COMMONWEALTH OF VIRGINIA
STATE CORPORATION COMMISSION

APPLICATION OF
VIRGINIA ELECTRIC AND POWER COMPANY **Case No. PUR-2021-00142**

For approval and certification of the Coastal Virginia Offshore Wind Commercial Project and Rider Offshore Wind, pursuant to § 56-585.1:11, § 56-46.1, § 56-265.1 *et seq.,* and § 56-585.1 A 6 of the Code of Virginia

DIRECT TESTIMONY OF MAXIMILIAN CHANG

ON BEHALF OF CLEAN VIRGINIA

PUBLIC VERSION

March 25, 2022

Summary of the Direct Testimony of Maximilian Chang

Clean Virginia Witness Maximilian Chang provides an overview of Dominion's proposal to construct, own, and operate an offshore wind farm consisting of 176 14.7 megawatt (MW) wind turbines located in a federal lease area approximately 27 statute miles off the coast of Virginia Beach, Virginia. When completed, the project will be one of, if not the, largest offshore wind farms in the United States.

Outside of the Coastal Virginia Offshore Wind (CVOW) pilot project of 12 MW, Dominion's project team appears to have limited direct offshore wind project experience that would demonstrate Dominion's ability to execute the completion of the offshore wind project on time and within budget.

Under the Virginia Clean Economic Act (VCEA), Dominion does not appear to be required to adhere to a specific cost cap for the proposed project if it is approved. Mr. Chang recommends that the Commission impose a capital cost cap for the project set at Dominion's application that excludes the $500 million for financial hedges and contingency. Should the project's capital costs increase beyond the $9.8 billion forecasted by Dominion, the Commission should set clear guidance that Dominion would be at risk for the recovery of excess costs.

Given the complexity, scale, and inexperience with offshore wind projects, the Commission should require Dominion to provide regular reports and meetings to update the progress of the project, including critical path items and cost overruns/underruns. As part of the regular project updates, the Commission should also require Dominion to hire an independent monitor to provide additional oversight to the project.

Finally, Mr. Chang recommends that the Commission conduct an assessment to evaluate if the current utility-owned model for the CVOW is the most appropriate mechanism for the second 2,600 MW of offshore wind for Virginia as outlined in the VCEA legislation. As part of this assessment, the Commission may consider other forms of offshore wind procurement including but not limited to power purchase agreements and/or offshore renewable energy credits.

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1. SUMMARY OF TESTIMONY

Q. Please summarize your primary conclusions.

A. My primary conclusion is that, if approved, Dominion Energy Virginia ("Dominion" or the "Company) would be constructing, to date, the largest offshore wind farm off the Eastern Seaboard. Unlike other projects along the Eastern Seaboard, Dominion's project would be (1) the first utility-owned offshore wind project and (2) managed by a project team with offshore wind development expertise limited to the recently completed coastal Virginia offshore wind pilot project.

Q. Please summarize your primary recommendations.

A. I recommend that the Commission impose a project capital cost cap set at Dominion's publicly stated project capital cost of $9.8 billion. I note that Dominion's project cost of $9.8 billion already includes contingency amounts of $500 million for currency hedges and project costs.

I also recommend that the Commission require Dominion to provide regular project status reports that should, at a minimum, identify critical path items that could delay the project and identify project spending and costs that could result in project overruns. The project status reporting should be a component of Dominion's annual Rider Offshore Wind proceeding for the proposed Coastal Virginia Offshore Wind (CVOW) project.

Finally, I recommend that the Commission conduct an assessment to evaluate if the current utility-owned model for the CVOW is the most appropriate mechanism for the second 2,600 megawatts (MW) of offshore wind for Virginia as outlined in the Virginia Clean Economic Act (VCEA) legislation. As part of this assessment, the Commission may consider other forms of offshore wind

procurement, including but not limited to power purchase agreements and/or offshore renewable energy credits.

2. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name, business address, and position.

A. My name is Maximilian Chang. I am a Principal Associate with Synapse Energy Economics, Inc., an energy consulting company located at 485 Massachusetts Avenue #3, Cambridge, Massachusetts.

Q. Please describe Synapse Energy Economics.

A. Synapse is a research and consulting firm specializing in energy and environmental issues, including electric generation, transmission and distribution system reliability, ratemaking and rate design, electric industry restructuring and market power, electricity market prices, stranded costs, efficiency, renewable energy, environmental quality, and nuclear power.

Synapse's clients include state consumer advocates, public utilities commission staff, attorneys general, environmental organizations, federal government agencies, and utilities.

Q. Please summarize your work experience and educational background.

A. My experience is summarized in my resume, which is attached as Attachment MPC 1. I am an environmental engineer and energy economics analyst who has analyzed energy industry issues for 13 years. I have provided testimony or testified before the public utility commissions of Delaware, District of Columbia, Hawaii, Illinois, Kansas, Maine, Maryland, Massachusetts, New Jersey, New Hampshire, and Vermont. In my current position at Synapse Energy Economics, I focus on economic and technical analysis of many aspects of the electric power industry,

including: (1) utility reliability performance and distribution investments, (2) nuclear power, (3) wholesale and retail electricity markets, (4) energy efficiency and demand response alternatives, and (5) offshore wind.

Q. On whose behalf are you testifying in this case?

A. I am testifying on behalf of Clean Virginia.

Q. Have you testified previously before the State Corporation Commission of Virginia?

A. No.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony is to present information about Dominion's proposed CVOW project, Dominion's experience in managing what will be the largest offshore wind project in the United States, and my recommendations that would help the Commission maintain appropriate oversight to mitigate cost overruns that would be borne by ratepayers. That I do not testify on other matters within the Petition does not mean that I necessarily agree with Dominion's position.

3. SUMMARY OF THE OFFSHORE WIND APPLICATION

Q Please describe your understanding of the Coastal Virginia Offshore Wind Application

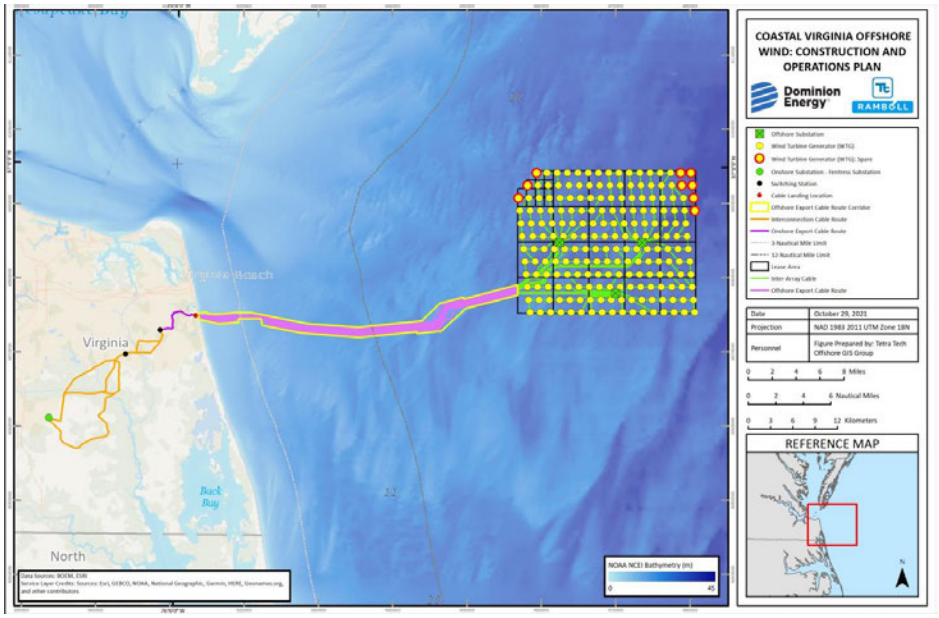
A On November 5, 2021, Dominion Energy Virginia filed a petition before the Commission to seek approval for the construction of the CVOW Commercial

Project.[1] Dominion proposes to install 176 wind turbines in its federal lease area located 27 statute miles off the coast of Virginia Beach, Virginia. Each turbine would be 14.7 MW. The proposed wind farm would have a total capacity of 2,587 MW. Dominion anticipates that the project will produce approximately 9,500 gigawatt-hours (GWh) of energy annually.[2] The following figure shows the approximate location and layout of the project.

[1] Dominion Energy Virginia. 2021. *Application, Direct Testimony, Appendices, and Schedules of Virginia Electric Power Company for approval and certification of the Coastal Virginia Offshore Wind Commercial Project and Rider Offshore Wind.* Available at: https://coastalvawind.com/resources/pdf/public-application-volume-01-2021-cvow.pdf.

[2] Application. Page 4.

Figure 1: Map of Proposed Commercial Coastal Virginia Offshore Wind Project



Source: Tetra Tech Inc. "Construction and Operations Plan; Coastal Virginia Offshore Wind Commercial Project" Submitted to the Bureau of Ocean Energy Management by Dominion Energy Virginia (Oct. 29, 2021). Available at: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Public-Exec-Summary-TOC.pdf.

The Company states that it anticipates starting construction at the end of 2023 and expects the wind farm to be operational and online by the **end** of 2026.[3] The Company has announced that the turbines will be Siemens Gamesa SG 14-222 Direct Drive offshore wind turbines. Dominion has also indicated that the Harper

[3] Application Volume 1. Pages 5 and 6.

