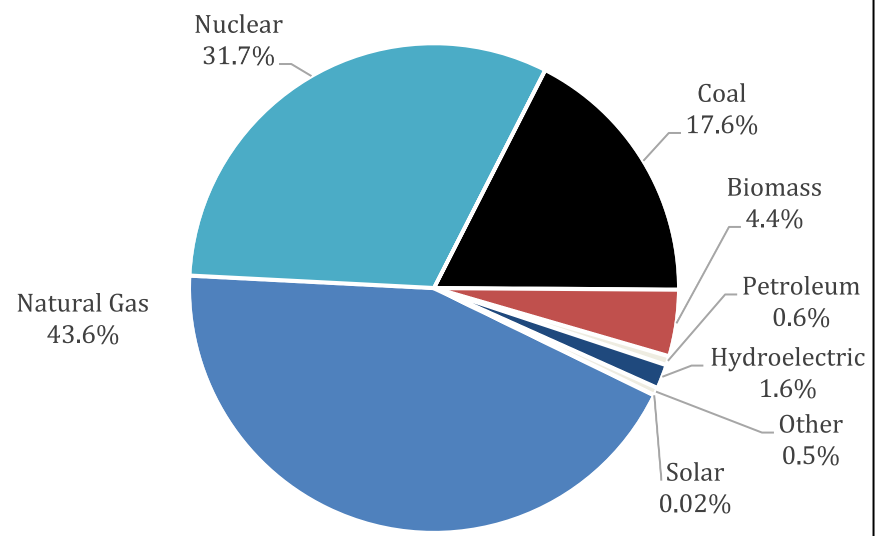
State Brief: Virginia

BACKGROUND

Most of Virginia's electricity generation is fueled by natural gas and nuclear. Natural gas-fired generation has recently boomed, doubling between 2014 and 2016. Natural gas-fired plants out-produced nuclear for the first time in 2015. The increase in natural gas has occurred concurrently with the decline in coal-fired generation, which has steadily declined since 2009. Preliminary 2017 data from the U.S. Energy Information Administration (EIA) suggests that coal will continue to decline, while natural gas will continue to increase.

Virginia's Electricity Mix 2016



Virginia has a voluntary renewable portfolio standard (RPS). The state also has an energy efficiency goal of 10% savings by 2022 relative to base sales in 2006. Several utility-scale renewable projects are under development in the state, including a 15 megawatt (MW) solar project by Appalachian Power Co. (APCo) and the 80 MW Amazon Solar Farm US East. Virginia also has substantial offshore wind potential and Dominion Virginia Power (Dominion) is moving forward on the mid-Atlantic's first offshore wind project in a federal lease area 25 miles off the coast of Virginia Beach.

The Virginia State Corporation Commission (SCC) regulates thirteen electric cooperatives and three investor-owned utilities (IOUs). The SCC has three elected commissioners, but with the retirement of Commissioner Judge Dmitri in early 2018, there is currently a vacant seat. The General Assembly failed to fill the vacancy prior to the 2018 adjournment in March, creating the opportunity for Governor Ralph Northam (D) to appoint a new commissioner to the SCC under Virginia's Constitution. A Republican majority controls both legislative chambers.

POLICY STRENGTHS AND OPPORTUNIES[1]

The National Renewable Energy Laboratory (NREL) developed the notion of "policy stacking,"[2] an important framework for policymakers to consider. The basic idea behind policy stacking is that there is an interdependency and sequencing of state policy that, when done effectively, can yield greater market certainty, private sector investment, and likelihood of achieving stated public policy objectives.

In theory, but not always in practice, clean energy policies can be categorized into one of three tiers of the policy stack. Tier 1, market preparation policies, remove technical, legal, regulatory, and infrastructure-related barriers to clean energy technology adoption. Tier 2, market creation policies, create a market and/or signal state support for clean energy technologies. Tier 3, market expansion policies, create incentives and other programs in order to expand an existing clean energy market by encouraging or facilitating technology uptake by additional market participants.

[1] For more information on policy opportunities, please visit the SPOT for Clean Energy. For more information on specific policy actions related to these opportunities, please review the *Clean Energy Policy Guide for State Legislatures*.

