OUR COMMON AGENDA

2025 ENVIRONMENTAL BRIEFING BOOK

a publication of Virginia Conservation Network

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OUR COMMON AGENDA:
2025 ENVIRONMENTAL BRIEFING BOOK

A publication of the
Virginia Conservation Network

Our Common Agenda is written by, vetted through, and voted on by the 170+ Network Partners of the Virginia Conservation Network. This briefing book is intended to be used as an educational guide for policymakers, educational institutions, civic leaders, environmental advocates, and the public to understand the state policy background and potential opportunities to address the environmental problems facing Virginia.

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2024 BOARD OF DIRECTORS

ABOUT VCN

Founded as the Conservation Council of Virginia in 1969, Virginia Conservation Network (VCN) began as a roundtable of major conservation groups and has grown to include over 170 Network Partners across the Commonwealth. VCN is committed to building a powerful, diverse, and highly-coordinated conservation movement focused on protecting our Commonwealth's natural resources.

VCN is a facilitator of strategic action, a resource for Network Partners statewide, and a constant conservation presence in Virginia's Capitol. Playing a unique role in Virginia's conservation community, VCN helps the community speak with one coordinated voice. The organization and its staff focus on strengthening the conservation community as a whole and winning environmental victories that benefit all Virginians.

VCN's Network Partners work on a wide range of issues from stream restoration, to transportation reform, to renewable energy advancement, to promoting sustainable community growth, to environmental justice and more. Given the diverse work of our partner organizations, VCN organizes its programs into four main categories: **WATER, LAND & WILDLIFE CONSERVATION, CLIMATE & ENERGY**, and **LAND USE & TRANSPORTATION.**

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VIRGINIA CONSERVATION PHOTOGRAPHY CONTEST WINNER

Every year, we ask Virginia's amateur photographers to share their best conservation photography of Virginia to showcase within Our Common Agenda. The public votes to decide on the featured cover photo of the Briefing Book, as well several award categories. This year's photo contest winner is Blaine Fitzgerald's photo of Burnside Sunflower Farm in Prince William County, VA.

Blaine Fitzgerald is a Northern Virginia-based amateur photographer. An avid hiker, Blaine initially set out to tour Virginia by foot and completed the Virginia State Parks Trail Quest in less than one year. Once achieved, however, she realized she was not done exploring and sharing Virginia's beauty and picked up her camera. Blaine's current portfolio focuses on floral and insect photography. Follow along Blaine's journey on Instagram at @bafphotography.

HOW THE BRIEFING BOOK GETS DRAFTED

Our Common Agenda is written by, vetted through, and voted on by VCN's 170+ Network Partners. Here's our process for crafting this Briefing Book, a comprehensive policy resource:

ISSUE WORKGROUPS HOST ANNUAL MEETINGS

VCN's issue workgroups (Clean Water, Land & Wildlife Conservation, Climate & Energy, and Land Use & Transportation) decide which issues should be covered in the Briefing Book. During this process, the authors of each paper are also selected.

AUTHORS PUT PEN TO PAPER

The collaborative process is truly on display while co-authors craft their briefing book papers. Two–four authors work on each briefing book paper while consulting with VCN staff.

ISSUE WORKGROUPS CONDUCT EXTENSIVE REVIEWS

Once the briefing book papers have been drafted by authors, VCN's issue workgroups review all of the papers. Authors incorporate the workgroup's feedback to make stronger arguments and/or opportunities. By the time briefing book papers have been fully reviewed and finalized, they are read by at least 5-10 experts in the topic's field.

EQUITY REVIEW COMMITTEE WORKS TO ENSURE GOALS ARE EQUITABLE

A team of Network Partners serves on the Equity Review Committee. The committee reviews all briefing book paper drafts to ensure that policy opportunities won't have unintended consequences on environmental justice communities – specifically low-income communities, communities of color, and rural communities. Recommendations offered by the Equity Review Committee are considered by the co-authors and integrated to the best of their collective ability. This year, the Equity Review Committee members were:

Rowena Zimmermann, Blue Ridge PRISM
Grace Rogers, Environmental Defense Fund
Faith Harris, Virginia Interfaith Power and Light
Maribel Castañeda, Our Virginia Outdoors
Weston Gobar, BlackOak Collective
Victoria Higgins, Chesapeake Climate Action Network
Mary Cromer, Appalachian Citizens' Law Center
Jeanette Cadwallender, Garden Club of Virginia
Alexis Dickerson, Potomac Conservancy
Kendyl Crawford, The Climate & Clean Energy Equity Fund
Pamela Bingham, Bingham Consulting Services
Nicole Vaughan, Virginia Conservation Network

LEGISLATIVE COMMITTEE VOTES ON POLICY RECOMMENDATIONS

Our legislative committee – co-chaired by Jay Ford, Chesapeake Bay Foundation, and Victoria Higgins, Chesapeake Climate Action Network – is made up of partners from each of our workgroups. This is an opportunity to break down the silos between workgroups: energy experts review water papers, land conservation experts review transportation papers, etc. This helps ensure policy goals don't unintentionally adversely impact other workgroup issue areas. Briefing book papers are voted on by the committee.

BOARD OF DIRECTORS VOTE TO ACCEPT EACH BRIEFING BOOK PAPER

Finally, each briefing book paper is presented to the Board and a vote on its inclusion follows. This final step of the process ensures that topics and opportunities are in line with VCN's mission and goals.

Shenandoah National Park
Photo by David Petersen

OUR COMMON AGENDA

A MESSAGE FROM THE EXECUTIVE DIRECTOR

Thank you for opening up a copy of Virginia Conservation Network's (VCN) *Our 2025 Common Agenda*.

Our Common Agenda is the most comprehensive overview of Virginia's environmental policy landscape. A collection of papers written by, vetted through, and voted on by VCN's 170+ Network Partners, this briefing book explains the Commonwealth's environmental policy background and potential opportunities for clean water & flood resilience, land & wildlife conservation, land use & transportation, climate & energy, and good governance.

This publication is meant to be used as both an educational resource as well as a Rolodex – the authors of Our Common Agenda are leading conservation advocates in Virginia. They ground their research and findings in science and present practical environmental priorities that strive to be equitable for all Virginians. The glossary – added for the first time this year – is a resource to make sure everyone understands the frequently used terms, state agencies, and programs that govern Virginia's environment. Each paper gives the background for the existing policies that are in place and why the issue matters with references to a myriad of background material in the endnotes.

Our Common Agenda is published annually and widely circulated to policymakers, educational institutions, civic leaders, environmental advocates, and the public. No matter which of those categories you fit in, I'm looking forward to working with you on the topic or topics in this book that interest you the most. Feel free to reach out to me, my team, or any of the authors in this book for more information.

Mary Rafferty
Executive Director

Docker Waterman's Boat at Wachapreague, VA
Photo by Lucas Manweiler

CLEAN WATER & FLOOD RESILIENCE

CLEAN RIVERS, CREEKS & BAYS

RELEVANT PROGRAMS & AGENCIES

See full glossary starting on page 157

CHESAPEAKE BAY TMDL PHASE III WIP
Provides scientific and technical guidance on the Chesapeake Bay Program on measures to restore and protect the Chesapeake Bay. Works to enhance scientific communication and outreach through reports, discussion groups, reviews, and workshops.

CLEAN WATER ACT
The primary federal law in the US governing water pollution established regulations on pollutant discharges into bodies of water and regulated water quality standards. The CWA recognizes both federal and state roles in its implementation and enforcement.

ENHANCED NUTRIENT REMOVAL PROGRAM
This program incorporates technologies that allow sewage treatment plants to provide a highly advanced level of nutrient pollution removal by building on previously set biological nutrient removal (BNR) systems.

SOIL & WATER CONSERVATION DISTRICTS
Develops comprehensive programs and plans to conserve soil resources, control and prevent soil erosion, prevent floods, and protect and conserve water resources. Agency staff provide education and stewardship programs across the state to support conservation.

STATE WATER CONTROL BOARD
Appointed Virginia citizen body that promulgates regulations to implement Virginia's State Water Control Law and sets water quality standards which include regulation of sediment, nutrient, and toxic pollutants.

