

Southern States Energy Board

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EVOLUTION ENERGY

NEXT 25 YEARS











Reimagining the Power System of the Future



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Example use cases			Description		Lithium-ion is the dominant	
					technology	
Generation	\otimes	Renewables Firming	Mitigate the variability of renewables			
	\otimes	Clipped Energy Capture	Enable greater energy capture for solar		The cost of lithium-ion batteries is	
	\otimes	Steady Ramp-rate	Smooth ramps from renewable intermittency		steadily	
	\otimes	Peaker Planning	Defer investment in peaker plants			
	\otimes	Voltage Regulation	Manage system voltage in short-term		Mature technology in electric vehicles	
	\otimes	Energy Arbitrage	Charge and discharge when economical	_ \/		
				- μ/	Project capacities are increasing, enabling	
Grid	\otimes	T&D Deferral	Defer T&D investments		learning efficiencies	
	\otimes	Islanding	Enable grid segments to autonomously operate for long duration outages		Next-gen technologies are more nascent	
Customer	\otimes	Customer Demand	Help minimize demand charges	_	Pumped hydro storage projects require	
	\otimes	Back-up Power	Increase reliability during short outages	_	regulatory push, large up-front investment	

Note: Li-ion cannot currently address islanding use case because islanding requires duration of 4+ hours

Source: Cleantechnica; Energy Storage Journal; R&D Magazine; Battery University; Energy Storage Report; MIT; Greentech Media; DOE Global Energy Storage Database; Company press releases





Project Overview:

Duke Energy will construct, own, and operate a battery energy storage system located on property adjacent to the Anderson Civic Center (ACC) and leased from Anderson County. The battery will be used by Duke Energy Carolinas grid operators to maintain grid frequency, supply power during peak energy needs, and help improve operational efficiency of the grid. The battery will be configured as a microgrid, which will allow it to provide backup power to the Anderson Civic Center during an outage.

Project Details:

- Size: 5 MW / 5 MWh
- Area of Land: ~0.5 acres
- Expected Operation Date: 2020

The ACC provides the following emergency needs:

- SC Department of Health and Environmental Control
 - Special Medical Needs Shelter (Largest shelter in SC Capacity for 500 patients + 500 caregivers)
 - Distribution point for Strategic National Drug Stockpile
 - Weather Emergency Shelter (hurricane, ice storm, extreme heat/cold)
 - Oconee Nuclear Station Evacuation Shelter
- Anderson School District Five (students brought here if schools are evacuated)
 - Westside High School
 - Whitehall Elementary School
- American Red Cross shelter for disaster victims





Western North Carolina Modernization :

DEP will deploy battery projects throughout the region, with construction beginning in 2019.

Hot Springs (3 MWdc Solar + 4.4 MW Battery):

- 1. Provides back-up power to a remote community fed with a single distribution line
- 2. Improved efficiency of the bulk system
- 3. Aggregated storage deployment supports the deferral of the Future Asheville CT unit by freeing up existing generation capacity to then serve the winter peak.
- 4. Approved by the NCUC and will be on-line in Q1 2020



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Business Case

Mt. Sterling Fire Tower is located on a peak in the Great Smoky Mountains. It is the only customer served by a 5-mile 12.47 kV distribution feeder. The feeder averages 3+ major outages per year, each 1 week in duration

Goal

- Improve reliability for customer
- Reduce O&M
- Give ROW back to Park Service

Technology

 Utility-owned and -operated micro-grid that serves a remote customer_off-grid through 10 kW solar PV + 95

	Base Case	Microgrid Case
Technology	12.47 kV Distribution	10 kW Solar PV &
recimology	<u>Feeder</u>	95 kWh Battery
Employee Safety	Ļ	1
Footprint	1	+
Reliability	Ļ	1
Emissions	1	↓
Revenue Requirement	1	Ļ





Project Overview:

The Cape San Blas Energy Storage project is an economical alternative to replacing distribution equipment necessary to accommodate local load growth. The battery project will also benefit the larger Duke Energy Florida grid by providing frequency regulation service and peak load shaving. Approved by FPUC as part of a 50 MW pilot program.

Project Details:

- Size: 5.5 MW / 14 MWh
- Area of Land: ~2 acres
- Expected Operation Date: Q4 2020

Distribution Applications:

- Peak Load only occurs around 4th of July holiday week.
- Defer a 12 mile radial distribution line reconductoring project
- Defer a new transformer investment at the substation

Generation Applications:

- Distribution application requires battery for 1-2 weeks each summer
- Battery will provide capacity during system peak
- Battery can provide frequency regulation or other ancillary services

