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STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. E-7, SUB 1297

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of: Application of Duke Energy Carolinas, LLC for a Certificate of Public Convenience and Necessity to Construct an 850 MW Natural Gas-Fired Combustion Turbine Generating Facility in Catawba County, North Carolina	)	**DIRECT TESTIMONY OF WILLIAM B. MCALEB ON BEHALF OF ENVIRONMENTAL DEFENSE FUND**

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I. Introduction. Background, Findings, and Recommendations

Q: PLEASE INTRODUCE YOURSELF, YOUR CURRENT POSITION AND BUSINESS LOCATION.

A: My name is William B. ("Bill") McAleb, and I am employed as the Chief Executive Officer and President of Rod Walker & Associates ("RWA"), a Management Consultancy and Technical Advisory firm based near Atlanta, GA.

Q: PLEASE SUMMARIZE YOUR EXPERIENCE, PROFESSIONAL AND EDUCATIONAL BACKGROUND.

A: I possess over forty years of Oil, Gas, Power and Utility industry experience and business operational knowledge, engineering, and technical expertise. Having a well-seasoned range of career executive, management, strategic and operational experience, I offer leadership, guidance, vision, corporate and board counsel, interim executive, and expert witness services. The focus of my practice is the provision of technical, financial, policy and managerial advisory and forensics services to clients engaged in the nexus between hydrocarbon fuels, electric power, transmission & distribution, energy and fuels storage, petroleum midstream, inter- and intrastate pipelines and utilities. Further, I deliver deep experience and hands-on leadership, implementation, and management relative to operations, financial and operational performance and optimization, utility and energy policy practices, process and profitability strategy and innovation. In addition, I have expertise with respect to M&A/Transactional/Transitional advisory services to financial and private equity clients as well as strategic advisory services to utility, energy, and related clients.

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I have MBA and Master of Petroleum Engineering degrees from Tulane University and a Bachelor of Chemical Process Metallurgical Engineering from the University of Texas at El Paso.

I have provided expert testimony related to natural gas procurement and prudency, energy asset property tax issues, RCN analysis, operational joint-interest agreements and performance, energy market performance and forecasting, regulatory policy and practices, utility prudency determinations and economic forensics in state, federal, and regulatory venues.

Q: ON WHOSE BEHALF ARE YOU APPEARING?

A: I am submitting this testimony on behalf of the Environmental Defense Fund.

Q: HAVE YOU EVER TESTIFIED BEFORE A STATE PUBLIC UTILITIES COMMISSION?

A: Yes, I have submitted and/or supported testimony before various state commissions including The New Orleans City Council's Utility Regulatory Office (the regulatory agency charged with oversight of Entergy) and the Regulatory Commission of Alaska, the state of Alaska Petroleum Tax Review and Assessment Board and the Illinois Commerce Commission. I have previously submitted testimony before the North Carolina Utilities Commission in Docket No. E-100, Sub 190.

Q: HAVE YOU PREPARED ANY ATTACHMENTS IN SUPPORT OF YOUR TESTIMONY?

A: Yes. I have included various supporting documents contained in EDF Exhibit A.01 through EDF Exhibit E.01 as identified below.

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Exhibit No.	Description
EDF Exhibit A.01	General Electric 7HA Heavy Duty Turbine Specification Sheet
EDF Exhibit B.01	Siemens Energy HL-Class Gas Turbine Specification Sheet
EDF Exhibit C.01	EIA Cost and Performance Characteristics of New Generating Technologies, Annual Energy Outlook 2022
EDF Exhibit D.01	EIA Annual Energy Outlook 2023 Table 55 Overnight Capital Costs for New Generating Plants
EDF Exhibit E.01	Direct Testimony of William McAleb NCUC Docket 100, Sub 190

Table 1: List of Exhibits

Q: WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A: The purpose of my testimony is to review and provide commentary and analysis regarding the Application of Duke Energy Carolinas, LLC for a Certificate of Public Convenience and Necessity to construct an 850 MW Natural Gas-Fired Combustion Turbine Generating Facility in Catawba County, North Carolina ("Application"). Duke Energy Carolinas, LLC ("DEC") is proposing to construct two, advanced-class, hydrogen-capable simple-cycle natural gas combustion turbine (CT) generation units on the site to the existing Marshall Steam Generation Facility to replace and retire coal Units 1 and 2. Each of the proposed CT units have a winter capacity of 425 MW, or a total winter capacity of 850 MW.

