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PART B

#### Summary of the Testimony of Matthew S. Glattfelder

- 1 My testimony provides the following findings and recommendations:
- 2 1. The capacity factors the Company used for modeling onshore wind appear optimistic 3 as compared to published averages and sampled facilities near Virginia. Staff 4 recognizes that the Company appears to have a strong preference for offshore wind. In 5 future certificate of public convenience and necessity ("CPCN") requests, Renewable 6 Portfolio Standard Plans, Integrated Resource Plans, or other relevant Company 7 proceedings that come before the Commission, Staff recommends that the Commission 8 direct the Company to utilize the most recent studies, as well as the proven capacity 9 factors of actual existing facilities located as close to Virginia as possible.
- 102. Small Modular Reactors ("SMRs") are still in the nascent stages of development, not11yet having been deployed at scale. As such, there are many uncertainties around future12SMR development, including their projected costs and timelines.
- 133. The Company appears to have utilized an inflated bonus/penalty risk-adjusted Effective14Load Carrying Capability ("ELCC") as an input for modeling its fixed and tracking15solar resources in its modeling for 10 of the 12 years during the 2023-2038 Planning16Period. Staff was unable to verify the ELCC values used by the Company. Staff17recommends that the public class values for ELCC published by PJM be utilized as18opposed to a value that is modified with bonus and penalty adjustments.

#### PRE-FILED TESTIMONY OF MATTHEW S. GLATTFELDER

#### VIRGINIA ELECTRIC AND POWER COMPANY 2023 INTEGRATED RESOURCE PLAN FILING

#### CASE NO. PUR-2023-00066

### 1Q.PLEASE STATE YOUR NAME AND POSITION WITH THE STATE2CORPORATION COMMISSION ("COMMISSION").

A. My name is Matthew S. Glattfelder. I am a Public Utility Regulation Analyst with the
 Commission's Division of Public Utility Regulation.

#### 5 Q. WHAT ARE YOUR PRESENT RESPONSIBILITIES?

A. My present responsibilities include analyzing public utility Integrated Resource Plan
("IRP") applications, rate adjustment clause filings, and applications for certificates of
public convenience and necessity ("CPCNs"). I am also responsible for presenting
testimony as a Commission Staff ("Staff") witness and making alternative proposals to the
Commission when appropriate.

#### 11 Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

#### 12 A. My testimony focuses on the input components of Virginia Electric and Power Company's

#### 13 d/b/a Dominion Energy Virginia ("Company" or "Dominion") IRP filing ("2023 IRP"),

14 except for certain input components related to the load forecasts, energy sales assumptions,

and commodity price forecasts.<sup>1</sup> The first portion of my testimony will focus on the
 Company's non-generation related input assumptions. The second portion of my testimony
 will address the Company's input assumptions as they relate to supply side, or generation
 resources.

#### **Modeling Process**

# 5 Q. PLEASE BRIEFLY DESCRIBE DOMINION'S MODELING METHODOLOGY 6 USED FOR ASSESSING THE COMPANY'S FUTURE CAPACITY AND ENERGY 7 NEEDS.

A. Dominion utilizes PLEXOS software, specifically the long term ("LT") model, for the
creation of LT optimization models to develop resource plans that include the levels and
types of resources required to meet the Company's future capacity and energy needs,
optimized on a least-cost basis, given the various assumptions and parameters that the
Company instructs the model to retain.<sup>2</sup>

#### 13 Q. ARE THERE ANY REFINEMENTS THE COMPANY MADE TO THE MODEL

#### **BETWEEN THE PREVIOUS IRP PROCEEDING AND THIS ONE?**

<sup>&</sup>lt;sup>1</sup> Staff witness Johnson addresses the Company's assumptions related to the load forecast, energy sales assumptions, and commodity price forecasts.

<sup>&</sup>lt;sup>2</sup> Company's Response to Sierra Club Interrogatory No. 2-2. All referenced interrogatories are attached as part of MSG-1.

1	А.	Yes. The Company has included several refinements to PLEXOS since the 2020 IRP <sup>3</sup> to
2		incorporate the many requirements of the Virginia Clean Economy Act ("VCEA").4
3		Section 4.12 of the 2023 IRP contains a list of eleven refinements that have been made to
4		the modeling process, though the Company has confirmed that there are additional
5		refinements that were made and that Section 4.12 is not an exhaustive list. <sup>5</sup> The Company
6		objected to providing a list of additional refinements when requested by Staff. <sup>6</sup>
7	Q.	ARE THERE ANY INPUT ASSUMPTIONS THAT ARE COMMON TO ALL
8		ALTERNATIVE PLANS PRESENTED IN THIS IRP?
9	А.	Yes. The Company has utilized the following assumptions for modeling all its alternative
10		plans:
11		i. The 2023 Load Forecast prepared by PJM; <sup>7</sup>
12 13		ii. An assumption that the Commonwealth exits the Regional Greenhouse Gas Initiative ("RGGI") before January 1, 2024;
14 15		<ul> <li>The retirement of Yorktown 3, Chesterfield 5, and Chesterfield 6 in May of 2023;<sup>8</sup></li> </ul>
16		iv. A base commodity price forecast; <sup>9</sup> and

<sup>8</sup> Id. at 3.

<sup>&</sup>lt;sup>3</sup> Commonwealth of Virginia, ex rel. State Corporation Commission, In re: Virginia Electric and Power Company's Integrated Resource Plan filing pursuant to Va. Code § 56-597 et seq., Case No. PUR-2020-00035, 2021 S.C.C. Ann. Rept. at 190, Final Order (Feb. 1, 2021).

<sup>&</sup>lt;sup>4</sup> Va. Code § 56-585.5; See 2023 IRP at 75.

<sup>&</sup>lt;sup>5</sup> See Company's Response to Staff Set 5-137.

<sup>&</sup>lt;sup>6</sup> See Company's Response to Staff Set 8-183.

<sup>&</sup>lt;sup>7</sup> 2023 IRP at 24. PJM Interconnection, LLC. ("PJM") is the Company's Regional Transmission Organization and Independent System Operator.

<sup>&</sup>lt;sup>9</sup> See Company's Response to Staff Interrogatory 08-177.

1 2 v. Certain legislation proposed during the 2023 Regular Session of the Virginia General Assembly that the Company assumed would be approved.<sup>10</sup>

### 3 Q. PLEASE DISCUSS HOW THE COMPANY CONSIDERED RGGI AS IT 4 RELATES TO THE INPUTS OF THE MODEL.

5 The Company assumed in all its models that there will be no RGGI participation by Α. Virginia after 2023, consistent with a recent vote by the Virginia Air Board.<sup>11</sup> Staff notes, 6 7 however, that there may be legal challenges regarding Virginia's non-legislatively mandated RGGI exit that may prevent this exit from RGGI.<sup>12</sup> Staff takes no position on 8 9 whether Virginia will or will not continue participation in RGGI; however, given the lack 10 of certainty regarding this participation, the Commission may wish to direct the Company 11 to include in future IRP or Renewable Portfolio Standard ("RPS") modeling, both a 12 scenario in which Virginia withdraws from RGGI and a scenario in which the 13 Commonwealth continues to participate in RGGI.

#### 14 Q. PLEASE DISCUSS HOW THE COMPANY CONSIDERED THE INFLATION

#### 15 **REDUCTION ACT ("IRA") AS IT RELATES TO THE INPUTS OF THE MODEL.**

- 16 A. In Section 4.6 of the 2023 IRP, the Company states,
- 17Under the IRA, both Production Tax Credits ("PTCs") and18Investment Tax Credits ("ITCs") have a tiered credit structure

<sup>10 2023</sup> IRP at 16-18.

