

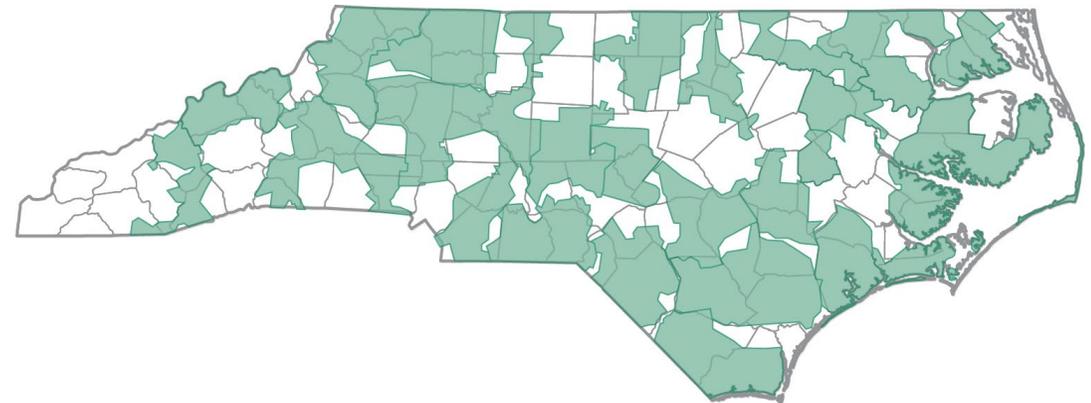
NCUC Technical Conference on Integrated System Operation and Planning