Specifically, my testimony will:

- Review and offer comments relative to the pertinent portions of the Application,
- Review, highlight, and compare cost and performance data within the Certificate against publicly available information and datasets to confirm reasonableness,

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- Cite to any concerns related to cost, emissions, reliability, definition, potential ratepayer impacts, or other areas of concern related to foundational issue omissions related to the Application,
- Explain the foundation of any such concerns, and an overview level discussion related to the Application.

Q: PLEASE SUMMARIZE YOUR FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS.

A: My review and analysis of the Plan has resulted in the following broad conclusions:

- The Application is supported by and was developed based in substantive part on analytic investigations performed within the DEC and Duke Energy Progress, LLC's ("DEP") (DEC and DEP collectively "Duke" or the "Companies") 2023-2024 Carbon Plan and Integrated Resource Plan ("CPIRP" or "Plan").
- The exit from coal generation appears to be of primary concern during reshaping of DEC's power resource transition to reduced emissions through changing fuels and a greater reliance on renewable resources – the instant Application focuses on that objective.
- However, DEC's presumption that it will be able to convert new natural gas-fired assets into low or zero carbon emission, hydrogen-fired assets is not based on substantive evidence presented in this docket proceeding.
- The issues surrounding hydrogen co-firing, 100% hydrogen fueling, and infrastructure are not inconsequential. OEM ("original equipment manufacturers") for combustion turbines have not demonstrated a firm

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commitment as to when, or even if, 100% hydrogen fueling of combustion turbines ("CTs") is technically and economically feasible.

- Two of the leading CT manufacturing firms currently have equipment capable of a 50% hydrogen/natural gas blended fuel, but the delivery of CT equipment with 100% hydrogen fuel capabilities stands as currently unavailable and only potentially capable sometime in or after 2030.
- A clear commitment from the OEMs is currently lacking with respect to the timing of a fully compatible 100% hydrogen fired utility scale ("General Electric model 7HA" and/or "Siemens Energy model SGT6- 9000HL") turbine.
- Even if the equipment manufacturers can introduce hydrogen-capable turbines sometime in or after 2030, 100% hydrogen equipment retrofits for the then in-service turbines will require additional, and currently unknown, costs associated with the fuel technology implementation.
- Due to regional pipeline congestion, TRANSCO Zone 5 area is planned for a supply enhancement project that DEC have subscribed to on the order of 1,000,000 Dth per day that assures natural gas deliveries for projects like the proposed Marshall CT facility into the future.
- Whether the proposed new Marshall CT facility is a reasonable and necessary investment made on behalf of ratepayers depends largely on whether the Marshall CT will be able to continue to provide generation when North Carolina law requires low or zero emissions by DEC's in-state generation resources. As it stands today, presuming a hydrogen-fired, carbon emissions-

free Marshall CT facility within the period required by law is not only speculative but unlikely.

Recommendations:

As a result of the above findings and conclusions, The Commission should not approve the Application unless it also directs DEC to comply with each of the following pointed recommendations and in doing so, apply a clear, transparent, and rigorous statistical and logic-based analysis protocol.

Recommendation 1: 100% Hydrogen Reasonable Demonstration Study

- The Commission should require DEC to present:
  - The commitments made to DEC by the manufacturers of the proposed CT units relative to when the units will be 100% hydrogen capable.
  - A detailed timeline explaining when DEC anticipates, based on substantial evidence, when DEC plans to convert the proposed Marshall CT to 100% hydrogen firing.
  - A detailed and evidence-based analysis showing the DEC perceived likelihood of a viable hydrogen pipeline supply to the Marshall CT facility.
  - Detail DEC's estimate of retrofit and/or modification costs to convert the proposed Marshall CT and ancillary "inside the fence" plant infrastructure and controls to achieve 100% hydrogen capable generation status.

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- Sourcing and/or generation plus storage costs anticipated for the for the proposed Marshall CT.
- If hydrogen blending utilizing existing methane pipelines in unavailable, how will DEC supply hydrogen to the proposed Marshall CT?
- An evidence-based analysis determining the relative costs and obstacles to:
  - Co-located renewable energy and PEM technology, as at Duke's DeBary hydrogen co-firing pilot.
  - Import of hydrogen via non-pipeline means such as train or truck.

Recommendation 2: Hydrogen Blending Study

- The Commission should require DEC to detail what representations and/or commitments from its current gas suppliers it relies upon in assuming the availability of hydrogen blended into the existing methane pipeline network and addressing safety and feasibility concerns raised above.

