

Solar-Plus-Storage Procurement Best Practices and Lessons Learned

Day 1 • August 31, 2020



SPECs

Solar-Plus for Electric Co-ops

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The Evolving Value of Battery Storage For Electric Co-ops

Takeaways from NRECA's Business and Technology Strategies Case Studies of Current Cooperative Deployments

Bob Gibson, contractor, NRECA

Cooperatives and Use Cases

- Anza Electric Co-op
- Arizona Electric Power (G&T)
- Cordova Electric Co-op
- MiEnergy
- Jo-Carroll Energy
- Dairyland Power (G&T)
- Middle Tennessee EMC
- North Carolina EMC (G&T)
- Tideland EMC
- South River EMC
- T&D Deferral
- Behind the Meter Peak Shaving
- Utility Peak Shaving
- Renewable Integration
- Microgrids

Battery providers and EPCs

- Samsung
- Saft/ABB
- Sonnen
- Tesla
- ENGIE
- Power Secure

Takeaways:

Procurement and Construction

- Early challenge in finding EPCs for smaller utility projects
- Gap between co-ops and battery vendors in culture and business practices
- Take extra care in defining roles and responsibilities
- Expect delays – both parties are on a learning curve



Takeaways:

Installation to Fully Operational

- Plug-and-play does not exist at this stage
- Expect setbacks in integrating BESS with existing utility infrastructure
- The BESS/microgrid controller is the key piece of the puzzle. Some uses require complex control algorithms.
- Battery providers and cooperatives can quickly achieve harmonious and effective working partnerships



Have Expectations for BESS Been Overstated?

- Perhaps, if expectations were for fully ‘commercial’ deployments, rather than for ‘learning laboratory’ pilots
- Battery technology works and can deliver expected results
- Battery storage is a “co-op – friendly” technology
- Based on initial experience, co-ops are convinced that battery storage will deliver lasting value – with further operational experience and improved economics

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Starting with Success

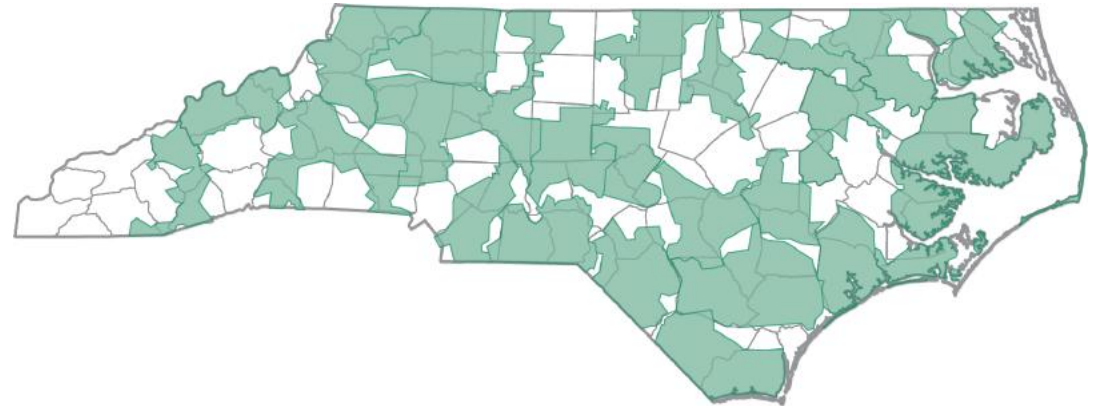
NC Electric Cooperative Perspective

John Lemire - Director, Grid Management



NC Electric
Cooperatives

Your Touchstone Energy® Cooperatives 



Summary

- Who are the NC Electric Cooperatives
- Discussion of microgrid and solar + storage projects
- Next Steps – Distribution Operator and Virtual Power Plant

