

**NORTH CAROLINA UTILITIES COMMISSION
DOCKET NO. E-7, SUB 1297**

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

**MARSHALL ENERGY COMPLEX
SIMPLE-CYCLE GAS COMBUSTION TURBINE
ADDITIONS PROJECT**

Exhibit 4: Construction Information



4.1 CONSTRUCTION SCHEDULE

After North Carolina Utilities Commission (“Commission”) issuance of the requested certificate of public convenience and necessity, Duke Energy Carolinas, LLC (“DEC” or the “Company”) will undertake a competitive process to select an Engineering, Procurement, and Construction (“EPC”) contractor to construct the two proposed hydrogen capable, advanced-class combustion turbine (“CT”) units (this Exhibit will refer to the CTs and their ancillary facilities as the “Proposed Facility”). The Company will take care, custody, and control of the plant and commence commercial operation after Substantial Completion of the project is achieved. The construction schedule for the Proposed Facility is presented below in Table 4.1.

Table 4.1: Construction Schedule

EVENT	DATE
Award Combustion Turbine Generator Contract	2Q 2024
Receive ruling on DEC’s Application for a Certificate of Public Convenience and Necessity	4Q 2024
Award EPC Contract	2Q 2026
Begin Site Construction	3Q 2026
Natural Gas Available for Commissioning	3Q 2027
Transmission Back Feed for Commissioning	4Q 2027
Commissioning and Testing	1Q 2028
Substantial Completion and Commercial Operation	3Q 2028
Final Completion	1Q 2029

4.2 PLANT DESCRIPTION

The Proposed Facility will be sited at DEC’s Marshall Steam Station (“Marshall”). Marshall is a four-unit, coal- and natural gas-fired 2,078 MW generating facility located in Catawba County, North Carolina. It entered commercial operation in 1965 and is one of DEC’s largest generation facilities operating in the Carolinas. The station was originally fueled by coal alone, but DEC completed conversion projects on the existing units to allow 50% natural gas co-firing on Units 3 and 4 in 2020, and up to 40% natural gas co-firing on Units 1 and 2 in 2021.

The CTs will be equipped with Selective Catalytic Reduction (“DSCR”) for emissions controls. The main electrical equipment will include two generator step-up transformers (“GSU”) and two unit auxiliary transformers (“UAT”).

The CTs have an estimated nominal winter capacity of 425 megawatts (“MW”) each for a total estimated 850 MW to facilitate the permanent retirement of two of Marshall’s four coal-fired generating units, Units 1 and 2. The CTs are designed to utilize the existing transmission infrastructure that Marshall coal-fired Units 1 and 2 are currently utilizing. The Company submitted a Generator Replacement Request (“GRR”) to utilize the roughly 780 MW of transmission interconnection rights from Marshall’s coal-fired Units 1 and 2. The GRR process facilitates expedited interconnection of replacement generation at the retiring generation’s point of interconnection and can, thereby, reduce or save the cost of expensive network upgrades. The GRR Facilities Study indicated minimal network upgrades were necessary for the Proposed Facility and DEC has executed an associated GRR Large Generator Interconnection Agreement to support interconnecting the replacement MW. For the CT units’ incremental MW beyond those included in the GRR, DEC submitted an Interconnection Request into the 2023 Definitive Interconnection System Impact Study (“DISIS”). The Phase I study report indicated minimal network upgrades are necessary to support the incremental MW. Phase II of the DISIS study is underway and DEC expects to receive results in May 2024.

Each proposed CT unit will supply a 230 kilovolt (“kV”) 1.09-mile span bus line that will connect through its own breaker to the nearby Marshall 230-kV switchyard. Several 230-kV breakers in Marshall’s switchyard are required to complete the breaker-and-a-half scheme to facilitate the Proposed Facility’s point of interconnection.

The CTs will utilize Piedmont Natural Gas Company, Inc.’s (“Piedmont”) natural gas transmission pipeline that currently redelivers natural gas to Marshall. Piedmont will install a new compressor station on DEC-owned property at the Lincoln Combustion Turbine Station to increase the pressure of the gas delivered to Marshall to enable the incremental firm transportation (“FT”) the CTs require. The CTs will also be able to operate using ultra-low sulfur diesel (“ULSD”) as a backup fuel. The back-up fuel facilities will consist of two large, demineralized water tanks and two ULSD fuel tanks with capacity for approximately six days of continuous operations.

