STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. E-2, SUB 1185

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of Application of Duke Energy Progress, LLC for A Certificate of Public Convenience and Necessity to Construct a Microgrid Solar and Battery Storage Facility in Madison County, North Carolina	))))))	ORDER GRANTING CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY WITH CONDITIONS

BY THE COMMISSION: On October 8, 2018, Duke Energy Progress, LLC ("DEP" or the "Company") filed a verified application pursuant to N.C.G.S. § 62-110.1 and Commission Rule R8-61 for a Certificate of Public Convenience and Necessity ("CPCN Application" or "Application") to construct the generation components of the Hot Springs Microgrid Solar and Battery Storage Facility (the "Hot Springs Microgrid") on DEP-leased property in Madison County, North Carolina. The Company also requested appropriate approval from the Commission for its decision to construct and own the battery storage components of the Hot Springs Microgrid as consistent with the Company's commitment and the Commission's March 28, 2016 Order Granting Application, in Part, with Conditions, and Denying Application in Part in Docket No. E-2, Sub 1089 (the "Western Carolinas Modernization Project (WCMP) Order"). In support of the CPCN Application, the Company included exhibits and the supporting direct testimony of Jonathan A. Landy, Business Development Manager for Duke Energy Business Services LLC, an affiliate of DEP.

The intervention of the Public Staff has been recognized pursuant to N.C.G.S. § 62-15(d) and Commission Rule R1-19(e). On October 10, 2018, the North Carolina Sustainable Energy Association ("NCSEA") filed a motion to intervene, which was granted by the Commission on October 16, 2018.

On October 31, 2018, the Commission issued its Order Finding Application Incomplete. On November 13, 2018, in response to the Commission's October 31 order, DEP filed the supplemental testimony and exhibits of witness Landy. On November 30, 2018, the Commission issued its Order Scheduling Hearings, Requiring Filing of Testimony, Establishing Discovery Guidelines and Requiring Public Notice ("Scheduling Order"). The Scheduling Order, among other things, scheduled a public witness hearing on the Company's Application to be held in Madison County on January 23, 2019, and an expert witness hearing to be held in Raleigh on February 25, 2019. Further, the Scheduling Order required DEP to publish a notice containing a summary of the Application, the details of the public witness hearing and other information. The Company

published notice in newspapers having general coverage in Madison County, as required, and also in the Asheville Citizen-Times.

On January 7, 2019, the State Environmental Review Clearinghouse ("State Clearinghouse") filed a letter with agency comments about the Hot Springs Microgrid, stating that no further action was needed on the Commission's part for compliance with the North Carolina Environmental Policy Act. On January 14, 2019, the State Clearinghouse filed additional comments from the Department of Cultural Resources requesting additional information, including the results of an archaeological survey to be conducted by an experienced archaeologist prior to construction. On January 22, 2019, the State Clearinghouse filed additional comments, from the Department of Agriculture and Consumer Services, encouraging preservation of productive farmland on the site.

On January 16, 2019, the Commission issued an order cancelling the public witness hearing scheduled for January 23, 2019, citing the lack of significant protest and the number of public statements filed in support of the Hot Springs Microgrid.

On January 30, 2019, the Public Staff filed the testimony of Jeff Thomas, an engineer with the Electric Division of the Public Staff. He recommended that the Hot Springs Microgrid be approved as a pilot project and that the certificate be granted, subject to certain conditions.

On February 7, 2019, DEP, the Public Staff and NCSEA jointly filed a motion requesting that the Commission cancel the expert witness hearing scheduled for February 25, 2019. In this motion, DEP explained that it agreed with recommended conditions proposed by the Public Staff as set forth in Confidential Attachment A, "Reporting, Study, Cap and Other Conditions Agreed to by the Parties" to the joint motion. No other parties intervened or filed testimony in this matter. On February 19, 2019, the Commission issued its Order Canceling Expert Witness Hearing and Receiving Evidence into Record. That order also required parties to file proposed orders on or before March 29, 2019.

DEP and the Public Staff filed a joint proposed order on March 22, 2019.

Based upon the Company's verified Application, the testimony and exhibits received into evidence, and the record as a whole, the Commission makes the following:

FINDINGS OF FACT

1. DEP is a public utility with an obligation to provide electric utility service to customers in its service area in North Carolina and is subject to the jurisdiction of the Commission.

2. The Commission has jurisdiction over the Application. Pursuant to N.C.G.S. § 62-110.1 and Commission Rule R8-61(b), a public utility must receive a CPCN prior to constructing electric generating facilities.

3. The Hot Springs Microgrid consists of an approximately 3 MW direct current ("DC") / 2 MW alternating current ("AC") solar photovoltaic ("PV") electric generator and an approximately 4 MW lithium-based battery storage facility to be constructed in Madison County, North Carolina. In addition to providing energy to the DEP system, the Hot Springs Microgrid will be capable of operating while disconnected from the grid (known as "islanding") to improve reliability for DEP customers connected to the Hot Springs 22.86 kV feeder, which runs for approximately ten miles from the Marshall Substation along the French Broad River and through the Great Smoky Mountains. While grid-tied, the Hot Springs Microgrid should be capable of providing ancillary system services, such as frequency, voltage, and ramping support, to the electric grid, and capacity during system peaks.