1 M

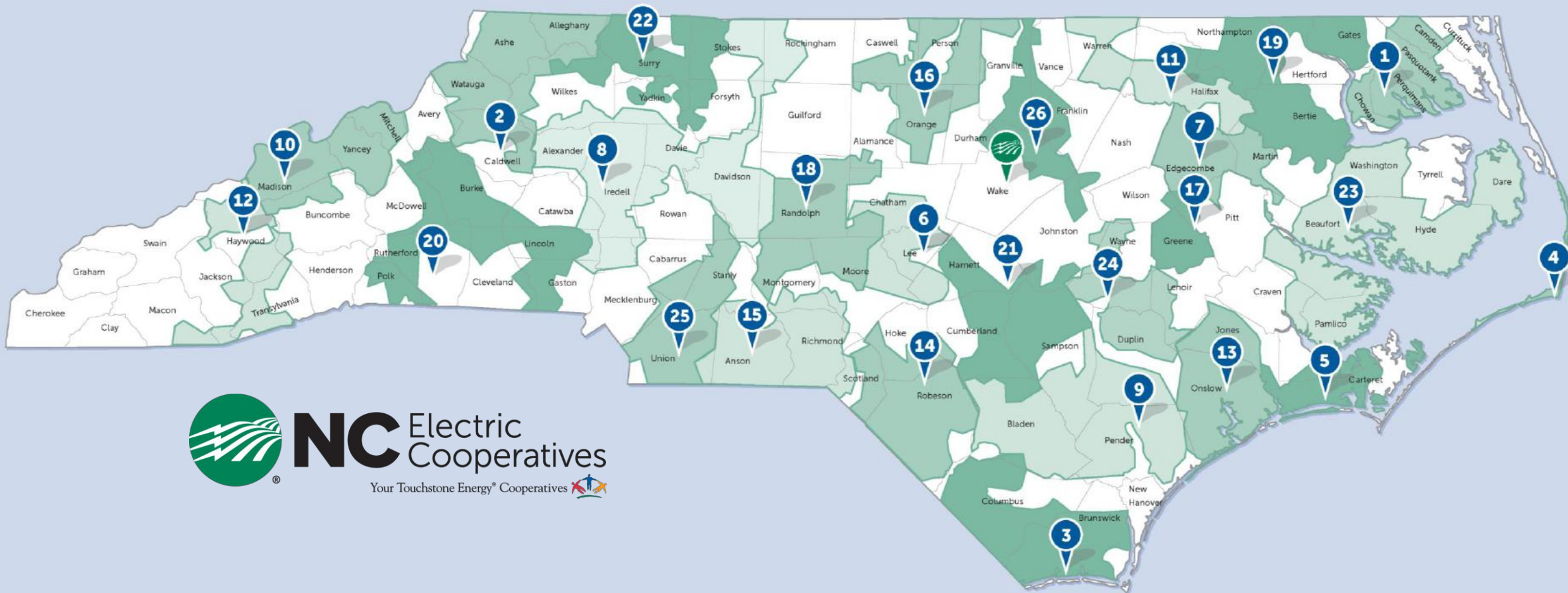
Households and businesses
served by NC Electric
Cooperatives

93

Counties we work in around the state of
North Carolina

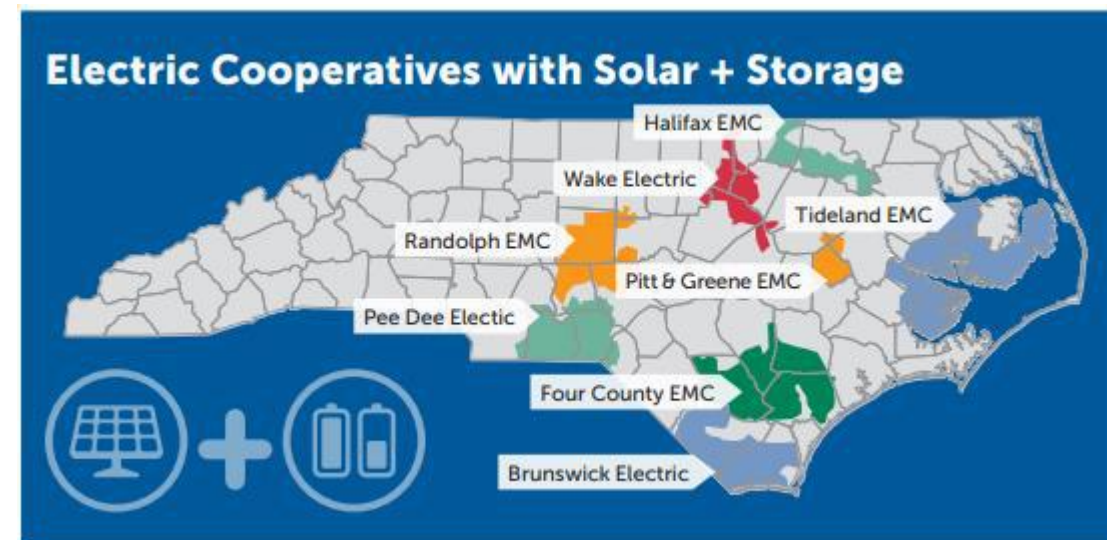
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Distinct member-owned, not-
for-profit cooperatives





