DER and Customer Integration Challenges

Mark McGranaghan
Vice President, Innovation
mmcgranaghan@epri.com

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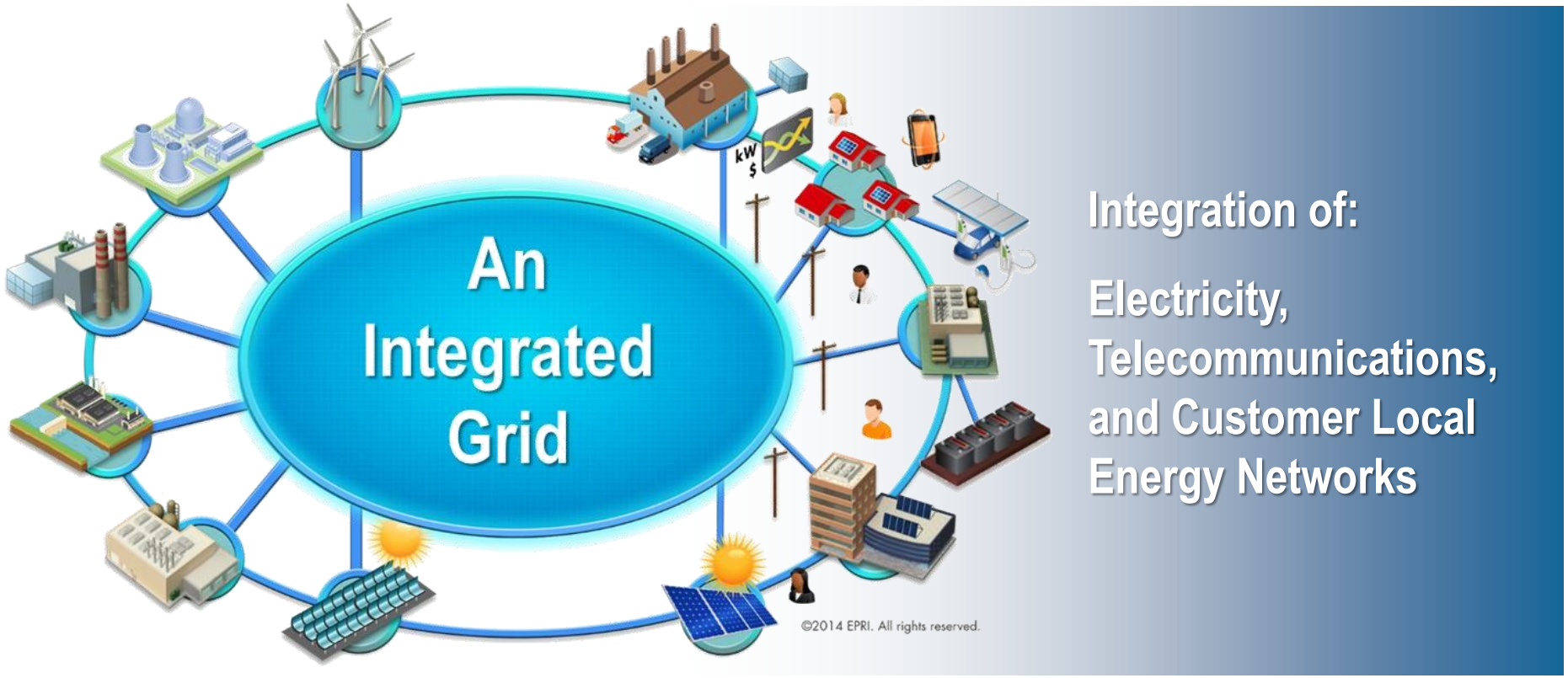
The Vision of an Integrated Grid



The Integrated Grid Enables Local Energy Optimization to be part of Global Energy Optimization

