COMMONWEALTH OF VIRGINIA

STATE CORPORATION COMMISSION

Reports to the Governor of the Commonwealth of Virginia,
the Chair of the Senate Committee on Commerce and Labor,
the Chair of the House Committee on Labor and Commerce,
the Joint Commission on Technology and Science, and the
Commission on Electric Utility Regulation
of the Virginia General Assembly

COMBINED REPORTS

INCLUDING:

Annual Report on Grid Modernization, Reliability,
and Integration of Renewables
Pursuant to Chapter 296 of the 2018 Virginia Acts of Assembly

Annual Report on the Transmission Line Undergrounding Pilot
Pursuant to Chapter 296 of the 2018 Virginia Acts of Assembly

Annual Report on Construction of new Solar and Wind Projects
Pursuant to Chapter 296 of the 2018 Virginia Acts of Assembly

Annual Report on Solar Demonstration Programs
Pursuant to Chapter 771 of the 2011 Virginia Acts of Assembly

Annual Report on Energy Efficiency Programs
Pursuant to Chapter 1193 of the 2020 Virginia Acts of Assembly

December 1, 2020

MARK C. CHRISTIE
COMMISSIONER

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COMMONWEALTH OF VIRGINIA

STATE CORPORATION COMMISSION

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December 1, 2020

TO: The Honorable Ralph S. Northam
Governor, Commonwealth of Virginia

The Honorable Richard L. Saslaw
Chair, Senate Committee on Commerce and Labor

The Honorable Jeion A. Ward
Chair, House Committee on Labor and Commerce

Members of the Commission on Electric Utility Regulation

Members of the Joint Commission on Technology and Science

Ladies and Gentlemen:

Pursuant to Chapter 296 of the 2018 Virginia Acts of Assembly, please find enclosed the Combined Report of the State Corporation Commission, which includes the following:

- The Annual Report on Grid Modernization, Reliability and Integration of Renewables;
- The Annual Report on the Transmission Line Undergrounding Pilot; and
- The Annual Report on Construction of new Solar and Wind Projects.

The Combined Report also includes the Annual Report on Solar Demonstration Programs pursuant to Chapter 771 of the 2011 Virginia Acts of Assembly and the Annual Report on Energy Efficiency Programs pursuant to Chapter 1193 of the 2020 Virginia Acts of Assembly.[1]

[1] The Biennial Report on the Third-Party PPA Pilot Program pursuant to Chapter 382 of the 2013 Virginia Acts of Assembly and Chapter 803 of the 2017 Virginia Acts of Assembly will be provided again in next year's Combined Report.

Please let us know if we may be of further assistance.

Respectfully submitted,

Mark C. Christie
Chairman

Judith Williams Jagdmann
Commissioner

Jehmal T. Hudson
Commissioner

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EXECUTIVE SUMMARY

This document contains the combined reports ("Report") of the Virginia State Corporation Commission ("Commission") pursuant to five provisions of law. The Commission has reviewed§ and investigated each of these areas or topics listed below, and reports as follows:

Grid Modernization, Reliability, and Integration of Renewables (2018 Acts of Assembly Chapter 296):

Concerning reliability, Virginia electric utilities participate in regional transmission planning through PJM Interconnection, L.L.C. ("PJM"), the entity that manages the electric grid primarily at transmission-level voltages. At the distribution level, the Commission monitors reliability in part through utility reports on measures related to tree-trimming and indices that measure frequency and duration of electricity service outages.

Utility-owned and third-party owned renewable generation resources are being added to the electric distribution grid. Before connecting utility-scale resources to the electric grid, owners must coordinate with the affected local utility and with PJM. Typically, the projects are also subject to Commission approval. During 2020, the Commission completed a revision to its regulations governing the interconnection of small electrical generators and energy storage resources to the electric grid.

Concerning grid security and hardening activities, the Commission has previously given approval for Dominion Energy Virginia ("DEV" or "Dominion") to implement physical security controls at ten substations, and that activity is still ongoing.[2] The Commission has also approved three major components of DEV's proposal to harden parts of the distribution grid, primarily addressing the worst performing distribution feeders, and remote customer locations that face extended outages upon failure of critical substation equipment that lack redundancy.

Both DEV and Appalachian Power Company ("APCo") are expected to have sufficient capacity to meet peak energy demands in the near term, either through company-owned generation or market purchases. Both companies also continue to invest in generation, transmission, and distribution of electricity. During 2019, such annual investments were:

Company	Generation	Transmission	Distribution
Dominion Energy Virginia	$718.0M	$838.0M	$324.0M
Appalachian Power Company	$54.1M	$266.4M	$212.3M

Transmission Line Undergrounding Pilot (2018 Acts of Assembly Chapter 296):

Dominion's Haymarket Project, specifically the I-66 Hybrid Route, was the first of up to two projects that may be approved under this Pilot. DEV reports this project is in the construction

[2] The ten substations that received Commission approval for enhanced physical security measures were substations requested by Dominion; the Commission did not select those substations.

phase, with estimated completion by March 2022, compared to the original completion date of July 2021. On September 29, 2020, Dominion filed an application for a certificate of public convenience and necessity ("CPCN") for a second transmission line project under this Pilot. The application is for a "Partial Line #2010 230 kV Single Circuit Transmission Line Underground Pilot Project (Tysons-Future Spring Hill Substation)." It is proposed to be constructed in Fairfax County, with a cost of approximately $30.4 million, and a projected in-service date of December 31, 2025.

Construction of New Solar and Wind Projects (2018 Acts of Assembly Chapter 296):

Since July 1, 2018, Virginia utilities have placed in operation a total of 214 MW of solar facilities. Dominion also has approximately 821 MW of solar generation and 2,600 MW of off-shore wind generation under development, as well as a 12 MW off-shore wind pilot. APCo currently has 105 MW of solar under development. Third-parties also are developing approximately 1,524 MW of solar facilities. Chapter 296 declares 5,000 MW of new solar and wind facilities to be in the public interest.

Solar Demonstration Programs (2011 Acts of Assembly Chapter 771):

Dominion's Solar Purchase Program featured a tariff designed to facilitate customer-owned distributed solar generation. As part of the Solar Partnership Program, qualifying commercial, industrial, high school, and university customers representing nine solar projects were constructed and continue to be operational, with a total capacity of 6.4 MW. Total capital expenditures to date are approximately $25 million of the $80 million program cap.

Energy Efficiency Programs (2020 Acts of Assembly Chapter 1193):

No utility has yet submitted plans on how they intend to meet the energy efficiency goals of the Virginia Clean Economy Act ("VCEA" or "Chapter 1193"), as passed by the 2020 Virginia General Assembly ("General Assembly"). It is expected that the VCEA goals will be addressed in DEV's and APCo's upcoming demand side management ("DSM") cases expected to be filed in December 2020. While no new energy efficiency programs have been approved pursuant to this new law, the Commission has previously approved numerous programs. This includes 60 energy efficiency programs and 9 peak shaving programs between DEV and APCo. The cumulative total Commission approved cost cap for spending on all associated programs for both utilities is approximately $1.03 billion. Notably, on August 28, 2020, the Commission established a proceeding to address Dominion's methodologies for conducting evaluation, measurement and verification of energy savings of approved energy efficiency measures.

INTRODUCTION

COVID-19

Like other government agencies in the Commonwealth, the Commission has been impacted by the coronavirus national health emergency. The Commission has continued operations with changes to operating procedures to protect the public and Commission employees, including increased employee teleworking and increased use of electronic filings and electronic hearings in Commission proceedings.

To ensure continued operations of critical services to residential, business, and government customers during the health emergency, the Commission certified providers in the electric, gas, telecommunications, water, and sewer industries in Virginia as critical infrastructure industry workers.[3] This designation allows utility service providers and their workers to receive priority status to obtain resources necessary to continue uninterrupted delivery of vital services to Virginians.

The Commission has responded to this economic emergency by, among other actions, suspending for approximately six months customer disconnections from utility service and directing Virginia utilities to offer extended payment plans, without late fees for those who are current on such plans, to protect customers from service disconnection. The Commission stands ready to effectuate any legislation passed by the General Assembly in this regard.

Statutory Background

This document contains the Report of the Commission pursuant to the referenced provision(s):

- Grid Modernization, Reliability, and Integration of Renewables: Enactment Clause 19 of the GTSA directs the Commission to submit annual reports by December 1 of each year assessing: (i) the reliability of electrical transmission or distribution systems; (ii) the integration of utility or customer owned renewable electric generation resources with the utility's electric distribution grid; (iii) the level of investment in generation, transmission, or distribution of electricity; (iv) the need for additional generation of electricity during times of peak demand; and (v) distribution system hardening projects and enhanced physical security measures;

[3] *Commonwealth of Virginia, ex rel. State Corporation Commission, Ex Parte: Certification of Critical Infrastructure Industry Workers*, Case No. PUR-2020-00052, Doc. Con. Cen. No. 200330095, Order Certifying Critical Infrastructure Workers (Mar. 23, 2020) and Doc. Con. Cen. No. 200330125, Order Certifying Additional Critical Infrastructure Workers (Mar. 24, 2020).

- Transmission Line Undergrounding Pilot: Enactment Clause 2 of the GTSA directs the Commission to submit annual reports by December 1 of each year assessing the progress of the underground pilot program for electrical transmission lines of 230 kilovolts ("kV") or less;

- Construction of new Solar and Wind Projects: Enactment Clause 14 of the GTSA, as amended by 2020 Virginia Acts of Assembly Chapter 1190, directs the Commission to submit annual reports by December 1 of each year assessing: (i) the aggregate annual new construction and development of new utility-owned and utility-operated generating facilities utilizing energy derived from sunlight; (ii) the integration of utility-owned renewable electric generation resources with the utility's electric distribution grid; (iii) the aggregate additional utility-owned and utility-operated generating facilities utilizing energy derived from sunlight placed in operation since July 1, 2018; (iv) the need for additional generation of electricity utilizing energy derived from sunlight in order to meet the objective of the General Assembly on or before July 1, 2028; and (v) the aggregate annual new construction or purchase of energy storage facilities.

- Solar Demonstration Programs: 2011 Virginia Acts of Assembly Chapter 771 directs the Commission to submit annual reports on any demonstration programs approved pursuant to that act; and,

- Energy Efficiency Programs: The VCEA directs the Commission to annually monitor and report to the General Assembly on the performance of all programs approved pursuant to § 56-585.1 A 5 c of the Code of Virginia ("Code"), including: each utility's compliance with the total annual savings required by Code § 56-596.2; the annual and lifecycle net and gross energy and capacity savings, related emissions reductions, and other quantifiable benefits of each program; total customer bill savings that the programs produce; utility spending on each program, including any associated administrative costs; and each utility's avoided costs and cost-effectiveness results.

Background of the Grid Transformation and Security Act

In 2018, the General Assembly passed the GTSA, which, among other things: (i) provided for triennial reviews of base rate earnings for APCo beginning in 2020 and for Dominion beginning in 2021; (ii) provided for Dominion and APCo to file, at their discretion and not more than once annually, for approval of a plan for electric distribution grid transformation projects; (ii) created a new rate adjustment clause option for these utilities to recover the costs of distribution grid transformation projects; and (iii) changed the timing for these utilities to file Integrated Resource Plans ("IRPs") with the Commission from annually to once every three years. Each utility now

makes an IRP filing in the year before that utility files its triennial base rate review. Additionally, the GTSA directed the Commission to submit annual reports on the following three topics:

1. Grid Modernization, Reliability, and Integration of Renewables, to be submitted annually by December 1;
2. Transmission Line Undergrounding Pilot, to be submitted annually by December 1, through 2024; and
3. Construction of new Solar and Wind Projects, to be submitted annually by December 1, through 2028.

Background of Solar Demonstration Report

Through this document the Commission is also providing a report related to Solar Demonstration Programs since the applicable laws do not specify a particular filing date for this report and since the information provided in the report corresponds with the information required by the GTSA reports listed above.

