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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-2021-00127

Dear Mr. Logan:

Please find enclosed for electronic filing in the above-referenced matter the *Petition of Virginia Electric and Power Company and Request for Limited Waiver*.

Please do not hesitate to contact me if you have any questions in regard to this filing.

Highest regards,

Vishwa B. Link

enc.

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Petition of Virginia Electric and Power Company

Before the State Corporation Commission of Virginia

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-2021-00127

Filed: June 21, 2021

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

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COMMONWEALTH OF VIRGINIA
STATE CORPORATION COMMISSION

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-2021-00127

PETITION OF VIRGINIA ELECTRIC AND POWER COMPANY
<u>AND REQUEST FOR LIMITED WAIVER</u>

Pursuant to § 56-585.1 A 6 ("Subsection A 6") of the Code of Virginia ("Va. Code") and the Rules Governing Utility Rate Applications and Annual Informational Filings of Investor-Owned Electric Utilities (the "Rate Case Rules") of the State Corporation Commission of Virginia (the "Commission"), Virginia Electric and Power Company ("Dominion Energy Virginia" or the "Company"), by counsel, hereby files its petition for approval of a plan for electric distribution grid transformation projects (the "Petition"). Specifically, Dominion Energy Virginia asks for approval of Phase II of its ten-year plan to transform its electric distribution grid (the "Grid Transformation Plan," the "GT Plan," or the "Plan"), which consists of proposed projects in 2022 and 2023.[1]

Pursuant to Rule 10 E of the Rate Case Rules, the Company also requests limited waivers of the requirements of Rules 40 and 90 with respect to paper copies of certain Filing Schedule 46 materials.

In support of this Petition and request for limited waivers, the Company respectfully states as follows:

[1] The Company's request also includes limited work in prior years related to preparation for certain Phase II projects.

I. General Information

1. Dominion Energy Virginia is a public service corporation organized under the laws of the Commonwealth of Virginia furnishing electric service to the public within its certificated service territory. The Company also supplies electric service to non-jurisdictional customers in Virginia and to the public in portions of North Carolina. The Company is engaged in the business of generating, transmitting, distributing, and selling electric power and energy to the public for compensation. The Company is a public utility under the Federal Power Act, and certain of its operations are subject to the jurisdiction of the Federal Energy Regulatory Commission. The Company is an operating subsidiary of Dominion Energy, Inc.

2. The Company's name and post office address are:

> Virginia Electric and Power Company
> 120 Tredegar Street
> Richmond, Virginia 23219

3. The names, addresses, and telephone numbers of the Company's attorneys are:

> Paul E. Pfeffer
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II. Legal Authority

4. Subsection A 6, as amended by the Grid Transformation and Security Act of 2018 (the "GTSA"), requires the Company to petition the Commission for approval of a plan for electric grid transformation projects:

> A utility shall, without regard for whether it has petitioned for any rate adjustment clause pursuant to clause (vi), petition the Commission, not more than once annually, for approval of a plan for electric distribution grid transformation projects. 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.

5. Va. Code § 56-576 defines an "electric distribution grid transformation project" as follows:

> "Electric distribution grid transformation project" means a project associated with electric distribution infrastructure, including related data analytics equipment, that is designed to accommodate or facilitate the integration of utility-owned or customer-owned renewable electric generation resources with the utility's electric distribution grid or to otherwise enhance electric distribution grid reliability, electric distribution grid security, customer service, or energy efficiency and conservation, including advanced metering infrastructure; intelligent grid devices for real time system and asset information; automated control systems for electric distribution circuits and substations; communications networks for service meters; intelligent grid devices and other distribution equipment; distribution system hardening projects for circuits, other than the conversion of overhead tap lines to underground service, and substations designed to reduce service outages or service restoration times; physical security measures at key distribution substations; cyber security measures; energy storage systems and microgrids that support circuit-level grid stability, power quality, reliability, or resiliency or provide temporary backup energy supply; electrical facilities and infrastructure necessary to support electric vehicle charging systems; LED street light conversions; and new customer information platforms designed to provide improved customer

access, greater service options, and expanded access to energy usage information.

6. Subsection A 6 sets forth the standard for Commission review of a plan for electric distribution grid transformation projects:

> In ruling upon such a petition, the Commission shall consider whether the utility's plan for such projects, and the projected costs associated therewith, are reasonable and prudent. Such petition shall be considered on a stand-alone basis without regard to the other costs, revenues, investments, or earnings of the utility; without regard to whether the costs associated with such projects will be recovered through a rate adjustment clause under this subdivision or through the utility's rates for generation and distribution services; and without regard to whether such costs will be the subject of a customer credit offset, as applicable, pursuant to subdivision 8 d.

7. Subsection A 6 also finds that electric distribution grid transformation projects are in the public interest.

8. In accordance with Subsection A 6, the Commission must issue its final order on a petition for approval of an electric distribution grid transformation plan not more than six months after the date of filing the petition.

III. <u>The Grid Transformation Plan</u>

9. Fundamental changes in the energy industry have prompted the need for electric utilities across the country to modernize their distribution grids. There is a paradigm shift that is creating a new set of current and future needs that must be addressed. The Virginia General Assembly recognized this need when it enacted the GTSA in 2018, establishing objectives for grid transformation and finding such projects to be in the public interest. Policy and market developments since then—notably the targets for the deployment of distributed energy resources ("DERs") set forth in the Virginia Clean Economy Act of 2020 (the "VCEA") and the

opportunities for DERs provided by FERC Order 2222—only accelerate the need for a modern distribution grid.

10. The Grid Transformation Plan is Dominion Energy Virginia's comprehensive plan to address these needs and meet the goals and objectives for grid transformation in a reasonable, prudent, and cost-effective manner. The Company presents the executive summary of its Grid Transformation Plan (the "GT Plan Document") as <u>Exhibit 1</u> to this Petition. The GT Plan Document explains the need for a modern distribution grid, including industry developments from 2019 to 2021 supporting the continuing need for grid transformation. The GT Plan Document then reviews the Company's distribution planning process, and explains how that process is evolving to meet the fundamental changes in the industry through integrated distribution planning. With this context, the GT Plan Document then presents an overview of the Grid Transformation Plan, including the process that led to its development. Finally, the GT Plan Document includes a look at future technologies and a quick-reference acronym list and glossary of terms used in the GT Plan Document itself and throughout this filing.

11. The Commission approved certain projects in Phase I of the Grid Transformation Plan—the years 2019, 2020, and 2021—in Case Nos. PUR-2018-00100 and PUR-2019-00154. The Company provides a status update on the successes of Phase I to date through various witnesses.

12. In this Petition, the Company focuses on Phase II, the next two years of the Grid Transformation Plan. Phase II of the Grid Transformation Plan includes 14 projects, including advanced metering infrastructure ("AMI"); the customer information platform ("CIP"); grid improvement projects, both grid infrastructure (2 projects) and grid technologies (6 projects); security, both physical and cyber; telecommunications; and customer education. Section IV.B of

the GT Plan Document provides an overview of the need, benefits, and alternatives considered for each project, among other relevant information. More information on each project, including the information required by the Rate Case Rules, is provided by the sponsoring Company witness. Many of the projects in Phase II focus on facilitating the integration of DERs. These Phase II projects, in tandem with a continued focus on grid reliability and availability, will be vital to effectively accommodating the expected penetration of DERs in the near term resulting from the VCEA and FERC Order 2222. The total proposed investment associated with Phase II of the GT Plan is $669.4 million in capital investment and $109.5 million in operations and maintenance investments. Company Witness Christopher J. Lee presents an estimated long-term revenue requirement for the proposed Phase II projects, as required by the Rate Case Rules.

13. The Company retained an independent, experienced, third-party partner, West Monroe Partners ("West Monroe"), to generate a cost-benefit analysis for the Grid Transformation Plan. Company Witness Andrew L. Trump of West Monroe presents testimony explaining that analysis and presenting the results. As summarized in Figure 7 in Section IV.E of the GT Plan Document, the proposed investments are beneficial to customers, with a benefit to cost ratio of 1.05 on a net present value basis.

14. The Company also retained an independent, third-party partner, Quanta Technology, LLC, to provide context on industry grid modernization efforts and evaluate how the Company's Grid Transformation Plan compares. Company Witness Dr. Julio Romero Agüero presents testimony explaining that evaluation.

IV. <u>Supporting Testimony, Filing Schedule 46, and Request for Limited Waivers</u>

15. In support of its Petition, the Company submits the pre-filed direct testimonies of Company Witnesses Joseph A. Woomer, Augustus Johnson, IV, Robert S. Wright, Jr., Nathan J.

Frost, Heather M. Jennings, Bradley R. Carroll, Sr., Jonathan S. Bransky, Andrew L. Trump, Christopher J. Lee, and Dr. Julio Romero Agüero.

16. Rule 40 of the Rate Case Rules provides that a prudence determination petition pursuant to Chapter 23 of Title 56 "shall include Schedule 46 as identified and described in 20 VAC 5-201-90, and which shall be submitted with the utility's direct testimony." With this petition, the Company is filing with Filing Schedule 46 as follows:

a. Filing Schedule 46A consists of Statements 1 through 3. Filing Schedule 46A, Statements 1 and 2, are co-sponsored by Company Witnesses Woomer, Johnson, Wright, Frost, Jennings, Carroll, and Bransky. Filing Schedule 46A, Statement 1, provides a table showing where the Company has provided a detailed explanation of the justification for the proposed costs for which it seeks a prudence determination in Phase II. Filing Schedule 46A, Statement 2, provides schedules of these projected and actual costs by type of cost and year, and by project.[2] Finally, Filing Schedule 46A, Statement 3, which Company Witness Woomer sponsors, provides support used by senior management for major cost decisions, as determined by the Company.

b. Filing Schedule 46B, consisting of Statements 1 and 2, is sponsored by Company Witness Johnson. Schedule 46B, Statement 1, provides key documents supporting the projected and actual costs for the deployment of AMI. Schedule 46B, Statement 2, provides the key document supporting the projected and actual costs for the deployment of DERMS.

c. Filing Schedule 46C, consisting of Statements 1 through 6, is sponsored by Company Witness Wright. Schedule 46C, Statement 1, provides key documents supporting the projected and actual costs for targeted corridor improvement. Schedule 46C, Statement 2, provides the key document supporting the projected and actual costs for voltage island mitigation. Schedule 46C, Statement 3, provides the key documents supporting the projected and actual costs for projects that rely upon existing Company contracts, primarily intelligent grid devices and FLISR. Schedule 46C, Statement 4 provides the key document supporting the projected and actual costs for the deployment of EAMS. Schedule 46C, Statement 5 provides the key documents supporting the projected and actual costs for voltage optimization enablement. Finally, Schedule 46C, Statement 6 provides the key documents supporting the projected and actual costs for substation technology deployment.

[2] The Company does not have this information available by month at this time.

d. Filing Schedule 46D, consisting of Statement 1, is sponsored by Company Witness Frost, and provides the key document supporting the projected and actual costs for customer education.

e. Filing Schedule 46E, consisting of Statement 1, is sponsored by Company Witness Jennings, and provides the key documents supporting the projected and actual costs for the CIP.

f. Filing Schedule 46F, consisting of Statement 1, is sponsored by Company Witness Carroll, and provides the key documents supporting the projected and actual costs for telecommunications.

g. Filing Schedule 46G, consisting of Statements 1 and 2, is sponsored by Company Witness Bransky. Schedule 46G, Statement 1, provides the key documents supporting the projected and actual costs for physical security. Schedule 46G, Statement 2, provides the key documents supporting the projected and actual costs for cyber security.

h. Filing Schedule 46H, consisting of Statement 1, is sponsored by Company Witness Trump. This statement provides documentation of the results of the cost-benefit analysis model for the GT Plan—a document supporting the projected and actual costs for which the Company seeks approval in this proceeding.

i. Filing Schedule 46I, consisting of Statements 1 and 2, is sponsored by Company Witness Lee. Filing Schedule 46I, Statement 1, provides the estimated annual revenue requirement over the duration of the proposed Phase II projects, by year and by project, on a total company basis. Filing Schedule 46I, Statement 2, provides a list of the workpapers showing all supporting calculations and assumptions for the estimated annual revenue. The Company requests to file these workpapers electronically for the reasons set forth below.

17. The Company, for good cause shown and pursuant to Rate Case Rule 10 E, respectfully requests that the Commission waive, in part, the requirements under Rule 40 and 90 of the Rate Case Rules with respect to paper copies of certain Filing Schedule 46 materials. Specifically, the Rate Case Rules require the Company to provide key documents supporting the projected and actual costs of the proposed projects, such as support used by senior management for major cost decisions as determined by the applicant, contracts, results from requests for proposals, and cost-benefit analyses.[3] The supporting documentation responsive to this

[3] 20 VAC 5-204-90, Schedule 46.d.1.ii.

requirement is voluminous and, often, not easily reviewed in hard copy (*i.e.*, paper) format. Accordingly, the Company seeks waiver of the requirement to file this information in hard copy. Instead, the Company proposes to provide this documentation to Commission Staff and any other future case participants in electronic format only. The Company will make these documents available via an electronic discovery site ("eRoom") contemporaneously with this filing, with immediate access available to Commission Staff. This request for waiver is consistent with recent Commission orders granting similar limited waivers.[4] Should the Commission deny this request, the Company asks for a reasonable allowance of time to print the requisite filing copies of this material and submit it to the Commission prior to the Company's petition being deemed incomplete.

18. Further, for good cause shown and pursuant to Rate Case Rule 10 E, the Company respectfully requests that the Commission waive, in part, the requirements under Rate Case Rules 40 and 90 with respect to paper copies of supporting calculations for the estimated annual revenue requirement required as part of Filing Schedule 46. The Rate Case Rules require the Company to provide the estimated annual revenue requirement over the duration of the proposed project by year and by project, "including all supporting calculations and assumptions."[5] The Company has included the estimated long-term revenue requirement by project and by year as part of Schedule 46I, Statement 1. The calculations supporting the estimated annual revenue requirement calculation, however, are completed in Microsoft Excel, involve multiple worksheets and lines of data, and include formulas to complete the calculations. These

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[4] *See, e.g., Commonwealth of Virginia, ex rel., State Corporation Commission, Ex Parte: Establishing 2020 RPS Proceeding for Virginia Electric and Power Company*, Case No. PUR-2020-00134, Order for Notice and Hearing at 13, Ordering Paragraph (4) (Nov. 10, 2020).
[5] 20 VAC 5-204-90, Schedule 46.d.2.ii.

workpapers are not easily converted to a printable version, and not easily reviewed in hard copy (*i.e.*, paper) format. For example, in hard copy, a reviewer cannot easily see the formulas and calculations embedded in the Excel worksheets and how they interact. Accordingly, the Company seeks waiver of the requirement to file these workpapers in hard copy. Instead, the Company proposes to provide this documentation to Commission Staff and any other future case participants in electronic format only. The Company will make these documents available via an eRoom contemporaneously with this filing, with immediate access available to Commission Staff. Should the Commission deny this request, the Company asks for a reasonable allowance of time to print the requisite filing copies of this material and submit it to the Commission prior to the Company's petition being deemed incomplete.

V. Request for Confidential Treatment and Additional Protective Treatment for Extraordinarily Sensitive Information

19. The Company's Petition and accompanying schedules contain confidential and extraordinarily sensitive information as designated. Because portions of the Company's Petition contain confidential and extraordinarily sensitive information, in compliance with Rate Case Rule 10 F and Rule 170 of the Commission's Rules of Practice and Procedure, this Petition is accompanied by a contemporaneously-filed Motion for Entry of a Protective Order and Additional Protective Treatment, including a Proposed Protective Order.

VI. Compliance with Rule 10 of the Rate Case Rules

20. The Company's Petition complies with the requirements contained in Rule 10 of the Rate Case Rules.

21. In accordance with Rule 10 A, Dominion Energy Virginia filed with the Commission its notice of intent to file this Petition on April 15, 2021, and provided that notice to those listed in Rule 10 J 1, as required by that subsection.

22. The Company has included all information required by Rule 10 B in its Petition, including a table of contents, direct testimonies with one-page summaries, and properly labeled exhibits and schedules.

23. In accordance with Rule 10 H, the Company will make a searchable PDF version of the Petition, direct testimonies, and Filing Schedule 46 available via an eRoom contemporaneously with this filing, with immediate access available to (i) Commission Staff, including identified members of the Divisions of Utility Accounting and Finance and Public Utility Regulation; and (ii) identified members of the Office of the Attorney General's Division of Consumer Counsel ("Consumer Counsel").[6] Also in according with Rule 10 H, and consistent with the request for limited waiver in Paragraph 18 of this Petition, the Company will make electronic spreadsheets supporting the schedules that contain calculations—Company Witness Lee's Schedule 1 and Filing Schedule 46I, Statement 1—available via an eRoom contemporaneously with this filing, with immediate access available to Commission Staff

24. The Company files this Petition, direct testimonies, and Filing Schedule 46 electronically, consistent with the Commission's orders concerning electronic service.[7] The

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[6] Rule 10 J 3 requires the Company to provide a copy of the complete version of the Petition to Consumer Counsel at the same time it is filed with the Commission. As noted, pursuant to Rule 10 H, the Company will make a searchable PDF version of the Petition, direct testimonies, and Filing Schedule 46 available via an eRoom contemporaneously with this filing, with immediate access available to Consumer Counsel. The Company can provide a hard copy of the Petition to Consumer Counsel upon request to counsel.

