BEFORE THE NORTH CAROLINA UTILITIES COMMISSION
DOCKET NO. E-7, SUB 1250

In the Matter of: Application of Duke Energy Carolinas, LLC Pursuant to N.C. Gen. Stat. § 62-133.2 and Commission Rule R8-55 Relating to Fuel and Fuel-Related Charge Adjustments for Electric Utilities	)))))))	**POST-HEARING BRIEF OF THE SIERRA CLUB**

PURSUANT to NCUC Rule R1-25 and the instructions from the Chair of the North Carolina Utilities Commission ("Commission") at the close of the June 1, 2021 evidentiary hearing in this matter, the Sierra Club respectfully submits this brief in the above-captioned docket.

LEGAL STANDARD

In this annual fuel charge adjustment proceeding, the Commission establishes a rider to allow Duke Energy Carolinas, LLC ("DEC" or "the Company") to recover its reasonable and prudently incurred fuel and fuel-related costs from customers. N.C. Gen. Stat. § 62-133.2, NCUC Rule R8-55. N.C.G.S. § 62-133.2(a1) lays out specific fuel and fuel-related costs that may be recovered from ratepayers via this rider. Critically, only "reasonable and prudently incurred" costs are recoverable. NCUC Rule R8-55. Further, N.C. Gen. Stat. § 133.2(d) states that the rider must be based on the "reasonable cost of fuel- and fuel-related costs prudently incurred under efficient management and economic operations." Therefore, a thorough examination of DEC's management and operations is a key part of the Commission's review in this proceeding. *Id.* To aid the Commission in making this determination, NCUC Rule R8-55(e) specifies the minimum disclosures that must be made by DEC. Despite these required minimum disclosures, the burden of proof

remains on DEC to show that any costs were "reasonably and prudently incurred" and "the correctness and reasonableness" of any charge imposed as a result of this proceeding. N.C.G.S. § 62-133.2(d); NCUC Rule R8-55(k).

ARGUMENT

A. Duke Energy Carolinas' Unit Commitment and Dispatch Practices Are Relevant to This Proceeding Because the Fuel and Fuel-Related Costs Incurred by the Company Are Directly Impacted by Which Generating Units Are Operated, for How Long, and at What Capacity.

The Company's unit commitment and dispatch decision-making process has a direct impact on the fuel and fuel-related costs that the Company incurs and ultimately seeks to recover from ratepayers in this docket. Unit commitment is the process by which a utility determines which generating units should operate on the following day.[1] A utility can decide to either keep a generating unit online, bring online a new generating unit, or take a unit offline.[2] In contrast, dispatch is the decision to increase or decrease the generation of a unit that is already online.[3] Because these decisions determine which units are operated, for how long, and at what capacity, they directly impact the type and amount of fuel that is burned by generating units.[4]

In this proceeding, DEC is permitted to recover only its reasonable and prudently incurred fuel and fuel-related costs from customers. N.C. Gen. Stat. § 62-133.2, NCUC Rule R8-55. The Company has an obligation to operate its generation fleet in a manner that minimizes its costs, including the fuel costs recovered in the proceeding, while reliably serving load.[5] DEC has the burden of proof to show that any costs were

[1] Tr. p. 87:18-21
[2] Tr. p. 87:18-21
[3] Tr. p. 88:1-3.
[4] Tr. pp. 130:8-24; 131:1-5.
[5] Tr. p. 130: 2-7.

"reasonably and prudently incurred" and to demonstrate "the correctness and reasonableness" of any charge imposed as a result of this proceeding. N.C.G.S. § 62-133.2(d); NCUC Rule R8-55(k). Determining whether DEC's fuel and fuel-related costs were reasonable and prudently incurred requires an evaluation of the Company's unit commitment and dispatch decision-making process to ensure that those costs are minimized.