Background of the Virginia Clean Economy Act

In 2020, the General Assembly passed the VCEA, which among other things: (i) directs the Commission to annually monitor and report to the General Assembly the performance of all energy efficiency programs approved pursuant to Code § 56-585.1 A 5 c, including each utility's compliance with the total annual savings required by Code § 56-596.2, as well as other related metrics; and (ii) requires the Commission to include the aggregate annual new construction or purchase of energy storage facilities within its existing report on the Construction of New Solar and Wind Projects.

A glossary of terms used throughout the Report can be found in Appendix 1.

GRID MODERNIZATION, RELIABILITY, AND INTEGRATION OF RENEWABLES

Under the GTSA, DEV and APCo are required to petition the Commission, not more than once annually, for approval of a plan for electric distribution grid transformation projects. Pursuant to Code § 56-585.1 A 6, the GTSA requires that "any plan for electric distribution grid transformation projects shall include both measures to facilitate integration of distributed energy resources and measures to enhance physical electric distribution grid reliability and security."

Utility GTSA Filings

On September 30, 2019, DEV filed its second petition with the Commission related to grid modernization, seeking approval of Phase IB of its ten-year plan ("GT Plan"), which covered the same period as the Phase I filing (2019 through 2021). As proposed, DEV's forecasted investment in the GT Plan was as follows:

Portion of GT Plan	Total Capital Investment	Operations/Maintenance Costs
Full 10-year GT Plan	$2.81 billion	$ 465.9 million
Phase IB (2019-2021)	$503.4 million	$78.4 million

On March 26, 2020, the Commission issued a Final Order on the Phase IB petition.[4] For purposes of its Final Order, the Commission grouped the Company's proposed investments into several categories of related elements, and approved as reasonable and prudent the following proposed investments:[5] (i) Cybersecurity; (ii) Stakeholder Engagement and Customer Education; (iii) Customer Information Platform ("CIP"); (iv) Pilot Programs (Locks Campus Micro-grid and

[4] *Petition of Virginia Electric and Power Company, For approval of a plan for electric distribution grid transformation projects pursuant to § 56-585.1 A 6 of the Code of Virginia, and approval of an addition to the terms & condition applicable to electric service*, Case No. PUR-2019-00154, Doc. Con. Cen. No. 200330188, Final Order (Mar. 26, 2020) ("2019 GT Plan").

[5] In total, for Phase IB, the Commission approved approximately $212 million and additional related costs involving cyber security, stakeholder engagement and customer education, and related telecommunications (including capital investment, operations/maintenance costs, and financing costs), while denying approximately $626 million in proposed costs. (2019 GT Plan Final Order at 25-26.)

Smart Charging Pilot); (v) Hosting Capacity Analysis; and (vi) portions of Grid Hardening.[6] The Commission established cost caps on the CIP, Pilot Programs, Hosting Capacity Analysis, and Mainfeeder Hardening, and also directed Dominion to comply with certain annual reporting requirements. No other grid modernization-related petitions were filed during the past year.

The GTSA directs that the Commission's annual report on Grid Modernization, Reliability, and Integration of Renewables address five specific sub-topics, which will be discussed in the following sections. Where applicable, some historical information is also provided.

(i) Reliability of Electric Transmission or Distribution Systems

At transmission-level voltages, PJM is the Regional Transmission Entity ("RTE") that manages the electric grid and wholesale electricity market in Virginia and across 12 other states and the District of Columbia. As part of its role, PJM must maintain reliability of the transmission grid, which includes addressing transmission system constraints that impede electric power delivery, and properly adjusting the generation output of all generation within its footprint to meet electricity demand. PJM uses a planning process called the Regional Transmission Expansion Plan ("RTEP") to identify and evaluate changes to the electric grid that, if left unaddressed, could negatively impact reliability of the grid.

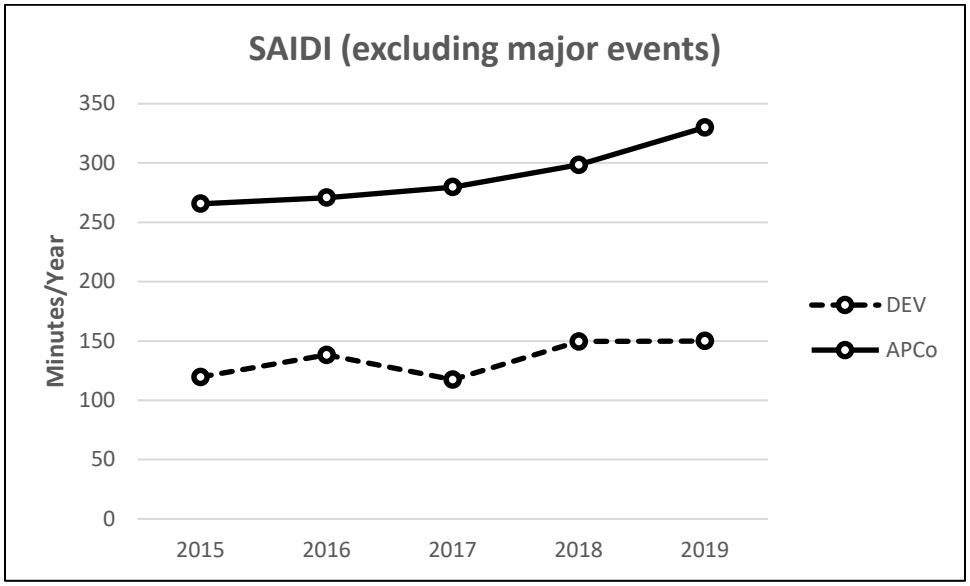
In addition to their participation in the PJM RTEP process, Virginia electric utilities seeking to construct transmission facilities that are not part of their ordinary course of business are required to apply at the Commission for CPCNs under Title 56 of the Code of Virginia. During this type of proceeding, the Commission evaluates several factors, including the need for the project, the proposed project route, the project's environmental impact based on a coordinated review conducted by the Department of Environmental Quality, and the impact of the proposed

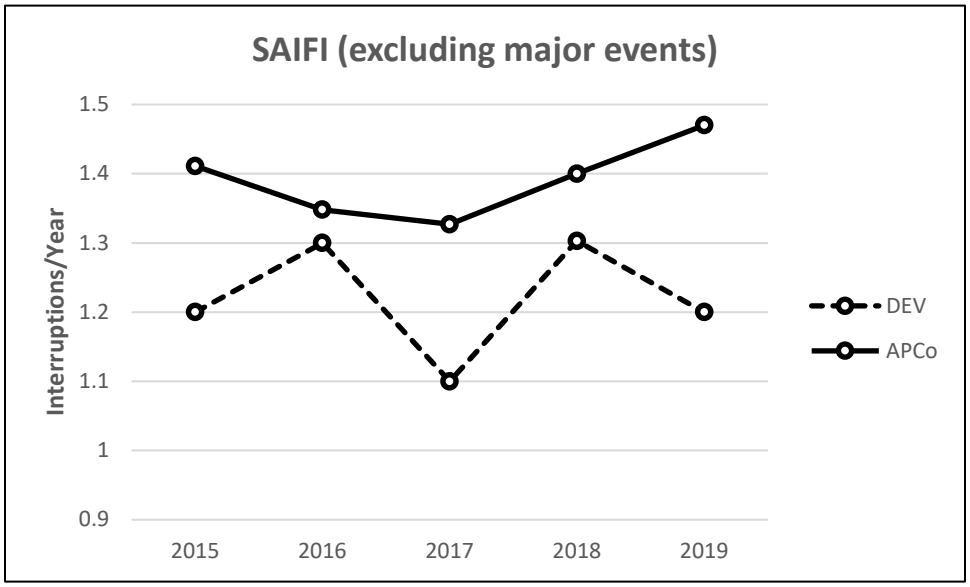
[6] The approved components were Main-feeder Hardening, Targeted Corridor Improvements, and Voltage Island Mitigation.

facilities upon the reliability of electric service delivery within the Commonwealth. These transmission-related processes have worked well for many years to maintain electric service reliability within the Commonwealth.

At the electric distribution level, the Commission monitors service reliability through a number of measures, including the Annual Reliability and Tree Trimming Report required from each of the three investor-owned utilities ("IOUs") in Virginia.[7] This report tracks various reliability indices including, but not limited to, System Average Interruption Frequency Index ("SAIFI")[8] and System Average Interruption Duration Index ("SAIDI").[9] The charts below show DEV's and APCo's reliability indices over the past five years, based on data submitted by the companies in their annual reliability reports to the Commission.

[7] Note that some provisions of the GTSA and the VCEA do not apply to one of Virginia's IOUs, Kentucky Utilities Company d/b/a Old Dominion Power Company.
[8] SAIFI, the "how often" index, is used by electric utilities as a measure of the frequency of electric outages and is defined as the average number of interruptions experienced per customer.
[9] SAIDI, the "how long" index, is commonly used by electric utilities as an indicator of the duration of electric outages, defined as the average outage duration for each customer served. It should be noted that both SAIFI and SAIDI omit the impacts of major events, such a hurricanes or derechos, from their calculations.





While system-based metrics like SAIDI and SAIFI are universally used by the electric utility industry to monitor trends on a utility-specific basis, it is difficult to compare the performance of one utility to another because these metrics do not account for differences in utility infrastructure (underground vs. overhead), customer density, tree exposure, topography of utility service territories, weather incidents/patterns, and varying definitions of major storm/event. For example, APCo's service territory contains a great deal of mountainous, rural, and customer-sparse territory in the western part of Virginia, whereas DEV's territory in the eastern part of the state is generally flatter and includes large, customer-dense urban and suburban areas. Consequently, in

a comparable situation affecting both companies' distribution grids, fewer of APCo's customers may be affected, but service restoration may take longer when compared to the impact on customers in DEV's service territory.

Additionally, weather can vary considerably for one utility from year to year, or between utilities within the same year.

(ii) Integration of Utility- or Customer-Owned Renewable Electric Generation Resources with Utility's Electric Distribution Grid

Background

Before utility-scale generation resources can be integrated into Virginia's electric transmission or distribution grid, developers must submit any such project to PJM for a series of technical and cost studies designed, among other things, to assess the impact of the project's interconnection on the reliability of PJM's transmission grid. If such a project is being installed on the distribution system, PJM coordinates with the local utility to ensure that impacts to the distribution system are also studied. That process identifies any electric infrastructure upgrades needed to address potential reliability issues caused by integration of the proposed resource, and also, when applicable, assigns the costs associated with addressing those issues among individual developers whose proposed projects contribute to the same electric reliability issues. Additionally, the Commission must issue CPCNs for virtually all utility projects and for certain non-utility projects. In such proceedings, the Commission must determine whether the proposed project will negatively impact reliability of the electric grid. A project that may negatively impact grid reliability can nevertheless receive a CPCN if the developer funds grid upgrades found necessary to maintain reliability.

Private developers and utilities (the latter, subject to certain conditions) seeking to interconnect renewable energy generating resources of up to 150 MW capacity at the transmission or distribution level also may apply and receive approval for a Permit by Rule ("PBR") from the

Virginia Department of Environmental Quality ("DEQ") before constructing such facilities.[10] The PBR process requires that technical studies be performed by PJM or the affected electric utility to demonstrate no negative impact on electric reliability in the Commonwealth. A CPCN may also be required from the Commission for construction of any generation or distribution tie lines from the renewable generation facility to the electric grid.

Rulemakings

To facilitate the integration of renewable energy resources on Virginia's distribution electric grid, on September 5, 2018, the Commission initiated a rulemaking proceeding to update the Commission's existing "Regulations Governing Interconnection of Small Electrical Generators,"[11] last revised in May 2009.[12] Since 2009, there had been numerous changes in applicable laws and Federal Energy Regulatory Commission ("FERC") guidelines, as well as technological changes in the power industry, that had rendered the existing Interconnection Regulations inadequate to support the proper integration of a growing number of renewables into the electric grid. During this rulemaking process, Staff solicited comments from, and held meetings with, stakeholders and persons having an interest in the Commission's Interconnection Regulations and the interconnection of small electrical generators within the Commonwealth. From this process, Staff crafted proposed regulations, which the Commission adopted by a Final Order[13] with an effective date of October 15, 2020.[14]

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[10] *See* Code § 10.1-1197.5 *et seq*.