STORMWATER LOCAL ASSISTANCE FUND (SLAF)
A 50-50 state and local matching grant program that protects and improves the health of our waterways by funding local stormwater resiliency projects.

VIRGINIA AGRICULTURAL COST SHARE PROGRAM (VACS)
Funds the implementation of a wide suite of agricultural best management practices that reduce pollution while enhancing farm productivity.

VIRGINIA CONSERVATION ASSISTANCE PROGRAM
Cost-share program providing assistance as well as financial incentives to urban landowners installing Best Management Practices (BMPs) on their property. Eligible practices include the removal of impervious surfaces, rainwater harvesting, and other efforts to mitigate the effects of erosion and stormwater runoff.

VIRGINIA DEPARTMENT OF CONSERVATION & RECREATION (DCR)
Agency which oversees Virginia's natural resource management and outdoor recreation.

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)
Virginia's environmental agency that is responsible for administering laws and regulations related to air quality, water quality, water supply, renewable energy and land protection. DEQ issues permits, conducts monitoring, performs inspections, and enforces environmental law.

VIRGINIA DEPARTMENT OF HEALTH
State agency THATOversees public health throughout the state, including the regulation of public drinking water.

VIRGINIA POLLUTANT DISCHARGE ELIMINATION SYSTEM (VPDES)
Program administered by the Department of Environmental Quality (DEQ) designed to prevent pollutants from getting into state waters. DEQ issues permits for all point source discharges; stormwater discharges from Municipal Separate Stormwater Sewer Systems (MS4s); and stormwater discharges from industrial sites.

WATER QUALITY IMPROVEMENT FUND (WQIF)
Fund that directs Virginia Department of Environmental Quality to assist local government and individuals in reducing point source nutrient loads to the Chesapeake Bay.

Sailing under Coleman Bridge - Yorktown, Va
Photo by Brenna Behel

PREVENTING POLLUTED STORMWATER RUNOFF

CLEAN RIVERS, CREEKS, & BAYS

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WHY IT MATTERS

Virginia is facing more frequent high-intensity rainfall events due to climate change[1] and the increasing percentage of impervious surfaces exponentially increases the negative impact on land and water. Developed areas are the fastest-growing source of pollution to our waterways.[2] Significant development pressures result in the expansion of impervious surfaces – parking lots, roofs, and roads – in suburban and urban areas. Impervious surfaces transport water and pollution rapidly to storm sewers and streams; this rapidly moving runoff erodes streams, harms aquatic ecosystems, and contributes to the decline of streams and the Chesapeake Bay.

Stormwater runoff from sites under construction also contributes large amounts of pollution to Virginia's waters. Construction sites with currently required erosion and sediment control (ESC) measures contribute the highest annual sediment pollution loads per acre of any land use in the Chesapeake Bay watershed,[3] and Virginia currently permits more than 4,000 construction site discharges across the state under its **Virginia Pollutant Discharge Elimination System (VPDES).**[4] Experts have concluded that many sites, even with required ESC measures, will be moderately or extremely "functionally deficient," in sediment removal efficiency.[5]

Conversion of land from agricultural to urban highly developed and low-density residential land uses is increasing rapidly, with new development from 2017-2022 exceeding totals from the previous 15 years,[6] thus exacerbating runoff problems.

Managing construction stormwater and post-development runoff with low impact development (LID) methods and wider use of green infrastructure, as opposed to engineered installations, will reduce pollution to our waterways, ameliorate flooding impacts, and be more cost-efficient in the long term. Virginia can implement these solutions through municipal permits (**Municipal Separate Stormwater Systems, MS4**), **construction stormwater (CSW) permits**, and flexible planning and zoning rules.

CURRENT LANDSCAPE

For decades, Virginia has issued VPDES permits for discharges from construction projects.[7] These permits[8] require controls to meet **water quality standards (WQS)**. The **Department of Environmental Quality (DEQ)** has yet to require monitoring of discharges or receiving streams to assess whether waters are protected. This data is necessary for proper enforcement and to enable sound permitting decisions in the future.

Stormwater permits for Virginia's largest localities, called Phase I Municipal Separate Storm Sewer System (MS4) permits, were reissued in 2024 after a significant delay. The related stormwater permits for medium-sized localities (those with populations between 10,000 and 100,000), called Phase II Small MS4s, are covered by a General Permit that was reissued in November 2023. These permits will require an additional 60 percent reduction in nitrogen and phosphorus pollution discharges over the next five years. The current biennial budget did not include any additional stormwater funding to meet these significant obligations. To meet the requirements, the Commonwealth must ensure sufficient and consistent funding of the **Stormwater Local Assistance Fund (SLAF)**, a state and local matching grant program that protects and improves the health of our waterways by funding localities' stormwater projects.

The **Virginia Conservation Assistance Program (VCAP)** helps fund residential-scale stormwater management installations. VCAP reimburses homeowners, homeowner associations (HOAs), businesses, schools, and places of worship to reduce stormwater volume and pollutant loads entering our rivers. Eligible practices include rainwater harvesting, rain gardens, conservation landscaping, permeable pavers, living shorelines, green roofs, and more. Since 2016 the VCAP, as administered by the Soil and Water Conservation Districts, has protected local waterways by funding thousands of practices across Virginia.

Nearly 25% of Virginians live in HOAs.[9] Many HOAs restrict opportunities for residents to manage their runoff using native plantings ("conservation landscaping"). These restrictions prevent property owners from reducing stormwater impacts on their properties. Moreover, restrictions on landscaping limit these Virginians from accessing state-funded programs like VCAP.

OPPORTUNITIES

Meeting the stated SLAF needs assessment is critical as Virginia continues to face more frequent and intense storms. The current FY25 needs assessment is approximately $28M with cumulative needs through FY28 of $131M. These funds will allow communities to address increased needs as they face more frequent and intense storms.

VCAP was fully funded at $4M in the FY25-26 budget. Consistent funding for VCAP, with an emphasis on level funding in 2026, is another important component of managing stormwater.

With almost 25% of Virginians living in a community association, it is also important to ensure that these homeowners have the option to install conservation landscaping on private property to help mitigate runoff. Limitations to the installation of conservation landscaping also limit constituents' ability to access state-sponsored programs such as VCAP.

Sampling of discharges and of receiving waters under the CSW general permit and individual CSW permits is necessary to understand the true impacts of construction activities on water quality.

Funding opportunities are needed for smaller localities (those with fewer than 10,000 residents) that are not subject to MS4 permitting requirements to implement stormwater best management practices. Localities across the Commonwealth rely on state funding to reduce pollution discharges and effectively manage stormwater.

TOP TAKEAWAYS

Developed areas are the fastest-growing source of pollution to our waterways and HOA restrictions too often prevent private property owners from installing "conservation landscaping" to reduce stormwater runoff.

Managing stormwater runoff with low-impact development (LID) methods and green infrastructure is more cost-effective than engineered installations in the long term.

Sustained funding supports the implementation of practices by localities to reduce stormwater runoff.

Richmond Waterfront
Photo by Isaiah Ramadane

INVESTING IN WASTEWATER IMPROVEMENTS

CLEAN RIVERS, CREEKS, & BAYS

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WHY IT MATTERS

Through diligent efforts and technological advancement in our **wastewater** treatment facilities, the Commonwealth has made notable progress in reducing pollution and safeguarding the state's waters.[1] However, opportunities for improvement still exist, and in fact, a recent analysis[2] suggests that phosphorus loads to the Chesapeake Bay are higher than previously expected. Further, the majority of tidal waters in Virginia remain impaired due to nutrient pollution, and impacts from climate change are exacerbating these issues.