March 9, 2021

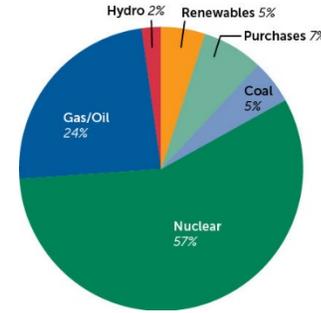


NC Electric
Cooperatives

Your Touchstone Energy® Cooperatives 

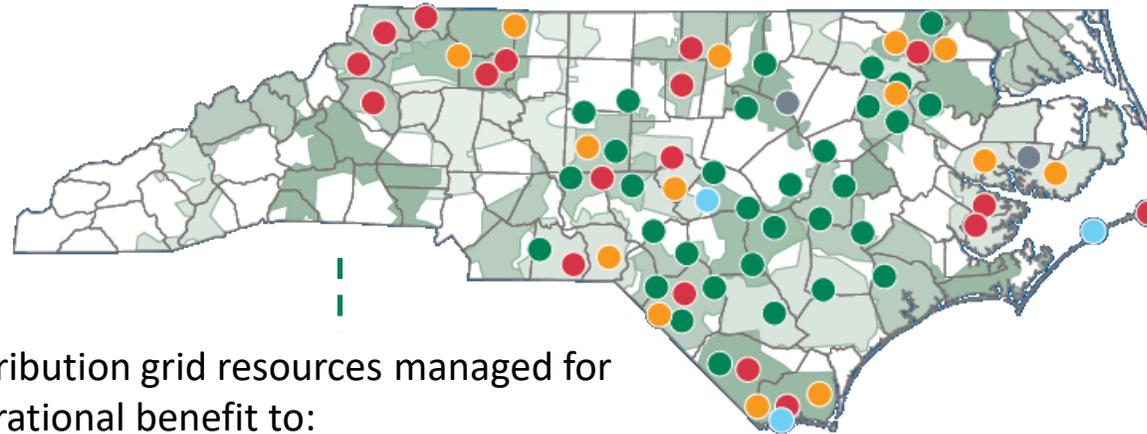


Increased reliability for transmission operators



Provide value to all co-ops through portfolio and shared capabilities at G&T

Distribution Operations and G&T Coordination

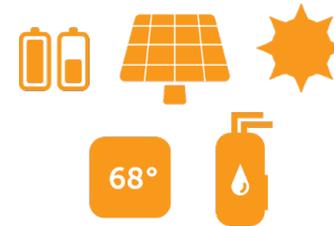
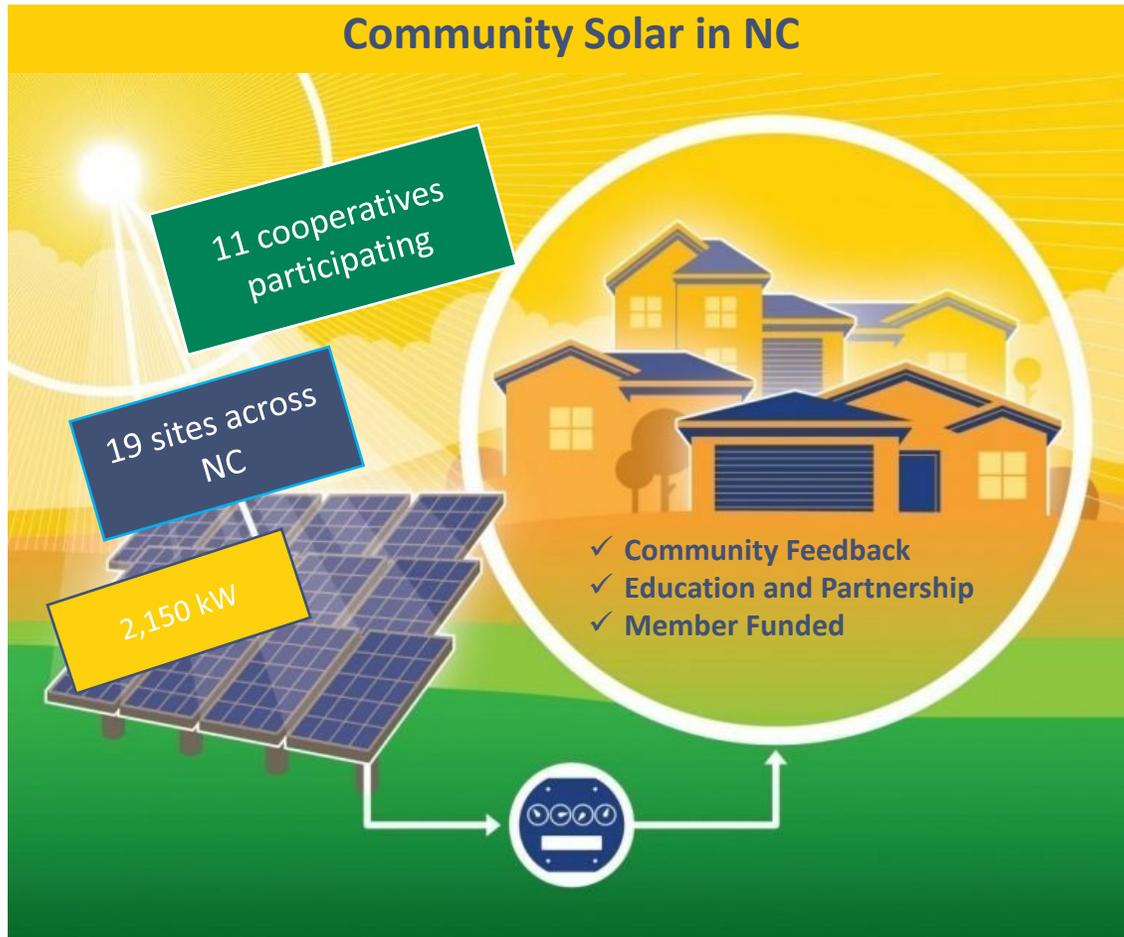


● ● Distribution grid resources managed for operational benefit to:
● ●

Build a **Brighter Future** for co-op members through reliability, affordability, sustainability