[7] *See* 5 VAC 5-20-150; *Commonwealth of Virginia, ex rel. State Corporation Commission, Ex Parte: Revised Operating Procedures During COVID-19 Emergency*, Case No. CLK-2020-00005, Order Regarding the State Corporation Commission's Revised Operating Procedures During COVID-19 Emergency at 3 (Mar. 19, 2020) (permitting electronic filings to exceed 100 pages), *extended by* Order Regarding the State Corporation Commission's Revised Operating Procedures During COVID-19 Emergency (May 11, 2020); *see also Commonwealth of Virginia, ex rel. State Corporation Commission, Ex Parte: Electronic service among parties during COVID-19 emergency*, Case NO. CLK-2020-00007, Order Requiring Electronic Service (Apr. 1, 2020) (requiring electronic service on Commission Staff).

Company interprets these directives from the Commission as superseding Rule 10 I of the Rate Case Rules requiring the Company to file a certain number of hard copies. The Company can provide hard copies to the Commission and Commission Staff upon request to counsel.

VII. Request Regarding Discovery Deadline

25. Finally, the Company respectfully requests that the Commission allow all parties to the proceeding to have at least five to seven business days from receipt to respond to interrogatories or requests for production of documents. Measuring the discovery deadline in business days is consistent with the Commission's Rules of Practice and Procedure,[8] and accounts for intervening weekends and holidays. In addition, based on past experience, this proceeding likely will have a significant amount of discovery; allowing at least five to seven business days would allow the Company to better provide timely and complete responses. This request is consistent with the discovery timeline permitted in prior proceedings.[9]

VIII. Conclusion

WHEREFORE, Dominion Energy Virginia respectfully requests that the Commission: (i) approve Phase II of the Grid Transformation Plan in its entirety as reasonable and prudent within six months of the date of this filing; (ii) grant the waiver requests outlined in this Petition

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[8] 5 VAC 5-20-140, -260 (setting the default rule at 10 business days for responses).

[9] *See Commonwealth of Virginia, ex rel. State Corporation Commission, In re: Virginia Electric and Power Company's Integrated Resource Plan filing pursuant to Va. Code § 56-597 et seq.*, Case No. PUR-2020-00035, Hearing Examiner's Ruling (Apr. 27, 2020) (revising the discovery timeline for responses within seven business days for the majority of the discovery period rather than seven calendar days); *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, Hearing Examiner's Ruling (August 20, 2018) (revising the discovery timeline for responses within three business days rather than three calendar days); *Commonwealth of Virginia, ex rel. State Corporation Commission, In re: Virginia Electric and Power Company's Integrated Resource Plan filing pursuant to Va. Code § 56-597 et seq.*, Case No. PUR-2018-00065, Hearing Examiner's Ruling (June 5, 2018) (revising the discovery timeline for responses within seven business days rather than seven calendar days).

of the filing requirements; (iii) grant the request for a discovery deadline of at least five to seven business days from receipt; and (iv) grant such other relief as deemed appropriate and necessary.

Respectfully submitted,

Virginia Electric and Power Company

By: ______________________
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Counsel for Virginia Electric and Power Company

June 21, 2021

Exhibit 1

Grid Transformation Plan

Phase II

Dominion Energy

Actions Speak Louder

Smart Energy

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Introduction

Headquartered in Richmond, Virginia, Virginia Electric and Power Company ("Dominion Energy Virginia" or the "Company") currently serves approximately 2.6 million electric customers located in approximately 30,000 square miles of Virginia and North Carolina. The Company owns approximately 58,000 miles of distribution lines at voltages ranging from 4 kilovolts ("kV") to 46 kV in Virginia and North Carolina.

Dominion Energy Virginia first presented its plan to transform its distribution grid ("Grid Transformation Plan," "GT Plan," or "Plan") in 2018. Since then, the Company has engaged in an iterative process to refine its Grid Transformation Plan, incorporating feedback from the State Corporation Commission of Virginia (the "Commission"), Commission Staff, and other stakeholders, to devise the best strategy to meet the overarching goals of grid transformation—facilitating the integration of distributed energy resources ("DERs") and maintaining system reliability and security.

The ten-year Grid Transformation Plan covers the years 2019 through 2028. "Phase I" of the Plan focused on grid transformation projects in the years 2019, 2020, and 2021. "Phase IA" refers to projects approved by the Commission in Case No. PUR-2018-00100, while "Phase IB" refers to projects approved by the Commission in Case No. PUR-2019-00154. "Phase II" of the GT Plan focuses on grid transformation projects in the years 2022 and 2023.

In 2019, the Company presented its first executive summary of the Grid Transformation Plan. This document updates the document to reflect industry developments supporting grid transformation, refinements to the Grid Transformation Plan, and the Company's progress with grid transformation efforts to date.

Executive Summary

Fundamental changes in the energy industry have prompted the need for utilities across the country to modernize their distribution grids. With the passage of the Grid Transformation and Security Act of 2018 ("GTSA"), the Commonwealth of Virginia recognized this need, declaring electric distribution grid transformation to be in the public interest and mandating that utilities file a plan for grid transformation. The GTSA set forth two objectives for grid transformation: (i) facilitating the integration of DERs and (ii) enhancing grid reliability and security.

In response to this need, Dominion Energy Virginia prepared a comprehensive 10-year plan to transform its distribution grid to meet the changing landscape of the energy industry while continuing to provide the reliable service that its customers expect and deserve.

In Phase I of the Grid Transformation Plan, the Company has pursued projects focused on the vital objectives of grid reliability and security, and has already seen success. The Company also began the process in Phase I of replacing its aging customer information system with a customer information platform ("CIP") that will modernize the customer relationship. Finally, Phase I included a number of pilot projects that will study important programs and technologies for the modern distribution grid, such as managed charging, microgrids, and hosting capacity. The Company plans to continue the non-pilot grid transformation projects in Phase II, including the CIP, physical security, targeted corridor improvement, and voltage island mitigation.

In Phase II, the primary focus leans more heavily into facilitating the integration of DERs, while continuing to address the reality that reliability and security are vital to the success of DERs. Industry developments in the past year alone will accelerate the proliferation of DERs, from the development targets for DERs set forth in the Virginia Clean Economy Act of 2020 ("VCEA"), to the market opportunities for DERs enabled by FERC Order 2222, to the myriad of commitments and incentives to speed the transition to electric vehicles. Stated simply, there is no doubt that significant volumes of DERs are coming to Virginia imminently. The distribution grid must be ready.

To effectively integrate DERs into the distribution grid, the Company needs data about the grid, as well as the systems to process, manage, and use that data to optimize grid operations. To that end, the Company proposes to deploy advanced metering infrastructure ("AMI") and intelligent grid devices that will gather data both at the end-of-the-line and along distribution feeders, respectively, and then will transmit that data in near real-time over a secure telecommunications network. The Company also proposes to install systems that will manage and use this influx of data—a DER management system ("DERMS") and an enterprise asset management system ("EAMS")—as well as a system that will leverage the capabilities of intelligent grid devices to improve customer reliability through fault location, isolation, and service restoration ("FLISR") functionality.

The pace of change and dependence on the electrical grid is on an upward trajectory, driven by higher expectations, expansion of DERs, electrification, climate change, and technology advancements. Modernizing the grid has no quick fix; time is of the essence with the need for hundreds of thousands of touch points across a distribution system spread across the Commonwealth. We must act now and remain agile to meet the needs and expectations of customers with a grid of the future.

This document provides a guide through the need for grid modernization (Section I), the Company's distribution grid planning process (Section II), and the development of the Grid Transformation Plan (Section III). This document also provides an overview of the Plan itself (Section IV), including the accurate and reasonable cost estimates for each project based on competitive bidding processes and the quantitative and qualitative benefits of the proposed projects. The Grid Transformation Plan represents the optimal package to facilitate the integration of DERs while maintaining the reliable electric service that customers expect and deserve.

I. Need for a Modern Distribution Grid

Electricity has become a basic need, vital to our economy, public safety, and way of life. Critical services and infrastructure increasingly rely on electricity, including homeland security, medical facilities, public safety agencies, state and local governments, telecommunications, transportation, and water treatment and pump facilities. The transportation industry is actively continuing its shift toward electrification of personal vehicles, fleets, and mass transit. Another vital resource powered by electricity is the internet, which drives commerce and everyday life. As society has grown more dependent on electricity, customers expect highly reliable service. The critical need for reliable electric service became even more acute in 2020, when life for many Americans—including commerce, education, and health—shifted to the home, and the internet, because of the pandemic. While service interruptions have always been an inconvenience, the safe, reliable, and consistent grid connectivity has never been more important than it is today. With policy and climate change initiatives important to the Company and the Commonwealth, electricity should also be increasingly clean.

A. Context for Distribution Grid Transformation

The electric grid was originally designed for the one-way flow of electricity, with electricity moving from large, centralized generators through high-voltage transmission lines to the distribution system. On the distribution system, electricity flowed from the substation to the customer. While originally limited to cities, the electric power grid eventually reached even the most remote areas of the country as a result of the incentives provided in the Rural Electrification Act of 1936 for the installation of distribution systems in isolated rural areas of the United States. A comprehensive description of Dominion Energy Virginia's Grid Transformation Plan is provided as Appendix B.

As reliance on electricity grew, focus shifted to the transmission system as vital to reliability of the electric grid as designed (*i.e.*, the one-way flow of electricity). The Northeast Blackout of 2003 drove new standards and investments into the transmission grid. NERC became the national electric reliability organization responsible for the reliability of the transmission system, and instituted mandatory minimum standards to which transmission owners had to plan.

In the current day, focus has now shifted to DERs. The term "DER" encompasses all manner of resources, including solar and wind generation, energy storage, and electric vehicles ("EVs"). As the Department of Energy's Office of Electricity noted in a 2019 report, "[m]any parts of the country are experiencing fundamental changes in customer expectations for distribution grid performance, with a large number of customers utilizing the grid to integrate DER and other new technologies or seeking a platform for market transactions."[1]

The rise of DERs requires a fundamental change to the electric grid. With DERs, electricity is now flowing onto the distribution system from multiple points. The distribution

[1] Department of Energy's Office of Electricity, MODERN DISTRIBUTION GRID (DSPX) VOLUME I: OBJECTIVE DRIVE FUNCTIONALITY at 16 (Nov. 2019) [hereinafter DOE REPORT], *available at* https://gridarchitecture.pnnl.gov/media/Modern-Distribution-Grid_Volume_I_v2_0.pdf.

system that was designed for the one-way flow of electricity must now accommodate the dynamic flow of electricity. In addition, the intermittent nature of some of these resources resulting from weather variability creates power fluctuations not typical of traditional generation resources. Propagated in an arbitrary manner, DERs are independent nodes that can disrupt traditional grid power quality and reliability. But when paired with investments to increase visibility, reliability, and resiliency on and control of the distribution system, the grid can transform DERs into a system resource that can be equitably managed to maximize the value of other available resources, and potentially offset the need for future "traditional" generating assets or grid upgrades, and maintain reliable service to customers. As the Electric Power Research Institute ("EPRI") has outlined, the distribution grid benefits DER through (i) reliability; (ii) startup power; (iii) voltage quality; (iv) efficiency; and (v) energy transaction.[2]

In addition, because DERs rely on the distribution system to deliver the electricity they produce, a resilient distribution system is vital to maximizing the value of DERs. Day to day outages as well as major weather events not only cause prolonged outages for customers, but also prevent DERs from delivering electricity. The distribution system must be reliable and resilient so that it can operate for DERs like the transmission system operates for large, centralized generators.

Aside from DERs, and as the Commonwealth has recognized, "there are a number of market and policy shifts that are transforming the industry in ways that cannot and should not be ignored."[3] These shifts include "technological advances that are unlocking new opportunities in both the electricity and transportation sectors, customer preferences that are driving the expansion of new business models, a shift toward a reduction in carbon emissions, and a growing focus on the reliability and resiliency of our electric system."[4] And throughout, severe weather events continue as a reality across the country. Peer utilities have demonstrated the value of resiliency investments in response to such events, enabling timely restoration and economic recovery when damage does occur.

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[2] American Public Power Association, THE VALUE OF THE GRID (Jul. 2018), *available at* https://www.publicpower.org/system/files/documents/Value%20of%20the%20Grid_1.pdf (citing EPRI, THE INTEGRATED GRID: REALIZING THE FULL VALUE OF CENTRAL AND DISTRIBUTED ENERGY RESOURCES (2014)).

[3] VIRGINIA ENERGY PLAN.

[4] VIRGINIA ENERGY PLAN. *See also* DOE REPORT at 16 ("Even in areas in which [] demands [to integrate DERs are muted, the grid faces new challenges in fulfilling its role of delivering reliable, affordable power. These challenges include: [c]ustomer service expectations and requirements to support new energy technologies, some of which have low tolerances for disturbances or produce multi-directional power flow; [i]ncreased threats to the system from environmental, electromagnetic, physical and cyber events; [t]he need to improve capital and system efficiencies to reduce outages, enhance customer satisfaction and affordability; and [t]he ability of the distribution platform to enable the utilization of distributed resources to provide alternatives to traditional investment and bulk power services.").

B. Developments Supporting Grid Transformation—2019 to 2021

Since the Company published its 2019 GT Plan Document, a number of developments have occurred that support the need for grid transformation.

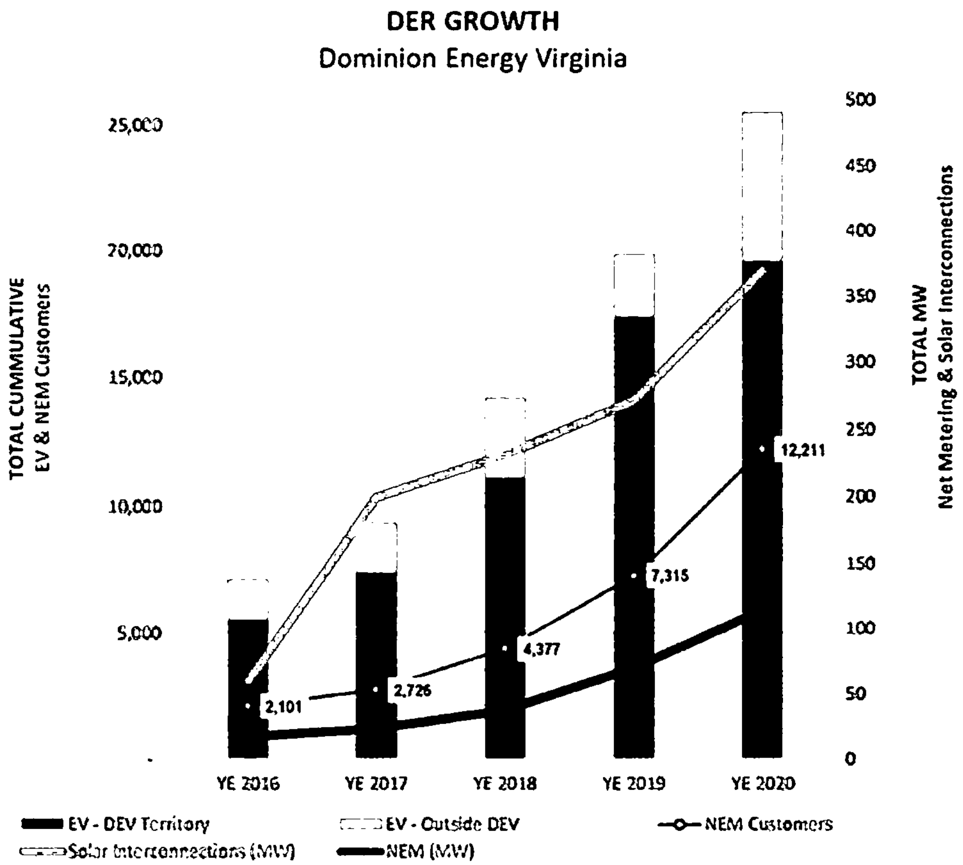
At the federal level, FERC issued a final rule—Order 2222—that allows for aggregation of all manner of DERs for participation in regional markets (*e.g.*, PJM). Specifically, FERC Order 2222 requires each regional transmission operator to create models for DERs to aggregate and participate in their wholesale markets on a comparable level with other resources. The order defines DER broadly to include "any resource located on the distribution system," which can include "storage resources, distributed generation, demand response, energy efficiency, thermal storage, and electric vehicles and their supply equipment." PJM expects to have its program structure submitted to FERC for approval in February 2022. Once that program structure is approved, the clocks starts for utilities to put the platforms, processes, and structure in place to support the objectives of the program.

In Virginia, the General Assembly accelerated its transition to a cleaner energy future with the passage of the VCEA in 2020. The VCEA calls for the development of a significant amounts of DERs, including 1,100 MW of small-scale solar resources that will interconnect to the distribution grid and 2,700 MW of energy storage that may interconnect to the distribution grid. The VCEA required the Commission to adopt regulations related to the deployment of energy storage in the Commonwealth, and required those regulations to include programs and mechanisms to deploy energy storage, specifically including behind-the-meter incentives and non-wires alternatives programs. Many of these programs will necessarily occur at the distribution level. In addition, the VCEA expands the opportunity for customers to participate in net metering through the installation of renewable energy resources at their distribution-connected premises, and sets aggressive targets for energy efficiency savings.

Throughout the country, there is support for transportation electrification. The federal administration has declared its support for electric vehicles, extending tax credits related to EV charging infrastructure and announcing additional grant funding opportunities to encourage EV adoption. In Virginia, the General Assembly passed legislation earlier this year that encourages transportation electrification, including rebates for the purchase of EVs and requirements for manufacturers to offer EVs for sale in Virginia. Indeed, car manufacturers have stated support for the transition to EVs; for example, General Motors announced its goal of producing only electric cars by 2035. More EVs means more EV charging infrastructure connected to the distribution grid.