NCUC Rule R8-55 requires the utility to make certain minimum disclosures in its application. While in the past the Commission has determined that these required minimum disclosures were sufficient for DEC to satisfy its burden of proof,[6] neither the statute nor Commission rules establish that these disclosures will always be sufficient.[7] The North Carolina Supreme Court recently held that:

> If a utility expense is properly challenged, the Commission has the *obligation* to test the reasonableness of such expenses. In addition, if there is an absence of data and information from which either the propriety of incurring the expense or the reasonableness of the cost can readily be determined, the Commission may require the utility to prove their propriety and reasonableness by affirmative evidence.[8]

Indeed, the rapidly changing nature of the power sector only serves to underscore the importance of ensuring that DEC's fuel and fuel-related costs were incurred "under efficient management and economic operations," as N.C.G.S. § 62-133.2(d) commands.[9] As discussed above, the Company's operations with regard to unit commitment and

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[6] *See, e.g. Order Approving Fuel Charge Adjustment*, Docket No. E-7, Sub 1228 (Aug. 19, 2020).
[7] *See* N.C. Gen. Stat. § 62-133.2(d) (allowing the Commission to consider "any and all other competent evidence that may assist the Commission in reaching its decision"); NCUC Rule R8-55(e) ("Each electric public utility, *at a minimum*, shall submit to the Commission for purposes of investigation and hearing the information and data in the form and detail as set forth below" (emphasis added)).
[8] *State ex rel. Utils. Comm'n v. Stein*, 375 N.C. 870 (2020) (internal citations and quotations omitted).
[9] Tr. p. 81:3-10 ("While in the past utilities operated their coal-fired plants as baseload resources with little thought given to whether the plants should be turned on or off, in recent years low gas prices and nearly zero-variable cost renewables have pushed coal generation to become marginal and uncompetitive during many hours of the year.").

dispatch have a direct impact on the fuel and fuel-related costs that are passed on to ratepayers via this proceeding.

B. The Average Cost of Operating DEC's Coal Fleet Exceeded the Marginal System Cost for Nearly All of 2020, Meaning That DEC's Coal Fleet Does Not Pass the Lowest Bar for Providing Economic Value to Ratepayers

Although DEC touts its coal fleet as having some of the most efficient coal units in the country,[10] the Company's four coal plants—Allen, Marshall, Cliffside, and Belews Creek—have some of the highest fuel costs among coal plants in the country.[11] Nevertheless, the Company has continued to operate its coal plants, thus incurring significant fuel and fuel-related costs that are charged to ratepayers. The Company frequently operates its coal plants at a cost that is higher than other available generation assets on DEC's system; this means that DEC is operating the units in an uneconomic fashion resulting in excessive costs for ratepayers. DEC underrepresents its coal fleet's marginal production cost by classifying variable, avoidable operational costs as fixed costs. This misclassification of costs makes it appear that DEC is operating its coal fleet in an economic manner, when in reality the coal fleet is uneconomic to run most of the time. When scrutinized, it is clear that DEC's coal unit commitment and dispatch practices result in excessive uneconomic coal plant generation at the ratepayers' expense. An accurate accounting of the costs of operating the coal plants would result in much lower operation of DEC's coal units.

[10] Tr. p. 21:17-23. Despite asserting that the Company's coal plants are highly efficient, DEC witness Steve Immel agreed that a highly efficient plant should have low fuel costs, which is not the case for DEC's coal fleet. Tr. p. 47:16-21.

[11] Tr. pp. 98:14-15; 99 (Table 3) (demonstrating that DEC's coal plants are more expensive than between 75 and 90 percent of comparable plants nationwide, depending on the DEC plant).

I. Marginal Cost, Average Cost, and System Lambda

Because DEC is not part of a centralized market, where an independent system operator would determine whether its coal units should be committed and dispatched, the Company is responsible for making these decisions. However, just as would occur in a centralized market, commitment and dispatch decisions should be based on the incremental cost to operate a given power plant unit, with the lowest-cost unit, compared against the other units on the Company's system,[12] coming online first and progressively more expensive units coming online until system load is met.[13] Accurately determining the cost of each unit is critically important to determining whether it should be committed and dispatched at all and, thus, whether the fuel and fuel-related costs required to run it have been reasonably and prudently incurred.

