COMMONWEALTH OF VIRGINIA

STATE CORPORATION COMMISSION

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

COMBINED REPORT

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

November 30, 2018

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COMMONWEALTH OF VIRGINIA

STATE CORPORATION COMMISSION

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November 30, 2018

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

The Honorable Frank W. Wagner
Chairman, Senate Committee on Commerce and Labor

The Honorable Thomas K. Norment, Jr.
Member, Senate of Virginia
Chairman, Commission on Electric Utility Regulation

The Honorable Terry G. Kilgore
Chairman, House Committee on Commerce and Labor

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.

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

Respectfully submitted,

Mark C. Christie, Chairman

Judith Williams Jagdmann, Commissioner

TABLE OF CONTENTS

GLOSSARY OF TERMS

APCo	Appalachian Power Company
CPCN	Certificate of Public Convenience and Necessity
Code	Code of Virginia
Commission	Virginia State Corporation Commission
DEV	Virginia Electric and Power Company d/b/a Dominion Energy Virginia
Dominion	Virginia Electric and Power Company d/b/a Dominion Energy Virginia
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
IOU	Investor-owned electric public utility
IRP	Integrated Resource Plan
Interconnection Regulations	Regulations Governing Interconnection of Small Electrical Generators
kV	Kilovolt
MW	Megawatt
O&M	Operations and maintenance
ODEC	Old Dominion Electric Cooperative
PJM	PJM Interconnection, LLC
PPA	Power Purchase Agreement
Phase I	First three years of ten-year Grid Transformation Plan
Pilot Program	Pilot Program requiring the construction of the qualifying electrical transmission lines of 230 kV or less in whole or in part underground
RAC	Rate Adjustment Clause
RFP	Request for proposal
RTE	Regional Transmission Entity
RTEP	Regional Transmission Expansion Plan
Report	Combined report of the Virginia State Corporation Commission
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
Staff	State Corporation Commission Staff
UVA	University of Virginia

EXECUTIVE SUMMARY

This document contains the combined reports ("Report") of the Virginia State Corporation Commission ("Commission") pursuant to Enactment Clauses 2, 14, and 19 of Senate Bill 966. Specifically:

Grid Modernization, Reliability, and Integration of Renewables: 2018 Virginia Acts of Assembly Chapter 296, Enactment Clause 19, 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;

The Commission currently is considering Virginia Electric and Power Company d/b/a Dominion Energy Virginia's ("DEV" or "Dominion") proposed Grid Transformation Plan, a 10-year plan that includes seven components in Phase I: (i) smart meters; (ii) customer information platform; (iii) reliability and resiliency; (iv) telecommunications infrastructure; (v) cyber and physical security; (vi) predictive analytics; and (vii) emerging technology. A Commission final order on this petition is due on January 24, 2019.

Transmission Line Undergrounding Pilot: 2018 Virginia Acts of Assembly Chapter 296, Enactment Clause 2, 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.

To date, the Commission has approved the undergrounding of a transmission project, known as the Haymarket Project, in Prince William and Loudoun Counties along part of Interstate 66. The Commission has not received any other transmission line applications where the applicant is seeking consideration for the pilot program.

Construction of New Solar and Wind Projects: 2018 Virginia Acts of Assembly Chapter 296, Enactment Clause 14, 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; and (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.

The development of new solar and wind projects continues. Highlights of this report include the Commission's recent approval of Dominion's applications for approval of the 80 megawatt ("MW") Water Strider solar power purchase agreement and for the 12 MW Coastal Virginia Off-shore Wind project. Additionally, Dominion and Shenandoah Valley Electric Cooperative have issued requests for proposals for solar and/or wind facilities in the Commonwealth.

INTRODUCTION

Composition of the Electric Industry in Virginia

The responsibilities of the Commission include the regulation of a diverse electric industry pursuant to the Virginia Constitution and laws enacted by the Virginia General Assembly ("General Assembly"). Virginia's electric industry, for which the Commission regulates the rates and services to customers, consists of three investor-owned utilities ("IOUs") and 13 member-owned electric cooperatives as identified below.[1]

Virginia Electric Utilities and Cooperatives

	Virginia Customers[2]	% of Virginia Customers
Investor-Owned:		
Dominion Energy Virginia	2,574,679	67.53
Appalachian Power Company	536,588	14.08
Kentucky Utilities Company	28,122	0.74
Electric Cooperatives:		
Northern Virginia	166,296	4.36
Rappahannock	160,573	4.21
Shenandoah Valley	93,405	2.45
Southside	56,072	1.47
Central Virginia	36,702	0.96
A&N	35,401	0.93
Powell Valley	31,651	0.83
Mecklenburg	31,322	0.82
Northern Neck	18,931	0.50
BARC	12,723	0.33
Prince George	11,638	0.31
Community	11,055	0.29
Craig-Botetourt	7,145	0.19
Totals	3,812,303	100.00

[1] Non-jurisdictional utilities, such as municipal electric utilities, also provide service in Virginia but are not regulated by the Commission.