[2] V.A. Krasko and E. Doris, *National Renewable Energy Laboratory*, 2012. Strategic Sequencing for State Distributed PV Policies: A Quantitative Analysis of Policy Impacts and Interactions. http://www.nrel.gov/docs/fy13osti/56428.pdf.

For example, before financial incentives for combined heat and power (CHP) will be successful, two key considerations for deployment are having clear interconnection standards and favorable stand-by rates for customers who opt to add CHP. In this example, states should adopt policies to address interconnection and stand-by rates before adopting financial incentive programs.

GRID MODERNIZATION

Policymakers can view grid modernization as creating a policy structure that supports and ties together many other initiatives, such as smart metering infrastructure, customer data management, energy storage, electric vehicle infrastructure, and utility business models.

In the last two decades, new digital technologies have enabled utilities to better manage the grid and provide opportunities for consumers to customize their services to fit their priorities. These technologies allow a two-way flow of information between the electric grid and grid operators and between utilities and their customers. Emerging technologies improve system reliability and resiliency by enabling better tracking and management of resources. These technologies allow grid operators to incorporate central and distributed energy resources, energy storage technologies, electric vehicles, and assist in addressing the challenges associated with planning, congestion, asset utilization, and energy and system efficiency. On the customer's side of the meter, advanced metering infrastructure, dynamic pricing, and other emerging technologies allow an exchange of information and electricity between a consumer and their electric provider.

In GridWise Alliance's latest Grid Modernization Index (GMI), Virginia placed in the mid-range of states for grid modernization efforts overall. The state received average scores for the category "customer engagement," which ranks states on access to things like customer data and dynamic rates. Virginia placed 20th in "grid operations" which scores states based on advanced metering infrastructure (AMI) deployment and transmission/distribution systems.

An omnibus energy bill (SB 966) passed in March and went into effect on July 1, 2018. The bill finds "electric distribution grid transformation projects" to be in the public interest. These projects are defined to include advanced metering infrastructure (AMI), distribution system modernization, energy storage, microgrids, and cybersecurity measures. The bill allows utilities to petition the SCC for approval of a rate adjustment for customer cost recovery of, amongst others, electric distribution grid transformation projects.[3]

In its efforts to modernize the power grid, Virginia could consider adopting the following supportive policies:

1. Develop a grid modernization strategy through a stakeholder process. States may also decide to require that utilities propose a ten-year grid modernization plan within a specified timeframe. Legislation could require plans to outline a clear set of grid modernization goals and describe methods to measure, report, verify, and enforce progress towards those goals. With the enactment of SB 966, Virginia has devised a framework for the provision of incentives and cost recovery mechanisms for utilities to meet grid modernization goals through SCC-approved rate adjustment clauses.

2. Require that utilities' integrated resource plans (IRPs) include plans to enhance cybersecurity, integrate distributed energy resources (including electric vehicles and energy storage), increase demand response and/or demand-side management (DSM) programs, and measure and report on the results of grid modernization efforts. SB 966 directs utilities to systematically evaluate long-term electric grid distribution planning/transformation projects and develop long-term energy efficiency plans to reduce customer electricity bills and the power system's carbon intensity. In an order approving Dominion 2017 IRP, the SCC mandated that utilities include measures to comply with the policy objectives outlined in SB 966 in future IRP filings.[4] Dominion briefly addresses grid modernization in its 2018 IRP, noting the company is in initial stages of planning for grid modernization.

---

[3] The bill also undoes a Dominion and APCo rate freeze that was put into effect in 2015 in order to shield customers of those utilities from rate increases related to the Clean Power Plan. In a separate order involving APCo's application for cost recovery associated with a wind farm acquisition, the SCC noted potential constitutional issues that could arise from the bill, specifically, that it impinges upon interstate commerce by disadvantaging out-of-state renewable industries.

[4] Commonwealth of Virginia, State Corporation Commission, March 12, 2018. In re: Virginia Electric and Power Company's Integrated Resource Plan filing pursuant to Va. Code § 56-597 *etseq*. Case No. PUR-2017-00051.

3. Virginia does not have clear state policies governing customer data access and privacy protections. To address this, policymakers should develop legislation or rules that, at minimum, do the following: clarify who owns the energy data associated with consumer energy usage; protect customer privacy; outline the process for allowing direct access to data by third parties; and promote access to the highest resolution of data by third parties. The state could establish customer access to energy data through the Green Button Connect program, for example. Dominion and APCo have implemented Green Button for their customers.