DEC bases its dispatch and commitment decisions on each generating unit's "marginal cost of production."[14] "The marginal cost of production is calculated based on the replacement cost of fuel, which is the 'market price of fuel plus variable transportation costs,' and the cost of reagents/byproducts, emissions, and variable O&M."[15] Company Witness Verderame testified that the marginal production cost is the incremental cost of operating a unit based only on the unit's variable costs.[16] As Mr. Verderame explained, "[o]nly variable costs are utilized in the unit commitment model. Fixed costs—which are those costs that will be incurred regardless of whether a unit is committed—are not considered in the development of the unit commitment plan."[17]

[12] Tr. p. 46:20-23.
[13] Tr. p. 90:4-14. .
[14] Tr. p. 89:8-9
[15] Tr. p. 89:8-12 (quoting Duke Energy Carolinas Response to Sierra Club Request 1-8 (Sierra Club Cross Exhibit 1)).
[16] Tr. p. 128:19-22.
[17] Tr. p. 162:21-24.

In making decisions about unit commitment, "utilities generally use internal systems that project the marginal production cost to operate each unit *and* calculate[] the cost of the marginal unit in the system, called 'system lambda.'"[18] DEC's system uses a software known as GenTrader.[19] As noted above, the lowest-cost unit, based on its marginal cost, will be planned to come online first. More expensive generating units are added until system load is met, with the final (and thus most expensive) unit to come online to meet demand representing the marginal unit in the system, i.e., system lambda. As Sierra Club Witness Glick explained:

> When a unit is committed economically, the unit is reasonably expected to be lower cost than [system lambda] over the next day or days. When a unit is committed uneconomically, the operator has decided to operate the unit at its economic minimum, which is the lowest MW output that a unit can safely and efficiently maintain, even though that unit's marginal costs of production are projected to be higher than the system lambda.[20]

Uneconomic commitment—where a unit's marginal cost is projected to be higher on average than system lambda—may occur on occasion due to unit testing, reliability needs, transmission constraints, or load requirements.[21] When units are regularly committed when it is uneconomic to do so, however, the utility is, by definition, incurring excessive costs because the unit's costs are regularly exceeding the costs of other available resources to meet system load.[22]

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[18] Tr. p. 90:8-10 (emphasis added). System lambda is the marginal cost to produce an additional or incremental megawatt of generation at a given hour. Tr. p. 129:20; 130:1.
[19] Tr. p. 145:1-6 (describing GenTrader model as an "optimization model [that] . . . determines what unit should be on and when they should be cycled of or kept on through to the next period when they would be needed as the least cost solution.").
[20] Tr. p. 88:13-19.
[21] Tr. p. 110:3-18; *see also* Tr. p. 135:23-24; 136:1-7.
[22] Tr. p. 95:8-11.

While unit commitment and dispatch should be based on marginal cost, the marginal cost of production differs from the generation unit's average cost of production, which is the cost actually charged to ratepayers.[23] The average cost of production "represents the cost to operate each unit. . . spread out over the unit's MW output."[24] When a unit's average cost is systematically higher than system lambda, it is also an indication that the company is committing relatively higher-cost generating resources when lower-cost resources are available.[25]

Tellingly, DEC has asserted that the economic principles that govern centralized energy markets have no bearing on how it operates its own system, despite the fact that following the common-sense, economic principle of operating lower-cost generating units before higher-cost units would save ratepayers money.[26] Instead, DEC regularly commits its high-cost coal units when it is not economic to do so. This practice would not occur in an efficient economic market because a generator would be unable to recover the costs above market price.

Finally, large deviations between an individual plant's average and marginal costs should also raise red flags. As Ms. Glick explained, "[i]t is reasonable to expect there will be a small difference between marginal unit costs and average unit costs . . . [b]ut a responsible utility manager should seek to minimize the portion of average costs that . . . are [ ] omitted from the unit commitment process."[27] This is important because an artificially low marginal cost—a marginal cost that is lower than the average cost actually

[23] Tr. p. 80:5-11; s*ee also* Tr. p. 129:12-19.
[24] Tr. p. 89:14-16.
[25] Tr. p. 95:8-11.
[26] Tr. p. 139:8-9 (arguing that Ms. Glick conflated "market methodologies and non-market methodologies").
[27] Tr. p. 96:12-14.

