BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-7, SUB 1276

In the Matter of:	)	
	)	**DIRECT TESTIMONY OF**
Application of Duke Energy Carolinas, LLC	)	**LAUREL M. MEEKS AND**
For Adjustment of Rates and Charges Applicable	)	**EVAN W. SHEARER**
to Electric Service in North Carolina and	)	**FOR DUKE ENERGY**
Performance-Based Regulation	)	**CAROLINAS, LLC**
	)	

I. INTRODUCTION

Q. MRS. MEEKS, PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Laurel M. Meeks. My business address is 400 S. Tryon Street, Charlotte, North Carolina 28202.

Q. BEFORE INTRODUCING YOURSELF FURTHER, PLEASE INTRODUCE THE PANEL.

A. I am appearing on behalf of Duke Energy Carolinas, LLC ("DEC" or "the Company"), together with Evan W. Shearer. Collectively, we are referred to as the "Battery Energy Storage Panel."

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by Duke Energy Carolinas, LLC ("DEC") as Director of Renewable Business Development at Duke Energy Corporation. DEC is a subsidiary of Duke Energy Corporation ("Duke Energy").

Q. PLEASE SUMMARIZE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE.

A. I graduated from the University of North Carolina at Chapel Hill with a bachelor's degree in 2011 and Master of Business Administration with an Energy Concentration in 2019. My educational experience is coupled with over seven years of experience in the energy sector and ten years of experience in business administration and development. For the past three years, I have worked on the Energy Storage Development team on behalf of the regulated arm of Duke Energy.

Q. PLEASE BRIEFLY DESCRIBE YOUR DUTIES AS DIRECTOR OF RENEWABLE BUSINESS DEVELOPMENT.

A. I currently lead a team of project developers responsible for the initiation and deployment of regulated battery energy storage and microgrid systems.

Q. HAVE YOU TESTIFIED BEFORE THIS COMMISSION?

A. No. I have not but I presented on behalf of Company at the Transmission & Distribution ("T&D") Technical Conference before this Commission on November 2, 2022. In addition, I submitted pre-filed direct testimony in support of DEP's pending rate case proceeding in Docket No. E-2, Sub 1300.

Q. MR. SHEARER, PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Evan W. Shearer. My business address is 526 South Church Street, Charlotte, North Carolina 28202.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by DEC as Principal Integrated Planning Coordinator, providing planning guidance for both DEP and DEC (collectively, the "Companies"), which are subsidiaries of Duke Energy.

Q. PLEASE SUMMARIZE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE.

A. I graduated from Boston College in 2007 with a bachelor's degree in history and English and from the University of South Carolina in 2017 with a master's degree in Business Administration. I joined Duke Energy in 2013 and spent eight years in various regulatory strategy roles for Duke Energy's Customer

Delivery and Grid Modernization organizations. I assumed my current role and joined the Integrated Systems and Operations Planning ("ISOP") team in 2021. Prior to working at Duke Energy, I was a Telecom Infrastructure Specialist with the Vermont Public Service Department, which included responsibilities overseeing smart grid activities by utilities in the state.

Q. PLEASE BRIEFLY DESCRIBE YOUR DUTIES AS PRINCIPAL INTEGRATED PLANNING COORDINATOR.

A. My responsibilities on the ISOP team have included preparing the ISOP Appendix to the 2022 Carolinas Carbon Plan ("Carbon Plan") and representing ISOP on the Carolinas Transmission and Distribution Climate Risk and Resilience Study.

Q. HAVE YOU TESTIFIED BEFORE THIS COMMISSION IN ANY PRIOR PROCEEDINGS?

A. No. I have not, but I submitted pre-filed direct testimony in support of DEP's pending rate case proceeding in Docket No. E-2, Sub 1300.

Q. MR. SHEARER, PLEASE DESCRIBE THE PURPOSE OF YOUR JOINT TESTIMONY [COMMISSION RULE R1-17B(d)(2)j.].

A. Our testimony supports the portfolio of discrete and identifiable battery energy storage investments included in DEC's proposed multiyear rate plan ("MYRP"). We discuss key factors driving the proposed investments—these projects support continued renewable development, integration and expansion while also encouraging carbon reductions. Importantly, battery energy storage solutions are necessary components in all future resource portfolios as DEC transitions to a cleaner energy future. Furthermore, DEC's proposed battery energy storage projects provide solutions for improving reliability for communities geographically isolated or remote circuits and enhance service for critical customer loads.

Q. PLEASE DESCRIBE THE EXHIBITS TO YOUR TESTIMONY.

A. Our testimony includes the following five exhibits:

- Battery Energy Storage Panel Exhibit 1 lists the battery energy storage projects included in DEC's proposed MYRP and details the projected cost, schedule, and scope for each MYRP project, as well as the reasoning for each project as required by Commission Rule R1-17B(d)(2)j.
- Battery Energy Storage Panel Exhibit 2 contains detailed descriptions of each battery energy storage project included in DEC's proposed MYRP and summarizes key components of each project.
- Battery Energy Storage Panel Exhibit 3 provides a program summary for the portfolio of battery energy storage projects that were presented at the T&D Technical Conference.
- Battery Energy Storage Panel Exhibit 4 includes the cost benefit analyses ("CBAs") for the projects presented at the T&D Technical Conference.
- Battery Energy Storage Panel Exhibit 5 outlines the methodology DEC employed in developing the CBAs included in Battery Energy Storage Panel Exhibit 4.

Q. WERE THESE EXHIBITS PREPARED BY YOU OR UNDER YOUR DIRECTION AND SUPERVISION?

A. Yes. These exhibits were prepared under our supervision and direction.

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. Our testimony describes the battery energy storage portfolio that DEC has included in the proposed MYRP. We highlight the critical importance of battery energy storage as DEC, and the entire industry, transition to a cleaner energy future. All paths forward include battery energy storage solutions as a tool to facilitate the transition. Our testimony discusses how DEC and its customers will benefit from a flexible resource that can serve multiple grid functions across generation, transmission, and distribution systems. To that end, DEC's proposed battery energy storage portfolio consists of near-term, prudent investments that that will play an integral role in the next phases of this transition. This portfolio was included as part of the battery storage resources in the 2018, 2019, and 2020 Integrated Resource Plans ("IRPs").[1] Furthermore, these efforts facilitate DEC's ability to begin executing the battery energy storage volume identified in the Carbon Plan near-term action plan and approved by the Commission in its Carbon Plan Order.[2]

[1] These projects have been included in the Companies' IRPs since 2018 and were more recently included in the 2020 IRPs, which were approved by the Commission in Docket No. E-100, Sub 165. *See Order Accepting Integrated Resource Plans, REPS, and CPRE Program Plans with Conditions and Providing Further Direction for Future Planning* (Nov. 19, 2021).

[2] *See Duke Energy Progress, LLC and Duke Energy Carolinas, LLC, 2022 Biennial Integrated Resource Plans and Carbon Plan*, Docket No. E-100, Sub 179 (May 16, 2022) Chapter 4: Execution Plan at 22-23; *Order Adopting Initial Carbon Plan and Providing Direction For Future Planning*, Docket No. E-100, Sub 179 (Dec. 30, 2022) ("Carbon Plan Order").

II. MYRP BATTERY ENERGY STORAGE PROJECTS

Q. PLEASE PROVIDE AN OVERVIEW OF THE BATTERY ENERGY STORAGE PROJECTS INCLUDED IN DEC'S PROPOSED MYRP. [COMMISSION RULE R1-17B(d)(2)j.].

A. DEC's proposed MYRP includes the following nine battery energy storage projects: Lowgap, Monroe, Frieden, Novant Health, Nebo, Rich Mountain, Longtown, Farr's Bridge, and Allen. Battery Energy Storage Panel Exhibits 1 and 2 provide detailed information on each proposed investment, including the reason, scope, and estimated cost as required by Commission Rule R1-17B(d)(2)j. This information is supplemented, where appropriate, by Exhibits 1—4 of Witness Kathryn S. Taylor.

Q. WERE ANY OF THE PROPOSED BATTERY ENERGY STORAGE PROJECTS PRESENTED AT THE T&D TECHNICAL CONFERENCE HELD IN THIS PROCEEDING?

A. Yes. Consistent with Commission Rule R1-17b(c), DEC presented the battery storage projects that are functionalized as distribution assets at the T&D Technical Conference. These specific projects fall within two categories: Reliability and Critical Community Customer. Battery Energy Storage Panel Exhibits 3—5 reflect the detailed information and supporting data provided at the T&D Technical Conference for these proposed investments. Only projected transmission and distribution projects included in DEC's proposed MYRP were presented at the T&D Technical Conference—DEC did not discuss the Allen, Monroe, or Frieden projects, which are not functionalized as distribution assets.

Q. PLEASE FURTHER DESCRIBE THE BATTERY ENERGY STORAGE PROJECTS INCLUDED IN DEC'S PROPOSED MYRP.

A. The Nebo, Lowgap, Rich Mountain, Longtown, and Farr's Bridge projects are reliability battery storage projects, and as noted above, were presented at the T&D Technical Conference. These projects are located on feeders and circuits that face unique reliability challenges with limited options for traditional outage mitigation improvements. These projects improve reliability and resiliency, and speed restoration times for circuits in those areas.

Allen, Frieden and Monroe are characterized as "bulk services" battery projects.

- <u>Allen</u>: As designed, the Allen battery project will be DEC's largest battery installation, consisting of a 50 MW, 4-hour bulk services battery. The Allen battery project is sited near the retiring Allen coal plant, which will provide DEC with direct learnings and experience with repurposing and reutilizing brownfield sites for new technologies. The Allen battery project will provide important experience and systemwide benefits, including bulk system capacity and ancillary services. Furthermore, this project will provide grid scale energy arbitrage services allowing the transfer of energy during peak periods. DEC will benefit from this suite of services as it manages the next stages of the energy transition.
- <u>Frieden</u>: This project is a 3.6 MW, 1-hour battery. Frieden is a part of a fleet of batteries used to test and perfect DEC's ability to provide bulk system benefits with distribution interconnection points. DEC also anticipates that

the Frieden project will facilitate testing and validating PV smoothing capabilities as a use case that DEC could apply more widely in areas with high distributed solar penetration. PV smoothing assets are strategically sited to enable exploring the value of energy storage which "smooths" the output of multiple local solar resources.

- <u>Monroe</u>: This project is co-located with the existing Monroe Solar Facility. This project is designed to utilize existing infrastructure and the interconnection agreement for the Monroe Solar Facility, resulting in reduced costs and a significantly reduced development timeline compared to storage projects using a new interconnection. This project is designed to maintain a 25 MW, (2-hour) sizing through its life.

Lastly, the Novant Health battery project provides an energy storage solution that enhances service for a critical customer—Novant Health, a large regional hospital. In addition to improving service reliability for a critical DEC customer, this battery will provide system wide bulk capacity or ancillary services when not serving its reliability function. This project is designed around a 2.75MW (1 hour) battery energy storage system.