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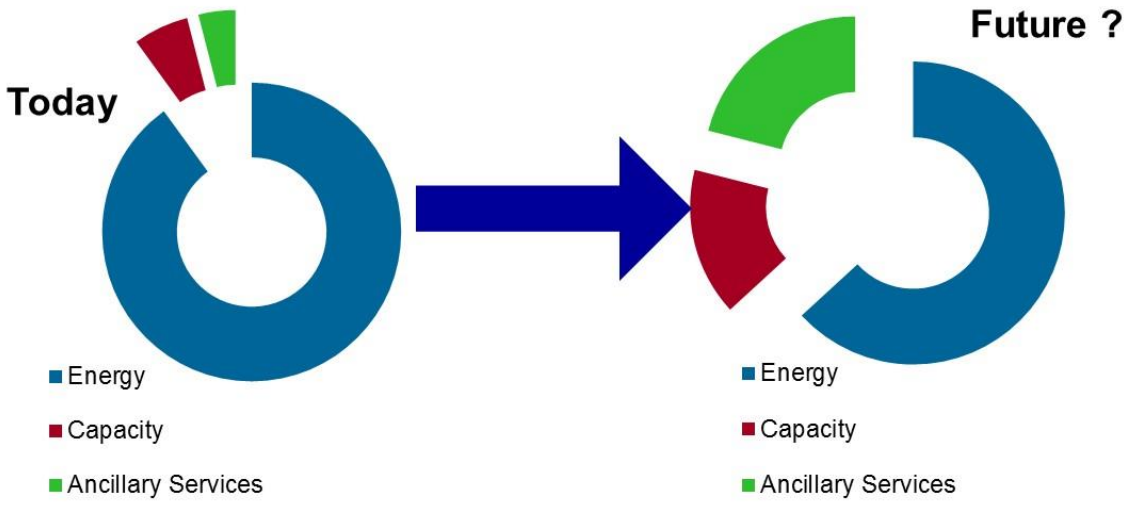
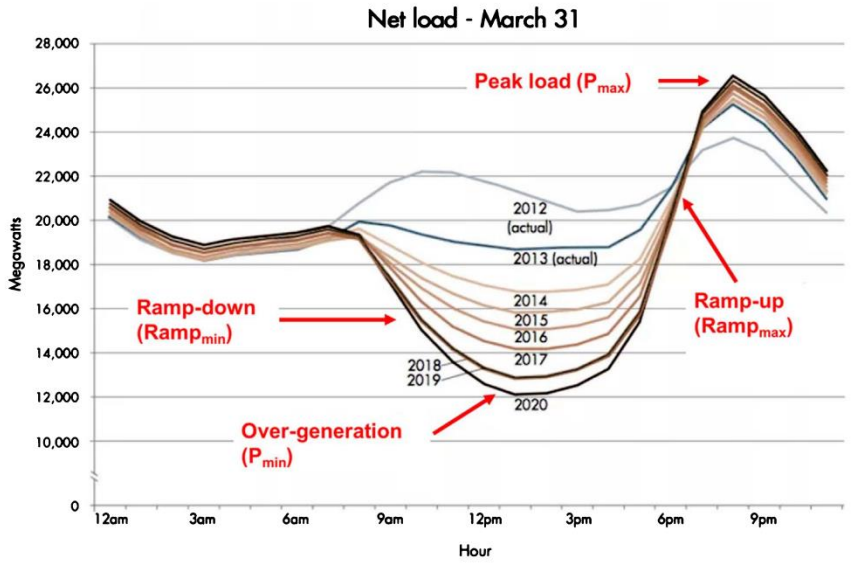