Switching Station at the Naval Air Station Oceana will be the point of interconnection, connecting the project to the PJM electric transmission grid.[4]

Dominion anticipates that the total project capital costs are expected to be approximately $9.8 billion. I note that the $9.8 billion only represents the capital cost of the project and does not reflect Dominion's return on its proposed capital investment. Dominion budgeted $7.8 billion for offshore work, and $1.5 billion for onshore work. The $9.8 billion also includes approximately $500 million reserved for contingency and hedging allowance.[5] Dominion states that the project's total levelized cost of energy (LCOE) is expected to be $73/MWh in 2018 dollars.

Q. How does the proposed project compare to other existing and planned offshore wind projects in the United States?

A. Based on the petition, Dominion's CVOW project will be 2,567 MW, making the project the largest offshore wind farm phase in the United States. Other wind farms may be larger in aggregate, but these are being built in phases. To highlight this point, I have made a table (below) summarizing known offshore wind projects in various stages of development and/or approval along the Eastern Seaboard based on information collected by the U.S. Department of Energy's 2021 Offshore Wind Market Report, Table 7. In addition, my table also incorporates projects approved after the publication of the report. These include Momentum Wind and Skipjack

[4] Siemens Gamesa, "Unmatched in the U.S.: Siemens Gamesa SG 14-222 DD offshore wind turbines to power 2.6-GW Dominion Energy project," news release, May 26, 2020. Available at: https://www.siemensgamesa.com/en-int/newsroom/2020/05/200526-siemens-gamesa-dominion-energy-usa-project.

[5] Direct Testimony of Mark Mitchell. November 5, 2021. Page 6, lines 17 and 18. Available at: https://scc.virginia.gov/docketsearch/DOCS/5yn%4001!.PDF.

2.1, two projects approved by the Maryland Public Service Commission in December 2021.[6]

[6] Maryland Public Service Commission. Skipjack Offshore Energy, LLC and US Wind, Inc's Offshore Wind Applications under Clean Energy Jobs Act of 2019. Case No. 9666, Order No. 90011, December 17, 2021. Available at: https://webapp.psc.state md.us/newIntranet/Casenum/NewIndex3_VOpenFile.cfm?FilePath=//Coldfusion/Casenum/9600-9699/9666/102.pdf

Table 1 Summary of Announced and Approved Offshore US Wind Projects

Project Name	Developer/Owner	Size (MW)	Number of Turbines	Offtake State	Contract Type	Expected Online Date
Aqua Ventus I	University of Maine/ RWE/ Mitsubishi	12	1	ME	PPA	2023
Beacon Wind 1	Equinor and BP	1,230	82	NY	NY OREC	2026
Block Island Wind Farm	Deepwater Wind (Orsted)	30	5	RI	PPA	2016
Empire Wind 1	Equinor and BP	816	54	NY	NY OREC	2024
Empire Wind 2	Equinor and BP	1,260	84	NY	NY OREC	2026
Icebreaker	LEEDCo/Fred Olsen	21	*	OH	PPA	2023
MarWin	US Wind	248	22	MD	MD OREC	2025
Mayflower Wind	Energias de Portugal Renováeis/Shell	400	*	MA	PPA	2025
Mayflower Wind	Shell/Atkins/Ocergy	404	*	MA	PPA	2025
MarWin II	US Wind	808.5	55	MD	MD OREC	2026
Ocean Wind	Ørsted and PSEG	1,100	92	NJ	NJ OREC	2024
Park City Wind	CIP and Avangrid	804	*	CT	PPA	2025
Revolution Wind	Ørsted and Eversource	400	27	RI	PPA	2023
Revolution Wind	Ørsted and Eversource	200	27	CT	PPA	2023
Revolution Wind	Ørsted and Eversource	104	27	CT	PPA	2023
Skipjack	Ørsted	120	10	MD	MD OREC	2026
Skipjack 2.1	Ørsted	864	60	MD	MD OREC	2026
South Fork	Ørsted and Eversource	130	8	NY	PPA	2023
Sunrise Wind	Ørsted and Eversource	880	116	NY	NY OREC	2024
Vineyard Wind 1	CIP and Avangrid	400	31	MA	PPA	2023
Vineyard Wind 1	CIP and Avangrid	400	31	MA	PPA	2024
Coastal Virginia Offshore Wind Commercial	Dominion Energy	2,587	176	VA	Utility Owned	2026
Coastal Virginia Offshore Wind- Pilot	Dominion Energy	12	2	VA	Utility Owned	2021

Source: U.S. Department of Energy. Offshore Wind Market Report: 2021. Available at: https://www.energy.gov/sites/default/files/2021-08/Offshore%20Wind%20Market%20Report%202021%20Edition_Final.pdf.

As shown above, the proposed CVOW is the single largest project shown in the table. This would make the project twice as large as the second largest project, Empire Wind 2. I note that New York selected Empire Wind 2 (1,260 MW) and Beacon Wind I (1,230 MW) that total to 2,490 MW in its competitive solicitation

process.[7] If completed, the proposed CVOW project would also be one of the largest offshore wind farms in the world. For example, the proposed CVOW capacity would exceed that of Hornsea One, one largest offshore wind farm in service (1.2 GW), and Hornsea Two (1.3 GW), both located in the United Kingdom.[8]

I also note that Dominion's CVOW pilot and proposed CVOW are also the only utility-owned offshore wind projects. In other states, offshore wind developers either directly or jointly own the offshore wind projects and are paid through a state-specific Ocean Renewable Energy Credit or power-purchase agreement.

Q. Please describe your understanding of the CVOW Pilot

Dominion and its partner Orsted completed the CVOW Pilot in October 2020. The pilot project consists of two 6 MW turbines for a total capacity of 12 MW. The pilot project is also located approximately 27 miles off the coast of Virginia Beach.[9] The Company budgeted the pilot project to cost $300 million, excluding financing cost.[10] The Company indicated that the actual cost of the project was $295 million.[11]

Table 2 below provides a comparison of the pilot and commercial CVOW projects across selected project elements. The table shows that while some

[7] https://www.nyserda ny.gov/All-Programs/Offshore-Wind/Focus-Areas/Offshore-Wind-Solicitations/2020-Solicitation

[8] Orsted. 2021. "Hornsea One and Two." Available at: https://hornseaprojects.co.uk/hornsea-project-two.

[9] Dominion Energy. 20201. "Coastal Virginia Offshore Wind." *Projects & Facilities.* Available at: https://www.dominionenergy.com/cvow.

[10] Commonwealth of Virginia State Corporation Commission. 2018. *Final Order* regarding Case No. PUR-2018-00121. Available at: https://scc.virginia.gov/docketsearch/DOCS/4c%24z01!.PDF.

[11] AG 3-44

elements are similar, other elements are new to the CVOW project, and that the scale of the CVOW project relative to the pilot is different.

Table 2: Comparison of the Pilot and Proposed CVOW

Project Element	Pilot	Commercial
Project Size (MW)	12	2,587
# of Turbines	2	176
Turbine Size (MW)	6	14.7
Turbine Model	SWT – 6.0 – 154	SG 14-222
Estimated Capital Cost ($, million)[12]	$294	$9,800
Onshore Substation	Yes	Yes
Offshore Substation[13]	No	Yes
Cable Work	Yes	Yes
Offshore Substation Count	0	2/3
Transmission Interconnection	No	Yes
Offshore Export Cable Line Counts	1	9

Sources: CV 2-1, CV 2-4,. CV 2-7, AG 3-44, CV 2-10, Application Page 11

Dominion claims that the pilot project has provided "invaluable" experience as it embarks on the much larger CVOW project.[14] However, the scale and magnitude between the pilot project and the CVOW project are very different, as shown in Table 2 above. First, the cost of the CVOW project relative to the pilot is very different. The Company estimated that the pilot project would cost $294 million, the proposed CVOW is 33 times more expensive than the pilot project.

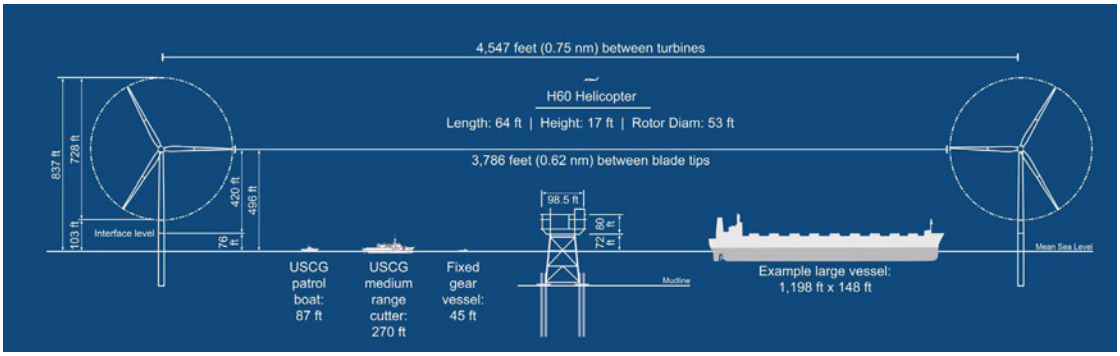
[12] The projected CVOW project costs include financing/hedging costs of $500 million

[13] The Pilot CVOW did not include construction of any offshore substation but did include the construction of an offshore inter-array cable connecting the two 6 MW turbines, and an export cable connecting the project to the Virginia State Military Reservation.

[14] Direct Testimony of Mark D. Mitchell. Page 9, line 8.