Q. PLEASE DESCRIBE HOW DEC IDENTIFIED AND SELECTED THE RELIABILITY AND CRITICAL COMMUNITY CUSTOMER BATTERY STORAGE PROJECTS TO INCLUDE IN DEC'S MYRP.

A. DEC initially identified reliability projects using a composite approach that combined data-driven and local grid planning analyses. A centralized engineering team analyzed distribution circuits serving electric load clustered far from a substation. Concurrently, distribution planning experts and technicians conducted a local grid planning analysis to identify circuits with a history of outage restoration challenges and limited options for traditional outage mitigation improvements.

DEC selected the Novant Health project was after it examined circuit geography, outage history, and availability of alternative feeds to mitigate future outages. DEC also conducted an engineering analysis to optimize the sizing of the system based on local outage history and factored this analysis into the determination of the geographic bounds of the microgrid area.

Q. PLEASE ELABORATE ON THE ANTICIPATED BENEFITS THAT WILL RESULT FROM THE BATTERY ENERGY STORAGE PORTFOLIO INCLUDED IN DEC'S PROPOSED MYRP.

A. Battery Energy Storage Panel Exhibit 2 contains detailed information for each proposed project and identifies anticipated benefits that will result from these investments. In addition, as mentioned above, Battery Energy Storage Panel Exhibits 3—5 provide additional information on the battery projects discussed at the T&D Technical Conference.

Q. DO ANY OF THE PROPOSED BATTERY ENERGY STORAGE PROJECTS OFFER PROJECTED OPERATING BENEFITS?

A. DEC anticipates that the standalone storage Investment Tax Credit ("ITC") within the recently enacted Inflation Reduction Act ("IRA") will provide value to DEC's retail customers over the course of each MYRP storage project's recovery life, and thus, constitute an operational benefit within the meaning of

N.C. Gen. Stat. § 62-133.16(c)(1)(a). Taylor Exhibit 4 shows the calculation of the revenue requirement for each MYRP project and includes an estimated revenue requirement impact associated with potential IRA tax credits. The testimony of Witness John R. Panizza summarizes the key tax related components of the IRA and provides an overview of the changes most applicable to DEC.

Q. PLEASE EXPLAIN THE ASSUMPTIONS REGARDING THE STANDALONE STORAGE ITC REFLECTED IN THE EXHIBITS TO YOUR TESTIMONY.

A. The standalone storage ITC is factored into Battery Energy Storage Panel Exhibit 4 and discussed in Battery Energy Storage Panel Exhibit 5. For the CBAs, Battery Energy Storage Panel Exhibit 4 reflects simple assumptions made soon after enactment of the IRA—the purpose of these preliminary assumptions was to share potential ITC impacts in the T&D Technical Conference held on November 2, 2022. Those assumptions, which can be clearly seen in the negative revenue requirement figures in 2031 on the CBA summaries, were as follows:

- 30% ITC rates for all battery energy storage projects except for the Allen battery, which assumes a 40% ITC rate because it is located in or adjacent to an "Energy Community" as defined in the IRA, and thus is eligible for a 10% ITC adder. ITC rates are further described in the testimony of Witness Panizza.
- No transferability. Rather than transferring the credits, the CBAs

assume that DEC will keep the tax credits. Importantly, when DEC developed Battery Energy Storage Panel Exhibit 4, reasonable assumptions on credit transfers had not been established.

- No monetization. Assumed DEC would not have a tax need that would allow for monetization of the tax credits until 2031.

Witness Taylor subsequently took capital costs and ITC rate assumptions for individual projects from the Battery Energy Storage Panel to make further assumptions based upon information from Witness Panizza as to how the expected ITCs should be reflected from a ratemaking perspective.

Q. DID THE COMPANY QUANTIFY OTHER BENEFITS FOR THE PROPOSED BATTERY ENERGY STORAGE PROJECTS?

A. Yes. The ISOP team quantified system benefits (capacity, energy arbitrage, and ancillary service values) for all energy storage projects in the DEC MYRP using proxy values derived from the 2020 IRP. Benefits such as capacity, energy, and grid services result in lower system-wide costs compared to what they would have been without these new resources. These benefits are passed on to customers in the ordinary course through avoided cost and fuel proceedings and other avenues.

Q. HAS THE COMPANY CONSIDERED THE POTENTIAL FOR FUNDING UNDER THE FEDERAL INFRASTRUCTURE INVESTMENT AND JOBS ACT ("IIJA") FOR THE PROPOSED MYRP BATTERY ENERGY STORAGE PROJECTS?

A. Yes. DEC is actively engaged in the ongoing review and implementation of the IIJA at the state and federal levels. Regarding battery energy storage projects specifically, DEC recently submitted concept papers to the Department of Energy ("DOE") for the first round of Grid Resilience and Innovative Partnerships ("GRIP") program. GRIP combines three IIJA grid resilience and modernization programs. The battery storage team is collaborating with other business units to request funding for a suite of T&D projects.

Q. HOW WILL POTENTIAL GRIP PROGRAM FUNDING IMPACT DEC'S PROPOSED MYRP BATTERY ENERGY STORAGE PROJECTS?

A. The Lowgap, Nebo, and Novant Battery Energy Storage projects will be included in DEC's GRIP funding request. On December 16, 2022, DEC submitted the required concept papers to the DOE; applications are due in April 2023. Although DEC is diligently pursing IIJA funding opportunities for the benefit of our customers, the GRIP program is highly competitive. DEC maintains that the proposed battery energy storage projects included in DEC's MYRP will benefit customers even if DEC does not receive IIJA funding.

Q. DID THE COMPANY CONSIDER COST WHEN IDENTIFYING BATTERY ENERGY STORAGE PROJECTS FOR THE PROPOSED MYRP [COMMISSION RULE R1-17B(d)(2)j.]?

A. Yes. Project cost was one criterion that DEC considering when identifying which battery energy storage projects to include in its MYRP. However, it is important to highlight that each project included in DEC's MYRP portfolio is critical: prudent utility planning supports the Company undertaking these investments to navigate the energy transition while continuing to provide customers with affordable and reliable service. DEC also considered lead time, location, and value when identifying the battery energy storage projects to include in DEC proposed MYRP.

Q. PLEASE EXPLAIN CRITERIA OTHER THAN COST THAT DEC CONSIDERED WHEN SELECTING WHICH BATTERY ENERGY STORAGE PROJECTS TO INCLUDE IN THE MYRP.

A. First, DEC prioritized projects that could be placed in-service prior to 2027 to support timing described in the 2018[3], 2019[4], and 2020[5] IRPs. The Companies have learned over the past decade of development that grid-connected batteries frequently require a multi-year lead-time. DEC's proposed battery energy storage projects employ a variety of strategies to achieve faster deployment,

[3] *See Duke Energy Carolinas, LLC 2018 Integrated Resource Plan and 2018 REPS Compliance Plan*, Docket No. E-100, Sub 157, (Sept. 5, 2018) ("2018 IRP") at 76 (Table 13-A).
[4] *See* 2019 IRP Update at 76 (Table 10-A).
[5] *See Duke Energy Carolinas, LLC 2020 Integrated Resource Plan Corrections*, Docket No. E-100, Sub 165 (Nov. 6, 2020) at 120 (Table 14-B).

such as utilization of an existing interconnection agreement or early development efforts.

Second, DEC strategically selected project locations where existing infrastructure and land can be leveraged—this approach reduces local community impact. Third, DEC selected projects that ensure a variety of business development, construction, and operational environments. This "All of the Above" development approach ensures that DEC has an appropriate mix of configurations, sites, and use cases. Moreover, this project selection approach will facilitate DEC's ability to expand energy storage generation, transmission, and distribution systems in the years beyond the MYRP.

Finally, DEC focused on selecting projects that maximize customer and grid values over the asset life through demonstration of "stacked values." Battery Energy Storage Panel Exhibit 2 further details the proposed portfolio and individual project benefits to DEC customers.

Q. DO THE PROPOSED MYRP BATTERY ENERGY STORAGE PROJECTS SATISFY THE SELECTION CRITERIA DESCRIBED ABOVE?

A. Yes. As described in Battery Energy Storage Panel Exhibit 2, MYRP battery energy storage projects satisfy the selection criteria described above.

Q. HOW DID DEC DEVELOP COST ESTIMATES FOR THE MYRP BATTERY ENERGY STORAGE PROJECTS?

A. DEC used internal cost projections in developing cost estimates for the proposed battery energy storage projects. Specifically, DEC estimated costs based on averages/ranges of: (1) construction labor and engineering costs from previous projects; (2) averages/ranges of equipment costs from real-time 2022 market supplier data; and (3) Q2 2022 interconnection study cost estimates. In addition, DEC plans to competitively bid the major components and construction of the projects for the benefit of customers.

