Resilient Power for North Carolina: Solar+Storage Efforts in the Wake of Hurricane Helene

June 25, 2025

www.cleanegroup.org

Webinar Logistics

All attendees are in **“listen only” mode** – your webcam and microphone are disabled.
The Chat function is also disabled.

Submit questions and comments via the Q&A panel 

Automated **captions** are available 

Speaker bios will be made available in the Chat

This webinar is being recorded. We will email you a webinar recording within 48 hours. This webinar will be posted on CEG’s website at **www.cleanegroup.org/webinars**

Thank you for attending this webinar! We encourage you to provide feedback in the post-webinar survey or via email.

Clean Energy Group

Affordable, reliable, clean energy for all.

Climate Resilience and Community Health

Distributed Energy Access and Equity

Energy Storage and Flexible Demand

Fossil Fuel Replacement

www.cleanegroup.org

CleanEnergyGroup

Resilient Power Project

Building the foundation for energy resilient communities.

USDN urban sustainability directors network

footprintproject.org™

AMERICAN MICROGRID SOLUTIONS

ELEVATE

GEMINI ENERGY SOLUTIONS

Rooftop solar installation in Dorchester, MA. Credit: Resonant Energy

www.resilient-power.org

CleanEnergyGroup

Technical Assistance Fund

Providing technical support to build local resilience.

GEMINI ENERGY SOLUTIONS

footprintproject.org™

ELEVATE

AMERICAN MICROGRID SOLUTIONS

Clean Coalition

USDN urban sustainability directors network

Solar installation in Puerto Rico. Credit: Solar Responders

www.cleanegroup.org/initiatives/technical-assistance-fund

CELEBRATING 10 YEARS TECHNICAL ASSISTANCE FUND

CleanEnergyGroup

TECHNICAL ASSISTANCE FUND

Providing Support to Build Local Resilience

The Resilient Power Project Impact: 2013 - 2024

$2 million in Grants Awarded

200 Community Service Partners

380 Community Facilities

www.cleanegroup.org

CleanEnergyGroup

Resilient Power Leadership Initiative

Building community-based capacity for more energy resilient communities.

Feed the SECOND LINE

THE FAUNTEROY COMMUNITY ENRICHMENT CENTER

Photo Credit: Queen Shabazz, United Parents Against Lead (UPAL)

www.cleanegroup.org/initiatives /resilient-power-leadership-initiative

Webinar Speakers

Jason Handley
Duke Energy

Matt Abele
NC Sustainable Energy Association

Aubry Larson
Footprint Project

Nate Heegaard
Footprint Project

Olivia Tym
Clean Energy Group (Moderator)

DUKE ENERGY

NC SUSTAINABLE ENERGY ASSOCIATION

footprintproject.org

CleanEnergy Group

Upcoming Webinars

Solar+Battery Storage Fire Safety Part 2: Utility-Scale Projects and EVs (July 8)

Community Storage: SMUD's Energy StorageShares Program (July 17)

Read more and register at www.cleanegroup.org/webinars

CleanEnergyGroup

www.cleanegroup.org | info@cleanegroup.org

Hot Springs Microgrid

Hurricane Helene Performance

DUKE ENERGY®

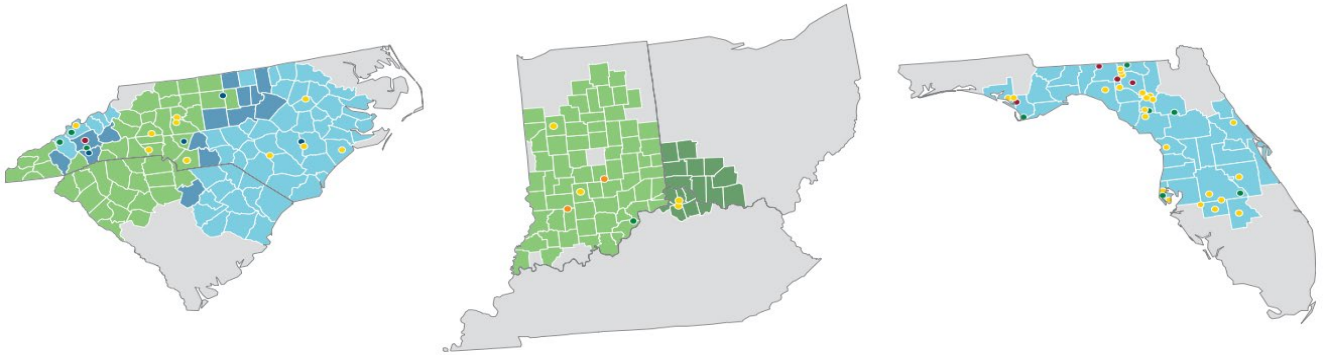
Duke Energy - One of the largest energy holding companies in the U.S.

About Duke Energy

- 150+ years of service
- 8.6 million retail electric customers in 6 states
- 1.7 million natural gas customers in 5 states
- Over 26,000 employees
- Own and operate assets that generate 55 GW

Duke Energy Electric & Natural Gas Service Territories

(including Regulated Renewable & Storage Facilities)



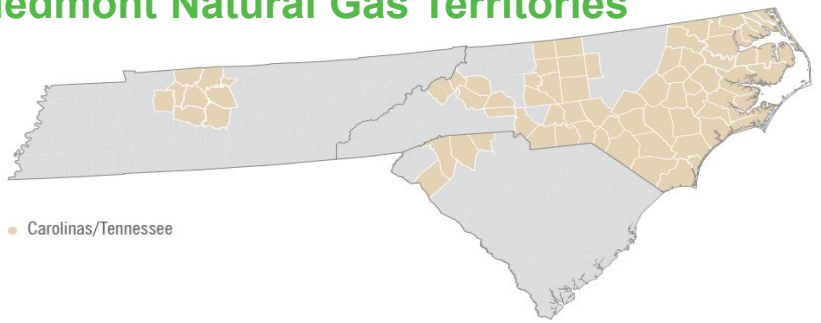
Carolinas
- Duke Energy Carolinas
- Duke Energy Progress
- Overlapping Territory

Midwest
- Duke Energy Indiana
- Duke Energy Ohio/Kentucky

Florida
- Duke Energy Florida

Regulated Renewable and Storage Facilities
- Solar Power Facility
- Solar + Storage
- Under Construction, Solar Power Facility
- Battery Storage Facility
- Under Construction, Battery Storage Facility

Piedmont Natural Gas Territories



- Carolinas/Tennessee

Overview

Community Microgrid: Hot Springs, NC (2023)

Site Specs:

- Power Capacity: 4.4MW
- Energy Capacity: 4.4MWh
- PV Capacity: 2MWac

Use Cases:

- Islanding Reliability
- Energy Arbitrage

NC Public Utilities Commission approved a Certificate for Public Convenance and Necessity (CPCN) in 2019

Status:

- 7.31.2022 - Grid Parallel Commercial Operation
- 1.17.2023 - Islanding Commercial Operation

Hot Springs Microgrid

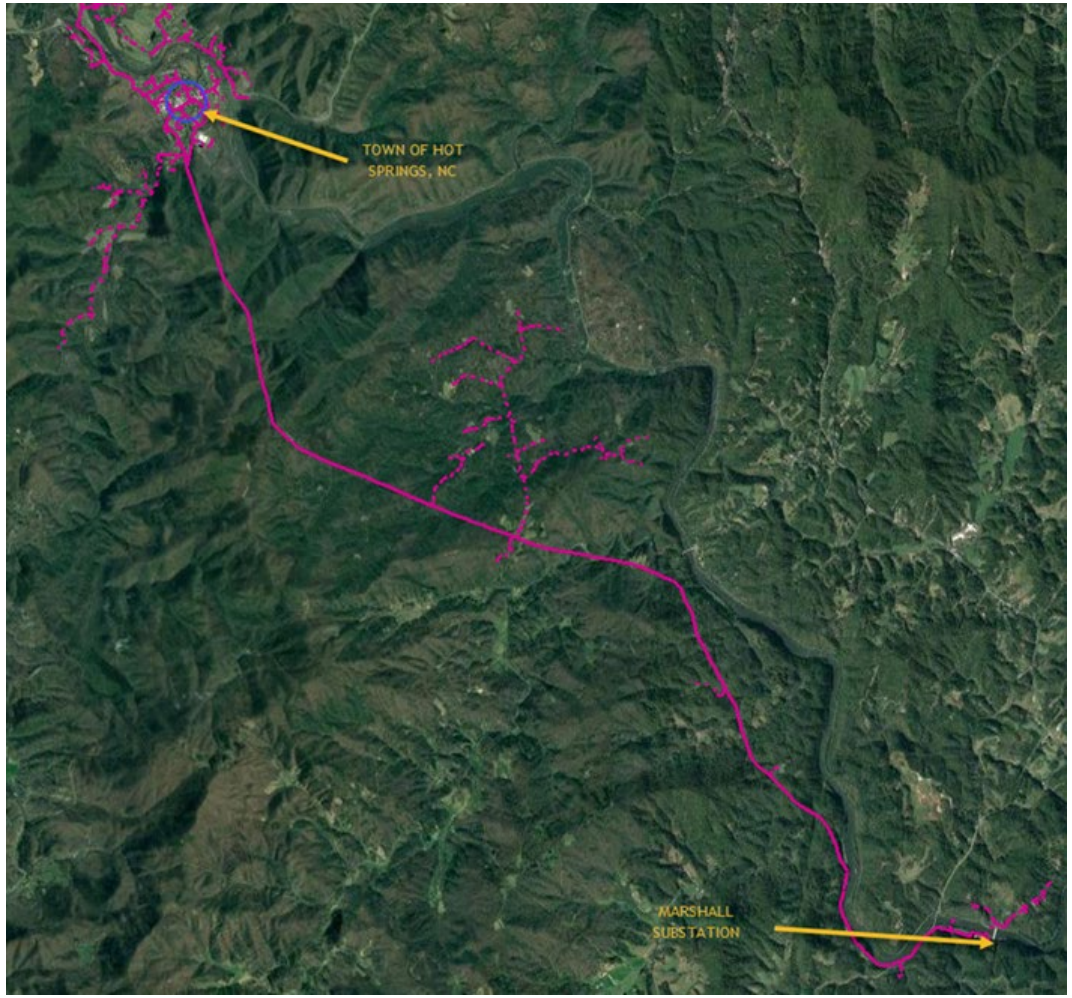
Town of Hot Springs ~10mi from Marshall Substation

Fed by Radial Line

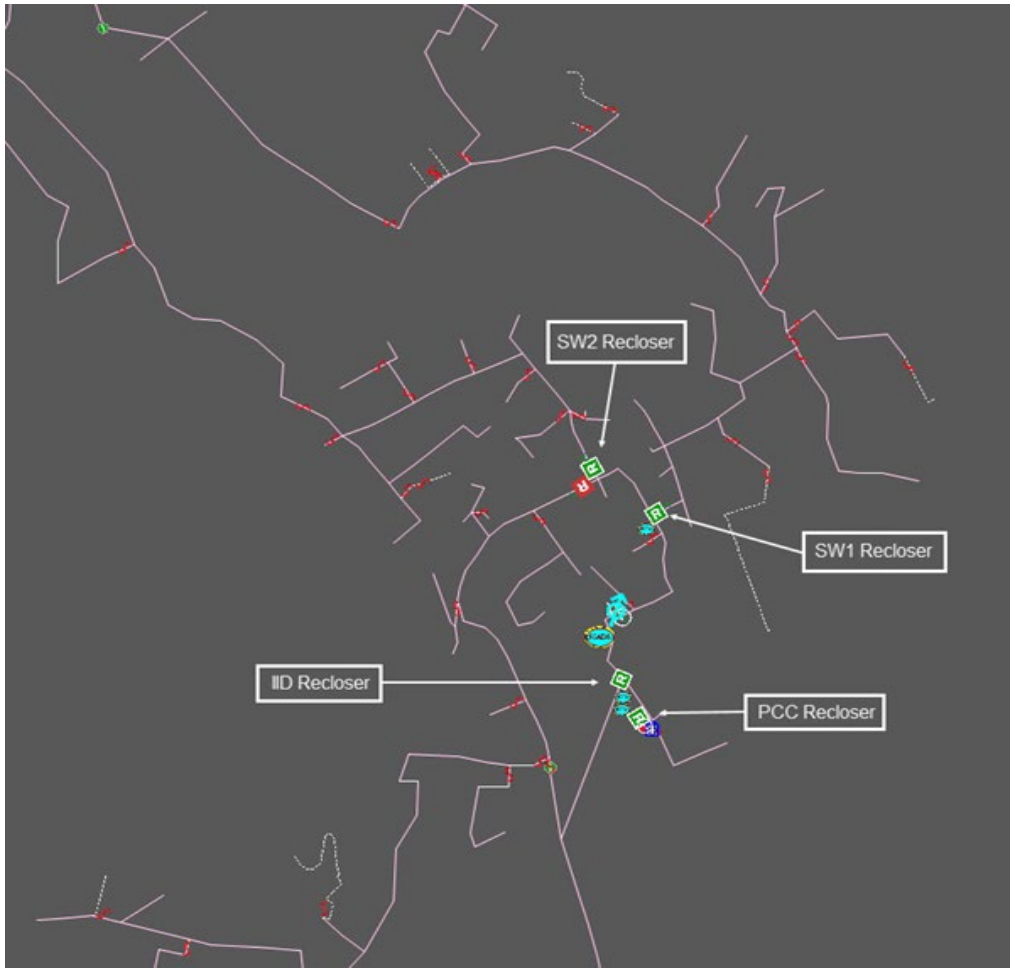
- No alternate source to town

Outages take extended duration to locate, repair, and restore

- Steep Terrain
- Remote
- Limited Access



Hot Springs Microgrid



- **PCC – Point of Common Coupling**
  - DER ON/OFF Grid
  - Load Segment 1
- **IID – Intentional Islanding Device**
- **SW1 Recloser – Load Segment 2**
- **SW2 Recloser – Load Segment 3**