The scale of Dominion's proposed turbines is presented in the following figure taken from Dominion's Construction and Operations Plan (COP).[15]

Figure 1. Scaled Representation of CVOW Turbine Spacing



Tetra Tech, Inc. Construction and Operations Plan Coastal Virginia Offshore Wind Commercial Project. *June 29, 2021. Prepared for Dominion Energy, Inc. and submitted to the Bureau of Ocean Energy Management. Figure 2-1.1. Available at https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/CVOW-Commercial-COP-Sections-1-3.pdf.*

The figure shows that each of these turbines are large, and that installation of 176 turbines will require project management experience.

4. DOMINION'S OFFSHORE WIND PROJECT EXPERIENCE

Q. Please summarize your findings regarding Dominion team's offshore wind experience.

A. As detailed in previous sections, Dominion is planning to build what would be the largest offshore wind project in the United States. Dominion is planning to scale from its 12 MW pilot project (two turbines) to 2,587 MW (176 turbines). I am

[15] Tetra Tech, Inc. *Construction and Operations Plan Coastal Virginia Offshore Wind Commercial Project*. June 29, 2021. Prepared for Dominion Energy, Inc. and submitted to the Bureau of Ocean Energy Management. Available at https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/CVOW-Commercial-COP-Sections-1-3.pdf.

concerned that Dominion's project team has limited direct offshore wind project experience outside of the CVOW pilot project to execute the completion of the project on time and within budget. While Dominion has identified Ramboll Group A/S (Ramboll) and Merkur Offshore (Merkur) as project partners, it is unclear **[Begin Extraordinarily Sensitive]** [redacted] **[End Extraordinarily Sensitive]** of the work based on my review of the current contracts provided by Dominion.

Q. Has Dominion identified key personnel associated with the proposed project?

A. Yes. Dominion has identified Senior Vice President Mark Mitchell and Vice President of Offshore Wind Joshua Bennett as project team leads for the proposed CVOW project.

As noted by in his Direct Testimony, Mr. Mitchell's background is in electrical engineering in Virginia and Pennsylvania.[16] Mr. Mitchell joined Dominion in 2000 as a project manager and has since overseen installation of new generating resources for the Dominion fleet including gas and hybrid coal-biofuel power plants, as well as solar projects. Mr. Mitchell also oversaw the engineering and construction of, and is currently responsible for the ongoing operations of, the CVOW pilot project.[17] Outside of the pilot project, Mr. Mitchell does not claim to have any direct offshore wind experience or any onshore wind experience. Mr. Mitchell does have experience with Dominion's Mount Storm and Fowler Ridge onshore wind projects.[18]

As noted by in his Direct Testimony, Mr. Bennett's background is also in electrical engineering, and he has been similarly responsible for engineering, outage

[16] Direct Testimony of Mark D. Mitchell. Appendix A.
[17] CV 3-2
[18] CV 3-2

management, capital projects, regulatory compliance, and renewable operations across a variety of power plants across Dominion's fleet.[19] Outside of the pilot project, Mr. Bennett does not claim to have any direct offshore wind experience or any onshore wind experience. Mr. Bennett also has experience with Dominion's Mount Storm and Fowler Ridge onshore wind projects.[20]

The lack of experience in offshore wind other than the single pilot project does not doom the CVOW to failure, but it should raise concerns that proper and transparent project management will need to be in place to ensure that the project is completed on-time and within budget.

Q. Has Dominion retained project engineering firm?

A. Yes. Dominion has contracted Ramboll, a Danish consulting engineering firm, to be the project's owner engineer.[21] It appears that Ramboll's projects include designing offshore wind substations and turbine foundations, as well as completing environmental and maritime studies for the 300 MW Anholt Offshore Wind Farm in Denmark.[22] It appears that Ramboll has also led the design process in the 400 MW SPIC Binhai North Phase 2 Offshore Wind Farm in China.[23]

The Company's contract with Ramboll include **[Begin Extraordinarily Sensitive]** [redacted][24] **[End Extraordinarily Sensitive]** While the scope of work includes **[Begin Extraordinarily Sensitive]** [redacted]

[19] Direct Testimony of Joshua Bennett. Appendix A.
[20] CV 3-3
[21] Direct Testimony of Mark D. Mitchell. Page 18, line 6.
[22] Ramboll Group. "Anholt Offshore Wind Farm – Denmark's largest offshore wind farm." *Projects.* Available at: https://ramboll.com/projects/re/anholt-offshore-wind-farm.
[23] Ramboll Group. "SPIC Binhai North H2 Offshore Wind Farm." *Projects.* https://ramboll.com/projects/re/danish-engineers-enter-the-chinese-market-for-offshore-wind.
[24] AG 3-48 Attachment 2.

[redacted] **[End Extraordinarily Sensitive]** that would extend to subsequent sequencing of the CVOW project.

I note that Dominion's contract with Ramboll appears to end **[Begin Extraordinarily Sensitive]** [redacted] **[End Extraordinarily Sensitive]** the 2023 construction start.[25] If that is case, then Dominion maybe have limited outside engineering knowledge available to the project team during the installation phase.

Q. Has Dominion retained other partners?

A. Yes. Dominion has also contracted Merkur Offshore Wind as its strategic advisor.[26] Merkur Offshore is the developer of the Merkur Offshore Wind Farm, consisting of 66 6-MW GE Haliade X turbines located in the German Economic Exclusion zone in the North Sea.[27] I note that Dominion's contract with Merkur appears to **[Begin Extraordinarily Sensitive]** [redacted] **[End Extraordinarily Sensitive]**.[28] However, the Company states that it "holds periodic coordination meetings with Ramboll and Merkur to ensure that scopes are defined and are not overlapping."[29]

Q. What is your recommendation for the Commission to address Dominion's offshore wind project management experience?

A. As I will describe later in my testimony, I recommend that the Commission require Dominion to provide regular and comprehensive project status updates to

[25] AG 3-48. Attachment 2 Page 12.
[26] Direct Testimony of Mitchell. Page 18, line 11.
[27] https://www.merkur-offshore.com/company-2/
[28] AG 3-48, Attachment 3. Page 6.
[29] CV 3-16.

the Commission throughout the permitting, design, procurement, installation, and operation phases of the project should the Commission approve the petition. In addition, Dominion should identify the extent, scope, and duration of the work that outside firms who will assist the Company will perform during all phases of the project.

5. COST CONTAINMENT

Q. Please summarize your concerns regarding cost containment measures to protect ratepayers.

A. I have concerns that the VCEA does not require Dominion to adhere to a specific cost cap for the proposed project if it is approved. I recommend that the Commission impose a capital cost cap for the project set at Dominion's application that excludes the $500 million for financial hedges and contingency. Should capital costs for the proposed project increase beyond the $9.8 billion forecasted by Dominion, the Commission should set clear guidance that Dominion would be at risk for recovery of excess costs.

Q. Is there cost cap set forth in the VCEA?

A. Yes, the VCEA states that:

> the project's projected total levelized cost of energy, including any tax credit, on a cost per megawatt hour basis, inclusive of the costs of transmission and distribution facilities associated with the facility's interconnection, does not exceed 1.4 times the comparable cost, on an unweighted average basis, of a conventional simple cycle combustion turbine generating facility as estimated by the U.S. Energy Information Administration in its Annual Energy Outlook 2019[30]

[30] Virginia Acts of Assembly. Chapter 1193. § 56-585.1:11.

In its Petition, Dominion states that this levelized cost of energy (LCOE) threshold is $125/MWh (2018$).[31] Dominion states that its proposed CVOW project has a LCOE of $73/MWh (2018$).[32] I understand that other parties may opine about the reasonableness of Dominion's LCOE calculations.

Q. Does the VCEA state that projects' actual levelized cost of energy must be below 1.4 times the comparable cost of a conventional simple cycle combustion turbine generating facility?

A. No, there does not appear to be any language in the VCEA that requires that actual costs remain below the 1.4 times threshold for a conventional simple cycle combustion turbine generating facility. When asked if there was a cost cap for the proposed project, the Company objected.[33]

Q. Does the Company consider its projected LCOE of $73/MWh (2018$) a cost cap?

A. It is unclear. When asked if the Company viewed the LCOE of $73/MWh (2018$) as a cost cap, the Company objected.[34]

Q. What are your concerns about actual costs exceeding projected costs?

A. My concern about the lack of a cost cap for the project, if approved, is that Dominion will seek to recover any project overruns from ratepayers. There does not appear to be a mechanism explicitly in place that limits Dominion's ability to recover project overruns. In that situation, I am concerned that Dominion may not have a strong inclination to control project costs and may be inclined to incur project overruns knowing that the Company may be able to recover overruns.

[31] Application. Paragraph 13. Page 10.
[32] Ibid.
[33] CV 2-16.
[34] CV 2-17.

Q. Did the Company provide an upper and lower bound for its projected capital costs for the proposed CVOW project?

A. Not exactly. In response to discovery request CV 4-2, the Company objected to the request for upper and lower bounds for the CVOW project, but did reference Filing Schedule 46.b.1.i – Statements 1 and 2 and Filing Schedule 46.b.1.iv – Statements 2 and 3. The contents are marked Extraordinarily Sensitive, but essentially provides details supporting the $9.8 billion in capital costs in the Petition. If one takes the hedging and contingency amount of $500 million, then that would leave the upper and lower bound of the projected capital costs of the project to be $9.3 to $9.8 billion. The Company indicated that its projected amount for contingencies is **[Begin Extraordinarily Sensitive]** [redacted] **[End Extraordinarily Sensitive].**[35]

Q. What options does the Commission have to ensure that the capital costs of the project remain between $9.3 to $9.8 billion.

