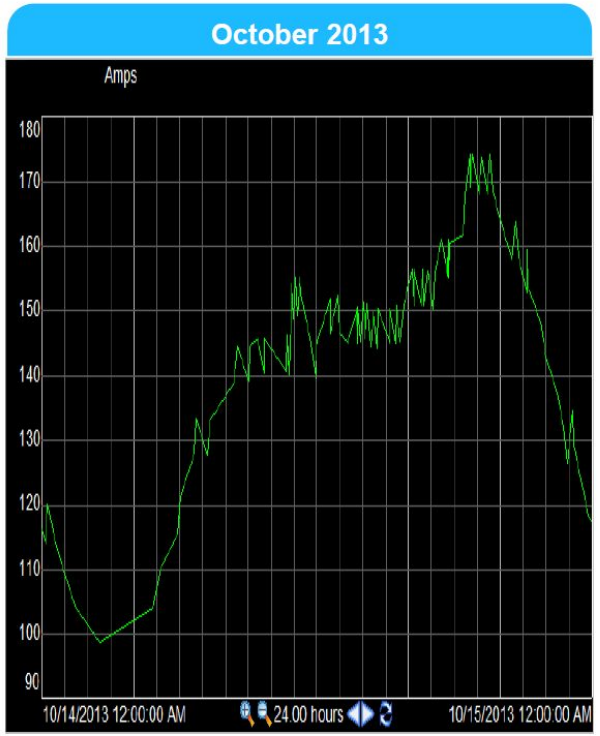
Market Service Coordination is Complicated



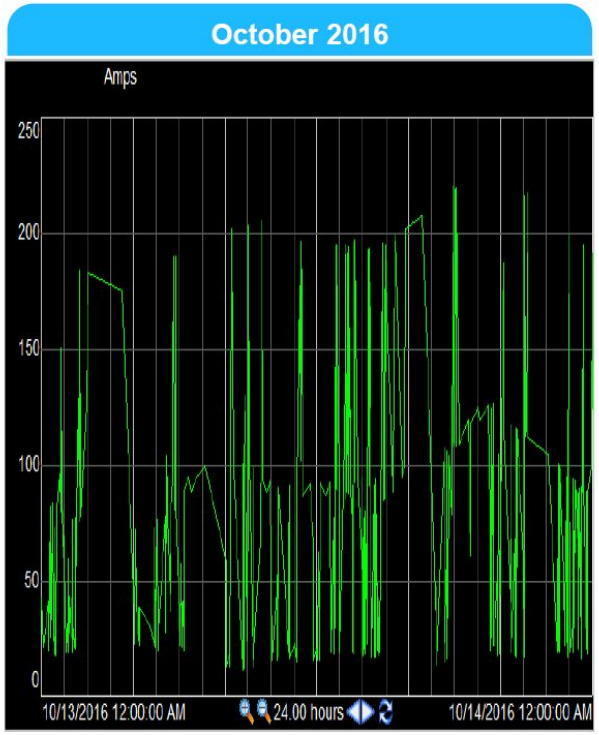


The real world effects of Total TSO model

"Before" and "After" Grid Impacts as result of DER Market Participation



"Before"



"After"

The Answer: Total DSO Coordination

Distributed System Operators (DSO) Management

- This model ensures that power quality and reliability are maintained within existing utility standards.
- This model coordinates load during both normal and abnormal grid conditions and facilitates load shaping and grid services.