Fact Sheet: [Resilient Communities](#)

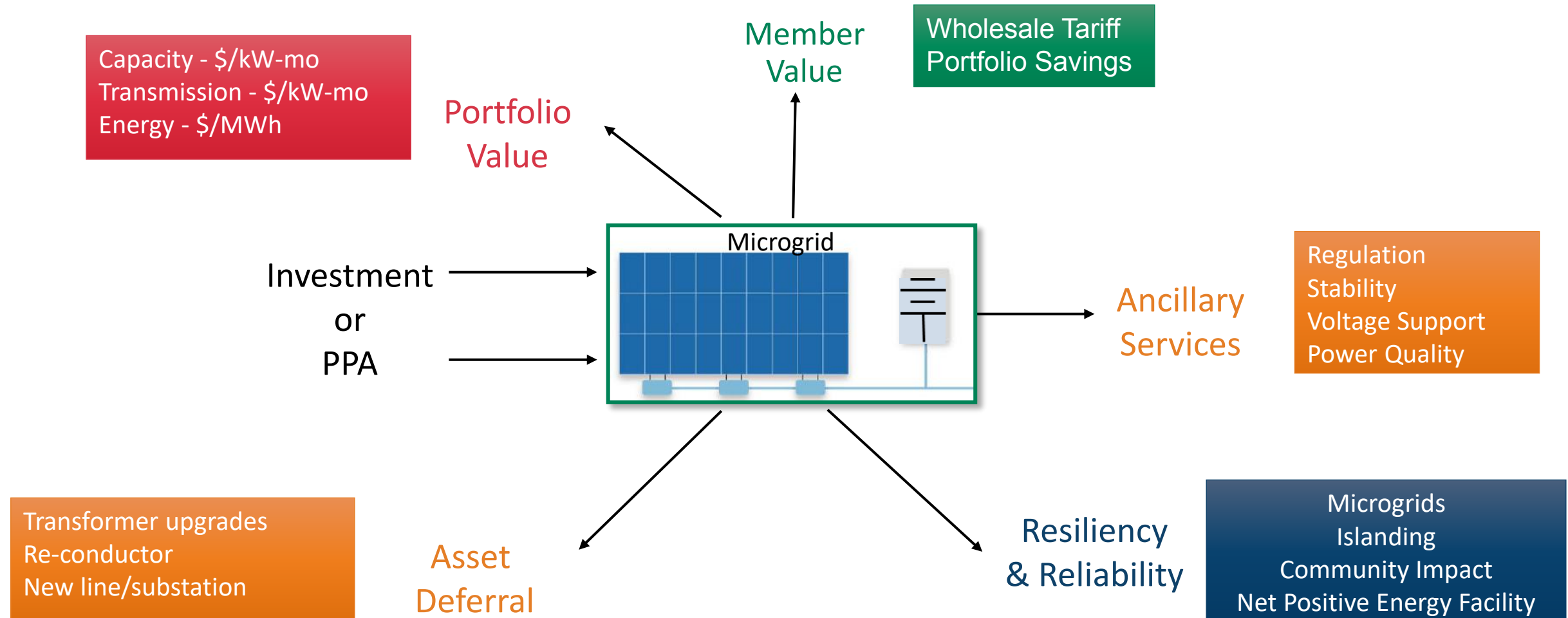
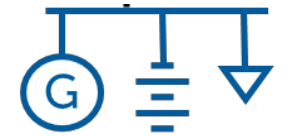


