Summary

- About Us
- Microgrids: Macro-Benefits
  - Ocracoke Microgrid
  - Butler Farms Microgrid
- Heron’s Nest – Neighborhood Microgrid
NC Electric Co-op Territory

950,000
Households and businesses served by NC Electric Cooperatives

93 Counties in NC

NORTH CAROLINA’S ELECTRIC POWER PROVIDERS SERVICE AREAS

Member owned not-for profit cooperatives

Powering Everyday life for 2.5 Million

24% of the population
45% of the land mass

NC Electric Cooperatives
Cooperative Innovation

Community Solar

Microgrids

Wi-Fi Enable Devices

Advanced Controls

- Small Scale Solar
- Batteries
- CVR
- Water Heaters
- Thermostats

CONTROL & OPERATIONS

- Transmission Optimization
- Optimization Algorithm

INTERFACE

- Microgrids
- Software Integration

TRANSMISSION INTERFACE AND OPERATION

Dist. Ops (DO)
A Brighter Energy Future

Low Carbon

Grid Flexibility

Beneficial Electrification

- MICROGRIDS
- COMMUNITY SOLAR
- RETAIL TRANSFORMATION
- WATER HEATER CONTROLS
- SERVICES
- BATTERY STORAGE
- AGRICULTURAL ENERGY AUDITS
- THERMOSTAT PROGRAMS
Microgrids: Macro-Benefits

- Capacity - $/kW-mo
- Transmission - $/kW-mo
- Energy - $/MWh

- Portfolio Value
- Member Value
- Wholesale Tariff Portfolio Savings
- Ancillary Services
- Regulator
- Stability
- Voltage Support
- Power Quality
- Resiliency & Reliability
- Microgrids
- Islanding
- Community Impact
- Net Positive Energy Facility

Investment or PPA

- Transformer Upgrades
- Re-conductor
- New line/substation

Asset Deferral

Member Value

Portfolio Savings

Ancillary Services

Regulator

Stability

Voltage Support

Power Quality

Resiliency & Reliability

Microgrids Islanding

Community Impact Net Positive Energy Facility
Ocracoke Island Microgrid

- Long, exposed distribution feeder serving the area under normal conditions
- Marine environmental conditions, high wind and storms
- Peak seasonal load coincides with costly demand peaks
- Generation capacity below peak loads

- Part of NC Outer Banks
- Population: 948
- Area: 9.614 square miles
NCEMC System Microgrid

Member-Consumers

- 200+ Thermostats
- 50 Water Heater Controls
- Ecobee

Ocracoke Island

- Carina
- Ecobee

Operations Center

- NCEMC

Microgrid Controller

- 3 MW Diesel Generator
- 500 kW / 1 MWh Tesla Battery Storage
- 15 kW Rooftop Solar
Butler Farms

- Integrates biogas, solar and batteries on one site
- Improves reliability beyond the farm on to homes that share the same feeder
- Ties agriculture and electric utilities together
Butler Farms
Microgrid Components

Resources owned by the farm:

- 20kW solar panels
- 100kW diesel generator
- 185kW biogas generator

NCEMC-owned:

- 250kW/735kWh battery system
- Controller to integrate and manage all components
Heron’s Nest Microgrid Project
Heron’s Nest

- Located on Brunswick EMC’s system in Shallotte, NC
Connected Neighborhood

Heron’s Nest

- New construction - 33 homes
  - Rooftop solar
  - ecobee4 thermostats
  - Vaughn water heaters with Carina technology
- Hurdles
  - 3 parties involved
  - HOA Covenants
How about making it a microgrid?

- **Benefits:**
  - Resiliency for consumers
  - Marketing for developer
  - Flexible grid-edge asset for utility

- **Hurdles:**
  - Coordination
  - Operations