Before the
North Carolina Utilities Commission

Docket No. G-9 Sub 811

Annual Review of Gas Costs Pursuant to G.S. 62-133.4(c) and Commission Rule R1-17(k)(6)

Rebuttal Testimony
of
Jeffrey Patton

On Behalf Of

Piedmont Natural Gas Company, Inc.

Piedmont Natural Gas

September 29, 2022

Q. Please state your name and your business address.

A. My name is Jeffrey Patton. My business address is 4720 Piedmont Row Drive, Charlotte, North Carolina.

Q. By whom and in what capacity are you employed?

A. I am employed by Duke Energy Corporation ("Duke") and work on behalf of Piedmont Natural Gas Company, Inc. ("Piedmont" or the "Company"), a wholly owned subsidiary of Duke, as the Manager of Pipeline Services.

Q. Have you previously testified in this proceeding?

A. Yes. I previously submitted prefiled direct testimony in this proceeding on August 1, 2022.

Q. What is the purpose of your rebuttal testimony?

A. The purpose of my rebuttal testimony is to address the concerns and recommendations raised in the Testimony of Dustin R. Metz and Jordan Nader on behalf of the Public Staff - North Carolina Utilities Commission ("Public Staff") filed in this proceeding on September 19, 2022. Specifically, I address Mr. Metz's concerns relating to the report that Marquette Energy Analytics ("MEA") recently prepared for Piedmont, the results of which were incorporated into Piedmont's design day demand computations for the Carolinas presented in my direct testimony in this proceeding. I also address Mr. Nader's concerns associated with Transco's Southeast Reliability Project and his question as to whether Pine Needle capacity should be included in the Company's design day calculations.

Q. What specific role did MEA have in supporting the Company's design day planning

for Winter 2022-2023?

A. During the Company's review of the five refinements to its design day demand methodology identified by the Public Staff in Piedmont's last prudence review proceeding, the Company retained MEA to perform a design day demand and load duration curve study.

Q. Did MEA's role or study include a review or recommended change in the Company's system planning (e.g. transmission and distribution system) process, assumptions or methodology?

A. No. MEA was employed by Piedmont for the sole purpose of refining the Company's estimate of future winter season natural gas demand. They did not advise Piedmont on other matters such as the acquisition of interstate capacity or the planning of Piedmont's transmission or distribution systems.

Q. What concerns were raised by Public Staff Witness Metz in his testimony regarding MEA?

A. On page 3 of Mr. Metz's testimony he concludes that "the Piedmont Natural Gas Company Design Day Study Report prepared by Marquette Energy Analytics (MEA) at the request of Piedmont in response to the Sub 791 Order (MEA Report) is inconclusive, and it is not clear how Piedmont used the MEA Report." Additionally on page 12 of Mr. Metz's testimony he asserts that due to the approximate 100,000 dts/day increase in design day demand resulting from Piedmont's change to the MEA forecast that Piedmont has not provided adequate support to address an "imminent" projected future supply shortfall which could require Piedmont to build new supply resources such as an LNG

facility.

As described in my prefiled testimony, Piedmont elected to use the design day demand and load duration curve developed by MEA to forecast the Company's future winter season requirements. This decision was a result of discussions with the Public Staff and the Company's review of the five refinements from the previous prudence review Order.[1] MEA's methodology addresses the five refinements requested by the Public Staff in last year's Annual Review and provides a definitive forecasted design day demand and load duration curve for Winter 2022-2023 as presented in Exhibits JCP-2, 5A, 5C, 7, 8 and 9. As stated in Mr. Metz's testimony in the Sub 791 proceeding and in my prefiled testimony, the forecasting process, including the Company's design day demand and design winter load duration curve forecasting process, is dynamic. Although the Company has adopted MEA's forecast for the Winter 2022-2023 and shows the resulting forecasted load through Winter 2026-2027 on Exhibit JCP-5C, Piedmont recognizes that MEA's methodology is a change in the forecasting process, and it requires additional review by the Company before utilizing it for long-term capacity and supply planning decisions as well as the planning of Piedmont's distribution and transmission systems. The Company's total capacity of 1,679,055 Dt/d shown on Line 46 on Exhibit_(JCP-4C) and on Line 45 on Exhibit_(JCP-5C) has not changed from Winter 2021-2022 to Winter 2022-2023, and the Company has not committed to or incurred any additional costs for incremental capacity to meet this increased design day requirement given the projected 156,839 Dt/d capacity surplus (Line 46 on Exhibit_(JCP-5C) for Winter 2022-2023.