4. The Hot Springs Microgrid should improve reliability for customers in the Town of Hot Springs who are connected to the Hot Springs 22.86 kV distribution feeder.

5. DEP conducted a comprehensive siting process and appropriately selected the site for the Hot Springs Microgrid.

6. The short-term plan in DEP's 2017 Integrated Resource Plan ("IRP") Update called for investment in a limited number of battery storage projects to gain additional operation and technical experience with evolving utility-scale storage technologies. The Hot Springs Microgrid is included in DEP's 2018 IRP, filed with the Commission on September 5, 2018 in Docket No. E-100, Sub 157.

7. Because of the unique needs of the Hot Springs service area, exploring the wholesale market for the capacity and energy to serve those needs is not feasible.

8. The Company's confidential construction cost estimate for the Hot Springs Microgrid is reasonable and is hereby approved, subject to the conditions ordered below.

9. The Hot Springs Microgrid is consistent with the WCMP Order, in which the Commission noted DEP's commitment to work with customers in the Asheville region to site solar and battery storage facilities as part of the WCMP.

10. Though it is not clear that the Hot Springs Microgrid is the most cost effective way to address reliability and service quality issues at Hot Springs, the overall public convenience and necessity would be served by granting the certificate for the solar facility and approving the Hot Springs Microgrid as a pilot project. The system benefits from the Hot Springs Microgrid are material but are difficult to quantify accurately without real world experience in DEP's service territory. DEP will gain valuable experience by operating the Hot Springs Microgrid, and this experience and data collection and analysis will be beneficial in future cost-benefit analyses of projects with that proposed to include an energy storage component. For these reasons, pursuant to N.C.G.S. § 62-110.1, a Certificate of Public Convenience and Necessity for the solar generation-related components of the Hot Springs Microgrid proposed by DEP will be granted, and the Hot Springs Microgrid will be approved as a pilot, subject to (1) the reporting requirements, (2) a study of frequency regulation, (3) the imposition of a cap on the above-the-line

capital costs of the project, and (4) other conditions proposed by the Public Staff, all of which have been agreed to by DEP and are set forth more fully in the ordering paragraphs below.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NOS. 1-2

These findings are informational, procedural, and jurisdictional in nature and are uncontroverted.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NOS. 3-4

These findings are supported by the Application and exhibits, the direct and supplemental testimony and exhibits of DEP witness Landy, and the testimony of Public Staff witness Thomas.

DEP witness Landy testified that the Hot Springs Microgrid will be constructed as an approximately 3 MW direct current ("DC") / 2 MW alternating current ("AC") solar photovoltaic ("PV") electric generator and approximately 4 MW lithium-based battery energy storage system ("BESS") in Madison County, North Carolina, and will be situated on one parcel totaling approximately 15 acres. The entire facility will be located on land that DEP has leased from a local industrial company, as shown on the vicinity map attached as Figure 3 in Exhibit 2 to the Application. The Hot Springs Microgrid will be capable of providing energy to customers in Hot Springs even while disconnected from the DEP grid to mitigate outages for DEP customers connected to the Hot Springs 22.86 kV feeder, which runs for approximately ten miles from the Marshall Substation along the French Broad River and through the mountainous Pisgah National Forest. While grid-tied, the Hot Springs Microgrid will be capable of providing essential reliability services to the DEP grid, such as frequency and voltage regulation, ramping support, and capacity during system peaks.

According to witness Landy, the Hot Springs Microgrid will consist of PV panels affixed to ground-mounted 20 degree fixed-tilt racking, solar inverters, a Microgrid controller, and a BESS. A lithium-based BESS will be connected and sized so that the Hot Springs Microgrid can provide backup power to customer loads during certain outage events. The nominal generation capacity for the PV generator will be approximately 3 MW DC / 2 MW AC. The nominal storage capacity for the battery will be approximately 4 MW. Additional equipment to support the Hot Springs Microgrid will include circuit breakers, combiners, surge arrestors, conductors, disconnect switches, inverters, and connection cabling. The anticipated useful life of the Hot Springs Microgrid is expected to be 25 years with anticipated replacement battery cells after the tenth year, depending on the degradation curves experienced by the BESS. DEP witness Landy testified that if Commission approval were obtained, the limited notice to proceed could be issued as early as March 2019, with site mobilization to begin in September 2019, and with final commissioning in January 2020.

Witness Landy further testified that the Hot Springs Microgrid will be interconnected to the single DEP-owned 22.86 kV distribution feeder serving the Town of Hot Springs. He stated that the Company chose this interconnection point in order to reduce potential failure modes and project costs. During normal operation, the Hot Springs Microgrid will be connected in parallel and will export energy to the DEP grid. The islanding capability will be managed through appropriate protection and control equipment, which switches service to customers from the Hot Springs feeder to the Hot Springs Microgrid.

Witness Landy explained that a primary need for the Hot Springs Microgrid is to improve the reliability of service to customers connected to the Hot Springs 22.86 kV distribution feeder, which is the single source of service for the Town of Hot Springs. The existing feeder has a history of incurring long-duration outage events and is expected to require high-cost equipment upgrades beginning in 2020. The Company evaluated two alternatives to the Hot Springs Microgrid. The first was to construct a second distribution feeder into the town by connecting to French Broad EMC, which serves the area adjacent to DEP's service territory. Witness Landy indicated that this option presented several challenges that made it infeasible; therefore, a detailed cost estimate for this option was not developed. Specifically, obtaining right of way in this region was anticipated to be extremely challenging. In addition, the requisite tie into the DEP system and the tie into French Broad EMC's system would also result in significant infrastructure investments.