charged to ratepayers to operate a unit—does not accurately reflect the average cost to ratepayers of operating a unit and thus will "put the unit lower on the supply curve and make it more likely that the unit will be committed[,]" ultimately leading to over-commitment and over-dispatch.[28] As discussed below, DEC omits a full 40 percent of its coal fleet's actual fuel and variable O&M costs from the marginal cost used in dispatch and commitment decision-making.[29]

II. DEC's Coal Fleet Operated Above System Lambda Throughout Nearly All of 2020

Ms. Glick demonstrated that DEC is regularly committing its coal plants, even though the plants' average costs are typically well above system lambda. She did this by "review[ing] data reported by DEC on the average cost of generation for each plant by month and the hourly system lambdas [and] compar[ing] the monthly average system lambda to the monthly average cost of generation at each plant."[30] In fact, DEC's reported average cost of generation at each of its four coal plants exceeded the system lambda during nearly every month, with only two exceptions, Allen and Cliffside in December 2020.[31] Other than these two instances, the average cost of generation exceeded the system lambda for all plants in all months. Stated another way, the units are being operated even though there are less expensive generating assets available on DEC's system whose operation would have reduced costs to ratepayers.

As acknowledged by Ms. Glick, comparing average cost to system lambda "says nothing about whether the plant is the lowest-cost resource available to serve customer

[28] Tr. p. 102:3-9.
[29] Tr. p. 112:15-16
[30] Tr. p. 95:3-5.
[31] Tr. p. 83:14-17.

load (relative to alternatives) based on the full forward-going costs (both fixed and variable) required to keep the plant operational."[32] The full forward-going costs would be used by the Company to make resource planning decisions, as opposed to operational decisions such as unit commitment and dispatch. However, this analysis *does* provide insight as to whether DEC's commitment and dispatch of its coal fleet is providing economic value to ratepayers.[33] The analysis indicates that it does not, as "nearly all of DEC's coal-fired power plants were operating . . . when there were lower cost resources available to serve load."[34]

DEC dismisses Ms. Glick's findings by stating that "[t]he average system lambda does not provide the real picture concerning the hours in which the units in question were called up on to operate when needed."[35] DEC maintains that, while it is operating its coal plants even when costs exceed system lambda, it was required to do so in order to meet other needs or requirements, such as reliability or transmission congestion concerns and that, regardless, the Company does not have access to the system lambda when making its planning decisions.

There are two problems with DEC's assertions. First, DEC never provided any evidence to support them, such as hourly data that can substantiate DEC's claims that the units were required for reliability reasons. Through discovery, Sierra Club requested such hourly unit cost data. The Company objected to this request and failed to provide responsive documentation.[36]

[32] Tr. p. 97:17; Tr. p. 98:1-2.
[33] Tr. p. 97:17-18.
[34] Tr. p. 95:9-11.
[35] Tr. p. 170:2-4.
[36] *See* Sierra Club Cross Examination Exhibit 2.

Second, even assuming that certain occasions justified DEC's decision to uneconomically commit its coal units and acknowledging that the Company does not have access to the system lambda when making its planning decisions, the sheer scope of DEC's uneconomic operation of its coal units calls into question DEC's assertion that the operation of the units was required for noneconomic reasons like reliability. More specifically, DEC provides no justification for why the average cost of coal generation exceeded the system lambda for every plant in *every* month, aside from Allen and Cliffside in December 2020. Such widespread uneconomic commitment indicates that DEC is not merely "accept[ing] a 'loss' in a few hours of the day or week in order to be online during peak hours[,]"[37] but instead, is systematically failing to reduce costs for ratepayers by committing lower-cost resources. As Ms. Glick noted, these results "indicate that DEC is either (1) not using robust and complete input data to inform its unit-commitment decisions, or (2) ignoring the results of its unit-commitment analysis."[38]

III. DEC Inappropriately Excludes 40 Percent of Actual Coal Operation Costs From Its Commitment and Dispatch Decisions

One potential explanation for why the average cost for DEC's coal units so regularly exceeds system lambda is that the coal units' marginal cost (used to make commitment decisions) excludes a significant portion of its production costs and is therefore drastically lower than the units' actual cost charged to ratepayers. As witness Glick explained:

> [I]n 2020 DEC incurred $597 million in fuel and other production costs operating its coal fleet. But only $333 million in variable fuel and other operating costs were included in the Company's unit commitment and dispatch modeling. This means that a full *40 percent* of the Company's

[37] Tr. p. 112:5-8.
[38] Tr. p. 112:10-12.

