

**NORTH CAROLINA UTILITIES COMMISSION
DOCKET NO. E-2, SUB 1318
DOCKET NO. EC-67, SUB 55**

**JOINT APPLICATION FOR A
CERTIFICATE OF PUBLIC
CONVENIENCE AND NECESSITY**

**PERSON COUNTY ENERGY COMPLEX
COMBINED-CYCLE COMBUSTION TURBINE
ADDITION PROJECT**

Exhibit 1B: DEP Statement of Need



1.1 PROJECT DESCRIPTION

Duke Energy Progress, LLC (“DEP” or the “Company”) proposes to construct a new hydrogen capable, advanced-class combined-cycle natural gas-fueled electric generating combustion turbine power block (“CC”) with ultra-low sulfur diesel (“ULSD”) back-up and associated transmission and natural gas pipeline interconnection facilities (the “Proposed Facility”). The Proposed Facility will have an estimated nominal winter capacity of 1,360 megawatts (“MW”). The Proposed Facility will be located in Person County, on DEP-owned land at the Roxboro Steam Plan (“Roxboro”). The site consists of four (4) coal-fired electric generating units with subcritical steam generator technology put into service between 1966 and 1980. The four units have the following winter ratings: Roxboro Unit 1 – 380 MW; Roxboro Unit 2 – 673 MW; Roxboro Unit 3 – 698 MW; and Roxboro Unit 4 – 711 MW. The addition of the Proposed Facility will allow for the permanent retirement of Roxboro Units 1 and 4. The Proposed Facility has completed a generator replacement request (“GRR”) interconnection study process for use of approximately 1,053 MW of transmission capacity associated with the retiring coal capacity from two retiring coal units. DEP is pursuing an interconnection agreement in the 2023 Definitive Interconnection System Impact Study (“DISIS”) for the remaining capacity beyond the interconnection rights of the retiring coal units retained through the GRR process. The Proposed Facility, along with the remaining Roxboro Units 2 and 3, will be referred to as the Person County Energy Complex.

1.2 STATEMENT OF NEED

The Proposed Facility will provide dispatchable capacity and energy to meet the needs of the system. The Commission’s *Order Adopting Initial Carbon Plan and Providing Direction for Future Planning* issued in Docket No. E-100, Sub 179 on December 30, 2022 (the “Carbon Plan Order”), along with DEP’s and Duke Energy Carolinas, LLC’s (“DEC” and together with DEP, the “Companies”) 2023-2024 Carbon Plan and Integrated Resource Plan (“CPIRP” or the “Plan”) including the initial Plan filed with the Commission on August 17, 2023, in Docket No. E-100, Sub 190, and the Supplemental Planning Analysis (“SPA”) filed in the same docket on January 31, 2024, support the addition of the Proposed Facility as part of the Companies’ current Execution Plan and proposed Near-Term Action Plan. The Proposed Facility conforms to the CPIRP and is supported by robust modeling and analysis. The Proposed Facility is consistently selected across all model pathways and scenarios, and is needed to provide firm, dispatchable, and equally reliable capacity to the retiring coal units, contribute to maintaining reliable system operations and meeting the Company’s capacity planning reserve margin target, and to serving load during extreme weather conditions as well as serving as a reliability back stand for variable energy and energy limited resources.

Consistent with the requirements of N.C.G.S. § 62-110.1(e), the Proposed Facility is part of the least cost path to achieve compliance with the authorized carbon dioxide (“CO₂”) emissions reduction goals in N.C.G.S. § 62-110.9, will maintain or improve upon the adequacy and reliability of the existing grid, and construction and operation of the Proposed Facility is in the public interest. The Proposed Facility is part of the Companies’ most reasonable, least cost, and least risk resource plan and will be a used and useful resource serving DEP’s system over its planned 35-year operational life.

The analysis presented within this exhibit identifies DEP’s statement of need for the wholly owned Proposed Facility aligned with the CPIRP modeling, unless otherwise noted. The joint ownership with North Carolina Electric Membership Corporation (“NCEMC”) is neutral to the planning need of the Company.