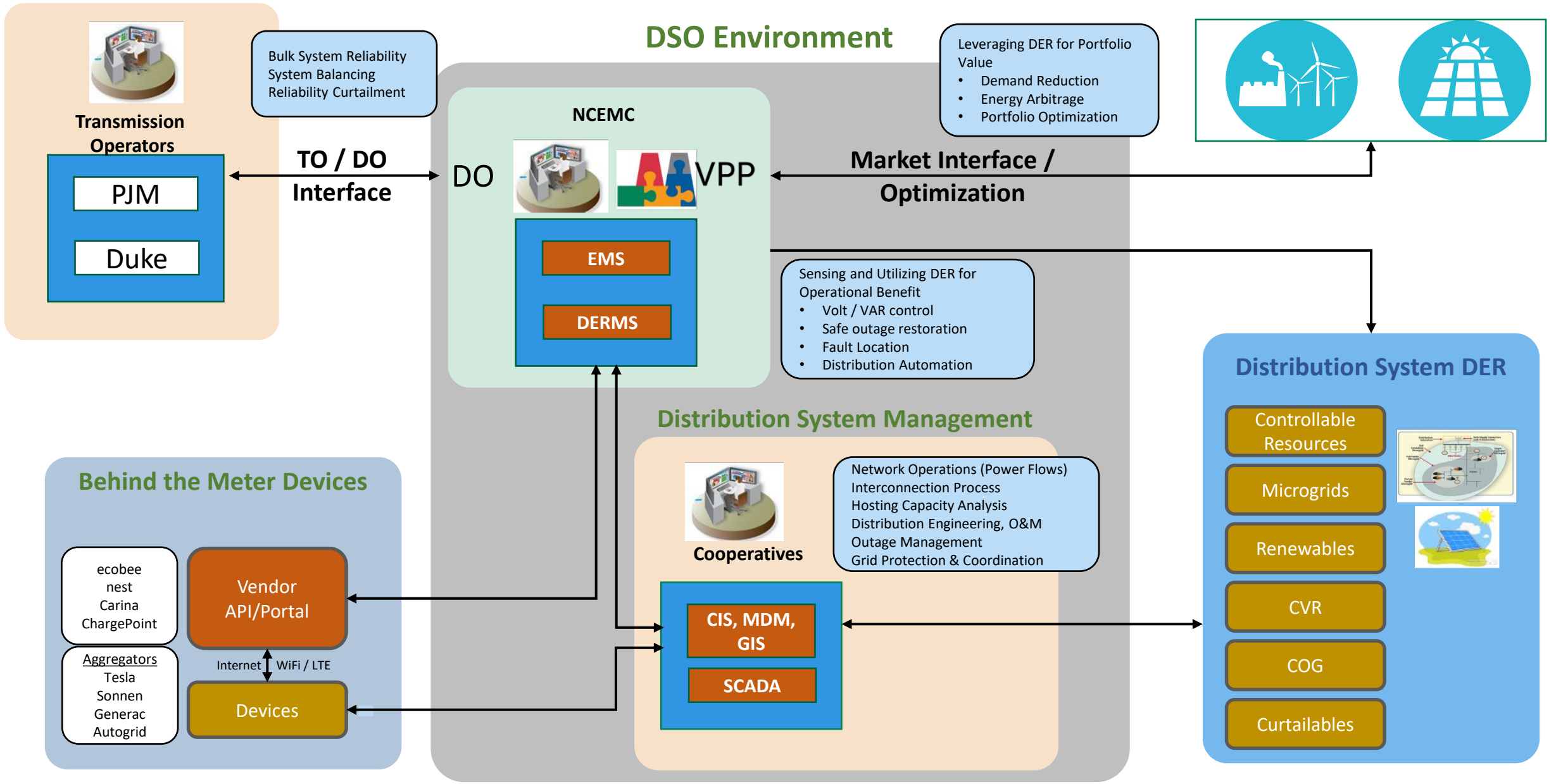
Fact Sheet: [Solar + Storage](#)

Microgrid sites each have energy storage – range from primary to support role

Solar + Storage – 10 sites ranging from 0.5 MW/1.1MWh to 5 MW/10.1 MWh

Microgrids: Use Cases and Value





Solar Plus for Electric Co-ops Workshop

August 31 & September 1, 2020

Laura Caspari, Vice President of Origination, ENGIE





About ENGIE

ENGIE is the largest independent power producer in the world, spanning 40 countries and 160,000 employees. In response to the urgency of climate change, our ambition is to become the world leader in the zero-carbon transition "as a service" for our customers including global companies and local utilities.