A plant description with additional detail is provided as Appendix A to this Exhibit 4.

4.3 MAJOR EQUIPMENT

4.3.1 Combustion Turbines

The Company is currently evaluating bids for the CT units to be installed for the Proposed Facility. All three major CT manufacturers (General Electric Vernova (“GE”), Siemens Energy (“Siemens”), and Mitsubishi Power Americas, Inc. (“Mitsubishi”)) provided DEC with bids to supply the CTs for the Proposed Facility. All bidders included required DSCR equipment with their bids, which DEC required to couple emissions guarantees under a single original equipment manufacturer (“OEM”). Although cost is not the sole factor upon which DEC will select a bidder to supply the CTs, the Company solicited and is now evaluating bids to supply CTs for multiple potential combustion turbine projects in parallel with the goal of securing the best valued commercial offering for customers.

The gas turbine models for which DEC has received bids are:

[BEGIN CONFIDENTIAL]



[END CONFIDENTIAL]

Regarding the units identified confidentially above, there are two GE units in commercial operation, five Mitsubishi units in commercial operation, and two Siemens units in commercial operation. All three OEMs are currently testing the CTs identified above at various test facilities in addition to the units in commercial operation. By the time the Proposed Facility enters commercial operation, DEC expects that all three OEMs will have increased experience operating the CTs identified above.

DEC also notes that one of the CTs requires an inlet gas pressure in excess of what Piedmont is able to provide utilizing its existing natural gas redelivery infrastructure to Marshall. Accordingly, DEC would have to invest in onsite compression infrastructure to utilize that particular CT at Marshall.

Each manufacturer’s CT design is unique and has different nominal MW capacity ratings, operating requirements, cooling requirements, compressor designs, and unique characteristics such as inlet gas pressure requirements. However, all three OEMs have submitted bids to supply

qualified advanced-class turbines that DEC is currently considering. To identify the top evaluated bidder, DEC will consider each manufacturer's unique requirements and characteristics, along with other factors including normalized capital cost in dollars per kW, constructability, life-cycle fuel costs, performance, experience, reliability, completeness of bid, ability to meet schedule, long-term parts and maintenance cost, and key contract terms and conditions. As identified above in Table 4.1: Construction Schedule, DEC anticipates finalizing selection of the CT units in 2Q 2024, and will then begin negotiations with the selected OEM.

4.3.2 Generator Step-up and Unit Auxiliary Transformers

The Company selected the OEM provider for generator step-up and auxiliary transformers after receiving and evaluating bids from multiple qualified OEM providers. To identify the best valued commercial offering, DEC evaluated criteria such as supplier experience, technical compliance, operating characteristics, ability to achieve delivery schedule, and key contract terms and conditions. **[BEGIN CONFIDENTIAL]** [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] **[END**

CONFIDENTIAL]

4.4 EPC

DEC's strategy for constructing the Proposed Facility includes a combination of Owner-procured major equipment components, such as CTs and step-up and auxiliary transformers, and contracting with a full-service EPC contractor. DEC will procure the Owner-procured equipment and will then assign it to the selected EPC contractor for coordination, construction, and commissioning.

The EPC contractor will be responsible for all civil, structural, mechanical, and electrical scopes required to construct the Proposed Facility and bring it to a state of mechanical completion. Upon receiving DEC's agreement that the facility is in a safe condition to begin energizing plant equipment, the EPC contractor will begin start-up and commissioning and will bring the Proposed Facility up to full power. Once fully powered, the EPC contractor will be responsible for testing the CT units and executing performance tests under the direction of a DEC-provided third-party testing service.

The Company plans to engage qualified EPCs and undertake a competitive selection process in 2025 and, as identified above in Table 4.1: Construction Schedule, is then targeting

selecting the EPC contractor for the Proposed Facility in 2Q 2026. The Company will assemble the project specifications and Request for Quote (“RFQ”) documents later this year and issue the project for bids by July 2025. The Company continually evaluates potential EPC providers through site visits and interviews to understand their abilities and availability by looking at their experience, financials, workload, and available resources, and has developed an initial qualified bidders list, including [BEGIN CONFIDENTIAL] [REDACTED]

[REDACTED] [END CONFIDENTIAL] The Company will continue to update its list based on bidder qualifications as well as information learned from the marketplace before issuing the RFQ. The Company ultimately anticipates a bid list of between three and six qualified providers.