[2] Total Virginia customer numbers are reported in Federal Energy Regulatory Commission ("FERC") Form 1 and Annual Operating Reports.

Nine of the electric cooperatives listed above are distribution cooperatives that are members of the electric generation and transmission cooperative operating as Old Dominion Electric Cooperative ("ODEC"). Dominion, Appalachian Power Company ("APCo"), and ODEC are members of PJM Interconnection, LLC ("PJM"), a regional transmission entity ("RTE") that operates the regional transmission system and the wholesale power market in all or parts of the District of Columbia and 13 states: Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia.

Grid Transformation and Security Act - Background

In 2018, the General Assembly passed the Grid Transformation and Security Act ("GTSA" or "SB 966"),[3] which, among other things, provided for triennial reviews of base rate earnings for APCo beginning in 2020 and for DEV beginning in 2021. This law also created a new rate adjustment clause ("RAC") for distribution grid transformation projects and changed the filing requirement of Integrated Resource Plans ("IRPs") from annually to every three years to coincide with the year prior to the filing of a triennial review. Additionally, the law 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.

[3] 2018 Va. Acts ch. 296.

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. According to newly revised Code of Virginia ("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."

As of the filing date of this Report, only one such petition has been received by the Commission, filed by DEV on July 24, 2018, and docketed as Case No. PUR-2018-00100.[4] This petition is currently under Commission consideration for a determination of its reasonableness and prudence. By law, the Commission's final order on this petition must be entered no later than six months from the date of filing, which in this case would be no later than January 24, 2019.[5]

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

(i) Reliability of Electric Transmission or Distribution Systems

As previously mentioned, at transmission-level voltages, PJM is the 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 is required to maintain reliability of the transmission grid,

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[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*, Case No. PUR-2018-00100, Doc. Con. Ctr. No. 180770080, Order for Notice and Hearing (July 26, 2018) (*"GT Plan* case")

[5] Code § 56-585.1 A 6.

which includes addressing transmission system constraints that impede electric power delivery, and properly adjusting the output of all generation facilities 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 electric grid. That process works as follows.

First, the RTEP, which is performed annually, is a 15-year look-ahead at various drivers that impact electric reliability, such as projected system load growth, generation additions and retirements, and new state or other governmental energy initiatives. Once those drivers have been identified, the electric grid is then analyzed using power flow studies and other tools to identify areas of potential concern. Those concerns could include overloaded transmission lines, transformers, switchgears, or other facilities. After identifying such potential concerns, PJM works with member transmission owners and stakeholders to identify solutions to identified problems.[6] These solutions may include construction of new transmission lines and/or substations, rebuilding of existing transmission lines, or installation of other electrical equipment with higher electrical ratings to remediate the identified problems.

As an "open" process, the RTEP requires that all identified transmission improvement needs and corresponding solutions proposed by member utilities be publicly discussed at stakeholder meetings. Solutions selected from the RTEP bidding process are then recommended to the PJM Board for approval before they can be formally added to the PJM transmission expansion plan. The costs of the selected system improvements are allocated to PJM transmission owners according to specific rules in PJM's governing documents.