Recommendation 3: Hydrogen Reasonableness

- The Commission should require DEC to present substantial, non-speculative evidence on the above 100% hydrogen and hydrogen blending issues.

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II. Category 1: Discussion of the Marshall Coal Unit Replacement and Energy Combustion Turbine Construction Projects, Need Determination, Project Components, and Fuels

Q: PLEASE PROVIDE A DISCUSSION OF THE FUTURE OF COAL GENERATION RESOURCES AND HOW THAT FUTURE IS BEING ADDRESSED BY DEC WITH RESPECT TO THE MARSHALL ENERGY COMPLEX.

A: In a 2019 article that appeared in Energy News[1] entitled "*Coal has always been king in the South. Now that's changing*", the increasing difficulties in achieving a positive economic outlook for coal generation resources are discussed. The article cites that Duke Energy's "coal fleet is running less and less." And that "nine of the company's 13 coal plants ran less than half the year in 2018." The article continues to describe that lower priced natural gas has rendered some of the older, less efficient coal units less competitive – including those that the Marshall Energy Complex will replace. Lower gas costs, coupled with the dispatching of more efficient units, results in the displacement of inefficient coal units from the dispatch merit stack leading to disappointing operational factors and metrics.

DEC frames natural gas as a bridge fuel capable of reducing carbon emissions. The point of the use of natural gas in the near term is essentially to "buy time" until less emission-emitting generation technologies and fuels can be proven and constructed at a scale that can be relied upon for the energy needs of DEC's service area.

[1] www.energynews.us/2019/10/03/coal-has-always-been-king-in-the-south-now-thats-changing/ (last checked May 24, 2024).

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The economic and emission review performed by DEC comparing the proposed natural gas units to the existing coal generation resources appears to have been the primary driver of the new generation units to replace two of the old coal units at the Marshall Steam Facility to the extent that DEC are in the process of obtaining an approval to replace Units 1 and 2.

Q: ON WHAT BASIS DOES DEC PROPOSE THE DEVELOPMENT OF THE MARSHALL ENERGY COMPLEX PROJECT?

A: The Marshall Steam Center currently consists of four coal-fired generation units, wherein two of the four units will be replaced with CTs. The Application is a result of DEC's modeling efforts within the CPIRP and consistent with DEC's plans to replace ineffieient coal generation resources prior to forced retirement in an effort directed toward transitioning to a progressively cleaner generation emissions future. The CPIRP is an overarching proposal, not yet approved by the Commission, focused on the provision of reliable electric service as required under law, which shapes DEC's transition to a carbon emission free generation stack. The CPIRP claims as a fundamental tenet an "Orderly Energy Transition" that has four main objectives - Resource Diversity, a Clean Resource Mix, Least Cost Planning, and the ability to Execute the Plan with Foreseeable Conditions with an overriding focus on reliability and the meeting of and compliance with laws and regulations. The State of North Carolina has a statutory requirement for a 70% reduction in emissions from 2005 levels in Duke's generation portfolio with an additional carbon neutrality requirement by 2050. Moreover, according to the CPIRP

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document, DEC is focused on a "most reasonable, least cost" approach to the North Carolina emissions reduction requirements.

These goals and statutory framework are the basis for the proposed facility.

Q: PLEASE BRIEFLY DISCUSS THE CPIRP MODELING EFFORT THAT DUKE ALLEGES TO DEMONSTRATE THE NEED REQUIRED IN THE APPLICATION.

A: The CPIRP modeling effort identified a need for 2,125 MW of new CT capacity within the period 2028-2031,[2] of which 850 MW of CT resource capacity is proposed to be provided by the Marshall Energy Complex.

Q: PROVIDE A DESCRIPTION OF MARSHALL ENERGY COMPLEX PROJECT THAT IS SCHEDULED TO BE ONLINE IN 2029.

A: The proposed Marshall Energy Complex project is a new, "hydrogen capable," advanced-class, combustion turbine (in a simple-cycle configuration) plant. DEC is proposing to construct two, advanced-class, "hydrogen-capable" simple-cycle natural gas combustion turbine generation units on a site about 1.25 miles from the existing Marshall Steam Station site to replace and retire coal units 1 and 2. The CTs being offered by the OEM manufacturers are 50% hydrogen capable with potential of being 100% capable by or after 2030. Further, the CTs are "advanced-class" potentially pointing to enhanced performance specifications and lower emissions, lower heat rates, and exceptional ramp rates. Each of the proposed CT

[2] *Direct Testimony of Michael Quinto*, Docket No. E-7, Sub 1297 p. 7

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units have a winter capacity of 425 MW, for a Marshall Energy Complex winter capacity of 850 MW for the two gas CTs.