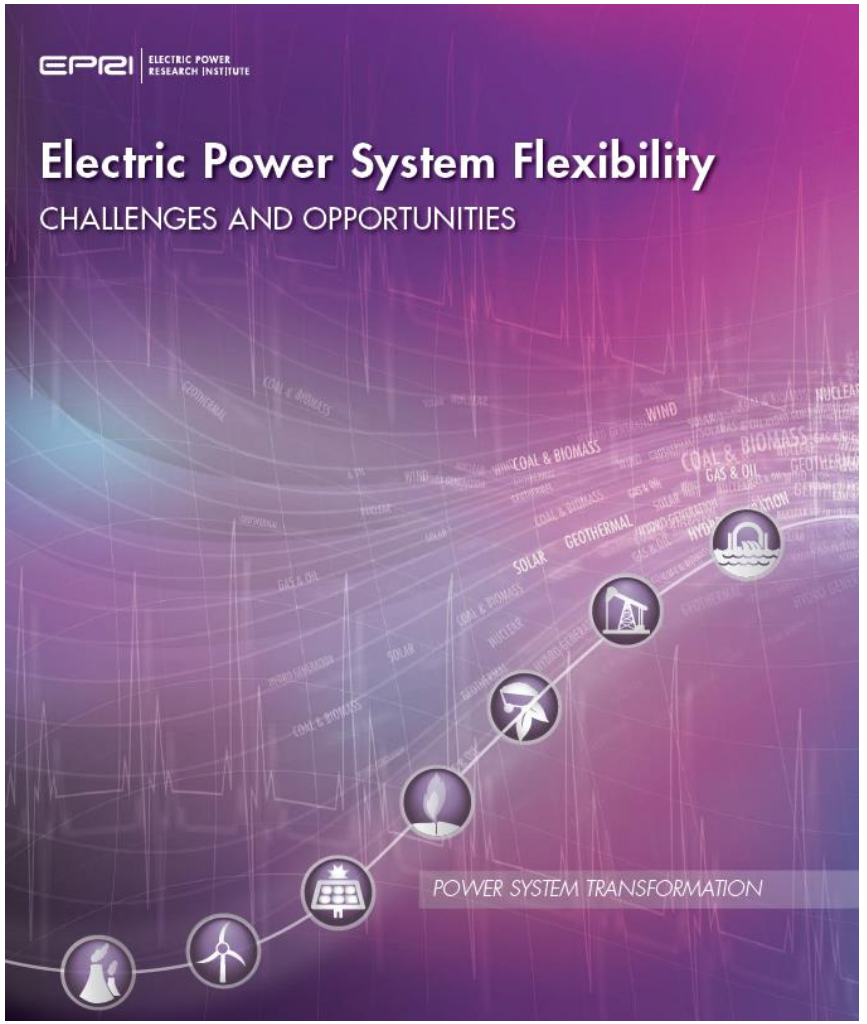
The need for flexibility and non-wires alternatives become new drivers