Q. DOES THIS CONCLUDE THE PANEL'S PRE-FILED DIRECT TESTIMONY?

A. Yes.

DUKE ENERGY CAROLINAS
MYRP PROJECT LIST
DOCKET NO. E-7 Sub 1276

Line No.	MYRP Project Name	FERC Function	Forecasted In-Service Date	Project Description & Scope	Reason for the Project	Total Project Amount (System): Projected In-Service Costs	Projected Annual Net O&M	Projected Installation O&M
1	Allen	Other Production Plant in Service	Dec-25	This is a 50MW, 4 hour battery connected at the retiring Allen steam plant.	Energy storage supports the continued and increasing pace of connecting carbon-free intermittent resources, e.g., solar and wind, to the grid, while enhancing customer reliability and providing cost-effective solutions for transmission and distribution deferral.	$ 119,000,000	$ 1,500,000	$ -
2	Farr's Bridge	50% Distribution Plant in Service 50% Other Production Plant in Service	Sep-25	This is a 5.3MW microgrid in DEC, supporting both production and distribution systems.	Energy storage supports the continued and increasing pace of connecting carbon-free intermittent resources, e.g., solar and wind, to the grid, while enhancing customer reliability and providing cost-effective solutions for transmission and distribution deferral.	$ 26,250,000	$ 190,000	$ -
3	Frieden	Other Production Plant in Service	Dec-24	This is a 3.6MW battery in Guilford county, supporting the production system.	Energy storage supports the continued and increasing pace of connecting carbon-free intermittent resources, e.g., solar and wind, to the grid, while enhancing customer reliability and providing cost-effective solutions for transmission and distribution deferral.	$ 12,000,000	$ 108,000	$ -
4	Longtown	50% Distribution Plant in Service 50% Other Production Plant in Service	Sep-25	This is a 4.6MW microgrid in DEC, supporting both production and distribution systems.	Energy storage supports the continued and increasing pace of connecting carbon-free intermittent resources, e.g., solar and wind, to the grid, while enhancing customer reliability and providing cost-effective solutions for transmission and distribution deferral.	$ 15,250,000	$ 190,000	$ -
5	Lowgap	50% Distribution Plant in Service 50% Other Production Plant in Service	Jun-25	This is a 2.7MW microgrid in DEC, supporting both production and distribution systems.	Energy storage supports the continued and increasing pace of connecting carbon-free intermittent resources, e.g., solar and wind, to the grid, while enhancing customer reliability and providing cost-effective solutions for transmission and distribution deferral.	$ 10,500,000	$ 81,000	$ -
6	Monroe	Other Production Plant in Service	Jul-24	This is a 25 MW, 2 hour battery connected to existing solar project owned/operated by DEC.	Energy storage supports the continued and increasing pace of connecting carbon-free intermittent resources, e.g., solar and wind, to the grid, while enhancing customer reliability and providing cost-effective solutions for transmission and distribution deferral.	$ 35,000,000	$ 750,000	$ -
7	Nebo	50% Distribution Plant in Service 50% Other Production Plant in Service	Jun-25	This is a 2.7MW microgrid in DEC, supporting both production and distribution systems.	Energy storage supports the continued and increasing pace of connecting carbon-free intermittent resources, e.g., solar and wind, to the grid, while enhancing customer reliability and providing cost-effective solutions for transmission and distribution deferral.	$ 11,500,000	$ 81,000	$ -
8	Novant Health	50% Distribution Plant in Service 50% Other Production Plant in Service	Sep-24	This is a 2.75MW battery in Mecklenburg county, supporting both production and distribution systems.	Energy storage supports the continued and increasing pace of connecting carbon-free intermittent resources, e.g., solar and wind, to the grid, while enhancing customer reliability and providing cost-effective solutions for transmission and distribution deferral.	$ 7,500,000	$ 82,500	$ -
9	Rich Mountain	50% Distribution Plant in Service 50% Other Production Plant in Service	Sep-25	This is a 8.4MW microgrid in DEC, supporting both production and distribution systems.	Energy storage supports the continued and increasing pace of connecting carbon-free intermittent resources, e.g., solar and wind, to the grid, while enhancing customer reliability and providing cost-effective solutions for transmission and distribution deferral.	$ 12,500,000	$ 190,000	$ -
	TOTALS					**$ 249,500,000**	**$ 3,172,500**	**$ -**

Docket No. E-7, Sub 1276 Battery Energy Storage Panel - Exhibit 2 Project Summaries

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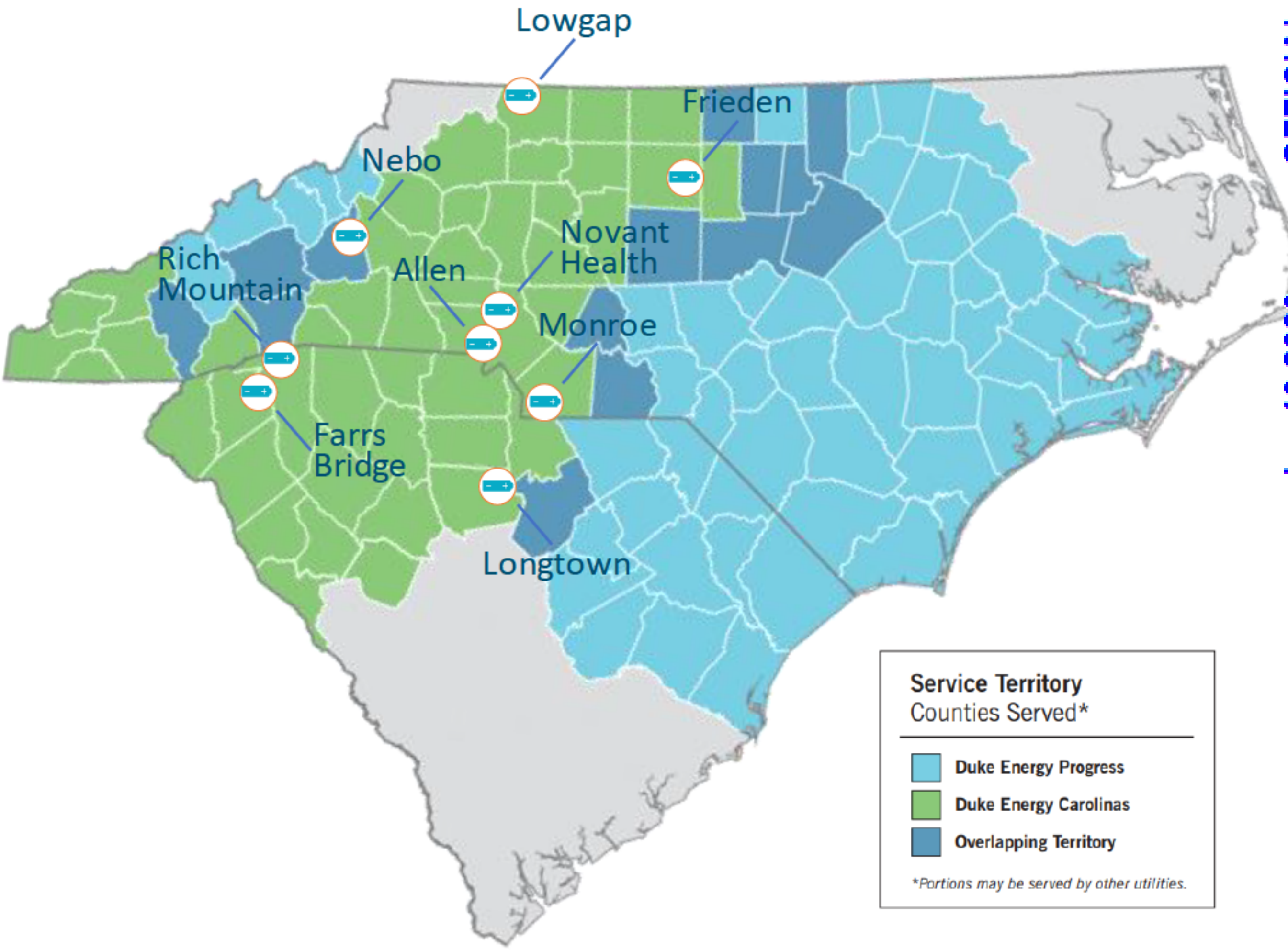
Map of Projects



Project	County	MW	MWh	CAPEX ($MM)	Target COD	Point-of-Interconnection
Frieden	Guilford	3.6	4.5	$12.0	Dec ‘24	Distribution
Monroe	Union	25.0	50.0	$35.0	Jul ‘24	Transmission
Novant Health	Mecklenburg	2.75	2.75	$7.5	Sep ‘24	Distribution
Nebo	Burke	2.7	8.6	$11.5	Jun ‘25	Distribution
Lowgap	Surry	2.7	8.0	$10.5	Jun ‘25	Distribution
Rich Mountain	Greenville	8.4	9.2	$12.5	Sep ‘25	Distribution
Longtown	Fairfield	4.6	12.0	$15.2	Sep ‘25	Distribution
Farrs Bridge	Pickens	5.3	25.0	$26.2	Sep ‘25	Distribution
Allen	Gaston	50.0	200.0	$119.0	Dec ‘25	Transmission

Project: Frieden

County	Guilford
Power	3.6 MW
Energy	4.5 MWh
CAPEX ($MM)	$12.0
Estimated ISD	Dec'24
Point of Interconnection	Distribution
PMCOE Gate/Date	Select – May'20
Associated Substation	Frieden Retail

Functions
Energy Arbitrage
Capacity
Ancillary Services

Strategic Rationale:

- Part of a local fleet of batteries testing and perfecting the ability to provide bulk system benefits with distribution interconnection points. This asset is unique within planned portfolios in that it is strategically sited to enable exploring the value of energy storage which "PV smooths" the output of multiple local solar resources.
- Uses existing land and infrastructure to lower development and operations cost.

Location: Adjacent to Duke Energy Carolinas Frieden Retail 100kV substation in Guilford County NC on land owned by Duke Energy.

Design Power/Energy: Designed to provide bulk system benefits via the medium voltage bus of a retail substation, the project is to maintain a 3.6 MW, 4.5 MWh (1+ hour) sizing through its life.

Expected Technology: Containerized, lithium-chemistry electrochemical battery storage, industry-proven, packaged DC-AC inverters, flexible battery control software/hardware, and best-in-class safety features.

Cost: A 2022 Class 4 estimate predicts the overnight capital investment for this project will be $12.0 MM.

Estimated ISD: Based upon expected timelines for interconnection study and subsequent required work to construct network upgrades and point-of-interconnection, this project is expected to enter service in December 2024.

Point of Interconnection: This project is to connect to the DEC distribution system, specifically the Frieden Retail 2405 circuit.

Selection History: The project was successfully screened in May 2020 Select Gate Review.

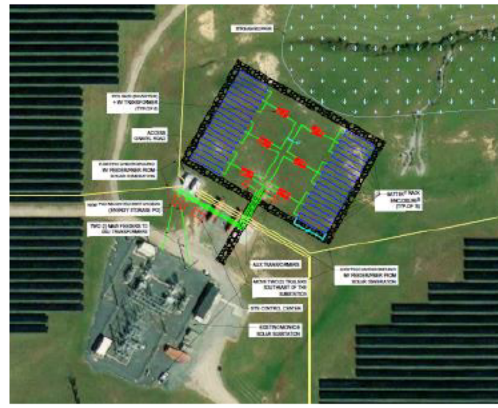
Interconnection Study: An interconnection request has been submitted and the study process is on-going.

Functionality: It is expected that this project will test and validate the ability for distribution-connected resources not held in reserve for reliability functions to provide bulk system capacity, energy arbitrage and ancillary services. Additionally, testing of this project will exploring the value of a battery storage system which is used to "PV smooth" the output of multiple solar distributed energy resources connected to the distribution circuits within the same substation.

Project: Monroe

County	Union
Power	25 MW
Energy	50 MWh
CAPEX ($MM)	$35.0
Estimated ISD	Jul'24
Point of Interconnection	Transmission
PMCOE Milestone/Date	Select – Apr '22
Associated Substation	Monroe Solar

Functions
Energy Arbitrage
Capacity
Ancillary Services



Strategic Rationale:

- Maximizes use of existing interconnection rights with surplus interconnection, lowering interconnection cost and accelerating deployment timeline.
- Uses existing land to lower development and operations cost.
- May provide access to investment tax credit as well as production tax credit due to co-location with solar.

Location: Adjacent to Duke Energy Progress' Monroe Solar Generating Facility in Union County NC on land owned by Duke Energy.

Design Power/Energy: Designed to utilize the existing infrastructure and interconnection agreement of the Monroe Solar Facility, the project is to maintain a 25 MW, 50 MWh (2-hour) sizing through its life. The battery system is co-located with the existing solar facility.