Cooperative Solar & Distributed Energy Resources



Distributed Energy Resources

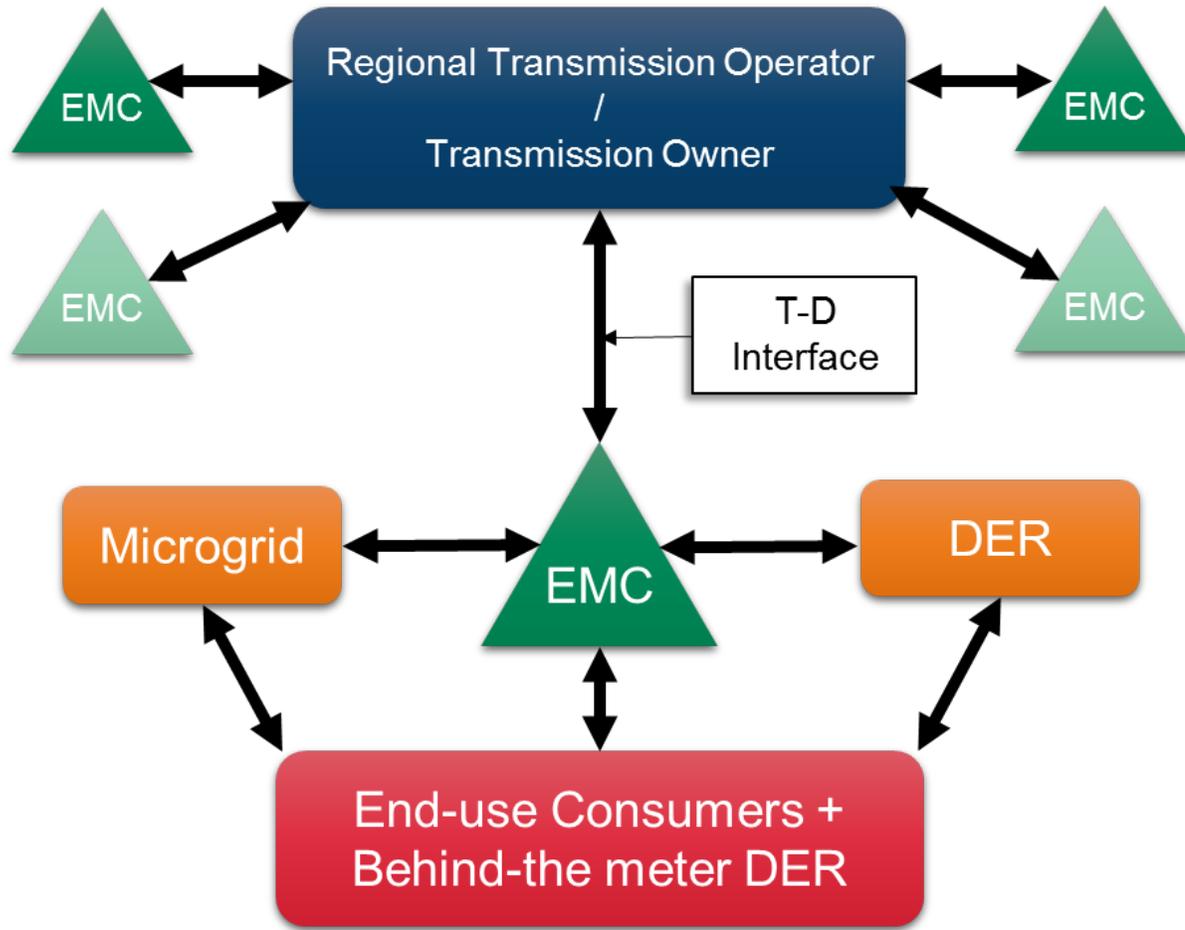
NC Electric Co-ops: Over 500 MW of DER/Edge of Grid

19 community solar sites	2.1 MW
Utility Scale Solar	293 MW
other Renewables (incl Residential)	27 MW
Conservation Voltage Reduction	50 MW
Customer-Owned Generation	60 MW
Battery storage	42 MW
connected thermostats and water heaters	9.5 MW

