

ENERGY GRID RESILIENCE AND MICROGRIDS

Information Flyer

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Course content based on the
Energy Grids panel at the



KENAN INSTITUTE
ENGINEERING, TECHNOLOGY & SCIENCE

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Energy Grid Resilience & Microgrids

How local solar + battery systems protect communities when extreme weather strikes

HURRICANE HELENE — SEPT. 27, 2024

Widespread flooding & downed lines across WNC

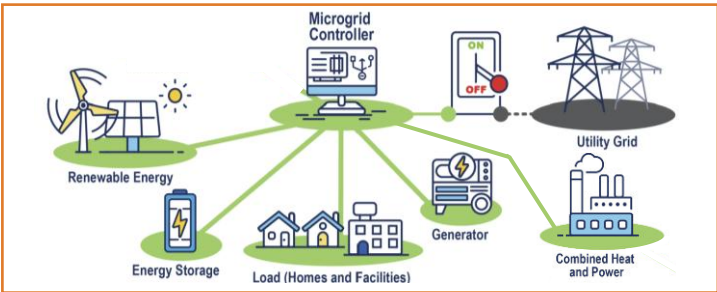
Power, water & cellular lost simultaneously

Roads washed out — communities isolated

WHAT IS A MICROGRID?

DEFINITION

A local solar + battery system that provides power to a specific area. It can operate with or independently from the grid during outages.



CASE STUDY: HOT SPRINGS, NC

Hot Springs, NC Microgrid

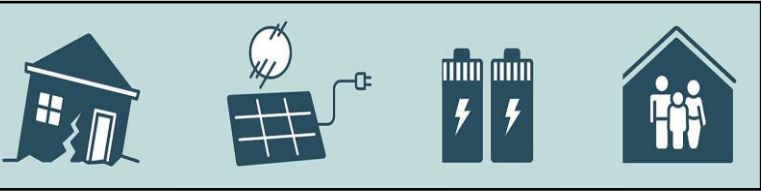
2 MW Solar

4.4 MWh Battery

7–8 hrs backup

CPCN approved

- Serves a town via 10-mile line through rugged terrain
- Auto-disconnects from Duke's grid during outages
- Discharges 1 MW during early-morning peak hours
- Deferred a costly traditional line upgrade



BENEFITS

RELIABILITY

Provides power during outages in isolated communities.

CLEAN ENERGY

Replaces polluting diesel generators.

MEDICAL SAFETY

Supports critical services.

COST SAVINGS

Delays grid upgrades; battery earns revenue.

RESILIENCE

Sustains hospitals & critical facilities for hours.

CLIMATE GOALS

Supports NC clean energy targets.

DISASTER RESPONSE — WNC, OCT. 2024

97

Requests for power assistance

49

Sites assisted with clean energy

100+ kW

Solar PV deployed

250+ kWh

Battery storage deployed

THE BEEHIVE SYSTEM

A mobile clean-energy hub that deploys portable microgrids to communities during disasters

- **The Hive:** Stationary hub: solar array, battery storage and inverter
- **The Bees:** Mobile solar + battery trailers deployed to community hubs
- **Provides:** Power, satellite internet, device charging



FUTURE OF MICROGRIDS IN NC

24

Sites to receive solar + battery

500+ kW

Solar PV to install across WNC counties

1+ MWh

Battery storage to be installed

200+

People trained on Inst & Maint

\$5M

NC DEQ Grant Program

CHALLENGES & LIMITATIONS

- ➔ **High Cost:** Hot Springs: ~\$15M final cost
- ➔ **Regulatory:** Extensive regulatory approval required

- ➔ **Break-Even:** Microgrids cost 60–75% more per kW than utility-scale storage

- ➔ **Equity Gap:** Residential customers pay 50% of costs but receive only 15% of the benefits