Upgrades to our wastewater treatment facilities play a crucial role in helping the state reach Virginia's pollution reduction goals outlined in the **Chesapeake Bay TMDL**. To date, the Chesapeake Bay reduction plan's primary source of success in reducing nutrient pollution has been through wastewater treatment plants. Wastewater upgrades have a high degree of certainty as benefits are monitored and verified on-site. And additional opportunities are on the horizon for Virginia, but these long-term solutions necessitate significant investment. Richmond, Alexandria, and Lynchburg specifically are in dire need of additional investments to upgrade their antiquated **combined sewer overflow (CSO)** systems, which routinely send raw sewage into major rivers in periods of heavy rainfall[3] – storms that are being exacerbated by climate-driven increases in rainfall across the Commonwealth.

| Photo by Erik Moore

CURRENT LANDSCAPE

The Commonwealth of Virginia made significant progress in the wastewater arena by putting forth $400M in bond funding to provide upgrades to wastewater treatment plants in the most recent biennium budget.[4] Under this outlay, the **Department of Environmental Quality (DEQ)** will make matching grants for **Water Quality Improvement Fund (WQIF)** eligible wastewater projects that achieve Chesapeake Bay nutrient pollution reductions via the design and installation of nutrient reduction technology at publicly owned wastewater treatment plants.

Since 1997, when WQIF was established, the fund has provided more than $1B in grants to implement nutrient removal projects. Over the past two decades, this has been further bolstered by the development of a general permit for Bay watershed treatment facilities. This permit, which places discharge limits on nutrient (nitrogen and phosphorus) pollution, also comes with a nutrient credit trading system. As a result of these investments, Virginia has achieved 97% and 75% of its nitrogen and phosphorus pollution reductions respectively to the Bay watershed from the wastewater sector.[5]

Despite these technological upgrades, our wastewater sector is still facing significant challenges given the rapid pace of development, population growth at the state level, and the baked-in impacts of a changing climate. Higher costs as a result of inflation and delayed project timelines further threaten our continued progress. Accordingly, Virginia and regional partners will have to enhance efforts to meet the goal of a restored Bay, as called for in the Commonwealth's **Phase III WIP**.[6]

Antiquated combined sewer overflow systems in three of our major cities are easily overloaded by stormwater. CSO overflow is sending untreated stormwater and sewer water directly into nearby rivers with concerning health implications.[7] Legislation in 2017 and 2020 put deadlines on Alexandria and Richmond to address untreated overflow events from their CSOs. But the scale of these infrastructure problems requires state help, and increased project costs and shifting timelines further impact these localities' ability to stay on track – particularly in Richmond, where 20.9% of residents are below the poverty line[8] and already pay some of the highest wastewater rates in the state. Richmond identifies projected costs to be over $1.3B to complete remediation work on its combined sewer system.[9] During the 2024 General Assembly, $50M was appropriated in the budget for Richmond's CSO efforts, but significant remaining funding is needed in order for the City to meet the state's order by 2035.

OPPORTUNITIES

According to the 2023 Commonwealth Wastewater Infrastructure Needs Assessment, the total wastewater infrastructure needed over the next 20 years in Virginia is approximately $15.8 billion, including $10.8B for community centralized projects. Accordingly, DEQ estimates that approximately $539M in additional funding above historical annual levels is needed going forward.[10] While the $400m in bond proceeds as part of the 2024 budget is a strong start, there is still a gap to reach the needs assessment. According to the DEQ, $270M in FY26 is needed to help localities meet their pollution reduction goals through infrastructure upgrades.

The General Assembly placed Richmond on a timeline to remediate its CSO system by 2035 through legislation (SB1064) passed in 2020. However, there remains a $350M budget gap that needs to be filled to meet the state's order by 2035. This gap will need to be funded, at least in part, with state funds.

In 2021, the **Enhanced Nutrient Removal Certainty Program** was established, which will ensure Virginia achieves the wastewater treatment technology upgrades necessary to meet the Phase III WIP.[11] Not only will more complete wastewater treatment revitalize the Bay and its tributaries, but it will ensure that communities across the Commonwealth will more equitably receive the benefits of clean water in their communities. Rural communities, especially rural communities of color, "have long faced challenges with toxic water due to insufficient water infrastructure," while low-income ratepayers in urban areas struggle to afford wastewater and drinking water improvements.[12] State investment will help these communities maintain and improve aging infrastructure, prevent local water quality problems, and create good-paying jobs for skilled workers.[13]

TOP TAKEAWAYS

- Wastewater treatment plant upgrades have been the most effective way to reduce nutrient pollution through the Chesapeake Bay cleanup plan. These wastewater upgrades have a high degree of certainty as benefits are monitored and verified on-site.
- The Commonwealth of Virginia made significant progress in the wastewater arena by putting forth $400M in bond funding to provide upgrades to wastewater treatment plants in the most recent biennium budget.
- Additional state funding is needed for localities to remediate aging CSO systems to make local rivers swimmable and fishable. The total wastewater infrastructure funding needed over the next 20 years in Virginia is approximately $15.8 billion, including $10.8B for community centralized projects.

SUPPORTING AGRICULTURE FOR CLEAN WATER

CLEAN RIVERS, CREEKS, & BAYS

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WHY IT MATTERS

Agriculture is Virginia's largest industry with 7.7 million acres producing about 8.7% of the state's economic output.[1] Virginia farms produce food and fiber, maintain open space, mitigate floods, create jobs, unite communities, and sustain wildlife. They also provide the greatest opportunity to reduce nutrient and sediment pollution reaching Virginia's local streams, rivers, and the Chesapeake Bay.[2]

Fortunately, it is possible to address pollution loads and protect the Commonwealth's natural resources while also enhancing the positive economic and societal impacts of agriculture. By improving animal and soil health and aiding in efficient nutrient management, agricultural best management practices improve water quality and also help increase farm profitability.

CURRENT LANDSCAPE

The **Virginia Department of Conservation and Recreation (DCR)** administers the state-funded **Virginia Agricultural Cost Share (VACS) Program** through 47 **Soil and Water Conservation Districts (SWCDs)**. The Districts' experienced staff assist farmers and landowners to improve local water quality by providing technical assistance in implementing **best management practices (BMPs)**, and helping to offset the cost of the BMPs. These farm practices include stream fencing and alternative water sources to keep livestock out of streams; nutrient management plans that help farmers efficiently apply fertilizers; riparian grass and forested buffers to filter nutrients and sediment from runoff; conservation tillage and cover crops to conserve productive soils; and many other practices that protect Virginia's streams, lakes, rivers, and bays, improve productive agricultural soils, and benefit farm businesses.

The 2014 **Chesapeake Bay Watershed Implementation Plan (WIP)** called on states to have practices in place by 2025 to reduce sediment and nutrient pollution to the Bay from their rivers and streams. The most recent data show that Virginia will fall far short of that goal, with 90% of the remaining pollution reductions needed to meet the **Total Maximum Daily Load (TMDL)** expected to come from the agricultural sector. Virginia started meeting the VACS program needs assessment in 2022. For most of the program's history, it has not had the resources required to assist all farmers to achieve the target pollution reductions. A fully-funded Agricultural BMP program is essential to provide the financial and technical support required for the agricultural sector to adequately reduce nutrient and sediment pollution to local waters and the Chesapeake Bay. Although our current pace of implementation will not achieve our goals by the 2025 Bay restoration deadline, there has been notable progress in recent years thanks to historic funding levels. This is no time to slow our efforts. To comply with the Clean Water Act, Virginia must continue to provide farmers the funding and support for best management practices (BMPs) on their farms.

Shenandoah Valley Farm - Page County
Photo by Lori A Cash

OPPORTUNITIES

Fully funding the VACS program in the state budget is a major achievement for Virginia. Strong, sustained funding at the level identified in the Agricultural Needs Assessment will facilitate water quality improvements at a faster pace of progress.

The 2024-2025 state budget also included $20M in the first year for the **Virginia Department of Environmental Quality (DEQ)** to reduce **nonpoint source pollution**, like that from agricultural fields, through a pay-for-outcomes program. To ensure this program complements rather than competes with the VACS program and other grantmaking and federal programs that assist farmers, this program will require sufficient agency capacity to administer the program, verify the outcomes, and ensure that the program provides opportunities to farmers who have not been able to access existing cost-share programs.

