Statement for the Record

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"Enhancing Resilience in Energy Infrastructure and Addressing Vulnerabilities"
Quadrennial Energy Review Task Force
April 11, 2014

Good morning Secretary Moniz, Dr. Holdren and members of the Quadrennial Energy Review Task Force. I am Bob Blue, President of Dominion Virginia Power, an operating segment of Dominion Resources serving 2.5 million customers in Virginia and North Carolina. Along with our electric utility, Dominion Resources operates a number of merchant generating facilities and has an extensive network of natural gas pipelines, processing facilities and local gas distribution companies in the Mid-Atlantic.

Thank you for inviting me to discuss Dominion's initiatives to enhance the security of our electric transmission grid and our natural gas pipeline network, and to minimize disruptions caused by severe weather events.

Dominion, like many other utilities, is modernizing our generation fleet and transitioning to lower carbon fuels. Our natural gas pipeline network and gas processing facilities are expanding as we meet the growing demands to transport Marcellus and Utica shale gas.

Dominion is the largest electricity provider in Virginia, serving our customers through 6,400 miles of electric transmission lines and 57,000 miles of electric distribution lines. Our merchant generation fleet includes nuclear and natural gas fired units in New England and the mid-Atlantic as well as wind and solar facilities in several states and a 15-megawatt fuel cell development in Connecticut, the largest in the country. Dominion's natural gas assets include 10,900 miles of natural gas transmission gathering and storage pipeline and 21,900 miles of gas distribution pipeline. We also operate one of the nation's largest underground natural gas storage systems with approximately 947 billion cubic feet (bcf) of storage capacity.

Strengthening our infrastructure and effectively coordinating with other utilities, states, regional transmission operators and federal regulators is critical to providing our 3.8 million electric and gas customers with reliable, affordable, and secure supplies of electricity. Our system requires constant vigilance. Certainly the events of the past year have caused all of us – industry and government – to reassess the security of our energy delivery system, to enhance physical and cyber security measures, and to accelerate investments to expand redundancies in our system.

Dominion serves some of the most vital national security facilities in the nation. We are very proud of the reliable service we provide every day to each of the four branches of the military services with installations in Virginia. We continually examine opportunities to integrate new technologies to improve resiliency and energy efficiency. From the world's largest naval base in Hampton Roads to the Pentagon and other major homeland security, intelligence, and military facilities in Northern Virginia, we know that our performance directly affects the successful execution of the national security missions of these installations.

We continually validate the readiness of our physical and cyber security systems. And we welcome opportunities to partner with the Department of Energy and other federal entities on grid preparedness exercises. These joint initiatives help make sure we are up to the task.

And, with many other electric utilities, we face the reality of the changing nature of the power grid, with the need to integrate properly the growing number of distributed energy facilities owned by other parties.

We need look no farther than our North Carolina service area for an example of this challenge. Due in large part to favorable state policies, merchant solar facilities are flocking to the state, and particularly to the counties we serve in the rural northeast. As of early March, more than 80 such developments had filed for state construction permits. If they are all built, they would represent about 585 megawatts of capacity. Compare this to our average load in North Carolina, which is less than 500 megawatts. And the solar developments would be more than half of our North Carolina peak, which is slightly more than 1,100 megawatts.

It's pretty obvious that managing so many solar resources into such a small service area would be a difficult task. Successfully absorbing them into our system presents our designers with a very complex task. Beyond that, having so many intermittent power sources connected to our grid in North Carolina could pose operational issues. Meanwhile, we are working with the state to try to make this influx of resources more manageable.

A regional grid operator, such as PJM which manages the dispatch of electricity to over 60 million people, has a much larger system where intermittent generation can be more effectively integrated onto the grid. At the individual utility level the daily cycles of solar and wind generation pose real challenges to utility baseload units. They are not designed to ramp up or down rapidly, based on immediate demands. Cycling large baseload units also reduces the performance of pollution control equipment.

I don't want to leave you with the impression that intermittent renewable generation cannot be integrated into the grid. It can, but it is yet another pressure on resiliency and load management requirements.

As the Task Force examines the many challenges to maintaining the efficient and secure performance of the electric grid, we urge our federal partners to continue the dialogue and information sharing we have started today. While this subject deserves a national response, each utility has its own individual set of regulatory and market issues. No single strategy will address each of the siting and permitting issues for new electric generation, transmission, or gas pipelines. Varying rate structures among the states warrant flexibilities to ensure that private capital is available to upgrade aging infrastructure, to expand energy networks and to reduce risks from weather events.

I'd like to begin by assuring the Task Force that Dominion shares the Federal Energy Regulatory Commission's (FERC) concern for the physical security of the grid. We commend FERC for issuing its order to the North American Reliability Corporation (NERC) to develop standards on the protection of critical infrastructure and we will continue to be active participants in their process.

We have confidence these standards will be thoughtful, well designed, and avoid a one-size-fits-all solution to infrastructure protection. The FERC order reflects our view that transmission operators should have considerable flexibility in implementing protective measures, based on their familiarity with their own service areas and the unique qualities of their customers.