<sup>&</sup>lt;sup>11</sup> See Action Report, State Air Pollution Control Board Meeting, (June 7, 2023), <u>https://townhall.virginia.gov/L/GetFile.cfm?File=Meeting\1\38048\Minutes\_DEO\_38048\_v1.pdf</u> (noting that Agenda Item "Repeal CO 2 Budget Trading Program as required by Executive Order 9 (Revision A22) Part VII of 9VAC5-140" was adopted as a final regulation by a vote of 4 to 3).

<sup>&</sup>lt;sup>12</sup> Rankin, Sarah, *Virginia Regulators Advance Youngkin Plan to Leave Climate Initiative He Calls Ineffective*, Associated Press (June 7, 2023), https://apnews.com/article/virginia-rggi-greenhouse-gas-initiative-climate-changee34f1c03806bc35d97adb6bf4bfbf917 ("We fully expect robust and ultimately successful legal challenges to ensue by any number of parties who will be harmed by this action," said Walton Shepherd, Virginia policy director and senior attorney for the Natural Resources Defense Council.").

1 2 3 4		including a base credit, and increased credit for meeting prevailing wage and apprenticeship requirements, and two additional potential 10% bonus credits if domestic content is used in the project or the facility is located in an energy community. <sup>13</sup>
6		The Company assumes that the prevailing wage requirements are met and that
7		projects that started construction before 2022 and through 2032 will receive either the
8		increased tax credit of 30% (ITC) or a 2.75 ¢/kilowatt-hour credit (PTC). <sup>14</sup> The Company
9		notes that "additional guidance from the IRS will be required for the Company to fully
10		analyze the impact, if any," <sup>15</sup> of the federal tax credits but that "in general, the Company
11		selects the federal tax credit option when new facilities are placed into service." <sup>16</sup>
12	Q.	DOES STAFF HAVE ANY CONCERNS REGARDING THE INPUTS TO THE
13		COMPANY'S MODEL THAT ARE COMMON TO ALL ALTERNATIVE PLANS?
14	А.	Yes. Staff's concerns, in the aggregate, relate to:
15 16		i. The average annual capacity factors of the onshore wind generating resources used in the model;
17 18		ii. The Effective Load Carrying Capability ("ELCC") capacity values of solar generating resources used in the model;
19 20		iii. The estimated construction costs/timelines of nuclear small modular reactor ("SMR") resources made available for selection by PLEXOS;
21		iv. The Company's energy, load, and commodities forecast; and
22 23		v. The modeling of 5% energy efficiency savings attributable to the Company's current and projected Demand Side Management activities.

13 2023 TRP at 65.

<sup>14</sup> Id.

<sup>15</sup> Id.

<sup>16</sup> Id. at 66.

1 The testimony contained herein will discuss the first three matters. The testimonies 2 of Staff witnesses Bernadette Johnson and Andrew T. Boehnlein address items iv. and v., 3 respectively. The possible impacts of Staff's concerns on the Company's modeling outputs 4 are discussed in the testimony of Staff witness Oliver C. Collier.

#### **Resource Selection**

#### 5 Q. PLEASE DISCUSS DOMINION'S RESOURCE SCREENING PROCESS.

6 Dominion's process for selecting supply-side generation resources starts with identification A. 7 and review of the characteristics of available and emerging technologies, as well as a 8 consideration of any statutory requirements. The current commercial status and market 9 acceptance of each technology is then considered. The Company's approach includes 10 determining whether particular alternatives are feasible in the short or long term based on availability of fuel for its generation fleet or non-utility-owned generation within the 11 12 Company's service territory as well as the availability of resources elsewhere within PJM. 13 Dominion then considers the viability of the resource technology, identifying risks that 14 certain technologies could create for the Company and its customers. Feasibility of all 15 generating resources is considered in utility-grade projects based on capital and operating 16 expenses including fuel and operation and maintenance. Once the "short list" of viable 17 resources is selected, PLEXOS is then used to allocate the type and timing of each resource addition in the Alternative Plans.<sup>17</sup> 18

<sup>17</sup> Id. at 91-92.

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### Q. PLEASE GENERALLY DESCRIBE THE SUPPLY-SIDE RESOURCES THAT WERE MADE AVAILABLE IN PLEXOS.

A. The supply-side resources made available for model selection consist of certain renewable
 resources: four-hour, lithium-ion battery storage; SMRs; capacity purchases; and natural
 gas units.<sup>18</sup> These were the technologies considered to augment and/or replace portions of
 the Company's existing generation portfolio.

## 7 Q. PLEASE GENERALLY DISCUSS THE RENEWABLE RESOURCES MADE 8 AVAILABLE FOR SELECTION IN PLEXOS.

9 A. The renewable resources made available for model selection include solar and wind
10 generation. Solar is separated into distributed and non-distributed resources. Wind is
11 similarly separated into onshore and offshore projects.<sup>19</sup> Additionally, pumped storage was
12 made available for model selection.

#### Solar Resources

# 13 Q. PLEASE DESCRIBE THE SOLAR RESOURCES MADE AVAILABLE FOR 14 MODEL SELECTION.

A. For all Alternative Plans, the Company allowed PLEXOS to select solar resources in 60
 megawatt ("MW") blocks.<sup>20</sup> In Alternative Plans A through C, the Company limited the
 model to selecting a maximum of 900 MW of utility-scale solar per year, which is based

<sup>19</sup> Id.

<sup>&</sup>lt;sup>18</sup> Id. at 92, fig. 5.5.1.

<sup>&</sup>lt;sup>20</sup> See Company's Response to Staff Set 6-160 (a).

on an assumed amount of new solar generation available each year.<sup>21</sup> For Alternative Plans
D and E, the Company limited the model to 900 MW through 2038 to reflect construction
limitations.<sup>22</sup> This limit is then increased to 1,200 MW starting in 2039.<sup>23</sup> The Company
allowed the model to select either Company-owned cost-of-service solar or third-party
power-purchase agreements ("PPAs") in Alternative Plan A.<sup>24</sup> Alternative Plans B through
E modelled solar PPAs as 35% of the solar generation capacity placed in service over the
Study Period,<sup>25</sup> in accordance with the Code of Virginia ("Code") § 56-585.5.<sup>26</sup>

### 8 Q. PLEASE DISCUSS THE CAPACITY FACTORS ASSUMED FOR SOLAR 9 RESOURCES.

A. In each of the Company's Alternative Plans, a capacity factor for solar resources has been assumed based on the lower of the design capacity factor or the three-year-average of the Company's existing solar facilities in Virginia.<sup>27</sup> For solar tracking resources, the assumed capacity factor is 22.2%.<sup>28</sup> The assumed capacity factor for fixed-tilt resources is 20.4%.<sup>29</sup>
 For comparison purposes, the 2022 Berkeley Labs study on utility scale solar

<sup>21</sup> 2023 IRP at 66.

<sup>22</sup> Id.

<sup>23</sup> Id.

<sup>24</sup> Id.

<sup>26</sup> Id. at 66-67.

<sup>27</sup> Id. at 67

<sup>28</sup> Id.

<sup>29</sup> Id.

<sup>&</sup>lt;sup>25</sup> The Company defines the "Study Period" as "the longer 25-year period of 2024 to 2048." *Id.* at 1. This is in contrast to the "Planning Period," which is defined as "the 15-year period beginning in 2024 and continuing through 2038." *Id.* 

reports the average capacity factor of fixed tilt resources in the PJM region to be 17.6%,
 based on 71 projects totaling 827 MW of nameplate capacity.<sup>30</sup> The reported average
 capacity factor for solar tracking installations by Berkeley Labs is 21.7%, sourced from 68
 projects with a total capacity of 2,330 MW.<sup>31</sup>

5 The capacity factors of two Company-owned facilities and one Dominion/T-6 Mobile contracted generation facility in Virginia were also considered by Staff for comparison purposes. Greensville County Solar Project, an 80 MW facility located near 7 the North Carolina border, had a capacity factor of 20.15% in 2022 and 22.07% in 2021.<sup>32</sup> 8 9 Montross Solar, a 20 MW solar tracking facility located closer to the Maryland border, had a capacity factor of 22.16% in 2021 and 22.47% in 2020.<sup>33</sup> Remington Solar, a 20 MW 10 fixed-tilt solar facility in Fauquier County, had a capacity factor of 20.39% in 2021, 11 19.03% in 2020, 19.51% in 2019, and 20.17% in 2018.<sup>34</sup> 12

Based on both the published averages from both the 2022 Berkeley Labs Study and the sampled actual performance of Company owned resources, Staff does not oppose the Company's assumed capacity factors for solar tracking resources. While the assumed capacity factor for fixed-tilt solar resources appears high compared to published averages,

<sup>31</sup> Id.