[1] Order On Annual Review of Gas Costs, Docket No. G-9, Sub 791, at p. 12 (December 22, 2021).

Utilizing MEA's forecast for Winter 2022-2023 does not inherently obligate the Company to address any future shortfall at this time as the Company continues to evaluate the assumptions and use of the MEA forecast for use in future winter periods. Furthermore, Exhibit_(JCP-5C) does not present a capacity shortfall through 2026-2027, and any definitive plans to address the impact of the forecast change over the long- term would be premature. While the adoption of the MEA forecast in some manner after the Company's review may require Piedmont to take action to address a projected shortfall in the future, it is important to acknowledge that Piedmont's actual capacity assets will vary somewhat from its forecasted demand capacity requirements and consistent with past practice, Piedmont will mitigate the impact of any mismatch through its use of bridging services, capacity release, and off-system sales activities.

Q. Does the MEA forecast produce a reasonable design day demand forecast for Winter 2022-2023?

A. Yes. The MEA forecast incorporates the five refinements requested by the Public Staff and although higher in forecasted demand when compared to Piedmont's previous methodology, the increase is likely due to the inclusion of several of the five refinements including customer growth to normalize historical data as I will discuss later in my testimony. Moreover, given recent extreme weather events such as Winter Storm Uri in February of 2021, which resulted in approximately 246 deaths in Texas, the NC Reliability Docket, and scientific studies that indicate extreme weather events, although rare, may occur more frequently, the Company continues to recognize the potentially catastrophic impact of a failure to maintain firm services to its customers. These impacts

include loss of life and property as well as the prolonged period (spanning several weeks or longer) and the associated cost to relight customers across the Company's service territory. Given these factors, the Company continues to take a prudent and conservative approach to design day planning.

Q. Did utilization of the MEA design day computations for this year cause the Company to adjust its upstream supply or capacity assets in any way?

A. No. We have sufficient assets to meet the MEA design day so to some extent the utilization of the MEA design day calculation for this coming winter was a planning scenario but it did represent the most conservative and updated design day calculation we had available at the time my Direct Testimony was prepared that addressed the five previously referenced refinements, and was based on a statistically valid methodology developed by nationally-respected natural gas demand forecasting company

Q. As implied by Staff witness Metz's testimony, does using a wind-adjusted temperature imply a higher design day demand forecast than if wind were not used?

A. Based on my understanding of MEA's analysis, the answer to this question is no. In general, the inclusion of wind does not produce a higher design day forecast; it produces a more accurate forecast that could be either higher or lower than a forecast that does not incorporate wind.

When wind is included in a model, a new regression model is estimated, with different parameter estimates reflecting the inclusion of wind. The same underlying load is being modeled, so there is no reason in general for the forecast to be higher, just more accurate with less error.

Q. Does using a wind-adjusted temperature with a 1-in-30-year planning condition and a reserve margin amount to "double counting" with regard to extreme weather?

A. No. The 5% reserve margin is intended to account for factors not considered in the design day forecast, such as statistical anomalies, unanticipated supply or capacity interruptions, force majeure, emergency or unauthorized gas usage by Piedmont's customers, or more extreme than design day weather. These events are no less likely to occur, or with lesser magnitude, than in prior design day forecasts that did not include wind. The 2022-2023 design day forecast, although higher, does not include, nor does it mitigate the factors used to justify the 5% reserve margin in prior year's forecasts.

As answered previously, the inclusion of wind-adjusted temperature and use of a wind adjusted design day condition ("DDC") does not in general result in a higher design day forecast. The higher 2022-2023 forecast versus the 2021-2022 forecast is likely not due to the inclusion of wind; it is more likely due to other changes in modeling methodology, including specifically the consideration and inclusion of item number three of the five required refinements which is that historical system usage data should be normalized for each respective year's actual customer growth. This is an issue the Company is currently evaluating.

Q. Is MEA's *Surrogate Weather Generator* methodology appropriate for developing design day planning criteria such as the 1-in-30-year design day condition ("DDC") used by Piedmont?

A. Yes. MEA's *Surrogate Weather Generator*[2] methodology is a published and peer reviewed methodology specifically developed for determining the probability of extreme weather events for LDC capacity and supply planning.