Given the number of critical facilities within our service territory, we believe that Dominion may need to make unique changes to protect our substations and other infrastructure. We are confident that the NERC standards will give us the latitude and flexibility to implement the measures we think are necessary to fulfill our obligation to the vital national assets we are privileged to serve.

Long before FERC issued its order, we were planning additional steps to protect vital substations and other key elements of the grid. Because of our federal customer base, as well as the recent threats around the world, Dominion performed a comprehensive risk assessment in coordination with FERC and PJM. Our resiliency and security program prioritizes the most serious potential vulnerabilities in the transmission system. This information guided us on the need to make investments at this time in additional security measures for a portion of our 460 transmission substations across our service territory.

Last September, we announced a plan to invest between $300 million and $500 million over the next five to seven years to better protect critical substation equipment, expand our inventory of spare equipment and create multiple levels of security. Also, we are locating this replacement equipment at regional locations to facilitate delivery throughout our service area. We are well underway with implementing our plans.

We have also announced that we will build a new System Operations Center (SOC), on a separate, dedicated and secure site. The SOC contains functions that are essential to managing the grid and ensuring its reliability. The new facility will feature the most modern infrastructure and employ new technologies that will improve our ability to support reliable operations. This new facility will cost approximately $108 million, and we expect it to begin operations in 2017.

As many of you know, recent media reports have highlighted the need for spare and readily accessible transformers to accelerate restoration times in the event of physical attacks or storms. Dominion recognized this concern a decade ago, prompting us to develop an interchangeable transformer program that responds to the need to have a standardized design and sufficient inventory.

This program has produced dual benefits. First, we have a larger inventory of accessible spare equipment that we can rapidly install to replace damaged transformers and other critical components throughout our network of substations. Second, the program has resulted in lower costs for our customers.

As for protections against cyber threats, Dominion uses an integrated set of cyber security controls and policies. These measures accomplish three main goals:

- Protecting our critical infrastructure;
- Protecting and preserving the confidentiality, integrity and availability of data and systems; and
- Ensuring operational continuity for both our electric and natural gas systems.

The company's information protection systems include many different elements.

Among them are intrusion detection capabilities, network boundary protections, authentication and access controls, malware protection and e-mail filtering. Additionally, employees receive periodic cyber security awareness training, as well as job-specific training. We safeguard customer information on secure systems with restricted access, and we have implemented multiple security controls to protect the information we transmit or store.

Our continuous monitoring program gives us the capability to assess and adjust system protections, and internal and external audits provide ongoing oversight of our operations. Dominion worked closely with the Department of Energy in the development and use of both the Electricity and Oil and Natural Gas Cybersecurity Capability Maturity Models. In addition, we support and plan to use DOE's Cyber Risk Information Sharing Program (CRISP) suite of technologies coupled with the Cyber Federated Model (CFM).

Dominion cyber security personnel communicate on a regular basis with government agencies, law enforcement and intelligence communities, and industry peers to assess the threat environment. Just last week, we helped plan and participated in a classified North American Energy Threats workshop sponsored by DOE. The company continually assesses and improves its security posture to align with new threats, regulatory and oversight expectations, and evolving digital technologies.

The electric transmission grid seamlessly transports around the nation energy produced by all forms of generation, from fossil fuels to renewable resources. However, the industry and grid operators manage risks and stresses on the grid each day. This past severe winter was a blunt reminder of the need for redundancy and reserve generation to meet unexpected and sustained requirements for power. However, our security protocols and efforts to

improve resiliency are continually revised as those intent on disrupting our economy by attacking our energy infrastructure never rest.

We agree with the comments offered today from other panelists: The best protection for the grid is to foster a government and industry partnership based on trust, and real-time information sharing. Liability protection – for those of us in the private sector working with the appropriate government entities – must be a key part of this relationship.

As others have also stated, but it deserves repeating, the electric industry is the only critical infrastructure sector that is required to meet mandatory, enforceable cyber security standards.

With Dominion's electric service territory in the coastal areas of Virginia and North Carolina, we have, unfortunately, experienced severe hurricanes and storms over the last several years.

Three of the top 10 storms that have affected Dominion's customers occurred in the past decade. Each major event disrupted service for more than 1 million customers -- nearly half of our total number. The storms resulted in significant infrastructure damages that disrupted service for multiple days. But after each of these storms, we evaluated our infrastructure impacts and response times. And the time required to restore power to all affected customers has progressively become shorter.

- In 2003, Hurricane Isabel disrupted service to approximately 1.8 million customers – approximately 80 percent of those we served at the time. It took 15 days to restore power to all customers.

- In 2011, Hurricane Irene left approximately 1.2 million customers without electricity. It took 9 days to completely restore service.

- And in 2012, the unexpected Derecho wind storm over the July 4th holiday affected about 1 million customers. This time, the total restoration effort – which extended over the July 4th holiday – required 8 days.

After each of these storms, we evaluated the infrastructure impacts and response times. Today, our restoration processes and system hardening investments are a result of these post storm examinations. One of the biggest improvements over the course of the last decade has been development of stronger communication and collaboration between Dominion Virginia Power and government, including emergency management officials.