The Company has already seen growth in DERs, and expects that growth to continue exponentially in the coming years. For example, for larger-scale DERs, as of May 31, 2021, there are 18 interconnection requests for utility-scale solar generation sites totaling 224 MW with executed interconnection agreements that are in the construction process, and 614 requests totaling 3,207 MW that are at some level of evaluation under the state interconnection process. This compares to a total of only 42 utility-scale solar generation sites totaling 386 MW currently connected to the Company's distribution system in Virginia. Looking at smaller DERs, in 2020 alone, the Company facilitated interconnection of nearly 5,000 unique net metering installations with a collective capacity of more than 44 MW. The Company now supports over 12,000 net metering customers with a collective capacity of 114 MW at the system level—roughly 70% of which has been added in the last two calendar years. The VCEA recently increased the capacity of net metering allowed in the Company's Virginia service territory from 1% of historical system peak, to 6%, which equates to approximately 1,056 MW of capacity. The same growth trends can be seen related to EVs, with nearly 20,000 customers in the Company's service territory having switched to electric. Figure 1 shows this growth in DERs between 2016 through 2020. With the passage of the VCEA and FERC Order 2222, as well as the other supportive public policies discussed above, the Company expects this growth to only increase.

Figure 1: DER Growth in Dominion Energy Virginia Service Territory (2016 to 2020)



Aside from these developments in Virginia, advancements in other states and industry groups show that Virginia is not alone in its transition to modern distribution grids. Since 2019, many other states have recognized the need for grid transformation. For example, the New Jersey Board of Public Utilities ("BPU") approved the deployment of AMI earlier this year, based in part on a BPU-commissioned report that found that "smart meters are well on their way to becoming the norm."[5] As another example, in early 2019, the National Association of Regulatory Utility Commissioners ("NARUC") and the National Association of State Energy Officials ("NASEO") convened a task force to address the need to reimagine electricity system planning processes in a world of DERs. In its February 2021 final report, the task force leadership reemphasized the continuing relevance of the drivers that initiated its efforts: (i) improve grid reliability and resilience; (ii) optimize use of distributed and existing energy resources; (iii) avoid unnecessary costs to ratepayers; (iv) support state policy priorities; and (v) increase the transparency of grid-related investment decisions.[6]

Finally, a number of major events have also happened in recent years that highlight the need for a secure, reliable, and resilient grid. For example, extreme weather events in California and Texas have shown the vulnerability of the grid. Such extreme weather event also occur closer to home, such as Tropical Storm Isaias in August 2020 that affected over 500,000 of the Company's customers, and the ice storms in Virginia in February 2021 that affected over 290,000 Virginia customers. Further, the recent attack on Colonial Pipeline that interrupted the supply chain for fuel has sent rippling effects throughout the country. These events illustrate that utilities are a target, both for natural and man-made attacks. A secure, reliable, and nimble grid is necessary to respond to the events and technologies in the modern world.

C. Value of a Transformed Distribution Grid to Customers

Foundational investments to transform the distribution grid will allow the Company to use the distribution system differently than it does today, all for the benefit of customers. Transformational investments in AMI, the CIP, intelligent grid devices, and automated control systems will enable the Company to improve operations (*e.g.*, reduced truck rolls; more predictive and efficient maintenance; increased visibility and control; optimized use of DERs), better forecast load shape, and predict future behaviors (*e.g.*, identifying and fixing grid problems before an outage occurs; enabling overall savings and cost management of demand-side management ("DSM") programs), resulting in a better, more informed customer experience. This value of a transformed distribution grid can be seen from the view of different types of customers.

Today, all customers must take specific action to report outages and then wait for the Company to deploy resources to bring the power back on. With transformational investments in AMI, CIP, intelligent grid devices, automated control systems, and resilience, customers will experience fewer outages and will not need to take action to report outages when they do occur. Instead, when outages do occur on the more connected and resilient grid, the outages reported through smart meters and other intelligent grid devices will prompt the dynamic system to automatically restore power to as many customers as possible, narrowing the scope of the outage and focusing effort on issues that require manual intervention. Additionally, grid visibility

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[5] Navigant Research, AMI GOLD STANDARDS REPORT at 37 (4Q 2019), *available at* https://www.bpu.state.nj.us/bpu/pdf/boardorders/2019/20191220/12-20-19-2H.pdf.
[6] NARUC-NASEO Task Force on Comprehensive Electricity Planning, BLUEPRINT FOR STATE ACTION at 3 (Feb. 2021), *available at* https://pubs.naruc.org/pub/14F19AC8-155D-0A36-311F-4002BC140969.

provided by the transformed grid will allow customers to receive proactive outage and restoration alerts—and more accurate information on expected restoration times, including detailed outage maps—allowing the fewer customers that are impacted to better adapt to the situation.

Today, most residential customers receive monthly energy usage data at a summary level through their bills. With transformational investments in AMI and the CIP, all residential customers can receive detailed interval energy usage data through convenient communication channels. The corresponding education will inform customers on how to take control of and manage their energy usage, if desired. These customers will also have the opportunity to participate in time-varying rates and innovative DSM programs that these investments will enable the Company to broadly offer. Such rate options and DSM programs can prompt behavioral changes that benefit customers through bill savings and reduced system costs. Further, with transformational investments in voltage optimization, informed by the data from AMI and intelligent grid devices, most customers will see lower energy consumption without a noticeable difference in service level because of the more precise voltage control settings.

Today, multi-family complex customers (*e.g.*, apartment complexes) have meters that limit the efficiency of the move-in / move-out process, a process that happens more frequently than for single-family homes. With transformational investments in AMI and the CIP, customers can change accounts the same day, leading to more efficient relocation, easier owner / tenant billing, and lower costs.

Today, DER net metering customers must engage in a largely manual application process, and then wait for a meter exchange. The meter exchange process alone can take up to 10 business days to schedule and complete, leading to potential interconnection delays for the customer. With transformational investments in AMI, CIP, intelligent grid devices, a DER management system ("DERMS"), and resilience, DER customers will (i) experience a much faster and seamless interconnection process, (ii) will no longer need a meter exchange, and (iii) will receive detailed information on how their DERs interact with the grid. Further, customers will maximize the value of their DERs through the connection with a resilient grid, and through opportunities to offer their DERs into programs that provide grid support or other functions. In addition, transformational grid investments will enable a dynamic hosting capacity map, allowing customers, and even localities, to evaluate optimal locations to interconnect DERs. By empowering customers with the information to optimally locate DER, customers can realize reduced interconnection costs and potentially contribute to the deferral of other system investments.

Today, the majority of EV customers do not have attractive options to encourage them to charge their vehicles during times when the demand for electricity is low. With transformational investments in AMI, CIP, and smart charging infrastructure, EV customers will have access to more innovative programs and advanced rate options, such as the Company's Off-Peak Plan (*i.e.*, Schedule 1G) that can lead to bill savings and reduced system costs.

Today, business customers are subject to sudden voltage fluctuations when outage events occur on the distribution grid. Even when a customer does not experience a sustained outage, these voltage fluctuations have the potential to impact operational processes and facility production. The intermittency and changing power flows related to renewable generation introduce new dynamics to grid operation that, if not managed properly, have the potential to similarly impact these customers. Transformational investments in reliability and resiliency will eliminate certain outage events and the associated voltage fluctuations that ripple across the distribution grid, while also ensuring power is restored more quickly when it does go out. With transformational investments in AMI, intelligent grid devices, and automated control systems, the Company will have the situational awareness and control capabilities to manage grid operation so business customers can rely on voltage stability to ensure minimal disruption to their operations.

Today, vital community resources are more dependent on grid reliability than ever before. Health and safety services, such as hospitals, water, and emergency services, carry the highest priority day-to-day and in a restoration event, closely followed by commerce and education, including internet services for home and work. More and more grid availability translates to availability for DER to contribute to system resources in the form of capacity factor. With transformational investments in resilient grid architecture, customers will have confidence that their growing reliance will be served.

Dominion Energy Virginia values the experience of its customers and believes that the Grid Transformation Plan will enable the Company to meet their changing needs and expectations.

II. Distribution Grid Planning

The fundamental changes in the energy industry discussed in Section I drive not only the need to transform the distribution grid, but also to transform how distribution grid planning occurs.

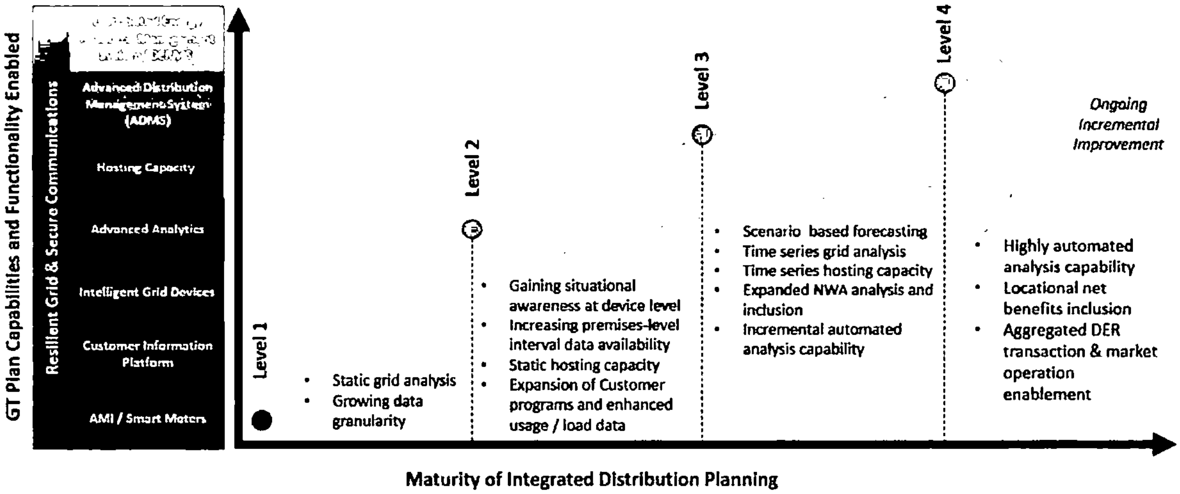
The Company's legacy distribution planning occurs through three separate processes:

i. Capacity planning, evaluating grid utilization during seasonal peak loading conditions based on projected load growth and identifying any necessary improvements to the distribution system needed to satisfy thermal and voltage criteria;
ii. Reliability planning, identifying causes of service interruptions and risks to the grid and developing cost-effective and prudent solutions to improve overall grid performance and customer experience; and
iii. DER interconnection planning, identifying the impact to the grid of interconnecting DER through regulated interconnection processes.

While these separate planning processes worked well in a world of centralized large-scale generation and a one-way power flow, they are not sustainable in the evolving paradigm where DERs and other emerging technologies are creating a dynamic distribution grid with bidirectional and constantly changing power flows.

In 2019, Dominion Energy Virginia presented a white paper that provided a conceptual first-look at its transition toward integrated distribution planning ("IDP"). The Company defines integrated distribution planning as a consolidated process to address capacity, reliability, and DER integration, accounting for uncertainties introduced by factors such as increasing DER penetration, changing usage patterns, and increasing use of new technologies. As explained in the white paper, the evolution to IDP requires changes related to people, technologies, and processes. Throughout, trained professionals are vital to leverage the technologies and optimize the processes. Technologies and secure communications that provide real-time visibility into the grid to the customer level are foundational to enable IDP. Processes and tools must then be developed that incorporate the data gathered by the foundational technologies, including advanced distribution modeling and analytical tools that consider a range of possible futures where varying levels of DER and emerging technologies are adopted on the distribution system. Figure 2 provides the maturity curve presented in 2019 showing the evolution of integrated distribution planning over time as enabling technologies are deployed.

Figure 2: Integrated Distribution Planning Maturity Curve



Since 2019, the Company has transitioned from Level 1 to Level 2. Notable successes in the evolution toward IDP include:

- Centralization of the Company's organizational structure such that the one team focuses on all distribution-related modeling and data analysis activities;
- Installation of ADMS;
- Development of an initial forecast of DERs by feeder;
- Publication of a hosting capacity tool that allows customers and developers to see the sections of the distribution system that may be more suitable to site new clean energy installations;
- Initial deployment activities for two battery energy storage systems ("BESS") pilot projects and the Locks Campus Microgrid, which will help the Company to study future non-wires alternatives; and
- Collection of additional premises-level data from AMI.
- .

Over the past two years, the Company has also participated in a research and development project with EPRI focused on modernizing distribution planning using automated processes and tools. The automated distribution assessment planning toolset ("ADAPT") project has been a multi-year effort with the objective of developing, testing, and demonstrating new methods and a prototype software tool that automates planning assessments and supports holistic decision-making in support of IDP. The ADAPT prototype software tool incorporates evolving grid planning criteria and objectives, evaluates traditional and emerging technology solutions, and allows for seamless integration of existing and emerging data sources.

Looking forward, the Company has begun work to create a roadmap for IDP that will add tangible goals and timeframes to the IDP maturity curve shown in Figure 2, incorporating lessons learned from the Company's engagement with EPRI and other industry activities. Efforts toward IDP continue to be limited by a lack of situational awareness and control capabilities across the distribution grid; direction from the Commission regarding the proposed deployment of intelligent grid devices and DERMS will thus help to inform the pace with which the Company can achieve the goals and objectives of IDP. The Company intends to present its next roadmap for IDP in 2023, as part of its next full integrated resource plan in Virginia.

III. Development of Grid Transformation Plan

The Company has engaged in an iterative process to develop the Grid Transformation Plan presented in this document. Guided by the policy objectives of the Commonwealth to facilitate the integration of DER and enhance distribution grid reliability and security, the Company incorporated its experience-based knowledge with input from customers and stakeholders; with lessons from the experiences of peer utilities; and with guidance provided by the Commission in prior orders.

A. Internal Process

The Company consistently tracks developments in the energy industry and challenges for its distribution system. The Company has collaborated with its peer utilities and has learned from their experiences. The Company has kept current with information published by various industry groups, and has engaged with these industry groups to gain additional knowledge and perspective. The Company also engaged an industry expert, West Monroe Partners, as a knowledgeable partner in the development of a plan to modernize the distribution grid. Additionally, the Company has tested certain components of the GT Plan on a smaller scale, such as AMI. All of this knowledge coalesced to create the framework for the Grid Transformation Plan.

B. Customer Engagement

Dominion Energy Virginia strives to meet its customers' energy needs while providing a seamless customer experience. To that end, the Company frequently seeks feedback from its customers in various forms and forums. The Company has also sought specific feedback to assist in the development of the Grid Transformation Plan. The Company intends to continue this customer engagement to assess the priorities included in the GT Plan.

The Company receives customer feedback on a daily basis. The Company strives not only to quickly and fairly resolve any customer issue, but also to identify trends and possible process improvements.

The Company also meets directly with customers. While the pandemic has limited the opportunities for in-person public events, the Company was able to conduct 28 virtual public meetings and events in 2020. The Company also hosted an outdoor, socially-distanced event with Lordstown Motors so that customers could learn about the Lordstown Endurance all-electric pickup truck and get a preview of the 2021 model. The Company will continue to engage with customers on an ongoing basis in its efforts to meet customer needs and expectations.

In 2019, the Company presented the results of a survey conducted by Maslansky + Partners ("Maslansky") to evaluate customer priorities related to the Grid Transformation Plan. Maslansky based this effort on a nationwide survey fielded by Edison Electric Institute ("EEI") on the "Voice of the Customer," and, where applicable, compared the results of the Virginia survey and the national study.

To further understand customer priorities, in 2021, the Company contracted with an external third-party to conduct enterprise-wide and Virginia-based research to evaluate customer priorities. For questions focusing on Grid Transformation Plan-related initiatives, preliminary findings indicate "uninterrupted service" remains a top priority, consistent across income levels, as shown in Figure 3. Furthermore, as shown in Figure 4, customers indicate they expect the importance of uninterrupted service to increase over the next few years, driven by the increase in number of electric devices and appliances, more opportunities to work from home, and meeting at-home healthcare needs.