By definition, a DDC is a rare event for which there is likely to be limited historical data available for analysis. The *Surrogate Weather Generator* methodology allows for a more accurate determination of the probability of extreme events, e.g., 1-in-30 year, than a calculation based on historically observed data alone.

The *Surrogate Weather Generator* has been used across the United States in numerous different climatic and geographic locations and has been found to accurately represent the probabilistic occurrence of extreme weather.

As Public Staff witness Metz indicates on page 10 of his testimony by referring to *Figure 3* (figure produced by MEA), there are three actual events below the NC West 1-in-30-year design day criteria of wind-adjusted 5.2°F. These days, with wind-adjusted temperatures ("TempW") and wind-adjusted Heating Degree Days ("HDDW") are:

Date	TempW	HDDW
20-Jan-85	(0.8)	65.8
10-Jan-82	4.5	60.5
24-Dec-83	5.0	60.0

These are three days out of approximately 9000 days used in the analysis (121 coldest days per year for 73 years), however, the appropriate comparison is not 3 days out of

[2] Kaftan, D.; Corliss, G.F.; Povinelli, R.J.; Brown, R.H. *A Surrogate Weather Generator for Estimating Natural Gas Design Day Conditions*. Energies 2021, 14, 7118. https://doi.org/10.3390/en14217118

9000 days, but 3 days in 73 years. This is about 4% of the last 73 years (3 ÷ 73 = 0.041) or about once every 24 years.

Based only on observed data, this implies a 1-in-24-year DDC of 5°F (60 HDDW). Similarly, using the 2 coldest days, a 1-in-37-year DDC would be 4.5°F (2 ÷ 73 = 0.027 or 1-in-37).

A 1-in-30-year (3.3% chance per year) temperature – the DDC Piedmont chose to use – cannot be precisely determined with observed data alone. The *Surrogate Weather Generator* methodology allows this more precise determination by generating more plausible data points based on the statistical characteristics of actual observed data and fitting a distribution to that data.

In fact, the *Surrogate Weather Generator* methodology calculates a less extreme DDC that would be implied by interpolating between actual observed data points. Based only on actual data interpolated, a 1-in-30 DDC would be approximately 4.8°F, colder than the 5.2°F determined by the *Surrogate Weather Generator* methodology.

Q. Will the Company update the Commission on its design day demand and winter load duration curve planning process for the Winter 2023-2024 and beyond?

A. Yes. As part of the Company's annual prudence filing, the Company will provide a discussion on the assumptions, methodology, and reasoning behind the Company's design day demand and winter load duration curve planning process.

Q. Please explain how the 160,000 dth per day of contracted capacity as part of the Transco Southeast Reliability Enhancement ("SRE") capacity is represented on Exhibit_(JCP-5C).

A. Due to the cancellation of the Atlantic Coast Pipeline Project that would have provided 160,000 dth per day of capacity into eastern North Carolina with direct access to non-Transco Zone 5 priced supply in the Marcellus Shale basin in West Virginia, Piedmont contracted with Transco for the SRE Project. Piedmont currently recognizes the 160,000 dth per day ("SVL Path") from the SRE Project as a firm transportation path to shift deliveries of natural gas supply from Transco's mainline to Piedmont's eastern North Carolina system (See Figure 1) rather than an increase to Piedmont's overall firm transportation capacity. The SVL Path provides Piedmont access to supply at the Station 165 Zone 5 Pool. Given the historical winter price volatility of natural gas priced at the Transco Zone 5 South daily index which applies to the Station 165 Zone 5 Pool, Piedmont has contracted for firm transportation capacity (Columbia Gas) and storage (Columbia Gas FSS and Hardy Storage) with access to non-Transco Zone 5 pricing that is delivered by Columbia Gas to the Boswells Tavern interconnect on Transco and on East Tennessee Natural Gas ("East TN") along with Firm Pipeline Service on Texas Eastern Transmission, LP ("TETCO") and Midwestern Gas Transmission ("MGT") that delivers natural gas via East TN to the Cascade Creek interconnect on Transco. These assets provide operational flexibility, supply diversity, and non-Transco Zone 5 pricing. Piedmont utilizes Asset Management Agreements ("AMAs") with suppliers to firm up the supply from these Transco interconnects to Piedmont's citygates. The following volumes (shown in the Figure 2 below) from upstream supply are from existing non-Transco Zone 5 priced supply contracts. Allocating these volumes as upstream transportation/storage contracts away from the Company's total capacity and to be

delivered into the SVL Path result in a net zero impact to Line 45 of Exhibit_(JCP-5C).