1.3 BIENNIAL AND ANNUAL REPORTS

Exhibit 1A contains a copy of (1) the Carbon Plan Order; (2) the Companies’ 2023-2024 CPIRP, including the initial Plan filed with the Commission on August 17, 2023, in Docket No. E-100, Sub 190, and the SPA filed in the same docket on January 31, 2024. The CPIRP is on file with the Commission in Docket E-100, Sub 190 and DEP is incorporating these documents by reference—rather than reproducing them—given the size of the documents and their public availability through the Commission’s Document Management System.

1.4 CONFORMANCE WITH 2022 CARBON PLAN ORDER AND 2023 CPIRP

The Proposed Facility conforms to the Commission’s Carbon Plan Order and the Companies’ CPIRP.

1.4.1 Conformance with the 2022 Carbon Plan Order

The Commission’s Carbon Plan Order concluded that “planning for ... a CC of up to 1,200 MW is a reasonable step for Duke to take at this time.”¹ The Companies’ 2022 Carbon Plan filing recommended the CC resource be online in the 2027-2028 timeframe to facilitate planned coal unit retirements supplying replacement resources that can provide firm, dispatchable, and equally reliable capacity like CCs. The Proposed Facility’s estimated nominal winter capacity is 1,360 MW, which reflects the largest of the size of advanced class, 2x1² combined cycle facilities available in the market. As discussed in the CPIRP, the Companies will continue to “optimize for execution,”

¹ Exhibit 1A Carbon Plan Order at 79.

² A “2x1” combined cycle unit is comprised of two gas combustion turbines that are each equipped with a heat recovery steam generator that provides steam to a common, single steam turbine generator.

meaning that the Companies recognize that resource planning leverages generic resources, and once executing on the generic resources identified in the plans, the Companies will consider a multitude of factors to develop the resource that best meets the needs of the customer. In this instance, for the Proposed Facility, the Companies have selected a 1,360 MW advanced-class CC resource, reflecting updated market availability and resource optimization relative to the 1,200 MW previously specified in the 2022 Carbon Plan and approved for planning purposes by the Commission its Carbon Plan Order.

1.4.2 Conformance with the CPIRP

The CPIRP identifies the need for 6,800 MW of CC capacity in the 2028-2033 timeframe, including the two CCs identified in the Company's 2022 Carbon Plan modeling and proposed near term actions. CC resources are needed to meet load growth and replace retiring coal units. New CCs are selected in each of the CPIRP's modeled Energy Transition Pathways and across the 40 portfolios developed in the CPIRP, ranging from base planning assumptions, alternate assumptions with regards to resources availability and fuel supply, and sensitivity assumptions with respect to load, technology prices, fuel price, and demand-side resources. The SPA modeling, with updated resource cost assumptions reflecting the dynamic cost environment, selected CC resources in the P3 Fall Base portfolio as well as in the P3 Fall High CC/CT Cost portfolio, which included CC and CT costs 25% higher than in the base case assumption in the SPA. The first CC selected consistently corresponds to the retirement of Roxboro coal-fired Units 1 and 4 and is part of the least cost path to achieve compliance with the authorized CO₂ emissions reduction goals in N.C.G.S. § 62-110.9 and will maintain or improve upon the adequacy and reliability of the existing grid.

1.4.2.1 Resource Type

The CPIRP models generic resources as representative for a class of resources. For baseload generation needs, the Companies model advanced-class CC resources. The Proposed Facility is an advanced-class CC resource consistent with the baseload generation resources modeled in the CPIRP and will be capable of meeting the identified generation resource identified in the Plan as needed starting in 2029. Advanced-class CC resources are highly efficient with full-load heat rates ranging from 6,300-6,600 btu/kWh. These firm, dispatchable, and flexible resources are able to respond to the needs of the system, while providing reliable capacity when the system needs it the most. The Proposed Facility will be hydrogen capable and will be configured for future conversion for operation on 100% hydrogen consistent with the CPIRP modeling.