<sup>33</sup> Montross Solar, monthly: U.S. Energy Information Administration, https://www.eia.gov/electricity/data/browser/#/plant/64093 (last visited July 27, 2023).

<sup>&</sup>lt;sup>30</sup> Mark Bolinger et al., *Utility-Scale Solar, 2022 Edition*, Lawrence Berkeley Nat'l Laboratory, CF by Region (2022), https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Femp.lbl.gov%2Fsites%2Fdefault% 2Ffiles%2F2022\_utility-scale\_solar\_data\_update.xlsm&wdOrigin=BROWSELINK.

<sup>&</sup>lt;sup>32</sup> Greensville County Solar Project, LLC, monthly: U.S. Energy Information Administration, https://www.eia.gov/electricity/data/browser/#/plant/63745 (last visited July 27, 2023).

<sup>&</sup>lt;sup>34</sup> Remington Solar Facility, monthly: U.S. Energy Information Administration, https://www.eia.gov/electricity/data/browser/#/plant/59685 (last visited August 1, 2023).

the actual performance of the Remington facility indicates that fixed-tilt facilities located
 in Virginia out-performed similar facilities located elsewhere in PJM. Therefore, Staff is
 also not opposed to the assumed capacity factors for fixed-tilt resources.

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#### Q. PLEASE DISCUSS ELCC IN GENERAL.

5 A. The ELCC of an intermittent resource describes its ability to meet peak demand. The 6 ELCC methodology is used by PJM to calculate the ELCC Class Ratings for ELCC Classes 7 and Accredited Unforced Capacity ("AUCAP") values for ELCC resources. AUCAP is 8 based on Unforced Capacity, which PJM defines as, "The MW value of a capacity resource 9 in the PJM Capacity Market. For [a] generating unit, the unforced capacity value is equal 10 to [the] installed capacity of [a] unit multiplied by (1- unit's [Equivalent Demand Forced 11 Outage Rate ("EFORd") determined based on five years of outage data through September 30 prior to the Delivery year]."35 12

#### 13 Q. PLEASE DISCUSS THE COMPANY'S ASSUMED ELCC VALUES FOR SOLAR

14 **RESOURCES.** 

A. In Section 4.3 of the 2023 IRP, Dominion includes a narrative of the assumptions the
 Company made concerning the ELCC and capacity values.<sup>36</sup> Dominion states that it
 estimated these capacity values using the December 2022 PJM ELCC study, which the
 Company represents is the most recently available guidance.<sup>37</sup> This approach indicates

37 2023 IRP at 61.

<sup>&</sup>lt;sup>35</sup> PJM Glossary, PJM (last visited Aug. 1, 2023), https://www.pjm.com/Glossary#index\_U. See Attachment MSG-6. The same glossary defines an EFORd as, "A measure of the probability that [a] generating unit will not be available due to a forced outages or forced deratings when there is a demand on the unit to generate."

<sup>&</sup>lt;sup>36</sup> See 2023 IRP at 60-62. The Company clarified the definitions of ELCC/Capacity Value/Capacity Factor in their response to Staff Interrogatory No. 8-172. Specifically, the Company clarified that ELCC and Capacity Value, while related, are not synonymous.

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that the capacity value for solar tracking is currently 55%.<sup>38</sup> This capacity value is assumed to decrease as solar saturation grows.<sup>39</sup>

3 PJM's most recent class ELCC value publication provides the class ELCC values per year through 2032.<sup>40</sup> When comparing PJM's class ELCC values to the Company's 4 forecasted capacity values based on PJM's class ELCC values adjusted for bonus and 5 penalty risks,<sup>41</sup> the Company has utilized what appears to be an inflated capacity value for 6 7 10 out of the 12 forecasted years from 2023 to 2032. PJM utilizes performance adjustments 8 to account for the performance of specific ELCC resources relative to the aggregate 9 performance of the ELCC class. These adjustments can be beneficial for the Company's 10 facility (i.e. a bonus) or detrimental to the Company's facility (i.e. a penalty). The 11 Company's capacity value assumptions are based on adjustments that are not guaranteed. 12 Staff considers this similar to a salesperson creating an annual budget assuming they will 13 earn commissions that are not guaranteed.

14 Staff has provided a comparison of the unadjusted PJM ELCC values to those 15 used by Dominion in the instant case. The results of this comparison are provided in the 16 table below:

<sup>38</sup> Id.

<sup>39</sup> Id.

<sup>&</sup>lt;sup>40</sup> Staff notes that the Class ELCC values are used to determine ELCC for the PJM region on a resource wide basis, and not a specific unit basis. For information on how unit specific ELCC values are calculated, *see* PJM Manual 21A: Determination of Accredited UCAP Using Effective Load Carrying Capability Analysis.

<sup>&</sup>lt;sup>41</sup> ELCC bonuses/penalties are applied when a given unit over/underperforms expectations. A bonus allows the plant to sell their capacity on the market for more money, while a penalty restricts how much money the plant can earn on the capacity market.

Year	DEV Solar Tracker <sup>42</sup>	DEV Solar Fixed <sup>43</sup>	PJM Solar Tracker <sup>44</sup>	PJM Solar Fixed <sup>45</sup>	Δ Tracking Solar	Δ Fixed Solar
2023	48.04%	32.71%	61.00%	50.00%	-12.96%	-17.29%
2024	55.17%	36.95%	56.00%	45.00%	-0.83%	-8.05%
2025	55.98%	45.87%	51.00%	37.00%	4.98%	8.87%
2026	51.94%	41.58%	45.00%	33.00%	6.94%	8.58%
2027	47.96%	34.72%	38.00%	27.00%	9.96%	7.72%
2028	36.66%	28.93%	34.00%	24.00%	2.66%	4.93%
2029	34.74%	24.69%	28.00%	21.00%	6.74%	3.69%
2030	31.89%	22.25%	23.00%	16.00%	8.89%	6.25%
2031	27.40%	20.31%	19.00%	12.00%	8.40%	8.31%
2032	23.58%	16.49%	16.00%	10.00%	7.58%	6.49%

### Table 1: Dominion's Modeled Solar Tracking and Solar Fixed ELCC Values PJM's December 2022 ELCC Values

1Staff recommends that, in future filings involving modeling (e.g., future IRPs or2RPS proceedings), the Company use PJM's published class ELCC values as opposed to the3ELCC values adjusted for bonuses and penalties that were used by the Company in this4proceeding.

#### Wind Resources

### 5 Q. PLEASE DISCUSS THE WIND RESOURCES MADE AVAILABLE FOR MODEL 6 SELECTION AND THEIR ASSUMED CAPACITY FACTORS.

<sup>43</sup> Id.

<sup>&</sup>lt;sup>42</sup> See Company's Response to Staff Set 01-34, Attachment Staff Set 01-34 (JLM).