Witness Landy testified that the second alternative that DEP evaluated was to reconductor and rebuild the existing 22.86 kV Hot Springs feeder to modern storm/mountain hardening standards. This alternative would involve replacing the existing poles and structures with higher class poles for greater strength, adding guying to each pole, and replacing the existing conductor. The capital-only cost of this upgrade was estimated to be **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]**, but would still leave Hot Springs with only a single feeder that would remain susceptible to outages in remote and rugged terrain and would not provide the additional ancillary benefits to DEP customers that are anticipated from the Hot Springs Microgrid.

Witness Landy testified that DEP determined that the Hot Springs Microgrid was a better option to meet the needs of all DEP customers than these distribution upgrade alternatives. Witness Landy asserts that by utilizing new technology, the Hot Springs Microgrid will provide Hot Springs customers with multiple hours of back-up power to improve the reliability of electric service to the community.

Public Staff witness Thomas testified regarding the Public Staff's investigation of the Hot Springs Microgrid proposal. Witness Thomas testified that Hot Springs is a small town in Madison County, North Carolina, with approximately 600 DEP retail electric service customers in DEP's Western Region. Electric service in Hot Springs is supplied via a single radial 23-kV distribution line of approximately 10.5 miles that runs from DEP's Marshall Substation to the southeast through rugged, mountainous terrain. DEP's Western Region has approximately 160,000 customers and covers all or parts of several counties in the general Asheville area. DEP's Western Region is geographically separate

from DEP's Eastern Region and is somewhat isolated from other nearby electric utilities due to limited transmission interties in the area.

Witness Thomas testified that during the summer of 2016 the Public Staff began receiving complaints from DEP retail customers in the Hot Springs area regarding power outages and investigated commercial customer concerns about outages that were lasting for an hour or more and occurring during weekends when local businesses, such as restaurants, had many customers to serve. At that time DEP pledged to improve service reliability by conducting a thorough visual survey of the distribution line and performing more aggressive vegetation management. The Public Staff subsequently contacted some of the commercial customers who attended the August 2016 meeting in early 2017, and they indicated that reliability had improved following DEP's actions.

Witness Thomas testified that the Hot Springs Microgrid could improve overall reliability at Hot Springs. During an outage event, i.e., a fault on the Hot Springs distribution line, the Hot Springs Microgrid would be able to supply power to Hot Springs in island mode. He explained that Hot Springs customers would notice a momentary power outage as the Hot Springs Microgrid disconnects from DEP's grid and begins supplying power to the town but that otherwise Hot Springs customers would not be immediately impacted by the distribution line fault. This power would come from the solar PV array based on its expected generation during daylight hours and from the battery system in hours when the PV array is not generating or capable of supplying the power needs of the area. Witness Thomas testified that according to a presentation provided to the Public Staff in September of 2018, DEP indicates that the battery is sized to meet 100% of Hot Springs' peak load and is capable of providing for the 90th percentile load for approximately four hours without any contribution from the solar PV generation.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NO. 5

This finding is supported by the Application and exhibits and by the direct and supplemental testimony and exhibits of DEP witness Landy.

DEP witness Landy explained that the Hot Springs Microgrid site was selected due to the following beneficial characteristics: the site is properly zoned for industrial land use; the acreage is sufficient for siting multiple megawatts of solar generation and additional battery storage; the site is primarily clear of trees and debris; the point of interconnection is only approximately 0.10 miles from the planned project substation and does not require additional land rights or permitting to access the interconnection facilities; the site is not adjacent to residential customers; and the site is owned by a landowner willing to enter into a lease agreement in support of the project and community's goals. Suitable, available sites within the Asheville region are not abundant, and these characteristics will minimize project costs and environmental impacts. Based on the evidence in the record, and the fact that no party disputed the proposed site for the project, the Commission concludes that the site selected by DEP is a reasonable location for the Hot Springs Microgrid.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NO. 6

This finding is supported by the Application and exhibits, the direct and supplemental testimony and exhibits of DEP witness Landy, and the testimony of Public Staff witness Thomas.

The Application provided, and witness Landy testified, that the Company's 2018 IRP, filed September 5, 2018 in Docket No. E-100, Sub 157, includes the Hot Springs Microgrid in the "Integrated Systems and Operations Planning and Battery Storage" and the "WCMP" chapters. From a total system perspective, the DEP 2018 IRP identifies the need for approximately 6,300 MW of new resources to meet customers' energy needs by 2033. Additionally, the 2018 IRP calls for 80 MW of energy storage and approximately 1,000 MW of incremental solar installations over the next five years. As noted in the 2018 DEP IRP, grid-connected battery storage projects that provide solutions for the transmission and distribution system may also simultaneously provide benefits to the generation resource portfolio.