Hot Springs Helene Impacts

Marshall Substation Helene Impacts

Hot Springs Outage

- **Outage for the town started on Friday 9/27 at 11:21 AM**
  - Duke Energy's Distribution Control Center opened the Marshall substation breaker due to safety reasons (flooding) in Hot Springs
  - Hot Springs experienced catastrophic flooding from both the French Broad River and Spring Creek severing access to the microgrid site
  - Due to flooding and concerns about the stability of the bridge to Hot Springs over the French Broad River, microgrid damage assessment and restoration could not start until Monday 9/30
- **Working with the mayor and DOT our crews received permission to cross the bridge and started restoration of the microgrid at 3 PM on Monday 9/30**
- **The microgrid was ready to support load at 7 PM on Tuesday 10/1**
- **Coordination with the town and Duke Energy Distribution repair crews allowed the microgrid to pick up load at 10:30 AM on Wednesday 10/2**

Hot Springs Outage

- **Messaging to the town was a key part of the restoration**
- **Sent to the town mayor and posted on the town's Facebook page**

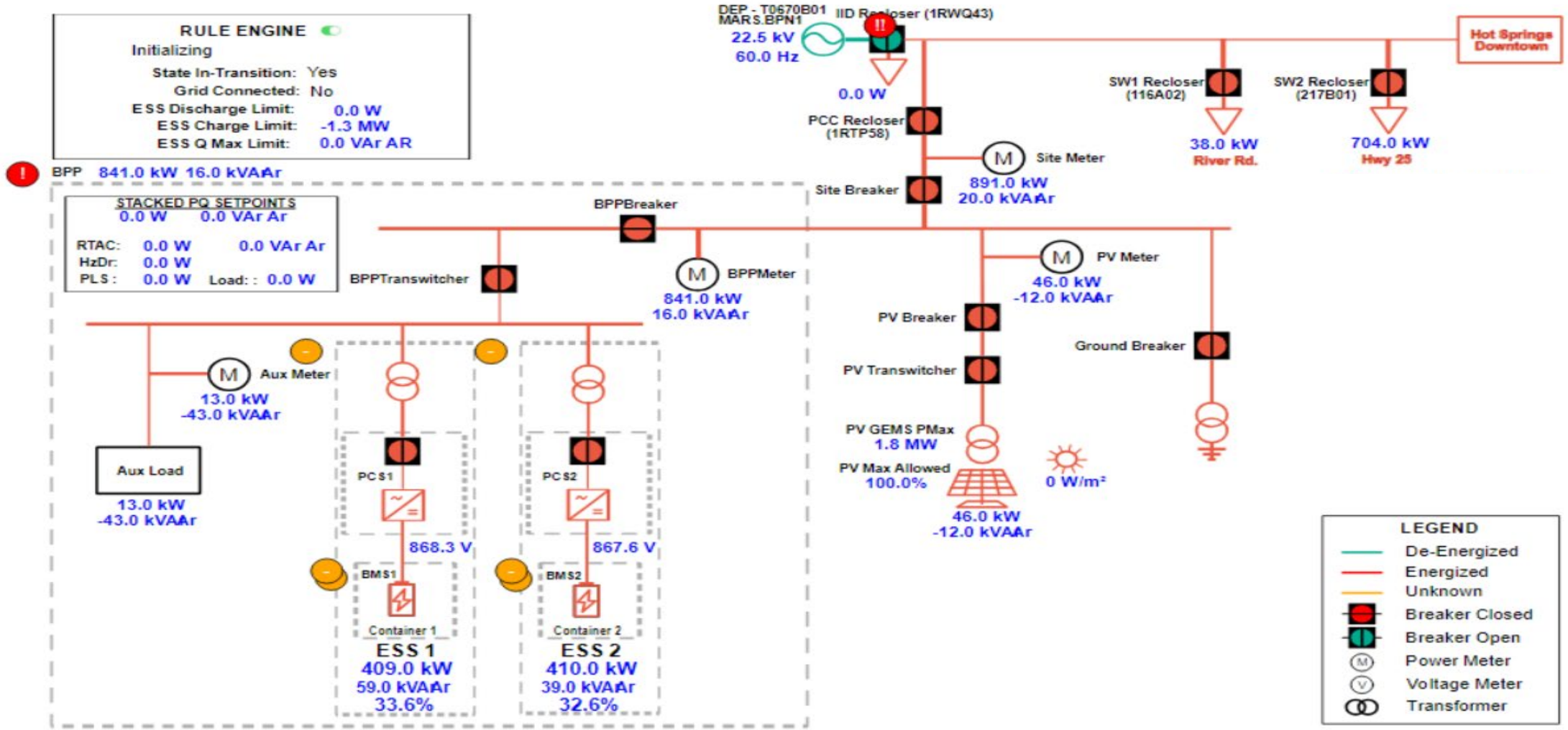
The Hot Springs microgrid has been restored in a limited capacity and is powering the town as Duke Energy continues to make repairs.

Here's what to expect:

- *The microgrid was originally designed to support the town for 4-6 hours at a time, using solar and battery resources.*
- *To maximize power availability, Duke Energy will need to implement nightly load management at midnight.*
- *Some areas will experience temporary outages overnight, but power is expected to be restored in the morning hours as the sun rises and solar resources begin to produce power.*
- *To optimize continuous power delivery, customers in Hot Springs should conserve power.*

We are working diligently to ensure consistent power for the community, and we greatly appreciate your understanding and cooperation during this time.