1.4.2.2 Resource Operational Life

The CPIRP modeled 35-year operational life for natural gas resources, which continues to be reasonable for planning purposes. In the Carbon Plan Order, the Commission similarly found the Companies' use of 35-year operational lives of new gas assets reasonable for planning purposes and also directed the Companies to provide additional information on the appropriateness of this assumption in its future filings.³ With the recent supportive policies intended to incentivize the deployment of zero- or low-carbon technologies, including the production of hydrogen and use of the fuel to generate electricity, as well as the capture, utilization, and sequestration of CO₂, the Companies maintain that there are reasonably viable long-term options for fuel conversion to hydrogen, utilization of future carbon emission offset market(s), as identified in N.C.G.S. § 62-110.9, CO₂ capture and sequestration, or to support continued operation of the Proposed Facility if determined necessary to maintain or improve the reliability of the system. Specifically, the continued development of hydrogen production, transportation, storage, and utilization as well as the long-term potential for CO₂ offsets or CO₂ capture, utilization or sequestration justify the use of 35-year lives for natural gas assets. Since the Commission issued the Carbon Plan Order, the momentum for development of hydrogen as an energy source for power generation and the economy, as a whole, has continued to increase. The Proposed Facility will be initially configured to allow operation on a blend of hydrogen and natural gas and for future conversion to operate exclusively on hydrogen, which the Company will continue to monitor to determine the least cost path to achieve Carbon Neutrality in 2050.

1.4.2.3 Fuel Supply and Dual-Fuel Capability

The CPIRP assumes generic CC resources have adequate fuel supply to ensure reliable operation of the units. The Company assumes these resources have firm intrastate transportation service of natural gas with supply provided by firm interstate natural gas transportation from liquid delivery points. Furthermore, the Companies assume, based on the need for increased fuel security, that these resources have dual-fuel capabilities on ULSD. Conforming to the CPIRP, the Proposed Facility will have firm intrastate natural gas transportation service and will be supported by sufficient firm interstate natural gas supply. Furthermore, the Proposed Facility will also have dual-fuel capability and have three (3) days of ULSD stored on-site.

³ Exhibit 1A Carbon Plan Order at 78.

1.4.2.4 Least Cost Path to Achieve Compliance with Authorized CO₂ Emissions Reduction Goals

The development of the CPIRP centered around Energy Transition Pathways to achieve the CO₂ emissions reduction goals authorized by N.C.G.S. § 62-110.9. The development of portfolios under each of these Pathways utilized sophisticated capacity expansion and production cost modeling that sought to minimize cost of the system in making resource decisions considering its reliability and operational needs, the cost of available resource options to meet those needs, and the overall production cost of the system. In each of the portfolios in each of the Energy Transition Pathways, the model selected CC resources in the 2028-2033 timeframe to meet the energy and capacity needs of the system while optimizing resources for achieving the emissions reduction targets. While the Carbon Plan Order did not definitively “select” new dispatchable natural gas-fueled resources as part of the Commission's initial Carbon Plan, the Commission gave “substantial weight” to the Companies’ testimony that the CC resources identified by the Companies are “essential to achieving the [70% CO₂ emissions reduction] Interim Target, while maintaining or improving reliability, and doing so along a least cost path[.]”⁴ and found “persuasive” the Companies’ testimony that “failing to develop new natural gas resources jeopardizes Duke’s ability to achieve the mandated carbon dioxide emissions reduction[.]”⁴ Finally, the Commission found persuasive the Companies’ testimony “that a failure to consider new natural gas resources may increase the cost of operating the system and curtail future longer-term development of the hydrogen economy or appropriately structure a North Carolina carbon offset market that may provide a pathway for continued operation of new CC ... resources beyond 2050 in a manner consistent with N.C.G.S. § 62-110.9.”⁵ The Proposed Facility is consistent with these resources uniformly selected across all portfolios in the CPIRP and supported in the Carbon Plan Order.

The need for the Proposed Facility is also justified by the CPIRP Coal Retirement Analysis, which identified the need for retirement of Roxboro Units 1 and 4 (1,091 MW capacity) as part of the orderly retirement of the coal fleet by 2035. The Supplemental Coal Retirement Analysis in the SPA Technical Appendix supports the planned coal unit retirement schedule as part of the ongoing orderly transition of the fleet.

1.4.2.5 Maintain or Improve upon the Adequacy and Reliability of the Existing Grid

The Proposed Facility will serve to meet the needs of DEP’s customers by maintaining or improving upon the adequacy and reliability of the existing grid. The planned retirement of 1,091

⁴ Exhibit 1A Carbon Plan Order at 79.