Public Staff witness Thomas reviewed the 2018 DEP IRP and, although he noted that the Commission has not yet accepted DEP's 2018 IRP for planning purposes, he agreed that DEP's 2018 IRP includes 140 MW of 4-hour lithium ion batteries in the base case as placeholders for future assets to provide operational experience on the DEP system. Public Staff witness Thomas also noted that the battery resources were not economically selected by the IRP's System Optimizer model. However, the short-term plan in DEP's 2017 IRP Update called for investment in a limited number of battery storage projects to gain additional operation and technical experience with evolving utility-scale storage technologies. Based on the foregoing, the Commission concludes that the Hot Springs Microgrid project is included in, and therefore consistent with, DEP's filed 2018 IRP, although the Commission notes that it has not yet issued an order on the 2018 IRP for planning purposes in pending Docket No. E-100, Sub 157.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NO. 7

This finding is supported by the Application and exhibits and by the direct and supplemental testimony and exhibits of DEP witness Landy.

DEP witness Landy testified that because of the unique circumstances of the Hot Springs service area and the Commission's WCMP Order requirements, DEP did not evaluate the wholesale market for alternatives to the capacity and energy to be provided by the Hot Springs Microgrid. He stated that DEP plans to competitively bid the major components and construction of the project to ensure the lowest reasonable cost for customers. In addition, he indicated that DEP intends to seek to obtain components and services from North Carolina providers where possible and effective. Because of the unique circumstances of the Hot Springs Microgrid, the Commission concludes that DEP's decision to not evaluate the existing wholesale market for alternatives, combined with the conditions set forth herein, is reasonable. In particular, the Commission takes note of the fact that the project's primary purpose is to address reliability issues arising

from the Hot Springs area's dependence on a single, vulnerable distribution feeder and that purchasing additional wholesale energy supplies would not address this purpose.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NO. 8

This finding is supported by the Application and exhibits, the direct and supplemental testimony and exhibits of DEP witness Landy, and the testimony of Public Staff witness Thomas.

According to DEP witness Landy, DEP's cost estimate for the Hot Springs Microgrid development is approximately **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]**. The estimate includes Engineering Procurement & Construction ("EPC"), major equipment, labor, and associated permitting and development costs. The annual operating cost is expected by DEP to be approximately **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]**. He indicated that any tax credits and accelerated depreciation benefits will reduce project costs for the benefit of customers.

Public Staff witness Thomas testified that the capital costs of the Hot Springs Microgrid are as presented in Table 1 below.

[BEGIN CONFIDENTIAL]

[END CONFIDENTIAL]

Witness Thomas did not dispute the reasonableness of the cost estimate for the Hot Springs Microgrid provided by DEP. However, he recommended that the Commission, in addition to finding DEP's construction cost estimate to be reasonable, establish a rebuttable presumption that any construction costs of the Hot Springs Microgrid exceeding **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL**] are unreasonably or imprudently incurred and shall not be recoverable from ratepayers. This amount was derived using DEP's estimate of **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]**. Witness Thomas asserted that the Company should not be permitted to rebut this presumption and recover any construction costs for the Hot Springs Microgrid exceeding the cap except to the extent DEP demonstrates that the costs in excess of the cap were reasonably and prudently incurred by DEP as a result of an event or events directly impacting the timing or cost of construction of the Hot Springs Microgrid that was or were (1) not reasonably foreseeable at the time the CPCN is approved; (2) unavoidable through the exercise of commercially reasonable efforts and diligence consistent with prudent industry practice, and (3) outside of the reasonable control of DEP ("Force Majeure Events"). For purposes of this recommendation, "Force Majeure Events" would include (1) extreme weather events (including named storms, tornadoes, earthquakes, floods, and forest fires), war, acts of terrorism, epidemics, natural disasters, and other Acts of God, (2) discovery of latent and unknown site conditions, and (3) changes in State or federal law through judicial, legislative, or executive/administrative action or interpretation implemented, enacted, adopted or otherwise ordered after the date the CPCN is approved.

In the motion filed on February 7, 2019, DEP indicated that it agreed with this cost cap, along with the other conditions recommended by the Public Staff. Based upon all of the information in the record, and subject to the cost cap and other conditions set forth below, the Commission concludes that the cost estimate for the construction of the Hot Springs Microgrid is reasonable and should be approved.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NO. 9

This finding is supported by the Application and exhibits, the direct and supplemental testimony and exhibits of DEP witness Landy, and the testimony of Public Staff witness Thomas.

Company witness Landy testified that the solar generation facility for which DEP is seeking a CPCN is the best alternative for the specific needs to be met by the Hot Springs Microgrid and that it is consistent with the Company's commitments and the Commission's WCMP Order. According to witness Landy, the Hot Springs Microgrid supports the WCMP's goals to attempt to avoid or defer the need for a contingent natural gas combustion turbine through deliberate development of solar and battery storage projects in the Western North Carolina region of DEP's service territory.

Witness Landy testified that DEP still intends to construct solar generation and battery storage facilities at the Asheville Plant site. He stated that although construction and final plans are contingent upon completion of the ash basin work and coal plant demolition activities, at this time the Company expects to install approximately 9 to 10 MW of solar generation along with additional battery storage at the Asheville Plant site and to seek a CPCN from the Commission for the generation facilities prior to commencing construction sometime in the 2023-2024 timeframe. He testified that DEP is evaluating additional solar and storage sites in the DEP-West area and will make appropriate filings with the Commission for approval once it has made a decision on those projects. Along with furthering its commitment to site solar and storage technologies in the western region, DEP intends for the Hot Springs Microgrid and future Company facilities to support the goals and objectives of the WCMP, including efforts to avoid or defer the contingent natural gas-fired CT addressed in the WCMP Order.