The adoption of incentives for or a requirement to integrate a certain amount of energy storage on the grid alongside enhancing renewable energy and electric vehicle policies would support modernization efforts and improve the chances of successful grid modernization.

ENERGY STORAGE

Energy storage offers a unique opportunity to dynamically manage supply and demand to maximize the value of grid resources. By deploying storage in strategic locations, utilities can more effectively manage their energy portfolios. First, storage can dispatch power to better integrate intermittent resources like renewable energy. Second, it provides management of intermittent demand – helping to flatten peak demand requirements for the utility. Third, the responsiveness of energy storage can allow the utility to implement voltage regulation and other ancillary services, useful for improving system efficiency. Finally, energy storage can help the commercial sector avoid costly demand charges. As utilities around the country consider extending demand charges to the residential sector, this will become an even more important issue.

The flexibility of battery storage, combined with advanced metering infrastructure, allows customers to control how and when they use energy from the grid or from solar panels installed on their home or business. In most cases, this can provide greater cost savings than standalone solar systems. Combined with time-varying rates or real-time pricing programs, state policy can further support customer choice and open a new market for energy services. Prices that better reflect the time-varying and location-dependent costs of producing and delivering electricity can lead to several economic and environmental gains.

Storage provides multiple benefits to both the customer and the utility. State planning and regulatory policies can help maximize these benefits by 1) establishing a framework for easy integration of energy storage into the grid and 2) establishing a marketplace that monetizes the benefits of energy storage for cost effective investment.

SB 966 directs state regulators to work with the utilities and establish energy storage pilots to run through 2023. The bill also finds the deployment of up to10 MW of storage in Appalachian's service territory, and up to 30 MW in Dominion's, to be in the public interest. Furthermore, the General Assembly voted in 2015 to create the Virginia Solar Energy Development Authority for the purpose of facilitating development of the state's solar industry, and in 2017 the legislature amended the law to include energy storage. The Virginia Solar Energy Development and Energy Storage Authority is a 15-member independent entity charged with assisting in the expansion and deployment of energy storage technology as well as providing a hub for public-private collaboration on energy storage projects.

The state has several utility-scale storage projects, including the solar-plus-storage pilot program managed by Dominion at Randolph-Macon College. American Electric Power and Greensmith Energy are currently working to install a 4 MW hybrid battery storage-hydro system at two hydroelectric plants in the state. Additionally, Virginia is home to one of the largest pumped hydro storage systems in the world; Dominion and FirstEnergy share ownership of the Bath County Pumped Storage Station, which has a net generation capacity of 3 gigawatts (GW).

There are several opportunities for developing supportive state policies:

1. Amend existing interconnection policies to ensure that storage can connect to the grid through a transparent and simple process. The Interstate Renewable Energy Council (IREC) has produced a series of interconnection protocols that states can easily adopt. The state could establish best practices for interconnecting storage in statute, or legislation could provide an instruction to the SCC to update existing policy.

2. Instruct utilities to evaluate the value of energy storage in multiple strategic locations across the utility system and consider a requirement to deploy storage where it will be cost effective, or identify the price point at which it will become cost effective.

3. Require the inclusion of energy storage as a critical piece of the energy system as both a demand and supply management resource. Some states have required that utilities evaluate the cost effectiveness of non-wires alternatives (NWAs) to large transmission and generation investments. Alternatively, states might want to require utilities to develop a distribution investment plan that identifies the locations on the distribution system where energy storage or other distributed resources would offer the greatest value.

4. Consider adding a mandatory energy storage procurement target or requirement for energy storage with a documented process for periodic review of progress towards that goal. Procurement targets can jump-start market creation, spur fast learning, and guide the development of a regulatory framework. Five states currently have energy storage goals that range from five megawatt hours (MWh) to two GW.