[11] 20 VAC 5-314-10 *et seq.* ("Interconnection Regulations"). These regulations establish standardized interconnection and operating requirements for the safe operation of electric generating facilities with a rated capacity of 20 MW or less connected to electric utility distribution (and in certain cases transmission) systems in Virginia.

[12] *Ex parte: In the matter of revising the Commission's Regulations Governing Interconnection of Small Electrical Generators*, Case No. PUR-2018-00107, Doc. Con. Cen. No. 200740003, Order Adopting Regulations (July 29, 2020).

[13] The Order was amended on August 3, 2020 due to a scribal error.

[14] Among other changes, the new regulations remove a previous 20 megawatt capacity cap on applicability; establish a pre-application process; and provide further information on: (i) the treatment of queue numbers and interdependent projects; (ii) the modification of interconnection requests; and (iii) the Levels 1, 2, and 3 interconnection requirements and processes. The new regulations also make it explicit that they apply as well to energy storage resources.

Among other things, the VCEA, in Code § 56-585.5 E, requires APCo and Dominion to petition the Commission for approval to construct or acquire 400 megawatts ("MW") and 2,700 MW, respectively, of new utility-owned energy storage resources by 2035 (collectively "Energy Storage Targets"). Additionally, Code § 56-585.5 E 5 provides in part that by January 1, 2021, the Commission shall adopt regulations to achieve the deployment of energy storage for the Commonwealth, including regulations that set interim targets and update existing utility planning and procurement rules.

Accordingly, on June 29, 2020, the Commission issued an Order Establishing Proceeding in which it solicited comments from APCo, Dominion, and interested persons and entities on several questions raised by § 56-585.5 E 5 of the Code.[15] Based on comments and draft regulations received in response to this and subsequent Orders, Commission Staff ("Staff") prepared Proposed Rules on energy storage, which the Commission attached to an Order for Notice and Comment on September 11, 2020. Comments from interested parties were received by November 2, 2020, and a Staff Report was filed on November 16, 2020. The proposed regulations are currently pending before the Commission.

Task Force

Under the VCEA, the Commission was also tasked with creating a task force to evaluate and analyze the regulatory, market, and local barriers to the deployment of distribution and transmission-connected bulk energy storage resources to help integrate renewable energy into the electrical grid, reduce costs for the electricity system, allow customers to deploy storage technologies to reduce their energy costs, and allow customers to participate in electricity markets for energy, capacity, and ancillary services. The Commission is required to submit a copy of the

[15] *Ex Parte: In the matter of establishing rules and regulations pursuant to § 56-585.5 E 5 of the Code of Virginia related to the deployment of energy storage*, Case No. PUR-2020-00120, Doc. Con. Cen. No. 200650010, Order Establishing Proceeding (June 29, 2020).

task force's evaluation and analysis to the General Assembly no later than October 1, 2021. The task force is expected to begin its meetings during the first quarter of 2021.

Utility Proposals

To incentivize customer-owned DER, on February 14, 2020, DEV proposed an optional solar incentive rebate program as a supplement to the Company's application for approval to establish a new experimental and voluntary time-of-use rate schedule.[16] The Commission approved this rebate program in its Final Order Approving Experiment issued on May 20, 2020.

DEV's 2019 GT Plan also included measures aimed at integrating customer-level distributed energy resources ("DER") such as rooftop solar.[17]

As previously stated, the Commission has approved a limited deployment of Dominion's proposed Hosting Capacity Analysis ("HCA") under Phase IB of the Company's 2019 GT Plan. HCA defines the amount of DER that can be connected to each segment of the distribution grid without causing voltage or loading issues, and indicates to customers whether distribution grid investments may be necessary to integrate their DER. Under this program, HCA would be performed for both utility scale and net metering DER, and the results published using online interactive maps. HCA is expected to further facilitate the deployment of DER within the Commonwealth.

A further discussion of the integration of utility-owned renewable electric generation resources is presented later in this Report under "Construction of New Solar and Wind Projects."

[16] *Application of Virginia Electric and Power Company For approval to establish an experimental residential rate schedule, designated Time-Of-Use Rate Schedule 1G (Experimental)*, Case No. PUR-2019-00214, Doc. Con. Cen. No. 200540136, Final Order Approving Experiment (May 20, 2020). The rebate program would provide an optional $500 per customer rebate, limited to one rebate per premises, to partially offset the costs to install new distributed solar (net metering) equipment. Existing net metering customers would not qualify for the rebate.
[17] 2019 GT Plan at 15.

(iii) Level of Investment in Generation, Transmission, or Distribution of Electricity

Electric utilities in Virginia continue to invest in generation, transmission, and distribution facilities used to serve their customers. The tables below show the cumulative and annual net investments in plant in service made by Virginia's two largest utilities, DEV and APCo, since 2014.

Dominion Energy Virginia
Cumulative and Annual Plant in Service Investment
(in Millions)

	Generation		Transmission		Distribution		Other[18]	
Year	Balance	Annual Investment	Balance	Annual Investment	Balance	Annual Investment	Balance	Annual Investment
2014	16,604.0		5,884.0		9,526.0		697.0	
2015	17,120.0	516.0	6,963.0	1,079.0	10,048.0	522.0	709.0	12.0
2016	18,684.0	1,564.0	7,871.0	908.0	10,573.0	525.0	745.0	36.0
2017	19,201.0	517.0	8,332.0	461.0	11,151.0	578.0	794.0	49.0
2018	20,522.0	1,321.0	9,391.0	1,059.0	11,771.0	620.0	820.0	26.0
2019	21,240.0	718.0	10,229.0	838.0	12,095.0	324.0	825.0	5.0

Appalachian Power Company
Cumulative and Annual Plant in Service Investment
(in Millions)

	Generation		Transmission		Distribution		Other	
Year	Balance	Annual Investment	Balance	Annual Investment	Balance	Annual Investment	Balance	Annual Investment
2014	6,824.0		2,228.0		3,258.3		373.5	
2015	6,200.8	(623.2)	2,408.1	180.1	3,402.5	144.2	345.5	(28.0)
2016	6,332.8	132.0	2,796.9	388.8	3,569.1	166.6	373.5	28.0
2017	6,446.9	114.1	3,019.9	223.0	3,763.8	194.7	427.9	54.4
2018	6,509.6	62.7	3,317.7	297.8	3,989.4	225.6	485.8	57.9
2019	6,563.7	54.1	3,584.1	266.4	4,201.7	212.3	571.3	85.5

[18] The category "Other" includes office furniture, transportation equipment, and other general plant that is not specific to the generation, transmission, or distribution functions.

(iv) Need for Additional Generation of Electricity During Times of Peak Demand

Virginia's two largest IOUs meet their peak energy demand[19] through a combination of company-owned generation and access to PJM's energy and capacity markets. Both DEV and APCo have had relatively flat-to-declining growth in their respective summer peak demand since 2011. Through 2022, both companies are expected to have sufficient capacity to meet their peak energy demands, either through company-owned generation or PJM's markets.[20]

(v) Distribution System Hardening Projects and Enhanced Physical Security Measures

The Commission approved the following components of Dominion's 2019 GT Plan petition that were designed to address distribution system hardening: (i) Mainfeeder Hardening Program (total cost: $1.6 billion; Phase IB: $112.4 million); (ii) Targeted Corridor Improvement Program (total cost: $37.4; Phase IB: $12.5 million); and (iii) Voltage Island Mitigation Program (total cost: $143.6 million; Phase IB: $15.7 million).[21]

The Mainfeeder Hardening Program is expected to improve reliability and resiliency for poorly performing feeder sections through a combination of: (1) rebuilding to newly implemented stronger design and material standards, and (2) relocating, converting to underground, or constructing feeder ties.[22] The Targeted Corridor Improvement program would: (i) remediate ash tree mortality caused by the emerald ash borer; and (ii) introduce a herbicide program for ground floor maintenance.[23] Finally, the Voltage Island Mitigation program would address portions of

[19] "Peak energy demand" means the amount of energy used by each IOU's customers during the hour of the coincident summer peak that occurs in PJM. This hour is used to determine the amount of capacity for which an IOU is responsible in order to maintain reliability in the broader PJM system.
[20] *Petition of Virginia Electric and Power Company, For approval and certification of the proposed US-4 Solar Project pursuant to §§ 56-580 D and 56-46.1 of the Code of Virginia, and for approval of a rate adjustment clause, designated Rider US-4, under § 56-585.1 A 6 of the Code of Virginia*, Case No. PUR-2019-00105, Doc. Con. Cen. No. 200120275, Order Granting Certificate at 10 (Jan. 22, 2020) ("the US-4 Project is not needed to serve load growth in the short-term…"). *In re: Appalachian Power Company's Integrated Resource Plan filing pursuant to § 56-597 et seq.,* Case No. PUR-2018-00058, Doc. Con. Cen. No. 181220151, Final Order at 4 (Dec. 18, 2018).
[21] 2019 GT Plan Final Order at 17. All costs include financing costs.
[22] 2019 GT Plan, Direct Testimony of Company witness Wright at 20.
[23] 2019 GT Plan, Direct Testimony of Company witness Wright at 27-28.

the distribution grid, typically serving remote communities, that have no available system redundancy to address failure of the single substation transformer. For Phase IB, DEV would mitigate two voltage islands serving about 2,600 customers that otherwise face extended outages upon such equipment failure.[24]

DEV's 2019 GT Plan did not request approval for any additional physical security projects as part of Phase IB. Instead, DEV plans to continue implementing the security programs that were approved by the Commission in its 2018 GT Plan, in which physical security controls would be implemented at ten substations along with all associated cybersecurity and telecommunications controls.[25]

TRANSMISSION LINE UNDERGROUNDING PILOT

Underground Pilot Program - Background

As part of the GTSA, the General Assembly established a pilot program requiring the construction of two qualifying electrical transmission lines of 230 kV or less in whole or in part underground ("Underground Pilot Program"). The GTSA directed the Commission to "report annually to the Commission on Electric Utility Restructuring, the Joint Commission on Technology and Science, and the Governor on the progress of the pilot program by no later than December 1 of each year that the GTSA is in effect" and to submit a final report no later than December 1, 2024.

During its 2020 Session, the Virginia General Assembly amended the Underground Pilot Program to, among other things, specify the requirements for the second qualifying electrical transmission line and to extend the deadline for submitting applications for qualifying projects

[24] 2019 GT Plan, Direct Testimony of Company witness Wright at 33-34.
[25] 2019 GT Plan, Direct Testimony of Company witness Bransky at 4. Also, as previously stated, the ten substations that received Commission approval for enhanced physical security measures were substations requested by Dominion; the Commission did not select those substations.

from July 1, 2020 to October 1, 2020.[26] Specifically, Code § 56-585.1:5 directs the Commission to approve, as qualifying projects under the Underground Pilot Program: (i) a transmission line meeting the description of Dominion's Haymarket 230 kV double circuit transmission line and 230-34.5 kV Haymarket Substation[27] that uses the I-66 Hybrid Route;[28] and (ii) one additional qualifying project that shall be the relocation or conversion of an existing 230 kV overhead line to underground line from among "applications submitted by public utilities for certificates of public convenience and necessity for the construction of electrical transmission lines of 230 kilovolts or less filed between the July 1, 2018, and October 1, 2020."[29]

Underground Pilot Project Selection Process

Pursuant to Code § 56-585.1:5, if a public utility requests that a transmission line project be considered as a qualifying project for the Underground Pilot Program, the Commission will consider such a request during a CPCN proceeding, along with the Commission's typical assessment of project need, proposed route, and environmental impacts. If the Commission approves a CPCN for the proposed transmission line project, the Commission would also rule on inclusion of the project in the Underground Pilot Program.