Figure 3: Preliminary Findings on Importance of Uninterrupted Service

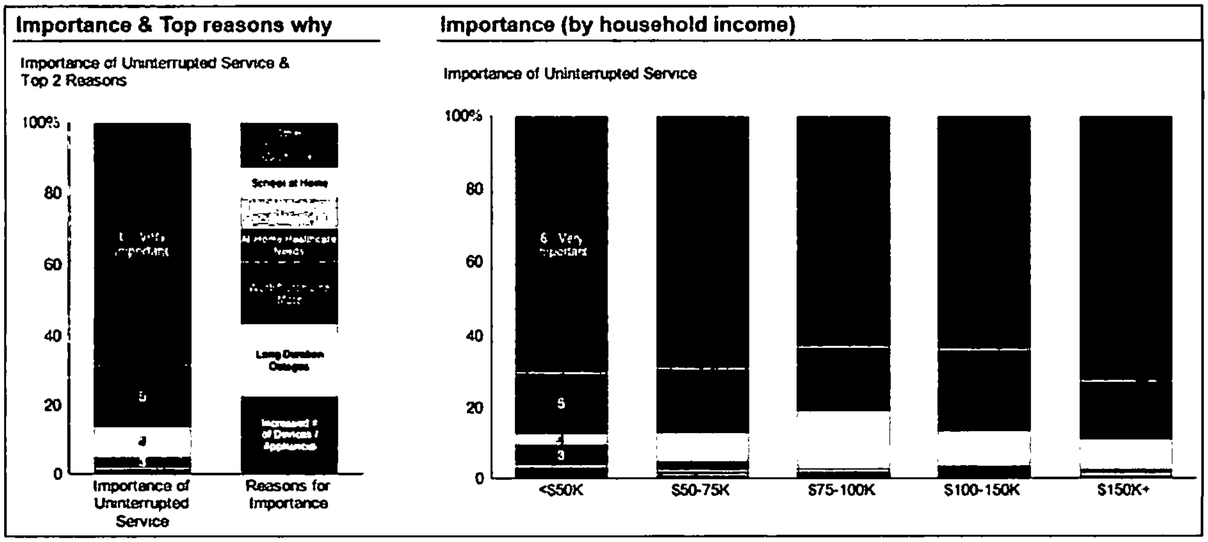
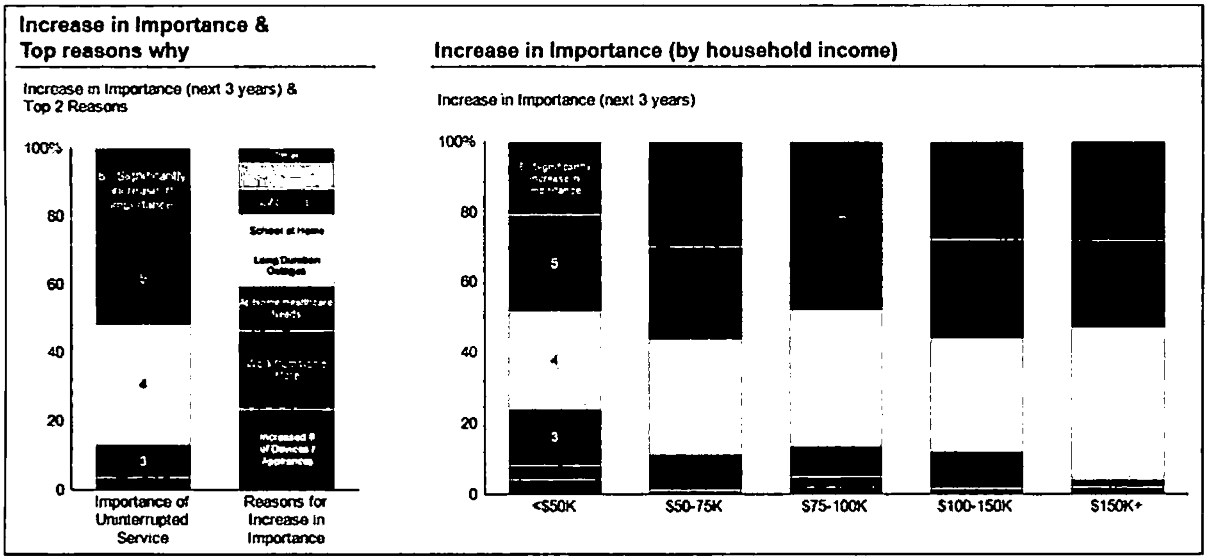


Figure 4: Preliminary Findings on Increase in Importance of Uninterrupted Service



C. Stakeholder Engagement

In furtherance and development of the Company's GT Plan and related initiatives, the Company began a series of stakeholder sessions in mid-2019 to inform and develop goals for a modern grid and the customer experience.

Ahead of its Grid Transformation Plan filing in 2019, the Company engaged an industry expert, Navigant, to facilitate an external stakeholder process. Attendees included a range of stakeholders with varying interests, from environmental advocates to municipality representatives to low income advocates. Commission Staff also attended the stakeholder process. Navigant facilitated a series of workshops that guided the conversation on the stakeholders' vision and objectives for grid transformation. Through collaborative conversations, a group of the stakeholders identified four goals for grid transformation:

- **Optionality**: Enable all customers with accessible, affordable electric service and engage customers with programs, education, and data access.
- **Sustainability**: Evolve to a clean and decentralized grid that integrates distributed energy resources, such as solar and wind, and electric vehicles.
- **Resiliency**: Build a more resilient energy grid that will reduce the effects of outages with automation and advanced asset management.
- **Affordability**: Deliver value for customers by optimizing demand and seeking to reduce system and customer costs.

Using these goals as a guide, Navigant led an exercise for stakeholder groups to prioritize grid capabilities that any plan for grid transformation should enable. Consistent across all stakeholder groups were investments that enabled two capabilities: (i) integrate and optimize DERs and (ii) provide relevant, data-enabled options that enable customers to meet their goals. In addition, highly prioritized by at least one stakeholder group were investments that enabled the following capabilities: (iii) increase monitoring and visibility; (iv) accommodate two-way power flows; (v) enable voltage monitoring and control, supporting load management and peak shifting; (vi) simplify interconnection for residential customers; and (vii) harden for resiliency and security.

Ahead of this Grid Transformation Plan filing in 2021, the Company re-convened stakeholders to provide an update and opportunity for feedback on various GT Plan components over three sessions. The first session focused on AMI, the CIP, and other customer-related programs such as the Company's Schedule 1G (marketed as the Off-Peak Plan). The second session focused on the Company's approved Smart Charging Infrastructure Pilot Program and other electrification initiatives. The third session focused on the Company's proposed intelligent grid device deployment and DERMS, and how the GT Plan more generally supports the objectives of the VCEA. Attendees at these sessions included a range of stakeholders with varying interests, from environmental advocates to state agency representatives to low income advocates. Commission Staff also attended the stakeholder process.

The Company intends to continue engagement with stakeholders as its grid transformation efforts proceed.

D. Environmental Justice Evaluation

Under the Virginia Environmental Justice Act ("VEJA"), environmental justice is defined as the fair treatment and meaningful involvement of every person—regardless of race, color, national origin, income, faith, or disability—regarding the development, implementation, or enforcement of any environmental law, regulation, or policy. The primary tenets of the VEJA—fair treatment and meaningful involvement—were not created anew in the Commonwealth, but instead stand and build upon existing, governmental environmental justice policies stemming back to Executive Order 12898 issued by President Clinton in 1994. This Executive Order focused on disproportionately high and adverse human health or environmental effects, including high risks from environmental hazards and impacts on populations relying on subsistence lifestyles, of federal agencies' actions on minority populations and low-income populations.[7] Like its federal predecessor, under the VEJA, "fair treatment" focuses on the negative and adverse environmental impacts of a project, and is defined to mean "the equitable consideration of all people whereby no group of people bears a disproportionate share of any negative environmental consequence resulting from operations, programs, or policies." Similarly, "meaningful involvement" under the VEJA means "the requirements that (i) affected and vulnerable community residents have access and opportunities to participate in the full cycle of the decision-making process about a proposed activity that will affect their environment or health and (ii) decision makers will seek out and consider such participation, allowing the views and perspectives of community residents to shape and influence the decision." The VEJA defines "environment" broadly to mean "the natural, cultural, social, economic, and political assets or components of a community."

Dominion Energy Virginia is dedicated to meeting environmental justice expectations of fair treatment and meaningful involvement by being inclusive, understanding, and dedicated to finding solutions, and by effectively communicating with its customers and neighbors. The Company adopted an environmental justice policy in 2018 through which it committed to hearing, fully considering, and responding to the concerns of all stakeholders. Consistent with the VEJA, this commitment includes ensuring that a voice in decisions about siting and operating energy infrastructure is given to all people and communities. Communities should have ready access to accurate information and a meaningful voice in the project development process. The Company has pledged to be a positive catalyst in its communities.

Generally, when conducting an environmental justice review, one evaluates: the type of activity (*e.g.*, a project or program at issue); where it will occur; what type of environmental impacts are likely; if any impacts, are they negative or adverse; and, whether there are environmental justice communities (as that term is defined by the VEJA) that might suffer the negative or adverse environmental impacts of the proposed activity. These factors are consistent with the VEJA, U.S. Environmental Protection Agency guidance, and currently accepted best practices. The VEJA defines environmental justice communities as identifiable, discrete communities within a specific geographic area. For example, the definition of "community of

[7] Executive Order 12,898 §§ 1-101, 3-301, 4-401 (Feb. 16, 1994), *available at* https://www.archives.gov/files/federal-register/executive-orders/pdf/12898.pdf.

color" focuses on "any geographically distinct area," and the definition of "low-income community" focuses on "any census block group."

The outcome of one or more of the inquiries in a typical environmental justice review may result in a finding that no environmental justice concerns exist. For example, a proposed project to upgrade a computer system may not have an environmental impact on any community, let alone an environmental justice community. As noted above, the VEJA defines environmental justice communities as identifiable, discrete communities within a specific geographic area. Thus, in this example, because a discrete environmental justice community is not at issue, the environmental justice review under the VEJA would be at an end. Assuming there is an environmental justice community that might suffer negative environmental impacts of the proposed activity, then an analysis is done to determine whether that community would bear a disproportionate share of such impacts. As discussed below, in preparing the Grid Transformation Plan, Dominion Energy Virginia evaluated each proposed project to determine whether any environmental justice concerns exist.

The Grid Transformation Plan includes multiple projects, some of which will require work in communities throughout the Company's service territory, and some that will not. While all of the proposed work in this Plan is intended to benefit these communities, and all customers broadly, as discussed in Section IV.B, the Company remains committed to ensuring environmental justice. Six of the fourteen grid transformation projects proposed for Phase II do not have a physical component that would cause any environmental consequence—the CIP, FLISR, DERMS, EAMS, cyber security, and customer education. The remaining eight Phase II grid transformation projects will require at least some work in communities. The Company proposes to deploy some of these projects broadly, and eventually in nearly every community it serves, such as the system-wide deployment of AMI and voltage optimization enablement. Other projects will focus on mitigating reliability, resiliency, and security risks in select areas, such as voltage island mitigation, substation technology deployment, and physical security.

The Company has engaged a third-party consultant to evaluate the eight Phase II grid transformation projects that will require at least some work in communities, and will use the results of this evaluation to inform its environmental justice strategy as it relates to the GT Plan. As discussed, in Section III.C, the Company has engaged in outreach with a number of stakeholders and stakeholders' representative groups regarding the GT Plan, and otherwise plans to continue with additional outreach and meaningful involvement activities as appropriate.

IV. Grid Transformation Plan

Virginia Code § 56-585.1 A 6 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." Based on the development process described in Section III, the Company presents a comprehensive plan designed to achieve all of the goals and objectives for grid transformation in a reasonable, prudent, and cost-effective manner.

The Grid Transformation Plan includes six core components: (i) AMI; (ii) CIP; (iii) grid improvements within two categories, grid infrastructure and grid technologies; (iv) transportation electrification; (v) security; and (vi) telecommunications infrastructure. Certain components, such as grid improvements, consist of multiple electric distribution grid transformation projects. The Plan also incorporates customer education related to the Company's grid transformation efforts generally, and to specific projects.

A. Interrelated Nature of Projects

The Company developed its Grid Transformation Plan as an integrated package of projects that work together for the benefit of customers to achieve the objectives of grid transformation—to facilitate the integration of DERs and to improve grid reliability and security. While some projects may provide benefits standing alone, the benefits increase exponentially when paired with the capabilities of other projects. The Company focused on the synergy between capabilities to ensure that it would not miss opportunities to benefit its customers. Some examples of these synergies follow, though they do not represent a comprehensive list.

The Company could deploy a new CIP to replace its aging infrastructure, and use it to manage customer billing. But the new CIP will transform the customer experience when it can use the data from AMI to provide customers detailed and timely education about their energy consumption, empowering customers to manage their energy usage to suit their individual goals.

The Company can (and did) publish a static hosting capacity tool with data obtained from existing sources, and refresh that tool quarterly. But the distribution grid is now a dynamic system that changes daily as any number and type of DERs are installed along feeders. When fed by the data from AMI and intelligent grid devices, the hosting capacity tool can refresh more frequently with the most up-to-date information, providing customers, localities, and developers with the tools to make the right decisions for them on siting DERs.

The Company could deploy DERMS to manage the growing population of DERs. But DERMS will best optimize use of DERs for grid support when informed by the data collected from AMI and intelligent grid devices over a secure telecommunications network. Every additional data element that DERMS collects helps it to become smarter—thus providing grid operators additional tools—in assessing real-time grid constraints and managing DERs accordingly. Further, investments in reliability and resiliency will ensure that these DERs are available to provide grid support on which the system can rely.

The Company could deploy intelligent grid devices to provide situational awareness on the distribution grid. These devices alone would support many other grid transformation projects with the data collected, as described in the examples above. But when paired with the proposed FLISR control system, the Company will unlock significant reliability improvements for customers at a small incremental cost, leading to faster overall system restoration time.

B. Projects

The sections that follow provide an overview of each project incorporated into the Grid Transformation Plan and summarize the need for the specific project, the deployment timeline, the alternatives considered, and the benefits. Refer to Appendix B as needed for context, which provides a description of the existing distribution grid. Each section below also lists the other proposed grid transformation projects that need to be approved if that specific project is approved. Finally, each section provides an overview of the Company's progress to date on the project, if applicable. These sections are intended to provide a high-level overview only; more information on each project is provided by the sponsoring Company witness.

1. Advanced Metering Infrastructure

Dominion Energy Virginia plans to fully deploy AMI across the service territory. Through this technology, the Company can remotely read data gathered by smart meters and send commands, inquiries, and upgrades to individual smart meters.

- Need. Modernize the distribution grid by digitally gathering customer energy usage data in specific increments and other premises-level data; replace aging AMR meters.
- Deployment Timeline. Full deployment over six-year period of 2019 to 2024.
- Alternatives Considered. No alternatives considered from a general metering technology perspective, as the Company does not consider AMR meters as a viable metering solution on a modern distribution grid. For AMI, considered alternative systems, vendors, and deployment timeline.
- Benefits. Advanced time-varying rates; targeted DSM programs; reduced components of the cost of service; enhanced grid operations; enhanced DER integration; avoided capital maintenance investments.
- Phase II Request. Deploy approximately 1.1 million smart meters and associated infrastructure.
- Progress to Date. Installed approximately 715,000 smart meters as of December 31, 2020; avoided almost 708,000 truck rolls from 2017 to 2020; reduced bad debt expense in areas where AMI has been deployed; reduced "found ons" by approximately 70% in areas where AMI has been deployed; launched Schedule 1G for customers in areas where AMI has been deployed.

2. Customer Information Platform

Dominion Energy Virginia proposes to implement a new CIP that will replace existing systems that support different aspects of the customer experience, including aging and outdated systems. As part of this project, the Company also proposes to complete a bill redesign to make it more understandable and easy to read.

- Need. Modernize the customer experience; replace antiquated CIS.
- Deployment Timeline. Full deployment of all four projects by 2024; Core Project to replace existing systems live in second quarter of 2023.
- Alternatives Considered. Prior to Phase I, considered the alternative of a patchwork of applications and manual processes. Now that deployment has begun, no alternatives considered.
- Benefits. Modernized customer relationship; advanced time-varying rates, DSM programs, and other customer offerings at scale; reduced manual workarounds; avoided capital maintenance investments; improved customer satisfaction.
- Phase II Request. Continue deployment of CIP.
- Progress to Date. Launched Outage Center app in November 2019, with more than 40,000 outages reported by Virginia customers as of April 1, 2021; launched notification Preferences in April 2021; completed two milestones for Core Project.

3. Grid Infrastructure

Within the category of grid infrastructure, the Company proposes: (a) hardening mainfeeders; (b) deploying targeted corridor improvement activities; and (c) mitigating voltage islands.

a. Mainfeeder Hardening

Dominion Energy Virginia proposes to complete hardening work (*i.e.*, physically strengthening infrastructure; improving distribution system architecture and connectivity) on a targeted population of mainfeeders.

- Need. Improve reliability on the worst performing mainfeeders.
- Deployment Timeline. Harden 187 mainfeeders through 2028.
- Alternatives Considered. Considered addressing issues on the identified mainfeeders reactively as outages occur rather than proactively, hampering efforts to improve reliability for these customers. Considered alternative solutions, and identified the appropriate hardening solution for each mainfeeder based on detailed engineering and design.
- Benefits. Improved reliability and resiliency; faster recovery after severe weather events.
- Phase II Request. None.
- Progress to Date. Completed hardening work on two mainfeeders as of May 31, 2021.

b. Targeted Corridor Improvement

Dominion Energy Virginia proposes several new vegetation management programs to improve grid reliability and resiliency while minimizing environmental impacts.

- Need. Improve accessibility to right-of-way; remove emerging risk related to ash trees.
- Deployment Timeline. Ash tree remediation completed by end of 2023; ground floor maintenance completed by end of 2027.
- Alternatives Considered. Considered addressing ash trees and ground floor growth reactively rather than proactively, potentially affecting reliability and resiliency, increasing costs for restoration and maintenance work, and requiring higher cost options for ash tree removal.
- Benefits. Improved reliability; improved access to right-of-way.
- Phase II Request. Continue ash tree mitigation and ground floor maintenance programs.
- Progress to Date. Removed over 3,200 ash trees; treated over 9,300 miles of right-of-way.

c. Voltage Island Mitigation

Dominion Energy Virginia proposes to mitigate voltage islands, which are single substation transformers that serve a population of customers without the support of available load transfer capability within the substation or through field tie switches to adjacent feeders.

- Need. Mitigate risk of an extended outage for customers served by voltage islands if the single substation transformer fails.
- Deployment Timeline. Address 15 voltage islands through 2028.
- Alternatives Considered. Considered not mitigating the risk of extended outages for customer served by voltage islands. Considered alternate solutions, and identified the appropriate solution for each voltage island.
- Benefits. Reduced risk of extended outages; improved reliability.
- Phase II Request. Address four voltage islands.
- Progress to Date. Work in progress to address two voltage islands.

4. Grid Technologies

Within the category of grid technologies, the Company proposes: (a) installing intelligent grid devices; (b) deploying FLISR; (c) implementing a DERMS; (d) conducting and publishing hosting capacity analysis; (e) implementing an enterprise asset management system ("EAMS") (f) enabling voltage optimization through infrastructure upgrades; (g) deploying modern technologies at substations; and (h) demonstrating microgrid capabilities at the Locks Campus.

a. Intelligent Grid Devices

Dominion Energy Virginia proposes to install intelligent grid devices ("IGDs") to provide the data and control necessary to restore power and manage distribution grid voltages and power flows in a system with increasing penetrations of DERs.