Expected Technology: Containerized, lithium-chemistry electrochemical battery storage, industry-proven, packaged DC-AC inverters, flexible battery control software/hardware, and best-in-class safety features.

Cost: A 2022 Class 5 estimate predicts the overnight capital investment for this project will be $ 35.0 MM.

Estimated ISD: Based upon expected timelines for interconnection study and subsequent required work to construct point-of-interconnection facilities, this project is expected to enter service in July 2024.

Point of Interconnection: This project is to connect to the DEP transmission system at the Monroe Solar 100kV Substation.

Selection History: The project was successfully screened in an April 2022 Select Gate Review.

Interconnection Study: A Surplus interconnection request has been submitted for the project and the study process is ongoing.

Functionality: It is expected that this project will provide bulk system capacity, energy arbitrage and ancillary services.

Additional Notes: By utilizing the existing interconnection agreement for the Monroe Solar 100kV substation, this project is expected to have a significantly reduced development timeline and cost compared to storage projects using net new interconnection.

Project: Novant Health

County	Mecklenburg
Power	2.75 MW
Energy	2.75 MWh
CAPEX ($MM)	$7.5
Estimated ISD	Sep'24
Point of Interconnection	Distribution
PMCOE Milestone/Date	Select – Dec'21
Associated Substation	Reames Rd Ret

Functions
Reliability
Energy Arbitrage
Capacity
Ancillary Services

Strategic Rationale:

- Improves reliability and resiliency to avoid outages and speed restoration for a large, regional hospital while not diminishing utility system benefits.
- Provides benefits to the bulk electric system as it transitions from legacy generation types to more renewable resources.
- Utilizes customer-owned land to lower cost of development.

Location: On the property of Novant Health's Huntersville Medical Center in Mecklenburg County NC on land controlled by Duke Energy Carolinas.

Design Power/Energy: Optimized to significantly reduce the frequency and duration of service interruptions to a critical Duke Energy Carolinas customer, the project is based around a 2.75MW, 2.75MWh (one-hour) battery energy storage system.

Expected Technologies: Containerized, lithium-chemistry electrochemical battery storage, industry-proven, packaged DC-AC inverters, flexible battery control software/hardware, best-in-class safety features, Duke Energy standard automatic/remotely-controlled reclosers.

Cost: A 2022 Class 5 estimate predicts the overnight capital investment for this project will be $7.5MM.

Estimated ISD: Based upon expected timelines for interconnection study and subsequent required work to construct network upgrades and point-of-interconnection, this project is expected to enter service in September 2024.

Point of Interconnection: This project is to connect to the DEC distribution system, specifically the Reames Rd Ret 2408 circuit.

Selection History: The project was successfully screened in a December 2021 Select Gate Review.

Interconnection Study: An interconnection request has been submitted and the study process is on-going.

Functionality: It is expected that the project will improve service reliability to a critical Duke Energy Carolinas customer. Additionally, the battery will provide bulk system capacity, energy arbitrage and ancillary services to the DEC bulk system when not serving its reliability function.

Project: Nebo

County	McDowell
Power	2.7 MW
Energy	8.6 MWh
CAPEX ($MM)	$10.5
Estimated ISD	Jun'25
Point of Interconnection	Distribution
PMCOE Milestone/Date	Select – Dec'21
Associated Substation	Nebo Retail

Functions
Reliability
Energy Arbitrage
Capacity
Ancillary Services

Strategic Rationale:

- Improves reliability and resiliency to avoid outages and speed restoration for a circuit with a history of outage restoration challenges and limited options for traditional outage mitigation improvements.
- Provides benefits to the bulk electric system as it transitions from legacy generation types to more renewable resources.

Location: Six miles northwest of Town of Glen Alpine in Burke County NC on land controlled by Duke Energy Carolinas.

Design Power/Energy: Optimized to significantly reduce the frequency and duration of service interruptions to a group of approximately 200 Duke Energy Carolinas customers, the project is based around a 2.7MW, 8.6MWh (three-hour) battery energy storage system.

Expected Technologies: Containerized, lithium-chemistry electrochemical battery storage, industry-proven, packaged DC-AC inverters, flexible battery control software/hardware, best-in-class safety features, Duke Energy standard automatic/remotely-controlled reclosers.

Cost: A 2022 Class 5 estimate predicts the overnight capital investment for this project will be $11.5MM.

Estimated ISD: Based upon expected timelines for interconnection study and subsequent required work to construct network upgrades and point-of-interconnection, this project is expected to enter service in June 2025.

Point of Interconnection: This project is to connect to the DEC distribution system, specifically the Nebo Retail 1203 circuit.

Selection History: The project was successfully screened in a December 2021 Select Gate Review.

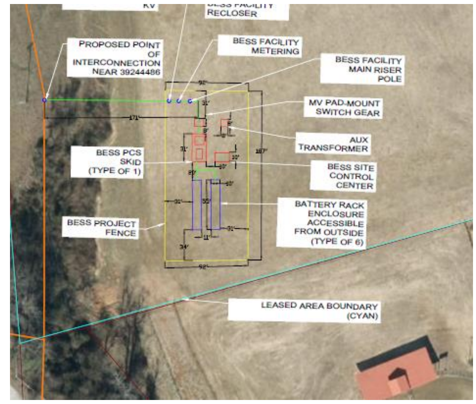
Interconnection Study: An interconnection request has been submitted and the study process is on-going.

Functionality: It is expected that the project will improve service reliability to approximately 200 Duke Energy Carolinas customers. Additionally, the battery will provide bulk system capacity, energy arbitrage and ancillary services to the DEC bulk system when not serving its reliability function.

Project: Lowgap

County	Surry
Power	2.8 MW
Energy	8.0 MWh
CAPEX ($MM)	$10.5
Estimated ISD	Jun'25
Point of Interconnection	Distribution
PMCOE Milestone/Date	Select – Jun'22
Associated Substation	Toast Retail

Functions
Reliability
Energy Arbitrage
Capacity
Ancillary Services



Strategic Rationale:

- Improves reliability and resiliency to avoid outages and speed restoration for a circuit with a history of outage restoration challenges and limited options for traditional outage mitigation improvements.
- Provides benefits to the bulk electric system as it transitions from legacy generation types to more renewable resources.

Location: One mile south of Town of Lowgap in Surry County NC on land controlled by Duke Energy Carolinas.

Design Power/Energy: Optimized to significantly reduce the frequency and duration of service interruptions to a group of approximately 500 Duke Energy Carolinas customers, the project is based around a 2.8MW, 8.0MWh (three-hour) battery energy storage system.

Expected Technologies: Containerized, lithium-chemistry electrochemical battery storage, industry-proven, packaged DC-AC inverters, flexible battery control software/hardware, best-in-class safety features, Duke Energy standard automatic/remotely-controlled reclosers.

Cost: A 2022 Class 5 estimate predicts the overnight capital investment for this project will be $10.5MM.

Estimated ISD: Based upon expected timelines for interconnection study and subsequent required work to construct network upgrades and point-of-interconnection, this project is expected to enter service in June 2025.

Point of Interconnection: This project is to connect to the DEC distribution system, specifically the Toast Retail 1210 circuit.

Selection History: The project was successfully screened in a June 2022 Select Gate Review.

Interconnection Study: An interconnection request has been submitted and the study process is on-going.

Functionality: It is expected that the project will improve service reliability to approximately 500 Duke Energy Carolinas customers. Additionally, the battery will provide bulk system capacity, energy arbitrage and ancillary services to the DEC bulk system when not serving its reliability function.

Project: Rich Mountain

County	Greenville
Power	8.4 MW
Energy	9.2 MWh
CAPEX ($MM)	$12.0
Estimated ISD	Sep'25
Point of Interconnection	Distribution
PMCOE Milestone/Date	Select – Mar20
Associated Substation	Rich Mtn Retail

Functions
Reliability
Energy Arbitrage
Capacity
Ancillary Services

Strategic Rationale:

- Improves reliability and resiliency to avoid outages and speed restoration for a circuit with a history of outage restoration challenges and limited options for traditional outage mitigation improvements.
- Provides benefits to the bulk electric system as it transitions from legacy generation types to more renewable resources.

Location: 2.5 miles south of Community of Cedar Mountain NC, along US-276 near intersection in Greenville County SC on land controlled by Duke Energy Carolinas.

Design Power/Energy: Optimized to significantly reduce the frequency and duration of service interruptions to a group of approximately 500 Duke Energy Carolinas customers, the project is based around an 8.4MW, 9.2MWh (one-hour) battery energy storage system.

Expected Technologies: Containerized, lithium-chemistry electrochemical battery storage, industry-proven, packaged DC-AC inverters, flexible battery control software/hardware, best-in-class safety features, Duke Energy standard automatic/remotely-controlled reclosers.

Cost: A 2022 Class 5 estimate predicts the overnight capital investment for this project will be $12.0MM.

Estimated ISD: Based upon expected timelines for interconnection study and subsequent required work to construct network upgrades and point-of-interconnection, this project is expected to enter service in September 2025.

Point of Interconnection: This project is to connect to the DEC distribution system, specifically the Rich Mountain Retail 1203 circuit.

Selection History: The project was successfully screened in a March 2020 Select Gate Review.

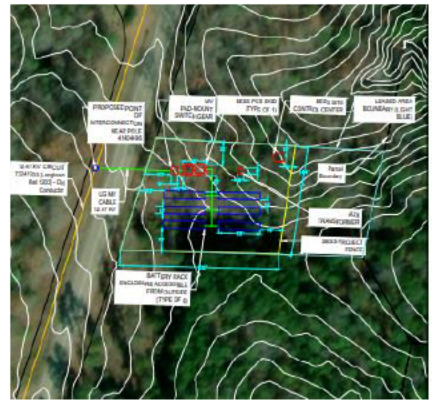
Interconnection Study: An interconnection request has been submitted and the study process is on-going.

Functionality: It is expected that the project will improve service reliability to approximately 500 Duke Energy Carolinas customers. Additionally, the battery will provide bulk system capacity, energy arbitrage and ancillary services to the DEC bulk system when not serving its reliability function.

Project: Longtown

County	Fairfield
Power	4.6 MW
Energy	12.0 MWh
CAPEX ($MM)	$15.0
Estimated ISD	Sep'25
Point of Interconnection	Distribution
PMCOE Milestone/Date	Select – Mar20
Associated Substation	Longtown Ret

Functions
Reliability
Energy Arbitrage
Capacity
Ancillary Services



Strategic Rationale:

- Improves reliability and resiliency to avoid outages and speed restoration for a circuit with a history of outage restoration challenges and limited options for traditional outage mitigation improvements.
- Provides benefits to the bulk electric system as it transitions from legacy generation types to more renewable resources.