A 2023 report that evaluated the Chesapeake Bay cleanup progress[3] includes additional suggestions to accelerate the restoration of the watershed, including:

- Refocus conservation efforts on shallow water habitats to make a more immediate impact for the wildlife and people of the Commonwealth. Installing BMPs like vegetated buffers, living shorelines (page 27), excluding livestock from streams, and creating year-round vegetative cover on farms will reduce nonpoint source pollution, sequester carbon, mitigate flooding, and create corridors for landscape-level conservation.
- Prioritize hotspots to achieve more effective reductions in pollution to local waterways. Combining monitoring and modeling data to identify areas where there is a nutrient imbalance will allow more strategic placement of BMPs to reduce pollution. Funding for BMPs and technical assistance should also be targeted to these locations.

The state should also identify and embrace opportunities to partner with federal and nonprofit programs to take advantage of unprecedented funding for agricultural producers and allow for innovation that accelerates the adoption of BMPs and/or accelerates pollution reductions.

In addition, a dedicated, well-funded Riparian Forested Buffer program initiative would provide consistent and long-term funding for this critical BMP.

These investments in agricultural BMPs must be equitably reaching historically under-resourced communities like farmers of color and beginning farmers. As noted by the Virginia Soil and Water Conservation Board, the allocation of funding for the VACS program should address Diversity, Equity, Inclusion, and Justice concerns, and the state should follow through with this directive.[4]

TOP TAKEAWAYS

Maintaining full funding for the Virginia Agricultural Cost Share (VACS) program and focusing on long-term conservation practices will reduce pollution loads while also enhancing the positive economic and societal impacts of agriculture.

The Virginia DCR and the SWCDs require staff capacity and training to provide the necessary technical assistance to successfully implement the fully-funded VACS program.

The DEQ's new pay-for-performance program will be an opportunity to improve water quality which requires adequate staffing and funding to be successful.

ENFORCING WATER QUALITY STANDARDS

CLEAN RIVERS, CREEKS, & BAYS

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WHY IT MATTERS

Virginia has surface waters, including streams, rivers, lakes, estuaries, and coastal bays, that make up nearly 8% of the state's area. These waters provide drinking water, commercial opportunities, venues for recreation, tourism draws, and much more. At the same time, Virginia's waterways are widely degraded. In its 2024 statewide water quality assessment, the **Department of Environmental Quality (DEQ)** determined that:

- Wildlife populations, including insects, mollusks, and other invertebrates across more than 2,300 miles of streams have been harmed and are in need of pollution diets and cleanup plans;
- 3,351 acres of lakes and reservoirs are degraded by **harmful algal blooms (HABs)**;
- 139 stream segments and 44 lakes have **dissolved oxygen (DO)** levels insufficient to fully support aquatic life. [1]

What's more, DEQ and the **Virginia Department of Health (VDH)** have advised that children and pregnant women not eat fish from the Middle Chickahominy River watershed due to newly discovered high concentrations of so-called "forever chemicals" (page 15).[2] These problems result in the loss of habitat for aquatic life, reduced economic returns from recreation and fishing, and unnecessary harm to residents who rely on our waterways for drinking water, subsistence fishing, and their livelihoods.

State and federal statutory and regulatory systems are designed to prevent the kinds of impairments reported. Right now, there is an important opportunity for Virginians to protect our state waters and our communities by improving the ways we implement these laws and regulations. Permits that govern discharges of pollution into waterways can be improved by setting limitations that enforce all **water quality standards (WQS)** and by adopting new water quality criteria. If all parts of the WQS are enforced, water quality assessments and cleanup plans will be more accurate and protective.

CURRENT LANDSCAPE

WQS are a crucial part of the regulatory framework established by the **Clean Water Act (CWA)**. These standards encompass both **numeric and narrative criteria** that specify acceptable pollutant levels and overall water conditions necessary to support beneficial uses like swimming and fishing. Currently, state discharge permits and water quality assessments do not comprehensively address impairments caused by pollutants such as sediment, nutrients, **turbidity**- and color-producing substances, and certain hazardous chemicals. These pollutants may frequently exceed the specified narrative water quality criteria.[3] Moreover, essential numeric criteria for turbidity and suspended solids have yet to be implemented.

Sinking Creek turbidity pollution
Photo provided by POWHR/Mountain Valley Watch

Narrative water quality criteria prohibit pollution that "interfere[s] directly or indirectly with designated uses of [state waters] or which are inimical or harmful to human, animal, plant, or aquatic life," including "substances that produce color, tastes, turbidity, odors, or settle to form sludge deposits" or "which nourish undesirable or nuisance aquatic plant life."[4] In other words, they describe conditions that are essential for a healthy waterway; conditions which are not only essential for human uses, but for the natural assemblage of wildlife and plant life native to the waterbody to thrive.

Waterways can become degraded, and more specifically the aquatic plant and animal communities therein negatively impacted, by sediment or nutrient pollution.[5] However, DEQ does not assess violations of the narrative criteria for these pollutants until after the health of aquatic life has become degraded. Likewise, excess nutrients pollute our water, but DEQ does not impose limits on nitrogen and phosphorus for most streams. Certain toxic pollutants, such as **per- and polyfluoroalkyl substances (PFAS)**, may also violate narrative criteria by creating conditions that harm people and wildlife but are not controlled or monitored in discharge permits.

Numeric criteria set maximum allowable concentrations of specific pollutants that must not be exceeded in waterbodies. Virginia does not have numeric criteria to protect streams from substances such as phosphorus and nitrogen (nutrient pollutants), sediment and other turbidity-causing substances, and color-producing waste. Turbidity-causing substances, such as sediment, are widespread, prompting the **State Water Control Board** (Board) to pass a motion "to direct the DEQ staff to develop numeric turbidity standards for use across the Commonwealth."[6] DEQ took initial actions to carry out the Board's instruction in 2021 but has not completed that process.

OPPORTUNITIES

DEQ should designate streams and reservoirs as "impaired" waters under its Clean Water Act authority in circumstances where the narrative criteria are violated by the presence of excessive sediments or turbidity, unnatural colors, high levels of polluting nitrogen and phosphorus, and nuisance algal blooms. In developing permits for discharges to surface waters, the potential of activities to violate the narrative criteria must be assessed and permit limitations or other conditions must be imposed to prevent violations of Virginia's water quality standards.

DEQ should require that PFAS and other toxic pollutants be eliminated from discharges where they may violate narrative criteria. Given that Virginia has yet to begin processes to adopt numeric criteria for forms of PFAS and that it will be impossible to develop them for the thousands of different chemicals in the PFAS family, narrative criteria should be implemented now (page 15).

DEQ should re-initiate the regulatory process to develop numeric criteria for turbidity and/or solids and the Board should adopt appropriate criteria in 2025.

TOP TAKEAWAYS

Many of Virginia's waters are degraded by pollutants such as sediments, nutrients, color-producing waste, and toxic chemicals not yet addressed by numeric water quality criteria.

Currently, DEQ does not designate waters as impaired by these types of pollutants until harm to aquatic ecosystems is shown or human health threats emerge.

Virginia has an important chance to improve protections and clean up many waterbodies by fully enforcing narrative criteria and adopting long-planned numeric criteria for turbidity and/or solids.

TOXIC POLLUTION

RELEVANT PROGRAMS & AGENCIES

See full glossary starting on page 157

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

An independent agency of the United States government tasked with environmental protection matters.

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

Virginia's environmental agency that is responsible for administering laws and regulations related to air quality, water quality, water supply, renewable energy and land protection. DEQ issues permits, conducts monitoring, performs inspections, and enforces environmental law.

VIRGINIA DEPARTMENT OF HEALTH (VDH)

State agency oversees public health throughout the state, including the regulation of public drinking water.