5. Finance and incentivize energy storage for customers and utilities. Incentives could enable customers to use storage to manage their electric load and store locally produced renewable energy. Incentives in the form of rebates, grants, and tax credits can provide a bridge to scalable deployment for storage. Incentives can be designed to decline as storage values become more readily monetized. Policymakers could allow utilities that provide incentives to customers to recover the costs of installing smart meters. This would enable dynamic and time-varying energy management from multiple distributed battery systems. This should signal to customers the value of leveraging storage while better aligning customer costs with system costs. Financing energy storage installations for commercial customers would help reduce their demand charges. Policymakers might want to start first with a policy to incentivize solar system owners.

MAINSTREAMING RENEWABLES

As the renewable energy industry has matured, technology has improved, and global production of generating equipment has increased, renewable energy is increasingly seen as the least cost and lowest risk form of energy (excluding energy efficiency). A Bloomberg New Energy Finance report from this year predicts that at least 50% of total global electricity will be renewable by 2050. With increased deployment, utilities are learning more about how to integrate renewables effectively, investors are becoming more comfortable with the technologies, and building code officials are recognizing common standards and best practices. For these reasons, it is in the interests of policymakers to ensure that their states are well positioned to benefit from the transition to clean and sustainable energy resources.

To reduce barriers to customer and utility participation in the renewable energy market, Virginia might consider several policy options.

Customer-Oriented Policies

1. Interconnection, net metering, and streamlined permitting – In general, customers want a clear, streamlined, affordable, and predictable system for connecting renewable energy systems to the grid. To ensure this, Virginia's policy makers could consider adopting IREC's model interconnection procedures and by removing net metering system size limitations and the aggregate capacity limit. The state has limited aggregated net metering for eligible agricultural customer generators (as defined in HB 2303). Up to 500 kW of metered capacity may be aggregated for agricultural generators located on contiguous sites, and the customer must be served by a standard tariff. Other applications for aggregated net metering include commercial properties and public entities like state and local governments, universities, and schools. Virginia launched a net metering pilot program for public schools with the passage of HB 1451 in the 2018 legislative session. To streamline the interconnection of new renewable generators, Virginia has adopted "permit-by-rule" (PBR) regulations for solar and wind facilities with a nameplate capacity of less than 100 MW and streamlined permitting for qualifying biomass facilities. State incentives, such as tax credits, financial incentives, or loans can be tied to systems that are established within a designated streamlined permitting jurisdiction.

2. Shared Renewables – Due to building and property attributes and ownership issues, many customers are unable to install renewable energy technologies. Allowing shared, or community, renewable energy projects addresses these barriers. These projects have multiple owners or subscribers who pay for a portion of the generation provided by the system. Virginia directed IOUs to develop community solar pilot programs in 2017; Dominion subsequently submitted their program to the SCC in January 2018 and is currently awaiting approval. Community solar advocates note Virginia's community solar law differs from other state programs in that the utility maintains direct ownership of generating assets, versus other programs where the subscribers own and

administer solar projects (see for example Colorado's community solar policy). To expand program participation, the state might consider adopting a virtual net metering policy. Virtual net metering allows a customer to receive credits from a shared system as if the generation were on site. Virtual net metering is different from a power purchase agreement (PPA), which pays the customer for the proportion of power they produce. Because it is treated as a credit on the customer's bill, the customer can avoid the tax implications of a PPA payment - which can adversely affect the economics of the system (and may come as a surprise to the participant).

Low credit ratings often deter participation in renewable energy markets; this can affect low- and moderate-income (LMI) households' adoption of renewable energy solutions. Supportive policies for shared renewables can be designed to encourage participation by LMI households; this can increase adoption of renewable technologies and reduce energy costs. Low-income participation can be encouraged either through a percentage mandate for the overall annual contracted capacity, or by offering a higher rate of payment for the portion of shared solar capacity attributed to low-income customers. States that have a shared renewable program may want to coordinate this program with implementation of the federal Weatherization Assistance Program to provide recipients of assistance with participation in a shared renewable system.

There are several additional policy options that Virginia might consider to promote renewable energy uptake by low- and moderate-income consumers. Generally, successful state policies should be tailored to these customers, be cost-effective and financially sustainable, have measurable performance indicators, and be flexible enough to allow later changes in design.