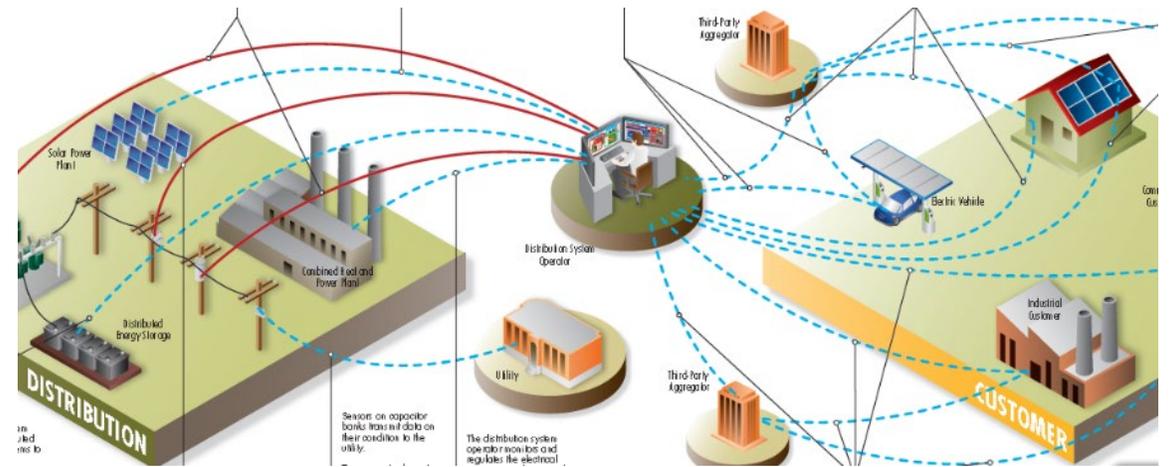
Solar + Storage:

14 sites with 18.5 MW of solar and 45 MWh of energy storage facilities, owned by NCEMC, under construction on member systems in 2020 and early 2021

DO and the Wholesale Interface



The DO model leads to additional communication and coordination, between the DO and the Transmission Operator



Source: EPRI

DO Pilots

- John Lemire
Director, Grid Management
NCEMC



DO Reliability Coordination Platform: Operations

The Distribution Operator pilots are focused on reliability coordination activity through integration, monitoring and coordination of DR / DER in the Digital Platform (EMS, DERM, SCADA)

- PJM Pilot
 - Coordination on Reliability Event simulation with TO
 - Test of operational needs within an RTO
 - Demonstrating successful execution of 8 MW of DER and DR
- Duke Pilot
 - Expanding the impact – more complexity and resources – 80 MW of DER and DR observed
 - Identifying regulatory needs and platform integration

PJM Pilot Results

May 28 – successful test performed in two parts

- Part I: DER curtailment
 - 11.4 MW nameplate capacity - 8.4 MW available
 - 2.44 MW of resources curtailed and battery charge
- Part II: DR activation
 - 6.72 MW nameplate capacity
 - 4.83 MW of load reduced

- Automation through platform integration
- Reliance upon third-party systems remains a known risk



Report excerpts - PJM viewpoints

The pilot testing also proved that having a DERMS system for central and simultaneous dispatch and control of DR and DER resources is key to the success of a DO and will continue to increase in scope, value and importance as new edge-of-grid devices and resources are added.

This pilot also served as a relationship bridge between NCEMC and PJM narrowing the gap between transmission and distribution operations by adding value through greater situational awareness and operational coordination leading to increased stability, reliability, and resilience.

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Mar 10 2021

Duke DO Pilot

September 29 – successful test performed in two parts

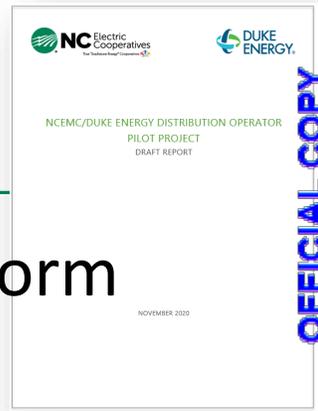
- Part I: DER curtailment
 - 118 MW nameplate capacity
 - 43.46 MW of resources curtailed and Heron's Nest battery charge
- Part II: DR activation
 - 46.7 MW nameplate capacity
 - 35 MW of load reduced

- Automation through platform integration
- Unexpected issues with third-party equipment

Report excerpts - Duke viewpoints

Duke Energy expects that NCEMC as a DO will become increasingly more sophisticated in their ability to manage DER on the distribution system, and this pilot offered an opportunity to test communication and data exchange protocols so that NCEMC and Duke Energy may think longer term about what works, what doesn't, and how to improve future coordination in these areas.