Progress of the Underground Pilot Program

On July 2, 2018, Dominion filed a "Request to Participate in the Pilot Program Established by Enactment Clause 2 of the Grid Transformation and Security Act of 2018." The Company requested approval of the Haymarket Project, specifically the I-66 Hybrid Route, as a qualifying

[26] *See* Code § 56-585.1:5 *et seq*.
[27] *Application of Virginia Electric and Power Company, For approval and certification of electric transmission facilities: Haymarket 230 kV Double Circuit Transmission Line and 230-34.5 kV Haymarket Substation*, Case No. PUE-2015-00107, Doc. Con. Cen. No. 180620319, Order on Request to Participate in Pilot Program (July 26, 2018).
[28] The I-66 Hybrid Route is a 230 kV double circuit electrical transmission line approximately 5.3 miles long, has both overhead and underground transmission facilities, includes an underground portion of approximately 3.1 miles in length, and will be constructed within or immediately adjacent to the right of way of interstate highway I-66 in Prince William County and the Town of Haymarket.
[29] A project is qualified to be placed underground, in whole or in part, if it meets all the criteria found in Code § 56-585.1:5 D.

project under Section 2 of Enactment Clause 2 of the GTSA. On July 26, 2018, the Commission approved the Haymarket Project using the I-66 Hybrid Route as a pilot project. Appendix 2 of this Report provides a letter to DEV requesting a status update on the project. Appendix 3 provides the status update Dominion provided on the permitting, real estate, engineering and construction activities, cost, and schedule of the ongoing Haymarket Project.

According to the update, dated September 15, 2020, all permits required for project construction have been obtained, and Dominion has completed acquisition of the right of way through the two parcels along the overhead segment, and 10 of the 11 parcels along the underground segment.

Since active construction began in fall of 2019, both duct bank and horizontal directional drilling ("HDD") operations have experienced challenges that resulted in project delays, cost increases and engineering re-work. Dominion's report states that initial HDD activities resulted in several inadvertent releases of drilling mud to the surface due to pockets of highly fractured rock. According to Dominion, VDOT indicated that any further inadvertent releases on I-66 would jeopardize the permit for the project. Dominion therefore made several engineering changes to address this problem. First, Dominion increased the drill profile depths by approximately 15 feet,[30] a solution which also reduces the power transfer rating of the line.[31] The Company also performed a Geothermal Analysis of bore samples as part of its investigative process, the results of which identified non-ideal conditions that warranted a design shift from a "spacer" to a "spacer-less" cable bundle arrangement. Other engineering concerns led to a cable size increase[32] that was required even at the reduced power transfer rating of the line. In addition to these engineering challenges, Dominion states it encountered several utility lines located in unanticipated places that

[30] The drill profile depths were increased from 65 feet to 80 feet.
[31] The power transfer rating of the line is reduced from 1047 megavolt-amperes ("MVA") to 1036 MVA.
[32] The cable size requirement increased from 3500 thousands of circular mils ("kcmil") to 5000 kcmil.

interfered with the construction of the project. An on-site contractor working on a commercial development also damaged an already installed duct bank.

These issues have resulted in delays and cost increases to the Haymarket Project. The new scheduled completion date for the project is March 2022, which equates to an approximately 8-month delay from the originally projected completion date of July 2021. The current cost estimate for the project is $180 million, which is approximately $8 million higher than the $172 million anticipated in 2019 (4.7% increase) and approximately $13 million higher than the $167 million cost estimate provided at the conclusion of the Commission proceeding approving the Haymarket Project (7.8% increase).

Apart from Dominion's Haymarket Project, on September 29, 2020, the Commission received a CPCN application from Dominion for the second qualifying transmission line project. The application is for a "Partial Line #2010 230 kV Single Circuit Transmission Line Underground Pilot Project (Tysons-Future Spring Hill Substation)."[33] According to the application, the project would be constructed in Fairfax County, cost approximately $30.4 million, and have a projected in-service date of December 31, 2025.

CONSTRUCTION OF NEW SOLAR AND WIND PROJECTS

Enactment Clause 14 of the GTSA states that it is the objective of the General Assembly that new utility-owned and utility-operated generating facilities, utilizing energy derived from sunlight and from wind with an aggregate capacity of 5,000 MW, including rooftop solar installations with a capacity of not less than 50 kilowatts, and with an aggregate capacity of 50 MW, be placed in service on or before July 1, 2028.

[33] *Application of Virginia Electric and Power Company, For approval and certification of Electric Transmission Facilities Partial Line #2010 230 kV Single Circuit Transmission Line Underground Pilot Project (Tysons-Future Spring Hill Substation)*, Case No. PUR-2020-00198, Doc. Con. Cen No. 201050191, Order for Notice and Hearing (Oct. 29, 2020).

The Commission must submit a report and make recommendations on or before December 1 of each year assessing: (i) the aggregate annual new construction and development of new utility-owned and utility operated generating facilities utilizing energy derived from sunlight; (ii) the integration of utility-owned renewable electric generation resources with the utility's electric distribution grid; (iii) the aggregate additional utility-owned and utility-operated generating facilities utilizing energy derived from sunlight placed in operation since July 1, 2018; (iv) the need for additional generation of electricity utilizing energy derived from sunlight in order to meet the objective of the General Assembly on or before July 1, 2028; and (v) the aggregate annual new construction or purchase of energy storage facilities. The responses provided below include data as of June 30, 2020.[34]

(i) Aggregate Annual New Construction and Development of New Utility-Owned and Utility-Operated Generating Facilities Utilizing Energy Derived from Sunlight

New Construction by Virginia Utilities

Since the time of the Commission's last report on November 27, 2019, DEV has put one additional solar facility into operation, the Colonial Trail West Solar Facility (142 MW),[35] located in Spring Grove, Virginia that entered operation in December 2019.[36]

[34] While Code § 56-596.1 only requires the reporting of facilities utilizing sunlight, the objective within the Code section also refers to wind. Additionally, Code § 56-585.1:4 A declares "the construction or purchase by a public utility of one or more solar or wind generation facilities located in the Commonwealth or off the Commonwealth's Atlantic shoreline…having in the aggregate a rated capacity that does not exceed 5,000 megawatts… is in the public interest." Code § 56-585.1 A 6 also makes multiple public interest declarations related to wind generation. Therefore, for the purposes of this report, wind generation facilities have been included within the reporting data. A "public utility" or "utility," as used in Code § 56-596.1 and Code § 56-585.1:4 A, is not specifically defined in Chapter 23 of Title 56. For the purposes of this report, data pertaining to electric cooperatives and merchant facilities has been provided, as well as data from the Commonwealth's IOUs.

[35] All MW provided in this section are alternating current (AC).

[36] *Petition of Virginia Electric and Power Company, For approval and certification of the proposed US-3 Solar Projects pursuant to §§ 56-580 D and 56-46.1 of the Code of Virginia, and for approval of a rate adjustment clause, designated Rider US-3, under § 56-585.1 A 6 of the Code of Virginia*, Case No. PUR-2018-00101, 2019 S.C.C. Ann. Rept. 239, Order Granting Certificates (Jan. 24, 2019), and 2019 S.C.C. Ann. Rept. 248, Order Approving Rate Adjustment Clause (Apr. 15, 2019).

New Development

DEV has multiple solar facilities currently under development. The Spring Grove I Solar Facility (98 MW) remains under development. Additionally, the Commission has approved the Sadler Solar Facility (100 MW), which is also under development.[37] DEV also continues to develop the Coastal Virginia Offshore Wind Project (12 MW) ("CVOW"),[38] as well as approximately 2,600 MW of offshore wind.

DEV also is pursuing certain "ring-fenced" projects (*i.e.*, projects whose costs and revenues are associated only with customers, such as governmental customers, not subject to the Commission's jurisdiction). Specifically, Dominion has notified the Staff that DEQ has approved development of the Grasshopper Solar (80 MW), Belcher Solar (88.2 MW), Fort Powhatan (150 MW), Bedford Solar (70 MW), Maplewood Solar (120 MW), and Rochambeau Solar (20 MW) projects through the PBR process. The Commission is also aware of other ring-fenced facilities under development with DEV; data related to these facilities is currently confidential.

APCo is currently performing due diligence on two solar projects totaling 105 MW.

Northern Virginia Electric Cooperative has announced a 300 MW solar PPA with D.E. Shaw Renewable Investments, which will include multiple solar facilities, some of which will be located in Virginia. Because the precise locations for these facilities is still being determined, the number of megawatts attributable to Virginia is currently unknown.

[37] *Petition of Virginia Electric and Power Company, For approval and certification of the proposed US-4 Solar Project pursuant to § 56-580 D et al., and for approval of a rate adjustment clause, designated Rider US-4, under §56-585.1 A 6 of the Code of Virginia*, Case No. PUR-2019-00105, Doc. Con. Cen. 200120275, Order Granting Certificate (Jan. 22, 2020).

[38] Initial testing to synchronize CVOW to the grid began in late September 2020.

In addition, merchant generators are developing approximately 1,524 MW of solar facilities, including two solar facilities approved by the Commission,[39] and other facilities that DEQ has approved through its PBR process.

A table reflecting the status of constructed and under development solar and wind projects as of June 30, 2020, is provided in Appendix 4.[40]

(ii) Integration of Utility-Owned Renewable Electric Generation Resources with the Utility's Electric Distribution Grid

DEV

DEV is studying integration of renewable energy facilities into its electric grid through several mechanisms. For example, DEV is utilizing its Solar Partnership Program to study the benefits and impacts of small-scale renewable electric generation resources on targeted distribution circuits.[41] Dominion's 12 MW CVOW pilot is a demonstration project to study offshore wind generation and how to transmit the generation produced miles out in the ocean onto land and into the company's electric grid.[42]

[39] *Joint Application of Pleinmont Solar, LLC, et al. for certificates of public convenience and necessity for nominal 500 MW solar generating facility in Spotsylvania County pursuant to §§ 56-46.1 and 56-580 D of the Code of Virginia*, Case No. PUR-2017-00162, 2018 S.C.C. Ann. Rept. 310, Order Granting Certificates (Aug. 8, 2018). *Joint Application of Skipjack Solar, LLC, et al. for certificates of public convenience and necessity for solar generating facilities totaling 320 MW in Charles City County*, Case No. PUR-2019-00073, Doc. Con. Cen. No. 200310147, Order Granting Certificates (Mar. 5, 2020).

[40] The Commission's Annual Report on the Construction of New Solar and Wind Projects provides data responsive to each requirement through June 30 of the filing year. The Commission notes, however, that since June 30, 2020, both DEV and APCo have filed annual Renewable Portfolio Standard ("RPS") proceedings pursuant to the VCEA. DEV's RPS proceeding is docketed as Case No. PUR-2020-00134 and APCo's is docketed as Case No. PUR-2020-00135. Both utilities' proposed RPS plans include further construction and development of solar and wind projects in the future. More detail on these pending proceedings can be found on the Commission's website by searching the relevant case number at: scc.virginia.gov/pages/Case-Information.

[41] *Application of Virginia Electric and Power Company, For approval of a Community Solar Power Program and for certification of proposed distributed solar generation facilities pursuant to Chapter 771 of the 2011 Virginia Acts of Assembly, and §§ 56-46.1 and 56-580 D*, Case No. PUE-2011-00117, 2012 S.C.C. Ann. Rept. 328, Order (Nov. 28, 2012).

[42] *Petition of Virginia Electric and Power Company, For a prudency determination with respect to the Coastal Virginia Offshore Wind Project pursuant to Virginia Code § 56-585.1:4 F*, Case No. PUR-2018-00121, 2018 S.C.C. Ann. Rept. 491, Final Order (Nov. 2, 2018).