A. The Commission should impose a capital cost cap for the project set at the Application's $9.3 billion capital cost that excludes the $500 million for financial hedges and contingency. Should actual capital costs for the proposed project increase beyond the $9.8 billion forecasted by Dominion, the Commission should set clear guidance that Dominion would be at risk for recovery of excess costs.

[35] Staff 6-69.

6. PROCUREMENT OPTIONS

Q. Please summarize your understanding of how Dominion plans to recover the projects costs of the CVOW project.

A. I understand that Dominion will own the project and recover the project costs from ratepayers through the proposed CVOW rider mechanism.

Q. Are there other procurement mechanisms available?

A. Yes. Other states along the Eastern Seaboard are utilizing other procurement mechanisms to contract for offshore wind projects. These mechanisms include offshore renewable energy credits (ORECs) and power purchase agreements (PPA). Both of these mechanisms are described generally below.

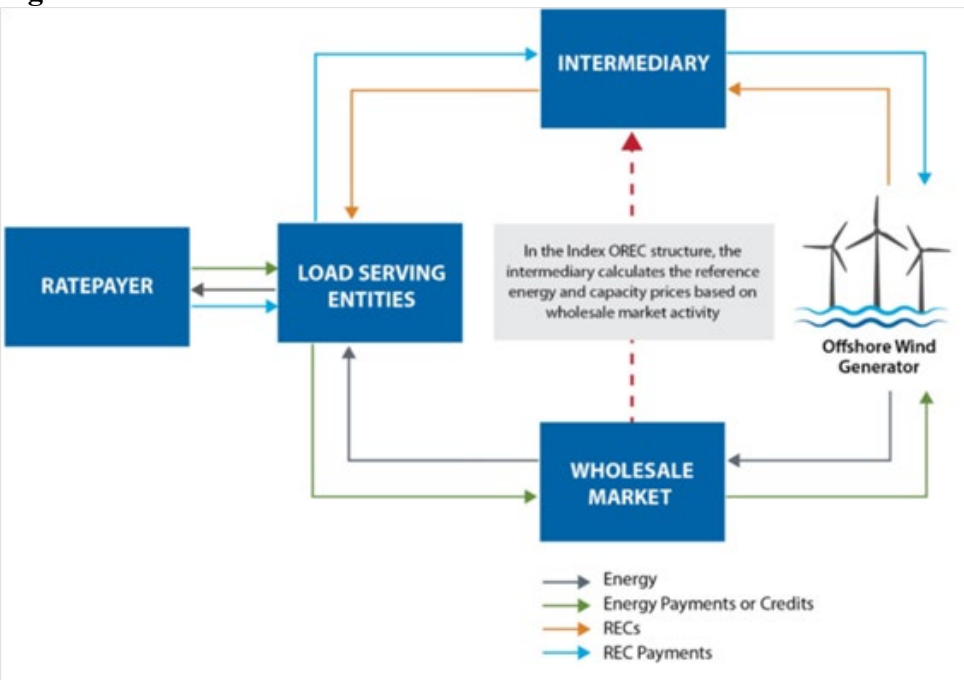
Q. Please explain the concept of ORECs.

A An OREC is the environmental attribute associated with one megawatt-hour of electricity generated from an eligible offshore wind project that can be used to fulfill a state's renewable portfolio standard requirements. ORECs generally include energy, capacity, ancillary services, and environmental attributes. A 2020 National Renewable Energy Laboratory report describes different OREC structures.[36] The NREL report notes that the OREC structure involves the wind generator selling energy and capacity into the wholesale market. The associated revenues are then routed to an escrow account and ultimately to the distribution utility and ratepayers. The state's electricity suppliers purchase ORECs via the escrow account, and those funds are then transferred to the eligible generator. An

[36] Beiter P., J. Heeter, P. Spitsen, D. Riley. 2020. Comparing Offshore Wind Energy Procurement and Project Revenue Sources Across U.S. States. National Renewable Energy Laboratory (NREL). NREL/TP-5000-76079. Available at: https://www nrel.gov/docs/fy20osti/76079.pdf

illustrative schematic of the OREC structure taken from NREL's report illustrates the mechanics of the OREC structure.

Figure 2 Illustrative OREC Structure



Source: Beiter P., J. Heeter, P. Spitsen, D. Riley. 2020. Comparing Offshore Wind Energy Procurement and Project Revenue Sources Across U.S. States. National Renewable Energy Laboratory (NREL). NREL/TP-5000-76079. Available at: https://www.nrel.gov/docs/fy20osti/76079.pdf. Figure 7, page 32.

I recognize that the OREC structure would require changes in Virginia's legislation, but I present the OREC structure as one possible procurement pathway for the Commonwealth to consider.

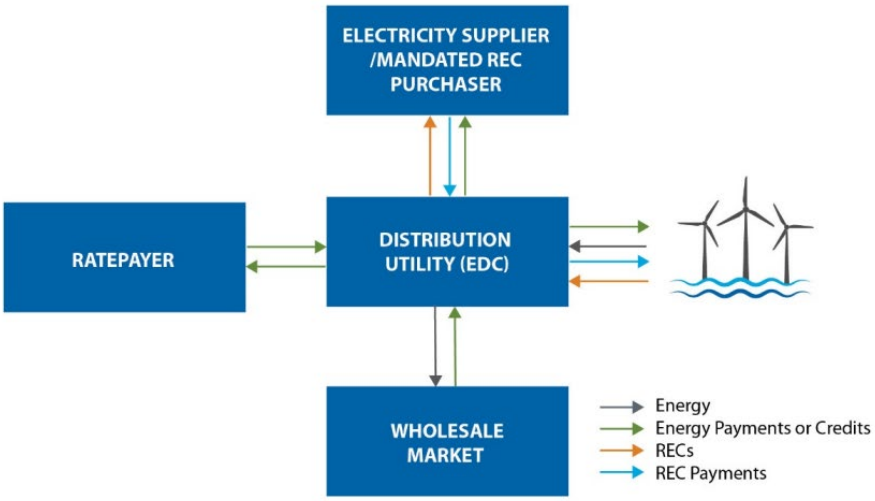
Q. Please explain your understanding of Offshore Wind PPAs.

A. A Power Purchase Agreement (PPA) is a standardized long-term contract, typically lasting 20 years, for the purchase of energy, capacity, energy services,

and environmental attributes from a specific renewable energy generator.[37] PPAs are currently used in Massachusetts, Rhode Island, Connecticut, and Maine in procuring offshore wind capacity. The 2020 NREL report states that offshore wind generators generally sell energy, energy services, and RECs to the electric distribution utility, who then sells the energy in the wholesale market and RECs to the electricity supplier. Under the PPA agreement, the offshore wind developer receives a fixed price ($/MWh) for generation regardless of the market clearing price. An illustrative schematic of the PPA structure taken from NREL's report illustrates the mechanics of the PPA structure.

[37] Beiter P., J. Heeter, P. Spitsen, D. Riley. 2020. *Comparing Offshore Wind Energy Procurement and Project Revenue Sources Across U.S. States.* National Renewable Energy Laboratory (NREL). NREL/TP-5000-76079. Available at: https://www nrel.gov/docs/fy20osti/76079.pdf.

Figure 3 Illustrative PPA Structure



Source: Beiter P., J. Heeter, P. Spitsen, D. Riley. 2020. Comparing Offshore Wind Energy Procurement and Project Revenue Sources Across U.S. States. National Renewable Energy Laboratory (NREL). NREL/TP-5000-76079. Available at: https://www.nrel.gov/docs/fy20osti/76079.pdf. Figure 7, page 31.

The PPA structure is another pathway for the Commonwealth to consider procuring future offshore wind capacity.

Q. Please explain why these procurement options are important for the Commission to consider.

A. While Dominion has already filed a petition for the 2,587 MW CVOW, the VEAC requires Virginia to purchase a total of 5,200 MW of offshore wind by 2034. The Commission should be aware that there are other procurement options available for the Commonwealth to consider beyond what is being offered by Dominion. While Dominion does own the lease for offshore wind, Dominion could solicit other offshore wind developers to develop the remaining 2,600 MW in a future procurement process. By competitively bidding the development of the remaining 2,600 MW, ratepayers may be able to reap the benefits of competition with established offshore wind developers. In case PUR-2021-00146, State

Corporation Commission staff (Staff) recommended that Dominion retain an independent third party to run the renewable RFP process.[38]

7. FUTURE REPORTS AND PROJECT OVERSIGHT

Q. Please describe your findings and recommendations for future reporting requirements should the Commission approve Dominion's proposed CVOW project.

A. Given the complexity and scale of the proposed project, and the Company's inexperience with offshore wind projects, the Commission should require Dominion to provide regular reports and meetings to update the progress of the project, including critical path items and cost overruns/underruns. I welcome the Company's offer to provide project status and cost report updates as part of the annual rider offshore wind proceeding. The Commission should require Dominion to solicit comments on a template of the cost and status reports from the Commission and stakeholders.

Q. Has the Company agreed to future reporting requirements?

A. Yes. The Company has stated that:

> If approved, the Company will provide project status and cost report updates in the annual rider filings in compliance with the administrative code requirements for the CVOW Commercial Project. Should the Commission require reports with a greater amount of information or at a greater frequency, the Company will comply with the Commission's ruling.[39]

The Company's response is very clear that, at the very least, it will provide project status and cost report updates as part of the Company's annual rider filing.

[38] Staff of the State Corporation Commission. Post Hearing Brief. Case No. PUR-2021-00146. January 19, 2022. Page 3.