Location: 4 miles north of community of Longtown SC, along River Rd in Fairfield County SC on land controlled by Duke Energy Carolinas.

Design Power/Energy: Optimized to significantly reduce the frequency and duration of service interruptions to a group of approximately 300 Duke Energy Carolinas customers, the project is based around a 4.6MW, 12.0MWh (three-hour) battery energy storage system.

Expected Technologies: Containerized, lithium-chemistry electrochemical battery storage, industry-proven, packaged DC-AC inverters, flexible battery control software/hardware, best-in-class safety features, Duke Energy standard automatic/remotely-controlled reclosers.

Cost: A 2022 Class 5 estimate predicts the overnight capital investment for this project will be $15.0MM.

Estimated ISD: Based upon expected timelines for interconnection study and subsequent required work to construct network upgrades and point-of-interconnection, this project is expected to enter service in September 2025.

Point of Interconnection: This project is to connect to the DEC distribution system, specifically the Longtown Retail 1203 circuit.

Selection History: The project was successfully screened in a March 2020 Select Gate Review.

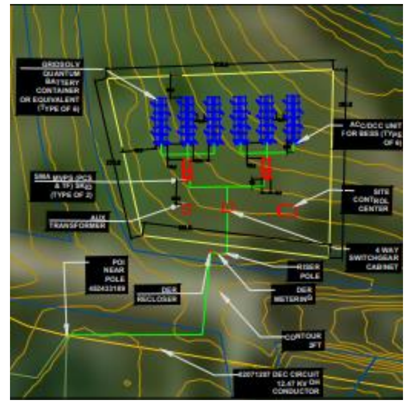
Interconnection Study: An interconnection request has been submitted and the study process is on-going.

Functionality: It is expected that the project will improve service reliability to approximately 300 Duke Energy Carolinas customers. Additionally, the battery will provide bulk system capacity, energy arbitrage and ancillary services to the DEC bulk system when not serving its reliability function.

Project: Farrs Bridge

County	Pickens
Power	5.3 MW
Energy	25.0 MWh
CAPEX ($MM)	$24.0
Estimated ISD	Sep'25
Point of Interconnection	Distribution
PMCOE Milestone/Date	Select – Jan'21
Associated Substation	Berea Rd Retail

Functions
Reliability
Energy Arbitrage
Capacity
Ancillary Services



Strategic Rationale:

- Improves reliability and resiliency to avoid outages and speed restoration for a circuit with a history of outage restoration challenges and limited options for traditional outage mitigation improvements.
- Provides benefits to the bulk electric system as it transitions from legacy generation types to more renewable resources.

Location: 4.5 miles west of community of Berea SC in Pickens County on land controlled by Duke Energy Carolinas.

Design Power/Energy: Optimized to significantly reduce the frequency and duration of service interruptions to a group of approximately 800 Duke Energy Carolinas customers, the project is based around a 5.3MW, 25.0MWh (4.5-hour) battery energy storage system.

Expected Technologies: Containerized, lithium-chemistry electrochemical battery storage, industry-proven, packaged DC-AC inverters, flexible battery control software/hardware, best-in-class safety features, Duke Energy standard automatic/remotely-controlled reclosers.

Cost: A 2022 Class 5 estimate predicts the overnight capital investment for this project will be $24.0MM.

Estimated ISD: Based upon expected timelines for interconnection study and subsequent required work to construct network upgrades and point-of-interconnection, this project is expected to enter service in June 2025.

Point of Interconnection: This project is to connect to the DEC distribution system, specifically the Berea Retail 1207 circuit.

Selection History: The project was successfully screened in a January 2021 Select Gate Review.

Interconnection Study: An interconnection request has been submitted and the study process is on-going.

Functionality: It is expected that the project will improve service reliability to approximately 800 Duke Energy Carolinas customers. Additionally, the battery will provide bulk system capacity, energy arbitrage and ancillary services to the DEC bulk system when not serving its reliability function.

Project: Allen

County	Gaston
Power	50 MW
Energy	200 MWh
CAPEX ($MM)	$119.0
Estimated ISD	Dec '25
Point of Interconnection	Transmission
PMCOE Milestone/Date	Select – Mar'22
Associated Substation	South Point Switching Sta

Functions
Energy Arbitrage
Capacity
Ancillary Services

Strategic Rationale:

- Part of a fleet of clean technologies sited at a retiring coal facility, providing direct learnings for how to reutilize brownfield sites for new technologies, repurpose existing equipment, and retrain personnel for working on clean energy technologies of the future.
- Uses existing land and infrastructure to lower development and operations cost.
- May provide access to investment tax credit as well as production tax credit due to location at retiring fossil facility.

Location: Duke Energy Carolinas' Allen Steam Station in Gaston County NC on land owned by Duke Energy.

Design Power/Energy: Designed to utilize the existing significant transmission infrastructure in the vicinity of Allen Station, the project is designed as a 50.0 MW, 200 MWh (4-hour) project.

Expected Technology: Containerized, lithium-chemistry electrochemical battery storage, industry-proven, packaged DC-AC inverters, flexible battery control software/hardware, and best-in-class safety features.

Cost: A 2022 Class 5 estimate predicts the overnight capital investment for this project will be $119.0 MM.

Estimated ISD: Based upon expected timelines for interconnection study and subsequent required work to construct network upgrades and point-of-interconnection facilities, this project is expected to enter service in December 2025.

Point of Interconnection: This project is to connect to the DEC transmission system at the South Point Switching Station.

Selection History: The project was successfully screened in a March 2022 Select Gate Review.

Interconnection Study: An interconnection request has been submitted and the study process is on-going.

Functionality: It is expected that this project will provide bulk system capacity, energy arbitrage and ancillary services.

Energy Storage
Program Description

Program purpose

The Energy Storage program expands Duke Energy's fleet of flexible battery storage systems to enable cleaner energy options. It addresses existing reliability challenges on the distribution system, improving reliability and resiliency by avoiding outages and speeding restoration for groups of distribution customers or single community-critical customers. The program does so while providing benefits to the bulk electric system as it transitions from legacy generation types to more renewable resources in support of the Carbon Plan.

Timeline for construction

Refer to MYRP Project List for project-specific timelines. At the program level, construction is planned from late 2023 through September 2025.

Estimated in-service date

Refer to MYRP Project List for project-specific dates. Initial in-service is expected to occur between June 2024 and September 2025.

Program description

Reliability Type Description – A key feature of these projects is their ability to electrically separate a portion of the Duke Energy transmission or distribution system from the larger grid, a capability known as "islanding." In addition to battery site equipment and existing transmission and distribution grid, the scope of these projects will also include off-site islanding equipment. Furthermore, the projects are strategically sited to improve reliability and resiliency for geographically isolated feeders.

Critical Community Customer Type Description – These projects improve reliability and resiliency to avoid outages and speed restoration times for a community critical customer while simultaneously providing bulk electric system benefits—this grid support enables cleaner energy options during the transition from legacy generation types to more renewable resources in support of the Carbon Plan.

Operation – Each project category above is designed to form a "microgrid" in the event of an outage on a subsection of the Duke Energy grid, while supporting the bulk electric system during normal operations. Most of the time, under normal grid operations, the batteries will charge from and discharge to the grid. However, upon loss of normal utility service, the batteries can then discharge stored energy to a limited portion of the distribution system for a limited time while repairs are performed and normal service is restored. This capability will reduce or eliminate outages for either: (1) a single critical community service provider, or (2) a cluster of customers in a larger but still limited area.

New Use Case Benefits – The Energy Storage projects are among the first of a kind in the Carolinas. As such, this work is expected to drive proficiencies in all aspects of project identification, design, construction, operation, and decommissioning. These projects will also facilitate improvements in all relevant processes, such as recovery, permitting, community education, and fire safety training.

Capital Cost Drivers – Most capital costs in the Energy Storage program relate to the physical battery equipment, including containerized battery cells, inverters, and transformers. In addition, a portion of the capital costs required relate to support equipment located at the site, battery construction labor, and potential distribution and transmission network upgrades necessary for a new electric resource.

DUKE ENERGY

Projected costs (including capital and O&M expenditure) *Note: Timing for costs based on in-service dates for associated projects; capital includes contingency and AFUDC*				
DEC NC	**Jan '24-Dec '24**	**Jan '25-Dec '25**	**Jan '26-Dec '26**	**Total**
Reliability	$21M	$55M	$0M	**$76M**
Critical Customer	$7.5M	$0M	$0M	**$7.5M**
Total Capital costs	$28.5M	$55M	$0M	**$83.5M**
O&M Costs (installation only)	$0M	$0M	$0M	**$0M**

Grid capabilities enabled	**HB951 Policy Considerations addressed**
Reliability • Promote DER adoption by providing consistent power flow Capacity • Promote DER adoption by enabling 2-way power flow capability in more circuits • Address changing demand by outfitting circuits with capacity to meet increasing load Automation & Communication • Promote DER adoption by enabling more efficient resource management	• Encourages utility-scale renewable energy and storage • Encourages DERs • Maintains adequate levels of reliability and customer service

Energy Storage
Customer benefits

Is the Program required by law?	
No. However, standalone battery energy storage is included in the Carbon Plan's near-term action plan, as filed in compliance with the Energy Solutions for North Carolina Act.	
Explanation of need for proposed expenditure	
The Energy Storage program addresses long-standing reliability challenges with cost-effective applications of a maturing technology, while providing benefits to the bulk electric system without construction of new carbon-emitting resources.	
Financial cost-benefit analysis	
Total NPV Costs	**$73.9M**
Total NPV Benefits	**$69.9M**
Net value of Program	**($4.0M)**
Benefit to Cost Ratio	**0.95**
Other qualitative benefits	
Benefit	**Description**
Improved Reliability and Resiliency	Reliability microgrids improve service reliability, resulting in saved customer expenses such as spoiled food, lost home office productivity, lost business revenue and backup generator fuel purchase which are a direct result of unplanned utility interruptions caused by vegetation, wildlife, and vehicle accidents.
Basic Services	Reliability microgrids include volunteer fire departments, TV broadcasting stations, cell towers, gas stations, medical practice, schools, and grocery sales. Improving reliability for these customers and reducing service outages increases the safety of the communities they serve.
Solution Scaling	Deployment of multiple reliability microgrid projects builds confidence in microgrids as available "tools in the toolbox" for solving other/future operational and engineering challenges.
Community Safety	Critical customer microgrids help ensure that the continuation of fundamental community services provided by organizations such as hospitals. As such, the benefits created by electric service reliability improvements are enjoyed by a large variety and number of customers in the utility service territory.
New Customer Solutions	By deploying early critical customer projects, Duke Energy can continue offering innovative solutions, like microgrids, as options for customers with needs for high electric service reliability and ability to share project costs and benefits.