Hot Springs Microgrid



Hot Springs Microgrid

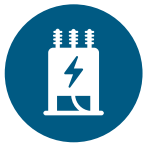
Microgrid utilized to serve the area with battery and solar assets from 10/2 through 10/8 when the mobile substation was energized at Marshall

Average load of town varies between 600kW to 1MW depending on the time of year

- **PCC Recloser**
  - Closed on 10/2 at 10:30 AM
  - Opened 10/8 at 10:00 AM – restored to grid power
    - Supported the downtown area and other critical services
    - Fire Station, Gas Station, Dollar General, Smoky Mountain Diner
- **Switch 1 & Switch 2**
  - Load managed to ensure downtown area of Hot Springs could continue to stay energized
  - Poor solar day on Friday October 4th – heavy cloud cover and rain in area

	PCC	SW1	SW2
2-Oct	13.5	6	12
3-Oct	24	12	11
4-Oct	24	0	0
5-Oct	24	17	15
6-Oct	24	24	15.5
7-Oct	24	24	17
8-Oct	10	10	4
Total Hours on MG	143.5	93	74.5
% of Time Energized by MG (10/2 10:30 AM - 10/8 10 AM)	100%	65%	52%
% of Total Outage Length (9/27 11:21 AM - 10/8 10 AM)	55%	35%	28%

Key Takeaways



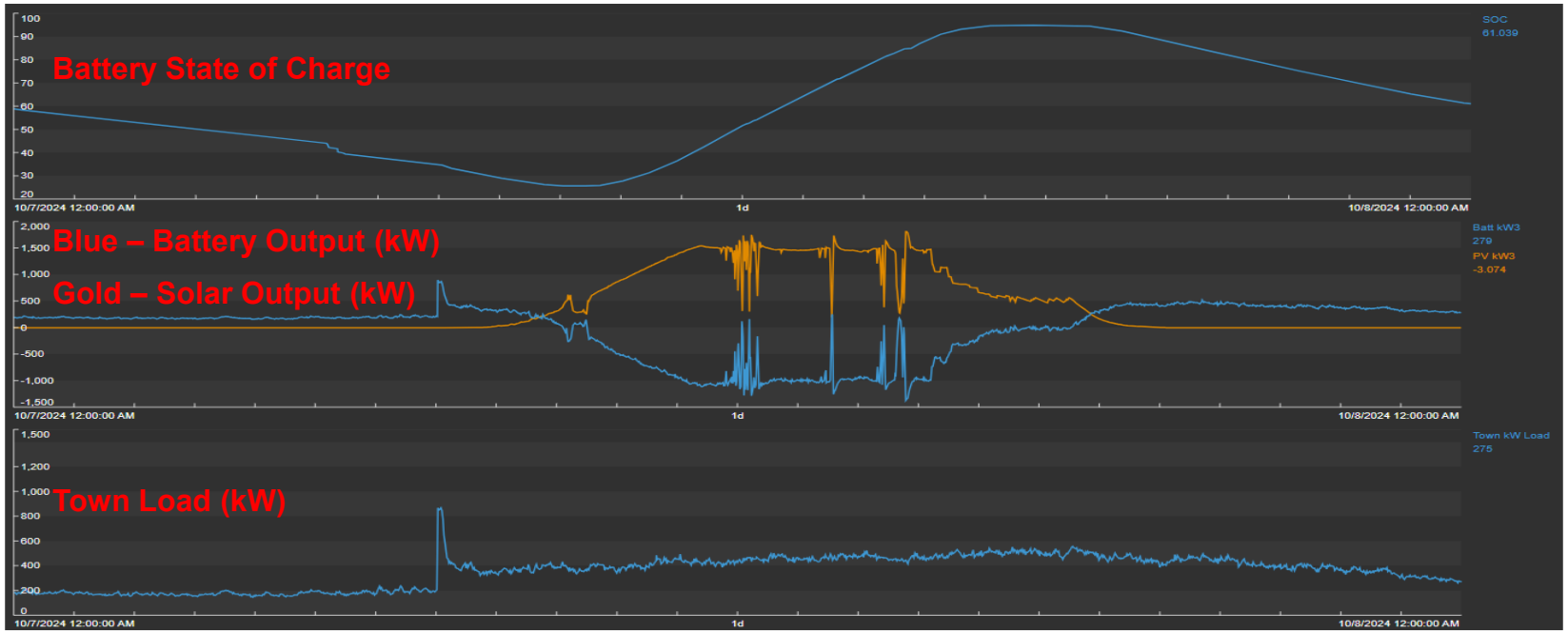
- **Switching Plans are critical**
  - Automation is ideal but always need a backup for automation failures or safety power shutoffs similar to Helene response
- **Different preparation approach for known storms**
  - Self-Island in preparation of a larger outage on the grid
- **Design Improvements**
  - Considering an alternative for communication backhaul for critical systems
  - Implementing a design enhancement for our UPS systems
  - Alternate power supply to our PCC Recloser
- **Alternative means to charge BESS**
  - PV was critical to Helene response, but it is also a variable/unpredictable source of generation
- **Overbuild provided additional capability for our Microgrid**
  - Overbuild allowed us to operate for an extended duration. Degradation and load growth (potentially) could impact our duration of support for future events

Key Takeaways (cont.)

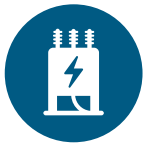
- **Training and understanding of values available in our control system**
  - Multiple points for DC & AC Energy. Need to understand the accuracy and calculation of these values to assist with predicting load support durations.
- **Improve controls of our PV and BESS assets**
  - Automate the response of our PV system when reaching high SOC levels

STATUS	
AC Real Power	-14.000 kW
AC Reactive Power	0.000 VAr
AC Apparent Power	14.000 kVA
Effective SOC	81.5%
SOH	100.0%
Allowed Dischargeable DC Energy	3.180 MWh
DC Wh Capacity	7.669 MWh

More Detailed Status >



Key Takeaways (cont.)



- **Inverter only based resources are real; but extremely complex to build and operate**
- **Microgrids are a good non-traditional solution (NTS) option for socially vulnerable areas**
- **Community microgrids can provide all customers benefits**
  - Solar generation provides added capacity back into the grid
  - Energy arbitrage
    - Charge BESS with solar
    - Discharge as needed to offset peaks
- **Don’t overlook the ongoing Operations & Maintenance costs**
- **Need an industry accepted hard dollar value for resiliency**


DUKE
ENERGY®


footprintprojectorg™

Our Mission

PROVIDE CLEANER ENERGY INFRASTRUCTURE TO COMMUNITIES IN CRISIS

We are a 501(c)(3) non-profit disaster service organization that develops and deploys sustainable infrastructure networks to empower community resilience. We work across the disaster management cycle to expand frontline access to climate technologies and reduce fossil fuel use in the field. Since 2018, we've mobilized solar generators to 25+ disaster response and recovery missions.