Nearly 100% of the company's power generation portfolio is low carbon or renewable. ENGIE is on track to add 5 GW of renewables to its global portfolio annually. ENGIE has installed and operates dozens of solar and storage projects for electric co-ops.

ENGIE's partner in co-op solar + storage



NRTC is a cooperative providing technology solutions to support more than 1,500 electric and telephone members in rural America. We develop our products and services specifically to meet the needs of rural utilities and their communities, including smart grid and utility solutions, advanced energy, broadband infrastructure and managed network services, wireless technologies and programming distribution capabilities for video providers.

NRTC helps ensure our members' success by aggregating their individual buying power, negotiating national contracts, and helping members integrate technology solutions with existing infrastructure.

Use Case: Black Start, Back-Up Power

Project Case Study: Guam Power Authority “Solar After Sunset”; RFP run by utility

- Naval Base and South Finegayan – 70 MWdc / 53 MWac PV + 72 MW / 292 MWh ESS
 - 100%-time shift; solar energy stored in the batteries during the day will be dispatched at night
 - Black-start capability; system will be on a Navy base and will have the capability to "black-start" and come back online even if the grid is down
 - Efficient DC-coupled system; PV and ES share inverters and capture more PV energy, but cannot charge from the grid

The sun shines only at night

Engie has been selected to supply a solar power plant in Guam with 50 MWdc of generation capacity and approximately 300 MWh of storage – with the express purpose to deliver 100% of the electricity after sunset.

OCTOBER 8, 2019 JOHN WEAVER

Commercial Structure	PPA
Notable Constraints / Risks	DC-coupled with substantial DC overbuild

Use Case: Increased PV Self-Consumption

Project Case Study: Hawaii Electric Company Puako Solar + Storage; RFP run by utility

- Puako – 60 MW PV + AC-coupled 60 MW / 240 MWh ESS
 - Grid-charged storage for capacity
 - Fast-frequency response / frequency regulation
 - Solar-charged storage "renewable dispatchable" generation



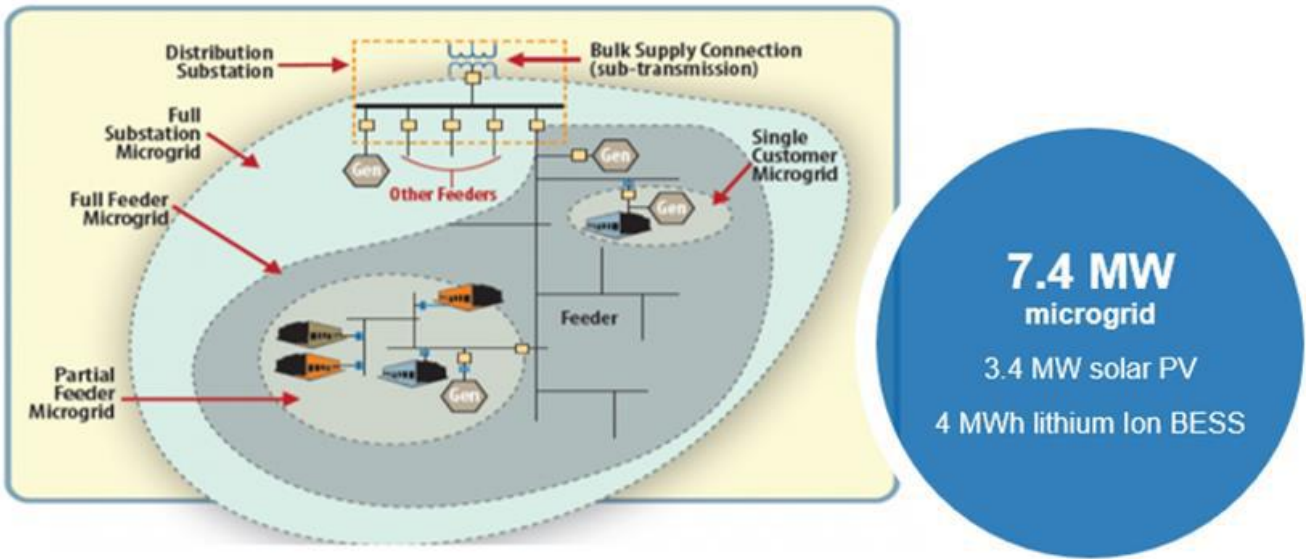
Commercial Structure	PPA
Notable Constraints / Risks	Inverters certified to California Rule 21 and Hawaii Rule 14H