3. Corporate Procurement – Many Fortune 100 and 500 companies have established either climate goals or commitments to purchase renewable energy. In just the last four years, over nine GW of renewable contracts have been announced by corporate entities. In the first quarter of 2018 alone, corporations signed 14 agreements for over 1700 MW of renewable energy. This is leading policymakers to provide additional avenues for businesses to procure renewable energy. Microsoft signed the largest solar PPA to date with renewable energy developer sPower earlier this year, in which Microsoft will purchase 315 MW of capacity from the Pleinmont I and Pleinmont II projects currently under development. Virginia's policy allows companies to purchase RECs or renewable energy through green tariffs, own shares in shared renewable projects, and develop or lease onsite renewable energy facilities. Certain large customers are also provided with retail choice and the ability to enter on-site third party PPAs. The products available in Virginia meet all six of the Corporate Renewable Energy Buyers' Principles. In addition, it is prudent to incorporate corporate renewable purchase commitments into the IRPs that utilities submit to regulators to plan for resource needs over multiple decades. By integrating these renewable purchase commitments into the IRP process, regulators can avoid over-building resources and stranding generation assets.

Utility-Oriented Policies

Some states have created programs that aim to reduce greenhouse gas emissions and increase investments in clean energy resources. States might see an emissions or clean peak standard as the next step in a progression from RPSs. As mentioned above, Virginia established a voluntary RPS in 2007 with the goal of 15% electricity sales generated from renewable sources relative to the base year by 2025. The RPS encourages utilities to purchase renewable energy credits (RECs) from in-state qualified renewable generators by attaching "compliance multipliers" to certain technologies. Both Dominion and APCo are participants in the voluntary RPS. Legislation was introduced in the 2018 session (HB 436) to make the RPS goals mandatory and significantly increase the stringency, calling for 80% of all electricity sales to be sourced from renewable energy, but the bill did not receive a vote before the session's adjournment. To increase utility adoption of clean energy technologies, Virginia's policy makers might consider the following:

1. Emissions standards can take a technology neutral approach that looks at the total emissions of the utility portfolio and drive emissions down with a combination of renewables, traditional fuels, efficiency, and technological advances. Emissions reductions can be achieved through 1) a carbon portfolio standard approach, or 2) a market-based approach. A portfolio emissions standard sets emissions reduction targets to be achieved over time. This can be implemented through the IRP process or by establishing a maximum allowable rate of emissions per unit. Under a market-based approach, a state or a group of states might set a certain emissions reduction target, for example, 20% below 1990 levels by 2040. This reduction is achieved by the distribution of annual emission allowances that decrease to the point that the standard is met in 2040. One of the advantages of

a market-based program is that it is designed to reduce emissions in the most economically efficient manner possible. Such a standard can also address other concerns such as pollution, asthma risk, environmental justice and water use.

2. Clean Peak Standards aim to increase the share of clean energy resources used to meet peak demand and decrease energy bills over the long-term by reducing peak demand in the hours when energy costs are highest. These objectives can be met through different policy options including: planning and procurement that focuses on peak demand; a moratorium on the construction of new peaking units or a phase out of existing units; incentives – including carve-outs in states with RPSs – for clean energy resources delivered during peak times; and/or adopting a new clean peak standard that sets a target for clean energy deliveries during peak times.

ELECTRIFICATION OF THE TRANSPORTATION SECTOR

Bloomberg New Energy Finance estimates that 55% of new car sales will be electric by 2040. Therefore, a key part of building a modernized grid involves designing infrastructure that will facilitate easy connection of electric vehicles (EVs) to the grid. One of the most important barriers to increased adoption of EVs is the consumer's awareness of the availability of EV charging stations. Ultimately, drivers want to be sure that their car will get them where they need to go. Another important barrier to increased adoption of EVs is their higher up-front cost as compared to similar conventionally fueled vehicles. The good news is that both supportive policies for developing charging infrastructure and technological advancements have eased "range anxiety." See the U.S. Department of Energy's Alternative Fuels Data Center for a map of refueling locations for EVs and other alternative fuel vehicles.