Q: WHAT CONCERNS DO YOU HAVE WITH THE PROPOSED COMBUSTION TURBINE COMPONENTS?

A: In general, there are only two or three OEM companies that manufacture utility scale CTs that are "advanced class" and 50% hydrogen fuel capable. This fact is confirmed by DEC who state: "The Companies received bids from all three CT manufacturers, i.e., General Electric Vernova, Siemens Energy, and Mitsubishi Power Americas, Inc[…]."[3]

Q. HAS DEC IDENTIFIED THE CT EQUIPMENT THEY PLAN TO INSTALL?

A. Not in a firm manner, however two of the companies, Siemens Energy and General Electric, specification sheets are included as Exhibits EDF-A.01 and EDF-B.01. Because both simple- and combined-cycle CT configurations are presented in these Exhibits and because DEC have recent experience with a new Siemens SGT-9000HL facility at Lincoln County, North Carolina, there is a reasonable potential that one of the two OEMs presented here will likely be selected to supply the CT equipment for the Marshall Energy Complex CPCN.

DEC has not publicly identified the specific CTs it plans to use for the project but has provided some of the features it plans for the selected CTs. The planned CTs will be "advanced-class, hydrogen-capable" utility scale CTs. These features also

[3] *Direct Testimony of Bobby Smith*, Docket No. E-7, Sub 1297, p. 17.

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appear to support the conclusion that one of the two OEMs above will be the equipment vendor for the Marshall facility.

Q: WHAT IS MEANT BY "HYDROGEN CAPABLE" AND WHAT ARE YOUR CONCERNS WITH THE ROUTINE USE OF HYDROGEN AS A CT FUEL?

A: The focus of the OEMs of the CTs is to respond to market wants for a CT that can utilize, initially, a 50% blend of hydrogen and natural gas as fuel, with an aspiration of 100% hydrogen. The CTs being offered by the OEM manufacturers claim to be 50% hydrogen capable with potential of being 100% capable by or after 2030. Further, the CTs are described as being "advanced-class," potentially pointing to enhanced performance specifications and lower emissions (2 ppm NOx – 10ppm CO2), lower heat rates (7,884 Btu/kWh), and exceptional ramp rates (75 to 85 MW/minute).

The use of hydrogen as a routine fuel, however, is burdened with uncertainties. Many of which will require new technological advancements with respect to the handling, storage, and transportation of hydrogen fuel and whether a robust hydrogen marketplace will develop to provide those services.

Moreover, technological strides are also necessary within hydrogen production wherein the production of hydrogen will need to utilize as much emission-free energy as possible to address and be compliant with the State of North Carolina's statutory requirement for a 70% reduction in emissions from 2005 levels with an additional carbon neutrality requirement of 2050. Simply using grid power to produce hydrogen does not automatically mean that the facilities are now inherently

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low-emissions and the lifecycle emissions of the hydrogen burned must be considered – not just the combustion emissions.

Q: WHAT IS MEANT BY ADVANCED-CLASS AND WHAT ARE THE POTENTIAL IMPLICATIONS FOR IMPROVED PERFORMANCE?

A: The term "advanced class" with respect to CTs is not defined in the Application. After a review of publicly available specification documents from the probable OEMs, the likely performance improvements that could support this idea of "advanced class" designation are fairly clear. For example, the Siemens Energy HL-class gas turbine specification sheet displays several significant changes and/or upgrades to the HL-class CT.[4]

The improvements include:

- Higher efficiency turbine blades
- Advanced combustion system (higher firing temperatures and operation flexibility)
- Improved blade cooling characteristics and features
- Improved air leakage sealing
- Larger turbine blades that enhance power output

In addition, improved performance metrics also may contribute to an "advanced class" designation:

- Enhanced Ramp-up – 85 MW/Minute
- Improved Heat Rate - <7,898 Btu/kWh

[4] EDF Exhibit B.01.

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- NOx emission – 2-25 ppm (with/without SCR)
- CO emission – 10 ppm

DEC in the Application states that an annual emission reduction of NOx by 82%, SO2 by 92%, and CO2 by 40% per MWh is planned.[5] However, it is not clear if there is an additional cost for the 50% hydrogen current capability or whether there will be a retrofitting cost if and when the CTs potentially become 100% hydrogen capable in the future. The "advanced class" designation appears to be solely tied to the improvements to current technology and not newly developed technology as it relates to blended or full hydrogen combustion. Therefore, DEC use of the "advanced class" refers to improvements to a natural gas CT and not hydrogen combustion.