DUKE ENERGY

Sustainability	Benefits to the bulk electric system such as capacity, regulation and contingency reserves have traditionally been performed by carbon-emitting generation resources. Replacing carbon-emitting resources with assets that have nearly zero direct emissions helps reduce emissions and deliver positive environmental benefits to the state.
Interconnection Study Process Improvements	Engineering assessments of the projects' impacts to the existing transmission and distribution systems are constantly being improved across the Carolinas. Challenges solved during execution of these initial projects will enable faster, more efficient, more predictable outcomes when studies are performed for future projects.
Organizational Experience (Design/Ops)	Duke Energy teams in the Carolinas have not yet operated battery energy storage projects at this scale. Battery use cases explored in the DEC MYRP energy storage portfolio will refine future ideation/construction/operation processes and enable more effective designs and more efficient operations when repeated for future similar projects.
Cost-effective implementation	Sourcing of materials and labor for battery engineering, procurement, and construction is more effective when a group of projects can be solicited rather than individual/single projects. A programmatic approach will likely result in better outcomes in terms of cost, material certainty, and schedule predictability. These outcomes can help improve service and deliver cost savings to customers.

AREA/PROJECT/PROGRAM	Energy Storage (Reliability Projects)
PERIOD:	2024-2026
REGULATORY JURISDICTION:	DEC
STATE:	NC
WACC:	6.55%

	NPV of COST/BENEFIT STREAM	Pre 2022	2022	2023	2024	2025	2026
		0	0	1	2	3	4
COSTS							
Revenue Requirement	$ 66,756,950	$ -	$ -	$ -	$ -	$ 9,646,202	$ 9,112,770
Total Program Costs	$ 66,756,950	$ -	$ -	$ -	$ -	$ 9,646,202	$ 9,112,770
OPERATIONAL BENEFITS							
Bulk System Benefits (Capacity, Energy, Ancillaries)	$ 13,200,693	$ -	$ -	$ -	$ -	$ 199,000	$ 513,600
Avoided Cost of T&D Alternative (Rev. Req.)	$ 49,704,555	$ -	$ -	$ -	$ -	$ 5,449,554	$ 5,115,935
Total Operational Benefits	$ 62,905,248	$ -	$ -	$ -	$ -	$ 5,648,554	$ 5,629,535
COMBINED COSTS AND BENEFITS							
Total NPV of Benefits	$ 62,905,248	$ -	$ -	$ -	$ -	$ 5,648,554	$ 5,629,535
Total NPV Program Costs	$ 66,756,950	$ -	$ -	$ -	$ -	$ 9,646,202	$ 9,112,770
Combined NPV of Program	$ (3,851,702)	$ -	$ -	$ -	$ -	$ (3,997,648)	$ (3,483,235)
Ratio of NPV Benefits to NPV Costs	0.94						
Cumulative Net Benefits (Payback Period)		$ -	$ -	$ -	$ -	$ (3,997,648)	$ (7,480,884)

AREA/PROJECT/PROGRAM	Energy Storage (Reliability Projects)
PERIOD:	2024-2026
REGULATORY JURISDICTION:	DEC
STATE:	NC
WACC:	6.55%

	NPV of COST/BENEFIT STREAM	2027	2028	2029	2030	2031	2032
		5	6	7	8	9	10
COSTS							
Revenue Requirement	$ 66,756,950	$ 8,585,185	$ 8,207,011	$ 7,884,874	$ 7,604,767	$ (21,255,648)	$ 7,254,682
Total Program Costs	$ 66,756,950	$ 8,585,185	$ 8,207,011	$ 7,884,874	$ 7,604,767	$ (21,255,648)	$ 7,254,682
OPERATIONAL BENEFITS							
Bulk System Benefits (Capacity, Energy, Ancillaries)	$ 13,200,693	$ 554,500	$ 659,600	$ 656,200	$ 739,500	$ 813,100	$ 854,000
Avoided Cost of T&D Alternative (Rev. Req.)	$ 49,704,555	$ 4,786,020	$ 4,550,781	$ 4,351,049	$ 4,177,949	$ 4,058,107	$ 3,964,897
Total Operational Benefits	$ 62,905,248	$ 5,340,520	$ 5,210,381	$ 5,007,249	$ 4,917,449	$ 4,871,207	$ 4,818,897
COMBINED COSTS AND BENEFITS							
Total NPV of Benefits	$ 62,905,248	$ 5,340,520	$ 5,210,381	$ 5,007,249	$ 4,917,449	$ 4,871,207	$ 4,818,897
Total NPV Program Costs	$ 66,756,950	$ 8,585,185	$ 8,207,011	$ 7,884,874	$ 7,604,767	$ (21,255,648)	$ 7,254,682
Combined NPV of Program	$ (3,851,702)	$ (3,244,664)	$ (2,996,630)	$ (2,877,625)	$ (2,687,318)	$ 26,126,855	$ (2,435,785)
Ratio of NPV Benefits to NPV Costs	0.94						
Cumulative Net Benefits (Payback Period)		$ (10,725,548)	$ (13,722,178)	$ (16,599,804)	$ (19,287,122)	$ 6,839,733	$ 4,403,948

AREA/PROJECT/PROGRAM	Energy Storage (Reliability Projects)
PERIOD:	2024-2026
REGULATORY JURISDICTION:	DEC
STATE:	NC
WACC:	6.55%

	NPV of COST/BENEFIT STREAM	YEAR					
		2033	2034	2035	2036	2037	2038
		11	12	13	14	15	16
COSTS							
Revenue Requirement	$ 66,756,950	$ 7,100,666	$ 6,946,662	$ 6,792,669	$ 6,638,689	$ 6,484,722	$ 6,330,767
Total Program Costs	$ 66,756,950	$ 7,100,666	$ 6,946,662	$ 6,792,669	$ 6,638,689	$ 6,484,722	$ 6,330,767
OPERATIONAL BENEFITS							
Bulk System Benefits (Capacity, Energy, Ancillaries)	$ 13,200,693	$ 1,060,600	$ 1,156,300	$ 1,031,400	$ 1,025,900	$ 1,159,800	$ 1,180,200
Avoided Cost of T&D Alternative (Rev. Req.)	$ 49,704,555	$ 3,871,695	$ 3,778,499	$ 3,685,311	$ 3,592,131	$ 3,498,958	$ 3,405,793
Total Operational Benefits	$ 62,905,248	$ 4,932,295	$ 4,934,799	$ 4,716,711	$ 4,618,031	$ 4,658,758	$ 4,585,993
COMBINED COSTS AND BENEFITS							
Total NPV of Benefits	$ 62,905,248	$ 4,932,295	$ 4,934,799	$ 4,716,711	$ 4,618,031	$ 4,658,758	$ 4,585,993
Total NPV Program Costs	$ 66,756,950	$ 7,100,666	$ 6,946,662	$ 6,792,669	$ 6,638,689	$ 6,484,722	$ 6,330,767
Combined NPV of Program	$ (3,851,702)	$ (2,168,371)	$ (2,011,862)	$ (2,075,958)	$ (2,020,659)	$ (1,825,964)	$ (1,744,774)
Ratio of NPV Benefits to NPV Costs	0.94						
Cumulative Net Benefits (Payback Period)		$ 2,235,577	$ 223,714	$ (1,852,244)	$ (3,872,903)	$ (5,698,867)	$ (7,443,641)

AREA/PROJECT/PROGRAM	Energy Storage (Reliability Projects)
PERIOD:	2024-2026
REGULATORY JURISDICTION:	DEC
STATE:	NC
WACC:	6.55%

	NPV of COST/BENEFIT STREAM	2039	2040	2041	2042	2043	2044
		17	18	19	20	21	22
COSTS							
Revenue Requirement	$ 66,756,950	$ 6,176,826	$ 4,211,713	$ 3,560,605	$ 3,558,623	$ 3,526,782	$ 3,483,722
Total Program Costs	$ 66,756,950	$ 6,176,826	$ 4,211,713	$ 3,560,605	$ 3,558,623	$ 3,526,782	$ 3,483,722
OPERATIONAL BENEFITS							
Bulk System Benefits (Capacity, Energy, Ancillaries)	$ 13,200,693	$ 1,365,400	$ 1,413,500	$ 1,444,700	$ 1,477,200	$ 1,510,000	$ 1,544,400
Avoided Cost of T&D Alternative (Rev. Req.)	$ 49,704,555	$ 3,312,636	$ 3,219,487	$ 3,126,348	$ 3,033,217	$ 2,940,095	$ 2,846,983
Total Operational Benefits	$ 62,905,248	$ 4,678,036	$ 4,632,987	$ 4,571,048	$ 4,510,417	$ 4,450,095	$ 4,391,383
COMBINED COSTS AND BENEFITS							
Total NPV of Benefits	$ 62,905,248	$ 4,678,036	$ 4,632,987	$ 4,571,048	$ 4,510,417	$ 4,450,095	$ 4,391,383
Total NPV Program Costs	$ 66,756,950	$ 6,176,826	$ 4,211,713	$ 3,560,605	$ 3,558,623	$ 3,526,782	$ 3,483,722
Combined NPV of Program	$ (3,851,702)	$ (1,498,790)	$ 421,274	$ 1,010,443	$ 951,794	$ 923,313	$ 907,661
Ratio of NPV Benefits to NPV Costs	0.94						
Cumulative Net Benefits (Payback Period)		$ (8,942,431)	$ (8,521,157)	$ (7,510,715)	$ (6,558,921)	$ (5,635,608)	$ (4,727,946)

AREA/PROJECT/PROGRAM	Energy Storage (Reliability Projects)
PERIOD:	2024-2026
REGULATORY JURISDICTION:	DEC
STATE:	NC
WACC:	6.55%

	NPV of COST/BENEFIT STREAM	2045	2046	2047	2048	2049	2050
		23	24	25	26	27	28
COSTS							
Revenue Requirement	$ 66,756,950	$ 3,432,241	$ 3,363,960	$ 3,287,267	$ 3,210,567	$ 3,133,882	$ 3,057,215
Total Program Costs	$ 66,756,950	$ 3,432,241	$ 3,363,960	$ 3,287,267	$ 3,210,567	$ 3,133,882	$ 3,057,215
OPERATIONAL BENEFITS							
Bulk System Benefits (Capacity, Energy, Ancillaries)	$ 13,200,693	$ 1,578,500	$ 1,614,000	$ 1,650,500	$ 1,687,600	$ 1,725,800	$ 1,764,400
Avoided Cost of T&D Alternative (Rev. Req.)	$ 49,704,555	$ 2,753,881	$ 2,660,789	$ 2,567,707	$ 2,474,636	$ 2,381,576	$ 2,288,527
Total Operational Benefits	$ 62,905,248	$ 4,332,381	$ 4,274,789	$ 4,218,207	$ 4,162,236	$ 4,107,376	$ 4,052,927
COMBINED COSTS AND BENEFITS							
Total NPV of Benefits	$ 62,905,248	$ 4,332,381	$ 4,274,789	$ 4,218,207	$ 4,162,236	$ 4,107,376	$ 4,052,927
Total NPV Program Costs	$ 66,756,950	$ 3,432,241	$ 3,363,960	$ 3,287,267	$ 3,210,567	$ 3,133,882	$ 3,057,215
Combined NPV of Program	$ (3,851,702)	$ 900,140	$ 910,829	$ 930,940	$ 951,669	$ 973,494	$ 995,712
Ratio of NPV Benefits to NPV Costs	0.94						
Cumulative Net Benefits (Payback Period)		$ (3,827,807)	$ (2,916,978)	$ (1,986,037)	$ (1,034,369)	$ (60,875)	$ 934,837