While the state imposes a financial disincentive on the purchase of EVs with a $64 annual registration fee, Virginia is looking to improve deployment and adoption of EVs with several bills proposed in the 2018 session. HB 922 and SB 908, enacted in March, allow local governments, recreation areas, and public education institutions to install EV charging stations. HB 469 would have established a tax credit for the purchase or leasing of an EV of up to $3,500, but the bill was left in committee. Additionally, a few incentives for alternatively fueled vehicles are currently available from the state, including a green jobs tax credit and a tax exemption for alternative fuel used by charitable non-profits and agricultural operators. The Commonwealth Energy Fund provides funding opportunities for the development of advanced transportation technologies including fuel cells and batteries.

There are several policy opportunities to further encourage and prepare for increased market penetration of EVs in the state, including:

1. EV and EVSE Financing and Financial Incentives – Providing additional financial incentives and innovative financing options can help spur greater market penetration of EVs. Sales, property, and income tax credits are some of the simplest methods for addressing high up-front costs of EVs and EV supply equipment (EVSEs). While sales tax credits are typically applied at the time of purchase, property and income tax credits may do less to address upfront cost barriers as receipt of the credit is typically removed in time from the purchase.[5] States have adopted other financial incentives including low-interest loans, grants, vouchers and rebates. A handful of states qualify EVSE under their property assessed clean energy (PACE) programs. A simple solution is to increase and expand existing tax credits to incentivize commercial, publicly available charging stations.

2. Charging Infrastructure Plan – Locating charging infrastructure is different from locating conventional fueling stations. For the most part, EVs are cars used for commuting and local trips. Furthermore, while a driver of a conventional vehicle stops only briefly at a gas station for the specific purpose of filling up, a driver of an EV is generally looking to refuel when they are parked for longer period of time, for example when going shopping, going to a restaurant, or going to work. Charging infrastructure plans should target these types of locations and attempt to pair the appropriate level of charging infrastructure with a reasonable amount of time a person will be at that location. Legislation could direct a state agency to develop such a plan through a stakeholder process. Virginia's existing registration fee for EVs could help fund these efforts. For example, in Washington a portion of each EV registration fee is used to fund charging infrastructure development across the state.

[5] A study by the Congressional Budget Office however suggests that tax credits are important tools for ensuring increased adoption of alternative-fueled vehicles.

Regional collaborations around the U.S. are emerging to coordinate the development of EV transportation and charging infrastructure. In May 2018, Virginia joined 11 other states and the District of Columbia to release the Northeast Corridor Regional Strategy for Electric Vehicle Charging Infrastructure. The states in this region, from D.C. to Maine, will collaborate to invest in public EV charging infrastructure, promote EV sales across the region, and develop complementary policies and programs. Maine is also a member of the Transportation and Climate Initiative (TCI), a regional collaboration of Northeast and Mid-Atlantic States that seeks to improve transportation, develop the clean energy economy, and reduce carbon emissions from the transportation sector.

3. Parking Infrastructure Requirements – In tandem with the development of a statewide plan, legislation could set requirements for EV parking infrastructure. Some states have adopted permitting standards for parking lots, requiring, for instance, that for every 100 parking spaces, there must be at least one EV charging space. Legislation could also incentivize utilities to develop make-ready locations. These locations supply power to the point where a utility or third-party developer might install an EV charging station. Virginia's statewide building energy code could also be updated to include requirements for EV charging infrastructure.

NEWS

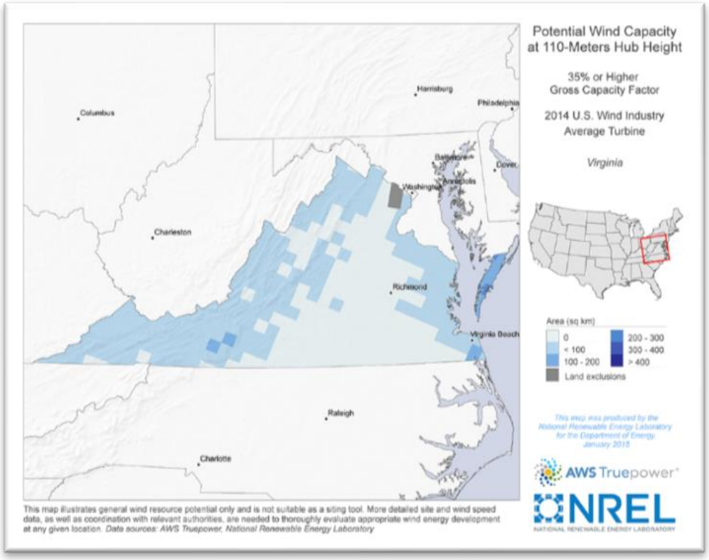
- July 19, 2018: It's Time to Harness Offshore Wind Energy
- July 18, 2018: Rural Virginia Renewable Energy Fest Sparks Curiosity, Not Controversy
- July 10, 2018: Dominion Increased Political Spending While Pushing for Law
- July 6, 2018: How Coal's Decline Complicates an Appalachian Utility's Transition to Clean Energy
- May 15, 2018: Dominion's New Grid Plan Overlooks Energy Storage in Favor of Gas Peakers
- April 11, 2018: Virginia Becoming The Industry Leader In Solar Energy Production
- April 4, 2018: Virginia Regulators Question if Utility Overhaul Law Violates US Constitution