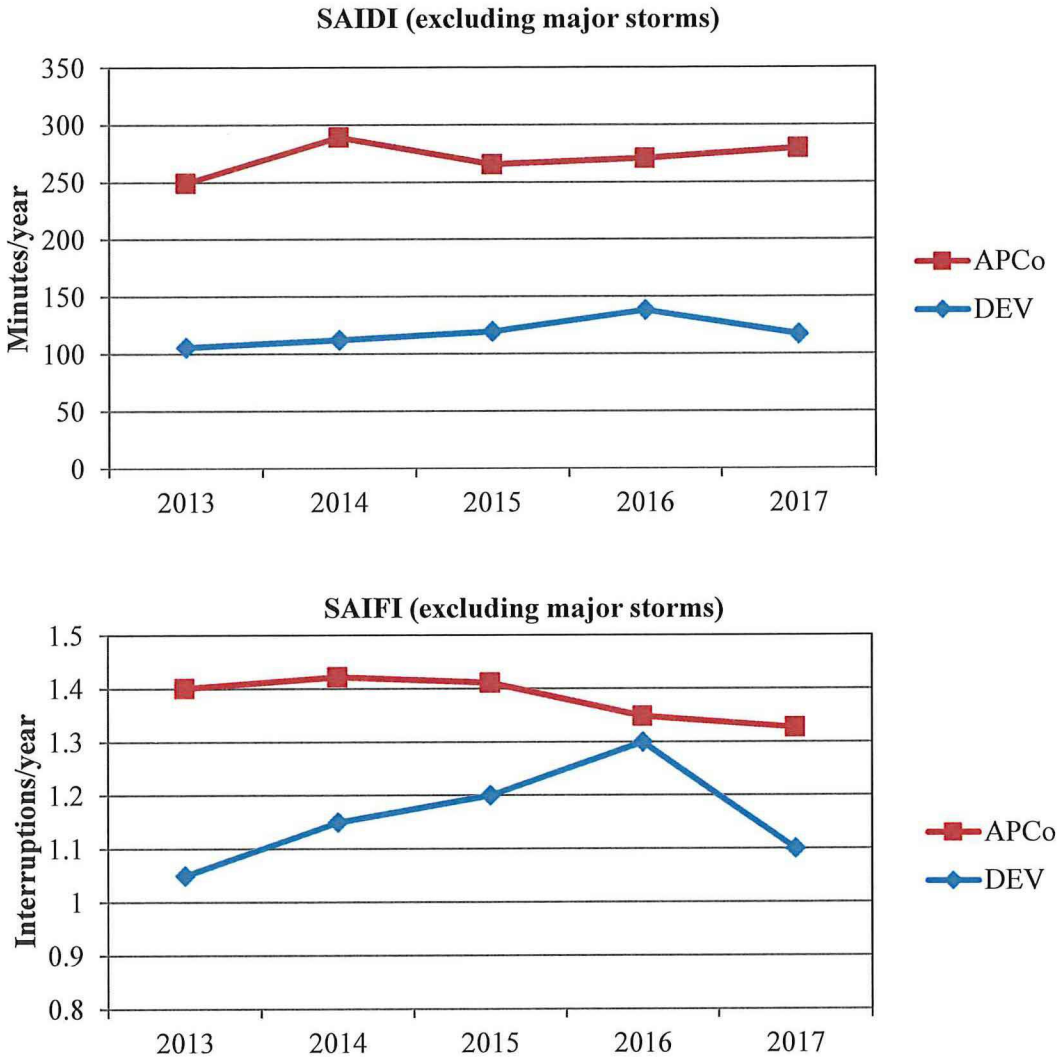
[6] Projects to resolve grid concerns may involve a compatibility bidding process. PJM has rules governing what types of projects can be competitively bid.

In addition to the PJM RTEP process, Virginia electric utilities seeking to construct transmission facilities that are not considered ordinary extensions or improvements in the usual course of business are required to file an application at the Commission for issuance of a Certificate of Public Convenience and Necessity ("CPCN") under Title 56 of the Code of Virginia. During the Commission proceeding, the Commission evaluates several factors including the need for the project, the proposed route, impact on the environment, and the impact of the proposed facilities upon the reliability of electric service delivery within the Commonwealth. In tandem, the above processes have worked effectively to maintain electric service reliability within the Commonwealth.

In addition to issuing CPCNs for transmission facilities, the Commission tracks distribution reliability, i.e., the delivery of electricity at sub-transmission voltages to end users. The Commission considers several measures of distribution reliability, including the Annual Reliability and Tree Trimming Report required from each of the three Virginia IOUs. This report tracks various reliability indices including, but not limited to, System Average Interruption Frequency Index ("SAIFI")[7] and System Average Interruption Duration Index ("SAIDI").[8] For the two largest investor-owned utilities, APCo and Dominion, the SAIDI and SAIFI indices have remained somewhat consistent over the previous five years as shown in the graphs below, derived from the companies' annual reliability reports submitted to the Commission.

[7] SAIFI 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 over a specific period of time. It should be noted that SAIFI and SAIDI omit the impacts of major events, such a hurricanes or derechos, from their calculations.

[8] SAIDI is commonly used by electric utilities as an indicator of the duration of electrical outages, defined as the average outage duration for each customer served over a specific period of time.



While system-based metrics like SAIDI and SAIFI are universally used by the electric utility industry to monitor distribution reliability trends for a specific utility, it is important to understand that comparing distribution reliability of utilities is complicated due to factors such as differences in utility infrastructure (underground vs. overhead), customer density, tree exposure, topography, weather incidents/patterns, and definition of major storm/event. Weather can vary considerably for one utility from year to year, or between utilities within the same year and impact distribution reliability. Similarly, differences in topography also can impact distribution reliability; the service territory of one Virginia utility contains a great deal of mountainous, rural, and customer-sparse

territory in the western part of Virginia, whereas the service territory of another Virginia utility in the eastern part of the state is generally flatter and includes large customer-dense urban and suburban areas.

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

Dominion states that its proposed Grid Transformation Plan ("GT Plan"), which is currently pending before the Commission, would allow the Company to integrate customer-level distributed energy resources, such as rooftop solar, safely and effectively. There, however, appears to be no proposed programs to incentivize customer-owned distributed energy resources as part of the GT Plan.[9]

To facilitate the integration of small renewable resources on Virginia's electric distribution grid, on September 5, 2018, the Commission initiated a rulemaking proceeding (Case No. PUR-2018-00107) to update the Commission's existing "Regulations Governing Interconnection of Small Electrical Generators," 20 VAC 5-314-10 *et seq* ("Interconnection Regulations"),[10] last revised in May 2009. Since then there have been numerous changes in applicable laws, FERC guidelines, and technological changes in the power industry that rendered the existing Interconnection Regulations inadequate to support the proper integration of a growing number of renewables into the electric grid. As part of this proceeding, Commission Staff is soliciting comments from, and scheduling meetings with, stakeholders and persons having an interest in the Commission's Interconnection Regulations and the interconnection of small electrical generators within the Commonwealth to develop proposed revisions to the Interconnection Regulations.