Public Staff witness Thomas described the history of the WCMP and the WCMP Order in his testimony. He stated that Session Law 2015-110, commonly known as the Mountain Energy Act, required the Commission to provide an expedited review of an application filed by DEP for the construction of a natural gas-fired generating facility at the site of the existing Asheville coal-fired generating facility. Conditions in the law required DEP to cease operation of the coal-fired facility and limit capacity of the natural gas-fired facility to no more than twice that of the coal-fired facility.

Witness Thomas further testified that on January 15, 2016, in response to the passage of the Mountain Energy Act, DEP filed a CPCN application in Docket No. E-2, Sub 1089, to construct and operate its WCMP. The proposed WCMP was comprised of two new 280-MW combined cycle ("CC") units and one contingent 186-MW simple cycle

combustion turbine ("CT") unit (to be built later). In its WCMP proposal, DEP also committed to seek a CPCN in the future to invest in a minimum of 15 MW of new solar generation in DEP's Western Region, with a portion being sited at the Asheville plant after the coal-fired units were demolished. In addition, DEP committed to invest in a pilot project with a minimum of 5 MW of utility-scale storage in DEP's Western Region.

Witness Thomas explained that on February 29, 2016, the Commission issued its Notice of Decision approving the construction and operation of the two combined cycle units. In part, the Notice of Decision also required DEP to retire the coal-fired units at the Asheville plant and file annual progress reports on: (1) construction of the combined cycle units, (2) DEP's efforts to work with its customers in DEP's Western Region to reduce peak load through demand-side management, energy efficiency or other measures, and (3) DEP's efforts to site solar and storage capacity in DEP's Western Region.

Witness Thomas further explained that on March 28, 2016, the Commission issued the WCMP Order. In summary, the Commission affirmed its Notice of Decision and denied without prejudice the CPCN for the combustion turbine unit. The Commission's order did not specifically approve the solar or storage components proposed by DEP, but stated that it expected DEP to file as soon as practicable the CPCN to construct at least 15 MW of solar at the Asheville plant or elsewhere in the Asheville region. The Commission further urged DEP to move forward in a timely manner with the 5 MW storage project in the Asheville region. Finally, the Commission required DEP to include information in its annual progress reports on its efforts to site solar and storage capacity in DEP's Western Region.

Witness Thomas stated that on March 28, 2017, DEP filed its first annual progress report on the WCMP. In it, DEP noted the creation of the Energy Innovation Task Force ("EITF"), which is working with DEP and Asheville area residents to investigate cost-effective methods of complying with the WCMP Order, including use of energy storage technologies. DEP proposed to deploy up to 10 batteries (total capacity is over 5 MW but final amount to be determined), with each installation sited and configured to serve multiple functions (e.g., frequency regulation and back-up power). DEP also discussed its proposed Mt. Sterling Microgrid Project, a 10-kW solar PV facility coupled with 95 kWh of battery storage.

Witness Thomas testified that on March 28, 2018, DEP filed its second WCMP annual progress report. The WCMP Battery Storage Deployment Plan was updated, with the total energy storage capacity target increased to 50 MW. In it, DEP stated that:

> Through a cost-effective and prudent battery storage deployment plan, the Company will evaluate the impacts of deploying batteries of a significant scale on the electric system, explore the nature of new offerings desired by customers, and fill knowledge gaps. Utility-owned and operated batteries will enable the Company to leverage bulk purchases of equipment and material, build relationships with battery developers, manufacturers, and

installers, and develop capabilities as an owner and operator of a battery fleet.[1]

DEP also updated the Commission on the Mt. Sterling Microgrid, stating that it is operating as intended with only a few minor issues related to control and monitoring equipment and software.

Witness Thomas concluded that construction of the Hot Springs Microgrid would be consistent with the Commission's expectation, set out in the WCMP Order, that DEP would site solar and battery storage in the Asheville region. He noted, however, the Commission did not require the siting of solar and battery storage without regard to the need or cost-effectiveness of individual projects.

The Commission concludes that the Hot Springs Microgrid is consistent with the WCMP Order. In the WCMP Order, the Commission accepted DEP's commitment to solar and storage projects and held, "As to solar and storage, the Commission expects DEP to file as soon as practicable the CPCN to construct at least 15 MW of solar at the Asheville Plant or in the Asheville region. The Commission further urges DEP to move forward in a timely manner with the 5 MW storage project in the Asheville region." WCMP Order at p. 38.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NO. 10

This finding is supported by the Application and exhibits and the testimony and supplemental testimony of DEP witness Landy and Public Staff witness Thomas.

DEP witness Landy testified that in addition to improving reliability in the Hot Springs area, the Hot Springs Microgrid will provide bulk system benefits as well, which neither of the traditional distribution upgrades would have provided. For example, witness Landy testified that the solar array will produce approximately 4,000 MWh of annual solar generation for the benefit of all of DEP's customers. He explained that the battery components of the Hot Springs Microgrid also provide capacity value and reliability services to DEP's electric grid, such as frequency and voltage regulation and ramping support, which the distribution alternatives would not provide. Witness Landy testified that the Hot Springs Microgrid is an innovative grid solution deployed in lieu of upgrading the existing distribution feeder or constructing a new traditional distribution service. Finally, he stated that the Company anticipates increasing its reliance on these types of distributed energy technologies to reliably and cost-effectively serve its customers over time, and DEP's experience in operating the Hot Springs Microgrid will provide additional future benefits to all customers as these technologies are further deployed across DEP's grid.