NCEMC and Duke Energy are discussing and considering additional testing on both peak load days and minimum load days to demonstrate and realize maximum effects of NCEMC's programs. The NCEMC DO capabilities will continue to grow as additional resources are integrated into DERMS and the processes become more automated.



Mar 10 2021

Blue Ridge Energy

- Mike High
Director of Engineering Services
Blue Ridge Energy

BLUE RIDGE SYSTEM

Blue Ridge Description

- 77,000 meters in NW North Carolina
- 8,000 miles of distribution line and 300 miles of transmission lines
- Elevation change from 1,000' to over 5,000'
- Limited DER potential based on terrain and NC Ridge Law

Summary of DER Resources

- 500KW of community solar
- 11MW utility scale solar project in operation by the end of the year
- 200KW of hydro
- 200KW of landfill gas
- 230 rooftop solar
- 3 residential wind turbines

Summary of DR Resources

- Legacy AC and WH load management switches
- Ecobee AC load control
- CVR on several distribution circuits



DO PILOT AND BEYOND...

DO Pilot Experience

- Well planned and coordinated
- Communications from/to NCEMC
- Communications from/to DER/DR
- Both hydro and landfill gas gens were down for repairs
- Weather during pilot
- Forecasting Improvements

Blue Ridge Vision for Successful DO

- Grid Hardening / Grid Resiliency
- Communications Improvements
- Visibility and Control (DER, Volt/VAR, FLISR)
- Forecasting and M&V (real-time data)
- Planning, Aggregation & Analytics (software and training)
- Strategically Attracting DER (RFP)
 - Reduce interconnection costs
 - Demand reduction savings
 - Defer necessary capital expenditures
 - Reliability improvement



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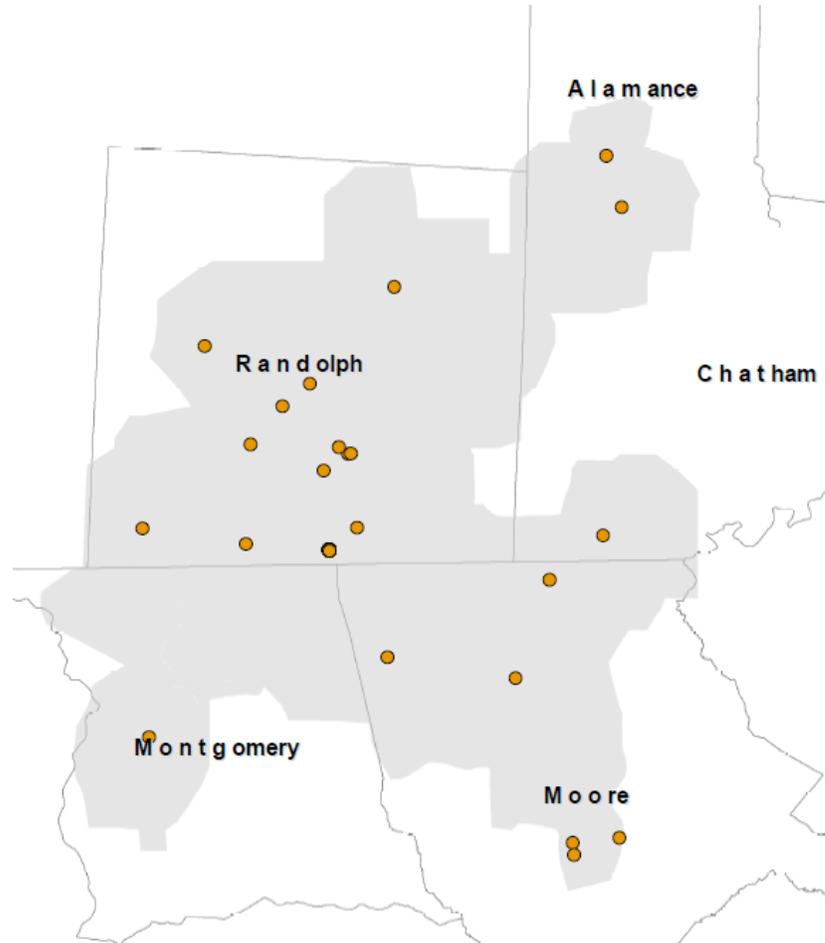
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Randolph EMC