Our emergency response communications with the many individual local governments and regional entities allow us to promptly address the restoration of critical public infrastructure, from water treatment systems to hospitals to 911 centers. This partnership has strengthened a restoration program that allocates our resources first to those facilities protecting public safety and health.

The evaluations have also resulted in physical improvements. Earlier this year, the Virginia General Assembly enacted and Governor McAuliffe signed legislation authorizing us to conduct a multi-year program to place underground approximately 4,000 miles of overhead distribution lines. The program will allow us to target the most vulnerable part of the electric system – the small overhead tap lines that carry power into neighborhoods. The worst-performing of those lines were identified through a careful review of outage data.

This effort is a major step forward in system reliability, not only for the customers on these circuits, but for all of our customers in Virginia. When it is completed, it will reduce by as much as 50 percent the time required to restore power to all customers following a major storm such as a hurricane. Our customers will also benefit from lower storm restoration costs in the future due to this system hardening.

The utility industry - from investor-owned utilities to municipal systems to rural electric cooperatives - is undergoing a major transformation, both in the nature of its generation fleet and the delivery of electricity. Approximately 70 gigawatts of coal-fired generation will be retired by 2016, according to plans announced by the industry. Renewable generation, natural gas combined cycle generation and new, high voltage transmission lines are planned or under construction to deliver replacement power. The new generation fleet in the very near future will have significantly lower carbon intensity. The success of this transition, however, rests on the industry's ability to site and permit new generating stations, transmission lines and natural gas pipelines.

The record-setting winter temperatures are evidence that this transition requires our constant attention to ensuring how the system can function effectively, with a high degree of flexibility. We now know how severely tested the energy systems in the Midwest, Northeast and Mid-Atlantic were on January 6 when shortage pricing was triggered by voltage reduction actions. January 7 was another challenging day, starting with reserve shortages in the morning and moving on to the highest historic winter demand in PJM that afternoon, with demand peaking at 141,312 megawatts. By comparison, the typical evening peak for this time of year in PJM is only about 106,100 megawatts. Forced outages that day totaled over 40,000 megawatts, more than 20 percent of PJM's total capacity. In Eastern PJM, Dominion's load requirements represent 25 percent of the total, so we are much attuned to PJM's activities.

In a recent letter from PJM's Terry Boston to EPA Administrator McCarthy, Boston emphasized that, "We are managing a significant shift in our region's generating mix that is occurring due to the increased availability of natural gas, state and federal regulations that have raised costs for coal-fired power generation, the aging of certain generating resources and other factors. More than 16,000 megawatts of coal-fired resources will retire by 2016 and new gas and renewable generating units are rapidly interconnecting to our system….Effectively managing the timing of such a dramatic supply shift is an intricate process which triggers the needs for significant investments in transmission and other infrastructure. This infrastructure does not spring up overnight – transmission facilities and new baseload generation can sometimes take years to move from initial concept to integration onto the grid."

Like other utilities, Dominion is investing in large natural gas combined cycle generating stations. We have two stations totaling 2,600 megawatts under construction today, and our Integrated Resource Plan calls for another, similarly sized facility to begin construction before the end of the decade.

I believe the winter events in PJM and our plans for additional gas generation demonstrate that the QER must recognize the importance of our network of natural gas pipelines and their contribution to our national goals, both in reducing greenhouse gas emissions and improving the resiliency of our energy delivery system.

The prices for natural gas during the Polar Vortex days provided clear and even startling evidence of the constraints on our pipeline infrastructure. For example, gas prices on the Transco Zone 5 hub that serves Virginia on January 6 were $11.14 (MM/btu), but just one day later, on January 7, they surged to $72.62. Capacity on existing pipelines was inadequate to meet residential and commercial heating demands along with power generation requirements. Federal policies must provide a stable and predictable environment where private capital will invest in an expanded pipeline network to move the unprecedented supplies of gas to our population and power load centers.

The Task Force also should examine appropriate policies to address the financial and regulatory challenges facing the replacement and repair of aging infrastructure. For example, Ohio's regulatory policies have provided a reasonable financing mechanism to allow Dominion East Ohio and other utilities to begin replacing aging bare steel distribution pipelines. Under this program, Dominion is spending more than $160 million annually replacing bare metal pipe. The $4 billion, 25-year project will involve the eventual replacement of more than 5,500 miles of the company's 22,000-mile pipeline system. Safety of our system demanded we move forward with this program. Our customers also benefit because of the significant cost savings we are seeing from what we were spending previously on leak repairs.

Like many others in the energy business, Dominion is vigilant in protecting our assets. Our commitment to our customers – including the many federal installations we are privileged to serve – requires nothing less. The external threats to the delivery of secure electricity are constantly growing. We are constantly refining and expanding our programs to protect the system from this range of threats – hostile action, cyber attacks, and damage from storms.

And, in order to make sure we do the best job possible, we are constantly engaged with the appropriate federal agencies. We welcome an expanded partnership with you to ensure the reliability of our service for all customers. They expect and deserve nothing less.