⁵ *Id.*

MW of aging coal generating capacity and corresponding addition of an estimated 1,360 MW of new dispatchable gas CC capacity allows the excess capacity to go toward meeting rapid load growth in the Carolinas as identified in the CPIRP. The Proposed Facility's firm, dispatchable, and flexible operating characteristics will assist with the integration of renewables and promote customer usage with the ability to quickly start and shutdown and rapidly ramp to meet the energy needs of the system. Dispatchable and flexible generation is increasingly critical to maintain reliability and energy adequacy as the Companies' fleet transitions towards more variable energy and energy-limited renewable resources, as discussed in CPIRP Appendix M (Reliability and Operational Resilience).

The CPIRP also discusses that the retirement of Roxboro and the Mayo Generating Station ("Mayo") will cause the need for additional transmission projects if the generation is not replaced sufficiently at the Roxboro and/or Mayo sites coincident with the retirements to maintain the reliability of the grid. As explained in CPIRP Appendix L (Transmission Planning and Grid Transformation),⁶ it is likely that a static var compensator would be needed in the DEP northern region along with some other moderately small transmission upgrades to provide the necessary voltage support for the region to maintain the reliability of the grid if the replacement resources are sited elsewhere in DEP. Replacing this generation at the Roxboro site sustains the voltage support needed for the Wake County area load center and avoids the need for additional voltage support infrastructure, contributing to the reliability of the grid through the transition, and avoiding incremental transmission upgrades. The Proposed Facility will also utilize existing infrastructure and provide the required capacity from the site in a more efficient and flexible manner relative to the retiring coal units resulting in a more efficient operation of the system while maintaining or improving its reliability.

1.5 CAPACITY REQUIREMENTS OF THE SYSTEM AND OPERATIONAL PROJECTIONS FOR THE PROPOSED FACILITY

As presented in this section, the Proposed Facility provides the firm planning capacity required by the system and efficiently provides increasingly critical, around the clock energy to meet the needs of DEP's customers. The Proposed Facility contributes to resource and fuel diversity and, thereby, contributes to maintaining a robust and resilient system.

1.5.1 Resource and Fuel Diversity

The Proposed Facility will operate primarily on natural gas which will be delivered to the plant through firm intrastate transportation service. The gas supply will be available via firm

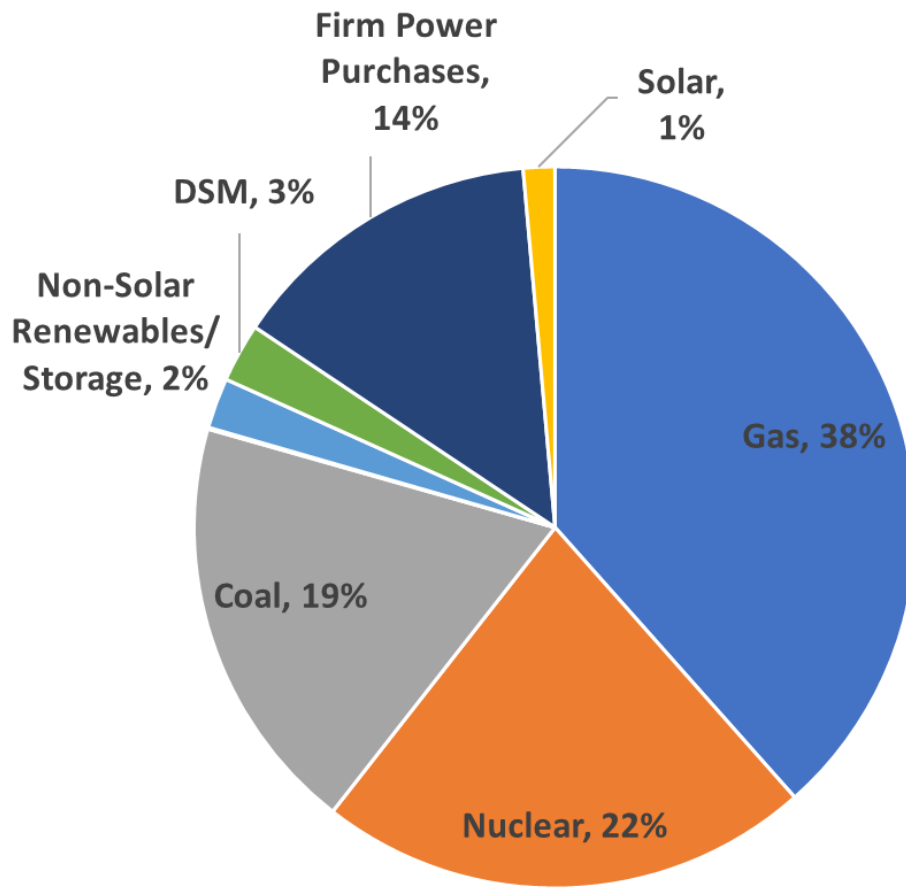
⁶ CPIRP Appendix L at 29.