Impact to Date

25+ disaster missions

250+ kW of mobile solar

700+ kWh of mobile battery storage

50,000+ people supported with emergency, sustainable energy access

Hurricane Ida

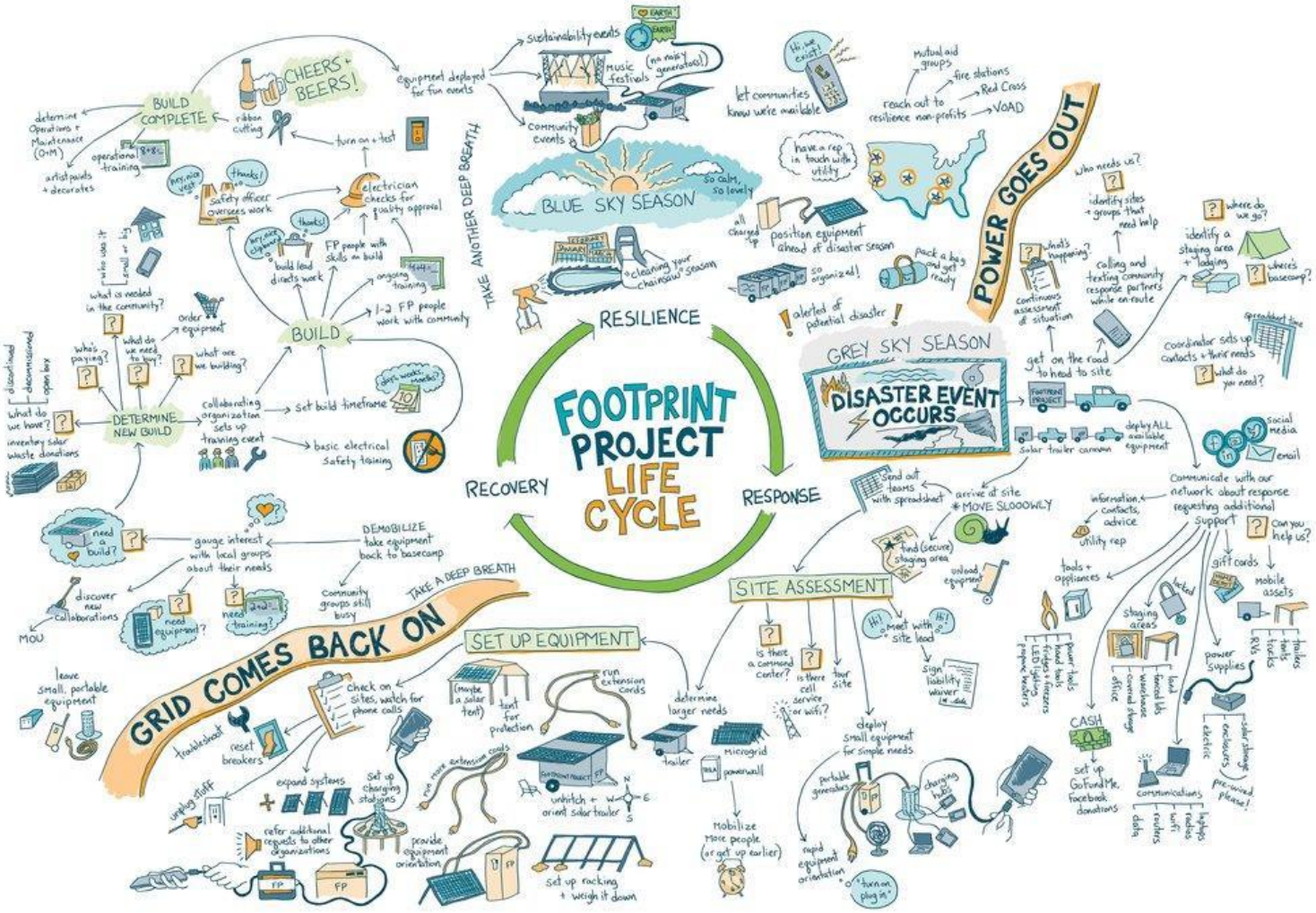
Kentucky Tornadoes

Puerto Rico Earthquakes

Tennessee Tornadoes

COVID-19 Field Clinic

California Wildfires


FOOTPRINT PROJECT LIFE CYCLE
RESILIENCE
RESPONSE
RECOVERY
BLUE SKY SEASON
GREY SKY SEASON
TAKE ANOTHER DEEP BREATH
TAKE A DEEP BREATH
POWER GOES OUT
DISASTER EVENT OCCURS
BUILD COMPLETE
CHEERS + BEERS!
BUILD
DETERMINE NEW BUILD
SITE ASSESSMENT
SET UP EQUIPMENT
GRID COMES BACK ON
DEMOBILIZE
Support
CASH
Communicate with our network about response requesting additional

Response Timeline

DISASTER STRIKES!!

1) DEPLOY: Rapidly deliver turnkey cleantech equipment to support local responders and resilience hubs.

2) MAINTAIN: Keep the mobile stuff working in the field for the people who need it.

3) FUNNEL: Open "free store" to provide in-kind cleantech donations to renewable recovery projects in the region.