Once DEC receives bids, it will consider and score various criteria that it will then summarize under technical, commercial, and corporate responsibility categories. Evaluations for an EPC contractor are amongst the most comprehensive evaluations that DEC performs. The criteria will include safety, environmental, scope understanding, engineering capabilities, construction team experience and commitment, project management and project controls teams and tools, experience with similar technology and project scale, quality assurance, project execution planning, schedule adherence, and key aspects of the commercial terms and conditions that provide confidence that the contractor is committed to the project. After completing the evaluation, the Company will identify the bid that represents the best valued commercial offering.

4.5 SCOPE OUTSIDE OF EPC CONTRACT

The Company will procure the following components prior to assigning them to the EPC contractor: CTs including the DSCR, GSU, and UAT transformers, Distributed Control System, and High-Voltage Breakers.

The Company will retain environmental emissions and facility performance testing obligations through a DEC-contracted third-party testing service(s). Use of independent third parties ensures that the interests of all parties including DEC, major equipment OEM, and the EPC contractor are protected in determining whether the parties have achieved their respective performance requirements that were the original basis for validating the overall project economics, including long-term operations and maintenance costs.

4.6 DEPENDABLE FUEL SUPPLY

4.6.1 Natural Gas

Constructing the Proposed Facility will not require installation of new natural gas

transmission pipeline to deliver natural gas to Marshall. DEC will install necessary piping to transport natural gas from the onsite metering and regulation (“M&R”) station to the new CTs. Piedmont Natural Gas Company, Inc. (“Piedmont”), a DEC affiliate and natural gas local distribution company, provides intrastate natural gas pipeline redelivery service to Marshall. Piedmont’s existing transmission pipeline that currently delivers natural gas to Marshall can accommodate the increased volumes of natural gas that the Proposed Facility will require and, therefore, no new transmission pipeline will be necessary. Piedmont will install a new electric compressor station on DEC-owned property to increase the pressure of the gas delivered to Marshall to enable the higher pressure intrastate firm transportation (“FT”) the CTs require. Piedmont will also expand its interconnection with Transcontinental Gas Pipe Line Company, LLC (“Transco”) and the existing Marshall M&R station. Piedmont filed a First Amendment to the existing Natural Gas Construction and Redelivery Service Agreement for Commission review and Approval in Docket No. G-9, Sub 718, pertaining to incremental FT service to Marshall.

The Company’s agreement with Piedmont enables increased volumes of FT from Transco where DEC will procure firm delivered Transco Zone 5 gas supply as required. The CTs could also utilize portfolio Transco FT service, instead of firm delivered gas supply, if it is not being utilized by a more efficient combined-cycle generator. Furthermore, these CT units will have ULSD dual-fuel capability along with six days’ worth of on-site ULSD storage for generation purposes.

4.6.2 Back Up On-Site ULSD

The EPC contractor will be responsible for the construction of tanks, demineralized water, and all other facilities necessary to store a sufficient quantity of ULSD on-site to enable 144 hours of continuous operation of both CTs.

4.7 RISK FACTORS

The major construction risk factors include labor availability, labor productivity, weather, supply chain constraints, schedule, and new gas turbine technology performance. Risks associated with labor, weather, schedule, and supply chain constraints will be transferred to the EPC contractor. Risks associated with new gas turbine technology performance will be allocated commercially in DEC’s contract with the turbine manufacturer.

The major operating risks are equipment failure and weather. Equipment failure impacts on plant operations will be mitigated by a quality assurance program during equipment manufacturing/fabrication, and further through Project Management and Construction and EPC

contractor Quality oversight during construction and commissioning. The Company will also negotiate and require the selected OEMs and EPC contractor to provide extended contract warranties.

The Proposed Facility will be designed and constructed to operate reliably during extreme cold weather events. The lowest temperature ever recorded at the National Weather Service Automated Surface Observing System First Order Station in Charlotte, North Carolina, was -5°F in January 1985. This temperature is incorporated into all equipment and EPC specifications as the minimum design temperature and the Proposed Facility will be capable of operating at -5°F. A building will be constructed around the CT units to provide an additional level of cold hardening.