interstate delivery of natural gas supply from liquid delivery points via both MVP Southgate and Transcontinental Pipe Line Company, LLC (“Transco”). The CC will also have the ability to operate on ULSD as an emergency backup should there be a physical interruption in natural gas delivery to the Proposed Facility or a temporary spike in price that makes natural gas more expensive than ULSD. There will be sufficient ULSD on site to enable the Proposed Facility to operate for three (3) days.

The Proposed Facility’s turbines are also designed to be able to run on a blend of hydrogen when installed and will be suitable for operation exclusively on hydrogen in the future.

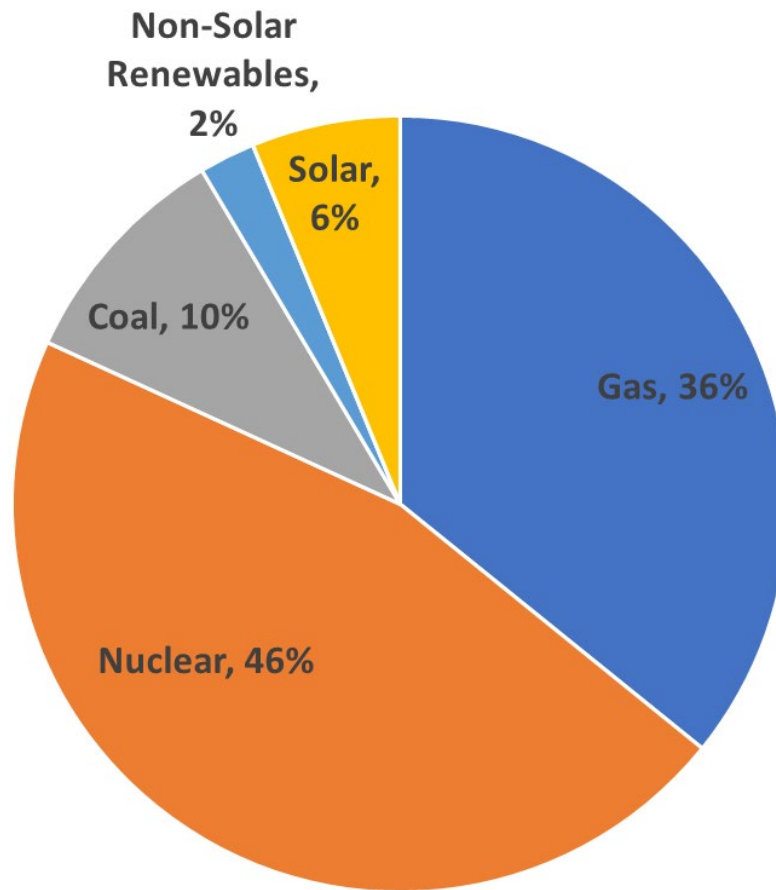
The Company’s firm winter capacity mix consists of approximately 38% gas-fired generating capacity, 22% nuclear generating capacity, 19% coal-fired generating capacity, and the remainder in non-solar renewables, demand-side management, other firm power purchases, and solar. The 2024 DEP Firm Winter Capacity Mix is shown in Figure 1 below.

Figure 1: 2023 CPIRP P3 Fall Base – 2024 DEP Firm Winter Capacity Mix



While ensuring long-term capacity planning reserve margins are met for DEP and DEC separately, the systems in the Carolinas are jointly dispatched under the Joint Dispatch Agreement, which allows DEP and DEC to jointly dispatch the systems through non-firm, energy-only transfers between DEP and DEC. Figure 2 below represents the projected 2024 DEP and DEC jointly dispatched energy mix. Gas-fired generation is projected as approximately 36% for 2024, with nuclear generation at 46%, and coal-fired generation at just 10%.