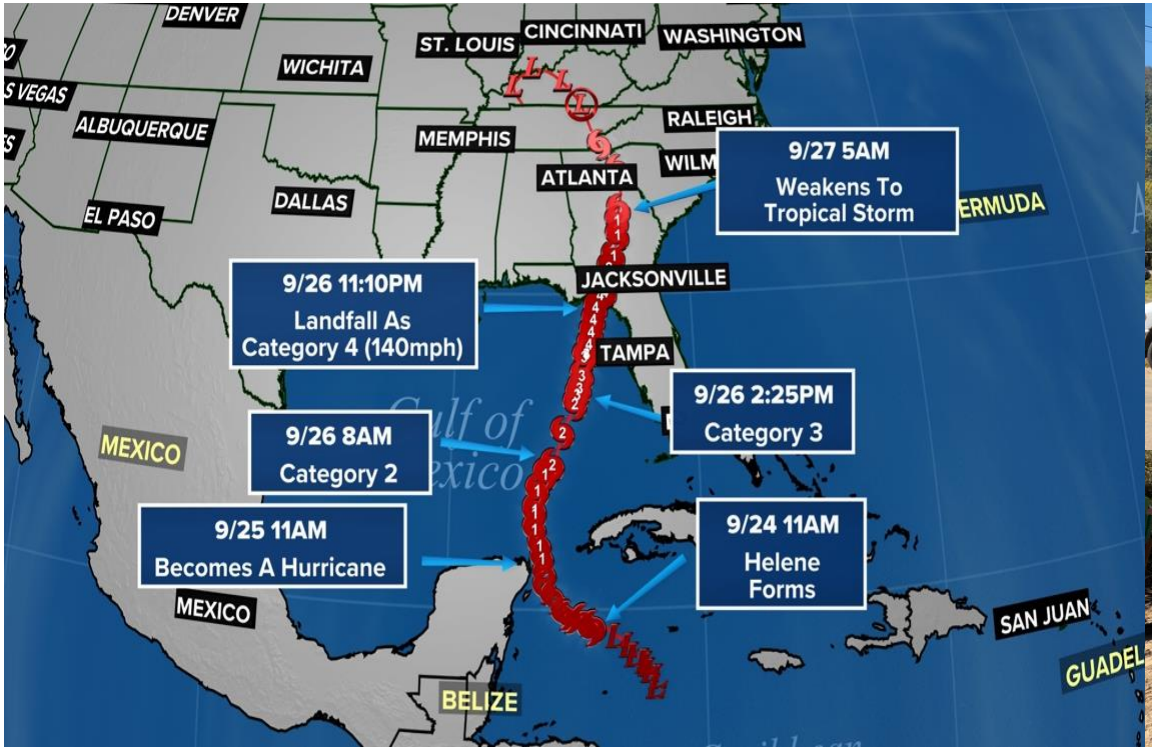
4) TRAIN: Educate and organize local groups to self deploy cleantech equipment for future climate disasters.

Days to Weeks

Weeks to Months

Months to Years

Hurricane Helene Response From FL to NC



Core Programs

DISASTER RESPONSE

We rapidly deploy mobile solar generators to power up responders and survivors.

BUILD POWER

We develop fleets of community mobile solar generators and train local partners to plug-in.

LONG TERM RECOVERY

We install permanent microgrids to make communities more resilient.

Equipment

Portable

Inverter: 1-2 kW
Battery: 2-5 kWh
Solar: Up to 2 kW

Towable

Inverter: 2-20 kW
Battery: 10-100 kWh
Solar: 2-10 kW

Palletized

Inverter: 10-50 kW
Battery: 10-100 kWh
Solar: 10+ kW

Containerized

Inverter: 50+ kW
Battery: 100+ kWh
Solar: 10+ kW

Atmospheric Water Generation (AWG)