<sup>&</sup>lt;sup>44</sup> December 2022 Effective Load Carrying Capability Report. PJM. January 6, 2023. https://www.pjminterconnection.com/-/media/planning/res-adeq/elcc/elcc-report-december-2022.ashx

A. In December 2022, the Company received approval for the Coastal Virginia Offshore Wind
 project, which represents nearly 2,600 MW of capacity. A capacity factor of 42% was used
 for modelling this project within all Alternative Plans.<sup>46</sup>

4 Concerning new onshore wind, the Company made two "specific projects" 5 available for selection in their PLEXOS model: a 120 MW project with a capacity factor 6 of 36.5%, and an 80 MW project with a capacity factor of 42.4%.<sup>47</sup> Additionally, the 7 Company made a 60 MW generic wind resource available in the model with an associated 8 capacity factor of 39.5%.<sup>48</sup>

#### 9 Q. DOES STAFF HAVE ANY CONCERNS WITH THE CAPACITY FACTORS THE

#### 10 COMPANY UTILTIZED FOR ONSHORE WIND?

11 A. Yes. Staff believes the capacity factors the Company used for modeling onshore wind

12 appear optimistic as compared to published averages and sampled facilities near Virginia.

- 13 Specifically, Staff notes that the PJM Independent Market Monitor's 2022 State of the
- 14 Market report shows a capacity factor of 31.5% for onshore wind facilities located in the
- 15 PJM footprint.<sup>49</sup> Additionally, the capacity factor for select states within PJM can be seen
- 16 in Table 2 Wind Capacity Factors found in the State of the Market Report.

<sup>48</sup> Id.

<sup>&</sup>lt;sup>46</sup> The Coastal Virginia Offshore Wind project has an "Operating Performance Provision" found in paragraph 2 of the Second Stipulation based on a 42% capacity factor, which was approved by the Commission in its Order on Reconsideration filed December 15, 2022. See Application of Virginia Electric and Power Company for approval and certification of the Coastal Virginia Offshore Wind Commercial Project and Rider Offshore Wind, pursuant to § 56-585.1:1 1, § 56-46.1. § 56-265.1 el seq., and § 56-585.1 A 6 of the Code of Virginia, Case No. PUR-2021-00142, Order on Reconsideration (Dec. 15, 2022).

<sup>&</sup>lt;sup>47</sup> 2023 IRP at 67. Staff's understanding is that the specificity of these projects is based on their geographic location.

<sup>&</sup>lt;sup>49</sup> Monitoring Analytics, LLC, *State of the Market Report for PJM* 344, Table 5-30 (2022), <u>https://www.monitoringanalytics.com/reports/PJM\_State\_of\_the\_Market/2022/2022-som-pjm-vol2.pdf</u>.

State	Wind Capacity Factor (%)
WV	35.8
MI	34.0
IL	38.0
MD	34.3
OH	32.2
NC	29.9
PA	34.1

Table 2 – Wind Capacity Factors<sup>50</sup>

2 The average capacity factor for new units from 2014-2022 found in the State of the Market Report is listed as 26%.<sup>51</sup> 3 Specific onshore wind resources were also analyzed by Staff for comparative 4 5 purposes. "Desert Wind Farm" is a 208 MW onshore wind facility, located just across the 6 border in North Carolina, which has been operating for the past six years. The annual 7 capacity factor for this facility ranges from 25.84% to 29.98%, with an average capacity factor of 28.76%.<sup>52</sup> "New Creek Wind" is a 103 MW facility located in West Virginia, 8 9 near the Company's Mt. Storm Power Plant. For the past five years, its annual capacity factor has ranged from 33.41% to 35.86%.53 10

<sup>50</sup> Ryan Wiser et al., Land-Based Wind Market Report, 2021 Edition, Lawrence Berkeley Nat'l Laboratory, [Capacity Factor by State] (2021), https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fetapublications.lbl.gov%2Fsites%2Fdefault%2Ffiles%2F2021\_land-

based\_wind\_market\_report\_public\_data\_file.xlsm&wdOrigin=BROWSELINK. The wind capacity factor values found in Table 2 are a reproduction.

<sup>&</sup>lt;sup>51</sup> Monitoring Analytics, LLC, *supra* note 41 at 402, Table 7-5.

<sup>&</sup>lt;sup>52</sup> Desert Wind Farm, LLC, monthly: U.S. Energy Information Administration, https://www.eia.gov/electricity/data/browser/#/plant/59968 (last visited July 27, 2023).

<sup>&</sup>lt;sup>53</sup> New Creek Wind, monthly: U.S. Energy Information Administration, https://www.eia.gov/electricity/data/browser/#/plant/60132 (last visited July 27, 2023).

1According to the Company's response to Staff Interrogatory No. 8-173 (a), the2Company's assumed capacity factors were based on a 2016 AWS Truepower study and3used site-specific wind data to model the capacity factors of the 120 MW and 80 MW4projects. The 60 MW project is not site specific and utilizes the average of the 120 MW5and 80 MW capacity factors.<sup>54</sup>

6 Given the age of the AWS Truepower study, Staff recommends that the 7 Commission direct that more recent studies be considered as well as the proven capacity 8 factors of actual existing facilities, as close to Virginia as possible, if a CPCN or other 9 relevant proceeding comes before the Commission concerning onshore wind.

#### 10 Q. PLEASE DISCUSS THE ELCC VALUES ASSUMED FOR WIND RESOURCES.

A. The Company used the December 2022 PJM ELCC study to estimate the capacity values
 for wind, as it did for estimating the capacity values for solar.<sup>55</sup> The Company's analysis
 shows that offshore wind has an assumed ELCC of 43%, decreasing over time as offshore
 wind saturation grows.<sup>56</sup> The class rating for onshore wind is 18%.<sup>57</sup> Staff is not opposed
 to these assumed values.

#### **Energy Storage Resources**

### 16 Q. PLEASE DISCUSS THE STORAGE RESOURCES MADE AVAILABLE FOR 17 MODEL SELECTION.

<sup>57</sup> Id.

<sup>&</sup>lt;sup>54</sup> See Company's Response to Staff Set 1-55(a).

<sup>&</sup>lt;sup>55</sup> See supra p. 10.

<sup>56 2023</sup> IRP at 61.

A. The Company has assumed that all storage additions in the 2023 IRP are four-hour,
 lithium-ion batteries or pumped storage.<sup>58</sup> All Alternative Plans were limited to 300 MW
 of storage additions per year. The Company allowed 900 MW per year after 2038 in
 Alternative Plans D and E in order to reach net zero carbon emissions. In Alternative Plans
 B and D, the Company set a constraint requiring PLEXOS to model 2,700 MW of energy
 storage by 2035, consistent with the requirements of the VCEA. The Company states that
 third-party owned storage will make up 35% of the 2,700 MW.<sup>59</sup>

### 8 Q. PLEASE DISCUSS THE ELCC VALUES ASSUMED FOR STORAGE 9 RESOURCES.

A. The Company used the same method of utilizing the December 2022 PJM ELCC study to
 estimate the capacity values for storage resources as it did for estimating the capacity values
 for solar and wind.<sup>60</sup> The Company's analysis shows that the four-hour lithium technology
 selected for inclusion in the model has an assumed capacity value of 82%, which is
 predicted to increase after 2026.<sup>61</sup>

<sup>&</sup>lt;sup>58</sup> Staff notes that while pumped storage was made available for model selection, it wasn't selected by the model in any Alternative Plan.

<sup>&</sup>lt;sup>59</sup> Id. at 73.

<sup>&</sup>lt;sup>60</sup> See supra pp. 10, 13.

<sup>61 2023</sup> IRP at 61.

According to PJM's December 2022 ELCC Report, a four-hour storage facility has
 an ELCC of 94% in 2023 that drops to 77% by 2025.<sup>62</sup> The ELCC then climbs to near
 100% by 2030.<sup>63</sup> Staff is not opposed to the Company's assumed ELCC.