VIRGINIA DEPARTMENT OF WILDLIFE RESOURCES (DWR)

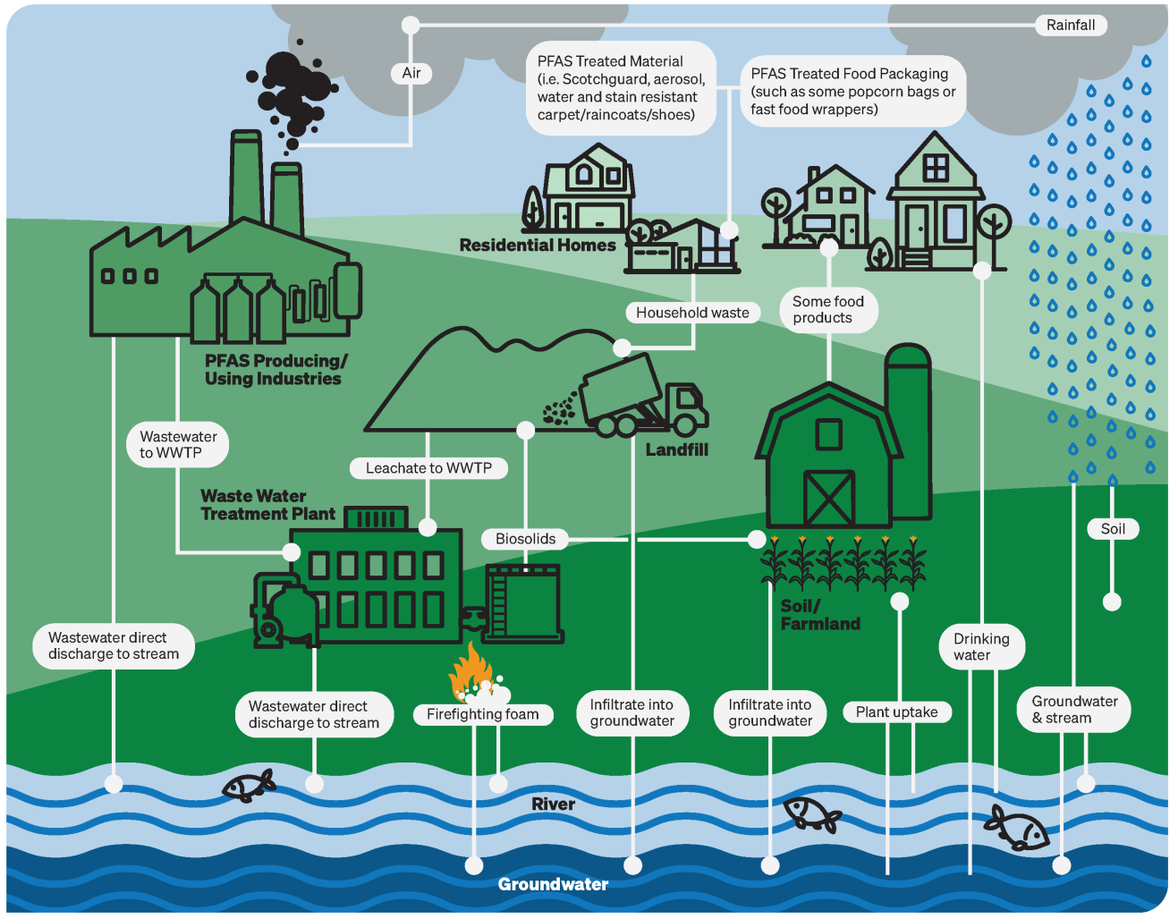
Agency responsible for the management of inland fisheries, wildlife, and recreational boating for the Commonwealth of Virginia.

VIRGINIA HOUSEHOLD WATER QUALITY PROGRAM (VAHWQP)

A voluntary testing program for households served by private water supplies; led by the Virginia Cooperative Extension and Virginia Tech.

VIRGINIA POLLUTION DISCHARGE ELIMINATION SYSTEM (VPDES)

Virginia implements its authority to regulate point source discharges of pollutants under the Clean Water Act through this program.



PFAS Cycle
Diagram by Southern Environmental Law Center

STOPPING PFAS POLLUTION AT ITS SOURCE

PLASTIC & TOXIC WASTE

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WHY IT MATTERS

PFAS are a group of over 15,000 chemicals that are dangerous to human health and the environment.[1] They are commonly known as "forever chemicals" because, unlike most other chemicals, they do not break down but instead build up and persist in our bodies, soil, water, and wildlife.[2] PFAS, even at very low levels, can cause significant human health harms, including cancers, impacts to the heart and the liver, developmental harm to infants and children, and reduced immune function.[3,4]

PFAS are used in many industrial processes and consumer products. This means people come into contact with PFAS when using everyday items like waterproof and stain-resistant fabrics and materials, food packaging, and non-stick cookware.[5] Concentrated streams of PFAS pollution enter the environment from sources like industrial wastewater discharges, landfill leachate, land-applied sewage sludge, **biosolids**, and firefighting foams, and can contaminate drinking water, ground and surface waters, soil, livestock, crops, food, and wildlife.[6] Studies show that members of low-income communities and communities of color are more likely to live within five miles of a PFAS-contaminated site and that these communities may be disproportionately exposed to PFAS in drinking water.[7,8]

Importantly, the water treatment systems most commonly used do not remove PFAS from our drinking water or wastewater.[9]

CURRENT LANDSCAPE

Much of Virginia's efforts have focused on assessing PFAS contamination in drinking water. In 2020, the General Assembly passed two bills: one convening a workgroup to study and report on the occurrence of PFAS in the Commonwealth's public drinking water;[10] and another requiring Virginia to establish drinking water standards for some PFAS and other chemicals.[11]

This legislation and associated funding resulted in Virginia's Department of Health (VDH) undertaking a limited study of PFAS in Virginia's drinking water in 2021. With additional funding, VDH expanded PFAS testing in 2022 and 2023. To date, VDH has collected 350+ samples from 274 out of 2,826 public waterworks in Virginia.[12] VDH's findings focused only on six PFAS chemicals detected above VDH-set screening levels. The study showed that PFAS were present in 26 drinking water utilities across the Commonwealth, impacting the drinking water of 2.5 million Virginians.[13] VDH's study did not include testing of private wells.

VDH did not develop state drinking water standards for PFAS because the **US Environmental Protection Agency (EPA)** began to develop national standards. EPA finalized drinking water standards for six PFAS in April 2024, and all public water systems in Virginia must comply with the new standards by 2029.[14] These legally enforceable maximum contaminant levels are based on cost and technological considerations. However, the EPA has also set non-enforceable maximum contaminant level goals of zero for two types of PFAS (PFOA and PFOS) since there is no safe level of exposure for human health. Private wells are not monitored or regulated under EPA's new drinking water standards, excluding more than one million Virginians from these protections.[15]

Last year, the General Assembly passed legislation requiring the **Virginia Department of Environmental Quality (DEQ)** to develop an assessment process to identify PFAS sources impacting public drinking water supplies.[16] These assessments are only required when PFAS above the federal drinking water standards are detected in public water supplies, and in those cases DEQ may require PFAS self-reporting and monitoring by potential "significant" sources. DEQ maintains a public dashboard for the limited data available about PFAS in Virginia's surface water; over half of the samples contain PFAS.[17] Identified areas of significant PFAS pollution have included Spring Hollow Reservoir outside of Roanoke, White Oak Swamp downstream of the Richmond Airport, the area around the DuPont Spruance plant, and areas near numerous military bases.[18]

Virginia also previously passed legislation that generally prohibits the use of PFAS-containing firefighting foam for testing or training purposes.[19]

Unlike other states, Virginia does not require disclosure and monitoring of PFAS or setting PFAS limits in pollution discharge permits, despite having the authority to do so.

OPPORTUNITIES

The most cost-effective and efficient way to tackle PFAS is at the source – where PFAS is manufactured or used in industrial processes – before it reaches our drinking water sources. Recent estimates show that Virginia's public water systems will need to spend $390K to $2.4M per year for the next 35 years just to comply with EPA's new drinking water standards.[20] Private well owners could also face costs of between $14K and $17K annually for the next 35 years to remove PFAS from their drinking water.[21] Until we stop PFAS pollution at its source, downstream waterworks, communities, and private well owners will continue to pay the costs for PFAS treatment to make sure their drinking water is safe.

A substantial source of PFAS in our waters is concentrated pollution released in industrial wastewater and biosolids. DEQ has existing authority under the Clean Water Act to control PFAS pollution discharges through the **VPDES permit program**. DEQ does not currently have the funding needed to implement monitoring, assess pollution limits, and improve pretreatment requirements for PFAS in these permits. This would place the responsibility for cleaning up the PFAS pollution in our waters and in biosolids on the industries that use and discharge PFAS.