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[9] The total installed net metering capacity, as reported to the Commission by DEV, APCo, and the Virginia electric cooperatives, is approximately 59 MW (cumulative, starting from previous years up to the filing date of this report), and 15.8 MW (installed in 2018 alone).

[10] The Interconnection 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.

The integration of utility-scale generation resources into the electric transmission grid requires a different process than interconnection at the distribution level. Developers of utility-scale distribution resources 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 the PJM-maintained transmission grid. That process identifies any electric infrastructure upgrades needed to address potential reliability issues caused by integration of the proposed resource and, 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 certain utility-owned projects and for non-utility projects. In such proceedings, the Commission must determine, among other things, 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 necessary to maintain reliability.

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."

(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, Dominion and APCo, since 2014.[11] All the investments were made prior to passage of the GTSA.

[11] The information on the following tables is taken from the 2015, 2016, and 2017 SEC Form 10-K filings of Dominion Energy, Inc., and American Electric Power Company, Inc.

Dominion Energy Virginia
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	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
TOTAL		**2597.0**		**2448.0**		**1625.0**		**97.0**

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
TOTAL		**(377.1)**		**791.9**		**505.5**		**54.4**

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

Virginia's two largest IOUs meet peak demand[12] through a combination of company-owned generation and access to PJM's energy markets. Since 2009, Dominion's coincident summer peak demand has decreased by an annual rate of 0.4%.[13] Since 2008, APCo's Virginia jurisdictional coincident summer peak demand has decreased by an annual rate of 0.8%.[14]

[12] "Peak demand" means each IOU's demand during the hour of the coincident summer peak that occurs in PJM.
[13] *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 rate adjustment clause designated Rider US-3, under § 56-586.1 A 6 of the Code of Virginia*, Case No. PUR-2018-00101, Doc. Con. Ctr. No. 181140018, Direct Testimony of Staff witness Earnest J. White (Nov. 20, 2018).
[14] *Petition of Wal-Mart Stores East, LP and Sam's East, Inc., For permission to aggregate or combine demands of two or more Individual Nonresidential retail customers of electric energy pursuant to § 56-577 A 4 of the Code of Virginia*, Case No. PUR 2017-00173,. Doc. Con. Ctr. No. 180830095, Direct Testimony of Chad N. Burnett at 3 (Oct. 30, 2018); and *Petition of Wal-mart Stores, LP and Sam's East, Inc., For permission to aggregate or combine demands of two or more individual nonresidential retail customers of electric energy pursuant to § 56-77 A 4 of the*

Both companies appear to have sufficient capacity to meet their peak demands for the immediate and foreseeable future, either through company-owned generation or PJM's markets. In 2018, Dominion placed approximately 1,300 MW of generating capacity into "Cold Reserve."[15] Dominion maintains that the economics of these generating units make the units no longer efficient to bid into PJM's capacity and energy markets; however, it appears that ratepayers continue to pay for these units in base rates. This decision may require Dominion to replace that generation in kind beyond the near term. APCo may have no need to add additional capacity resources for the foreseeable future.

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

Dominion has petitioned the Commission for approval for the first three years ("Phase I" covering 2019 through 2021) of the entire ten-year GT Plan to transform the company's electric distribution grid. Of the seven programs proposed under the GT Plan, two components appear designed primarily to address system hardening and enhanced physical security - the "Grid Hardening" component of the Reliability and Resiliency program and the "Cyber and Physical Security" program.

Under the proposed Grid Hardening program, Dominion would:

- Replace and rebuild targeted distribution feeder segments based on performance, condition and architecture;
- Implement new distribution system design and construction standards;
- Implement new electrical loading standards and add new sources of service;
- Implement new vegetation management programs; and
- Proactively upgrade components of the Company's distribution system infrastructure.

Code of Virginia, Case No. PUE-2017-00174, Doc. Con. Ctr. No. 180830090, Direct Testimony of Chad M. Burnett at 3 (Oct. 30, 2018).

[15] The facilities placed in cold reserve are Bellemeade Power Station, Bremo Power Station Units 3 and 4, Chesterfield Power Station Units 3 and 4, Mecklenburg Power Station Units 1 and 2, Pittsylvania Power Station, and Possum Point Power Station Units 3 and 4. Facilities in cold reserve are not currently operating but can be restarted if DEV's needs so require.