- Dennis Mabe, P.E.
Vice President of Engineering & Operations
Randolph EMC

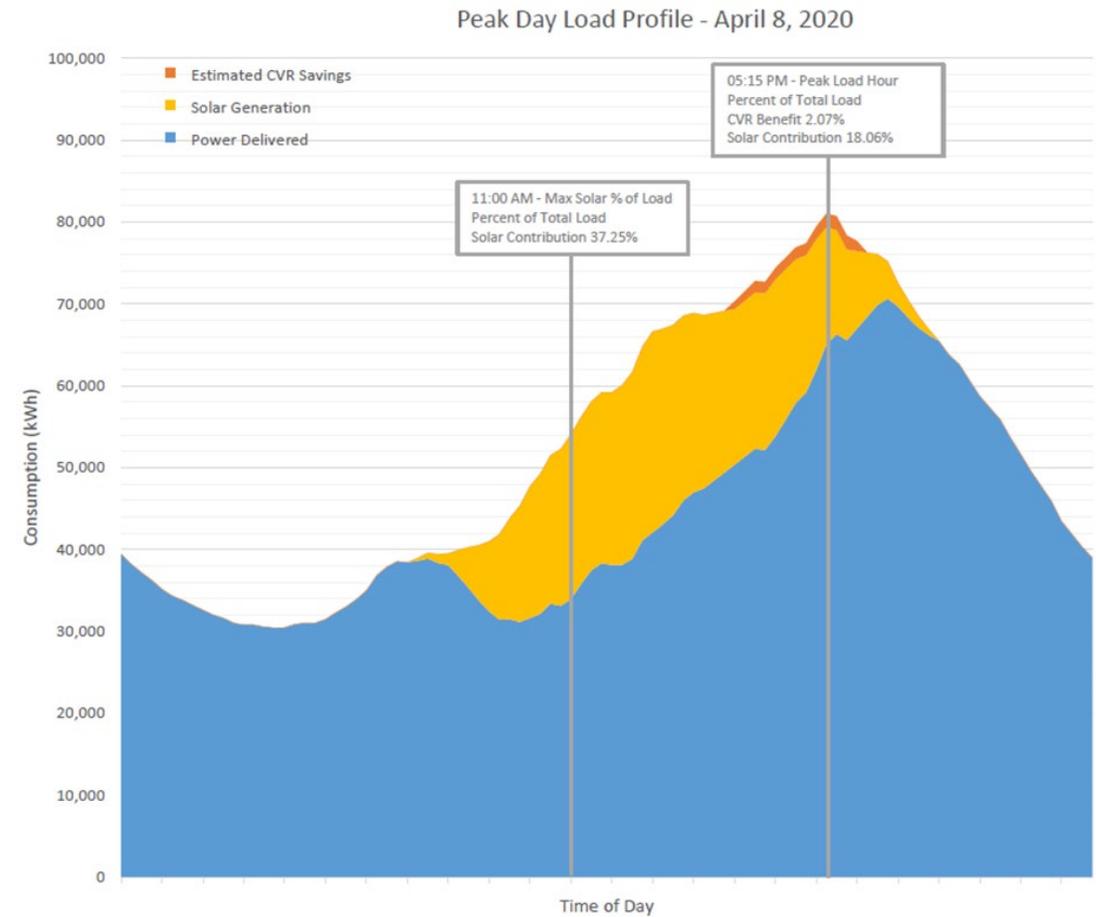
DER Interconnections



- Nearly 40 MW of solar installed
- 12 Utility scale solar (2-6MW)
- Over 70 residential or Community solar installations
- 6 Solar plus storage residential installations under construction

Pilot & Profile

- Visibility & Control
- Safety
- Daily Profile
- Reliable Resource
- Advanced Energy Inspections