#### **Thermal Resources**

### 4 Q. PLEASE DISCUSS THE THERMAL RESOURCES MADE AVAILABLE FOR 5 MODEL SELECTION.

6 A. Two types of thermal resources were made available for model selection: natural gas fired
 7 units, and SMRs.<sup>64</sup>

#### 8 Q. PLEASE DISCUSS THE NATURAL GAS UNIT INPUT ASSUMPTIONS.

A. Figure 5.5.1 of the 2023 IRP lists five types of natural gas generation facilities included as
a generating resource in PLEXOS: Aero-Derivative Combustion Turbines, Combined
Cycle 3x1, Combined Cycle 2x1, Combined Cycle 1x1, and traditional combustion
turbines ("CTs").<sup>65</sup> The Company states that Alternative Plans D and E assume the CT
plants will be able to fire using hydrogen fuel by 2045.<sup>66</sup> According to the Company's
response to Staff Interrogatory No. 8-174, all natural gas units included in Figure 5.5.1 are
technically able to co-fire with hydrogen, assuming additional fuel modifications are made.

<sup>63</sup> Id.

64 2023 IRP at 92.

66 Id. at 24.

<sup>&</sup>lt;sup>62</sup> PJM, December 2022 Effective Load Carrying Capability (ELCC) Report at 8, fig. 4 (Jan. 6, 2023), https://www.pjm.com/-/media/planning/res-adeq/elcc/elcc-report-december-2022.ashx.

<sup>&</sup>lt;sup>65</sup> *Id.* While Figure 5.5.1 includes fuel cells as a natural gas resource, fuel cells are not included as a PLEXOS resource.

1 The Company further stated that "at this time no specific units have been identified to co-2 fire or run solely on hydrogen during the Planning Period."<sup>67</sup> Staff is not opposed to the 3 Company's assumption that the new CTs will be hydrogen-capable by 2045, given that all 4 the natural gas units in the model, assuming additional modifications, can co-fire with 5 hydrogen utilizing existing technology.

#### Nuclear Resources

#### 6 Q. PLEASE DISCUSS THE NUCLEAR INPUT ASSUMPTIONS.

7 A. All nuclear additions in each Alternative Plan are assumed to be SMRs. The Company 8 states that SMRs are a classification of nuclear reactors designed to produce up to 300 MW of electricity per reactor.<sup>68</sup> Dominion highlights several benefits of the technology in 9 10 Section 1.4 of the 2023 IRP, including improved construction quality, greater flexibility regarding unit location, and increased use of passive safety systems.<sup>69</sup> The Company notes 11 12 that this technology has not been deployed at scale yet in the United States, but that design activities and regulatory licensing are accelerating both domestically and abroad.<sup>70</sup> 13 14 Dominion states that "it is conceivable that the deployment of SMRs could be further accelerated by the Company, with the first SMR being placed in service within a decade."<sup>71</sup> 15 16 It is Staff's opinion that there is a high degree of uncertainty regarding the 17 forecasted construction timelines and costs associated with the Company's planned SMR

- <sup>69</sup> Id.
- <sup>70</sup> Id.

<sup>71</sup> Id. 9-10.

<sup>&</sup>lt;sup>67</sup> See Company's Response to Staff Set 8-174.

<sup>68 2023</sup> IRP at 10.

1	units in the Alternative Plans. The technology is based on decades of research, but there
2	have not yet been any real-life grid deployments of the technology. The first SMR
3	vendor to receive a Nuclear Regulatory Commission design certification, NuScale, is
4	scheduled to complete a demonstration <sup>72</sup> reactor complex to be connected to the Utah
5	Associated Municipal Power System in 2030.73 As recently as in 2021, NuScale's target
6	price for power was \$58/megawatt-hour ("MWh"). <sup>74</sup> It has since risen to \$89/MWh, a
7	53% increase. <sup>75</sup> This higher price is due to a 75% increase in the estimated construction
8	cost for the project, from \$5.3 to \$9.3 billion dollars. <sup>76</sup> Additionally, the executive vice
9	president of market development for GE-Hitachi has stated \$60/MWh as GE-Hitachi's
10	SMR price target. <sup>77</sup> Westinghouse, another manufacturer of SMRs, has stated
11	\$3,400/kW as the target overnight cost for their AP300 reactor. <sup>78</sup>

#### **Existing Fleet**

<sup>75</sup> Id.

<sup>76</sup> Id.

<sup>&</sup>lt;sup>72</sup> A demonstration project is a prototype facility. Civil commercialization requires successful completion of the demonstration project.

<sup>&</sup>lt;sup>73</sup> NRC Certifies First U.S. Small Modular Reactor Design, Office of Nuclear Energy (Jan. 20, 2023), https://www.energy.gov/ne/articles/nrc-certifies-first-us-small-modular-reactor-design.

<sup>&</sup>lt;sup>74</sup> David Schlissel, *Eye-popping New Cost Estimates Released for NuScale Small Modular Reactor*, Institute for Energy Economics and Financial Analysis (Jan. 11, 2023), https://ieefa.org/resources/eye-popping-new-cost-estimates-released-nuscale-small-modular-reactor.

<sup>&</sup>lt;sup>77</sup> Walton, Robert, *\$60/MWh for advanced nuclear electricity is achievable, says GE Hitachi executive*, Utility Dive (Aug 22, 2022), https://www.utilitydive.com/news/advanced-nuclear-ge-hitachi-mwh-nuscale-smr-small-modular-reactor/630154/#:~:text=Small%20modular%20nuclear%20reactors%20can%20be%20developed%20with,is%20de veloping%20the%20300-MW%20BWRX-300%20small%20modular%20reactor.

<sup>&</sup>lt;sup>78</sup> Patel, Sonal. *Westinghouse Unveils the AP300-A miniaturized AP1000 Small Modular Nuclear Reactor*, Power Magazine (May 4, 2023), https://www.powermag.com/westinghouse-unveils-the-ap300-a-miniaturized-ap1000-small-modular-nuclear-reactor/.

1

2

### Q. HAS THE COMPANY INCLUDED ANY ADJUSTMENTS TO THE CAPACITY VALUES OF ITS EXISTING GENERATION FLEET?

A. Yes. The Company has included three changes to existing generation during the Planning
Period. Specifically, the Company has increased, or "up-rated," the capacity of the
Brunswick generating facility by 18 MW in 2023, up-rated the Warren generating facility
by 7 MW in 2022 and reduced the capacity of the Mount Storm generating facility by 1.1
MW in 2022.<sup>79</sup>

8 The Company has confirmed that all listed changes in Appendix 5K have been 9 completed and that no additional plans have been made that would impact the contents of 10 the appendix.<sup>80</sup>

#### **Purchased Capacity**

# Q. PLEASE DISCUSS THE PURCHASED CAPACITY RESOURCES MADE AVAILABLE FOR MODEL SELECTION.

A. The Company has included capacity purchases in each of the Alternative Plans. The
 Company imposed varying constraints on each Alternative Plan regarding the amount of
 capacity purchases that can be selected. The capacity purchase limit for Alternative Plans
 A through C is 5,200 MW, while Alternative Plans D and E begin with a limit of 5,200
 MW from 2024-2038, which increases to 13,000 MW for years 2039-2048.<sup>81</sup>

<sup>&</sup>lt;sup>79</sup> 2023 IRP, Appendix 5K – Planned Changes to Existing Generation Units.

<sup>&</sup>lt;sup>80</sup> See Company's Response to Staff Set 10-199.

<sup>&</sup>lt;sup>81</sup> See Company's Response to Appalachian Voices 3-08.

### Q. DOES STAFF HAVE ANY CONCERNS WITH THE CAPACITY PURCHASE ASSUMPTIONS?

3 A. The capacity purchases called for at the end of the Alternative Plans D and E Planning 4 Period appear to be larger than physically possible without substantial increases to the 5 Company's import capabilities. Currently, the Company appears able to import approximately 2.700 MW of capacity through its interstate ties.<sup>82</sup> As discussed more fully 6 7 in Staff witness Collier's testimony, this means that to achieve the capacity purchases 8 envisioned by Plans D and E, the Company would need to increase its interstate capacity 9 import capability by 8,100 MW by 2045, an increase of 300%.