Specifically, Dominion would target approximately 300 miles of the Company's worst performing distribution feeder segments for improvement in Phase I of the GT Plan to achieve a projected reduction in SAIDI (excluding major events) of 1–4 minutes and SAIFI (excluding major events) of 0.02–0.06.[16] Under Phase I, Dominion anticipates spending approximately $231.9 million in capital investment and $35.8 million in operations and maintenance ("O&M") investment for this program, excluding financing costs. Over the entire 10-year plan period, the company estimates it would spend approximately $1.5 billion in capital investment and $71.3 million in O&M investment, excluding financing costs.

As it relates specifically to enhanced physical security measures under the GT Plan, Dominion's proposed Physical Security program would provide certain distribution substations with improved security such as: (i) upgraded physical barriers; (ii) more restricted access to control houses; (iii) backup power; and (iv) additional sensor systems to provide improved monitoring and alarm capabilities. Under Phase I, Dominion anticipates spending approximately $7.9 million in capital investment and $0.9 million in O&M investment for substation physical security enhancements, excluding financing costs. Over the entire 10-year plan period, DEV propose to spend approximately $27.0 million in capital investment and $8.3 million in O&M investment, excluding financing costs.

As of November 20, 2018, no other Virginia electric utility has submitted plans for system hardening or enhanced physical security measures in response to passage of the GTSA.

[16] By way of comparison, in 2017 the company's SAIDI (excluding major events) was 115 minutes and SAIFI (excluding major events) was 1.05 interruptions per customer.

TRANSMISSION LINE UNDERGROUNDING PILOT

Undergrounding 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 ("Pilot Program"). The GTSA directs 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 this act is in effect."[17] The GTSA further requires the Commission to "submit a final report to the Commission on Electric Utility Restructuring, the Joint Commission on Technology and Science, and 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."[18]

Specifically, the GTSA directs the Commission to approve two qualifying transmission projects for undergrounding: (i) Dominion's Haymarket 230 kV double circuit transmission line and 230-34.5 kV Haymarket Substation (Case No. PUE-2015-00107)[19] that uses the I-66 Hybrid Route[20] and (ii) one additional qualifying project from among "applications submitted by public utilities for [CPCNs] for the construction of electrical transmission lines of 230 kilovolts or less

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[17] 2018 Va. Acts ch. 296, Enactment Clause 2, § 6.

[18] *Id.*

[19] *Application of Virginia Electric and Power Company, For approval and certification of electric transmission facilities under Va. Code § 56-46.1 and the Utility Facilities Act*, Va. Code § 56-265.1 *et seq.*, Case No. PUE-2015-00107, Doc. Con. Ctr. No. 151110206, Application (Nov. 6, 2015) ("*Haymarket*").

[20] 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 which is 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.

filed between the July 1, 2018, and July 1, 2020."[21] The GTSA lists the following criteria as necessary for a project to qualify for placement underground, in whole or in part:

(i) *an engineering analysis demonstrates that it is technically feasible to place the proposed line, in whole or in part, underground*;

(ii) *the governing body of each locality in which a portion of the proposed line will be placed underground indicates, by resolution, general community support for the project and that it supports the transmission line to be placed underground*;

(iii) *a project has been filed with the State Corporation Commission or is pending issuance of a certificate of public convenience and necessity by July 1, 2020*;

(iv) *the estimated additional cost of placing the proposed line, in whole or in part, underground does not exceed 2.5 times the cost of placing the same line overhead, assuming accepted industry standards for undergrounding to ensure safety and reliability; if the public utility, the affected localities, and the State Corporation Commission agree, a proposed underground line whose cost exceeds 2.5 times the cost of placing the line overhead may also be accepted into the pilot program*;

(v) *the public utility requests that the project be considered as a qualifying project under this enactment*; and

(vi) *the primary need of the project shall be for purposes of grid reliability, grid resiliency, or to support economic development priorities of the Commonwealth and shall not be to address aging assets that would have otherwise been replaced in due course*.[22]

Pilot Project Selection Process

Pursuant to the GTSA, a public utility must request that a transmission line project be considered as a qualifying project for the Pilot Program. Upon such a request, the Commission will consider in a CPCN proceeding whether the proposed project is qualified for inclusion in the Pilot Program. This consideration occurs in addition to the Commission's normal review of CPCN applications, which includes, among other things, an assessment of project need, proposed route, and environmental impacts. Finally, if the proposed transmission line project is granted a CPCN

[21] 2018 Va. Acts ch. 296, Enactment Clause 2, § 3.
[22] 2018 Va. Acts ch. 296, Enactment Clause 2, § 4.

by the Commission, the Commission also would rule on inclusion of the project in the Pilot Program.

Progress of the Pilot Program

Apart from Dominion's previously mentioned Haymarket Project, selected by the General Assembly as a qualifying transmission line project under the Pilot Program, the Commission has received only one other transmission line CPCN application between July 1, 2018 and November 1, 2018. That application, which is for a 138 kV *overhead* transmission line, has not been requested by Dominion to be included as part of the pilot program.