> production costs, equaling $263 million, were excluded from DEC's unit commitment and dispatch decision-making processes.[39]

Because DEC excluded such a large percentage of its actual costs from its decision-making, "its unit commitment modeling showed that the coal fleet provided a value of almost $31 million in production costs to its ratepayers in 2020, but in fact the Company actually incurred $233 million in *excess* production costs relative to system lambda in 2020. Of that total, approximately 95 percent, or $221 million, represents fuel costs."[40]

As noted above, some deviation between marginal and average cost can be expected.[41] However, a significant variance, such as 40 percent, can ultimately harm ratepayers because pricing a coal unit at an extremely low marginal cost causes the expensive coal unit to run when there are cheaper, more economic options available. Essentially, DEC allows its coal plants to "cut the line" ahead of generation resources with actual lower costs. The coal units' average costs are then recovered from ratepayers, "thereby allow[ing DEC] to continue operating aging and costly coal plants when there are lower cost alternatives that can meet customers' needs."[42]

DEC put forward various explanations for why its coal units' average costs are strikingly higher than their marginal costs, none of which explain the magnitude of the difference. First, DEC points to its current rail transportation contracts, noting that these contracts include fixed costs that are excluded from unit commitment decisions.[43] However, DEC plans to classify transportation costs as variable in future proceedings,

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[39] Tr. p. 100:11-16 (emphasis added).
[40] Tr. pp. 100:16 (emphasis added); 101:1-4.
[41] Tr. p. 96:9-12.
[42] Tr. p. 81:7-10.
[43] *See* Tr. p. 103:3-13 (citing to Duke Energy Carolinas Response to Sierra Club Request 1-22).

thereby including these costs in its coal plants' marginal cost and indicating that these costs are not truly fixed.[44] Second, DEC argues that its unit commitment process uses the replacement cost of fuel, not the cost actually paid for its coal supply.[45] Yet, DEC's fuel procurement strategy relies on short-term and spot contracts, meaning that the difference between the coal contract price and the price the Company would pay on the market should not differ significantly.[46] Finally, DEC elected to buy out some of its coal contracts instead of accepting delivery. While this buy-out resulted in certain fixed costs that were not included in the coal units' marginal cost, it only accounted for $24.8 million in fuel costs.[47]

In sum, DEC has not adequately explained why 40 percent of its coal units' operating costs are excluded from commitment and dispatch decision-making. A marginal cost that does not fully account for all variable costs inappropriately manipulates a coal unit's pricing, allowing it to operate even when doing so is not in ratepayers' interest. Accordingly, the Commission should carefully scrutinize DEC's characterization of its coal units' costs as either variable or fixed. Specifically, in future fuel clause adjustment proceedings, the Commission should direct DEC to provide a full breakdown of its coal unit production costs, accompanied by a detailed explanation for each cost and full work papers that show how each component was calculated.[48] This reporting should include, at a minimum:

[44] Tr. p. 103:7-9.
[45] Tr. p. 103:14-16.
[46] Tr. p. 104:2-4.
[47] Tr. p. 104:10-12.
[48] Tr. p. 85:7-11.

1. The full production cost of each coal unit that will be passed on to ratepayers in future fuel dockets, broken down by the following categories:
    a) Fixed costs
    b) Variable costs
        1. Fuel
        2. Reagents/by products
        3. Emissions
        4. Variable O&M
2. Marginal production cost of each coal unit used for making unit commitment and dispatch decisions, broken down by the same categories listed above. For any production costs excluded from DEC's marginal production costs, the Company should provide a detailed justification for why these costs are not relevant for making unit commitment decisions.[49]

C. Even Accepting Duke Energy Carolinas' Artificially Low Marginal Price for Its Coal Fleet, the Company Incurred $8.5 million in Avoidable Costs at Its Coal Generation Units.