AREA/PROJECT/PROGRAM	Energy Storage (Reliability Projects)
PERIOD:	2024-2026
REGULATORY JURISDICTION:	DEC
STATE:	NC
WACC:	6.55%

	NPV of COST/BENEFIT STREAM	2051	2052	2053	2054	TOTAL
		29	30	31	32	
COSTS						
Revenue Requirement	$ 66,756,950	$ 2,980,568	$ 2,903,940	$ 2,827,332	$ 4,784,597	$ 134,833,858
Total Program Costs	$ 66,756,950	$ 2,980,568	$ 2,903,940	$ 2,827,332	$ 4,784,597	$ 134,833,858
OPERATIONAL BENEFITS						
Bulk System Benefits (Capacity, Energy, Ancillaries)	$ 13,200,693	$ 1,804,400	$ 1,845,100	$ 1,886,900	$ 1,929,500	$ 37,845,600
Avoided Cost of T&D Alternative (Rev. Req.)	$ 49,704,555	$ 2,195,490	$ 2,102,465	$ 2,009,452	$ 1,794,576	$ 99,994,542
Total Operational Benefits	$ 62,905,248	$ 3,999,890	$ 3,947,565	$ 3,896,352	$ 3,724,076	$ 137,840,142
COMBINED COSTS AND BENEFITS						
Total NPV of Benefits	$ 62,905,248	$ 3,999,890	$ 3,947,565	$ 3,896,352	$ 3,724,076	$ 137,840,142
Total NPV Program Costs	$ 66,756,950	$ 2,980,568	$ 2,903,940	$ 2,827,332	$ 4,784,597	$ 134,833,858
Combined NPV of Program	$ (3,851,702)	$ 1,019,322	$ 1,043,625	$ 1,069,020	$ (1,060,521)	$ 3,006,284
Ratio of NPV Benefits to NPV Costs	0.94					
Cumulative Net Benefits (Payback Period)		$ 1,954,159	$ 2,997,784	$ 4,066,804	$ 3,006,284	$ 6,012,568

MYRP PROJECT	Energy Storage (Reliability Projects)
PERIOD:	2024-2026
REGULATORY JURISDICTION:	DEC
STATE:	NC

Location	NPV of COST	NPV of BENEFIT	Ratio
Nebo	$ 9,730,403	$ 5,445,872	0.56
Lowgap	$ 8,962,325	$ 3,534,063	0.39
Farr's Bridge	$ 21,973,610	$ 11,409,516	0.52
Longtown	$ 13,244,513	$ 28,238,273	2.13
Rich Mountain	$ 12,846,099	$ 14,277,523	1.11
Total	66,756,950	62,905,248	0.94

Sensitivity Analysis	
AREA/PROJECT/PROGRAM	Energy Storage (Reliability Projects)
PERIOD:	2024-2026
REGULATORY JURISDICTION:	DEP
STATE:	NC

Component What-If Analysis*		
Capital Cost Variance Percentage		0%
Customer Benefit Variance Percentage		0%
BCR	NPV Costs ($M)	NPV Benefits ($M)
0.94	$ 66.8	$ 62.9

What-if Capital variance not applied to Pre 2022 actuals

Cost Variance				
Capital Cost Variance Percentage	Customer Benefit Variance Percentage	BCR	NPV Costs ($M)	NPV Benefits ($M)
-50%	0%	1.88	$ 33.4	$ 62.9
-30%	0%	1.35	$ 46.7	$ 62.9
-15%	0%	1.11	$ 56.7	$ 62.9
0 (Baseline)	**0 (Baseline)**	**0.94**	**$ 66.8**	**$ 62.9**
20%	0%	0.79	$ 80.1	$ 62.9
50%	0%	0.63	$ 100.1	$ 62.9
100%	0%	0.47	$ 133.5	$ 62.9

Benefit Variance				
Capital Cost Variance Percentage	Customer Benefit Variance Percentage	BCR	NPV Costs ($M)	NPV Benefits ($M)
0%	50%	1.41	$ 66.8	$ 94.4
0%	30%	1.22	$ 66.8	$ 81.8
0%	15%	1.08	$ 66.8	$ 72.3
0 (Baseline)	**0 (Baseline)**	**0.94**	**$ 66.8**	**$ 62.9**
0%	-15%	0.80	$ 66.8	$ 53.5
0%	-30%	0.66	$ 66.8	$ 44.0
0%	-50%	0.47	$ 66.8	$ 31.5

Combined Cost and Benefit Variance				
Capital Cost Variance Percentage	Customer Benefit Variance Percentage	BCR	NPV Costs ($M)	NPV Benefits ($M)
-50%	50%	2.83	$ 33.4	$ 94.4
-30%	30%	1.75	$ 46.7	$ 81.8
-15%	15%	1.27	$ 56.7	$ 72.3
0 (Baseline)	**0 (Baseline)**	**0.94**	**$ 66.8**	**$ 62.9**
20%	-15%	0.67	$ 80.1	$ 53.5
50%	-30%	0.44	$ 100.1	$ 44.0
100%	-50%	0.24	$ 133.5	$ 31.5

AREA/PROJECT/PROGRAM	Energy Storage (Critical Community Projects)
PERIOD:	2024-2026
REGULATORY JURISDICTION:	DEC
STATE:	NC
WACC:	6.55%

	NPV of COST/BENEFIT STREAM	Pre 2022	2022	2023	2024	2025	2026
		0	0	1	2	3	4
COSTS							
Revenue Requirement	$ 7,166,991	$ -	$ -	$ -	$ 965,376	$ 912,480	$ 860,165
Total Program Costs	**$ 7,166,991**	**$ -**	**$ -**	**$ -**	**$ 965,376**	**$ 912,480**	**$ 860,165**
OPERATIONAL BENEFITS							
Bulk System Benefits (Capacity, Energy, Ancillaries) & Avoided Cost of T&D Alternative (Rev. Req.)*	$ 6,992,600	$ -	$ -	$ -	$ 534,839	$ 520,745	$ 522,796
Total Operational Benefits	**$ 6,992,600**	**$ -**	**$ -**	**$ -**	**$ 534,839**	**$ 520,745**	**$ 522,796**
COMBINED COSTS AND BENEFITS							
Total NPV of Benefits	**$ 6,992,600**	**$ -**	**$ -**	**$ -**	**$ 534,839**	**$ 520,745**	**$ 522,796**
Total NPV Program Costs	**$ 7,166,991**	**$ -**	**$ -**	**$ -**	**$ 965,376**	**$ 912,480**	**$ 860,165**
Combined NPV of Program	**$ (174,391)**	**$ -**	**$ -**	**$ -**	**$ (430,537)**	**$ (391,735)**	**$ (337,369)**
Ratio of NPV Benefits to NPV Costs	**0.98**						
Cumulative Net Benefits (Payback Period)		**$ -**	**$ -**	**$ -**	**$ (430,537)**	**$ (822,271)**	**$ (1,159,640)**

*Releasing more detailed granular data about a single project could put customers at a competitive disadvantage in subsequent procurements.

AREA/PROJECT/PROGRAM	Energy Storage (Critical Community Projects)
PERIOD:	2024-2026
REGULATORY JURISDICTION:	DEC
STATE:	NC
WACC:	6.55%

	NPV of COST/BENEFIT STREAM	2027	2028	2029	2030	2031	2032
		5	6	7	8	9	10
COSTS							
Revenue Requirement	$ 7,166,991	$ 822,697	$ 790,797	$ 763,073	$ 743,701	$ (2,108,761)	$ 713,311
Total Program Costs	$ 7,166,991	$ 822,697	$ 790,797	$ 763,073	$ 743,701	$ (2,108,761)	$ 713,311
OPERATIONAL BENEFITS							
Bulk System Benefits (Capacity, Energy, Ancillaries) & Avoided Cost of T&D Alternative (Rev. Req.)*	$ 6,992,600	$ 513,161	$ 510,830	$ 500,779	$ 503,586	$ 517,472	$ 510,559
Total Operational Benefits	$ 6,992,600	$ 513,161	$ 510,830	$ 500,779	$ 503,586	$ 517,472	$ 510,559
COMBINED COSTS AND BENEFITS							
Total NPV of Benefits	$ 6,992,600	$ 513,161	$ 510,830	$ 500,779	$ 503,586	$ 517,472	$ 510,559
Total NPV Program Costs	$ 7,166,991	$ 822,697	$ 790,797	$ 763,073	$ 743,701	$ (2,108,761)	$ 713,311
Combined NPV of Program	$ (174,391)	$ (309,536)	$ (279,966)	$ (262,294)	$ (240,115)	$ 2,626,233	$ (202,753)
Ratio of NPV Benefits to NPV Costs	0.98						
Cumulative Net Benefits (Payback Period)		$ (1,469,176)	$ (1,749,142)	$ (2,011,436)	$ (2,251,551)	$ 374,682	$ 171,930

*Releasing more detailed granular data about a single project could put customers at a competitive c

AREA/PROJECT/PROGRAM	Energy Storage (Critical Community Projects)
PERIOD:	2024-2026
REGULATORY JURISDICTION:	DEC
STATE:	NC
WACC:	6.55%

	NPV of COST/BENEFIT STREAM	YEAR					
		2033	2034	2035	2036	2037	2038
		11	12	13	14	15	16
COSTS							
Revenue Requirement	$ 7,166,991	$ 698,118	$ 682,926	$ 667,736	$ 652,546	$ 637,358	$ 622,171
Total Program Costs	$ 7,166,991	$ 698,118	$ 682,926	$ 667,736	$ 652,546	$ 637,358	$ 622,171
OPERATIONAL BENEFITS							
Bulk System Benefits (Capacity, Energy, Ancillaries) & Avoided Cost of T&D Alternative (Rev. Req.)*	$ 6,992,600	$ 558,946	$ 575,634	$ 538,623	$ 525,312	$ 557,102	$ 547,093
Total Operational Benefits	$ 6,992,600	$ 558,946	$ 575,634	$ 538,623	$ 525,312	$ 557,102	$ 547,093
COMBINED COSTS AND BENEFITS							
Total NPV of Benefits	$ 6,992,600	$ 558,946	$ 575,634	$ 538,623	$ 525,312	$ 557,102	$ 547,093
Total NPV Program Costs	$ 7,166,991	$ 698,118	$ 682,926	$ 667,736	$ 652,546	$ 637,358	$ 622,171
Combined NPV of Program	$ (174,391)	$ (139,172)	$ (107,292)	$ (129,113)	$ (127,234)	$ (80,255)	$ (75,078)
Ratio of NPV Benefits to NPV Costs	0.98						
Cumulative Net Benefits (Payback Period)		$ 32,758	$ (74,535)	$ (203,647)	$ (330,881)	$ (411,136)	$ (486,214)