Haymarket 230 kV Double Circuit Transmission Line

The application in the Haymarket case was filed on November 6, 2015. In the application, Dominion sought approval and certification of electric transmission facilities in Prince William and Loudoun Counties. In its application, the company requested Commission authority to: (i) construct a new 230-34.5 kV Haymarket Substation; (ii) convert its existing 115 kV Gainesville-Loudoun Line #124 to 230 kV operation; and (iii) construct a new 230 kV double circuit transmission line from a tap point approximately 0.5 mile north of the Company's existing Gainesville Substation on the Line #124 conversion to the new Haymarket Substation (collectively, the "Haymarket Project").

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 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.[23] Attachment 1 to

[23] *Haymarket*, Case No. PUE-2015-00107, Doc. Con. Ctr. No. 180740051, Order on Request to Participate in Pilot Program (July 26, 2018).

this Report is a letter to Dominion requesting a status update on the project, and Attachment 2 to this Report is a status update provided by Dominion on the permitting, real estate, engineering and construction activities, cost, and schedule of the ongoing Haymarket Project.

Summary of the Pilot Program

From July 1, 2018 through November 1, 2018, the Commission received no additional requests for a transmission line project to be considered as a qualifying project for inclusion in the Pilot Program.

CONSTRUCTION OF NEW SOLAR AND WIND PROJECTS

Enactment Clause 14 of the GTSA states that it is the objective of the General Assembly that the construction and development of 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 kilowatt, and with an aggregate capacity of 50 MW, be placed in service on or before July 1, 2028.

The Commission is required to submit a report and make recommendations on or before December 1 of each year through December 1, 2028, 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; and (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.

(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

DEV has a contract with the University of Virginia ("UVA") to provide the electricity generated from two solar facilities constructed and operated by DEV to UVA. These facilities are known as UVA Hollyfield Solar, 17 MW, and UVA Puller Solar, 15 MW. Due to their size and the fact that these facilities serve a non-jurisdictional customer, these facilities were approved through the Permit by Rule process at the Department of Environmental Quality.[24] It is the Commission's understanding that these facilities became operational in September and October 2018, respectively.

New Development

Since July 1, 2018, DEV has engaged in several activities related to construction and development of solar facilities. Specifically, Dominion has proposed two new solar facilities for development, US-3 Solar 1 (142 MW) and Solar 2 (98 MW), which would be owned and operated by DEV. The proposals are pending approval in Case No. PUR-2018-00101,[25] and this matter is scheduled for a hearing in December 2018.

On August 17, 2018, Dominion filed a petition for a prudency determination related to a solar power purchase agreement ("PPA") between Water Strider LLC and DEV for the electricity generated from an 80 MW solar facility located in Halifax County, Virginia.[26] While it is not a

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[24] *See* Code §§ 10.1-1197.6 and 10.1-1197.8.

[25] *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, Doc. Con. Cen. No. 180740079, Order for Notice and Hearing (July 26, 2018).

[26] *Petition of Virginia Electric and Power Company, For a prudency determination with respect to the Water Strider Solar Power Purchase Agreement pursuant to § 56-585.1:4 F of the Code of Virginia*, Case No. PUR-2018-00135, Doc. Con. Cen. No. 180840039, Petition (Aug. 17, 2018).

utility-owned and utility-operated generation facility, it qualifies as a newly developed solar facility since July 1, 2018, and is expected to be in operation by the end of 2020.[27] On November 2, 2018, the Commission issued a Final Order approving the PPA.[28]

On October 24, 3018, DEV issued a request for proposal ("RFP") seeking 500 MW of solar and on-shore wind projects. Interested bidders can propose either to sell DEV the project development assets or to sell energy to DEV under a PPA. Projects must be at least 5 MW in size and must be located within the Commonwealth. Awards of the bids are expected during summer 2019. Shenandoah Valley Electric Cooperative also issued an RFP in October 2018 regarding new solar energy production facilities at its new Rockingham complex.

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

On August 3, 2018, DEV filed a petition with Commission for a prudency determination with regard to its Coastal Virginia Offshore Wind Project.[29] This project consists of two 6 MW wind turbine generators located approximately 27 statute miles (or approximately 24 nautical miles) off the coast of Virginia Beach, as well as related generation and distribution interconnection facilities.[30] The project is expected to be in operation by the end of 2020.[31] According to Dominion, the project will be located on a research lease site next to the commercial Virginia Wind Energy Area; and this location is critical to enabling Dominion to gain experience

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[27] Code § 56-585.1:4 D requires 25% of the solar generation capacity placed in service on or after July 1, 2018, located in the Commonwealth, and found to be in the public interest pursuant to subsection A or B shall be from the purchase by a public utility of energy, capacity, and environmental attributes from solar facilities owned by persons other than a public utility.