- Need. Monitor the distribution grid; remotely control the distribution grid to restore power and address power quality issues created by DERs.
- Deployment Timeline. Deploy IGDs on 759 mainfeeders through 2028.
- Alternatives Considered. Considered different equipment and vendor options to achieve the needed situational awareness and grid control functionality. Considered alternative deployment options in terms of the number and location of devices on each feeder based on detailed engineering and design, and good utility practice.
- Benefits. Increased data about the distribution grid, which enables remote monitoring and control of grid operations, enhances integrated distribution planning, and supports a dynamic hosting capacity tool; improved reliability.
- Phase II Request. Deploy IGDs on 32 mainfeeders.
- Progress to Date. Not applicable.

b. FLISR

Dominion Energy Virginia proposes to install a distribution automation system called FLISR, which stands for fault location, isolation, and service restoration, to leverage the capabilities of intelligent grid devices to improve reliability.

- Need. Improve reliability; leverage the full capabilities of intelligent grid devices.
- Deployment Timeline. Upgrades integrated into ADMS by the mid-2022.
- Alternatives Considered. Considered not leveraging the capabilities of IGDs to improve customer reliability through FLISR; rejected alternative because the incremental cost of FLISR software is justified by the reliability improvements for customers. Considered alternative software vendors.
- Benefits. Improved reliability; reduced outage-related O&M expenses; improved customer satisfaction.
- Phase II Request. Complete upgrades to ADMS to enable FLISR.
- Progress to Date. Began software installation, configuration, and testing.

c. DER Management System

Dominion Energy Virginia proposes to deploy DERMS to monitor, control, and optimize increasing levels of DERs on the Company's system to maintain a safe and reliable grid.

- Need. Manage increasing volumes of DERs.
- Deployment Timeline. Begin installation in first quarter of 2022.
- Alternatives Considered. Considered using a patchwork of manual processes to manage the increased volumes of DERs of various sizes and types; rejected alternative because of the objectives of FERC Order 2222, the complexity of operating in this manner, and the risk to system reliability and security as penetration increases. Will consider alternative software vendors.
- Benefits. Enhanced monitoring and optimization of DERs; enabled customer programs at scale, such as EV managed charging and vehicle-to-grid; facilitated non-wires alternatives, as required by the VCEA.
- Phase II Request. Install DERMS.
- Progress to Date. Not applicable.

d. Hosting Capacity Analysis

Dominion Energy Virginia proposes to complete and publish a hosting capacity analysis, and to refresh this analysis on a regular basis.

- Need. Provide customers, localities, and developers guidance about which sections of the distribution system may be more suitable to site new clean energy installations.
- Deployment Timeline. Initial hosting capacity tool launched January 2021; additional capabilities implemented in 2021 for smaller generation projects.
- Alternatives Considered. Considered not providing this information to customers and developers, increasing their risk related to siting generation projects in terms of costs to interconnect.
- Benefits. Increased information for customers, localities, and developers about how much generation can be placed at each point on the distribution grid without causing voltage or loading problems; increased proliferation of DERs.
- Phase II Request. None.
- Progress to Date. Launched hosting capacity tool in January 2021, available at https://www.dominionenergy.com/projects-and-facilities/electric-projects/energy-grid-transformation/hosting-capacity-tool; over 1,500 unique page views as of May 31, 2021.

e. Enterprise Asset Management System

Dominion Energy Virginia proposes to implement EAMS to improve its asset management practices by assessing the health and performance of physical distribution grid assets and to drive predictive maintenance activities.

- Need. Improve asset management practices.
- Deployment Timeline. System deployed by 2024.
- Alternatives Considered. Considered continued use of a patchwork of manual processes and isolated data system to manage distribution grid assets; rejected alternative because it would result in repeated reactive tactics and the inability to develop proactive and predictive strategies to mitigate equipment-related risk and realize asset life optimization opportunities.
- Benefits. Improved capabilities and strategies for managing the procurement, deployment, maintenance, and retirement of distribution equipment and devices.
- Phase II Request. Begin to deploy EAMS.
- Progress to Date. Not applicable.

f. Voltage Optimization Enablement

Dominion Energy Virginia proposes to make the improvements necessary to enable voltage optimization on the feeders where AMI has been installed.

- Need. Enable voltage optimization to achieve energy savings for customers by performing the necessary infrastructure improvements, as identified by data from AMI.
- Deployment Timeline. Complete infrastructure improvements that support implementing a 0.5% voltage optimization capability, estimated at approximately 29,000 projects.
- Alternatives Considered. Considered lesser percentage voltage reductions to target, which affects the necessary infrastructure improvements and resulting energy savings.
- Benefits. Broadly-enabled voltage optimization, which will result in generally lower voltage control settings leading to lower energy consumption for most customers without a noticeable difference in service level.
- Phase II Request. Complete approximately 6,800 infrastructure improvement projects.
- Progress to Date. Not applicable.

g. Substation Technology Deployment

Dominion Energy Virginia proposes to modernize certain distribution substations by upgrading electromechanical relays; deploying substation communication protocol and power quality monitoring equipment; and piloting advanced substation technology.

- Need. Integrate DERs; improve reliability, power quality, and safety; study advanced substation technology.
- Deployment Timeline. Modernize 60 substations through 2028; deploy advanced substation technology as appropriate based on outcome of pilots.
- Alternatives Considered. Considered addressing substation equipment issues reactively rather than proactively; rejected alternative because it could result in an inability to effectively integrate DERs or circuit automation, such as FLISR, on the associated feeders.
- Benefits. Facilitated integration of DERs while maintaining voltage stability; improved reliability; improved power quality; enabled FLISR; enhanced understanding of advanced substation technology.
- Phase II Request. Modernize 9 substations; deploy 200 power quality devices; pilot three advanced substation technologies.
- Progress to Date. Not applicable.

h. Locks Campus Microgrid

Dominion Energy Virginia proposes to study a new technology—microgrids—by installing one at its Locks Campus near Petersburg, Virginia.

- Need. Obtain experience with microgrids.
- Deployment Timeline. Construction completed by first quarter of 2023.
- Alternatives Considered. Not obtaining experience with microgrids.
- Benefits. Enhanced understanding of microgrids from real-world data and testing of DER grid support and islanding capabilities.
- Phase II Request. None.
- Progress to Date. Awarded engineering, procurement, and construction contract.

5. Transportation Electrification

Dominion Energy Virginia plans to offer rebates and install a limited number of Company-owned charging stations through its Smart Charging Infrastructure Pilot Program. Looking forward, the Company will continue to monitor other opportunities for the Company to support transportation electrification for possible inclusion in future filings.

- Need. Support EV adoption while minimizing the impact of EV charging on the distribution grid; manage future EV charging load.
- Deployment Timeline. Offer rebates for the electrical infrastructure and upgrades at EV charging sites and rebates for the smart charging equipment that enables managed charging in Phase I; install four Company-owned fast charging stations.
- Alternatives Considered. Considered a "do nothing" scenario, as well as scenarios base on lower or higher EV adoption rates.
- Benefits. Energy and demand savings; fuel and maintenance savings for EV drivers; reduced greenhouse gas emissions.
- Phase II Request. None.
- Progress to Date. Issued rebates for 12 charging stations through May 31, 2021, with additional rebates to be issued pending installation and verification of selected charging stations; selected site host, equipment, and rideshare partner for four Company-owned fast charging stations.

6. Security

Dominion Energy Virginia will continue to protect the distribution grid by providing adequate and cost-effective security control measures to manage the growing threat to the energy sector and to protect from cyber and physical attacks.

a. Physical Security

The Company plans to enhance physical security at key distribution substations.

- Need. Protect the distribution grid from security threats, thus protecting the Company and its customers.
- Deployment Timeline. Enhance physical security at 46 substations through 2028.
- Alternatives Considered. Considered not enhancing physical security at critical distribution substations; rejected alternative because it would leave these substations vulnerable to threats.
- Benefits. Avoided attacks on the system; mitigated risk of new or emerging threats.
- Phase II Request. Enhance physical security at 12 critical distribution substations.
- Progress to Date. Enhanced physical security at one substation completed, with three additional substations to be completed by the end of 2021.

b. **Cyber Security**

The Company plans to protect the investments proposed in the Grid Transformation Plan through the necessary cyber security investments.

- Need. Protect the distribution grid from security threats, thus protecting the Company and its customers.
- Deployment Timeline. As needed to protect other approved grid transformation projects.
- Alternatives Considered. Leveraged existing cyber security solutions where possible; alternative considered for additional cyber security solutions as needed based on the security needs of the specific project.
- Benefits. Avoided attacks on the system; mitigated risk of new or emerging threats.
- Phase II Request. Cyber security solutions as needed to protect other Phase II grid transformation projects.
- Progress to Date. Leveraged existing agreements and solutions, requiring limited cyber security improvements to support other GT Plan projects.

7. **Telecommunications**

Dominion Energy Virginia proposes to deploy a comprehensive telecommunications strategy requiring multiple components specifically designed and deployed as an integrated solution to meet the wide-range needs of a transformed distribution grid. The strategy includes Tier 1, a high-speed broadband with very low latency network with redundancy; and Tier 2, a broadband network with redundancy, as well as increasing the capacity of the Company's network operations center ("NOC").

- Need. Enable the secure communication required for a transformed grid.
- Deployment Timeline. Tier 1 by 2021; Tier 2 deployed through 2028; NOC capacity increases through 2028.
- Alternatives Considered. Prior to Phase I, various alternatives considered to address the wide range of business and technical requirements. Now that deployment of Tier 1 and Tier 2 has begun, no alternatives considered.
- Benefits. Secure, reliable, and resilient telecommunications infrastructure; enabled grid transformation projects that require real-time communications for situational awareness and grid control.
- Phase II Request. Continue deployment of Tier 2 and increased NOC capacity.
- Progress to Date. Tier 1 implementation complete; deployed Tier 2 telecommunications solutions to over 50 facilities, including laying 25 miles of fiber.

8. Customer Education

Dominion Energy Virginia plans to improve the customer experience by incorporating education into various Plan components and including general energy education. Appendix C includes the full details of the customer education plan. While this customer education plan focuses on enhanced capabilities enabled by GT Plan, it supplements the Company's overall efforts to educate its customers on topics ranging from available rate schedules to general energy education.

- Need. Provide customers with concise, consistent, and easy-to-understand educational content.
- Deployment Timeline. As needed to support other approved grid transformation projects.
- Alternatives Considered. Considered various communication channels based on the educational need.
- Benefits. Improved customer experience; enhanced understanding of GT Plan and related benefits.
- Phase II Request. Customer education as needed to support other Phase II grid transformation projects.
- Progress to Date. New webpages, factsheets, postcards, presentations, and videos provided to customers; 1,272,283 direct communications, 171,168 digital impressions, and 28 virtual events in 2020.

C. Alignment with Customer and Stakeholder Feedback

As discussed in Section III.B, the Company received customer feedback on a range of priorities associated with the Grid Transformation Plan as part of the 2019 Maslansky Survey. Figure 5 notes the top findings on what customers rank with highest importance.

Figure 5: Customer Feedback Priorities

	Customer Priorities
1	Completes scheduled work when they say they will
2	Has knowledgeable customer service representatives
3	Invests in technology to help it prevent outages and respond to outages faster when they occur
4	Keeps my energy usage data private and doesn't make any personally identifiable information available
5	Alerts me when power is out, how long it will take to restore, and when it is restored
6	Invests in a stronger energy grid that can withstand extreme weather and cyberattacks
7	Completes work without needing follow up
8	Has easy to understand bills that explain charges clearly
9	Takes the time to listen to my issues and actually help me
10	Has an outage map that includes accurate estimates of outage time and progress in restoring power

As shown in Figure 5, among attributes tested, those relating to outage communications and smarter energy infrastructure rise to the top as priority areas of focus. These findings support the proposed GT Plan investments and make clear that they will provide the types of benefits the Company's customers value most—enhanced reliability and accurate information. Further, the initial results from the 2021 customer survey discussed in Section III.B show that "uninterrupted service" remains a top priority for customers.

As discussed in Section III.C, the Company initiated a series of stakeholder sessions in 2019 to inform and develop goals for a modern grid and the customer experience. Through the 2019 GT Plan stakeholder process, four goals were identified: (i) enable all customers with accessible, affordable electric service and engage customers with programs, education, and data access (Optionality); (ii) evolve to a clean and decentralized grid that integrates distributed energy resources, such as solar and wind, and electric vehicles (Sustainability); (iii) build a more resilient energy grid that will reduce the effects of outages with automation and advanced asset management (Resiliency); and (iv) deliver value for customers by optimizing demand and seeking to reduce system and customer costs (Affordability). GT Plan projects directly support each of these four goals, through deployment of technology to empower customers to make informed decisions about their energy usage, enabling increased adoption of DERs in a responsible manner, and delivering better reliability and fewer outages for customers.

D. Costs

The Company estimated costs for each grid transformation project using competitively-negotiated contracts and responses to competitive requests for proposals ("RFPs") and requests for information ("RFIs"), informed by prior experience. The Company's filing provides detailed information used to determine costs, and includes the relevant contracts or summaries of the completed RFPs and RFIs.

In Phase I of the Grid Transformation Plan, the Company suggested, and the Commission approved, a maximum amount of investment—by project—deemed reasonable and prudent ("cost caps"). Should costs exceed the approved cost caps, those costs would be incurred at the Company's risk, and it would be the Company's burden to demonstrate reasonableness and prudence for any such incremental investment.

Figure 6 provides projected costs by component for Phase I and Phase II of the GT Plan. The amounts shown for Phase I represent the cost caps approved by the Commission. The amounts shown for Phase II represent the cost caps proposed by the Company, subject to further refinement during the course of the proceeding.

Figure 6: Phase I and Phase II Costs ($M)

	Phase I		Phase II	
Project	**Capital**	**O&M**	**Capital**	**O&M**
AMI	---	---	$186.1	$12.2
CIP	$83.7	$27.0	$139.1	$68.8
Mainfeeder Hardening	$47.9	$0	---	---
Targeted Corridor Improvement	$0	$12.5	$0	$16.3
Voltage Island Mitigation	$6.7	$0	$11.4	$0
Intelligent Grid Devices	---	---	$29.1	$0.02
FLISR	---	---	$10.0	$0.9
DERMS	---	---	$5.2	$0
Hosting Capacity	$0.2	$0.05	---	---
EAMS	---	---	$18.8	$1.2
Voltage Optimization Enablement	---	---	$97.1	$0
Substation Technology Deployment	---	---	$32.1	$0
Locks Campus Microgrid	$7.2	$0.08	---	---
Physical Security	$7.9	$0.3	$37.3	$0.2
Transportation Electrification	$3.8	$16.2	---	---
Telecommunications	$53.0	$1.6	$97.9	$4.1
Cyber Security	$1.1	$0.4	$5.3	$2.8
Customer Education	$0	$2.7	$0	$3.0
Total*	**$211.5**	**$60.8**	**$669.4**	**$109.5**

*Totals may not add due to rounding

The Company has committed that the costs of the Plan associated with the deployment of AMI and the CIP in Phases I and II will not be the subject of a rate adjustment clause petition.

Instead, these costs will be recovered through the Company's existing rates for distribution services ("base rates"). As to other phases of and projects in the Plan, the Company has not yet determined its plans for cost recovery.

E. Benefits

The overarching benefits of the Grid Transformation Plan are that it facilitates the integration of DERs and enhances distribution grid reliability and security. All proposed projects contribute to these core objectives in some way.

The Company engaged a third-party industry expert, West Monroe Partners, to generate a cost-benefit analysis ("CBA") model for the Grid Transformation Plan that quantifies the benefits of the GT Plan compared to the costs. Figure 7 presents the results of the CBA.

Figure 7: CBA Summary

GT Plan Cost-Benefit Model Summary

(Revenue Requirement Basis, $ in Millions)

BENEFITS & COSTS	NOMINAL	PV[1]
AMI-Centric Programs		
AMI, Time-of-Use Rate, and Peak-Time Rebate (incl. Cyber Security Expenses)		
BENEFITS *(Asset Life)*:	**$1,320.6**	**$593.1**
Avoided/Deferred Capital[2]	$447.8	$138.9
O&M Savings	$409.6	$217.9
Energy & Demand Savings	$206.9	$93.9
Reduction of Bad Debt & Energy Diversion	$256.3	$142.4
COSTS[3] *(Revenue Requirement)*:	**$888.1**	**$547.9**
Net Benefit (Cost):	**$432.5**	**$45.2**
Benefit/Cost Ratio:	**1.5**	**1.1**
Grid Infrastructure		
Mainfeeder Hardening, Targeted Corridor Improvement, and Voltage Island Mitigation (incl. Cyber Security Expenses)		
BENEFITS *(Asset Life)*:	**$3,682.5**	**$900.7**
Avoided/Deferred Capital[2]	$49.3	$8.5
O&M Savings	$63.4	$17.9
Enhanced Reliability	$3,569.9	$874.3
COSTS[3] *(Revenue Requirement)*:	**$1,830.1**	**$721.4**
Net Benefit (Cost):	**$1,852.4**	**$179.3**
Benefit/Cost Ratio:	**2.0**	**1.2**
Grid Technologies		
Intelligent Grid Devices, FLISR Software, DERMS, Hosting Capacity, EAMS, Voltage Optimization Enablement, Substation Technology Deployment, Locks Campus Microgrid, and Telecom (incl. Cyber Security Expenses)		
BENEFITS *(Asset Life)*:	**$7,293.0**	**$1,771.3**
Avoided/Deferred Capital[2]	$933.7	$163.4
O&M Savings	$155.4	$71.6
Energy & Demand Savings	$2,387.9	$620.2
Enhanced Reliability	$3,816.0	$916.1
COSTS[3] *(Revenue Requirement)*:	**$3,226.5**	**$1,322.6**
Net Benefit (Cost):	**$4,066.5**	**$448.7**
Benefit/Cost Ratio:	**2.3**	**1.3**
Transportation Electrification		
Residential, Public, and Fleet EV Programs (incl. Cyber Security Expenses)		
BENEFITS *(Asset Life)*:	**$359.3**	**$125.4**
Avoided/Deferred Capital[2]	$300.5	$97.8
Energy & Demand Savings	$58.8	$27.6
COSTS[3] *(Revenue Requirement)*:	**$168.3**	**$105.6**
Net Benefit (Cost):	**$190.9**	**$19.8**
Benefit/Cost Ratio:	**2.1**	**1.2**
GT Plan Total[4]		
Total Net Benefit (Cost):	**$5,473.2**	**$152.5**
Total Benefit/Cost Ratio:	**1.7**	**1.05**

[1] *Present Value (PV) calculated using Weighted Average Cost of Capital (WACC) of 6.806%*

[2] *Avoided/Deferred Capital is stated on a Revenue Requirement basis*

[3] *Costs are inclusive of Cyber Security costs required to support projects within the investment grouping*

[4] *GT Plan Total includes costs and benefits associated with CIP, Customer Education, Physical Security, and Cyber Security costs not tied to specific projects*

As can be seen, the CBA model represents a positive business case from a financial perspective, providing over $150 million in net benefits to customers on a net present value basis, with a benefit to cost ratio of 1.05. Additional quantitative benefits include reduced greenhouse gas emissions, increased EV ownership savings, and positive economic development impacts. Some of the benefits derive from programs and offerings that the Company will implement once the proposed projects are deployed, including a time-of-use rate and a peak time rebate program. Including these in the CBA model reflects the Company's commitment to these programs and offerings

The CBA model focuses on quantifiable benefits, but the Grid Transformation Plan produces other qualitative, non-quantifiable benefits. For example, there are benefits that are difficult to quantify, like avoiding a cyberattack; providing resilient service to military bases, hospitals and communities; and providing customers with accurate and timely information that has implications for their daily lives.