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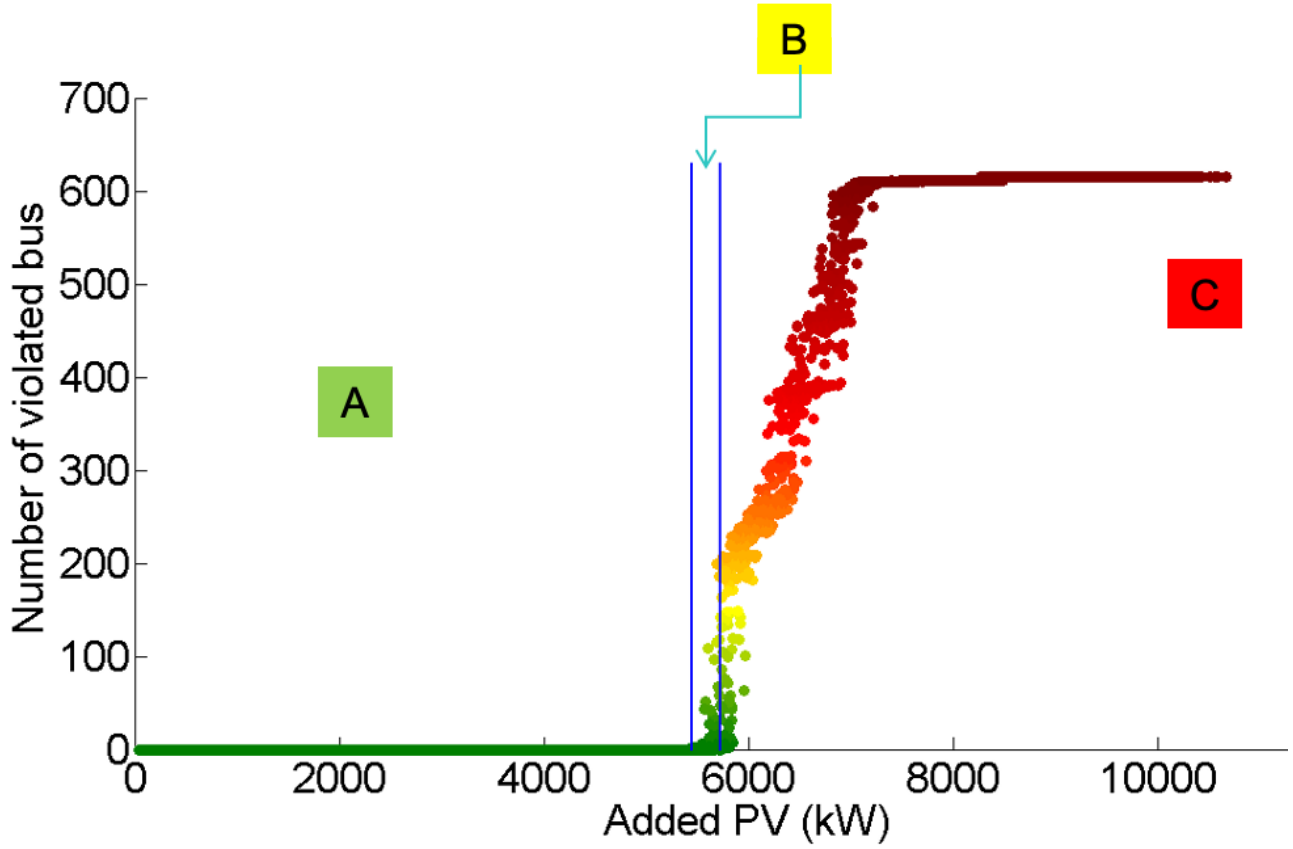
DER – Moving from Hosting Capacity to Integration