[28] *Petition of Virginia Electric and Power Company, For a prudency determination with respect to the Water Strider Solar Power Purchase Agreement pursuant to § 56-585.1:4 F of the Code of Virginia*, Case No. PUR-2018-00135, Doc. Con. Cen. No. 181110152, Final Order (Nov. 2, 2018).

[29] *Petition of Virginia Electric and Power Company, For a prudency determination with respect to the Coastal Virginia Offshore Wind Project pursuant to § 56-585.1:4 F of the Code of Virginia*, Case No. PUR-2018-00121, Doc. Con. Cen. No. 180810102, Petition (Aug. 3, 2018).

[30] *Id.* at 2.

[31] *Id.* at 6.

in permitting, design, installation, and operations that will inform the evaluation and deployment of a larger project in the future.[32] DEV claims it is pursuing this project as "a reasonable step to develop, operate, and study a new renewable energy generating asset" and to provide "a prudent pathway to facilitate a significant new renewable resource for the benefit of customers and the Commonwealth."[33] On November 2, 2018, the Commission issued a Final Order approving the petition and granting an associated CPCN.[34]

Additionally, as noted previously, DEV has filed a petition with the Commission for approval of its GT Plan. The company represents that the GT Plan will help it meet both system and customer expectations for "safely and effectively integrating new utility-scale renewable generation and storage as well as customer-level distributed energy resources . . . such as rooftop solar and battery storage."[35] This case currently is pending before the Commission; a final order must be entered on or before January 24, 2019.[36]

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

The total Virginia utility-owned and utility-operated solar generation facilities placed in operation since July 1, 2018, include:

- UVA Hollyfield Solar (DEV), 17 MW, which went into operation September 2018; and
- UVA Puller Solar (DEV), 15 MW, which went into operation in October 2018.

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[32] *Id* at. 4.
[33] *Id.* at 6-7.
[34] *Petition of Virginia Electric and Power Company, For a prudency determination with respect to the Coastal Virginia Offshore Wind Project pursuant to § 56-585.1:4 F of the Code of Virginia*, Case No. PUR-2018-00121, Doc. Con. Cen. No. 181110153, Final Order (Nov. 2, 2018). The Commission found that approval of the petition is limited to the amount requested in the petition, $300 million (excluding financing costs) for construction of the project as described in the Petition. *Id.* at 19.
[35] *See, e.g.*, GT Plan case, Doc. Con. Cen. No. 180730208, Direct Testimony of Edward H. Baine at 2-3 (July 24, 2018).
[36] Code § 56-585.1 A 6.

(iv) Need for Additional Generation of Electricity Utilizing Energy Derive from Sunlight in Order 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. As projects under development enter commercial operation, they will be included in this table for future reports.

Aggregate Solar and Wind Facilities Constructed since July 1, 2018

Total Solar and Wind General Assembly Objective	MW
	5,000
Total IOU Owned/Operated Solar Constructed since July 1, 2018:	32
Total IOU Solar PPAs Constructed since July 1, 2018:	0
Total IOU Owned/Operated Wind Constructed since July 1, 2018:	0
Total IOU Wind PPAs Constructed since July 1, 2018:	0
Total Cooperative Owned/Operated Solar Constructed since July 1, 2018:	0
Total Cooperative Solar PPAs Constructed since July 1, 2018:	0
Total Cooperative Owned/Operated Wind Constructed since July 1, 2018:	0
Total Cooperative Wind PPAs Constructed since July 1, 2018:	0
Total Remaining to Meet Objective	**4,968**

CLOSING

The Commission will continue to provide all annual reports as required by the GTSA and stands ready to provide additional information or assistance if requested.

ATTACHMENT 1

Letter to Dominion Requesting an Update on the Haymarket Project

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

COMMONWEALTH OF VIRGINIA

PO Box 1197
Richmond, Virginia 23218-1197

STATE CORPORATION COMMISSION

DIVISION OF PUBLIC UTILITY REGULATION

October 17, 2018

Bob McGuire, P.E.
Director – Electric Transmission Project Development and Execution
Dominion Energy
701 East Cary Street, 12th Floor
Richmond, VA 23219

Dear Mr. McGuire:

During the 2018 Session, the Virginia General Assembly enacted Senate Bill 966 ("SB966"). 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. As a part of the pilot program, Enactment Clause 2 of the Bill directed the State Corporation Commission ("SCC") to approve and issue a certificate of public convenience and necessity for the construction of an electrical transmission line approximately 5.3 miles in length utilizing both overhead and underground transmission facilities, of which the underground portion shall be approximately 3.1 miles in length, which has been previously proposed for construction within or immediately adjacent to the right-of-way of an interstate highway ("Haymarket I-66 Hybrid Route"). In addition, SB966 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 November 1, 2018.