#### **Renewable Energy Certificates**

### 10Q.PLEASE GENERALLY DESCRIBE HOW RENEWABLE ENERGY11CERTIFICATES ("RECs") WERE MODELED IN PLEXOS.

A. The Company allowed the model to select 100% of the RECs purchased for Virginia RPS
 Program compliance from the PJM REC market through 2024, and assumed that all RECs
 produced by Company-owned or contracted resources located in Virginia were banked for
 future use. Beginning in 2025, the Company allowed the model to select 25% of RECs as
 purchases from a PJM REC market and 5% of RECs for RPS Program compliance as
 purchases from a Virginia REC market for the remainder of the Study Period.<sup>83</sup>

<sup>&</sup>lt;sup>82</sup> See Company's Response to Staff Set 2-75.

<sup>&</sup>lt;sup>83</sup> 2023 IRP at 67-68. Staff notes that this is consistent with the requirements of Code § 56-585.5 C, which states, in part, "Beginning with the 2025 compliance year and thereafter, at least 75 percent of all RECs used by [Dominion] in a compliance period shall come from RPS eligible resources located in the Commonwealth."

### Q. DOES STAFF HAVE ANY CONCERNS REGARDING THE COMPANY'S REC ASSUMPTIONS?

A. Generally, no; however, given that RECs are produced based on the energy output of
renewable facilities, less energy production would also mean fewer RECs available for
compliance with Code § 56-585.5 C. As mentioned previously, Staff has concerns
regarding the average capacity factors used for estimating the energy outputs of onshore
wind resources, meaning these resources may produce fewer RECs than the Company's
assumptions indicate. The implications of this possible lower REC production from the
Company's projected resources are discussed in Staff witness Collier's testimony.

#### **Construction Costs**

### 10 Q. PLEASE DISCUSS THE CONSTRUCTION COST ASSUMPTIONS USED AS 11 INPUTS IN THE MODEL.

A. Dominion based its construction cost assumptions on cost data from Company-developed
 projects through 2022.<sup>84</sup> Dominion assumes fixed costs between 2023 and 2026, which
 the Company supports by noting the currently volatile supply chain, and to account for
 continued market demand challenges.<sup>85</sup> Beyond 2026, the Company shaped its
 assumptions (i.e., based increases/decreases) on the 2022 National Renewable Energy
 Laboratory's ("NREL") annual technology baseline assumptions for the moderate

<sup>85</sup> Id.

<sup>&</sup>lt;sup>84</sup> 2023 IRP at 64.

scenario.<sup>86</sup> That is, the Company used NREL's annual escalation percentages to
 escalate/de-escalate the cost assumptions on an annual basis.<sup>87</sup>

3 Staff is not opposed to this methodology as it is based on actual data from Virginia
4 resources.

#### **Environmental Justice**

### 5 Q. PLEASE DISCUSS HOW THE COMPANY ADDRESSED ENVIRONMENTAL 6 JUSTICE IN THE IRP.

A. In Section 9.1 of the 2023 IRP, Dominion provides a brief discussion of the requirements
 of the Virginia Environmental Justice Act ("VEJA"),<sup>88</sup> as well as a general narrative of the
 Company's commitments. Specifically, the Company states that it is committed to
 "ensuring all communities have a meaningful voice in planning and development
 processes."<sup>89</sup>

12 The Company notes that according to recently published draft environmental 13 guidance from the Virginia Department of Environmental Quality, applying VEJA 14 definitions results in 53% of the total geographic area of Virginia, and 59% of the 15 population meeting the definition of an environmental justice community.<sup>90</sup> Dominion 16 notes that in cases where a community meets the definition of an environmental justice 17 community, "the Company's approach requires consideration of proactive community

90 Id.

<sup>&</sup>lt;sup>86</sup> Id.

<sup>&</sup>lt;sup>87</sup> See Company's Response to Staff Set 8-190.

<sup>88</sup> Va. Code § 2.2-235.

<sup>&</sup>lt;sup>89</sup> 2023 IRP at 121.

engagement strategies to ensure that all people have an opportunity to participate meaningfully in the decision-making process."<sup>91</sup> Dominion clarifies that this means "providing information in an accessible way, providing opportunities for community members to voice their concerns and provide input, and that such concerns and input are appropriately responded to and that the Company works to minimize or mitigate any disproportionate impacts."<sup>92</sup> The Company believes that this approach is consistent with the goals and mandates of the VEJA.<sup>93</sup>

8 Q. DOES STAFF HAVE ANY COMMENTS REGARDING THE COMPANY'S
9 APPROACH TO ENVIRONMENTAL JUSTICE IN THE IRP?

10 Α. Generally, Staff believes that the Company's assessment of environmental justice in its 11 2023 IRP appears appropriate. Evaluation of a resource's environmental justice impacts 12 requires site-specific information, and these details are not generally present in the IRP. 13 This is because the IRP plans to add "generic" or "theoretical" resources that have not yet 14 been identified, including the siting of such resources. In contrast, in an RPS case in which 15 a utility is seeking CPCNs for renewable facilities, the environmental justice impact is 16 considered for each facility based on the specific known or knowable details of each facility.94 17

<sup>91</sup> Id.

<sup>92</sup> Id.

93 Id.

<sup>&</sup>lt;sup>94</sup> Petition of Appalachian Power Company, For approval of its 2023 RPS Plan under § 56-585.5 of the Code of Virginia and related requests, Case No. PUR-2023-00001, Doc Con Cen No. 230320217, Direct Testimony of Hallie L. Long (Mar. 15, 2023).

1		Staff notes and expects, therefore, that future applications for specific resources,
2		including CPCNs or prudency reviews, will include detailed environmental justice
3		evaluations of the specific resource or resources proposed.
		Conclusions
4	Q.	PLEASE SUMMARIZE STAFF'S CONCLUSIONS AND RECOMMENDATIONS.
5	А.	Staff provides the following conclusions and recommendations for the Commission's
6		consideration:
7 8 9 10 11 12 13		1. The capacity factors the Company used for modeling onshore wind appear optimistic as compared to published averages and sampled facilities near Virginia. Staff recognizes that the Company appears to have a strong preference for offshore wind. If a future CPCN request, RPS Plan, IRP, or other relevant proceeding comes before the Commission, Staff recommends that more recent studies be considered, as well as the proven capacity factors of actual existing facilities located as close to Virginia as possible.
14 15 16		2. SMRs are still in the nascent stages of development, not yet having been deployed at scale. As such, there are many uncertainties around future SMR development, including their projected costs and timelines.
17 18 19 20 21 22		3. The Company appears to have utilized an inflated bonus/penalty risk-adjusted ELCC as an input for modeling its fixed and tracking solar resources in its modeling for 10 of the 12 years during the 2023-2038 Planning Period. Staff was unable to verify the ELCC values used by the Company. Staff recommends that the public class values for ELCC published by PJM be utilized as opposed to the value that is modified with bonus and penalty adjustments.
23	Q.	DOES THIS CONCLUDE YOUR TESTIMONY?
24	А.	Yes.

## **ATTACHMENT MSG-1**

#### <u>Virginia Electric and Power Company</u> <u>Case No. PUR-2023-00066</u> <u>Sierra Club</u> <u>Set 2</u>

The following response to Question No. 2 of the Second Set of Interrogatories and Requests for Production of Documents propounded by the Sierra Club received on June 6, 2023, was prepared by or under the supervision of:

Jarad L. Morton Manager – Integrated Strategic Planning Dominion Energy Services, Inc.

#### **Question No. 2**

Please confirm that the Company used the LT mode of PLEXOS to allow resource optimization over the analysis period.

#### **Response:**

Confirmed.