[39] CV 3-1

The Company has also agreed to provide greater amounts of information or at greater frequency should the Commission require such information from the Company.[40]

Q. Are there examples of other Commissions requiring status reports?

A. Yes. For example, the Maryland Public Service Commission required quarterly reports from both offshore wind developers in its approval of the Momentum Wind and Skipjack 2.1 projects.[41] Specifically the Maryland PSC stated that:

> Quarterly milestone reporting will help ensure that the Applicants meet their regulatory requirement to diligently pursue and engage in a continuous development and construction program to achieve project COD. Therefore, in accordance with COMAR 20.61.06.16H, the Commission will require that the Applicants file with the Commission quarterly progress reports on the status of the proposed offshore wind projects' development, including but not limited to milestones for site assessment, engineering, permitting, turbine certification, financing, procurement, manufacturing, construction activities, testing, and commissioning commercial operation dates.[42]

The Commission should consider elements of the Maryland PSC's order regarding milestones for site assessment, engineering, permitting, turbine certification, financing, procurement, manufacturing, construction activities, testing, and commissioning commercial operation dates to be include in status reports for Dominion.

[40] Ibid.
[41] Maryland Public Service Commission. (2021) Page 127.
[42] Ibid.

Q. Do you have other recommendations for the Commission to consider regarding transparency and oversight of the $9.8 billion project?

A. Yes, the Commission could also consider requiring Dominion to hire an independent project monitor who would report to the Commission and designated parties.

Q. How would an independent monitor be different from the Company's status reports?

A. An independent monitor would be able to provide oversight during upcoming phases of the proposed project given the cost ($9.8 billion) and construction duration (four years) of the proposed project. While an independent monitor does not guarantee that there will not be project overruns or delays, the independent monitor may be able to provide timely information to the Commission to address possible issues at an earlier stage in the project process. The independent monitor would be present at project meetings and would be able to document issues related to the project throughout the duration of the project. An independent monitor could provide current and future members of the Commission with a continuous record of the project.

8. FUTURE TRANCHES

Q. Please provide your findings regarding future procurements for offshore wind.

A. While Dominion has not contracted for or issued RFPs for the second 2,600 MW of offshore wind as required under VCEA, Dominion has signaled to investors that the total capital costs for offshore wind could be up to $21 billion by 2035.[43]

[43] Dominion Energy. Q4 2021 Earnings Call. February 11, 2022. Slide 6. Available at https://s2.q4cdn.com/510812146/files/doc_financials/2021/q4/2022-02-11-DE-IR-4Q-2021-earnings-call-slides-vTCIII.pdf

In light of that potential cost, the Commission should require Dominion to consider other procurement options to ensure that offshore wind costs to ratepayers are minimized in the future.

Q. Did Dominion consider the 2,567 MW CVOW phase in the $21 billion?

A. Yes, Dominion's breakdown of the $21 billion included approximately $10 billion for the current 2,567 MW CVOW project.[44] I note that the approximately $10 billion in the Company's response to CV 4-1 is approximately $200 million higher than the $9.8 billion with hedging and contingencies provided by the Company in its application. The Company's response to CV 4-1 did not provide an explanation for the difference in projected costs. The Company also refused to provide the supporting workbooks for the $21 billion cost estimate shared in the Company's investor presentation.[45]

Q. Does Dominion's contracts with suppliers of the 2,647 MW CVOW project extend to the second 2,600 MW?

A. No. Dominion indicated that none of the awarded contracts extend to the second 2,600 MW phase, so there is no indication to the actual pricing for the second tranche of offshore wind.[46]

Q. Why is it a concern that Dominion has indicated that its offshore wind investments through 2035 may amount to $21 billion?

A. My concern is that Dominion is signaling the projected costs of future offshore wind investments to its investors without considering how efficiencies and maturation of the offshore wind industry will play out in the next few years when it is time to plan for the second tranche of offshore wind for the Commonwealth.

[44] CV 4-1.
[45] Ibid.
[46] See responses to CV 4-3, CV 4-4, CV 4-5, CV 4-6, CV 4-7, CV 4-8, and CV 4-9.

As such, I recommend that the Commission consider other procurement options for the second tranche of offshore wind to ensure that ratepayer impacts are minimized to meet the requirements of the VCEA.

9. CONCLUSIONS AND RECOMMENDATIONS

Q. Please summarize your findings and recommendations for the Commission.

A. My findings and recommendations are summarized below:

- If completed, the proposed 2,587 MW CVOW project will be one of the largest offshore wind farms in the United States.
- Outside of the CVOW pilot project of 12 MW, Dominion's project team appears to have limited direct offshore wind project experience that would demonstrate Dominion's ability to execute the completion of the offshore wind project on time and within budget.
- Under the VCEA, Dominion does not appear to be required to adhere to a specific cost cap for the proposed project if it is approved. I recommend that the Commission impose a capital cost cap for the project set at Dominion's application that excludes the $500 million for financial hedges and contingency. Should the project's capital costs increase beyond the $9.8 billion forecasted by Dominion, the Commission should set clear guidance that Dominion would be at risk for recovery of excess costs.

- Given the complexity and scale of the proposed project, and the Company's inexperience with offshore wind projects, the Commission should require Dominion to provide regular reports and meetings to update the progress of the project, including critical path items and cost overruns/underruns. As part of the regular project updates, the Commission should also require Dominion to hire an independent monitor to provide additional oversight to the project.

- The Commission should require Dominion to solicit comments on a template of the cost and status reports from the Commission and stakeholders.

- While Dominion has not contracted for or issued RFPs for the second 2,600 MW of offshore wind as required under VCEA, Dominion has signaled to investors that the total capital costs for offshore wind could be up to $21 billion by 2035. In light of that potential cost, the Commission should require Dominion to consider other procurement options to ensure that offshore wind costs to ratepayers are minimized in the future. By competitively bidding the development of the remaining 2,600 MW, ratepayers may be able to reap the benefits of competition with established offshore wind developers.

Q. Does this conclude your testimony?

A. Yes.

Maximilian Chang, Principal Associate

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mchang@synapse-energy.com

PROFESSIONAL EXPERIENCE

Synapse Energy Economics Inc., Cambridge, MA. *Principal Associate*, 2013 – present, *Associate*, 2008 – 2013.

Consults and provides analysis of technologies and policies, electric policy modeling, evaluation of air emissions of electricity generation, and other topics including energy efficiency, consumer advocacy, environmental compliance, and technology strategy within the energy industry. Conducts analysis in utility rate-cases focusing on reliability metrics and infrastructure issues and analyzes the benefits and costs of electric and natural gas energy efficiency measures and programs.

Environmental Health and Engineering, Newton, MA. *Senior Scientist*, 2001 – 2008.

Managed complex EPA-mandated abatement projects involving polychlorinated biphenyls (PCBs) in building-related materials. Provided green building assessment services for new and existing construction projects. Communicated and interpreted environmental data for clients and building occupants. Initiated and implemented web-based health and safety awareness training system used by laboratories and property management companies.

The Penobscot Group, Inc., Boston, MA. *Analyst*, 1994 – 2000.

Authored investment reports on Real Estate Investment Trusts (REITs) for buy-side research boutique. Advised institutional clients on REIT investment strategies and real estate asset exchanges for public equity transactions. Wrote and edited monthly publications of statistical and graphical comparison of coverage universe.

Harvard University Extension School, Cambridge, MA. *Teaching Assistant*, 1995 – 2002.

Teaching Assistant for Environmental Management I and Ocean Environments.

Brigham and Women's Hospital, Boston, MA. *Cancer Laboratory Technician*, 1992 – 1994.

Studied the biological mechanism of tumor eradication in mouse and human models. Organized and performed immunotherapy experiments for experimental cancer therapy. Analyzed and authored results in peer-reviewed scientific journals.

EDUCATION

Harvard University, Cambridge, MA
Master of Science in Environmental Science and Engineering, 2000

Cornell University, Ithaca, NY
Bachelor of Arts in Biology and Classics, 1992

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Maryland Public Service Commission (Docket No. 9629): Direct testimony on the applications of Skipjack Wind for a turbine design change pursuant to the compliance with conditions approved in 2017. On behalf of Maryland Office of People's Counsel. May 22, 2020.

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New Jersey Board of Public Utilities (Docket No. EO18070728): Direct testimony on Jersey Central Power and Light Company's petition for an Infrastructure Investment Program. On behalf of the New Jersey Division of Rate Counsel. December 17, 2018.

New Jersey Board of Public Utilities (Docket No. EO18020196): Direct testimony on Atlantic City Electric Company's petition for an Infrastructure Investment Program. On behalf of the New Jersey Division of Rate Counsel. September 4, 2018.

New Jersey Board of Public Utilities (Docket No. ER18010029 and GR18010030): Direct testimony on Public Service Electric and Gas' petition for base rate adjustments. On behalf of the New Jersey Division of Rate Counsel. August 6, 2018.

Illinois Commerce Commission (Docket No. 18-0211): Direct Testimony regarding Ameren Illinois Company's voltage optimization plan and the importance of prioritizing low-income communities. On behalf of the People of the State of Illinois, represented by the Office of the Illinois Attorney General. March 7, 2018.

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Kansas Corporation Commission (Docket No. 16-KCPE-593-ACQ): Direct testimony on clean energy and coal fleet retirement concerns related to the petition of Great Plains Energy Inc., Kansas City Power and

Light, and Westar Energy, Inc. for the acquisition of Westar by Great Plains Energy. On behalf of Sierra Club. December 16, 2016.

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Maryland Public Service Commission (Docket No. 9418): Direct testimony on Potomac Electric Power Company's application for a rate adjustment to recover smart grid costs. On behalf of Maryland Office of People's Counsel. July 6, 2016.