A- All penetrations acceptable regardless the location

B- Some penetrations are acceptable, site specific

C- No penetration acceptable regardless of the location



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Taking advantage of smart inverters

- **Monitoring and Scheduling**: These are basic functions that allow an operator to make adjustments and collect information from the inverter.
- **Frequency Support**: These functions provide frequency support to the grid.
- **Real Power Support**: These functions provide real power support to the grid.
- **Power Factor Support**: These functions provide VAR support to the grid.
- **Voltage Support**: These functions provide voltage support to the grid.

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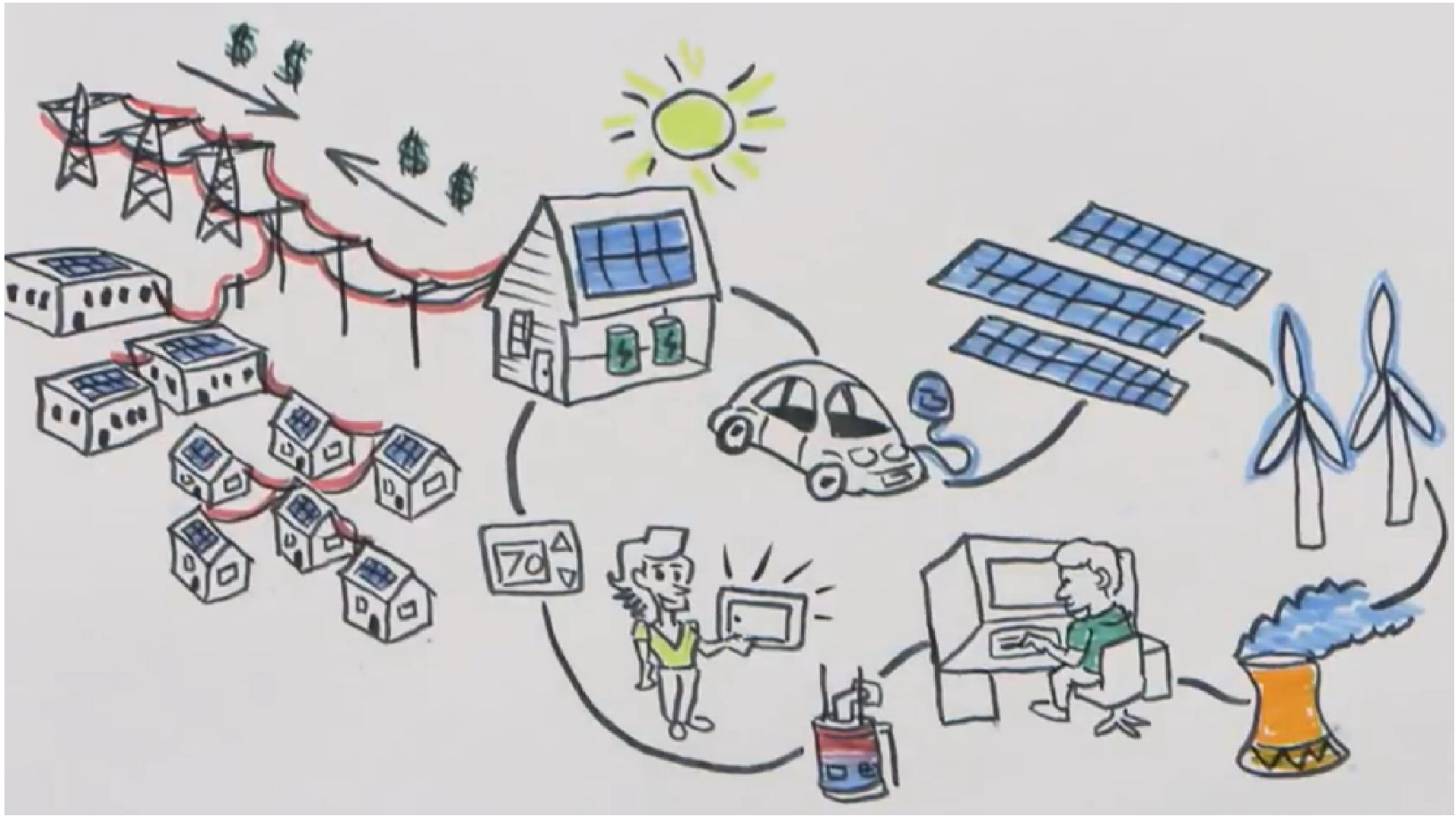
The Shared Integrated Grid – Making the Customer part of the Solution



https://www.youtube.com/watch?v=PknNL0TnCxQ&feature=youtu.be

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Examples of Local Energy Optimization

Alabama Power Smart Neighborhood (Birmingham)