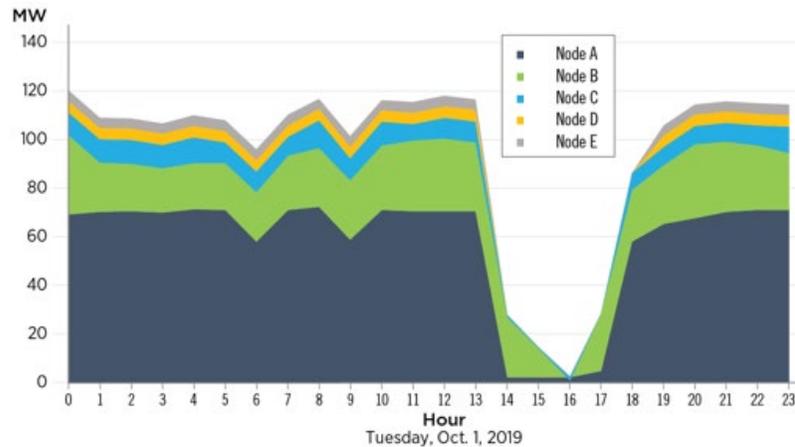


DER Coordination

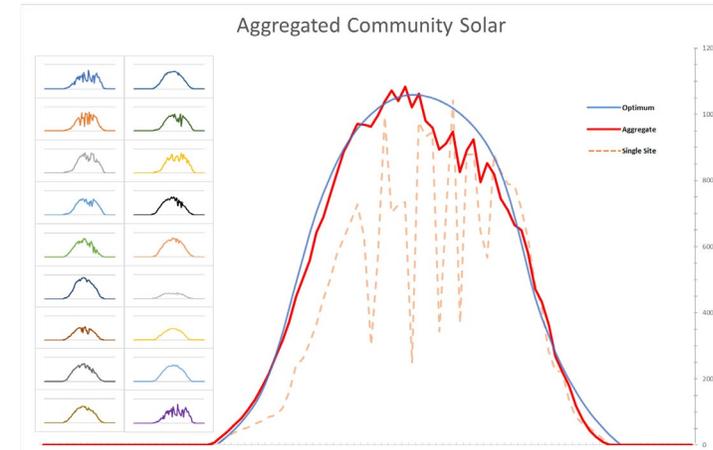
- Charlie Bayless
Vice President, Senior Regulatory Counsel
NCEMC