Figure 1:

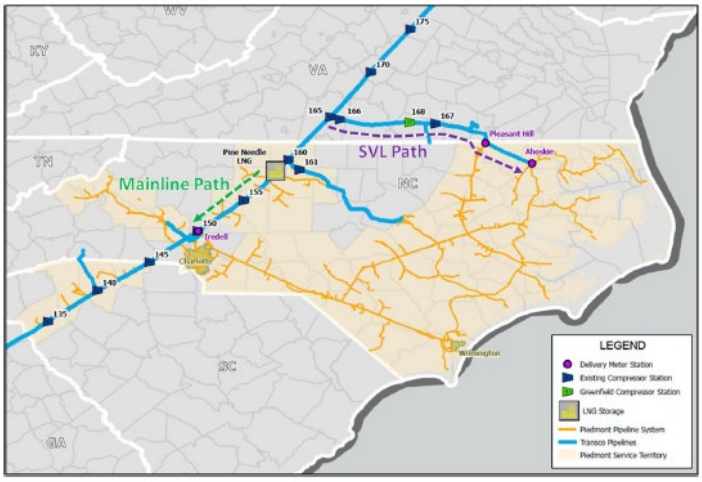

Figure 2:

Supply Capacity	dth per day
Columbia Gas FTS (Line 18)	23,000
East TN & MGT Upstream FT (Line 19)	19,578
East TN & TETCO Upstream FT (Line 25)	24,798
Columbia Gas Upstream FSS/SST	81,169
Hardy Storage Upstream HSS	11,455
Total	160,000

Q. Based on your testimony that the SRE project does not increase Piedmont's total capacity, why is the project being constructed?

A. The location of interconnection points with interstate natural gas pipelines is important.

Piedmont has historically and currently receives most of its natural gas from Transco's mainline near Charlotte. This is a great distance from customers in eastern North Carolina, which is hindering Piedmont's ability to deliver gas to the east while also accommodating customer growth. Given the locations of the Transco delivery points and the cancellation of Atlantic Coast Pipeline, Piedmont needed to explore access to interstate deliveries on the eastern portion of its system to ensure appropriate balancing and pressure. Piedmont analyzed several scenarios to ensure future reliability of natural gas service in North Carolina during winter conditions. The SRE project scheduled to commence operations in late 2024 met this need following Piedmont's best cost procurement strategy.

Q. On Page 9 of Mr. Nader's testimony, he asserts that Piedmont's participation in Transco's SRE Project and Piedmont's utilization of secondary or non-secondary reverse path ("NSRP") nominations to withdraw from Pine Needle means that Pine Needle LNG should not be included in Piedmont's design day prior to the completion of SRE in late 2024. Is this assertion correct?

A. No. Historically, Piedmont has not experienced any cuts or interruptions of gas supply from Pine Needle even while utilizing NSRP nominations, and Piedmont does not anticipate this to change for the 2022-2023 Winter Season or the Winter Seasons prior to SRE's completion, thus the inclusion of Pine Needle in the Company's design day is correct. Changing flow patterns and increasing constraints on Transco in Zone 5 have led Piedmont to proactively seek a cost-effective solution on a forward-looking basis to ensure the reliability of Pine Needle in the future by contracting for a primary firm

transportation path on Transco (Pine Needle volumes are currently and have historically been delivered using secondary firm capacity rights provided pursuant to FERC's segmentation policy). Transco is currently fully subscribed for this transportation path, and must install facilities through the FERC Section 7(c) process to provide Piedmont the contracted for primary firm transportation. Given the necessary permitting and construction process, the target date of December 1, 2024 is the anticipated SRE completion date, but it should not be interpreted as an indication that Pine Needle is considered unreliable by Piedmont prior to December 2024 or thereafter should SRE be delayed.

Q. Is the Company willing to maintain communication with the Public Staff going forward as it conducts its evaluation of the MEA model for use by the Company going forward?

A. Yes. We have had extensive discussions with the Public Staff regarding the MEA model and our utilization of the Design Day parameters that resulted from that model in this case and we anticipate that we will continue a close coordination with the Public Staff as we move forward in our evaluation of the propriety of that model for future use by the Company.

Q. Does this conclude your rebuttal testimony?

A. Yes, it does.