Electric Cooperatives

Virginia's electric cooperatives regulated by the Commission continue to assess the viability of utility-owned renewable generation resources. The cooperatives have participated in multiple working groups on these and other related topics.

(iii) Aggregate Additional Utility-Owned and Utility-Operated Generating Facilities Utilizing Energy Derived from Sunlight Placed in Operation Since July 1, 2018

All Virginia utility-owned and utility-operated solar generation facilities placed in operation since July 1, 2018, are DEV facilities. These include:

- UVA Hollyfield Solar Facility, 17 MW, operational September 2018;
- UVA Puller Solar Facility, 15 MW, operational October 2018;
- Montross Solar Facility, 20 MW, operational December 2018;
- Gloucester Solar Facility, 20 MW, operational April 2019; and,
- Colonial Trail West Facility, 142.2 MW, operational December 2019.

(iv) Need for Additional Generation of Electricity Utilizing Energy Derived from Sunlight to Meet the Objective of the General Assembly on or Before July 1, 2028

The table below shows the aggregate solar and wind facilities that have been constructed since July 1, 2018.

Aggregate Solar and Wind Generating Facilities Constructed since July 1, 2018

Total Solar & Wind General Assembly Objective	MW
Objective:	**5,000**
Total IOU Owned/Operated Solar Constructed since July 1, 2018:	214.4
Total New IOU Solar PPAs since July 1, 2018:	0
Total IOU Owned/Operated Wind Constructed since July 1, 2018:	0
Total New IOU Wind PPAs since July 1, 2018:	0
Total Remaining to Meet Objective:	**4,786**

(v) Aggregate Annual New Construction or Purchase of Energy Storage Facilities

No utilities have reported the construction or purchase of energy storage facilities.

SOLAR DEMONSTRATION PROGRAMS

Chapter 771 of the 2011 Virginia Acts of Assembly ("Chapter 771") directs the Commission to consider for approval petitions filed by a utility to construct and operate distributed solar generation facilities and to offer special tariffs to facilitate customer-owned distributed solar generation. Pursuant to Chapter 771, the Commission approved two such applications from DEV:

- An application to construct and operate distributed solar generation facilities (the Solar Partnership Program); and
- An application for approval of tariffs designed to facilitate customer-owned distributed solar generation as an alternative to net metering (the Solar Purchase Program).[43]

The Solar Purchase Program has concluded, and no further data is being provided related to this program.[44] DEV continues to provide data annually related to the Solar Partnership Program. For this program, Dominion selected qualifying commercial, industrial, high school, and university customers with suitable facilities, located in select areas, to install solar projects between 2014 and 2017. These projects are used for demonstration and grid impact study purposes. DEV has nine operational projects with a total capacity of 6.4 MW. Total capital expenditures from inception through May 31, 2019, are approximately $25 million of the $80 million cap originally authorized for this program.

ENERGY EFFICIENCY PROGRAMS

The Commission expects that several of the new requirements in the VCEA will require more extensive evaluation, measurement, and verification ("EM&V") to be performed for all approved energy efficiency programs. Specifically, the VCEA directs the Commission to award a margin for recovery on operating expenses for energy efficiency programs and pilot programs,

[43] *Application of Virginia Electric and Power Company, For approval of a special tariff to facilitate customer-owned distributed solar generation pursuant to Chapter 771 of the 2011 Virginia Acts of Assembly*, Case No. PUE-2012-00064, 2013 S.C.C. Ann. Rept. 269, Order (Mar. 22, 2013).

[44] All annual reports related to this program can be found on the Commission's website at: scc.virginia.gov/docketsearch, by searching the case number (PUE-2012-00064).

prior to January 1, 2022. Further, energy efficiency pilot programs are to be found in the public interest if they are of a limited scope, cost, duration and intended to determine whether a new or substantially revised program is cost effective.

Additionally, after January 1, 2022, the Commission is required to award a margin for recovery on operating expenses for Phase I and Phase II utility energy efficiency programs that achieve total savings equal to the following percentages of each utilities' respective 2019 retail jurisdictional sales:

Year	**Phase 1 Utility**	**Phase II Utility**
2022	0.5%	1.25%
2023	1.0%	2.5%
2024	1.5%	3.75%
2025	2.0%	5.0%

After 2025, the Commission is directed to establish new energy efficiency targets.[45]

As noted previously, the VCEA also directs the Commission to monitor and annually report to the General Assembly the performance of all energy efficiency programs approved pursuant to Code § 56-585.1 A 5 c, including each utility's compliance with the total annual savings required by Code § 56-596.2, as well as the annual and lifecycle net and gross energy and capacity savings, related emissions reductions, and other quantifiable benefits of each program; total customer bill

[45] Subject to certain conditions, the Commission is prohibited from approving construction of any new utility-owned generating facilities that emit carbon dioxide as a by-product of combusting fuel to generate electricity unless the utility has already met the energy savings goals prescribed above. Code § 56-585.1 A 5.

savings that the programs produce; utility spending on each program, including any associated administrative costs; and each utility's avoided costs and cost-effectiveness results.[46]

Together, these requirements will necessitate rigorous evaluation, measurement, and verification to ensure that the energy efficiency programs are, in actual practice, the proximate cause of a verifiable reduction in energy usage.

VCEA EE Programs

Currently, there are no programs approved pursuant to this new law. No utility has yet submitted plans on how they intend to meet the goals of the VCEA. It is expected that utilities will propose programs pursuant to the VCEA and that the VCEA goals will be addressed in each utility's upcoming DSM case expected to be filed in November or December 2020.

The most recent DSM cases submitted by APCo and Dominion were filed in compliance with the GTSA.

Previous DSM Activities

Prior to the passage of the VCEA, the Commission had approved, allowed for the modification of, or extended numerous DSM programs for both Dominion and APCo. A brief summary of those activities is provided below:

[46] Currently, the Commission does not possess all of the data required pursuant to Code § 56-585.1 A 5 c, for all currently approved DSM programs. It is expected that this information will be collected through the Commission's pending proceeding regarding EM&V, discussed in more detail below.

Dominion Energy Cases	Approved/Extended Programs		Cost Caps Approved (In Million $)
	EE	**Peak Shaving**	
Case No. PUE-2009-00081	4	1	$102.3
Case No. PUE-2011-00093	6	1	$149.2
Case. No. PUE-2012-00100	1	1	$75.2
Case No. PUE-2013-00072	4		$71.6
Case No. PUE-2014-00071	2		$20.0
Case No. PUE-2015-00089	1	1	$23.5
Case No. PUE-2016-00111	1	1	$40.8
Case No. PUR-2017-00129	1		$12.6
Case No. PUR-2018-00168	11		$225.8[47]
Case No. PUR-2019-00201	14	2	$186.0
Totals	**45**	**7**	**$907MM**
Appalachian Power Cases			
Case No. PUE-2014-00026	1	1	$7.1
Case No. PUE-2014-00039	5		$27.3
Case No. PUR-2017-00094	1	1	$7.1
Case No. PUR-2017-00126	6		$39
Case No. PUR-2019-00122	3		$43.2
Totals	**16**	**2**	**$123.7MM**

Evaluation, Measurement, and Verification Proceeding

The VCEA places additional emphasis on the actual performance of energy efficiency programs in Virginia. Additionally, the Commission has noted in its recent Final Orders that "the true test of any such program is whether, in actual practice, it is the proximate cause of a verifiable reduction in energy usage."[48] On August 28, 2020, the Commission issued an Order Initiating

[47] Three programs (Smart Thermostat EE, Smart Thermostat DR, and Residential Customer Engagement) were approved for cost recovery by the Commission and later withdrawn by the Company. These programs were reapplied for in Case No. PUR-2019-00201 and reapproved by the Commission.

[48] *Petition of Appalachian Power Company For approval to continue rate adjustment clause, the EE-RAC, and for approval of new energy efficiency programs pursuant to §§ 56-585.1 A 5 c and 56-596.2 of the Code of Virginia*, Case No. PUR-2019-00122, Doc. Con. Cen. No. 200550013, Order Approving Rate Adjustment Clause (May 21, 2020); *Petition of Virginia Electric and Power Company For approval of its 2019 DSM Update pursuant to § 56-585.1 A 5 of the Code of Virginia*, Case No. PUR-2019-00201, Doc. Con. Cen. No. 200740067, Final Order (July 30, 2020).

Proceeding to address Dominion's methodologies for conducting evaluation, measurement and verification of energy savings of approved energy efficiency measures.[49] This EM&V proceeding will also address the creation of a "dashboard" that standardizes the presentation of energy savings found in the utility's annual DSM EM&V Reporting. Dominion was directed to make its Initial Filing on November 6, 2020. A public hearing for this proceeding is schedule for May 25, 2021.

The upcoming EM&V case will be applicable to currently approved and operating DSM programs of Dominion, as well as future DSM programs filed by Dominion pursuant to the VCEA. Dominion's currently approved and operating programs are listed below: [50]

Dominion Energy Active DSM Programs

Phase and Case No.	Program Name	Program Type
Phase I		
PUE-2009-00081	*Residential AC Cycling Program*	*Peak Shaving*
Phase II		
PUE-2011-00093	*Non-Residential Distributed Generation Program*	*Demand Response*
Phase IV		
PUE-2017-00071	*Residential Income and Age Qualifying Program*	*Energy Efficiency*
Phase V		
PUE-2015-00089	*Non-Residential Small Business Improvement Program*	*Energy Efficiency*
Phase VI		
PUE-2016-00111	*Non-Residential Prescriptive Program*	*Energy Efficiency*
Phase VII		
PUR-2018-00168	*Residential Appliance Recycling Program*	*Energy Efficiency*
	Residential Efficient Products Marketplace Program	*Energy Efficiency*
	Residential Home Energy Assessment Program	*Energy Efficiency*
	Non-Residential Lighting Systems & Controls Program	*Energy Efficiency*
	Non-Residential Heating & Cooling Efficiency Program	*Energy Efficiency*
	Non-Residential Window Film Program	*Energy Efficiency*
	Non-Residential Small Manufacturing Program	*Energy Efficiency*

[49] *Ex Parte: In the matter of baseline determination, methodologies for evaluation, measurement, and verification of existing demand-side management programs, and the consideration of a standardized presentation of summary data for Virginia Electric and Power Company*, Case No. PUR-2020-00156, Doc. Con. Cen. No. 200830148, Order Initiating Proceeding (Aug. 28, 2020).

[50] It should be noted that there is a lag between when a new program is approved, and when EM&V reporting for the approved program becomes available.

	Non-Residential Office Program	*Energy Efficiency*
Phase VIII		
PUR-2019-00201	*Residential Energy Efficiency Kits Program*	*Energy Efficiency*
	Residential Electric Vehicle Program	*Energy Efficiency*
	Residential Electric Vehicle Program	*Demand Response*
	Residential Electric Vehicle Program	*Peak Shaving*
	Residential/Non-Residential Multi-Family Program	*Energy Efficiency*
	Residential New Construction Program	*Energy Efficiency*
	Residential Home Retrofit Program	*Energy Efficiency*
	Residential HB2789 (Heating and Cooling/Health and Safety) Program	*Energy Efficiency*
	Non-Residential Midstream Energy Efficiency Products Program	*Energy Efficiency*
	Non-Residential Small Business Improvement Enhanced Program	*Energy Efficiency*
	Residential Customer Engagement Program	*Energy Efficiency*
	Residential Smart Thermostat Management Program	*Energy Efficiency*
	Residential Smart Thermostat Management Program	*Energy Efficiency*
	Residential Manufactured Housing Program	*Energy Efficiency*
	Non-Residential New construction	*Energy Efficiency*
	AC Cycling Extension	*Peak Shaving*

The upcoming EM&V case is not explicitly applicable to currently approved and operating DSM programs of APCo. APCo's currently approved and operating programs are listed below:

Appalachian Power Active DSM Programs

Case No.	Program Name	Program Type
PUE-2014-00026	*Low-Income Weatherization*	*Energy Efficiency*
	Peak Reduction	*Demand Response*
PUR-2017-00128	*eScore*	*Energy Efficiency*
	Bring Your Own Thermostat	*Demand Response*
	Appliance Recycling	*Energy Efficiency*
	Commercial and Industrial Lighting	*Energy Efficiency*
	Commercial and Industrial Standard	*Energy Efficiency*
	Small Business Direct Install	*Energy Efficiency*
PUR-2019-00122	*Low Income Single Family*	*Energy Efficiency*
	Low Income Multifamily	*Energy Efficiency*
	ENERGY STAR Manufactured Homes	*Energy Efficiency*

Conclusion

Through the expected applications for DSM programs pursuant to the VCEA, as well as the ongoing EM&V proceeding, the Commission will address the specific performance of the DSM programs in the Commonwealth and incorporate this data in future Commission reports. Due to the time constraints of filing, investigation, and approving DSM programs, along with implementing and collecting EM&V data, any programs approved under the VCEA may not have data to report until 2023.