Cold Storage

Battery Libraries

REQUESTS / ASSESSMENTS:
97

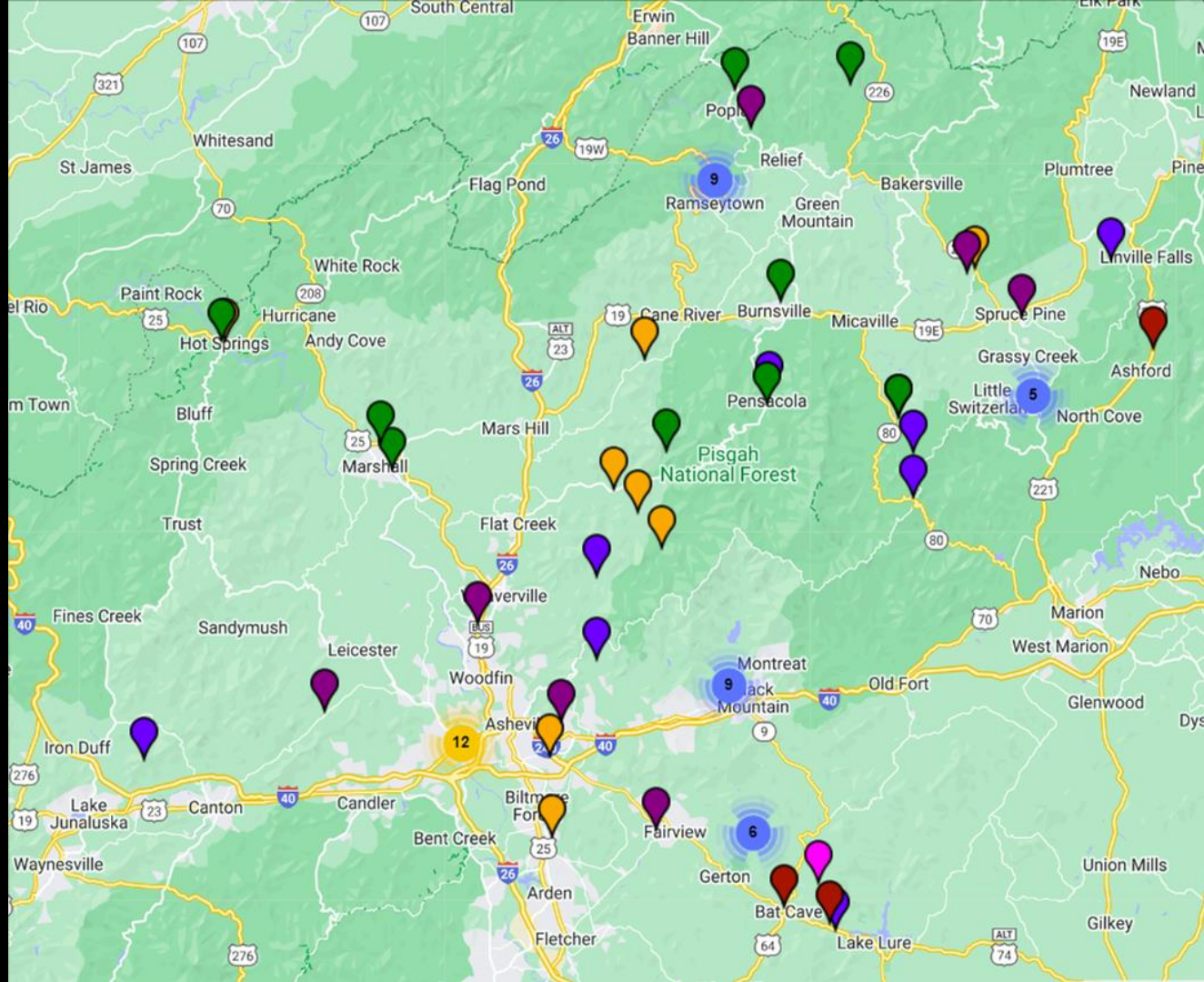
SITES SUPPORTED:
49

KW SOLAR DEPLOYED:
100+

KWH STORAGE:
250+

PEOPLE SERVED BY SITE PARTNERS DAILY:
2,000+

VALUE GROUNDED (SO FAR):
$500k+

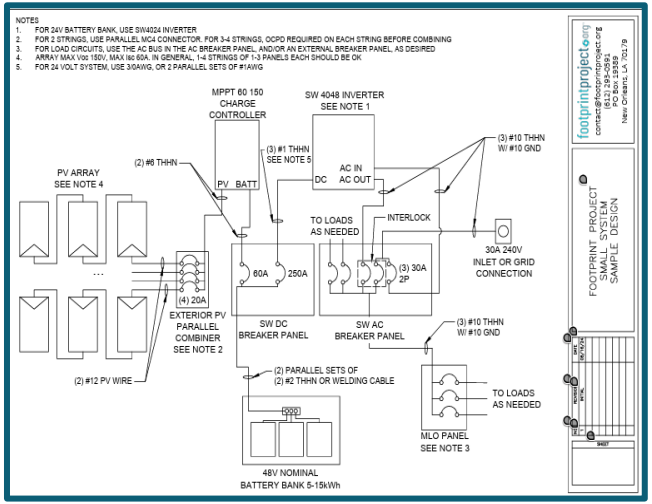


HURRICANE HELENE

Mobile Home Community Well Pump
with Poder Emma
Asheville, NC

Footprint’s Freestore

Opened Spring 2025



footprintproject.org

Western North Carolina Free Store

Hurricane Helene cut a gash across the landscape and social fabric of Western North Carolina. Within 72 hours, Footprint Project was on the scene providing emergency microgrid power to community hubs and vulnerable individuals.

Now, Footprint Project has committed to the ongoing, long-haul recovery & resilience efforts of Western North Carolina and surrounding communities through its WNC Free Store.

Thanks to generous in-kind donations from our many partners, we are offering FREE SOLAR EQUIPMENT for recovery and resilience projects.

For Organizations & Individuals:

Need equipment for a project? Fill out our donation request form below.

For Installers / Electricians:

Want to be part of our Installer Network? Our goal is get solar resilience projects installed quickly & safely, and we are prepared to play matchmaker! Send us an email at **WNCfreestore@footprintproject.org**

Today

- Opened office in WNC- Warehouse in Mars Hill, NC
- 2 Full-Time Program Staff
- Freestore
- 40+ Community Microgrid Projects in the Queue

Looking forward

- Build out permanent microgrid infrastructure
- Grow mobile equipment fleet for response operations in the region
- Continue to support as many “Requests for Power” as we can

Thank you!

CleanEnergyGroup

Western North Carolina Relief

Microgrid Deployment for Near-term Relief and Long-term Resiliency

footprintproject.org™

LAND OF SKY REGIONAL COUNCIL

NC SUSTAINABLE ENERGY ASSOCIATION

Hurricane Helene

- $59.6 Billion Total in Storm Damage (North Carolina)
- 185,000+ damaged homes
- $6.962 estimated ‘Utilities and Natural Resources’ Damages
- 104 Lives Lost

* According to NC Office of State Budget and Management

footprintproject.org™

OUR MISSION

To help build back greener after disasters by mobilizing cleaner energy infrastructure to communities in crisis.

OUR PROGRAMS

We accomplish our mission through three core initiatives:

- **Disaster Response:** We rapidly deploy renewable infrastructure technologies to displace fossil fuels through recovery and help communities reimagine their future.
- **Build Power:** We develop locally-grown resilience by training community responders to assemble, maintain, and activate sustainable disaster tech.
- **Upcycle Energy:** We re-use solar, battery, and power electronics components to keep them out of landfills and lower microgrid implementation costs for community resilience partners.

Footprint Project

footprintproject.org™

MOBILE MICROGRIDS: Anything better than single-source fossil fuels.

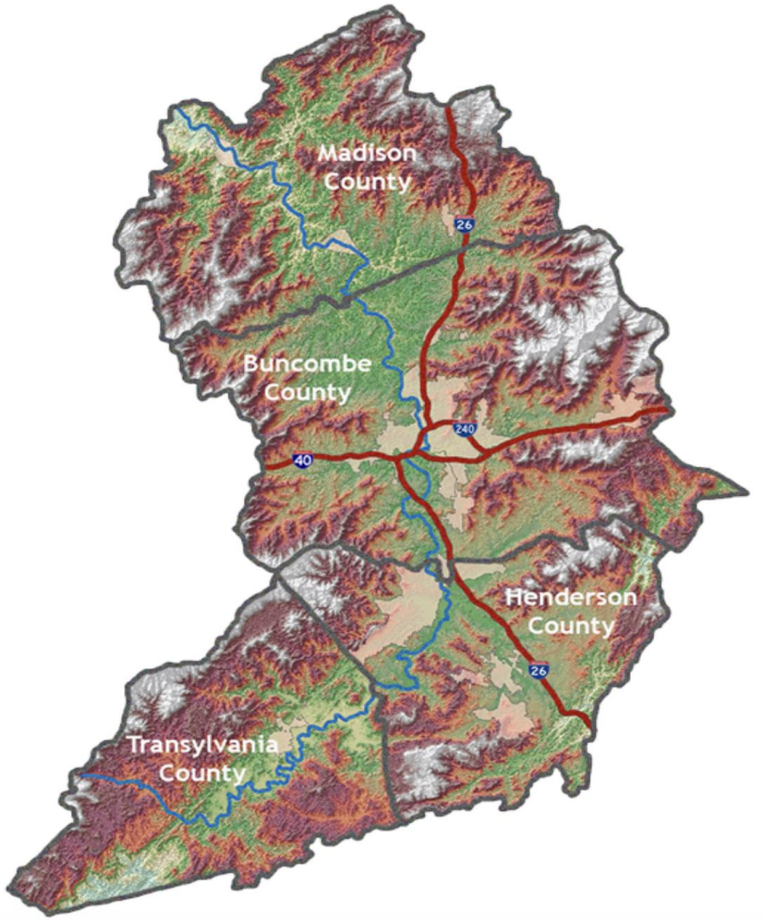
Portable	Towable	Palletized	Containerized
			
Inverter: 1-2 kW Battery: 2-5 kWh Solar: Up to 2 kW	Inverter: 2-20 kW Battery: 10-100 kWh Solar: 2-10 kW	Inverter: 10-50 kW Battery: 10-100 kWh Solar: 10+ kW	Inverter: 50+ kW Battery: 100+ kWh Solar: 10+ kW

Synonyms: charging stations, solar generators, solar trailers, temporary power systems, electric generators... if it's more renewable than gas, we'll use it!

Footprint Project

LAND OF SKY
REGIONAL COUNCIL

Land of Sky Regional Council is a multi-county, local government, planning and development organization. We reach county and municipal borders providing technical assistance to local governments and administer projects and programs which benefit our region's citizens.