Benefits of DER Coordination

Visibility Increases Reliability



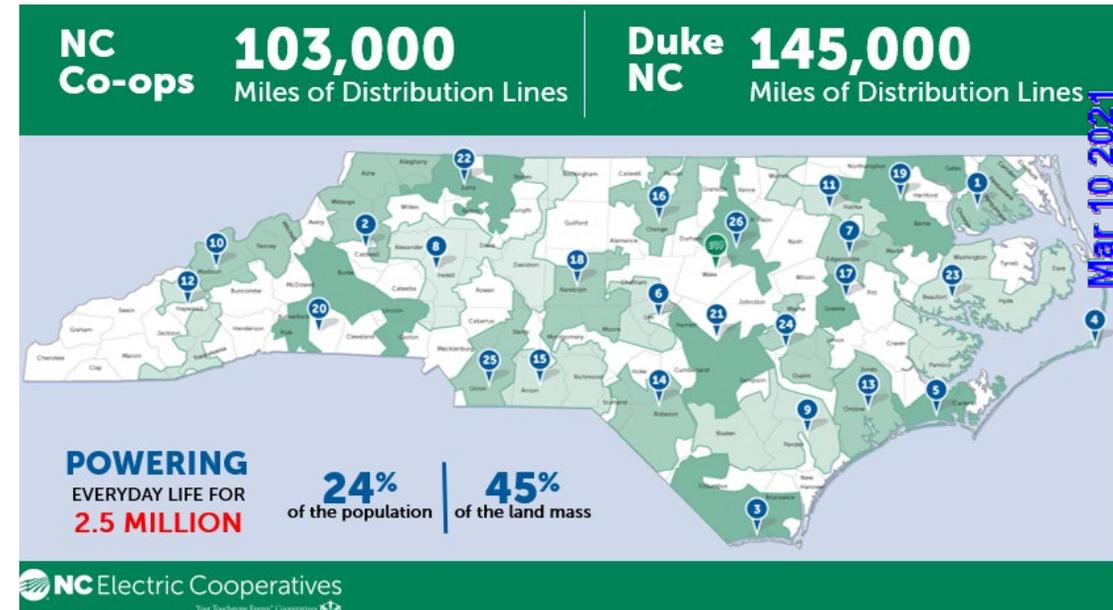
Aggregation Increases Dependability

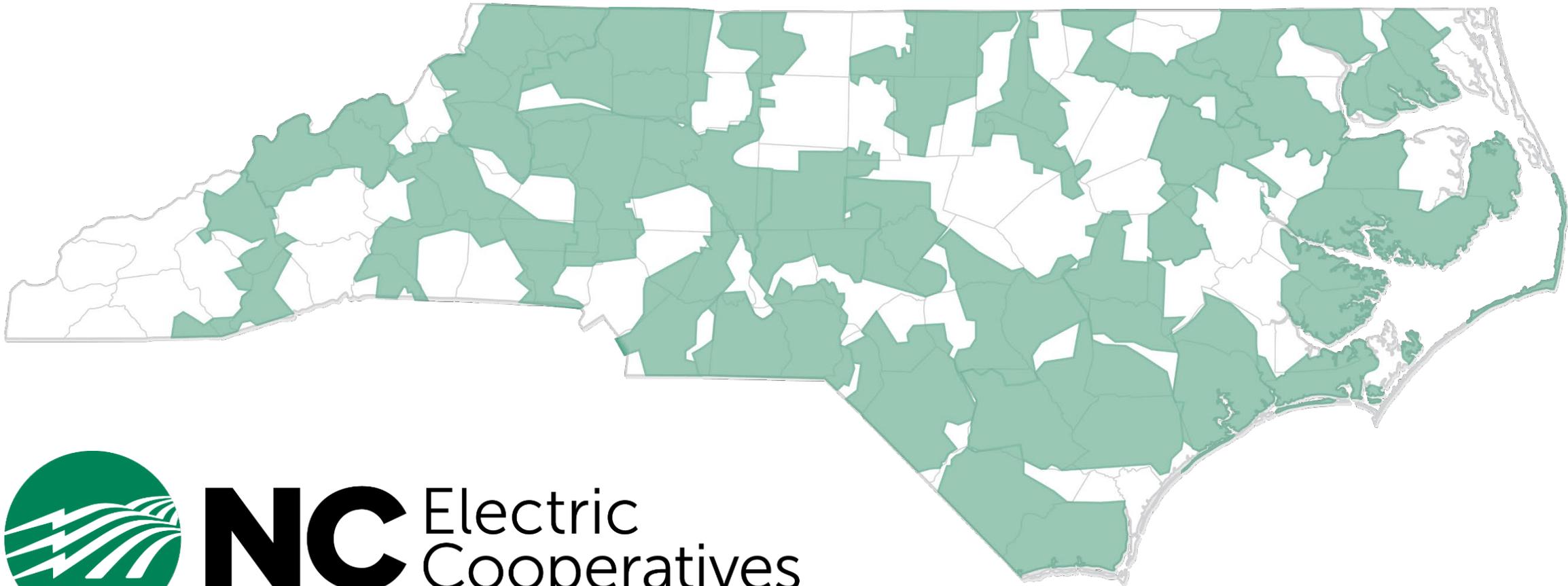


- DER visibility can increase the amount of DER that can reliably operate on the system without upgrades
- Managing DER on the distribution grid can potentially influence the needs of the transmission and generation networks

Coordination, Reliability, and Energy Goals

- Cooperatives control a significant share of the distribution system
 - DER coordination, via the cooperative DO, enhances the reliability benefit to the transmission system
 - If optimized, DER also has potential to enhance transmission planning
- Coordination among the state's utilities could facilitate North Carolina's efforts to meet its energy goals in the most economic and efficient manner





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