The following sections highlight certain GT Plan benefits important to the Company and various stakeholders.

1. Time-varying Rates

Transformational investments in AMI and the CIP, when coupled with customer education and communication, enable the Company to broadly offer time-varying rates. Time-varying rates provide incentives for customers to shift their usage to off-peak periods when the cost of generating electricity is less expensive, which both reduces the demand on the Company's system and reduces the customers' bills.

The Company has a concrete, definitive plan to implement time-varying rates on a system-wide basis—both a time-of-use rate and a peak-time rebate ("PTR") program. For ease of review, the Company has created a separate document outlining its comprehensive plan for time-varying rates ("Plan for Time-varying Rates"), which is attached as Appendix D. The Plan for Time-varying Rates provides the Company's definition of "time-varying rates," an overview of the existing time-varying rates that the Company offers, and a plan to offer enhanced time-varying rates on a system-wide basis in conjunction with the full deployment of AMI and the CIP. The Plan for Time-varying Rates also provides a discussion of opt-in versus opt-out time-varying rates.

2. Demand-Side Management Initiatives

The foundational and transformational investments proposed as part of the Grid Transformation Plan will enable enhanced and targeted DSM initiatives in many ways. Investment in the full deployment of AMI and the CIP will enable the Company to broadly offer enhanced demand response programs—such as time-varying rates, PTR, and managed charging for EVs—and to deploy new energy efficiency programs—such as voltage optimization. Additionally, the interval usage data captured by AMI will both enhance existing DSM programs and improve evaluation, measurement, and verification ("EM&V") of DSM programs. Finally, the deployment of DERMS will provide the capability to manage demand response programs going forward. All of these programs and enhancements should lead to savings for the individual customers who participate in the various DSM programs, but should also lead to system energy and demand savings that will benefit all customers. For example, voltage optimization utilizes the data collected from AMI and other intelligent grid devices to reduce the voltage supplied to customers to the optimum level, which results in lower energy consumption for most customers without a noticeable difference in service level.

3. Integrated Distribution Planning

As described in Section II, the Company's legacy distribution planning processes are not sustainable in the evolving paradigm where DERs and other emerging technologies are creating a dynamic distribution grid with bidirectional and constantly changing power flows. The real-time data from AMI and intelligent grid devices, paired with automated control systems (*e.g.*, DERMS) and advanced planning tools are foundational to the transition to integrated distribution planning.

4. Reliability

Transformational investments in grid infrastructure and grid technologies will improve reliability for customers across the Company's service territory. While some projects, like mainfeeder hardening and voltage island mitigation, focus on targeted populations of customers, others will be deployed more broadly, such as targeted corridor improvement. The CBA model quantifies reliability benefits using the Department of Energy's Interruption Cost Estimate Calculator ("ICE Calculator"), a recognized method for determining the economic value of increased reliability. This tool has been updated multiple times over the past decade to improve the accuracy of the results, and the Company fully supports the quantified benefits presented. Additionally, Dominion Energy Virginia engaged with Lawrence Berkeley National Laboratory in 2020 on a multi-year project to refine the ICE Calculator and incorporate Virginia-specific data.

5. Load Forecasting

The data obtained from AMI can also enhance the Company's load forecasting process. AMI data will permit the Company to examine consumption patterns on an hourly basis. This data can then be used to create consumption forecast models at various segment levels, for example, at the neighborhood level, the zip code level, and the feeder level. These localized forecasts can then be rolled up to a system level and compared against the Company's current forecasting methods. Having this ability will allow the Company to modify its forecasting process, which will likely lead to more accurate peak demand and energy forecasts.

6. Broadband Pilot Program

The foundational telecommunications investments proposed as part of the Grid Transformation Plan provide the opportunity to support expanded deployment of broadband in the Commonwealth through the Rural Broadband Pilot Program. The telecommunications project includes the extension of the Company's fiber network to substations and key facilities. The expansion of the Company's fiber network, particularly in rural unserved areas, provides opportunities to leverage the fiber network for the benefit of middle-mile expansion in unserved and underserved markets as a part of the Company's Rural Broadband Program. Not only does the fiber serve Dominion Energy Virginia's connectivity needs at key facilities, but it also supports existing and potential internet service providers' use of the fiber capacity to improve availability of broadband for commercial, government, institutional, and residential customers in Virginia. The Commission recently approved rural broadband pilot projects in Surry County, Botetourt County, and the Northern Neck region of Virginia.

F. Regulatory Process

The GTSA mandated that the Company petition the Commission for approval of a plan for electric distribution grid transformation projects. The GTSA also set forth the applicable standard for reviewing such petitions:

> In ruling upon such a petition, the Commission shall consider whether the utility's plan for such projects, and the projected costs associated therewith, are reasonable and prudent. Such petition shall be considered on a stand-alone basis without regard to the other costs, revenues, investments, or earnings of the utility; without regard to whether the costs associated with such projects will be recovered through a rate adjustment clause under this subdivision or through the utility's rates for generation and distribution services; and without regard to whether such costs will be the subject of a customer credit offset, as applicable, pursuant to subdivision 8 d.[8]

The Commission must rule on any petition not more than six months after the date of filing.

In July 2018, the Company submitted its petition for approval of Phase I of the GT Plan in Case No. PUR-2018-00100. The Commission issued its final order in that proceeding on January 17, 2019. In September 2019, the Company submitted its second petition for approval of Phase I of the GT Plan in Case No. PUR-2019-00154. The Commission issued its final order in that proceeding on March 26, 2020 (the "2019 Final Order"), and its order on reconsideration on April 27, 2020. Figure 6 in Section IV.D provides a list of the GT Plan projects that the Commission approved in Phase I, along with the associated cost caps.

In the 2019 Final Order, the Commission ordered the Company to file an annual report on or before March 31, 2021, and each year thereafter, to include reporting metrics proposed by the Company and other information directed by the Commission. The Company filed its first annual report on March 31, 2021 in the docket for Case No. PUR-2020-00154. The Company will incorporate additional metrics and information into its annual reports for any additional projects approved as part of Phase II.

[8] Va. Code § 56-585.1 A 6.

V. Future Technologies

Dominion Energy Virginia takes an active approach to understanding the trends, innovations, and progress related to new technologies in the electric utility landscape. The following section describes future technologies that the Company will continue to monitor as its pilot and demonstration programs progress.

A. Energy Storage

The term "energy storage" applies to a diverse set of technologies that can store energy at one time and make it available at another time. The technologies range in size, cost, performance characteristics, and application. Energy storage can support the grid in a number of ways, including improved reliability, increased resiliency, and operational flexibility.

Until recently, energy storage resources have not been broadly deployed at utility scale, other than pumped hydroelectric storage. As discussed in Section I.B, the VCEA sets aggressive targets for the development of energy storage in the Commonwealth to enhance the reliability and performance of the generation and distribution systems.

In 2019, the Company submitted its first application to participate in the pilot program established by the Commission pursuant to the GTSA under which the Company must submit proposals to deploy up to 30 MW of storage. The application presents three projects for deployment, including two for applications on the distribution system. Through BESS-1, the Company proposed to deploy a 2 MW / 4 MWh AC lithium-ion BESS that will study the prevention of solar backfeeding onto the transmission grid at a specific distribution substation. Through BESS-2, the Company proposed to deploy a 2 MW / 4 MWh AC lithium-ion BESS that will study BESS as a non-wires alternative to reduce transformer loading at a specific substation. The Commission approved these projects in its final order dated February 14, 2020, in Case No. PUR-2019-00124. The Commission also approved a third BESS, referred to as BESS-3, to study solar plus storage at the Company's Scott Solar Facility; BESS-3 is a generation asset. The Company expects both BESS-1 and BESS-2 to be in service and operational by early 2022.

In 2019, the Company also announced an innovative electric school bus initiative to replace diesel school buses with electric school buses, and then leverage the batteries using vehicle-to-grid technology. Fifty electric school buses have been delivered to school districts throughout Virginia. The Company will begin evaluation and vehicle-to-grid testing this year.

The Company will pursue additional energy storage resources as set forth in the Company's RPS Development Plan approved by the Commission in Case No. PUR-2020-00134, including opportunities to use energy storage for peak demand reduction and non-wires alternatives. Currently, the Company is evaluating a potential project to study storage paired with DCFC infrastructure for EVs and another potential project aimed at understanding the ability of storage to provide backup power and resiliency for our customers. While the Company believes that BESS (lithium-ion technology in particular) will be the dominant form of energy storage for the foreseeable future, the Company will also seek opportunities to expand its understanding of energy storage technologies by evaluating additional forms of energy storage and establishing projects to deploy those technologies where technically and economically feasible.

B. MicroGrids and NanoGrids

A microgrid is a small power grid consisting of interconnected loads and DERs with clearly defined electrical boundaries. A microgrid can operate both when connected to the larger electric grid and continue to operate as an "island" when there is an interruption or other grid disturbance.

A nanogrid is a small microgrid typically consisting of a single building or primary load, and the generation needed to supply that load without a connection to a centralized grid. A nanogrid is fully capable of operating independent of the grid through a combination of sustainable generation, storage, and smart devices, all digitally connected and controlled to optimize the balance of load with available power. A nanogrid gives the individual consumer the ability to manage its own generation sources, demand, and usage independent of both the microgrid that they may be a part of and the centralized utility grid.

Microgrids offer promising solutions for critical loads, such as military installations, hospitals, and water treatment plants. The Company will study microgrids by installing one at its Locks Campus near Petersburg, Virginia, as discussed in Section IV.B.4.

LIST OF ACRONYMS

Acronym	Meaning
AC	Alternating current
ADAPT	Automated distribution assessment planning toolset
ADMS	Advanced distribution management system
AMI	Advanced metering infrastructure
AMR	Automated meter reading
APT	Advanced persistent threat
AWA	Agency web access
BEA RIMS	Bureau of Economic Analysis Regional Input-Output Modeling System
BESS	Battery energy storage system
BTM	Behind-the-meter
CAIDI	Customer average interruption duration index
CBA	Cost-benefit analysis
CBMS	Customer Business Management System
C&I	Commercial and industrial
CCRO	Customer credit reinvestment offset
CI	Customer interruptions
CIP	Customer information platform
CIS	Customer information system
CMI	Customer minutes of interruption
COBOL	Common business-oriented language
CTB	Virginia Commonwealth Transportation Board
DA	Distribution automation
DAS	Data analytics system
DC	Direct current
DCFC	Direct current fast charging
DER	Distributed energy resources
DERMS	Distributed energy resource management system
DHS	Department of Homeland Security
DOE	Department of Energy
DR	Demand response
DSM	Demand-side management
EAB	Emerald ash borer
EAMS	Enterprise asset management system
EE	Energy efficiency
EEI	Edison Electric Institute
EIA	Energy Information Administration
EPRI	Electric Power Research Institute
EM&V	Evaluation, measurement, and verification
EPA	Environmental Protection Agency
EV	Electric vehicle
FACTS	Flexible AC transmission system
FALLS	Fault analysis and lightning location system

Acronym	Meaning
FAN	Field area network
FCI	Fault circuit indication
FERC	Federal Energy Regulatory Commission
FLISR	Fault location, isolation and service restoration
GDP	Gross domestic product
GHG	Greenhouse gas
GIS	Geographic information system
GPS	Global positioning system
GT Plan	Grid Transformation Plan
GTSA	Grid Transformation and Security Act of 2018
ICE Calculator	Interruption cost estimate calculator
IDP	Integrated distribution planning
IEEE	Institute of Electrical and Electronics Engineers
IGDs	Intelligent grid devices
INSI	Itron Networked Solutions, Inc.
IOU	Investor-owned utility
IT	Information technology
kV	Kilovolt
kWh	Kilowatt-hour
LMV	Locational marginal value
LTC	Load tap changer
MDMS	Meter data management system
MPLS	Multi-protocol label switching
MW	Megawatt
MWh	Megawatt-hour
NARUC	National Association of Regulatory Utility Commissioners
NASEO	National Association of State Energy Officials
NERC	North American Electric Reliability Corporation
NIC	Network interface card
NIST	National Institute of Standards and Technology
NOC	Network Operations Center
NPV	Net present value
NREL	National Renewable Energy Laboratory
NWA	Non-wires alternatives
O&M	Operations and maintenance
OMS	Outage management system
OT	Operational technology
PBR	Performance-based ratemaking
PDC	Phasor data concentrator
Phase IA	Grid transformation projects for 2019, 2020, and 2021 approved in Case No. PUR-2018-00100
Phase IB	Grid transformation projects for 2019, 2020, and 2021 approved in Case No. PUR-2019-00154

Acronym	Meaning
Phase II	Grid transformation projects proposed for 2022 and 2023 in Case No. PUR-2021-00127
PII	Personal-identifying information
PTR	Peak-time rebate
RAC	Rate adjustment clause
RFI	Request for information
RFP	Request for proposals
RPS	Renewable energy portfolio standard
RTP	Real-time pricing
SAIDI	System average interruption duration index
SAIFI	System average interruption frequency index
SCADA	Supervisory control and data acquisition
SCIP Program	Smart Charging Infrastructure Pilot Program
SONET	Synchronous optical networking
SSSC	Static synchronous series compensator
STATCOMs	Static compensators
SUP	Strategic Undergrounding Program
T&D	Transmission and distribution
THA	Transformer health assessment
TOU	Time-of-use
UPFC	Unified power flow controllers
V	Volt
Va. Code	Code of Virginia
VCEA	Virginia Clean Economy Act of 2020
VO	Voltage optimization
VMT	Vehicle miles of travel

GLOSSARY

ADMS (advanced distribution management system): A software platform that supports and manages the full suite of distribution grid management and optimization technologies employed by the Company.

AMI (advanced metering infrastructure): An over-arching metering system, which includes smart meters, a field area network, and a back office system called the AMI head-end system.

AMI head-end system: A back office system that receives and processes the data for smart meters, and serves as an operating platform for the back office team responsible for operating and maintaining AMI. The AMI head-end system also provides information from smart meters to other Company operating and analytical systems.

AMR (automated meter reading): A technology that records usage data and transmits it to the Company one-way. The Company reads these meters through drive-by readings using specially equipped trucks that receive the data through radio signals.

Automated control systems: Technology that allows for near real-time adjustment of the grid to changing energy loads, distributed generation, or feeder fault conditions without or with limited operator intervention.

Backfeed: The flow of electric power from the distribution grid to the transmission grid. Also represents the flow of electric power from a net metering distributed energy resource to the distribution grid during periods where distributed generation exceeds consumption at the premises.

Backhaul network: The backhaul portion of the network comprises the intermediate links between the core network and the small subnetworks at the edge of the network.

Base rates: The Company's existing rates for generation and distribution services.

BESS (battery energy storage system): A type of energy storage that stores energy for later discharge to the electrical grid.

Big data: An accumulation of data that is too large and complex for processing by traditional database management tools.

CBMS (customer business management system): The core system delivering business functions such as customer service, account management, credit and collections, service orders, meter inventory, usage, billing, service address management, portfolio management, rates and financial based activities.

CIP (customer information platform): A combination of technologies, applications, and projects at the core of the customer experience, consisting primarily of the CIS, MDMS, customer portals, and other customer experience applications.

CIS (Customer Information System): Another term for CBMS.

Collector: A device deployed as a component of AMI designed to enable two-way communications to and from meters within range of the device. The device captures meter data and transmits via a dedicated backhaul communications network to the AMI head-end system to drive business processes.

Cyber Security: Programs, techniques, and technology to protect the networks, devices, and programs from cyberattack.

DAS (data analytics system): A system that stores and quickly processes large amounts of data to support advanced analytics solutions.

DCFC (direct current fast charging): Electric vehicle charging technology capable of charging batteries to a 60 to 80 mile range state of charge within 20 minutes.

Decentralization: A concept that involves moving the electric grid away from relying solely on large centralized generating plants that supply power via the transmission grid to the distribution grid and ultimately end users, to a power grid where large generating plants and smaller distributed energy resources supply the grid simultaneously from two directions: the large generators through transmission lines and the smaller resources supplying from the distribution grid.

DER (distributed energy resource): A broad term used to describe resources connected to the distribution system, many of which are generation resources using renewable energy, such as solar and wind. DERs can also include, but are not limited to, energy storage, EVs, and demand response assets.