Illinois Commerce Commission (Docket No. 16-0259): Direct and rebuttal testimony on Commonwealth Edison Company's annual formula rate update and revenue requirement reconciliation on distribution and business intelligence investments. On behalf of the Office of Illinois Attorney General. June 29, 2016 and August 11, 2016.

Illinois Property Tax Appeal Board (Case Nos. 12-02297, 12-01248) Direct testimony on history of nuclear deregulation in Illinois and the impact of deregulation on Exelon nuclear units. On behalf of Byron Community School District. April 2016.

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United States District Court District of Maine (C.A. No. 1:11-cv-00038-GZS): Declaration regarding the ability of the New England electric grid to absorb the impact of a spring seasonal turbine shutdown at four hydroelectric facilities. On behalf of Friends of Merrymeeting Bay and Environment Maine. March 4, 2013.

State of Maine Public Utilities Commission (Docket 2012-00449): Testimony regarding the Request for Approval of Review of Second Triennial Plan Pertaining to Efficiency Maine Trust. On behalf of the Maine Efficiency Trust. January 8, 2013.

New Jersey Board of Public Utilities (Docket No. GO12050363): Testimony regarding the petition of South Jersey Gas Company for approval of the extension of energy efficiency programs and the associated cost recovery mechanism pursuant to N.J.S.A 48:3-98:1. On behalf of the New Jersey Division of Rate Counsel. November 9, 2012.

Resume updated March 2022

Virginia Electric and Power Company
Case No. PUR-2021-00142
Office of the Attorney General
Division of Consumer Counsel
Third Set

The following response to Question No. 44 of the Third Set of Interrogatories and Requests for Production of Documents propounded by the Office of the Attorney General, Division of Consumer Counsel received on February 8, 2022, has been prepared under my supervision.

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

As it pertains to legal matters, the following response to Question No. 44 of the Third Set of Interrogatories and Requests for Production of Documents propounded by the Office of the Attorney General, Division of Consumer Counsel received on February 8, 2022, has been prepared under my supervision.

Timothy D. Patterson
McGuireWoods LLP

Question No. 44

Please compare the construction cost of the CVOW Commercial Project to construction costs ($/kW nameplate) of other offshore wind projects currently operating in American waters.

Response:

The Company objects to the interrogatory as voluminous and overly burdensome. Additionally, the Company objects to the interrogatory because it would require original work in order to respond. The Company does not have responsive information beyond what is publicly available and equally ascertainable by Consumer Counsel. Subject to and notwithstanding these objections, the Company provides the following response.

For a comparison of the CVOW Commercial Project to the construction costs ($/kW) of the CVOW Pilot project please refer to the table below:

	Nominal Capacity (MW)	**Project Cost** *(000's)*	**$/kW**
CVOW Pilot	12	$ 294,550	24,546
CVOW Commercial	2,587	$ 9,800,000	3,788

Virginia Electric and Power Company
Case No. PUR-2021-00142
Clean Virginia
Second Set

The following response to Question No. 1 of the Fourth Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 4, 2022, has been prepared under my supervision.

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

Question No. 2-1

Please refer to the Application at page 6, paragraph 6 regarding the 12 MW Coastal Virginia Offshore Wind Demonstration project and the "invaluable experience" gained from the Demonstration project. Please provide the following information:

a) The number of turbines and size of the turbines in MW,
b) Turbine hub height, and
c) Distance of turbines in statutory miles offshore.

Response:

(a) The CVOW Demonstration Project ("Pilot Project") includes two 6 MW wind turbines.
(b) Hub Height of the wind turbines is 356 feet above mean sea level.
(c) The distance offshore is approximately 27 statute miles.

Virginia Electric and Power Company
Case No. PUR-2021-00142
Clean Virginia
Second Set

The following response to Question No. 4 of the Fourth Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 4, 2022, has been prepared under my supervision.

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

Question No. 2-4

Please refer to the Application at page 6, paragraph 6 regarding the 12 MW Coastal Virginia Offshore Wind Demonstration project and the "invaluable experience" gained from the Demonstration project. Please provide the following information:

a) Amount of effort (dollars and time) budgeted for onshore substation interconnection,
b) Actual effort (dollars and time) required for onshore substation interconnection, and
c) A description of the Company's experience with the installation of the offshore substation for the Demonstration project.

Response:

(a) See the Company's response to CV Set 02-03(b).
(b) See the Company's response to CV Set 02-03(b).
(c) Not applicable. See the Company's response to CV Set 02-02(a).

Virginia Electric and Power Company
Case No. PUR-2021-00142
Clean Virginia
Second Set

The following response to Question No. 7 of the Fourth Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 4, 2022, has been prepared under my supervision.

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

Question No. 2-7

Please refer to the Application at page 6, paragraph 6 regarding the 12 MW Coastal Virginia Offshore Wind Demonstration project and the "invaluable experience" gained from the Demonstration project. Please provide the following information:

a) Amount of effort (dollars and time) budgeted for transmission interconnection upgrades,
b) Actual effort (dollars and time) required for transmission interconnection upgrades, and
c) A description of the Company's experience with the need for transmission interconnection upgrades for the Demonstration project.

Response:

(a)-(c) The size of the Pilot Project allowed the Company to electronically interconnect at 34.5 kV (*i.e.*, distribution level), thereby alleviating the need for a transmission level interconnection. No transmission lines or facilities were removed, replaced, or taken out of service for the interconnection of the Pilot Project.

Virginia Electric and Power Company
Case No. PUR-2021-00142
Clean Virginia
Second Set

The following response to Question No. 2-10 of the Second Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 4, 2022, has been prepared under my supervision.

Thomas A. Dorsey
Contractor – Substation Engineering, Electric Transmission
Burns and McDonnell

Question No. 2-10

Please refer to the Application at page 7, paragraph 7. Please provide the following information:
a) Size of onshore substation,
b) Amount of effort (dollars and time) budgeted for the onshore substation interconnection, and
c) A description of the Company's anticipated process for the installation of the onshore substation for the proposed CVOW project.

Response:

(a) Harpers Switching Station's total fenced footprint will be approximately 21 acres. Fentress Substation's fenced area will expand from approximately 12 acres to 21 acres.

(b) As noted in Section I.I of the Transmission Appendix, the estimated cost of onshore station facilities is $374.2 million. As noted in Section I.H of the Transmission Appendix, the estimated time for detailed engineering, materials procurements, permitting, and construction of the onshore station facilities is approximately 39 months.

(c) The anticipated installation process for Harpers Switching Station and expansion of Fentress Substation will require several stages over a multi-year period. Initial stages will consist of site permitting and site preparation activities, including site grading and stormwater management. Following site preparation will be the installation of electrical equipment, including foundations, on-site buildings, and fencing. Final stages will consist of interconnection with underground and overhead transmission facilities, outage coordination, and final testing and commissioning of equipment.

Virginia Electric and Power Company
Case No. PUR-2021-00142
Clean Virginia
Third Set

The following response to Question No. 2 of the Third Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 9, 2022, has been prepared under my supervision.

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

Question No. 2

Please refer to the Direct Testimony of Mr. Mark Mitchell and the Application at page 6, paragraph 6 regarding the 12 MW Coastal Virginia Offshore Wind Demonstration project and the "invaluable experience" gained from the Demonstration project. Please provide the following information:
a) A description of Mr. Mitchell's role and involvement in the planning of the Demonstration project.
b) A description of Mr. Mitchell's role and involvement in the implementation of the Demonstration project.
c) A description of Mr. Mitchell's role and involvement in the current operation of the Demonstration project.
d) A description and estimate of the percent of time Mr. Mitchell plans to devote to the proposed Coastal Virginia Offshore Wind project.
e) A description of Mr. Mitchell's experience with the development and operation of offshore wind projects excluding the Demonstration project. Please identify the project(s).

Response:

(a) Mr. Mitchell was responsible for the development, contracting, construction, and now ongoing operations of the 12 MW Coastal Virginia Offshore Wind Demonstration project ("CVOW Pilot Project") first in his role as Vice President of Generation Construction, then beginning in September 2020, in his role as Senior Vice President of Project Construction. As of September 2020, Company Witness Joshua Bennett began reporting to Mr. Mitchell in his role as Vice President of Offshore Wind. Mr. Mitchell was the executive witness for Virginia Electric and Power Company in 2018 for Case No. PUR-2018-00121, in which the CVOW Pilot Project was approved by the Commission.
(b) See the Company's response to CV Set 03-02(a).
(c) See the Company's response to CV Set 03-02(a).
(d) Mr. Mitchell currently oversees numerous construction programs across Dominion Energy Virginia, as well as the group which includes offshore wind operations. Recently, Mr. Mitchell has devoted approximately one third to one half of his time specifically on the

CVOW Commercial Project, but this time can vary significantly depending on project needs.

(e) Mr. Mitchell has extensive experience in the development, engineering, procurement, and construction for major projects using various technologies across the Company starting in 2000 and continuing to the present. Mr. Mitchell was appointed by the Governor to the Virginia Offshore Wind Development Authority (VOWDA) board in 2018. In addition, he is a board member of the American Clean Power Association ("ACP") where he serves on the executive committee, as well as being on the offshore wind council within ACP. He also serves on the Board of the Business Network for Offshore Wind. Mr. Mitchell has managed several onshore wind development projects including Mount Storm Wind and Fowler Ridge Wind.

Virginia Electric and Power Company
Case No. PUR-2021-00142
Clean Virginia
Third Set

The following response to Question No. 3 of the Third Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 9, 2022, has been prepared under my supervision.