#### <u>Virginia Electric and Power Company</u> <u>Case No. PUR-2023-00066</u> <u>Staff Set 5</u>

The following response to Question No. 137 of the Fifth Set of Interrogatories and Requests for Production of Documents propounded by Virginia State Corporation Commission Staff received on July 7, 2023, was prepared by or under the supervision of:

Jarad L. Morton Manager – Integrated Strategic Planning Dominion Energy Services, Inc.

#### Question No. 137

Please refer to page 75, section 4.12 "*PLEXOS* Modeling Refinements" of the Company's IRP. There are eleven refinements listed by the Company.

- (a) Are there any refinements that the Company has made that are not included in this list?
- (b) The Company states that the modelling refinements included in this year's plan are "to incorporate the many requirements of the VCEA". Please provide a narrative explanation for each refinement regarding how it helps the Company "incorporate the many requirements of the VCEA."

#### **Response:**

- (a) Yes.
- (b) Each of the Company's model refinements in the 2023 Plan were incorporated to meet legal requirements set forth through previous IRP filings and incorporate PLEXOS needs for modeling VCEA goals.

#### <u>Virginia Electric and Power Company</u> <u>Case No. PUR-2023-00066</u> <u>Virginia State Corporation Commission Staff</u> <u>Set 8</u>

The following response to Question No. 183 of the Eighth Set of Interrogatories and Requests for Production of Documents propounded by Virginia State Corporation Commission Staff received on July 19, 2023, was prepared by or under the supervision of:

Vishwa B. Link McGuireWoods LLP

#### Question No. 183

Please refer to the Company's response to Staff Interrogatory 05-137(a). Please provide a list of additional refinements not included in section 4.12 on page 75.

#### **Response:**

The Company objects to this request because it would require original work. Further, the Company objects to this request as overly broad, unduly burdensome, and potentially voluminous to the extent it seeks an exhaustive list of PLEXOS modeling refinements not included in Section 4.12 of the 2023 Plan. The Company also objects to this request because "refinements" is vague and undefined. Subject to and notwithstanding these objections, the Company provides the following response.

The major refinements are described in Section 4.12 of the 2023 Plan.

#### <u>Virginia Electric and Power Company</u> <u>Case No. PUR-2023-00066</u> <u>Virginia State Corporation Commission Staff</u> <u>Set 8</u>

The following response to Question No. 177 of the Eighth Set of Interrogatories and Requests for Production of Documents propounded by Virginia State Corporation Commission Staff received on July 19, 2023, was prepared by or under the supervision of:

Jarad L. Morton Manager – Integrated Strategic Planning Dominion Energy Services, Inc.

#### Question No. 177

Please confirm that the Company utilized the same commodities price forecasts for the base model runs of Alternative Plans A, B, C, D, and E.

#### **Response:**

Confirmed.

#### <u>Virginia Electric and Power Company</u> <u>Case No. PUR-2023-00066</u> <u>Virginia State Corporation Commission Staff</u> <u>Set 6</u>

The following response to Question No. 160 of the Sixth Set of Interrogatories and Requests for Production of Documents propounded by Virginia State Corporation Commission Staff received on July 11, 2023, was prepared by or under the supervision of:

Jarad L. Morton Manager – Integrated Strategic Planning Dominion Energy Services, Inc.

#### Question No. 160

Please identify the MW size of the smallest constituent "building blocks" made available for PLEXOS selection (eg, the Company made three onshore wind resources available for selection -a 120MW project, an 80MW project, and a 60MW generic project)

- (a) For Solar Additions
- (b) For Nuclear SMR additions in Alternative Plans B through E.
- (c) For Natural Gas additions in Alternative Plans A through C.

#### **Response:**

Please see the Company's response to CV Set 01-10(f) for new unit availability. The smallest of the requested unit types available for selection are:

- (a) 60 MW for solar tracker units.
- (b) 268 MW for SMR units for plans B through E.
- (c) 485 MW for 2x1CT units with oil backup.

#### <u>Virginia Electric and Power Company</u> <u>Case No. PUR-2023-00066</u> <u>Virginia State Corporation Commission Staff</u> <u>Set 8</u>

The following response to Question No. 172 of the Eighth Set of Interrogatories and Requests for Production of Documents propounded by Virginia State Corporation Commission Staff received on July 19, 2023, was prepared by or under the supervision of:

William A. Coyle Manager – Market Analytics Virginia Electric and Power Company

#### Question No. 172

Please refer to section 4.3 beginning on page 60. The Company states, "a resource that contributes a significant level of capacity during high-risk hours will have a higher capacity value (i.e. a higher ELCC) . . . ."

- (a) Please confirm that the Company intends "capacity value" to be synonymous with "ELCC" throughout the IRP.
- (b) Please confirm that the Company intends "capacity factor" to have a definition identical to the one provided in PJM's glossary (www.pjm.com/Glossary) throughout the IRP.

#### **Response:**

- (a) No. While "capacity value" and "ELCC" are closely related concepts, the terms are not synonymous throughout the 2023 Plan. "ELCC" refers to the analysis performed by PJM that provides class ratings (*e.g.* wind, solar, energy storage, etc.) that *in part* determines the capacity value for ELCC resources. "Capacity value" refers to the total *realized* capacity that the Company reasonably expects to obtain for a specific type of resource, in which ELCC class value can be a primary determinant. Beyond ELCC class value, the Company considers possible PJM capacity market penalties and bonuses when determining "capacity value" for certain ELCC resources.
- (b) Confirmed.

#### <u>Virginia Electric and Power Company</u> <u>Case No. PUR-2023-00066</u> <u>Virginia State Corporation Commission Staff</u> <u>Set 1</u>

The following response to Question No. 34 of the First Set of Interrogatories and Requests for Production of Documents propounded by Virginia State Corporation Commission Staff received on June 2, 2023, was prepared by or under the supervision of:

Jarad L. Morton Manager – Integrated Strategic Planning Dominion Energy Services, Inc.

#### Question No. 34

Did the Company utilize a single solar capacity value for meeting the PJM system coincident peak throughout the 2023-2047 study period, or did the company assume that this capacity value changes over time? If the latter, please provide the annual capacity value used for each year of the study period.

#### **Response:**

The Company used an annual ELCC value for calculating solar capacity value. This value declines over time as additional solar resources come online in the PJM system. See Attachment Staff Set 01-34 (JLM) for ELCC values used in the 2023 Plan.

#### <u>Virginia Electric and Power Company</u> <u>Case No. PUR-2023-00066</u> <u>Virginia State Corporation Commission Staff</u> <u>Set 1</u>

The following response to Question No. 55 of the First Set of Interrogatories and Requests for Production of Documents propounded by Virginia State Corporation Commission Staff received on June 2, 2023, was prepared by or under the supervision of:

Corey J. Riordan Project Construction Controls Consultant Dominion Energy Services, Inc.

#### Question No. 55

Please refer to the IRP at page 67, specifically the capacity factors used for modeling onshore wind resources (36.5% for a 120 MW facility, 42.4% for an 80 MW facility, and 39.5% for a 60 MW facility). Please provide the following information:

- (a) Provide the source or sources for each capacity factor for each project.
- (b) Do these capacity factors represent three-year historical average capacity factors for wind generation resources located in Virginia, within the region, within PJM, or some other appropriate comparison group, or are these capacity factors project design assumptions.

#### **Response:**

- (a) Capacity factors are based on an AWS Truepower study from 2016. See Attachment Staff Set 01-55(a)(1) (CJR) CONF and Attachment Staff Set 01-55(a)(2) (CJR) CONF.
- (b) These represent wind generation profiles generated by AWS Truepower and are based on potential wind resources located in Virginia.