More information is also needed about the occurrence of PFAS in our wildlife, including in fish, shellfish, deer, and other game species. DEQ does not currently have sufficient funding for the fish tissue monitoring program to help DEQ assess the prevalence of PFAS contamination in fish.[22] This information can also help VDH determine whether PFAS consumption advisories are required to protect human health because subsistence anglers and hunters are at increased risk of possible PFAS exposure from contaminated fish and game species.[23]

TOP TAKEAWAYS

PFAS, even at very low levels, can cause significant human health harms, including cancers, impacts to the heart and the liver, developmental harm to infants and children, and reduced immune function.

DEQ should use existing authority under the Clean Water Act to place the responsibility and cost of cleaning up PFAS on the industries that use and manufacture PFAS by requiring PFAS disclosure, monitoring, and limits in pollution discharge permits.

VDH and DEQ should develop public health information about the occurrence of PFAS in Virginia's wildlife, and VDH should make available PFAS testing for private wells that are not regulated under existing drinking water laws such as Delegate Campbell's plan presented to the Water Commission.

REDUCING WELL WATER NITRATE CONTAMINATION

TOXIC POLLUTION

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WHY IT MATTERS

Nitrate is a colorless, odorless, and tasteless compound that is a health threat when ingested in significant amounts and can cause acute health emergencies for pregnant women, infants, and young children. Nitrate-contaminated drinking water has also increasingly been linked with the development of cancer and thyroid disease.[1]

The primary means of nitrate ingestion is through consumption of nitrate-contaminated water. There are a variety of means by which water sources can become contaminated, including plant and animal decomposition and wastewater discharge from treatment plants. The most common and impactful means of contamination comes from agricultural processes, typically those related to intensive application of fertilizers which leach into **aquifers** when nitrates, not yet absorbed by plants, are exposed to water and travel into groundwater aquifers.[2]

Although federal and state laws require testing for and treatment of water contaminated with nitrates in municipal water systems, no such legal protection exists for private wells. In Virginia, the burden of testing and treating private well water is placed upon the property owner.[3] This represents a major concern in the state, as 22% of the population relies on water supplied by a private water well, with the share of private well use reaching upwards of 80% of the population of the state's most rural counties, which, as discussed above, are subject to the most common source of nitrate contamination from fertilizers and other agricultural processes.[4]

CURRENT LANDSCAPE

The EPA has set a **maximum contaminant level (MCL)** of 10 mg/L for nitrate in drinking water, and although not enforceable for private wells, recommends private well water be maintained below the MCL.[5]

Prior to the drilling of a new private well, Virginia requires that the owner file an application with the local health district containing specifics as to the construction of the well, and requires that a test for **coliform bacteria** must be conducted prior to use.[6] However, there is no requirement to test for other contaminants or for ongoing testing or treatment, and the state requires no disclosure statement about the safety of the water or the state of the private well upon sale or rental of the property.

Additionally, although Virginia encourages residents to contact their local health district for information related to private wells, the quality of data collected and maintained by a given health district related to private wells varies in quality. Further, data related to groundwater quality is not collected and maintained by the agencies as a central reference for the region, even when private testing is conducted in the region.

Virginia does have programs to provide financial and technical assistance for testing. The Virginia Household Water Quality Program run through Virginia Tech performs tests and provides technical assistance. The Southeast Rural Community Assistance Project also provides grants and technical assistance, though availability is contingent on communities being aware of contamination and seeking out financial and technical assistance to address it.[7]

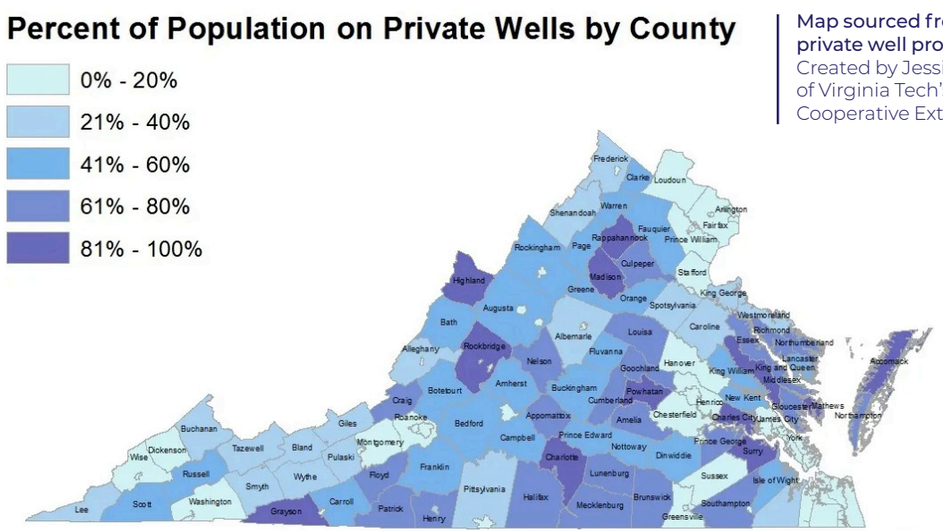
OPPORTUNITIES

Addressing the issue of nitrate contamination in the drinking water supplied by private wells is an achievable task through increased public protection and public information.

VDH should collect private well data related to contamination as well as create a centralized and publicly searchable database for nitrates and other criteria pollutant levels. This will improve state and public access to critical data, highlight areas where treatment is required, and track trends in contamination.

Landlords should also conduct testing and notify renters as to water quality issues. Disclosures related to water quality on sale or transfer of the property will improve public protection from existing sources of contamination and reduce the chance of harm to individuals least equipped to be aware of or mitigate against them.

Treatment, technical assistance, and mitigation efforts related to nitrates will need funding. Treatment of water with high nitrate contamination is an expensive process and one that is borne by the property owner. Increasing available funding for treatment and technical assistance in selecting a treatment method is important, especially for low-income residents of the state to meaningfully address contamination of water sources. Additionally, increasing funding for mitigation practices, particularly related to agricultural conservation efforts to reduce nitrate contamination from fertilizers, will reduce the likelihood of private well contamination, and provide for long-term public protections in communities that rely on private well water.



Map sourced from VDH's private well program website
Created by Jessica Slagle of Virginia Tech's Virginia Cooperative Extension

TOP TAKEAWAYS

Roughly one-fifth of Virginians source their water from private wells that lack regulatory protections from dangerous levels of nitrate contamination.

The state does not have accessible data related to contamination levels.

Centralized data collection and improved disclosure and public awareness, coupled with increasing funding for mitigation and treatment, will improve public health outcomes.