ESB Networks – The Dingle Transition Initiative

Australian Smart Tech Home of the Future

Exelon Com Ed – Bronzeville Smart Community

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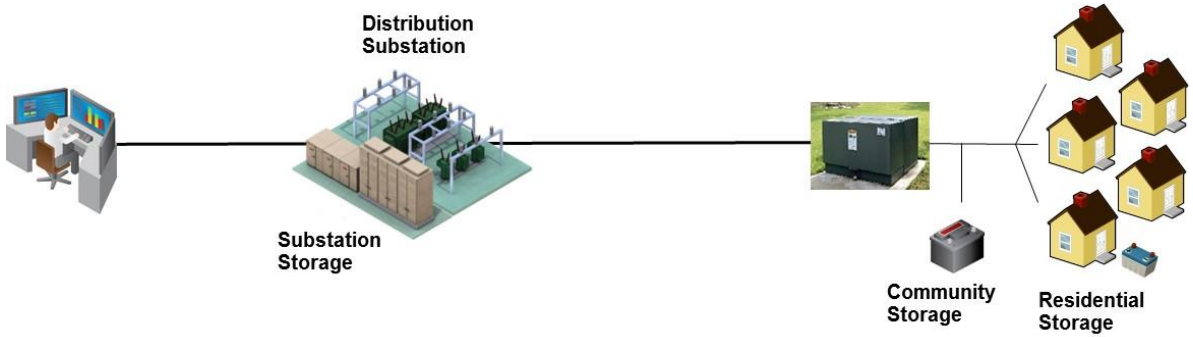
Energy Storage – Taking Advantage of Multiple Value Streams

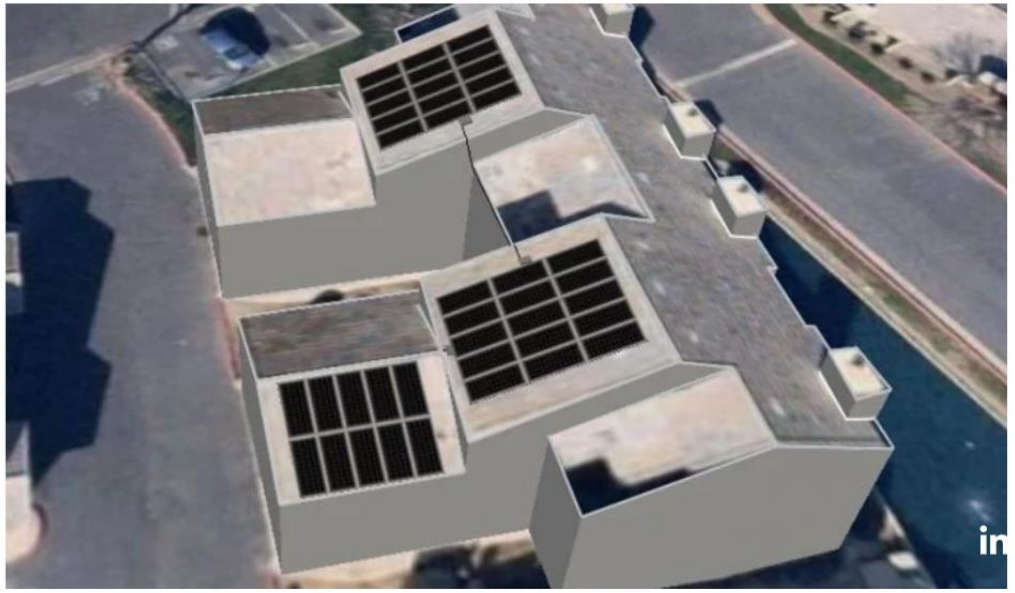


Sonnen Brings Virtual Power Plants to California Apartment Complexes

The German battery system vendor and its real-estate partner Wasatch Group see grid services as key to multifamily solar-storage.

JEFF ST. JOHN

AUGUST 27, 2020



Fresno apartment complex Heron Pointe is a test case for multifamily solar-battery investments. (Credit: Soleil Energy/sonnen)

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PV and Energy Storage – A New Building and Community Paradigm

12/05/2018

gtm: Solar Grid Edge Storage Wind More Trending Podcasts Resources

RESIDENTIAL SOLAR

California's Rooftop Solar Mandate Wins Final Approval

The California Building Standards Commission has signed off on the residential solar mandate—a first of its kind for the nation.