Witness Thomas testified that regarding DEP's cost-benefit analysis for the Hot Springs Microgrid, the Public Staff was unable to confirm the benefits of deferring storm

[1] DEP WCMP Second Annual Progress Report at p. 7, filed on March 28, 2018, in Docket No. E-2, Sub 1089.

hardening, to verify the magnitude of the estimated bulk system benefits that would be actually realized, or to ensure that the benefits realized from the Hot Springs Microgrid will be passed on to DEP's ratepayers. For example, on a net present value ("NPV") basis, the deferral of the storm/mountain hardening alternative comprised a majority of the benefits DEP claimed. However, on a January 8, 2019 conference call, DEP's Western Region personnel indicated that due to recent service quality improvements and absent a future unfavorable trend in reliability metrics, DEP did not plan to make the storm/mountain hardening investments on the Hot Springs feeder and would instead continue with standard vegetation management on the feeder, including the Hazard Tree Assessment Program, regardless of whether the Hot Springs Microgrid were to go forward.

Witness Thomas testified that the next largest category of claimed benefits is frequency regulation, in which the Hot Springs Microgrid would provide constant up and down regulation reserves when not operating in island mode. To estimate these benefits, DEP took a multi-year average of historic market clearing prices related to the Midcontinent Independent System Operator's ("MISO") entire Regulation Reserves market. The Hot Springs Microgrid will be outfitted with a battery inverter system technically capable of providing these benefits, and as the Hot Springs Microgrid provides this service less fuel will be consumed at the thermal plants that traditionally provide regulation reserves. However, the Public Staff believes that the Regulating Reserves market clearing prices in MISO do not necessarily reflect equivalent fuel savings in DEP's system, as DEP does not participate in a regional market. Based on this information, the Public Staff concluded that although the Hot Springs Microgrid would improve reliability and service quality in the Hot Springs area, because the Public Staff was unable to verify or quantify the benefits of the project, it was unable to conclude that the Hot Springs Microgrid was the most cost- effective method of doing so.

Public Staff witness Thomas testified that, while he believes that the Hot Springs Microgrid will provide benefits to DEP ratepayers, he does not believe that DEP has enough information currently to make an accurate estimate of those benefits and thus, they are not certain enough to be relied on in this proceeding. In particular, the ancillary service benefits associated with the battery storage system – frequency and voltage regulation and ramping support – cannot be accurately quantified without actual operational data gained from experience and meticulous data collection and analysis. However, Public Staff witness Thomas testified that he recognizes the value that microgrid operational knowledge can provide to DEP, particularly as nascent energy storage technologies become more widely deployed. In his opinion, the system benefits from the Hot Springs Microgrid are material, even if they are difficult to estimate accurately without real world experience in DEP's service territory. After reviewing the application, including the costs and unique benefits, the Public Staff recommended that the Hot Springs Microgrid be treated as a pilot project and the CPCN for the solar facility be approved, subject to certain reporting requirements, a study of frequency regulation benefits, the imposition of a cap on the above-the-line capital costs of the project, and other conditions, as discussed below.

Based on the testimony of the DEP and Public Staff witnesses, and the entirety of the evidence in the record, the Commission concludes that the Hot Springs Microgrid will have the opportunity to improve the reliability of service to customers connected to the Hot Springs 22.86 kV distribution feeder, which is the single source of service for the Town of Hot Springs. The existing feeder, which extends approximately ten miles through remote and hazardous terrain in the mountainous Pisgah National Forest, incurs long-duration outage events due to its location and is expected to require high-cost equipment upgrades beginning in 2020.

Though it is undisputed that the Hot Springs Microgrid should improve reliability in the Hot Springs area, based on the testimony of the Public Staff, it is not clear that it is the most cost-effective way of doing so. However, the Commission finds and concludes that there are additional system benefits from the Hot Springs Microgrid that are material. The ancillary service benefits associated with the battery storage system – frequency and voltage regulation and ramping support – cannot be accurately quantified without actual operational data gained from experience and meticulous data collection analysis. Operation of the Hot Springs Microgrid will provide valuable operational experience as battery storage and solar technologies continue to develop and evolve.