PROTECTION FROM TOXIC COAL ASH

TOXIC POLLUTION

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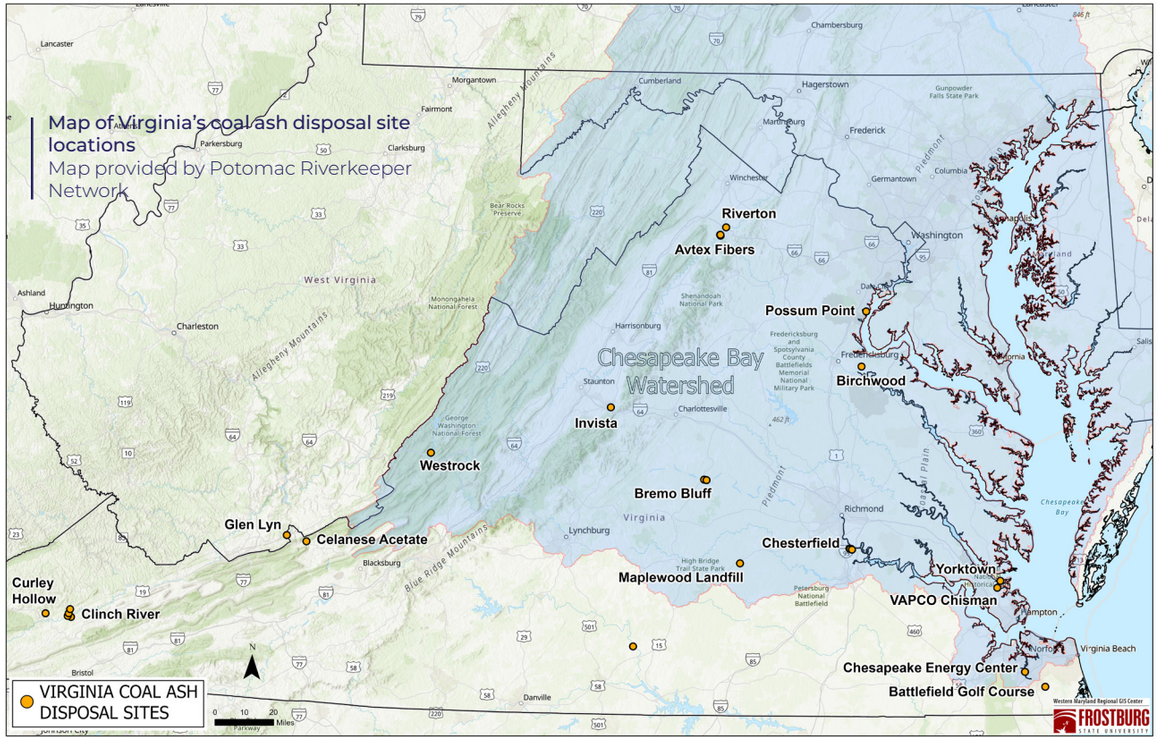
WHY IT MATTERS

Coal ash, or **coal combustion residuals (CCRs)**, poses significant health risks to humans and the environment. As a byproduct of burning coal at power plants, coal ash contains toxic substances such as mercury, cadmium, and arsenic.[1] Short-term exposure can result in irritation of the eyes, nose, and throat, dizziness, nausea, vomiting, diarrhea, and shortness of breath. Long-term exposure, however, is far more severe, potentially leading to liver and kidney damage, cardiac arrhythmia, cancer, asthma, wheezing, lung cancer, intestinal ulcers, anemia, and stomach cancer. Legacy coal ash **impoundments** often lack modern engineering controls and are prone to leaks and structural failures, potentially contaminating soil and water sources in surrounding communities. Ensuring compliance with coal ash regulations is crucial to protect ecosystems and communities from hazardous pollutants. Effective implementation will prevent contamination of drinking water, safeguard aquatic life, and reduce health risks for residents living near these sites. Workers at coal-fired power plants and residents living near coal ash disposal sites are particularly vulnerable to these health risks.

CURRENT LANDSCAPE

Bipartisan legislation enacted in Virginia in 2019 and 2020 required the removal of the more than 28 million tons of Dominion's coal ash that was in unlined ponds, leaking into surface and groundwater. Additionally, legislation passed in 2020 required the testing of drinking water wells, and in 2023 the replacement of drinking water wells located one mile from Dominion's coal ash ponds where contaminants were detected. Much of this work still has not been accomplished. The Virginia Department of Environmental Quality (DEQ) oversees the management of coal ash impoundments in the state and currently lacks sufficient staff to thoroughly oversee the full scope of the extensive remediation needed.



The EPA finalized Legacy Coal Combustion Residuals (CCR) rules on April 25, 2024, which aim to regulate previously unregulated coal ash sites. Identifying and cleaning up all legacy CCR impoundments and coal ash sites (including Appalachian Power sites) presents significant challenges. DEQ's limited staffing and resources hinder comprehensive oversight and enforcement of the new EPA rules. Existing funding primarily covers active impoundments only, leaving a gap in addressing legacy sites. Other challenges include the need for specialized technical expertise, increased inspection frequency, and community engagement to ensure transparency and compliance. Addressing these issues requires a strategic approach to secure additional funding and personnel.

OPPORTUNITIES

Virginia has the opportunity to greatly reduce toxic metal contamination throughout the Commonwealth by evaluating the information required under EPA's Legacy CCR rules effectively and continuing the state's leadership in requiring clean and responsible closure of coal-fired power plants and the wastes associated with them. Key steps include:

VERIFYING INDUSTRY REPORTING

EPA's Legacy CCR Rules require utilities to identify stockpiles of legacy ash and CCR materials and report all CCR disposal sites to EPA. These rules are effective as of November 2024, and the reports are required by May 2025, with a few opportunities for extensions. While these reports are filed directly with the EPA, DEQ personnel will be largely responsible for verifying the information.

SECURING ADDITIONAL PERSONNEL

Additional state budget allocations and federal grants will be needed to support the increased workload. Investment in additional staff will enhance DEQ's capacity for monitoring and enforcement with and ensure sufficient technical expertise in relevant areas such as environmental engineering, hydrogeology, and toxicology for assessing contamination risks and implementing corrective actions.

FACILITATING COMMUNITY ENGAGEMENT

Using existing websites and notification lists, DEQ can provide public notice of industry self-disclosures covered by the EPA legacy rules. Additionally, DEQ should provide for public information sessions in key impacted communities to ensure that residents are informed about the risks and remediation efforts.

TOP TAKEAWAYS

- Legacy coal ash impoundments pose significant environmental and public health risks.
- The 2024 EPA CCR rules require robust oversight, implementation, and enforcement to protect Virginians.
- Additional personnel and funding for the DEQ will be needed to ensure compliance and effective management of legacy CCR sites.

PREVENTING HARMS FROM METALS MINING

TOXIC POLLUTION

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WHY IT MATTERS

Virginia has a **gold-pyrite belt** that extends from Fairfax to Halifax Counties[1], and contains minerals including gold, copper, zinc, and lead. Small-scale mining for those minerals occurred in the 19th and early 20th centuries and is now evidenced by hundreds of abandoned or unreclaimed mines along the geological belt. **Mineral or metal mining** can be a very toxic process both during processing and in storage and waste operations.

Currently, a large-scale version of this toxic industry is trying to move forward in the Commonwealth before a comprehensive regulatory framework and sufficient financial assurances are in place. This could put the public health and drinking water of millions of downstream residents at risk.

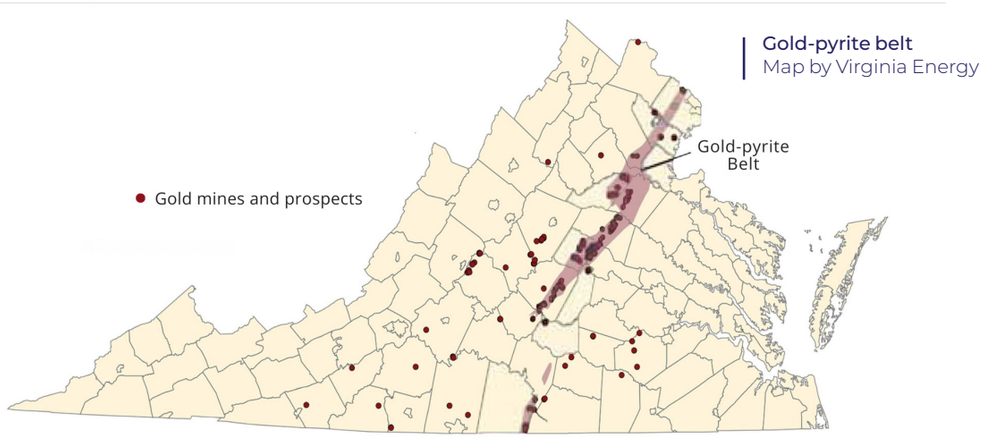
Metals mining is a land-intensive process and is the nation's #1 toxic pollution source.[2] Mining procedures can result in perpetual acid mine drainage,[3] catastrophic waste containment failures,[4] destruction of cultural heritage, and the devastation of local economies as a result of the boom-and-bust cycle of the industry.

Virginia must be protected from the potential harms of the large-scale metals mining industry. This must include supporting communities, namely rural and historically Black communities, most at risk from potential mining contamination and preserving our precious water resources and agricultural lands.