Use Case: Resiliency, Back-Up Power

Project Case Study: Anza Electric Cooperative; RFP run by co-op

Project Highlights

- Increase community access to clean, renewable energy
- Prevent an expensive capacity upgrade
- Provide energy cost certainty
- Increase reliability of community



Commercial Structure	System Sale Agreement
Notable Constraints / Risks	A microgrid for a co-op impacted by CA wildfires Integration with SCADA Low-voltage ride-thru capability

Use Case: Demand Charge Reduction

Project Case Study: United Electric Cooperative

- Brighton – 2 projects totaling **4.25 MW, 18 MWh**
 - 4 MW / 16 MWh & 250 kW / 2 MWh
 - Limitations / complications associated with
 - 100 dispatches per year for peak reduction
 - 100% capacity guarantee over 10 yr period



Commercial Structure	System Sale Agreement
Notable Constraints / Risks	ENGIE supporting exploration of additional value monetization

Use Case: Resource Adequacy, Increased PV Self-Consumption

Project Case Study: Mount Tom Solar + Storage



- Holyoke Gas & Electric – 6MW PV & 3 MW, 6 MWh ESS
 - 20-year commitment to operate system and integrate controls with HG&E’s asset control and monitoring system
 - Firmed PV delivery

Commercial Structure	Energy Storage Service Agreement (“ESSA”) + PPA
Notable Constraints / Risks	Fire department certification complexities

Use Case: Demand Charge Reduction

Project Case Study: New England Utilities Standalone Batteries

- Utility 1 (RFP run by NRCO)
 - 1 project totaling **2.5 MW, 5 MWh**
 - (1) Reduces transmission costs (escalating 15% in 2021) through load reduction and (2) affords utility partner/customer the benefits of wholesale revenues without the necessary infrastructure of a trading desk with zero work or separate asset management scope
 - Remainder of hours dedicated to providing regulation services to ISO system
 - Leverages GridSynergy platform to predict peaks and recommend discharges based on probabilistic outcomes
- Utility 2 (RFP run by utility)
 - 3 projects totaling **12 MW, 44 MWh**
 - Reduces transmission costs (escalating 15% in 2021) through load reduction
 - Remainder of hours dedicated to providing energy arbitrage and regulation services to ISO system
 - Platform predicts regional transmission peaks to approximate customer requests, and “blacks out” these anticipated periods for regulation scheduling

Commercial Structure	Energy Storage Service Agreement (“ESSA”)
Notable Constraints / Risks	Sited adjacent to substation where coop receives step-down transmission service

Some considerations...

- **Know what you want.** What is your storage use case? Garbage in, garbage out- the costs of a battery are dependent on how and how much it is used. If you don't know how you might use a battery, you cannot get reliable costs.
- **Understand major cost drivers and what developers are assuming in a proposal.** In some states, property taxes could be as much as \$10/MWh of your PPA rate. Is the developer including or excluding this cost? What assumptions have they made for mil rates and depreciation? Will your costs increase later because they assumed something overly favorable and were not clear about it in their bid?
- **Equipment-** are they using Tier 1 equipment? Which battery OEMs have they worked with / costed?
- **O&M-** How and who does their O&M and asset mgmt.? What will interaction be post COD?
- **Financing-** what is the developer's credit rating and how many projects have financed, what do they own? Is it their intent to own the project long term or to sell it at NTP or COD? Either approach can be fine, but you should know what they plan to do. Developers who flip mean you should have some standard around the credentials of who they can sell to. You should be cautious that their assumptions will ultimately work for a financed product if they are inexperienced in this. Otherwise when they bring in the ultimate owner, costs and agreements will change.

Some considerations...

- **Energy**- Are the production assumptions in line with what financing parties will accept? Have bifacial modules been used? Has backside assumption been calculated according to the specific albedo of the site?
- **Vegetation**- Has pollinator habitat been considered?
- **Site conditions**- what are they assuming? Will costs go up based on geotech? How much contingency is included?
- **PPA**- is a financing document so consider using one which has been subject to that process
- **Lease**- recommended not to negotiate lease in a vacuum without developer input as developer will need to finance it