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

Question No. 3

Please refer to the Direct Testimony of Mr. Joshua Bennett and the Application at page 6, paragraph 6 regarding the 12 MW Coastal Virginia Offshore Wind Demonstration project and the "invaluable experience" gained from the Demonstration project. Please provide the following information:
a) A description of Mr. Bennett's role and involvement in the planning of the Demonstration project.
b) A description of Mr. Bennett's role and involvement in the implementation of the Demonstration project.
c) A description of Mr. Bennett's role and involvement in the current operation of the Demonstration project.
d) A description and estimate of the percent of time Mr. Bennett plans to devote to the proposed Coastal Virginia Offshore Wind project.
e) A description of Mr. Bennett's experience with the planning and integration of offshore wind projects excluding the Demonstration project. Please identify the project(s).

Response:

(a) In Mr. Bennett's previous role as Vice President of Technical Services under the Power Generation organization, he was responsible for several departments including Renewable Energy Production, which included solar and wind facilities owned by Dominion Energy Virginia. This responsibility required preparation for the operations and maintenance of the CVOW Pilot Project turbines after completion of construction and commissioning. Prior to the turbines being installed, Mr. Bennett was responsible for completing the contract negotiation with Siemens Gamesa Renewable Energy for the Long-Term Service Agreement for the Pilot turbines, building the O&M organization and task requirements, as well as establishing the operational processes of dispatch of the pilot turbines from the Dominion Market Operations Center (interface to PJM).
(b) Mr. Bennett transitioned from Vice President of Technical Services to Vice President of Offshore Wind, effective September 1, 2020, which was also an organizational change for the Company that moved the future Pilot turbine operations under a single

organization, Project Construction. Thus, Mr. Bennett became responsible for the team overseeing the completion of the installation, commissioning, and turnover to operations.

(c) Mr. Bennett has responsibility for the asset management and production output of the Pilot turbines.

(d) Mr. Bennett's responsibility as VP of Offshore Wind is a full-time commitment to Dominion Energy Virginia's offshore wind program, including development of the CVOW Commercial Project and the ongoing operations of the CVOW Pilot turbines.

(e) Mr. Bennett has previous experience as a Dominion Energy Virginia management committee representative over jointly owned onshore wind projects "Mount Storm Wind" and "Fowler Ridge." This experience was useful in providing insight to similar technologies and production management techniques used in offshore wind.

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Third Set

The following response to Question No. 16 of the Third Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 9, 2022, has been prepared under my supervision.

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

Question No. 16

Please refer to the Direct Testimony of Mr. Mark Mitchell at page 18, lines 6 through 11. Please describe the roles of both Ramboll and Merkur Offshore. Please explain in detail how Dominion will ensure that there be minimal overlapping and/or conflicting roles and responsibilities between the two consulting entities.

Response:

See the Company's response to AG Set 03-48.

The Company has engaged Ramboll as the owner's engineer for design and technical support of equipment scope packages. The Company has engaged Merkur Offshore, which has developed and operated multiple wind farms, as a strategic consultant. Merkur provides advice on market conditions, contract structure, risk mitigation, and operation of wind farms. The Company holds periodic coordination meetings with Ramboll and Merkur to ensure that scopes are defined and are not overlapping.

Virginia Electric and Power Company
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Clean Virginia
Second Set

The following response to Question No. 16 of the Fourth Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 4, 2022, has been prepared under my supervision.

Timothy D. Patterson
McGuireWoods LLP

Question No. 2-16

Please refer to the Application at page 10, paragraph 13. Please indicate if the VCEA allows for the actual levelized cost of energy (LCOE) of the project to increase up to the $125/MWh (2018$) cap. If so, please explain and provide supporting documentation for the basis of the Company's conclusion.

Response:

The Company objects to this interrogatory as it calls for a legal conclusion.

Virginia Electric and Power Company
Case No. PUR-2021-00142
Clean Virginia
Second Set

With respect to legal issues, the following response to Question No. 17 of the Fourth Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 4, 2022, has been prepared under my supervision.

Timothy D. Patterson
McGuireWoods LLP

Question No. 2-17

Please refer to the Application at page 10, paragraph 13. Please indicate if the Company's proposed $73/MWh (2018$) LCOE is a cost cap for the proposed project. If not, please explain why not.

Response:

The Company objects to this interrogatory as it calls for a legal conclusion.

Virginia Electric and Power Company
Case No. PUR-2021-00142
Clean Virginia
Third Set

The following response to Question No. 1 of the Third Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 9, 2022, has been prepared under my supervision.

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

Question No. 1

Please refer to the Direct Testimony of Mr. Mark Mitchell at page 6, line 18, please indicate if the Company will commit to provide the Commission with regular project progress reports and spending reports for the Commission's review if the Commission were to approve the Company's petition. If so, please indicate the frequency that Dominion would provide such progress reports. If not, please explain why not.

Response:

If approved, the Company will provide project status and cost report updates in the annual rider filings in compliance with the administrative code requirements for the CVOW Commercial Project. Should the Commission require reports with a greater amount of information or at a greater frequency, the Company will comply with the Commission's ruling.

Virginia Electric and Power Company
Case No. PUR-2021-00142
Clean Virginia
Fourth Set

The following response to Question No. 1 of the Fourth Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 14, 2022, has been prepared under my supervision.

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

As it pertains to legal matters, the following response to Question No. 1 of the Fourth Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 14, 2022, has been prepared under my supervision.

Timothy D. Patterson
McGuireWoods LLP

Question No. 1

Please refer to the Direct Testimony of Mr. Mark Mitchell at page 7, line 15 and Slide 6 of the Dominion 4th Quarter Earnings Presentation dated February 11, 2022. Please provide the following information.

a) Please indicate if the $21 billion includes the $9.8 billion for the proposed CVOW project. If not, please provide the proposed CVOW amount from this proceeding that is included in the $21 billion.

b) The breakdown of projected costs by offshore wind project phases for the upwards of $21 billion for offshore wind investments through 2035.

c) Please indicate if the Company conducted or commissioned an analysis to determine the upwards of $21 billion in offshore wind investments. If so, please provide a copy of the analysis. If not, please explain why not.

d) Please provide the supporting workbook used to create Slide 6.

Response:

The Company objects to this request as vague to the extent it seeks information regarding "page 7, line 15" of Company Witness Mark Mitchell's Pre-file Direct Testimony, which states only "aforementioned further development" and is not relevant to the requests. Notwithstanding and subject to the foregoing objection, the Company provides the following response as it pertains to Slide 6 of the Dominion 4th Quarter Earnings Presentation dated February 11, 2022 ("Earnings Presentation").

(a) Yes.

(b) The Company further objects to subpart (b) of this request as not relevant or reasonably calculated to lead to the production of admissible evidence in this proceeding to the extent it seeks a "breakdown of projected costs by offshore wind project phases for the upwards of $21 billion for offshore wind investments through 2035" referenced in the Earnings Presentation, which was not used to develop the application in this proceeding. Notwithstanding and subject to the foregoing objections, the Company provides the following response.

As shown in Slide 48 of the Earnings Presentation, approximately $10 billion in offshore wind investment is anticipated between 2022 and 2026. The remaining offshore wind investment is anticipated between 2027 and 2035.

(c) The Company further objects to subpart (c) of this request as not relevant or reasonably calculated to lead to the production of admissible evidence in this proceeding to the extent it seeks information regarding "analysis" underlying the Earnings Presentation, which was not used to develop the application in this proceeding. The Company additionally objects to this request to the extent it seeks information that may be protected by the attorney-client privilege, work product doctrine, or other recognized protection.

(d) The Company further objects to subpart (d) of this request as not relevant or reasonably calculated to lead to the production of admissible evidence in this proceeding to the extent it seeks information regarding "supporting workbook used to create Slide 6" of the Earnings Presentation, which was not used to develop the application in this proceeding.

Virginia Electric and Power Company
Case No. PUR-2021-00142
Clean Virginia
Fourth Set

The following response to Question No. 3 of the Fourth Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 14, 2022, has been prepared under my supervision.

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

Question No. 3

Please refer to the Direct Testimony of Mr. Mark Mitchell at Table 3 starting on page 20 and Slide 6 of the Dominion 4th Quarter Earnings Presentation dated February 11, 2022. Please provide the following information.

a) Please indicate if Dominion's award to Siemens for the Turbine Generator and Tower Supply, Installation, and Commissioning extends to include more than the 176 turbines of the proposed CVOW project. If so, please explain.

b) Please indicate if the awarded scope of work would allow for the installation of additional turbines. If so, please explain. If not, please explain why not.

c) Please indicate if Dominion has issued a competitive RFP for the Turbine Generator and Tower Supply, Installation, and Commissioning component work for the approximately 2,600 MW of offshore wind anticipated to be installed after the installation of 2,587 MW in this phase and before Jan 1, 2035. If so, please provide a copy of the RFP.

Response:

a) No. The referenced Siemens Gamesa Renewable Energy ("SGRE") contract only includes 176 wind turbine generators.

b) No. The awarded scope to SGRE does not contemplate additional turbines beyond 176. As discussed in Section I.A of the Generation Appendix, inside the Lease Area, WTGs will be arranged in a grid pattern with each WTG spaced approximately 0.75 NM in an east-west direction and 0.93 NM in a north-south direction. The grid pattern inside the Lease Area contains 205 positions for WTG installation. Three grid positions will be utilized for Offshore Substations. The 26 spare positions will be available for WTG installation if seabed conditions in other grid positions are not recommended for construction. See also Attachment IV.A.5 of the Generation Appendix (TSA RFI Summary Report—Extraordinarily Sensitive).

c) The Company has not issued an additional RFP at this time.