For these reasons, and to ensure that the benefits of the Hot Springs Microgrid may be fully realized and measured, approval of the CPCN for the solar facility of the Hot Springs Microgrid should be granted, subject to the following requirements:

Reporting

DEP shall be required to do the following:

1. Within six months of Commission approval of this Application, formalize and provide its operational and learning goals in a transparent and comprehensive plan, showing how it will achieve such goals and what operational data from the Hot Springs Microgrid will be measured and recorded.
2. File with the Commission a status report on the progress of construction and actual project costs in the same format as for initial costs of construction six months after the date of the CPCN and at the completion of construction.
3. Annually report, update, and file with the Commission and provide to the Public Staff, confidentially, the results of its operational knowledge and learning goals to demonstrate the operational benefits of the Hot Springs Microgrid. At a minimum, this report should include:
    a. A detailed event summary of all instances in which the Hot Springs Microgrid operated in island mode, whether in response to an outage on the Hot Springs distribution line or otherwise. This summary should include a discussion of how outage duration and frequency were affected by the Hot Springs Microgrid, and document any instances in which an outage was not able to be mitigated completely due to the limited capacity of the energy storage system.

b. An annual summary of Hot Springs Microgrid operations, including hourly data, with enough specificity to determine:
    i. Where solar PV energy was directed (to grid or to battery), including the percentage of energy sent to each source;
    ii. How the battery was charged (from the solar PV system or the grid), including the percentage of total energy from each source;
    iii. How the battery was discharged, and for what purpose (islanding, ancillary services, etc.), including the total number of charge/discharge cycles, typical depth of discharge, hourly state of charge, and any other recorded characteristics.
    iv. Quantification of energy losses from the battery, including energy used as station power for the battery storage and any other on-site devices that use power.
c. A discussion of how, if at all, the actual Hot Springs Microgrid operations deviated from projections made in this docket.
d. A quantification of the total ancillary services provided to the grid by the Hot Springs Microgrid (in both capacity and energy), including what types of services were provided (spinning reserve, regulation up or down, etc.) and whether these services displaced ancillary services traditionally provided by thermal plants.
e. A quantification of energy use consumed by the Hot Springs Microgrid (station power).
f. To the extent possible, an estimate of any savings realized from the energy storage system's ancillary services.
g. A summary of how the Hot Springs Microgrid enhanced economic operations and how it was beneficial to DEP's operational knowledge (i.e., lessons from design engineers regarding programming the device or maintenance personnel regarding operations and management costs; Hot Springs Microgrid behavior in light of bulk system dynamics, etc.).
h. A description of how the battery system has degraded over time to include loss of: (1) storage capacity, (2) output capacity, and (3) ability to provide ancillary services.
i. Costs of installed capital upgrades and retirements, in the same format as for initial costs of construction.
j. Operations and maintenance costs, by FERC account and with descriptive footnotes explaining purpose (ongoing maintenance, specific repairs, etc.).

Required Study

DEP shall perform a study, either by contracting with a third party or as part of its integrated systems and optimization planning initiative, to estimate the ancillary service benefits battery storage can provide DEP's system, using sub-hourly modeling techniques similar to the Astrapé Solar Integration Cost Study in Docket No. E-100, Sub

158, and use the results to help quantify the success of the Hot Springs Microgrid. In addition, the results could be used in future battery storage proposals, providing more confidence that estimated benefits used to justify battery storage projects would actually be realized by DEP ratepayers. This study should aim to quantify and value separately the various ancillary services batteries can provide, such as spinning and frequency reserves. If possible, this study should analyze different energy storage technologies of varying durations to determine the most cost-effective energy storage technology and duration for each type of ancillary service provided. The study shall be completed within 15 months after commercial operation of the Hot Springs Microgrid commences.

Cost Cap

The Commission finds DEP's construction cost estimate to be reasonable. In addition, the Commission finds that there shall be a rebuttable presumption that any construction costs of the Hot Springs Microgrid exceeding **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]** are unreasonably or imprudently incurred and shall not be recoverable from ratepayers. This amount is derived using DEP's estimate of **[BEGIN CONFIDENTIAL] [END CONFIDENTIAL]**. The Company is not permitted to rebut this presumption and recover any construction costs for the Hot Springs Microgrid exceeding the cost cap except to the extent DEP demonstrates that the costs in excess of the cap were reasonably and prudently incurred by DEP as a result of an event, or events, directly impacting the timing or cost of construction of the Hot Springs Microgrid that was, or were (1) not reasonably foreseeable at the time the CPCN is approved; (2) unavoidable through the exercise of commercially reasonable efforts and diligence consistent with prudent industry practice, and (3) outside of the reasonable control of DEP ("Force Majeure Events"). For purposes of this recommendation, "Force Majeure Events" shall include (1) extreme weather events (including named storms, tornadoes, earthquakes, floods, and forest fires), war, acts of terrorism, epidemics, natural disasters, and other Acts of God, (2) discovery of latent and unknown site conditions, and (3) changes in State or federal law through judicial, legislative, or executive/administrative action or interpretation implemented, enacted, adopted or otherwise ordered after the date this CPCN is approved. The cap set forth in this paragraph shall not apply to DEP's costs incurred to meet the reporting and ancillary service benefits study required as conditions of the CPCN.

Other Conditions

1. DEP shall construct and operate the Hot Springs Microgrid in strict accordance with all applicable laws and regulations, including the provisions of all permits issued by the North Carolina Department of Environmental Quality;

2. Issuance of the CPCN does not constitute approval of the final costs associated with the construction of the Hot Springs Microgrid for ratemaking purposes, and this order is without prejudice to the right of any party to take issue with the ratemaking treatment of the final costs in a future proceeding; and,

3. DEP shall maintain the existing radial distribution feed into Hot Springs, including vegetation management, in a manner that under normal circumstances should produce SAIDI and SAIFI indices that are at least comparable to those of the overall DEP Western Region.