Even accepting the Company's inaccurate marginal price for its coal plants, DEC still incurred nearly $8.5 million in avoidable operational costs at its coal plants during the test period as a result of its uneconomic unit commitment practices.[50] In other words, even after omitting 40 percent of DEC's coal units' operating costs from the Company's unit commitment and dispatch decision-making, witness Glick found that DEC regularly

[49] Tr. pp. 85:20-21; 86:1-4.
[50] Tr. p. 105:9-13.

operates its coal generating units uneconomically or "out of merit" order.[51] Out-of-merit operation occurs when a utility runs a unit despite the unit's operating economics comparing unfavorably to that of other units on the utility's system.[52] This causes units to run despite there being lower-cost resource options available to meet system needs.[53] This uneconomic operation passes avoidable fuel costs on to ratepayers.[54]

Witness Glick identified numerous instances where, even using DEC's artificially low coal unit operating costs, the Company could have avoided incurring these costs by committing lower-cost resources to meet system needs. This analysis compared the actual system lambdas with "modeled" unit costs,[55] which represent the cost information the Company had at the time the unit commitment and dispatch decisions were made.[56] When added together, the instances of uneconomic commitment identified by Ms. Glick resulted in DEC incurring $8.5 million dollars in excessive operating costs.

As discussed above, Ms. Glick recognized that there are certain, limited circumstances where a unit may need to be operated out of merit.[57] However, the Company provided no documentation explaining whether these uneconomic decisions were the result of one of those circumstances. Without such documentation, the Commission does not have adequate information to determine the reasonableness or prudency of the Company's decisions to commit those units in the face of avoidable costs.[58] Because DEC bears the burden of establishing the reasonableness and prudency

[51] Tr. p. 107:1-2.
[52] Tr. p. 107:3-10.
[53] Tr. p. 107:9-10.
[54] Tr. p. 108:11-15.
[55] Tr. p. 114: 1-9.
[56] Tr. p. 114:4-6.
[57] Tr. p. 110:1-9.
[58] Tr. p. 114:13-15.

of its fuel and fuel-related costs, the Commission cannot simply assume that one of those limited circumstances existed. In future fuel charge adjustment proceedings, DEC should not be permitted to recover excess fuel and fuel-related costs stemming from the deviations from the Company's forward-looking price-based analysis unless a reasonable explanation is provided. Excess fuel and fuel-related costs should be defined as the difference between the costs actually incurred and the least-cost option available to meet system needs.

In future fuel charge adjustment proceedings, DEC should be required to provide a detailed report describing its daily unit-commitment decisions and practices. At a minimum, DEC should be required to provide the following information as part of each fuel charge adjustment filing in order to all the Commission to determine whether DEC's fuel- and fuel-related costs for its units were reasonably and prudently incurred:

a. All 7-day forecast sheets used to develop the Company's daily unit-commitment decisions and marginal cost.

b. The reason for any deviation between the commitment decision suggested by the Company's forward-looking price-based analysis and the Company's actual commitment decision (e.g., where the Company's analysis suggests that a unit has a production cost above the marginal system cost during a given day, and the Company self-commits the unit anyway).

c. Hourly data sufficient for the Commission to calculate the net revenues that each plant actually incurred in each test year period, including total unit generation, delivered fuel cost, marginal or "replacement" fuel cost,

total variable operations and maintenance ("O&M") cost, system lambdas, day-ahead commitment status, and actual outages.

CONCLUSION

For the foregoing reasons, the Sierra Club respectfully requests that the Commission determine whether additional reporting would aid the Commission in evaluating whether the Company's fuel and fuel-related costs were reasonably and prudently incurred. To the extent any additional reporting would aid the Commission's review, the Sierra Club respectfully requests the information be required in subsequent filings made pursuant to N.C. Gen. Stat. § 62-133.2 and NCUC Rule R8-55.

Respectfully submitted this the 19th day of July, 2021.

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CERTIFICATE OF SERVICE

I certify that the parties of record on the service list have been served with Post-Hearing Brief of the Sierra Club either by electronic mail or by deposit in the U.S. Mail, postage prepaid.

This the 19th day of July, 2021.

s/ Tirrill Moore
Tirrill Moore