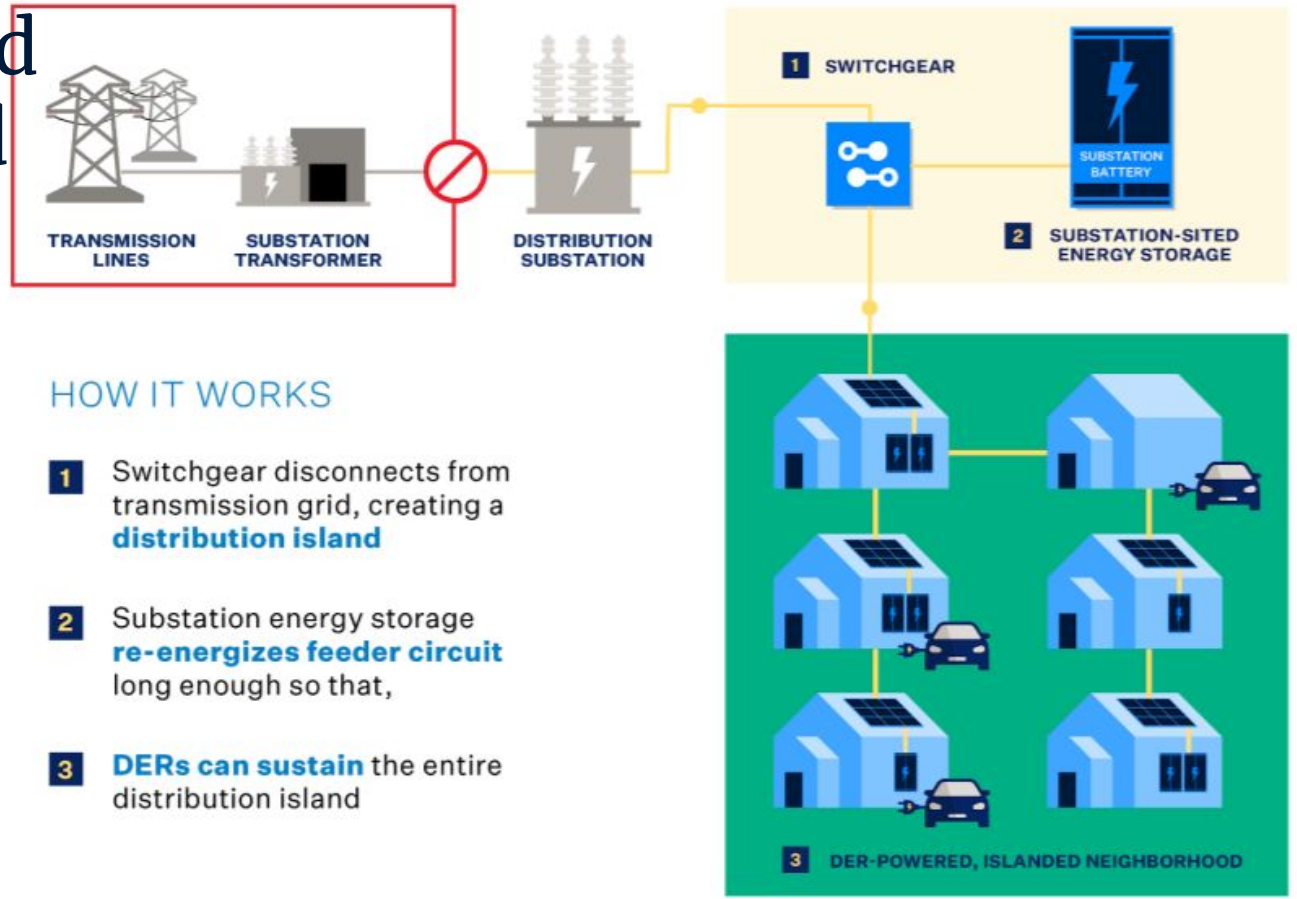
California

- Recent CPUC investigation align with a programmatic DSO platform provider approach
- Order Instituting Rulemaking to Establish Policies, Processes, and Rules to Ensure Reliable Electric Service in California in the Event of an Extreme Weather Event in 2021.
- CPUC staff proposal: Distributed Energy Resource Deferral Tariff

New York

- The NY PSC is leading a “Market Design and Integration Working Group” along with NYSERDA, NYISO, IOUs and DER developers to:
  - Determine how to coordinate DER operations across IOUs, the NYISO and developers for bulk and distribution services
  - Consider roles & responsibilities and their dis/advantages
  - Analyze FERC orders 841 & 2222
- Working group recommendations will inform PSC orders, NYISO rules, etc.

Next Evolutions: Microgrids and Neighborhood ~~Grids~~



HOW IT WORKS

1. Switchgear disconnects from transmission grid, creating a **distribution island**
2. Substation energy storage **re-energizes feeder circuit** long enough so that,
3. **DERs can sustain** the entire distribution island

Thank You.


@Aehoskins

Anne.Hoskins@sunrun.com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