DERMS (distributed energy resource management system): A system that monitors and analyzes performance and status data from multiple distributed energy resources and has the ability to control those resources to maintain safety and reliability on the energy grid while maximizing benefits of the resources.

Distribution grid: The portion of the electrical utility system that delivers electrical power from the transmission grid through a substation transformer to end-use customers; typical distribution grid operating voltages range from 4 kV to 46 kV.

DSM (demand-side management): Activities that are designed to modify the level and pattern of electricity usage. DSM efforts in the Commonwealth focus primarily on two methods to manage demand: (i) energy efficiency and conservation, which aims to reduce the total amount of electricity used; and (ii) demand response (often peak shaving), which aims to shift the time of use of electricity from peak-use periods to times of lower demand by inducing retail customers to curtail electricity usage during periods of congestion and higher prices on the electric grid.

EAMS (enterprise asset management system): A system that aggregates data and attributes of grid assets and provides capabilities to manage grid assets at all points in their life cycle, including procurement, deployment, and retirement. The system allows for collection of information related to the health and performance of grid components and analysis to drive life cycle decision making.

EM&V (evaluation, measurement, and verification): The collection of methods and processes used to assess the performance of demand-side management activities so that planned results can be achieved with greater certainty and future activities can be more effective.

Fault: An abnormal electrical condition caused by a short circuit on a feeder section.

Feeder: An electric distribution subsystem that begins at a substation and distributes electrical power within a localized service area. Feeders are comprised of mainfeeders, tap lines, and service lines.

FLISR (fault location, isolation, and service restoration): A distribution network system that works with intelligent grid devices such as switches, reclosers, line sensors, and a secure communications network to automatically isolate faulted feeder sections and reroute power to restore most customers in a matter of seconds or minutes.

GIS (geographic information system): A system designed to capture, store, analyze, and present spatial or geographic data, herein referring to distribution grid assets.

Green Screen: Common name for the user view of the existing CIS, which is a non-Windows based view of the mainframe system.

Grid Hardening: Physical grid improvements that improve reliability and resiliency by rebuilding portions of the grid to eliminate outages and reduce damage for faster restoration.

Grid modernization: A broad term used to describe efforts to improve and modernize the grid.

Grid transformation: A broad term used to describe efforts to improve and modernize the grid.

Hosting capacity: The estimated amount of DERs that can be connected to each segment of the distribution grid without causing voltage or loading issues as determined by engineering analysis.

IGDs (intelligent grid devices): Various devices that provide situational awareness and control capability of the grid and enable two-way communication and centralized control of the power system.

Integrated distribution planning: A consolidated process to address capacity, reliability, and DER integration, accounting for uncertainties introduced by factors such as increasing DER penetration, changing usage patterns, and increasing use of new technologies.

Intermittent generation: Also known as variable energy resources, these generating types do not produce continuously available electricity due to external factors that cannot be controlled, such as solar and wind power. The power from such resources is non-dispatchable, meaning that it cannot be called upon at all times, only at times when the conditions for their power are present (*e.g.*, sun or wind) and the amount of power varies depending on those conditions.

Kilovolt (kV): Unit of measure for electric equipment and facilities representing 1,000 volts.

Latency: The amount of time it takes for a packet of data to get from one designated point to another through telecommunications networks.

Mainfeeder: The three phase sections of a feeder that distribute electrical power from substations to tap lines and individual customers.

MDMS (meter data management system): A system that processes and stores interval data used for billing, and calculates billable consumption for interval meter data.

Mesh network: The information network created from smart meters communicating with each other.

Microgrid: A group of interconnected loads and DERs that act as a small power grid, able to operate when connected to the larger distribution grid and also able to continue to operate as an "island" when there is an interruption or other grid disturbance that affects normal power flow from the grid.

Microgrid controller: A device that enables the establishment of a microgrid by controlling distributed energy resources and loads in a predetermined electrical system to maintain acceptable frequency and voltage while the microgrid is disconnected from the distribution grid.

MPLS (multi-protocol label switching): A mechanism for the routing of communications within a network as data travels across network nodes.

Nanogrid: A very small power grid of interconnected loads and DERs that may serve only one or a few customers within its boundaries.

One-way energy: Power flow from a centralized location, such as a substation, along a distribution feeder, to end users.

OMS (outage management system): A system that provides tools and information to efficiently restore power and communicate status updates to customers by providing outage analysis and prediction functionality, while enhancing public and worker safety.

PTR (peak-time rebate) programs: Programs that provide incentive rewards for customers who achieve a desired reduction in usage during specific timeframes on abnormally hot or cold days.

Physical security: The protection of people, property, and physical assets from actions and events that could cause damage or loss.

Redundancy: In telecommunications, a process through which additional or alternate instances of network devices, equipment, and communication mediums are installed within network infrastructure. It is a method for ensuring network availability in case of a network device or path failure and unavailability.

Reliability: The ability of the distribution system to deliver uninterrupted power service to customers.

Repeater: An electronic device that receives a signal and retransmits it. Repeaters are used to extend transmissions so that the signal can cover longer distances or be received on the other side of an obstruction.

Resiliency: The ability of the power grid to withstand outages and maintain service to customers and recover from outages to restore service to customers.

RFI (request for information): A business process whose purpose is to collect written information about the capabilities of various suppliers.

RFP (request for proposals): A competitive bidding process where vendors and contractors offer to provide a service, asset, or good for a certain cost.

SCADA (supervisory control and data acquisition): A computer system that monitors and provides control of distribution assets, primarily located at substations.

Security information event and management (SIEM): A system to provide analysis of collected security events and logs to identify and detect potential security incidents as well as support incident response.

Single-phase: A segment of a power system consisting of one primary voltage conductor and one neutral conductor.

Situational awareness: Real-time perception of the grid and its environment that allows operators to project future outcomes as well as deal with present events.

Smart inverter: Inverters have the basic inverter function of converting direct current to alternating current, but also have additional capabilities such as voltage regulation, frequency support, and ride through capabilities (*i.e.*, staying online during grid events).

Smart meter: Electric meters that digitally gather energy usage data in specified increments (*i.e.*, interval data) and other related information as part of an AMI system.

System integrator: The vendor responsible for leading the Company through design of the CIP, configuration of the new system to meet the design, integration of other applications and systems to the new system, testing of the new system to ensure that it meets all requirements, and conversion of required data from the existing system.

Three-phase: A segment of a power system consisting of three primary voltage conductors and one neutral conductor.

Time-of-use rates: Rates that have pre-defined periods with tiered energy pricing that are generally aligned with the actual cost of producing electricity during those periods

Time-varying rates: Rates that provide incentives for customers to shift their usage to off-peak periods when the cost of generating electricity is less expensive, which both reduces the demand on the Company's system and can reduce the customers' bills.

Transmission grid: The high voltage part of the electrical grid that carries bulk power directly from large generating facilities to the distribution grid. Typical transmission grid operating voltages range from 69 kV to 500 kV.

Visibility: Real-time awareness of the grid's operating conditions.

Voltage optimization: The more precise control of distribution grid voltage that is possible with information from smart meters and a voltage control system.

Voltage island: A single substation transformer that serves a population of customers without the support of available load transfer capability within the substation or adjacent feeders. If a single transformer fails, all customers served by the substation could face an extended outage.

APPENDIX LIST

A. Sponsoring Witness Chart

B. Existing Distribution Grid

C. Customer Education Plan

D. Plan for Time-varying Rates

Appendix A

Sponsoring Witness Chart

The listed witness sponsors the identified sections and appendices of the GT Plan Document.

Section/Appendix	Company Witness
Introduction	Woomer
Executive Summary	Woomer
I. Need for a Modern Distribution Grid	Woomer
A. Context for Distribution Grid Transformation	Woomer
B. Developments Supporting Grid Transformation—2019 to 2021	Woomer
C. Value of a Transformed Distribution Grid to Customers	Woomer
II. Distribution Grid Planning	Wright
III. Development of Grid Transformation Plan	Woomer
A. Internal Process	Woomer
B. Customer Engagement	Woomer
C. Stakeholder Engagement	Woomer
IV. Grid Transformation Plan	Woomer
A. Interrelated Nature of Projects	Woomer
B. Projects	---
1. Advanced Metering Infrastructure	Johnson
2. Customer Information Platform	Jennings
3. Grid Infrastructure	Wright
a. Mainfeeder Hardening	Wright
b. Targeted Corridor Improvement	Wright
c. Voltage Island Mitigation	Wright
4. Grid Technologies	Wright
a. Intelligent Grid Devices	Wright
b. FLISR	Wright
c. DER Management System	Johnson
d. Hosting Capacity Analysis	Wright
e. Enterprise Asset Management System	Wright
f. Voltage Optimization Enablement	Wright
g. Substation Technology Deployment	Wright
h. Locks Campus Microgrid	Johnson
5. Transportation Electrification	Frost
6. Security	Bransky
a. Physical Security	Bransky
b. Cyber Security	Bransky
7. Telecommunications	Carroll
8. Customer Education	Frost
C. Environmental Justice Evaluation	Woomer
D. Alignment with Customer and Stakeholder Feedback	Woomer
E. Costs	Woomer

Section/Appendix	Company Witness
F. Benefits	Trump
1. Time-Varying Rates	Frost
2. Demand-Side Management Initiatives	Frost
3. Integrated Distribution Planning	Wright
4. Reliability	Wright
5. Load Forecasting	Wright
6. Broadband Pilot Program	Carroll
G. Regulatory Process	Woomer
V. Future Technologies	Johnson
A. Energy Storage	Johnson
B. MicroGrids and NanoGrids	Johnson
Appendices	---
Appendix A. Sponsoring Witness Chart	---
Appendix B. Existing Distribution Grid	Wright
Appendix C. Customer Education Plan	Frost
Appendix D. Plan for Time-varying Rates	Frost

Existing Distribution Grid

As discussed in Section I.A of the Plan Document, the electric grid was originally designed for one-way flow of electricity to meet customers' demand—from the generator, through the transmission system, to the distribution system and the end-use customer. In the traditional distribution system design, electricity typically flows from a substation, through mainfeeders, to tap lines and then service lines that are connected to the end-use customer.

Dominion Energy Virginia's over 2.5 million customer accounts in the Commonwealth power the business economy and serve over 5 million residents. The Company's existing distribution system in Virginia consists of more than 53,000 miles of overhead and underground cable, and over 400 substations. The distribution system utilizes a variety of devices for functions from voltage control to power flow management, and relies on multiple operating systems for various functions from customer billing to outage management. The following sections provide a detailed description of the Company's existing distribution system.

A. Substations

The primary function of a distribution substation is to transfer power from the higher voltage transmission system, which ranges from 69 kV to 230 kV on the Company's system, to the lower voltage distribution system, which typically ranges from 4 kV to 35 kV. Once this power is "stepped down," it is placed on the distribution system for delivery to the end use customer.

There are many pieces of equipment and devices that help to facilitate this transfer of power, including the following:

Substation transformers. Equipment that handles the "stepping down" of higher voltages to lower voltages.

Substation bus. Metal tubes or bars that carry electric current from the substation transformer to other devices, such as circuit breakers, or from the other devices to the substation transformer.

Substation circuit breakers. Devices that enable the flow of power into and out of the substation and serve to isolate faults.

Voltage regulation devices. Devices that help keep voltage within the desired bandwidth.

Communication schemes and protocols. Communication hardware and software responsible for transferring data and signals from various devices within the substation, as well as between the substation and the operating center or engineers and technicians.

Digital relays. Decision-making devices that control the operation of various high voltage equipment such as circuit breakers.

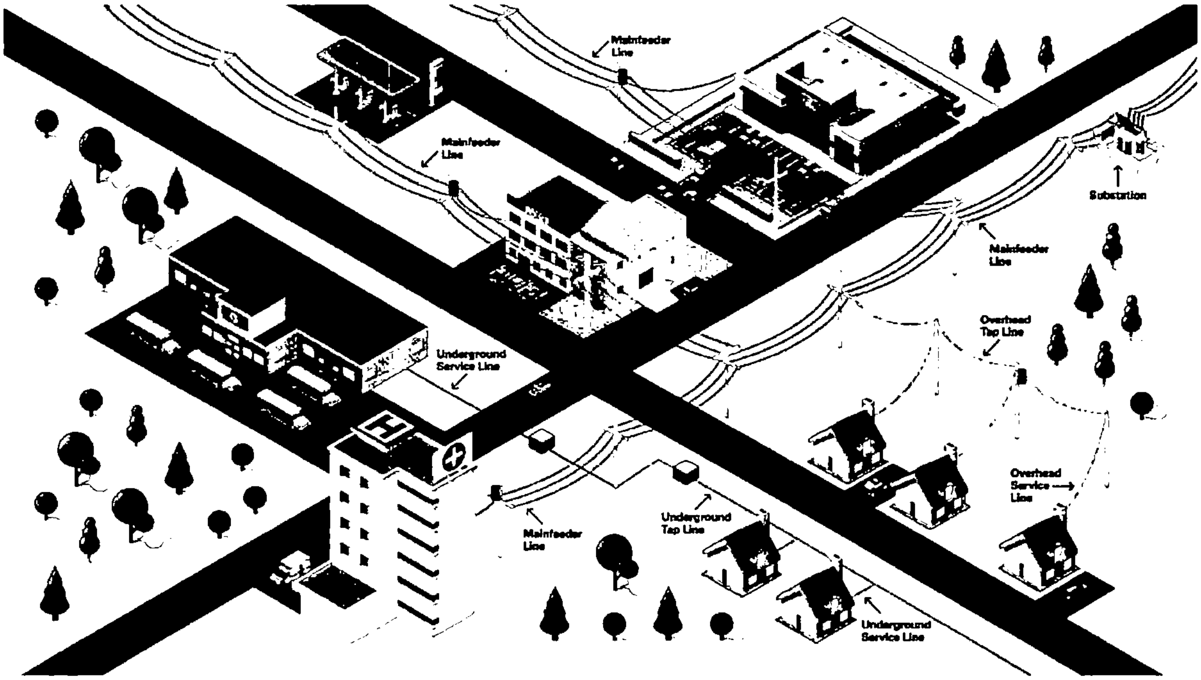
Electrical sensors. Devices responsible for providing electrical signals and inputs into the digital relays.

Control house. Enclosure that houses relays, communication hardware, back-up batteries, and other low voltage devices.

B. Wires

Within the distribution system, the wires—also known as conductors—transmit electricity from substations to end-use customers. A system of conductors is referred to as either a circuit or a feeder. The Company will use the term "feeder" in this document. The Company operates approximately 1,700 feeders in Virginia. There are three parts to feeders, the mainfeeders, the tap lines, and the service lines.

Distribution System Illustration



1. Mainfeeders

Mainfeeders are the three-phase portion of the distribution system that carries electricity from substations to tap lines and end-use customers. Larger customers, such as certain businesses and public services, are often served directly from the mainfeeders. Mainfeeders on the Company's distribution system typically serve hundreds or thousands of customers along many miles of conductor. The Company's distribution system in its Virginia service territory has approximately 11,000 miles of overhead mainfeeders and 1,900 miles of underground mainfeeders on its approximately 1,700 feeders.

2. Tap Lines

Tap lines are the portion of the distribution system that carry electricity from the mainfeeders to neighborhoods and individual end-use customers. The Company's distribution system in its Virginia service territory includes approximately 18,000 miles of overhead tap lines and approximately 23,000 miles of underground tap lines.

Separate from, but complementary to, the Grid Transformation Plan is the Company's Strategic Undergrounding Program ("SUP"). This program focuses on undergrounding *tap* lines to decrease downed wires and work repair locations, enabling crew redeployment to other outage locations and allowing a faster recovery after severe weather events. In contrast, the focus of grid transformation efforts is largely on the *mainfeeder* portion of the distribution system.

3. Service Lines

Service lines are the low voltage portion of the distribution grid that carries electricity from service transformers to customers. For residential customers, the most common service voltage is 120/240 volt ("V"), meaning appliances and devices using electricity can be connected to either a 120V or a 240V outlet from customers' electrical panels. Commercial and industrial service transformers deliver a variety of service voltages, including 120/208V, 120/240V, and 277/480V. Service lines typically connect to the service transformer on one end and the meter on the other end. In some instances, one service line can be used to serve multiple customers by connecting additional service lines to it along the route from the transformer to the meter.

C. Devices

There are devices installed along the feeders that facilitate the safe and reliable distribution of electricity, including the following:

Voltage control devices. Voltage control devices are used to manage grid voltage to ensure customers receive adequate voltage at the meter. The most common voltage control devices on the distribution grid are voltage regulators and capacitors. Voltage regulators monitor and adjust the voltage at the substation or along the feeder based on control programming that is loaded by Company engineers. The programming typically uses loading and specific electrical information based on the location of the equipment. Capacitors are used to manage power flow efficiency on the distribution grid. As customers use electricity, the equipment along the grid that delivers the power, such as transformers and conductors, consume additional electricity and cause electrical losses to occur, causing voltage to decrease. Capacitors are used to provide a portion of that additional electricity and reduce the losses, which in turn improves voltage.

Stepdown transformers. Stepdown transformers change the voltage level on the distribution wires from a more predominant distribution voltage, such as 35 kV as found at many of the Company's substations, to a less common distribution voltage, such as 6 kV or 4 kV.

Service transformers. Service transformers connect to the grid and serve to lower the voltage from distribution voltages used on the mainfeeders and tap lines, typically 4 kV to 35 kV, to the service voltage used by customers. The Company has approximately 600,000 service transformers in Virginia.

Protection and control equipment. Protection devices perform several different functions on the distribution grid, including monitoring power flows and voltages, providing switching points to reconfigure power flows, automatically disconnecting a grid segment when a problem is detected, and providing the associated communications functions to allow protection activities to occur. Electronically controlled line devices, fuses, line sensors, relays, and communications gateways are examples of protection and control equipment.