APPENDIX 1

GLOSSARY OF TERMS

APCo	Appalachian Power Company
CPCN	Certificate of Public Convenience and Necessity
Code	Code of Virginia
Commission	Virginia State Corporation Commission
DEQ	Virginia Department of Environmental Quality
DER	Distributed Energy Resource
DEV	Virginia Electric and Power Company d/b/a Dominion Energy Virginia
Dominion	Virginia Electric and Power Company d/b/a Dominion Energy Virginia
DSM	Demand Side Management
FERC	Federal Energy Regulatory Commission
GT Plan	Grid Transformation Plan
GTSA	Grid Transformation and Security Act, Chapter 296 of the 2018 Acts of Assembly
General Assembly	Virginia General Assembly
HDD	Horizontal Directional Drilling
IOU	Investor-owned electric public utility
IRP	Integrated Resource Plan
Interconnection Regulations	Regulations Governing Interconnection of Small Electrical Generators
kcmil	Thousands of circular mils
kV	Kilovolt
kW	Kilowatt
MVA	Megavolt-amperes
MW	Megawatt
O&M	Operations and maintenance
PBR	Permit by Rule
PJM	PJM Interconnection, L.L.C.
PPA	Power Purchase Agreement
Phase IB	First three years of ten-year Grid Transformation Plan
Underground Pilot Program	Pilot Program requiring the construction of the qualifying electrical transmission lines of 230 kV or less in whole or in part underground
RTE	Regional Transmission Entity
RTEP	Regional Transmission Expansion Plan
Report	Combined reports of the Virginia State Corporation Commission
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
Staff	State Corporation Commission Staff
VCEA	Virginia Clean Economy Act, Chapter 1193 of the 2020 Acts of Assembly

APPENDIX 2

Letter to Dominion Requesting an Update on the Haymarket Project

COMMONWEALTH OF VIRGINIA

William F. Stephens
Director
(804) 371-9611
FAX (804) 371-9350

PO Box 1197
Richmond, Virginia 23218-1197

STATE CORPORATION COMMISSION
DIVISION OF PUBLIC UTILITY REGULATION

August 5, 2020

Mark S. Allen, P.E.
Director – Project Development and Execution
Dominion Energy Virginia
10900 Nuckols Road, 4th Floor
Glen Allen, VA 23060

Dear Mr. Allen:

As you are aware, Senate Bill 966 ("SB966") was enacted during the 2018 Session of the Virginia General Assembly. Among other provisions, SB966 established a pilot program to construct two qualifying electrical transmission line projects of 230 kilovolts ("kV") or less in whole or in part underground. The Haymarket I-66 Hybrid Route Project was approved as the first pilot project pursuant to the Commission's July 26, 2018, Order On Request to Participate In Pilot Program in Case No. PUE-2015-00107. To date, no other applications have been received by the Commission in which the applicant is seeking consideration for the pilot program. SB966 also directed the SCC to submit an annual report to the Commission on Electric Utility Restructuring ("CEUR"), the Joint Commission on Technology and Science, and the Governor on the progress of the pilot program by no later than December 1 of each year.

Accordingly, to assist in the development of the annual report, the Staff requests the Company to provide a progress report on the construction activities of the Haymarket I-66 Hybrid Route and any other relevant information related to the aforementioned pilot program. Please provide the progress report to me by September 5, 2020.

Thank you for your assistance, and please contact me if you have any questions or concerns with this request.

Very truly yours,

David Essah, Ph.D.
Deputy Director

APPENDIX 3

Dominion's Status Update on the Haymarket Project

Dominion Energy Virginia Dominion Energy North Carolina
Electric Transmission
PO Box 26666, Richmond, VA 23261
DominionEnergy.com

September 15, 2020

David Essah, Ph.D.
Deputy Director, Division of Public Utility Regulation
State Corporation Commission of Virginia
1300 E. Main Street, Tyler Building
Richmond, VA 23219

Status Report Regarding Activities Related to
§56-585.1:5 Pilot Program for Underground Transmission Lines

Dear Mr. Essah,

The following presents a status report, pursuant to Enactment Clause 2 of SB966, which required, among other things, that the Virginia State Corporation Commission (Commission) report annually to the Commission on Electric Utility Restructuring, the Joint Commission on Technology and Science, and the Governor on the progress of the pilot program by no later than December 1 of each year that §56-585.1:5 is in effect.

> *§ 56-585.1:5.F. The Commission shall report annually to the Commission on Electric Utility Restructuring, the Joint Commission on Technology and Science, and the Governor on the progress of the pilot program by no later than December 1 of each year that this section is in effect. The Commission shall submit a final report to the Commission on Electric Utility Restructuring, the Joint Commission on Technology and Science, and the Governor no later than December 1, 2024, analyzing the entire program and making recommendations about the continued placement of transmission lines underground in the Commonwealth. The Commission's final report shall include, but not be limited to, analysis and findings of the costs of underground construction and historical and future consumer rate effects of such costs, effect of underground transmission lines on grid reliability, operability (including operating voltage), probability of meeting cost and construction timeline estimates of such underground transmission lines, and aesthetic or other benefits attendant to the placement of transmission lines underground.*

As such, Dominion Energy Virginia (the Company) is responding to your August 5, 2020, request to assist the Commission in developing the annual report.

Sincerely,

Mark L. Allen

Mark Allen
Director
Electric Transmission Project Development and Execution

Background

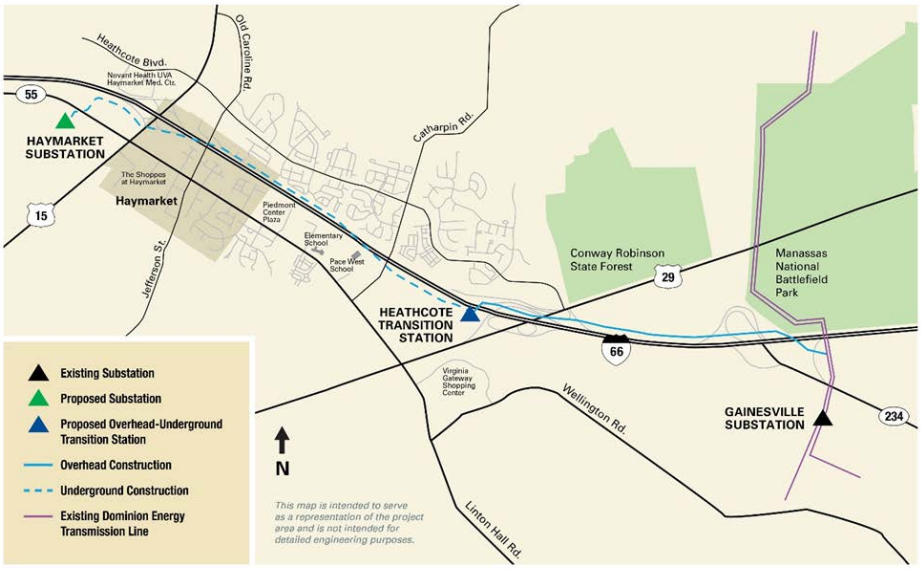
On March 1, 2018, the Virginia General Assembly passed legislation, specifically, Enactment Clause 2 of the Grid Transformation and Security Act of 2018 (GTSA), Chapter 296 of the 2018 Virginia Acts of Assembly (codified as Va. Code § 56-585.1:5), creating a pilot program to further the understanding of certain underground electric transmission lines in regard to electric reliability, construction methods and related cost and timeline estimating, and the probability of meeting such projections (the "Pilot Program"). The Governor signed the Pilot Program into law on March 9, 2018. The Pilot Program was effective July 1, 2018.

Consistent with this legislation, and subsequent to the Commission's June 12, 2018 Order on Remand in the Haymarket case (PUE-2015-00107), on July 2, 2018, the Company requested participation in the Pilot Program. Specifically, the Company requested approval of the proposed Haymarket 230 kV double circuit transmission line and 230-34.5 kV Haymarket Substation using the I-66 Hybrid Route as a qualifying project under Section 2 of Enactment Clause 2 of the GTSA.

On July 26, 2018, the Commission issued its Order on Request to Participate in the Pilot Program and approved Dominion Energy Virginia's request for the Haymarket Project using the I-66 Hybrid Route to participate in the Pilot Program. In so doing, the Commission also issued a Certificate of Public Necessity and Convenience ("CPCN") for the Haymarket Project.

Haymarket Project: I-66 Hybrid Route

The I-66 Hybrid Route is a 230 kilovolt (kV) double circuit electrical transmission line approximately 5.3 miles long; has both overhead and underground transmission facilities, includes an underground portion which is approximately 3 miles in length; and will be constructed within or immediately adjacent to the right of way of interstate highway I-66 in Prince William County and the Town of Haymarket.



Status Update

Since the Commission's July 26, 2018 approval of the Company's participation in the Pilot Program using the Haymarket I-66 Hybrid Route, the Company moved into the final engineering and construction phase of the project in earnest. Planning and construction of the Haymarket Project includes, among other things, the 230 kV double circuit transmission line, the construction of the new 230-34.5 kV Haymarket Substation, and an overhead/underground transition station known as the Heathcote Station.

The project has been in active construction for a about 12 months. As such, the Company is providing the following status update.

Project Challenges Overview

Since active construction began in fall of 2019, both duck bank and Horizontal Directional Drilling operations have experienced challenges that resulted in project delays, cost increases and engineering re-work. These challenges and consequences are detailed below.

Permitting Activities

All permits have been obtained to construct the line. The Army Corps of Engineers permit was issued on March 4, 2020 and is active until March 18, 2022.

Permits were also obtained from Norfolk Southern Railroad Corporation, Virginia Department of Transportation (VDOT) and the Department of Environmental Quality. The VDOT permit allows for construction activities, both overhead and underground portions, within VDOT right of way. This project is ongoing, and any permits set to expire within the construction period will be renewed as needed.

Abiding to the provisions of the Pilot Program, Dominion Energy Virginia has begun construction activities at the associated facilities (Haymarket Substation and Heathcote Station). The stations are being constructed in compliance with Prince William County's local zoning ordinances and Dominion Energy's Annual Standards and Specifications for Erosion and Sediment Control and Stormwater Management.

Real Estate Activities

As reported previously, since VDOT's approval and a finalized route alignment was determined the real estate process began in earnest with completing surveying and finalizing plats.

As of September 10, 2020, we have completed acquiring the right of way through the two parcels along the overhead segment, and 10 of the 11 along the underground segment. The Company is in the process of acquiring the final outstanding parcel needed to complete the right of way for the underground portion of the project, thus completing the real estate process for obtaining right of way.

Along the route, the Company needed to acquire right of way through a total of 13 parcels, represented by 11 property owners: two parcels owned by home owner associations; two parcels owned by Prince William County; one parcel owned by an individual; and, eight parcels owned by commercial entities. The overhead segment right of way required easements through two parcels. The underground segment right of way required easements through 11 parcels.