*Releasing more detailed granular data about a single project could put customers at a competitive c

AREA/PROJECT/PROGRAM	Energy Storage (Critical Community Projects)
PERIOD:	2024-2026
REGULATORY JURISDICTION:	DEC
STATE:	NC
WACC:	6.55%

	NPV of COST/BENEFIT STREAM	2039	2040	2041	2042	2043	2044
		17	18	19	20	21	22
COSTS							
Revenue Requirement	$ 7,166,991	$ 521,097	$ 482,366	$ 474,401	$ 465,013	$ 455,092	$ 444,770
Total Program Costs	$ 7,166,991	$ 521,097	$ 482,366	$ 474,401	$ 465,013	$ 455,092	$ 444,770
OPERATIONAL BENEFITS							
Bulk System Benefits (Capacity, Energy, Ancillaries) & Avoided Cost of T&D Alternative (Rev. Req.)*	$ 6,992,600	$ 569,185	$ 575,378	$ 573,771	$ 572,165	$ 570,760	$ 569,556
Total Operational Benefits	$ 6,992,600	$ 569,185	$ 575,378	$ 573,771	$ 572,165	$ 570,760	$ 569,556
COMBINED COSTS AND BENEFITS							
Total NPV of Benefits	$ 6,992,600	$ 569,185	$ 575,378	$ 573,771	$ 572,165	$ 570,760	$ 569,556
Total NPV Program Costs	$ 7,166,991	$ 521,097	$ 482,366	$ 474,401	$ 465,013	$ 455,092	$ 444,770
Combined NPV of Program	$ (174,391)	$ 48,088	$ 93,011	$ 99,370	$ 107,152	$ 115,668	$ 124,786
Ratio of NPV Benefits to NPV Costs	0.98						
Cumulative Net Benefits (Payback Period)		$ (438,126)	$ (345,115)	$ (245,745)	$ (138,593)	$ (22,924)	$ 101,862

*Releasing more detailed granular data about a single project could put customers at a competitive c

AREA/PROJECT/PROGRAM	Energy Storage (Critical Community Projects)
PERIOD:	2024-2026
REGULATORY JURISDICTION:	DEC
STATE:	NC
WACC:	6.55%

	NPV of COST/BENEFIT STREAM	2045	2046	2047	2048	2049	2050
		23	24	25	26	27	28
COSTS							
Revenue Requirement	$ 7,166,991	$ 433,648	$ 422,126	$ 410,604	$ 399,085	$ 387,567	$ 376,051
Total Program Costs	$ 7,166,991	$ 433,648	$ 422,126	$ 410,604	$ 399,085	$ 387,567	$ 376,051
OPERATIONAL BENEFITS							
Bulk System Benefits (Capacity, Energy, Ancillaries) & Avoided Cost of T&D Alternative (Rev. Req.)*	$ 6,992,600	$ 568,653	$ 567,651	$ 567,050	$ 566,650	$ 566,351	$ 566,253
Total Operational Benefits	$ 6,992,600	$ 568,653	$ 567,651	$ 567,050	$ 566,650	$ 566,351	$ 566,253
COMBINED COSTS AND BENEFITS							
Total NPV of Benefits	$ 6,992,600	$ 568,653	$ 567,651	$ 567,050	$ 566,650	$ 566,351	$ 566,253
Total NPV Program Costs	$ 7,166,991	$ 433,648	$ 422,126	$ 410,604	$ 399,085	$ 387,567	$ 376,051
Combined NPV of Program	$ (174,391)	$ 135,005	$ 145,525	$ 156,445	$ 167,565	$ 178,784	$ 190,202
Ratio of NPV Benefits to NPV Costs	0.98						
Cumulative Net Benefits (Payback Period)		$ 236,868	$ 382,393	$ 538,838	$ 706,403	$ 885,187	$ 1,075,389

*Releasing more detailed granular data about a single project could put customers at a competitive c

AREA/PROJECT/PROGRAM	Energy Storage (Critical Community Projects)
PERIOD:	2024-2026
REGULATORY JURISDICTION:	DEC
STATE:	NC
WACC:	6.55%

	NPV of COST/BENEFIT STREAM	2051	2052	2053	2054	TOTAL
		29	30	31	32	
COSTS						
Revenue Requirement	$ 7,166,991	$ 364,537	$ 353,024	$ 428,482	$ -	$ 14,841,554
Total Program Costs	$ 7,166,991	$ 364,537	$ 353,024	$ 428,482	$ -	$ 14,841,554
OPERATIONAL BENEFITS						
Bulk System Benefits (Capacity, Energy, Ancillaries) & Avoided Cost of T&D Alternative (Rev. Req.)*	$ 6,992,600	$ 566,556	$ 566,760	$ 556,102	$ -	$ 16,460,318
Total Operational Benefits	$ 6,992,600	$ 566,556	$ 566,760	$ 556,102	$ -	$ 16,460,318
COMBINED COSTS AND BENEFITS						
Total NPV of Benefits	$ 6,992,600	$ 566,556	$ 566,760	$ 556,102	$ -	$ 16,460,318
Total NPV Program Costs	$ 7,166,991	$ 364,537	$ 353,024	$ 428,482	$ -	$ 14,841,554
Combined NPV of Program	$ (174,391)	$ 202,019	$ 213,735	$ 127,620	$ -	$ 1,618,763
Ratio of NPV Benefits to NPV Costs	0.98					
Cumulative Net Benefits (Payback Period)		$ 1,277,408	$ 1,491,143	$ 1,618,763	$ 1,618,763	$ 3,237,527

*Releasing more detailed granular data about a single project could put customers at a competitive c

MYRP PROJECT	**Energy Storage (Critical Community Projects)**
PERIOD:	**2024-2026**
REGULATORY JURISDICTION:	**DEC**
STATE:	**NC**

Location	NPV of COST	NPV of BENEFIT	Ratio
Novant Health	$ 7,166,991	$ 6,992,600	0.98
Total	**7,166,991**	**6,992,600**	**0.98**

Sensitivity Analysis	
AREA/PROJECT/PROGRAM	**Energy Storage (Critical Community Projects)**
PERIOD:	**2024-2026**
REGULATORY JURISDICTION:	**DEP**
STATE:	**NC**

Component What-If Analysis*		
Capital Cost Variance Percentage		0%
Customer Benefit Variance Percentage		0%
BCR	**NPV Costs ($M)**	**NPV Benefits ($M)**
0.98	$ 7.2	$ 7.0

What-if Capital variance not applied to Pre 2022 actuals

Cost Variance				
Capital Cost Variance Percentage	**Customer Benefit Variance Percentage**	**BCR**	**NPV Costs ($M)**	**NPV Benefits ($M)**
-50%	0%	1.95	$ 3.6	$ 7.0
-30%	0%	1.39	$ 5.0	$ 7.0
-15%	0%	1.15	$ 6.1	$ 7.0
0 (Baseline)	**0 (Baseline)**	**0.98**	**$ 7.2**	**$ 7.0**
20%	0%	0.81	$ 8.6	$ 7.0
50%	0%	0.65	$ 10.8	$ 7.0
100%	0%	0.49	$ 14.3	$ 7.0

Benefit Variance				
Capital Cost Variance Percentage	**Customer Benefit Variance Percentage**	**BCR**	**NPV Costs ($M)**	**NPV Benefits ($M)**
0%	50%	1.46	$ 7.2	$ 10.5
0%	30%	1.27	$ 7.2	$ 9.1
0%	15%	1.12	$ 7.2	$ 8.0
0 (Baseline)	**0 (Baseline)**	**0.98**	**$ 7.2**	**$ 7.0**
0%	-15%	0.83	$ 7.2	$ 5.9
0%	-30%	0.68	$ 7.2	$ 4.9
0%	-50%	0.49	$ 7.2	$ 3.5

Combined Cost and Benefit Variance				
Capital Cost Variance Percentage	**Customer Benefit Variance Percentage**	**BCR**	**NPV Costs ($M)**	**NPV Benefits ($M)**
-50%	50%	2.93	$ 3.6	$ 10.5
-30%	30%	1.81	$ 5.0	$ 9.1
-15%	15%	1.32	$ 6.1	$ 8.0
0 (Baseline)	**0 (Baseline)**	**0.98**	**$ 7.2**	**$ 7.0**
20%	-15%	0.69	$ 8.6	$ 5.9
50%	-30%	0.46	$ 10.8	$ 4.9
100%	-50%	0.24	$ 14.3	$ 3.5

DUKE ENERGY®

Financial cost-benefit analyses methodology

ENERGY STORAGE

Overall methodology

- Cost-benefit analysis completed using methodology similar to prior Commission filing (Hot Springs CPCN)
- Expected financial benefits based on avoided T&D costs and ISOP bulk system values (e.g., capacity, energy arbitrage, ancillary services)
- Cost-benefit analyses performed on revenue requirement basis in order to reflect standalone storage Investment Tax Credit (ITC) impact

Data inputs

- **Battery sizing and siting** to address reliability need:
  - Power (MW) and Energy (MWh) determined to provide power during outage
  - Bounds of microgrid defined
- **T&D alternatives analysis** performed to determine "theoretical T&D alternative" to a battery:
  - Most sites surrounded by non-Duke utility
  - Distribution Planners used expertise to determine costs for theoretical alternative; however, these solutions are likely infeasible
- **ISOP bulk system benefits** developed from approved 2020 IRPs

Methodology for benefits and costs

- **Initial deployment costs** calculated using aggregated vendor responses for battery pack costs and historic project data for construction costs
- **Battery refresh costs** calculated using proprietary industry forecasts for costs to replace battery cells after 15 years
- **Program benefits** calculated as financial value of:
  - Revenue requirement of avoided cost for theoretical T&D alternative to a battery, not including easement acquisition costs
  - Bulk system services the specific battery project can be expected to provide

Excel-based cost-benefit analysis (CBA)

- Projected schedule of **program costs and benefits** tabulated in excel
- Present value (as of current year) calculated for costs and benefits
- Battery costs and theoretical T&D alternative benefits calculated on revenue requirement basis in order to reflect ITC impact on battery costs
- Net present value and benefit-cost ratio calculated for each program
- Sensitivity analysis tab included for variance on key inputs