For additional discussion about the execution risks to constructing and operating new natural gas fired resources, as well as DEC's plan to manage those risks, please see Appendix K (Natural Gas, Low-Carbon Fuels and Hydrogen) to DEC's and Duke Energy Progress, LLC's 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 filed in the same docket on January 31, 2024.

EXHIBIT 4 – APPENDIX A: PLANT DESCRIPTION

1.1 PROJECT SCOPE

The scope includes Duke Energy Carolinas, LLC (“DEC” or the “Company”) constructing two hydrogen-capable, advanced-class gas combustion turbines (“CT”) with dual fuel capability utilizing natural gas primarily, and ultra-low sulfur diesel (“ULSD”) as a back-up fuel (this Appendix will refer to the proposed CTs and their ancillary facilities as the “Proposed Facility”). The Proposed Facility’s design includes the CTs, two Dilution Selective Catalytic Reduction (“DSCR”) emissions control systems, and associated balance of plant equipment.

1.2 CAPACITY OBJECTIVE

The Company designed the Proposed Facility to have an estimated nominal winter capacity of 850 megawatts (“MW”) and the plant configuration to use the transmission infrastructure currently utilized by existing Marshall coal-fired Units 1 and 2. Evaporative cooling is included in the project scope to maximize summer output.

1.3 PLANT LOCATION

The Proposed Facility will be located at DEC’s Marshall Steam Station (“Marshall”) in Catawba County near Terrell, NC. The Proposed Facility will be located approximately 1.25 miles northeast of the existing Marshall coal units, on DEC-owned land that is contiguous with the existing coal units.

2.0 EXISTING UNIT OVERVIEW

Marshall consists of four coal-fired units with a winter capacity of 2,078 MW. The Company will retire Marshall coal-fired Units 1 and 2 in conjunction with the commercialization of the Proposed Facility. Marshall coal-fired Units 3 and 4 will continue to operate into the early 2030s.

The new CTs will utilize all or part of the following existing plant equipment systems:

- Plant intake system; and
- Plant discharge system.

3.0 DESIGN CRITERIA

The Proposed Facility will be designed based on project-specific DEC operational scope requirements and discipline design criteria. The design criteria will specify initial requirements, but DEC will determine final specific requirements through project drawing and model reviews.

4.0 MAJOR EQUIPMENT

Major project equipment will include the following:

1. Hydrogen-capable combustion turbine generator set
 - Dual fuel capable
 - Water injection for NO_x control (ULSD)
 - Evaporative air cooling
2. Cooling System
 - Fin-fan oil coolers
3. Controls
 - Combustion turbine generator controls provided by the original equipment manufacturer
4. Environmental Controls
 - DSCR with oxidation catalyst
 - 19% aqueous ammonia
 - NO_x and CO₂ continuous emissions monitoring systems
5. Major Tanks
 - Six days of ULSD with secondary containment
 - Demineralized water sized to match water injection rate
 - Service water
 - Ammonia storage
6. Fire water system
7. Gas systems
 - Service air with compressors, dryers, and mist eliminators
 - Micro-bulk CO₂ system
 - Generator hydrogen storage will utilize storage trailers

8. Electrical Equipment
 - Two generator step-up transformers
 - Unit auxiliary transformers
 - Generator breakers
 - Lightning and ground protection
 - Security and camera systems
9. Facilities
 - One shop/administration facility including control room, offices, conference room, warehouse, crew room, and restroom facilities
 - One lube oil storage facility
 - The Proposed Facility will be designed to operate at the all-time low temperature as measured at the Charlotte Douglas International Airport in accordance with applicable regulatory requirements and Duke Energy design criteria
10. Natural Gas
 - DEC will utilize Piedmont Natural Gas Company, Inc's existing natural gas redelivery transmission infrastructure currently delivering natural gas to Marshall to supply the incremental fuel the CTs require
 - Piedmont will expand the existing Marshall Metering and Regulation ("M&R") station and DEC will install necessary piping to transport natural gas from the M&R station to the new CTs
11. Transmission
 - The Proposed Facility will require on-site transmission facilities as required to connect the power block to the 230 kilovolt system