Q. IS THE ISSUE OF FUEL DELIVERY AND AVAILABILITY DISCUSSED WITHIN THE CPIRP OR THE CPCN?

A. Yes, the Application discusses that natural gas supplies are currently delivered to the Marshall Steam Facility and will prospectively be delivered to the Marshall Energy Complex facility once completed by Piedmont Natural Gas Company, Inc. ("Piedmont"), an affiliate of DEC and an intrastate pipeline that provides redelivery services to the Marshall Facility. Natural gas to be delivered is currently (and will be in the future) sourced from Piedmont's interconnection with the Transcontinental Pipeline ("TRANSCO"), an interstate pipeline under Federal Energy Regulatory Commission ("FERC") jurisdiction and regulatory oversight, in Zone 5.

[5] *Direct Testimony of John Robert Smith*, Docket No. E-7, Sub 1297 p. 7

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Q: DO SUFFICIENT AND AVAILABLE NATURAL GAS VOLUMES EXIST WITHIN TRANSCO'S ZONE 5 TO ENSURE THE DELIVERY OF RELIABLE FIRM QUANTITIES OF NATURAL GAS SUPPLIES TO THE MARSHALL ENERGY COMPLEX INTO THE FUTURE?

A: Natural gas supplies within the TRANSCO Zone 5 are currently constricted[6] and as a result, excess or additional natural gas volume requests for firm service are largely being denied. TRANSCO has recognized this constrained situation and, on February 1, 2024, filed with the FERC a request[7] for approval of a southeast supply enhancement project to expand its ability to supply additional volumes of natural gas to shippers within the TRANSCO Zone 5 area.[8] DEC has already subscribed to 1,000,000 Dth per day of transportation capacity to the new TRANSCO Southeast Supply Enhancement Project The proposed in-service date of the Project is November 1, 2027 which allows ample time to be in service prior to the firm gas volume need for the Marshall Energy Complex. It is unlikely that the proposed TRANSCO supply enhancement project will not be approved by the FERC.

Q: PLEASE HIGHLIGHT SOME OF THE POTENTIAL TECHNOLOGICAL CHANGES THAT ARE OF CONCERN.

A: Some of the long-lead and/or nascent technology concerns that I have identified include:

1. OEM manufacturers of CTs have not demonstrated a firm commitment as to when, or even if, hydrogen fueling of CTs is technically and economically

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6 EDF Exhibit E.01 Transcontinental Pipe Line Company Southeast Supply Enhancement
7 Id.
8 *Id.*

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feasible to deliver on the promise of 100% hydrogen capable equipment. According to two of the leading OEM CT manufacturing firms (i.e., Siemens and GE), utility scale CTs are currently capable of a 50% hydrogen/natural gas blended fuel, but the delivery of CT equipment with 100% hydrogen fuel capabilities stands as currently unavailable and only potentially capable sometime in or after 2030.[9] Moreover, there are a myriad of other technical hurdles related to the use of hydrogen as a primary CT fuel, coupled with hydrogen production, storage, transport, and infrastructure issues are discussed further as a separate set of topics later in this testimony.

2. There is no clear commitment as to timing of a fully compatible 100% hydrogen fired utility scale (General Electric model 7HA and/or Seimens Energy model SGT6-9000HL) turbine at this time. Both equipment manufacturers discussed earlier have indicated a target date for this technology sometime during 2030 or beyond.

3. Even if the equipment manufacturers are able to introduce hydrogen-capable turbines sometime in 2030 and are able to introduce 100% hydrogen equipment retrofits for the then in-service turbines, there will be additional currently unknown costs associated with the technology implementation. The installation of the retrofit equipment and additional labor and likely ancillary equipment and controls costs which will impact ratepayers above and beyond the current generator replacements, in the future. This unknown ratepayer cost impact

[9] Exhibits EDF-A.01 and EDF-B.01

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would be based on decisions made today that have future, unknown rate consequences due to their reliance on this emerging technology. DEC did not account for this in their Plan.

III. Category 2: Reasonableness of Costs, Potential Shortfalls and Recommendations

Q: WITH RESPECT TO PROJECT COST, HAVE YOU HAD THE OPPORTUNITY TO REVIEW DEC's CONFIDENTIAL COST INFORMATION IN EXHIBIT 3 TO THE CPCN?