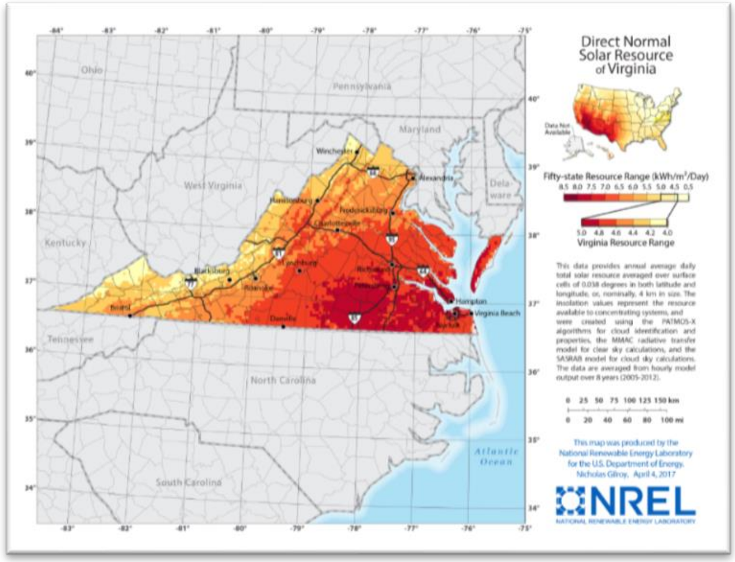
OTHER RESOURCES

- Virginia Department of Mines, Minerals, and Energy: https://www.dmme.virginia.gov/
- The American Council for an Energy-Efficient Economy State and Local Policy Database, Virginia: https://database.aceee.org/state/virginia
- The Database of State Incentives for Renewables and Efficiency, Virginia: http://programs.dsireusa.org/system/program?fromSir=0&state=VA
- U.S. Energy Information Administration, Virginia: https://www.eia.gov/state/?sid=VA
- SPOT for Clean Energy, Virginia: https://spotforcleanenergy.org/state/virginia/
- American Wind Energy Association (AWEA), Virginia: http://awea.files.cms-plus.com/FileDownloads/pdfs/Virginia.pdf
- The Rocky Mountain Institute: From Gas to Grid – Building Charging Infrastructure to Power Electric Vehicle Demand
- The GridWise Alliance, Inc., EVs - Driving Adoption, Capturing Benefits: http://gridwise.org/evs-driving-adoption-capturing-benefits/
- The Regulatory Assistance Project, Performance-Based Regulation: https://www.raponline.org/event/performance-based-regulation-the-power-of-outcomes-part-1/

VIRGINIA'S WIND AND SOLAR RESOURCES

WIND https://windexchange.energy.gov/states/va[6]
SOLAR https://www.nrel.gov/gis/solar.html





Our Resources

CNEE Homepage: http://cnee.colostate.edu/

The SPOT for Clean Energy: https://spotforcleanenergy.org/

The Advanced Energy Legislation (AEL) Tracker: https://www.aeltracker.org/

Clean Energy Policy Guide for State Legislatures: http://cnee.colostate.edu/cleanenergypolicyguide/

The Energy Policy Podcast: http://energypodcast.colostate.edu/

CNEE Contact Information
Tom Plant, Senior Policy Advisor
Tom.Plant@colostate.edu

[6] Please see your packet for a higher resolution wind energy capacity map.