Fundraising Efforts

- $850,000+ Cash Raised
- Collectively More than $1.2M of Donated Equipment
- Free Shipping/Transportation into the Region by Greentech Renewables


Bill and Sharon Welsch


Compliments or Conc
(800) 562-8724
RockSolid
CARGO


TOYOTA


ALTITUDE


FP-SG-10-07
NUE


Delivering Humanitarian Relief
LIFT
NON-PROFIT LOGISTICS

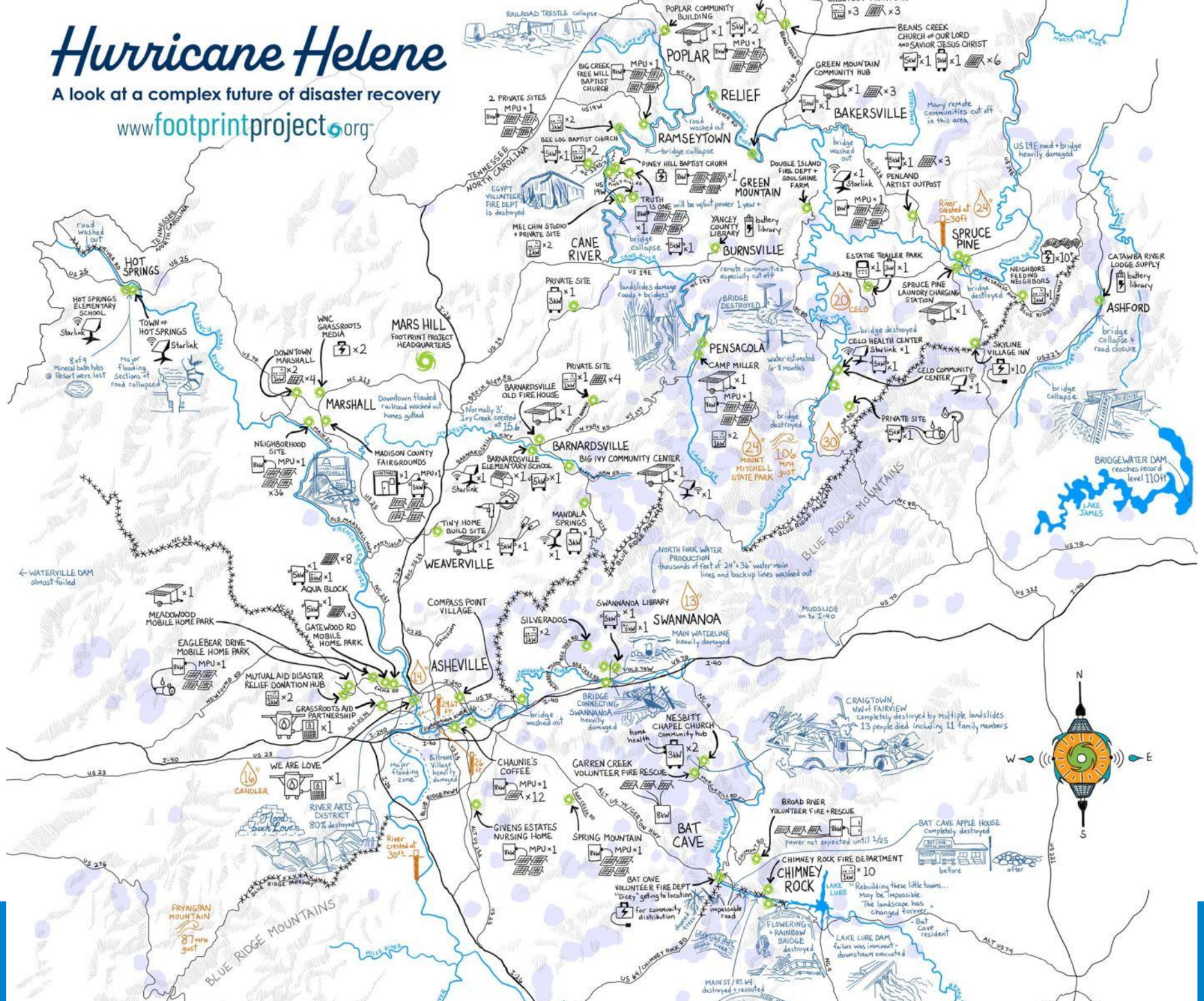

HURRICANE HELENE
Humanitarian Aid and Disaster Relief
DPS
NORTH CAROLINA DEPARTMENT OF PUBLIC SAFETY
LIFT
NON-PROFIT LOGISTICS
www.footprintproject.org
TESLA
TEAM RUBICON
DISASTER RESPONSE
Good360
FEMA
STARLINK
ups


DO IT RIGHT
Lowe's
ACE
HOME DEPOT
HARBOR FREIGHT

Hurricane Helene

A look at a complex future of disaster recovery

www.footprintproject.org™



NC SUSTAINABLE ENERGY ASSOCIATION

Future Funding Opportunity

- Community Resilience Hub Funding
  - Intake Form

- Tickets
- Proceeds to Benefit Footprint Project and Land of Sky Regional Council

OFFICE OF GOVERNOR
JOSH STEIN

Policy Opportunities

Competitive Funding Requested

Grid Hardening – $1 billion

The state requests $1 billion in loan credits for North Carolina's State Energy Office from the U.S. Department of Energy to establish a State Energy Financing Institution (SEFI) and fund microgrids for communications infrastructure.[5] Once established, the SEFI will enable North Carolina to leverage significant investments from DOE's Loan Program Office, providing financing support or credit enhancements for eligible energy projects. This investment will fund a loan program to help communications providers install energy storage microgrids allowing communications infrastructure, such as cell phone towers, to remain operational when the electric grid goes down.

D5 Resilience Backup Power Measures

Provides funding to the State Energy Office in the Department of Environmental Quality (DEQ) to provide grants to councils of government, counties, and other entities to provide solar power and battery backup power for emergency operations and other critical infrastructure. Funds may be used to install solar and storage microgrids that would allow critical infrastructure to remain operational when the electric grid goes down. These solar and battery arrays are mobile and can also be permanently attached to the local grid to act as long-term microgrids for future emergencies.

Req.	$	10,000,000
Rec.	$	10,000,000
NetApp.	$	-

Future Opportunities

- What barriers exist to deploying more resilient infrastructure like solar and storage microgrids in NC?
- What types of opportunities exist for collaboration between the utility, community organizations, clean energy groups, and local government to deploy more equipment like solar and battery storage?
- How do we ensure this equipment is being deployed to communities who need it most?