Along the length of the right of way for both the overhead and underground portions (5.25 miles), the company needed to acquire easements of approximately 2.14 miles, or 40.76%, of the route. The remainder, 3.11 miles, or 59.24%, of the route was obtained via VDOT permit.

The underground segment (2.96 miles) specifically required easements from private landowners along approximately 1.68 miles, or 56.8%, with the remainder via VDOT permit along 1.28 miles or 43.2%.

As of September 10, 2020, the Company has spent $6,142,106.17 on easements.

The Company has also completed the transaction for the Haymarket Substation for $320,754.00

As previously reported, the Company competed the transaction for the Heathcote transition station for $6,250,000.

Engineering

General

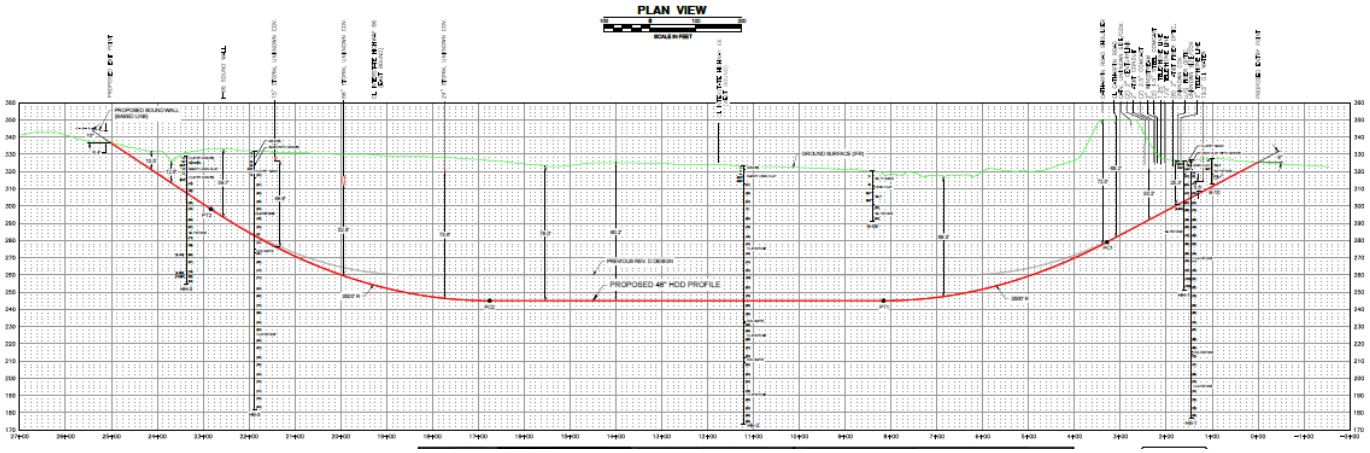
As previously reported, the final design of the underground portion of the Haymarket Project incorporates: two parallel 230 kilovolt (kV) circuits; two cables per phase; 5000kcmil enameled compact segmental copper conductor with 900 mils of XLPE insulation, embedded fiber, and a copper sheathing; integrated communication and distributed temperature sensing (DTS) fiber; 14 precast concrete vaults; and ten fiber handholes. Installation is a combination of horizontal directional drill (HDD) and open trenching.

The cable system design process included evaluation of items such as: cable construction, section lengths, route selection, elevation, circuit separation, mutual heating, load factor, dielectric loss, proximity to existing utilities, skin effect, proximity effect and backfill design. Balancing these components have been optimized to limit the impact on local residence, meeting VDOT specifications, meeting the required power transfer capability, and staying within the bounds of the SCC's final CPCN order as well as relevant factors stipulated by the Pilot Program.

Engineer Challenges

Initial HDD activities resulted in several inadvertent releases (IR) of drilling mud to the surface. A third round of geotechnical bores indicated that pockets of highly fractured rock were most likely to blame. Based on the analysis of the reel-time data collected during pilot hole operations

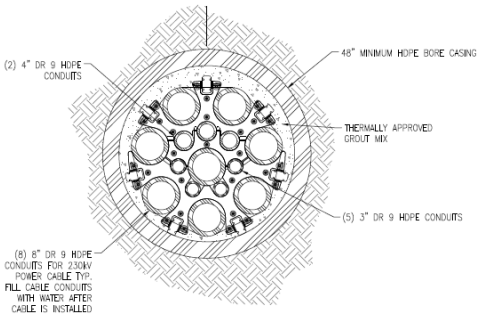
in conjunction with information from the additional bore samples it was determined that by increasing the drill profile depths to approximately 80’ from 65’ (East Profile Rev. E) the likelihood of additional IR’s would be drastically reduced. No additional IR’s have occurred to date.

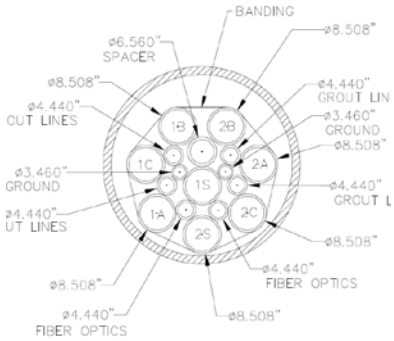


East Profile Rev. E

However, increasing the drill depth did encroach on the 10’ “ampacity-buffer” incorporated into the initial design. The buffer was intended to allow for minor field adjustments to occur without any major impacts on ampacity rating of either circuit. As a result, the circuit ratings have been reduced from 1047MVA to 1036MVA.

Geothermal analysis was also conducted on bore samples. The results of which identified areas with thermal resistivity as high as 120°C-cm/W at 3% moisture content, twice that of ideal conditions. Poor thermal conditions and deeper than anticipated HDD installations warranted the incorporation of thermal grout into the overall HDD design. Unfortunately, the inherent nature of the grouting process does not allow for the verification of 100% fill, which is paramount in maintaining the required line ratings. To combat the uncertainty of the grouting process the design was shifted from a “spacer” to a “spacer-less” bundle arrangement. A “spacer-less” arrangement provides an environment that reduces turbulent flow, decreases friction, and increases the overall chances of 100% annular fill.





Bundle Arrangement with Spacers Bundle Arrangement without Spacers

Furthermore, unfavorable thermal conditions, the presence of dense rock, and the potential of mutual heating at "pinch points" deemed it necessary to increase the cable size from 3500 to 5000 kcmil, incorporate enameled conductor into the cable design, and compliment open trench duct banks with varying types approved thermal backfills to achieve the even the new 1036MVA power transfer capability.

Construction Progress Update

Haymarket Substation:

The developer turned over the site to Dominion Energy early in 2020. The entrance to the substation, initial grading, and storm water piping was installed during July and August 2020. The terminal structure foundations for the underground lines were installed during the month of August 2020. The underground transmission lines are being installed from Route 55 into the station and will be completed by the end of 2020. In addition to completing this work, the substation wall will be installed during 2020. These efforts will allow our civil team to complete the curb and gutter installation prior to installing the internal substation components during the 2nd, 3rd, and 4th quarter of 2021.

Underground Construction – North Side of Route 55 to Wal-Mart:

Construction started on the underground portion of the project in November 2019 on a small portion of the project near Wal-Mart and Route 55 in Haymarket. This section was scheduled to be completed by February 2020. However, during the construction of this section Dominion Energy encountered a SummitIG fiber line in an unanticipated location (which may have been outside SummitIG's easement) that interfered with our planned duct bank route. This resulted in a significant delay on this phase of the project as we made efforts to locate and avoid impacting this in-service fiber line. After consulting with SummitIG and attempting to locate the line on several occasions, we sent a device that senses movement through a spare conduit, and we excavated over the top of the fiber line. No damage occurred to the fiber line, but the investigation took a significant amount of time and coordination. As a result, this section of the

project took approximately 90 days longer than anticipated. The manholes (101 and 201) for each circuit were set on this phase of the project.

After the underground duck bank was installed, this section experienced additional challenges in July 2020 when an on-site contractor working on the new Home Depot development struck and damaged portions of the duck bank The contractor caused several conduits to be damaged when they drilled through the duct bank to install explosive charges to excavate rock in these areas. We are intending on revisiting this site to make repairs during the month of October 2020.

Underground Trenching Work from Wal-Mart to Drill Pad 4:

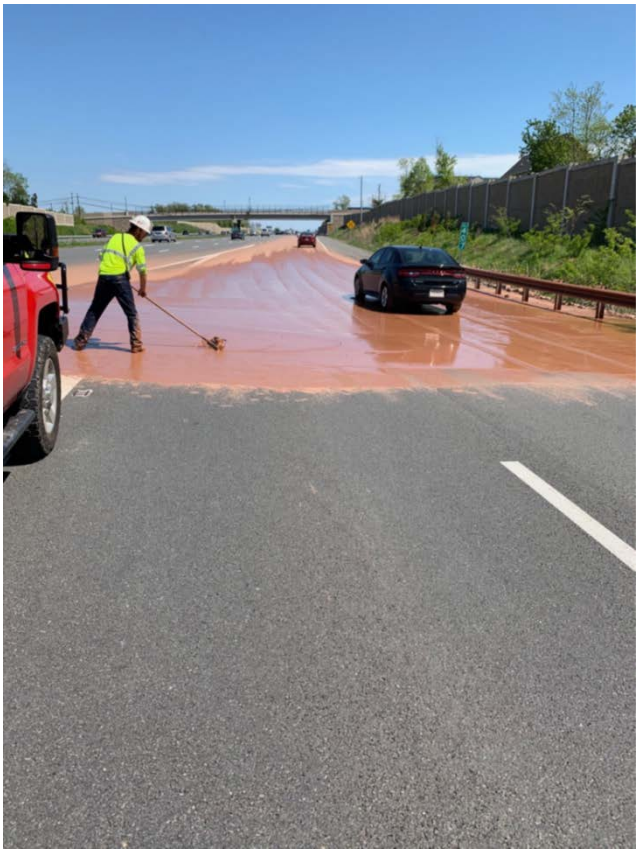
A gas line was discovered as we open trenched the duck bank in this section. After receiving conformation from Washington Gas that this line was abandoned, we were required to have our contractor excavate approximately 200 feet of abandoned line, which extended our timeline for completing this section of the project. The duct bank installation is now complete as it routes behind Wal-Mart to the western most HDD drill pad. Manholes 102 and 202 were set just west of the drill location adjacent to the Kohl's.

Western HDD Drill Path Drill Pad 4 (Kohl's Haymarket) Drill Pad 3 (Jordan Lane):

In the process of setting up for the first HDD drill path, our contractor was locating several facilities at the off ramp from I-66 East to Route 15 South. After having their equipment on-site and beginning to tie down the rig to start drilling it was discovered that there were several underground facilities that were not where we anticipated them to be based on available documentation. One facility was a Washington Gas line that was further southwest than expected. Our contractor had to meet with Washington Gas to make sure that sitting on top of this line would be acceptable. This was approved and approach distances were discussed and approved.

The second issue discovered was a second fiber line with SummitIG that was originally outlined by SummitIG as being 4 feet deep on the embankment of Route 15. After further investigation, the line was found to be actually 17 feet deep and directly in the path of the HDD route. We discovered this issue in late January and had to have SummitIG relocate their line before we could begin any significant amount of drilling. Our HDD contractor was on standby for approximately three and a half months.

Once the fiber line was relocated, we began the pilot hole drilling process for the 2185 west circuit. This activity took 12 days to complete. After completing the 2185W pilot hole, we set up the pilot hole drilling operations for the 2184 west circuit. On May 2, 2020, during pilot hole drilling operations (at approximately 1735 horizontal feet) the drilling mud found an existing rock fracture and escaped to the surface (known as an Inadvertent Release "IR") on I-66 in the right east-bound lane. In our coordination with VDOT, VDOT asked that all activities cease until VDOT's team had a chance to review the series of events that led to the IR and to evaluate the plan to prevent future events from reoccurring. VDOT held this approval for six working days while the pavement was repaired by Dominion Energy's contractor.