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

Very truly yours,

Timothy R. Faherty
Deputy Director

ATTACHMENT 2

Dominion's Status Update on the Haymarket Project

Dominion Energy Virginia Dominion Energy North Carolina
Electric Transmission
701 East Cary Street, Richmond, VA 23219
DominionEnergy.com

October 31, 2018

Timothy R. Faherty
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. Faherty,

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 October 17, 2018, request to assist the Commission in developing the annual report.

Sincerely,

Bob McGuire
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 3.1 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.

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. As such, the Company is providing a status update three months after obtaining all necessary approvals from the Commission.

Permitting Activities

Obtaining and satisfying the additional permitting needs required to begin construction is ongoing and as such, no subsequent permits have been granted.

Final approval from the Virginia Department of Transportation (VDOT) regarding line alignment in the limited access area, as well as the boring locations and length as the right of way corridor crosses under I-66, Rt. 15 and Highway 55 is outstanding. The Company is in constant contact with VDOT as these approvals will determine final engineering design and right of way corridor.

Environmental and cultural work is progressing and appropriate pre-application steps are being completed with the Army Corps of Engineers.

Pursuant to the provisions of the Pilot Program, Dominion Energy Virginia will be proceeding with construction of the Haymarket Project and its associated facilities (Haymarket Substation and Heathcote Station) at this time with the understanding that compliance with Prince William County's local zoning ordinances, such as, but not limited to, Public Facility Reviews (15.2-2232 reviews), Special Use Permits, or Site Plans, are deemed satisfied.

Real Estate Activities

No right of way has been purchased yet. Surveying activities continue; however, final plats along the underground portion cannot begin until VDOT approvals are obtained.

Engineering

Final engineering design is ongoing and is contingent upon VDOT approvals. Once the Company receives VDOT approval, final design, construction methods and any use of new technology will be determined. Notwithstanding the above, the Company has and continues to put forth a significant amount of final design planning in order to work with VDOT.

The design of the underground line portion of the Haymarket Project includes two parallel 230 kV underground transmission lines along the I-66 corridor. As part of this work, approximately three miles of double circuit extruded dielectric cables systems will be installed via a combination of open-cut trenching and trenchless installations. Each circuit will require two cables per phase.

Analysis is currently underway to determine the final cable system design. Considerations include routing, raceway elevations, burial depths, clearances to obstructions, crossings, horizontal and vertical curves, cable lengths, cable pulling tensions, site constraints, construction access, grounding, installation, and maintenance. Cable size is also being reviewed in relation to, at a minimum, burial depth, cable spacing, transmission voltage mutual heating, distribution cable mutual heating, soil thermal conductivity, insulation wall thickness, earth ambient temperature, air ambient temperature, load factor, dielectric losses, conductor material, and anticipated load requirements.

Underground Cable Installation Parameters

The Company and its design consultants are planning to use three different types of underground installation methods: duct bank; horizontal directional drill (HDD); and, jack and bore.

Approximately 1.96 miles of the overall underground route will be installed within a concrete encased duct bank. The installation assumptions include burying the duct bank at a minimum depth of 36 inches to the top of the duct bank.

Approximately .97 miles of the overall underground route will be installed via horizontal directional drilling. The installation assumptions include a minimum drill depth of 12 feet and a maximum drill depth of 100 feet.

Approximately .05 miles of the overall underground route will be installed via jack and bore. The installation assumptions include a minimum installation depth of 8 feet and a maximum depth of 30 feet.

Given the initial geothermal review and the soil thermal resistivity dynamics at the depths of the HDD and jack and bore, meeting the required ampacity continues to be a challenge (initial power transfer requirement, as approved through the CPCN process, is 1047 MVA). Review and evaluation of the ampacity calculations is ongoing to determine the appropriate final design to meet the electrical requirements.

Soil testing (to determine soil characteristics and presence and type of rock), underground utility surveying, and coordination with VDOT and landowners/developers are ongoing activities being reviewed for site-specific data to avoid underground conflicts and maximize design and operational efficiency in the final engineering parameters.

Cost

Preliminary cost estimate of $172 million remains unchanged at this time. The preliminary cost breakdown is below. The associated costs are conceptual numbers and subject to change based on final route alignment, final engineering, actual procurement costs, the construction contractor bid process and other items.

Activity	Conceptual Cost Estimate	Totals
Transmission Line Costs		$118,992,659
Overhead	$17,793,401	
Underground	$101,199,258	
Station Costs		$53,008,579
Haymarket Substation (new)	$17,952,646	
Heathcote Transition Station (new)	$31,030,849	
Gainesville Substation	$1,978,716	
Loudoun Substation	$2,046,368	
Total		**$172,001,238**

Timeline

Preliminary timeline to complete the Haymarket Project by the end of July 2021 has remained unchanged at this time. A more detailed schedule will be developed during final engineering and collaboration with the successful construction contractor.

Conclusion

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 has moved into the final engineering and construction phase of the project in earnest, much if which is contingent upon coordination and approvals from VDOT.

The Company plans to have a more complete and comprehensive project status report for the December 2019 timeframe if so asked for by the Commission.