JULIA PYPER | DECEMBER 05, 2018

https://www.greentechmedia.com/articles/read/california-solar-roof-mandate-wins-final-approval#gs.YKRXfvRW

02/07/2019

gtm: Solar Grid Edge Storage Wind More Trending Podcasts Resources

SOLAR-PLUS-STORAGE

Sunrun Wins Big in New England Capacity Auction With Home Solar and Batteries

The 20-megawatt contract is small by power plant standards, but marks a crucial proof point for the theory that clean, decentralized energy devices can deliver reliable power to the grid.

JULIAN SPECTOR | FEBRUARY 07, 2019

https://www.greentechmedia.com/articles/read/sunrun-wins-new-england-capacity-auction-with-home-solar-and-batteries#gs.9tPAirkV

- Resiliency
- Self-consumption
- Energy bill savings (demand charge, ToU)
- Opportunity to provide grid services – increasing solar value proposition

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EV Integration

EVs Could Save California Billions in Energy Storage Investment

Strategic EV charging could ease the “duck curve” more than California’s energy storage mandate, according to DOE researchers.

LACEY JOHNSON

MAY 29, 2018

EVs could offset up to $15.4 billion in energy storage costs.

SoCal Edison Will Deploy 38,000 EV Chargers in Largest Utility Program of Its Kind

New grid infrastructure investment will total $436 million and focus on multifamily buildings and underserved areas.

JULIAN SPECTOR

AUGUST 28, 2020

SCE now has approval to spend more than $800 million on all its EV charging investments. (Photo Credit: SCE/Carollyn Nguyen)

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DERMS – Integrating with Distribution Operations

Distributed Energy Resources Management Systems (DERMS) Working Group

Value Proposition:

- To better understand the incremental benefits of DERMS
- To develop consistent utility requirements that will be beneficial to the marketplace
- To identify potential gaps in communication standards for DER integration

Tucson Electric Power and EPRI collaborate to study how distributed resource devices might be collectively used to fulfill system needs dynamically.

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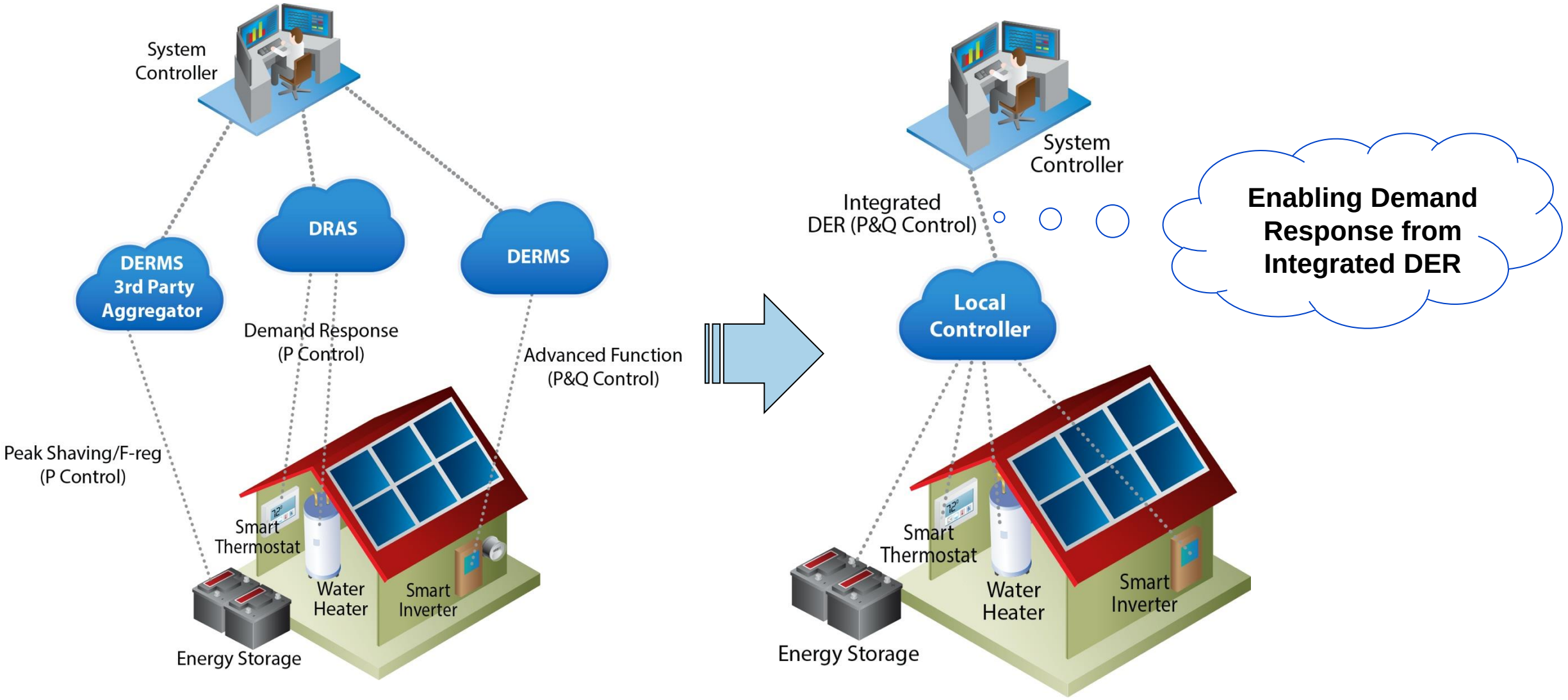
DER – Today vs Tomorrow