- *Electronically-controlled line reclosers*. Devices that can sense grid problems and take action to de-energize and isolate line sections where necessary, and that can also receive control commands from the advanced distribution management system ("ADMS") using a secure telecommunications network.
- *Line sensors*. Devices installed at select locations along the feeder that provide situational awareness regarding normal loading and voltage, as well as fault related information that can be used by the ADMS to further narrow potential outage locations.
- *Digital relays*. Devices that provide advanced protection and control functionality, and detailed grid performance information including near real-time situational awareness about grid operation.
- *Communication gateways*. Devices that facilitate secure communications and function as a central data hub, sending and receiving all data and control functionality between substations and the ADMS.

D. Meters

Dominion Energy Virginia customers primarily have one of three types of meters: automated meter reading ("AMR") meters, smart (*i.e.*, AMI) meters, or manually read meters. As of April 30, 2021, approximately 63% of Virginia customer meters are AMR meters, approximately 33% are smart meters, and approximately 4% are manually read meters.

AMR Meters. The Company began deploying AMR meters throughout the service territory over 20 years ago. Usage data from AMR meters is collected through drive-by readings once a month. Specially equipped trucks drive throughout the service territory daily, covering approximately 400 different meter route cycles throughout each month. The Company uses meter readers to drive these routes. The equipment collects a meter reading from the AMR meters within range, which the Company then uses for monthly billing. AMR meters cannot be remotely controlled or operated, meaning that the Company must send a field representative for common requests like connecting or disconnecting service. The Company utilizes meter servicers to execute these and other requests.

Smart Meters. Smart meters are electric meters that enable two-way communications, digitally gathering energy usage data in specified increments (*i.e.*, interval data) and other related information several times a day. Smart meters are equipped with a network interface card and communicate with each other, creating what is referred to as a mesh network. A system of field telecommunications devices—comprised of devices called repeaters and collectors—gathers meter data from the mesh network and transmits the data gathered back to the utility through a backhaul network. Together, the mesh and backhaul networks are called the field area network. A back office system, also called a head-end system, receives and processes the data and serves as an operating platform for the back office team responsible for operation and maintenance. The term AMI, or "advanced metering infrastructure," refers to the over-arching metering system, which includes smart meters, a field area network, and a back office system.

In 2008, the Company began to deploy AMI in a targeted fashion based on specific operational and customer needs. Taking a measured pace over the course of several years, the Company continued to deploy smart meters in larger quantities and densities in diverse geographical areas of the service territory to validate deployment and operational strategies. The Company used the knowledge gained from this initial deployment of AMI to develop its strategy for full deployment across the service territory. As of May 31, 2021, the Company currently has approximately 896,000 smart meters deployed across its service territory.

Manually Read Meters. As of April 30, 2021, approximately 104,000 customers have manually read meters, primarily to gather energy usage data in specified increments (*i.e.*, interval data) or monthly peak energy demand. To obtain this data, meter readers visit the customer premises and must walk up to the meter to record energy usage via an electronic "probe" approximately once per month. The meter readers that drive the AMR routes also complete these visits. The Company has deployed manually read meters to support offering time-varying rates to commercial and industrial customers that do not have smart meters. The Company has also deployed manually read meters to provide additional information to net metering customers that do not have smart meters. Finally, the Company has deployed manually read meters for the limited number of customers that have opted out of the Company's smart meter deployment.

E. Operating Systems

1. Customer Experience Systems

Customer Information System ("CIS"). Deployed about 23 years ago, the CIS is the core system delivering business functions such as customer service, account management, credit and collections, service orders, meter inventory, usage, billing, service address management, portfolio management, and rates and financial based activities. The CIS is an employee-facing system, and is also referred to internally as customer business management system ("CBMS").

CBMS is built on a mainframe platform using the programming language COBOL. Users use what is referred to as a "green screen" to view information. The system lacks a logical workflow, requiring users to memorize a series of four letter commands to navigate through screens. The system is not Windows based; nor is it compatible with using a mouse or cursor for simple navigation. The vendor no longer supports the system, and service providers do not routinely hire or train COBOL programmers. The limited services that are available for CBMS come at an increasingly higher cost.

Manage Accounts. Deployed in 2003, Manage Accounts is the customer-facing web self-service platform for residential and small commercial customers.

Key Customer. Deployed in 2006, Key Customer is the customer-facing web self-service system for large customers that are assigned an account representative.

Property Manager Portal. Deployed in 2013, the Property Manager Portal is the customer-facing web self-service tool for property management companies to manage landlord agreements and turn on / turn off service for their properties.

Agency Web Access ("AWA"). Deployed in 2006, Agency Web Access is the customer-facing web self-service application for charities and third-party agencies (*e.g.*, Salvation Army) to make energy assistance payments on behalf of customers.

Meter Data Management System ("MDMS"). Deployed in 2009, the meter data management system is the employee-facing system that processes and stores interval data used for billing and calculates billable consumption for interval meter data.

Gateway. Deployed in 2013, Gateway is the employee-facing web-based front end system to CBMS and other systems used in the contact center. Gateway is the primary tool for customer service representatives to interact with customers.

Knowledge. Deployed in 2016, Knowledge is the employee-facing system that allows for systematically capturing, describing, organizing, and sharing information including alerts, work processes, and policies across customer service.

E-Gain. Deployed in 2010, E-Gain is the employee-facing system that imports and sorts emails and work tickets, creating a queue for response. E-Gain includes auto replies and templates for responses.

LanBill. Deployed in 1996, LanBill is the employee-facing system that allows back office personnel to manually edit and print bills flagged for special handling. LanBill is used to process large complex bills that are not fully automated in CBMS.

Bill Image. Deployed in 2003, Bill Image is the employee-facing software used to render an image of the bill on demand in Manage Account and Gateway.

Agiloft. Deployed in 2011, Agiloft is the employee-facing record keeping system used to track elevated customer issues and inquiries.

Demand-side Application ("DSA"): DSA is the employee-facing system used to track inventory and initiate service orders for water heater controls.

State and Local Taxes ("SLT"). SLT is a mainframe application that aggregates taxes at a jurisdictional level for reporting and remittance.

2. Grid Operation Systems

AMI and AMR head-end systems. The system that receives and processes the data and serves as an operating platform for the back office team responsible for operating and maintaining AMI and AMR, respectively.

Advanced distribution management system ("ADMS"). A software platform that supports a full range of distribution management and optimization tools, such as supervisory control and data acquisition ("SCADA"). The Company implemented the first phase of ADMS in 2019, which provides the basic data acquisition and control functionality.

Outage management system ("OMS"). A system that provides tools and information to efficiently restore power to customers by providing outage analysis and prediction functionality. The system enhances public and worker safety, and serves as the Company's system of record for outage history. The existing OMS was deployed in 1994.

Data analytics system ("DAS"). A system that stores and quickly processes large amounts of data to create advanced analytics solutions. The existing DAS was deployed in 2017.

F. Telecommunications

Dominion Energy Virginia currently has a telecommunications ("telecom") transport portfolio that consists of Company-owned fiber, leased lines, copper cables, microwave, and public carrier solutions. The Company has a network operations center ("NOC") that is responsible for provisioning, testing, monitoring, troubleshooting, and dispatching the Company's telecommunication network year-round. As of May 31, 2021, over 50% of substations and key facilities either have no communications or do not have Company-owned telecom.

G. Security

The existing distribution system is protected by a comprehensive security program designed to provide adequate and cost-effective security control measures that manage the growing threat to the energy sector and that protect the Company and its customers from cyber and physical attacks. The Company's security program has been subjected to multiple third-party vulnerability assessments and penetration tests (announced and unannounced); peer reviews; and numerous internal and external audits. Results from those engagements have informed continuous improvements to both cyber and physical security.

H. Electric Vehicle Infrastructure

EVs are typically charged by plugging the EV into a charger that is connected to the electric grid. There are three major categories of chargers that are distinguishable by the amount of power the charger can provide, which results in different speeds of charging:

- Level 1 refers to use of a standard 120V outlet, which charges three to five miles of range per hour. Level 1 charging is ideal for overnight charging for EV owners that travel about 30 miles or fewer per day.
- Level 2 chargers require a higher voltage at 240V, which charges 10 to 20 miles of range per hour. Level 2 charging is ideal for workplaces, multi-family dwellings, and locations with the potential for more electric vehicles than chargers.
- Level 3—also known as direct current fast charging ("DC Fast Charge" or "DCFC")—can charge an EV battery to approximately 80% of capacity in 20 to 30 minutes. DCFC requires three-phase electric service and significant capacity. It is ideal for public locations to support travel over long distances.

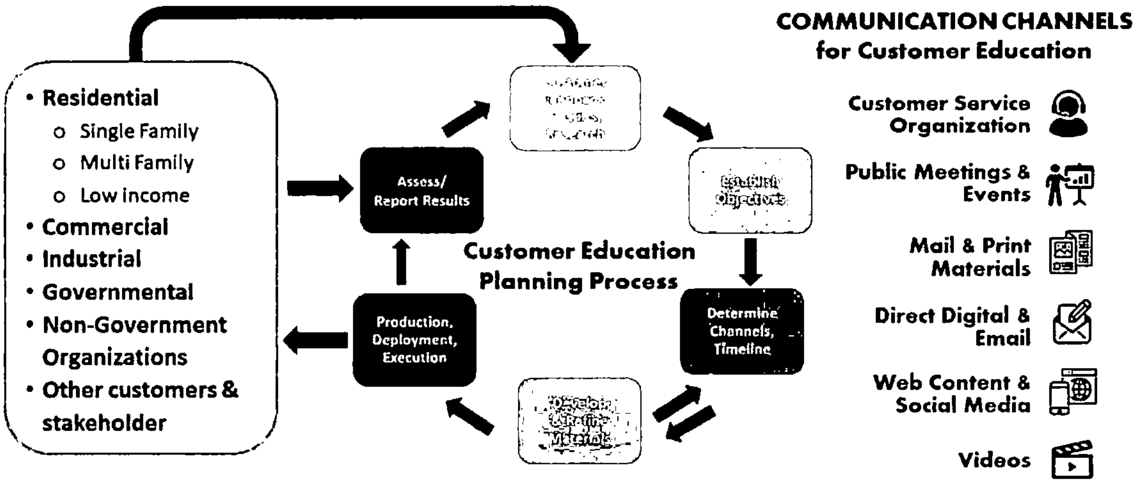
As of April 30, 2021, there were approximately 850 Level 2 (*i.e.*, 240V) and DCFC charging stations in Virginia available for public use. However, not all of these stations are available to all EV drivers, and some are only available during limited hours.

Customer Education Plan, 2021 Update

In 2019, Dominion Energy Virginia presented its plan to support the projects proposed as part of its Grid Transformation Plan with customer education. Key to achieving the Company's goal of improving the customer experience is educating customers about their energy consumption and how to manage their costs, and empowering customers to take advantage of the numerous enhanced capabilities enabled by the GT Plan.

As shown in Figure 1, the customer education plan process leverages feedback from customers and stakeholders, incorporates learnings from prior project experience and industry best practices, establishes objectives for the ongoing education of customers, develops timelines for communications, creates and distributes education materials for multiple customer classes, evaluates performance, and reflects on lessons learned.

Figure 1: Customer Education Process



Phase I Customer Education

During Phase I of the GT Plan, the Company developed concise, consistent, and easy-to-understand content via multiple external communications channels, including but not limited to website pages, social media, digital and direct mail, bill inserts, presentations and public webinars, videos, and engagement with the customer service organization. The timing of some of the Company's education initiatives was delayed by the impacts of the pandemic, but the Company continues to implement customer education and engagement tactics to support approved GT Plan projects.

Table 1 provides a sampling of the educational tactics deployed during Phase I.

Table 1: Summary of Communications Tactics, 2019 to Jun. 2021

GT Plan Project	Communication Tactic
Foundational Education	• **Direct communications:** Factsheets, targeted customer emails • **Digital impressions:** Website updates, including new "Energy 101" web page, ways to save on your bill, Grid Transformation Plan overview video
Customer Energy Management Programs	• **Customers:** New website, time-of-use graphic, explainer video, social media engagement, emails to eligible customers, launched bill comparison tool, rate comparison chart, comprehensive FAQs, energy-saving tips • **Stakeholders:** Webinars, factsheet, print collateral to support stakeholder engagement and their work in the community (*e.g.*, solar, EV owners)
Transportation Electrification Support	• **Smart Charging Infrastructure Pilot:** website, webinars, virtual meetings • **General EV Education:** ChooseEV website with comparison calculators and public charging locator map, FAQs, new video, factsheet, reference guides
Grid Improvement Projects to Enhance Reliability	• **Grid Infrastructure:** web page, FAQs, postcards, letters • **Hosting Capacity Tool:** press release announcing launch, outreach to stakeholders • **Corridor Improvements:** revised web page, Spanish translation of web content, revised letters, new postcards, bill inserts, media engagement

In 2020, the Company sent 1,272,283 direct communications (*e.g.*, bill inserts, postcards), garnered 171,168 digital impressions (*e.g.*, website, online videos, social media engagement), and held 28 events (*e.g.*, virtual presentation). Additionally, specific efforts to support the launch of the Company's new Schedule 1G, referred to as the Off-Peak Plan for marketing purposes, have enrolled over 3,500 customer enrollments as of June 10, 2021, driven by a robust marketing campaign, yielding nearly 7 million digital impressions and more than 93,000 program website page views.

Phase II Customer Education

In Phase II of the Grid Transformation Plan, the Company proposes to continue investments in customer education as needed to support other approved Phase II grid transformation projects. The Company's continued implementation of the customer education approach and plan during GT Plan Phase II will endeavor to improve the customer experience. Utilizing these education initiatives, the Company strives to ensure outreach is efficient and effective in achieving the goals of educating customers, keeping them informed, and empowering them to take advantage of the numerous enhanced customer capabilities, provided by the GT Plan, such as accessing interval energy usage data and taking advantage of new rates and offerings.

As with Phase I, the Company will focus on the following core categories:

Foundational Education

The GT Plan investments enable the Company to improve the customer experience by providing foundational "energy 101" information to ensure customers can learn basic terms and concepts of energy consumption (*e.g.*, peak-time and kilowatt hours) and understand the various ways to save. This foundational education supports the Company's efforts to educate customers on energy consumption, how to manage their costs, and how to take advantage of the new offerings. To begin this effort during Phase I, a webpage was launched during first quarter 2021 and additional content is planned in the future. That website is DominionEnergy.com/Energy101.

The GT Plan projects are interdependent and work together to provide long-term value and benefits to customers. In addition to providing information and materials to educate customers on specific projects, communication materials will continue to be developed regarding the need and benefits for the overall GT Plan and how the individual projects complement each other and work together to deliver real benefits. Education of the overall GT Plan is important to provide context for why the Company is investing in individual projects—such as smart meters and intelligent grid devices—and how they help with cost savings, provide new tools, and improve service over time.

In Phase II, the Dominion Energy website will continue to be updated as the main hub for public education. Videos, factsheets, and other foundational education materials are located on the "grid transformation" webpage, DominonEnergy.com/SmartEnergy, and will continue to be improved and modified.

Smart Meters

The Company continues to deploy AMI throughout its service territory and leverage the opportunity to interact with its customers. During Phase II, to ensure that the customer experience associated with the installation of smart meters is a positive one, the smart meter deployment team will continue to execute an outreach and education strategy. Outreach will include targeted communications to each customer prior to and during the deployment phase of the new smart meters, including postcards, door hangers, and updated factsheets, brochures, and videos. These customer communications will alert customers of the upcoming meter exchange, direct customers to the website for frequently asked questions ("FAQs") and provide options for setting an appointment for property access, if needed. These communications will also serve as a mechanism to educate and inform customers on the capabilities resulting from the smart meter installation.

Customer education for smart meters will continue to focus on the advantages and enhanced capabilities (now and in the future) of smart meters, safety and data security, understanding radio frequency, as well as the timing of deployment in communities. Materials will also be adapted to address questions related to the policy allowing eligible, residential customers to "opt out" and receive a non-communicating meter and associated charges for such opt out. Messaging will focus on improved customer experiences available today such as remote connect / disconnect of service and instructions on how to access energy usage data. Over time, the Company will further educate customers on additional capabilities as they become available.

Customer Information Platform ("CIP") Support

The implementation of the CIP is foundational to enhancing the customer experience. To ensure customers can take advantage of the enhanced capabilities, the education approach as described above will be utilized for each capability including a what/if analysis tool, alert options, and enhancements to e-bill. The Company will provide customers with the knowledge to access and effectively use the new tools to save them time and money as each functionality is implemented. For each of the CIP capabilities, the Company's education approach will consist of multi-channel engagement including but not limited to website content, direct digital (text, emails, and push notifications), bill inserts, and letters. The approach will also include incorporating lessons learned and adjustments as necessary.

Customer Energy Management Programs
As the Company implements the Off-Peak Plan and future customer energy management programs, including peak time rebates, the educational approach implemented in Phase I will continue in Phase II to encourage customers to participate in these programs and empower them to make decisions and monitor their success.

Grid Improvement Projects
While customers welcome reliability improvements, Dominion Energy Virginia recognizes that any work conducted in the field has the potential to impact the communities we serve; so it is important to educate customers before, during, and after project completion.

During Phase I, the focus in this area has been on safety and the Company's commitment to completing scheduled work in a timely manner. The timing for customer education on individual projects has addressed any significant construction impacts, especially in the areas where easements or permits have been required before work could commence. In addition, the tactics such as website updates address enhanced vegetation management practices within the targeted corridor improvement project, such as ash tree removal and herbicide usage across the entire width of the right of way.

Proposed Phase II projects include grid technologies, such as intelligent grid devices and FLISR, and continued targeted corridor improvements such as the herbicide program and emerald ash borer mitigation. During Phase II, communications will continue to be delivered through several channels including print materials, social media, web, digital, and public presentations where appropriate.