Attachments Staff Set 01-55(a)(1) and (a)(2) (CJR) CONF are entirely confidential and are being provided pursuant to the protections set forth in 5 VAC 5-20-170, the Hearing Examiner's Protective Ruling and Additional Protective Treatment for Extraordinarily Sensitive Information dated May 23, 2023, any additional protective order or ruling that may be issued for confidential or extraordinarily sensitive information in this proceeding, and the Agreements to Adhere executed pursuant to any such orders or rulings

#### <u>Virginia Electric and Power Company</u> <u>Case No. PUR-2023-00066</u> <u>Virginia State Corporation Commission Staff</u> <u>Set 8</u>

The following response to Question No. 174 of the Eighth Set of Interrogatories and Requests for Production of Documents propounded by Virginia State Corporation Commission Staff received on July 19, 2023, was prepared by or under the supervision of:

Corey J. Riordan Project Construction Controls Consultant Dominion Energy Services, Inc.

As it pertains to legal matters, the following response to Question No. 174 of the Eighth Set of Interrogatories and Requests for Production of Documents propounded by Virginia State Corporation Commission Staff received on July 19, 2023, was prepared by or under the supervision of:

Vishwa B. Link McGuireWoods LLP

#### Question No. 174

Please refer to Figure 5.5.1 on page 92.

- (a) Please identify which of the listed Natural Gas resources, if any, are currently able to cofire with hydrogen.
- (b) Please identify which Natural Gas resources, if any, are predicted to be able to co-fire with hydrogen by the end of the planning period.
- (c) Please identify which Natural Gas resources, if any, are predicted to be able to run solely on hydrogen by the end of the planning period.

#### **Response:**

The Company objects to the premise of this request, which is hypothetical in nature and calls for a speculative response. Subject to and notwithstanding this objection, the Company provides the following response.

(a-c) With additional fuel system modifications, it is technically possible to co-fire with hydrogen on the units identified in Figure 5.5.1 of the 2023 Plan. Co-firing could also be an option in the future if the supply, storage, and cost of hydrogen are feasible in the future. However, at this time no specific units have been identified to co-fire or run solely on hydrogen

during the Planning Period. See also the Company's response to APV Set 14-03 regarding Plans D and E during the Study Period.

#### <u>Virginia Electric and Power Company</u> <u>Case No. PUR-2023-00066</u> <u>Virginia State Corporation Commission Staff</u> <u>Set 10</u>

The following response to Question No. 199 of the Tenth Set of Interrogatories and Requests for Production of Documents propounded by Virginia State Corporation Commission Staff received on July 24, 2023, was prepared by or under the supervision of:

Jarad L. Morton Manager – Integrated Strategic Planning Dominion Energy Services, Inc.

#### Question No. 199

Please refer to Appendix 5K - Planned Changes to Existing Generation Units.

- (a) Please confirm that the two changes listed in the 2022 column have been completed.
- (b) Please confirm that the 2023 project is on schedule or complete.
- (c) Please confirm that the Company has not made any additional plans that would impact the contents of the appendix.

#### **Response:**

- (a) Confirmed.
- (b) Confirmed. The uprate for Brunswick CC was completed in May 2023.
- (c) Confirmed.

#### Virginia Electric and Power Company Case No. PUR-2023-00066 Appalachian Voices Set 3

The following response to Question No. 8 of the Third Set of Interrogatories and Requests for Production of Documents propounded by Appalachian Voices received on May 19, 2023, was prepared by or under the supervision of:

Jarad L. Morton Manager – Integrated Strategic Planning Dominion Energy Services, Inc.

#### **Question No. 8**

Please identify the hourly MW transmission constraint for importing/exporting power from/to the PJM energy markets included in the PLEXOS model simulations. Is this modeling constraint held constant throughout the planning and study periods? If not, please identify all changes to the import/export transmission constraint and the years those changes occur for each plan contained in the 2023 IRP (Plans A through E).

#### **Response:**

Plan A: 5,200 MW Plan B: 5,200 MW Plan C: 5,200 MW Plan D: 2024 - 2038 = 5,200 MW 2039 - 2048 = 13,000 MW Plan E: 2024 - 2038 = 5,200 MW 2039 - 2048 = 13,000 MW

#### <u>Virginia Electric and Power Company</u> <u>Case No. PUR-2023-00066</u> <u>Virginia State Corporation Commission Staff</u> <u>Set 2</u>

As it pertains to transmission import capacity limits, the following response to Question No. 75 of the Second Set of Interrogatories and Requests for Production of Documents propounded by Virginia State Corporation Commission Staff received on June 14, 2023, was prepared by or under the supervision of:

Katelynn Vance Manager, Electric Transmission Planning & Strategic Initiatives Dominion Energy Virginia

As it pertains to modeling, the following response to Question No. 75 of the Second Set of Interrogatories and Requests for Production of Documents propounded by Virginia State Corporation Commission Staff received on June 14, 2023, was prepared by or under the supervision of:

Jarad L. Morton Manager – Integrated Strategic Planning Dominion Energy Services, Inc.

As it pertains to legal matters, the following response to Question No. 75 of the Second Set of Interrogatories and Requests for Production of Documents propounded by Virginia State Corporation Commission Staff received on June 14, 2023, was prepared by or under the supervision of:

Vishwa B. Link McGuireWoods LLP

#### Question No. 75

What is the Company's current transmission import capacity limit based on interstate transmission constraints?

#### **Response:**

The Company objects to this request as it would require original work and it calls for a speculative response because it would require assumptions about real-time variable factors, including but not limited to system load, temperature, and generator availability. Further, the Company objects to this request as vague because transmission constraints are not "interstate" but rather between zones. Additionally, the Company objects to this request as not relevant or reasonably calculated to lead to the production of admissible evidence in this proceeding because

the information as requested was not used to develop the Company's 2023 Plan. Subject to and notwithstanding these objections, the Company provides the following response.

For modeling purposes, the 2023 Plan uses a base capacity limit of 2,700 MW based on a PJM Capacity Energy Transfer Objective (CETO) analysis conducted as part of the 2022/2023 PJM Base Residual Auction (BRA) Planning period. The capacity import limits were increased in the model as follows:

Plans B and C: Increased to 5,400 MW in 2039 Plans D and E: Increased to 10,800 MW in 2039

#### <u>Virginia Electric and Power Company</u> <u>Case No. PUR-2023-00066</u> <u>Virginia State Corporation Commission Staff</u> <u>Set 8</u>

The following response to Question No. 190 of the Eighth Set of Interrogatories and Requests for Production of Documents propounded by Virginia State Corporation Commission Staff received on July 19, 2023, was prepared by or under the supervision of:

Whitney W. Johnson Manager – Energy Market Analysis Dominion Energy Services, Inc.

As it pertains to legal matters, the following response to Question No. 190 of the Eighth Set of Interrogatories and Requests for Production of Documents propounded by Virginia State Corporation Commission Staff received on July 19, 2023, was prepared by or under the supervision of:

Vishwa B. Link McGuireWoods LLP

#### Question No. 190

Please refer to the Company's response to Staff Interrogatory No. 04-107, specifically, "To further clarify, the Company used NREL's utility-scale capital cost forecast solely to shape the forecast of the Company's projected costs solar, onshore wind, and storage beyond 2026. The Company did not use NREL's projected capital costs given the discrepancy between that forecast and observed capital costs from the Company's own development projects in Virginia." Please provide a narrative explanation for what the discrepancy was that caused the difference between NREL and Company capital construction costs.

#### **Response:**

The Company objects to the premise of this request to the extent it implies there is a "discrepancy" between the Company's construction cost assumptions and NREL data. Subject to and notwithstanding this objection, the Company provides the following response.

The Company did not use NREL capital cost data as the basis for its construction cost assumptions, so there is no "discrepancy." As explained on page 64 of the 2023 Plan, the Company used estimates from the Virginia market based on the Company-developed projects through 2022. The Company held these costs, based on Company experience in Virginia, constant through 2026. After 2026, the Company used NREL's *annual escalation percentages* to escalate / de-escalate the cost assumptions on an annual basis. To be clear, the Company applied the escalation percentages from NREL to the cost estimates based on the Virginia market the Company used through 2026 and not on NREL's construction cost assumptions.