A: Yes, I have reviewed and compared the data included in Exhibit 3 to publicly available similar Energy Information Administration data.

Q: WHAT METHOD DID YOU USE TO DETERMINE REASONABLENESS RELATED TO THE MARSHALL ENERGY COMPLEX AS PROVIDED IN EXHIBIT 3 TO THE CPCN APPLICATION?

A: My review of the cost information provided in Exhibit 3 consisted of a comparison of the costs presented with publicly available information from the U.S. Energy Information Administration ("EIA"). The information utilized is contained within the attached exhibits EDF Exhibit C.01 and EDF Exhibit D.01. Both of these exhibits utilize data that is collected by the EIA from a variety of sources and is then published in the EIA Annual Energy Outlook ("AEO") documents as "our assessment of the cost to develop and install various generating technologies used in the electric power sector." The data include within these documents are not absolute. According to the EIA documents "All technologies demonstrate some degree of variability in cost, based on project size, location, and access to key

infrastructure…" Thus, the data is useful in a general determination of reasonableness.

The CTs selected by DEC are characterized as advanced-class and "hydrogen capable", they represent the next generation in CTs. Since they are the latest next generation, the CTs planned for the Marshall Energy Complex CPCN are not a perfect match for the historic data included within EIA AOE documents and two different CT technologies were selected from the data for comparative reasonableness purposes. This selection of technologies developed a range of costs and performance operating characteristics that could be used to support a finding of reasonableness.

The technologies selected for comparison to the proposed project CTs was selected based on the general size, cycle performance, and the likelihood of similar operational performance. The selected technology for comparison were Industrial Frame Combustion Turbines and Combined Cycle Single Shaft Turbines. The Industrial Frame Turbine represented the lower limit of overnight capital costs while the Combined Cycle Single Shaft Turbine represents the upper range limit. Similarly, the Combined Cycle Single Shaft Turbine data was weighted more because of the combined cycle performance fit with the advanced-class designation of the proposed CT aspect and because the average size of the Combined Cycle Single Shaft Turbines in the EIA data was more closely that of the instant CPCN project.

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Q: WHAT ARE YOUR CONCLUSIONS RELATED TO THE COST OF MARSHALL ENERGY COMPLEX AS PROVIDED IN EXHIBIT 3 TO THE CPCN APPLICATION?

A: **[BEGIN CONFIDENTIAL]** [redacted]

- [redacted]

[redacted] **[END CONFIDENTIAL]**

The costs associated with the instant Marshall Energy Complex CPCN as a result of the above comparison, is reasonable. However, the costs assumptions do not solve the bridge to a hydrogen-firing facility required to meet the carbon emissions reductions requirements.

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Q: IN YOUR VIEW, ARE THERE ANY FURTHER AREAS OF CONCERN, QUESTIONS, OR RECOMMENDATIONS TO THE COMMISSION THAT SHOULD BE HIGHLIGHTED?

A: Yes, there are a few areas to highlight and discuss, as follows:

The Commission should direct DEC to apply a clear, transparent, and rigorous analysis and commentary to each of the following pointed recommendations.

- DEC states in the Application that: "the Proposed Facility will be… more flexible, efficient and have higher ramp rates and lower turndown than DEC's existing F-class CTs."[11] but fail to explain:
  - The efficiencies and other benefits associated with the term "advanced-class";
  - Whether the cost of the proposed CTs is enhanced as a result of them being "hydrogen-capable";
  - What are the CT component and ancillary equipment requirements, costs, and potential timing associated with the retrofitting of the CTs to 100% hydrogen capable;
  - The anticipation of capacity factor;
  - Capacity forecasts; and
  - Discussion of ramp rates and turndown rates, coupled with the implication on normal operations.

[11] Application, p. 8.

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- With respect to the statement "The Proposed Facility is projected to operate as a peaking resource, with generally low utilization factors, but its dispatchable capacity is critically important to achieving DEC's target 22% planning reserve margin…[12]; what is the basis for DEC's level of necessary reserve margin? Is the reserve margin level a result of "… operational impacts from an increase in variable renewable generation necessitate additional dispatchable generation resources…"?[13]

Q: DOES THIS CONCLUDE YOUR TESTIMONY?

A: Yes, it does.

[12] *Direct Testimony of Michael Quinto*, Docket No. E-7, Sub 1297, page 22.
[13] *Id.* at 16.

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