The Commission finds and concludes that these reporting requirements, cost cap, and conditions, negotiated and agreed to by DEP and the Public Staff, are appropriate and provide additional protections to ensure that all of DEP's customers will benefit from the deployment of the Hot Springs Microgrid. In addition to providing renewable generation to the DEP grid, while grid-tied, the Hot Springs Microgrid will be capable of providing additional bulk system benefits for all of DEP's customers, including reliability services to the DEP electric grid, such as frequency and voltage regulation and ramping support, and capacity during system peaks. The Commission agrees with DEP and the Public Staff that the Hot Springs Microgrid will enable DEP, the Public Staff, and other interested stakeholders to gain valuable experience and lessons from the deployment of utility-scale battery storage and microgrids in North Carolina, as this technology continues to develop.

The Commission is carefully exercising it authority to ensure prudent investment by DEP in a manner that is in accord with the stated policies of Chapter 62, including the policy set forth in N.C.G.S. § 62-2(10). See N.C.G.S. § 62-2(b). North Carolina General Statute Section 62-2(10) states that one of the policies of the State is to promote the development of renewable energy, including a requirement to diversify the resources used to reliably meet the energy needs of consumers. The Commission finds, within its sound discretion, that the value of the opportunity to learn through the approval of this one, discrete project is in the public convenience and necessity. The Commission has not given DEP a blank check as demonstrated by the conditions of a cost cap and the rebuttable presumption that any construction costs exceeding the cost cap shall not be recoverable from ratepayers. The Commission's determination in the present case is based upon the unique facts presented in this application and shall not be precedent for future, even if similar, applications.

As discussed above, the Hot Springs Microgrid is also consistent with the WCMP Order and the Commission's expectation that DEP pursue solar and battery storage projects in the Asheville region. The Commission notes that seventeen (17) consumer statements of position had been filed with the Commission expressing support for the Hot Springs Microgrid, including one from the Town of Hot Springs, and no consumer statements had been filed opposing the project. Many of the supportive filings made with the Commission were from participants in DEP's collaborative stakeholder process established as part of its WCMP engagement in the Asheville region. The Commission supports the cost-effective development of solar and battery storage by DEP as provided in the WCMP Order and encourages DEP to continue to pursue such projects on behalf of its customers.

Based on the filed Application and exhibits, the testimony of Company witness Landy, the testimony of Public Staff witness Thomas, and the fact that no party opposed

the proposed project, the Commission concludes that the Hot Springs Microgrid should be approved as a pilot project and that the granting of a CPCN for the solar generation-related components of the Hot Springs Microgrid is in the public interest and is required by the public convenience and necessity, subject to the enumerated conditions set forth herein.

IT IS, THEREFORE, ORDERED as follows:

1. That the Application filed in this docket should be, and the same hereby is, approved, and a Certificate of Public Convenience and Necessity for the solar generation-related components of Hot Springs Microgrid Project is hereby granted;

2. That DEP shall file with the Commission in this docket a progress report and any revisions in the cost estimates for the Hot Springs Microgrid Project, with the first report due no later than six months from the date of issuance of this CPCN and at the completion of construction;

3. That DEP shall comply with the reporting requirements, a study of frequency regulation, the imposition of a cap on the above-the-line capital costs of the project, and other conditions as enumerated in the body of this Order;

4. That for ratemaking purposes, the issuance of this Order and CPCN does not constitute approval of the final costs associated therewith, and that the approval and grant is without prejudice to the right of any party to take issue with the treatment of the final costs for ratemaking purposes in a future proceeding;

5. That the attached Attachment A shall constitute the certificate of public convenience and necessity issued to DEP for the approximately 3 MW DC / 2 MW AC solar photovoltaic ("PV") electric generator to be located in Madison County, North Carolina as part of the Hot Springs Microgrid; and

6. That the approximately 4 MW lithium-based battery storage facilities to be constructed by DEP as part of the Hot Springs Microgrid are consistent with the Commission's March 28, 2016 Order Granting Application in Part, with Conditions, and Denying Application in Part in Docket No. E-2, Sub 1089.

ISSUED BY ORDER OF THE COMMISSION.

This the 10th day of May, 2019.

NORTH CAROLINA UTILITIES COMMISSION

M. Lynn Jarvis, Chief Clerk

ATTACHMENT A

STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. E-2, SUB 1185

Duke Energy Progress, LLC
410 South Wilmington Street
Raleigh, North Carolina 27601

is hereby issued this

CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY
PURSUANT TO G.S. 62-110.1

for construction of an approximately 3-MW direct current, 2-MW alternating current solar photovoltaic electric generation facility and associated equipment for the Hot Springs Microgrid Project

located
on property in Madison County, North Carolina

This certificate is subject to the following conditions: (a) Duke Energy Progress, LLC (DEP) shall construct and operate the Hot Springs Microgrid Project in strict accordance with all applicable laws and regulations, including any local zoning and environmental permitting requirements, including the provisions of all permits issued by the North Carolina Department of Environmental Quality; (b) DEP will obtain approval of the Commission before selling, transferring, or assigning the certificate and/or generating facility; (c) this certificate is subject to Commission Rule R8-61 and all orders, rules, regulations and conditions as are now or may hereafter be lawfully made by the Commission.

ISSUED BY ORDER OF THE COMMISSION.

This the 10th day of May, 2019.

NORTH CAROLINA UTILITIES COMMISSION

M. Lynn Jarvis, Chief Clerk