Figure 2: 2023 CPIRP P3 Fall Base – 2024 DEP+DEC Energy Mix



Overall, the Proposed Facility allows for the orderly, planned retirement of coal capacity, while increasing flexibility of the system. CCs represent approximately 21% of DEP's firm winter capacity. When the Proposed Facility is added to the system and Roxboro coal-fired Units 1 and 4 are retired, CCs will make up approximately 28% of DEP's firm winter capacity while coal capacity decreases from 19% to approximately 12%. While the CC resources increase, the retirement of coal generation helps to avoid future more carbon-intensive generation from coal,

while providing the system with a more flexible and efficient resource. In general, the energy provided by CCs provides lower emission energy across the entire year, relative to existing resources on the system including the retiring coal that it is replacing. Finally, as the system continues to add zero- and low-carbon generation over time, the utilization of these resources will continue to decline, but the CCs will continue to present the dispatchability, flexibility, and efficiency to serve load when required by the system. The diversity of the Proposed Facility relative to the variable energy and energy limited resources that are also being added to the system, allows for a reliable back stand with a secure fuel supply to operate continuously for several days at a time if needed to meet the needs of customers.

1.5.2 Energy Forecasts and Energy Requirements of the System

The Proposed Facility will serve to meet the energy needs of the system. Through the joint dispatch of the system, CCs in the CPIRP modeling, overall, are projected to account for approximately 25-35% of the annual energy mix over the planning horizon. The Proposed Facility is projected to operate as a baseload resource, with flexibility to operate around-the-clock to efficiently serve load in all hours of the day while providing emissions reductions relative to replacement energy available to the system and meet the incremental energy-intensive economic development load, with around the clock, 24/7 operations. The Proposed Facility also has the flexibility to ramp up and down to respond to variations in load and generation on the system, especially from variable energy and energy limited resources, to maintain the reliability of the grid. Over the following decades, the utilization of these resources will lean more toward operational flexibility as more non-emitting resources, such as solar, wind, and nuclear are brought onto the system. However, the Proposed Facility, being an advanced-class CC, will still represent among the most efficient resources on the system and will be relied on for longer than existing resources on the system to provide around the clock power.

The average annual capacity factor for the Proposed Facility is expected to be approximately 75% over the first five years of operations. The Proposed Facility is expected to have a higher utilization in the early years of the CPIRP, with capacity factors gradually declining as additional renewables, battery energy storage, new nuclear, and additional combined cycle generation come online over time.

Table 1 shows the projected energy mix of the system by fuel type over the 2023 CPIRP's base planning horizon, through 2038 with generation from natural gas including the generation from the Proposed Facility.

Table 1: 2023 CPIRP P3 Fall Base – Annual DEC+DEP Energy Mix by Fuel Type

Fuel Type	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Nuclear	46%	46%	44%	43%	41%	40%	39%	39%	38%	37%	36%	38%	39%	41%	42%
Renewables	9%	9%	9%	10%	12%	13%	14%	16%	19%	22%	26%	30%	31%	32%	33%
Gas	36%	29%	30%	31%	34%	37%	40%	39%	39%	38%	36%	31%	30%	27%	25%
Coal	10%	16%	17%	16%	13%	9%	7%	6%	5%	3%	2%	1%	0%	0%	0%

1.5.3 Capacity Forecasts and Requirements of the System

The Proposed Facility will provide an estimated 1,360 MW of firm nominal winter capacity beginning in the winter of 2028-2029. The Proposed Facility is consistent with the capacity need identified to replace retiring coal generation from the Carbon Plan Order. The additional capacity over the retiring coal units contributes to the firm planning capacity of the system to meet the tremendous load growth the Companies are projecting in the SPA. These resources are identified in the CPIRP Near Term Action Plan and provide additional capacity to maintain reliable system operations. The Proposed Facility is projected to operate as a baseload resource and will continue to contribute to maintaining sufficient capacity to meet the Company’s planning reserve margin target and will be needed to serve load during extreme weather conditions as well as serve as a reliability back stand for variable energy and energy limited resources.