With the multitude of challenges related to the HDD crossings, Dominion Energy hired a consultant that specializes in this method of construction to review design, geotechnical information and provide oversite on the contractors daily drilling logs.

We completed the pilot hole for the 2184W path without any other events and moved into reaming activities on the 36" ream for the 2184 W.

While in the process of reaming the 36" ream on the 2184 W we had another IR of the drilling mud at approximately 900 feet into this reaming pass. Fortunately, this IR did not occur on the highway but in a ditch near the shoulder of the highway. This IR occurred a couple days after pilot hole release on the eastern crossing in the West Bound lane of I-66. It was at this time that we decided to completely reevaluate our HDD crossings and designs. Ultimately, the original 2184W path (completed pilot hole and 900 feet of 36" ream) was abandoned due to ongoing

concerns of the potential for additional IRs. VDOT indicated that another IR in the highway would jeopardize our permit for the project.

As a result, a new 2184 W path was designed at a greater depth. Prior to drilling the newly designed path we will need to grout the now abandoned, original route. Grouting will take place during the September 2020.

At this point in the project we had one successful pilot hole completed for the 2185W crossing. While evaluating the two crossings with the IRs we decided to move to reaming activities on the 2185W path. We started the 36" reaming on June 9th and completed the 60" ream on September 2nd. We installed the 48" HDPE casing in this hole the first week in September. This section is complete except for the installation of the internal conduits, grouting and cables.

Duct Bank from Drill Pad 3 to Drill Pad 2 (North Side of I-66)

The duct bank work in this section has several portions that are complete with several sections to be complete once all the HDD work is done. Portions of this duct bank are installed in the middle of Jordan Lane and we will be repaving Jordan Lane after the work has been completed. As part of easement agreement with Prince William County, we are required to bring the last 1000 feet of Jordan Lane up to current VDOT standards so the roadway can be turned over to VDOT from Prince William County. The engineering and approvals have been completed, pending the actual field work.

Eastern HDD Drill Path Drill Pad 2 (Parks of Piedmont HOA) Drill Pad 1 (Catharpin Road):

On May 19th we began the 2185 east pilot hole operation. 1793 linear feet was complete before an IR occurred in the I-66 west bound lane on August 26th. When this IR was presented to VDOT, they required Dominion to cease all operations pending a review of the events leading up to the IR and fully report on methods we will use to prevent reoccurrence of future events. With the previous IRs on the west crossings, our contractor had modified the drilling mud mixture to lower the risk of having an IR. VDOT insisted that we do more. This time we introduced a drilling mud additive to the fluid that would increase the probability of sealing existing rock fractures. Furthermore, we reevaluated the routes of each of the future drill paths realizing that the first successful path was at a depth of ~60 feet and each IR had occurred at a depth of 45' so we decided to increase the depth of future lines (see Engineering Challenges above).

As a result of these measures, the 2185E original path and the initial 1793' that was drilled for the pilot hole was abandoned. We did not feel we could complete the pilot and three reaming passes without future IRs at this depth.

When drilling, the pressures in the hole increase the farther the drill bit is away from the rig, so we explored the potential of completing the pilot hole using an intersect method. This method requires drilling from the north and south sides simultaneously to keep pressures lower and bump bits to complete the pilot hole. We completed additional geotechnical borings and evaluations to design the new routes at a greater depth. We introduced drill trips where the bits would return to the surface once we completed 800 feet and 1700 feet of distance to condition the hole. Conditioning the hole involves sealing the outer edge and cleaning excess cuttings from the hole which allows for the drilling mud to flow to the back to the drilling rigs with greater ease, decreasing pressures and lowering the probability of mud escaping through rock fractures.

Completing this evaluation, changing our work methods and applying these changes to all HDD routes delayed original schedules and increased time to completion. Not only was the project timeline increased, but these modifications came with increased costs.

After implementing these changes, we have completed both 2185E and 2184E pilot holes at a depth of ~60 feet without any additional IRs and we have completed the 36" ream on the 2184E. We are currently working on the 48" ream on this route.

Drill Pad 1 to Heathcote:

Very limited work has been able to be completed on this section of the project due to the space required for the HDD operations at drill pad 1. The duct bank into the station at Heathcote will be completed in September. Manholes 207 and 107 just outside the station have been installed.

Heathcote Station:

The substation work at this site is well on its way to being completed. We anticipate the work at this site will be completed before the end of 2020. We completed a significant amount of grading work in April, installed the overhead structures in May, and have been working on installing the duct bank and substation equipment since that time.

Overhead Line Heathcote to Cushing Road:

The monopoles have all been installed and the conductor has been pulled on all sections except the last crossing into Heathcote across I-66. State trooper availability for traffic control during wire pulling activities has caused some delays with conductor installation. We anticipate this work will be completed before October 1. Access removal and restoration activities will begin in October.

Loudoun Substation:

All substation work will be complete at Loudoun to make the conversion of the 124 line (115kV) to the 2140 line (230kV) by middle of October. The conversion work that NOVEC needs to complete at Catharpin DP will be completed by mid-October and this line will be energized at 230 kV during October.

Gainesville Substation:

The work at Gainesville substation to complete the 115kV conversion to 230kV will be completed in the fourth quarter of 2020. The switching at this site was complicated. Because of reliability issues, we were required to install a temporary line to keep several critical customers energized while certain sections of the station were reworked.

Cost

The current cost estimate is approximately $180 million, revised from $172 million. The estimated cost breakdown is shown below. The associated costs remain as estimates and subject to change.

Increase costs are predominately due to the construction of the underground portion of this project. Most of these costs are associated with the delays and challenges specific to the HDD crossings, as noted above.

To date, the company has spent approximately $121,404,875 on project-related activities.

Activity	Current Cost Estimate	Totals
Transmission Line Costs		$ 125816505
Overhead	$17,793,401	
Underground	$108023104	
Station Costs		$54,183,495
Haymarket Substation (new)	$17,952,646	
Heathcote Transition Station (new)	$31,030,849	
Gainesville Substation	$2,350,000	
Loudoun Substation	2,850,000	
Total		**$180,023,104**

Timeline

The new scheduled completion date for this project is March 2022. This change, from the original completion date of July 2021, is primarily driven by the construction challenges as noted above.

Conclusion

Although the Company and its contractors planned for the inevitable challenges that occur while underground transmission lines, since construction has commenced, the project has experience unexpected challenges above what was anticipated. As a result, the completion date has been delayed, and estimated project costs have been increased.

APPENDIX 4

Table of Solar and Wind Construction and Development Status

Investor Owned Utilities

Status of Solar and Wind Facilities
Constructed or Under Development

As of June 30, 2020*	IOU Owned/ Operated - Jurisdictional	MW	IOU Jurisdictional PPAs	MW	IOU Owned/ Operated - Ring Fenced	MW	Totals
Solar Constructed since July 1, 2018:							
Dominion Energy Virginia:	Colonial Trail West (US3) (12/26/19)	142	N/A		Hollyfield (9/6/18)	17	
					Puller (10/31/18)	15	
					Montross (12/12/18)	20	
					Gloucester (4/22/19)	20	
	SubTotal:	142	SubTotal:	0	SubTotal:	72	214
Solar Under Development since July 1, 2018:							
Dominion Energy Virginia:	Spring Grove I (US3)	98	Water Strider	80	Grasshopper Solar	80	
	Sadler Solar (US4)	100			Belcher Solar	88.2	
					Fort Powhatan	150	
					Bedford Solar	70	
					Maplewood Solar	120	
					Rochambeau Solar	20	
Appalachian Power Company:	Multiple Sites	105	Depot Solar	15			
	SubTotal:	303	SubTotal:	95	SubTotal:	528	926.2
Solar Constructed & Under Development Totals:		445		95		600	1140
Wind Constructed since July 1, 2018:							
	N/A		N/A		N/A		
	SubTotal:	0	SubTotal:	0	SubTotal:	0	0
Wind Under Development since July 1, 2018:							
Dominion Energy Virginia:	Coastal Virginia Offshore Wind Project	12	N/A		N/A		
	Comm. Offshore Wind Project (Stages 1-3)	2600					
	SubTotal:	2612	SubTotal:	0	SubTotal:	0	2612
Wind Constructed & Under Development Totals:		2612		0		0	2612
Solar & Wind Operational & Under development since July 1, 2018:							3752

*This data is provided informally to Staff as of June 30, 2020. This data does not include any projects announced after June 30, 2020.
**The MW indicated are alternating current (AC).

Electric Cooperatives

Status of Solar and Wind Facilities Constructed or Under Development

As of June 30, 2020*	Cooperative Owned/ Operated - Jurisdictional	MW	Cooperative Jurisdictional PPAs	MW	Owned/ Operated - Ring Fenced	MW	Totals
Solar Constructed since July 1, 2018:							
	N/A		N/A		N/A		
	SubTotal:	0	SubTotal:	0	SubTotal:	0	0
Solar Under Development since July 1, 2018:							
NOVEC:			PPA, amt. of VA facilities TBD				
	SubTotal:	0	SubTotal:	0	SubTotal:	0	0
Solar Constructed & Under Development Totals:		0		0		0	0
Wind Constructed since July 1, 2018:							
	N/A		N/A		N/A		
	SubTotal:	0	SubTotal:	0	SubTotal:	0	0
Wind Under Development since July 1, 2018:							
	N/A		N/A		N/A		
	SubTotal:	0	SubTotal:	0	SubTotal:	0	0
Wind Constructed & Under Development Totals:		0		0		0	0
Solar & Wind Operational & Under development since July 1, 2018:							0

*This data is provided informally to Staff as of June 30, 2020. This data does not include any projects announced after June 30, 2020.

**The MW indicated are alternating current (AC).

Others

Status of Solar and Wind Facilities
Constructed or Under Development

As of June 30, 2020*	Other Owned/ Operated	MW	Totals
Solar Constructed since July 1, 2018:			
TWE Myrtle Solar Project, LLC	Myrtle Solar	15	
	SubTotal:	15	15
Solar Under Development since July 1, 2018:			
Pleinmont Solar LLC:	Pleinmont Solar	500	
Skipjack Solar Center LLC:	Skipjack Solar	180	
Cypress Creek Renewables:	Turner Solar	20	
	Mt. Jackson Solar I	16	
Strata Solar Development LLC:	Danville Farm	12	
Carolina Solar Energy LLC:	Powells Creek Farm Solar	70	
	Sunnybrook Farm Solar	51	
SolUNesco LLC/Madison Solar LLC:	Sol-Madison Solar	63	
New Energy Ventures:	Rives Road Solar	20	
SolSystems:	Sol Leatherwood Solar	20	
NextEnergy:	Gardy's Mill Solar	14	
North Ridge Resources:	Pamplin Solar	16	
Caden Energix:	Caden Energix Hickory	32	
Altavista Solar:	Altavista Solar	80	
Savion:	Greensville Co. Solar Project	80	
Brookfield Renewable:	Otter Creek Solar	60	
	Pumpkinseed Solar	60	
Foxhound Solar:	Foxhound Solar	83	
Urban Grid:	Crystal Hill Solar	65	
Apex Clean Energy Holdings LLC:	Rivanna Solar	13	
Nokesville Solar:	Nokesville Solar	20	
Engie:	Whitehorn Solar	50	
	SubTotal:	1524	1524
Solar Constructed & Under Development Totals:		1539	1539

Others

Status of Solar and Wind Facilities Constructed or Under Development

Wind Constructed since July 1, 2018:			
	N/A		
	SubTotal:	0	0
Wind Under Development since July 1, 2018:			
	N/A		
	SubTotal:	0	0
Wind Constructed & Under Development Totals:		0	0
Solar & Wind Operational & Under development since July 1, 2018:			1539

*This data is from the DEQ's website found at:
https://www.deq.virginia.gov/Programs/RenewableEnergy/PermittingCompliance.aspx
**This data includes facilities where a PBR has been issued by DEQ