Virginia Electric and Power Company
Case No. PUR-2021-00142
Clean Virginia
Fourth Set

The following response to Question No. 4 of the Fourth Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 14, 2022, has been prepared under my supervision.

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

Question No. 4

Please refer to the Direct Testimony of Mr. Mark Mitchell at Table 3 starting on page 20 and Slide 6 of the Dominion 4th Quarter Earnings Presentation dated February 11, 2022. Please provide the following information.

a) Please indicate if Dominion's award to DEME Offshore US, LLC and Prysmian Cables and Systems USA, LLC for the Balance of Plant Engineering, Procurement, Transportation, and Installation of Services extends to include more than the 2,587 MW of offshore wind for the proposed CVOW project. If so, please explain.

b) Please indicate if the awarded scope of work would allow for the installation of additional turbines beyond the currently proposed 2,587 MW. If so, please explain. If not, please explain why not.

c) Please indicate if Dominion has issued a competitive RFP for the Balance of Plant Engineering, Procurement, Transportation, and Installation of Services component work for the approximately 2,600 MW of offshore wind anticipated to be installed after the installation of 2,587 MW in this phase and before Jan 1, 2035. If so, please provide a copy of the RFP.

Response:

a) No. The contract with DEME Offshore and Prysmian does not contemplate additional scope.

b) No. The awarded scope, which includes 176 14.7 MW WTGs, does not contemplate additional infrastructure. See the Company's response to CV Set 04-03(b).

c) The Company has not issued an additional RFP at this time.

Virginia Electric and Power Company
Case No. PUR-2021-00142
Clean Virginia
Fourth Set

The following response to Question No. 5 of the Fourth Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 14, 2022, has been prepared under my supervision.

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

Question No. 5

Please refer to the Direct Testimony of Mr. Mark Mitchell at Table 3 starting on page 20 and Slide 6 of the Dominion 4th Quarter Earnings Presentation dated February 11, 2022. Please provide the following information.

a) Please indicate if Dominion's award to Bladt Industries Virginia Offshore Wind, LLC and SEMCO Maritime Renewable II, LLC for the Offshore Substation Design and Supply extends to include more than the 2,587 MW of offshore wind for the proposed CVOW project. If so, please explain.

b) Please indicate if the awarded scope of work would allow for the installation of additional turbines beyond the currently proposed 2,587 MW. If so, please explain. If not, please explain why not.

c) Please indicate if Dominion has issued a competitive RFP for the Offshore Substation Design and Supply work for the approximately 2,600 MW of offshore wind anticipated to be installed after the installation of 2,587 MW in this phase and before Jan 1, 2035. If so, please provide a copy of the RFP.

Response:

a) No. The contracts with Bladt Industries and SEMCO do not contemplate additional scope.

b) No. The awarded scope of work for the offshore substations does not contemplate additional infrastructure beyond 176 14.7 MW WTGs. See the Company's response to CV Set 04-03(b). See also Attachment IV.A.2 of the Generation Appendix (Offshore Substations RFP Summary Report).

c) The Company has not issued an additional RFP at this time.

Virginia Electric and Power Company
Case No. PUR-2021-00142
Clean Virginia
Fourth Set

The following response to Question No. 6 of the Fourth Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 14, 2022, has been prepared under my supervision.

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

Question No. 6

Please refer to the Direct Testimony of Mr. Mark Mitchell at Table 3 starting on page 20 and Slide 6 of the Dominion 4th Quarter Earnings Presentation dated February 11, 2022. Please provide the following information.

a) Please indicate if Dominion's award to EEW Special Pipe Constructions GmbH for the Foundation (monopiles) work extends to include more than the 2,587 MW of offshore wind for the proposed CVOW project. If so, please explain.

b) Please indicate if the awarded scope of work would allow for the installation of additional turbines beyond the currently proposed 2,587 MW. If so, please explain. If not, please explain why not.

c) Please indicate if Dominion has issued a competitive RFP for the Foundation (monopiles) work for the approximately 2,600 MW of offshore wind anticipated to be installed after the installation of 2,587 MW in this phase and before Jan 1, 2035. If so, please provide a copy of the RFP.

Response:

a) No. The contract with EEW does not contemplate additional scope.

b) No. The awarded scope of work for the monopile foundations does not contemplate additional infrastructure beyond 176 14.7 MW WTGs. See the Company's response to CV Set 04-03(b). See also Attachment IV.A.6 of the Generation Appendix (Monopiles RFP Summary Report).

c) The Company has not issued an additional RFP at this time.

Virginia Electric and Power Company
Case No. PUR-2021-00142
Clean Virginia
Fourth Set

The following response to Question No. 7 of the Fourth Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 14, 2022, has been prepared under my supervision.

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

Question No. 7

Please refer to the Direct Testimony of Mr. Mark Mitchell at Table 3 starting on page 20 and Slide 6 of the Dominion 4th Quarter Earnings Presentation dated February 11, 2022. Please provide the following information.

a) Please indicate if Dominion's award to Bladt for the Foundation (transition pieces) work extends to include more than the 2,587 MW of offshore wind for the proposed CVOW project. If so, please explain.

b) Please indicate if the awarded scope of work would allow for the installation of additional turbines beyond the currently proposed 2,587 MW. If so, please explain. If not, please explain why not.

c) Please indicate if Dominion has issued a competitive RFP for the Foundation (transition pieces) work for the approximately 2,600 MW of offshore wind anticipated to be installed after the installation of 2,587 MW in this phase and before Jan 1, 2035. If so, please provide a copy of the RFP.

Response:

a) No. The contract with Bladt does not contemplate additional scope.

b) No. The awarded scope for transition pieces does not contemplate additional infrastructure beyond 176 14.7 MW WTGs. See the Company's response to CV Set 04-03(b). See also Attachment IV.A.1 of the Generation Appendix (Transition Pieces RFP Summary Report).

c) The Company has not issued an additional RFP at this time.

Virginia Electric and Power Company
Case No. PUR-2021-00142
Clean Virginia
Fourth Set

The following response to Question No. 8 of the Fourth Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 14, 2022, has been prepared under my supervision.

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

Question No. 8

Please refer to the Direct Testimony of Mr. Mark Mitchell at Table 3 starting on page 20 and Slide 6 of the Dominion 4th Quarter Earnings Presentation dated February 11, 2022. Please provide the following information.

a) Please indicate if Dominion's award for the Onshore Export Cables and Installation/ Direct Pipe from Punchout to Cable Landing and HDD/ Trench Underground to Harpers work extends to include more than the 2,587 MW of offshore wind for the proposed CVOW project. If so, please explain.

b) Please indicate if the awarded scope of work would allow for the installation of additional turbines beyond the currently proposed 2,587 MW. If so, please explain. If not, please explain why not.

c) Please indicate if Dominion has issued a competitive RFP for the Onshore Export Cables and Installation/ Direct Pipe from Punchout to Cable Landing and HDD/ Trench Underground to Harpers work for the approximately 2,600 MW of offshore wind anticipated to be installed after the installation of 2,587 MW in this phase and before Jan 1, 2035. If so, please provide a copy of the RFP.

Response:

a) No. The award for the Onshore Export Cables and Installation/ Direct Pipe from Punchout to Cable Landing and HDD/ Trench Underground to Harpers work does not extend to include more than the 2,587 MW of offshore wind for the proposed CVOW project.

b) The awarded scope for the onshore underground transmission cables does not contemplate additional infrastructure beyond 176 14.7 MW WTGs. See the Company's response to CV Set 04-03(b). See also Attachment IV.A.4 of the Generation Appendix (Underground Transmission RFP Summary Report).

c) The Company has not issued an additional RFP at this time.

Virginia Electric and Power Company
Case No. PUR-2021-00142
Clean Virginia
Fourth Set

The following response to Question No. 9 of the Fourth Set of Interrogatories and Requests for Production of Documents propounded by Clean Virginia received on February 14, 2022, has been prepared under my supervision.

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

Question No. 9

Please refer to the Direct Testimony of Mr. Mark Mitchell at Table 3 starting on page 20 and Slide 6 of the Dominion 4th Quarter Earnings Presentation dated February 11, 2022. Please provide the following information.

a) Please indicate Dominion's awards for miscellaneous contract work extends to include more than the 2,587 MW of offshore wind for the proposed CVOW project. If so, please explain.

b) Please indicate if the awarded scopes of work would allow for the installation of additional turbines beyond the currently proposed 2,587 MW. If so, please explain. If not, please explain why not.

c) Please indicate if Dominion has issued a competitive RFP for miscellaneous contract work for the approximately 2,600 MW of offshore wind anticipated to be installed after the installation of 2,587 MW in this phase and before Jan 1, 2035. If so, please provide a copy of the RFPs.

Response:

a) No. The awards for miscellaneous contract work do not contemplate additional scope.

b) The awarded scope for miscellaneous contract work does not contemplate additional infrastructure beyond 176 14.7 MW WTGs. See the Company's response to CV Set 04-03(b). See also Attachment IV.A.7 of the Generation Appendix (Engineering Services, Geotechnical and Geophysical Studies, Certified Verification Agent, Inter-Array Cable & Switchgear, and Localization Agreement for Blade Finishing Facility Contracts RFP Summary Report).

c) The Company has not issued an additional RFP at this time.

AG 3-48 Attachment 2
Extraordinarily Sensitive

Staff 6-69
Extraordinarily Sensitive