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Summary of challenges we have to address

1. **Architecture** for integration of resources at the customer and community levels
2. Shared **communication infrastructure** with **cyber security**
3. **Market and regulatory constructs** for flexibility and capacity
4. **Models and tools for planning** – Customers, Distributed Controls, Non-Wires Alternatives
5. Integration of Distributed Energy Resource Management Systems **(DERMS)** with Distribution Operations
6. **Platforms that integrate customer resources with distribution planning and real time operations**
7. **TSO/DSO coordination** – both planning and operations

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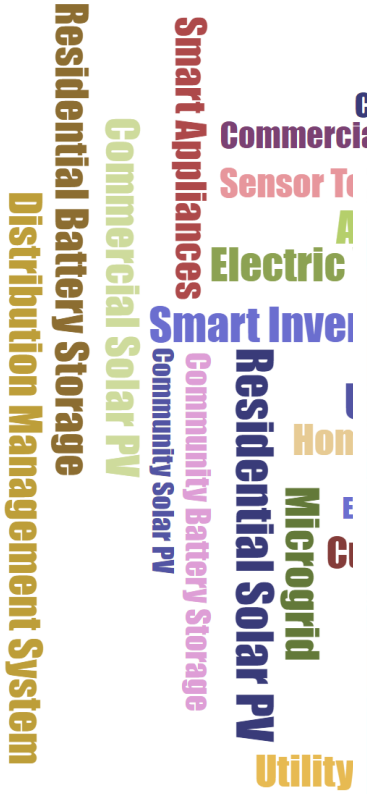
Tracking Integrated Grid demonstrations - IGDemos.epri.com

Technologies Demonstrated

Projects included in this portal demonstrate a number of different technologies (sometimes multiple technologies). Feel free to browse the projects in any of the categories below:

- Advanced Metering
- Battery Storage
- Commercial Battery Storage
- Commercial Solar PV
- Common Information Model
- Community Battery Storage
- Community Solar PV
- Customer Integration
- Cybersecurity
- Distributed Resource Management System
- Distribution Management System
- Edge of Grid
- Electric Vehicle
- Home Energy Manager
- Long-term Forecasting
- Microgrid
- Operational Forecasting
- Residential Battery Storage
- Residential Solar PV
- Sensor Technology
- Smart Appliances
- Smart Inverter
- Solar PV
- Telecom
- Utility-scale Battery Storage
- Utility-scale Solar PV



Demonstration Project Map

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Together…Shaping the Future of Electricity

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