CURRENT LANDSCAPE

A junior mining company has been prospecting near Virginia's gold-pyrite belt for several years,[5] and has announced "high grade" findings.[6] These prospecting efforts were made public after community members inadvertently learned of the exploratory drilling occurring in Buckingham County. As there is currently no permitting or notification requirement for exploratory drilling for mineral mining, Virginia communities may not know of prospecting happening elsewhere. Expanded exploration efforts for copper have also recently been announced, but not specific locations.[7]

In response to ongoing gold prospecting, proactive legislation was passed in 2022 to require the study of the effects of gold mining on the Commonwealth.[8] That study, conducted by the National Academy of Sciences, produced the report "Potential Impacts of Gold Mining in Virginia," and highlighted many threats from gold mining: cyanide contamination, perpetual acid mine drainage, and catastrophic waste containment failures.[9] Legislation to prohibit the use of cyanide in mineral mining and processing passed unanimously in 2024, eliminating one potential threat to Virginia's water and environment.[10]



Virginia's current mineral mining regulations are not designed to address modern-day industrial base and precious metals mining. Rather, they focus on the majority of active non-metals mining permits – sand, gravel, and stone aggregates, which involve distinctly different processing methods, and do not have the same toxicity impacts.

The gold-pyrite belt intersects innumerable environmental justice communities often overburdened with existing pollution and the drinking water systems for 3.2 million people downstream of the belt.[11,12,13] The belt crosses the James River, which brings millions of dollars into Virginia's economy from commercial fishing and attracts over 7 million visitors annually.[14]

As the Commonwealth works to safeguard our watersheds and agricultural lands, the introduction of a new significant source of pollution – industrial metals mining – threatens the viability of those efforts. Additionally, hundreds of historic metal mines lay abandoned across Virginia's landscape.[15] The cost to taxpayers of reclaiming these abandoned sites is an economic burden and the negative health and environmental impacts of not reclaiming these sites are dangerous.[16]

OPPORTUNITIES

To protect people and the Commonwealth's natural resources, specifically its rivers, streams, and agricultural lands, Virginia must put in place an effective regulatory framework for mining metals.

While the Commonwealth exercises due diligence in reviewing outdated and insufficient regulations, it should implement a 'pause' on permitting any new metals mining projects. The granting of permits for the mining of gold, copper, lead, or zinc, for example, without sufficient knowledge of project impacts, or with deficient regulatory oversight of impacts is inappropriate given the potential environmental, human health, and economic harms.

To create an effective regulatory framework, the Commonwealth must seek a broad analysis of existing metals mining regulations – not limited to just one commercial product. The review should engage environmental, health, and energy state agencies. As the threat of large-scale mining is statewide, and would have both short- and long-term impacts, existing bonding, reclamation, closure, and monitoring regulations must also be comprehensively evaluated and updated.

Any review processes must include robust public engagement and education. Economic, human health, and environmental implications of metals mining and reclamation should be part of all evaluations. To increase public awareness, prospecting companies who are performing drilling operations should be required to notify county officials and nearby residents.

TOP TAKEAWAYS

There are currently no regulations for large-scale mineral or metals mining in Virginia; implementation of a regulatory framework that is comprehensive and includes bonding, reclamation, closure, and monitoring requirements is needed before permitting any new metals mining projects.

Large-scale mineral or metals mining can use toxic materials in processing, and the impacts of toxic substances on Virginia's water resources should be evaluated before permitting any new metals mining projects.

Prospecting companies who are performing drilling operations should be required to notify county officials and nearby residents.

FLOOD & CLIMATE RESILIENCY

RELEVANT PROGRAMS & AGENCIES

See full glossary starting on page 157

CHESAPEAKE BAY TMDL PHASE III WIP
Provides scientific and technical guidance on the Chesapeake Bay Program on measures to restore and protect the Chesapeake Bay. Works to enhance scientific communication and outreach through reports, discussion groups, reviews, and workshops.

CHIEF RESILIENCE OFFICER (CRO)
A government employee (either at city or state level) who coordinates across agencies, departments, and stakeholders to develop strategies, programs, and funding applications to advance resilience-building activities. In Virginia, the CRO reports to the Secretary of Natural and Historic Resources and serves as the primary coordinator of resilience and adaptation initiatives and the primary point of contact regarding issues related to resilience for the Commonwealth.

COMMUNITY FLOOD PREPAREDNESS FUND (CFPF)
State-sponsored grant fund that provides financial assistance to localities to reduce the impacts of flooding within Virginia. High emphasis on projects that align with local, state, and federal floodplain management standards and plans. The only statewide source of funding for flood resilience capacity building and studies, as well as project implementation. Revenue derived from Virginia's participation in the Regional Greenhouse Gas Initiative.

NATIONAL FLOOD INSURANCE PROGRAM (NFIP)
Provides flood insurance and encourages floodplain management to reduce flood damage across the United States.

RESILIENT VIRGINIA REVOLVING FUND (RVRF)
Provides financial assistance to localities for projects that mitigate flood impacts to private properties through low- to no-interest loans. Projects can include hazard mitigation of buildings, locality-operated loan programs, and relocation. Primarily a loan program with limited grant funds; revenue comes from the Federal Emergency Management Agency, Regional Greenhouse Gas Initiative, and General Fund.

SACKETT V. EPA US SUPREME COURT RULING (2023)
2023 US Supreme Court decision removing federal protections from vast swaths of the nation's wetlands.

SHORELINE EROSION ADVISORY SERVICE (SEAS)
Department of Conservation and Recreation program that assists private landowners and localities in Virginia to complete site investigations, written reports, design and permit reviews, construction inspection, and more.

TIDAL WETLANDS ACT (1972)
Virginia law adopted in 1972 that recognizes the environmental value of tidal wetlands, establishes a permitting system for their protection, and authorizes localities to establish a local wetlands board and adopt a wetlands ordinance.

US ARMY CORPS OF ENGINEERS (USACE)
The military engineering branch of the United States Army.

VIRGINIA CONSERVATION ASSISTANCE PROGRAM (VCAP)
Cost-share program providing assistance as well as financial incentives to urban landowners installing Best Management Practices (BMPs) on their property. Eligible practices include the removal of impervious surfaces, rainwater harvesting, and other efforts to mitigate the effects of erosion and stormwater runoff.

VIRGINIA DEPARTMENT OF CONSERVATION & RECREATION (DCR)
Agency which oversees Virginia's natural resource management and outdoor recreation.

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)
Virginia's environmental agency that is responsible for administering laws and regulations related to air quality, water quality, water supply, renewable energy and land protection. DEQ issues permits, conducts monitoring, performs inspections, and enforces environmental law.

VIRGINIA FLOOD RISK INFORMATION SYSTEM (VFRIS)
Offers detailed flood risk data and mapping tools for Virginia residents.

VIRGINIA INSTITUTE OF MARINE SCIENCE (VIMS)
A marine research and education center that operates as a branch of the College of William and Mary. VIMS has a legal mandate to provide research, education, and advisory services to government, citizens, and industry.

VIRGINIA MARINE RESOURCES COMMISSION (VMRC)
State agency in charge of overseeing Virginia's marine and aquatic resources, and its tidal waters and homelands. One of the primary functions of VMRC is to zone water areas for recreation, oyster and clamming grounds, and commercial/recreational fishing.

Great Blue Heron on the Rappahannock River
Photo provided by Lis Heras

ENSURING LONG-TERM FLOOD RESILIENCE

FLOOD & CLIMATE RESILIENCY

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WHY IT MATTERS

Virginians across the Commonwealth are experiencing climate change firsthand, from rising seas along our coastlines, flash floods in our mountains, and more powerful storms statewide. By 2080, nearly one million Virginians will be at risk of major coastal flooding and face flood damages costing up to $5.7B annually.[1] The challenges extend far inland as well, with localities such as Buchanan and Tazewell Counties in the far southwestern reaches of Virginia facing some of the highest risk of flooding in the entire Commonwealth. Under-resourced communities who are least prepared to adapt, plan, and invest in flood resilience are often those who face the greatest climate risks. Flood **resilience** is a cross-sector issue, impacting health and public safety as well as economic, cultural, social, and natural resources.

Virginia's **Community Flood Preparedness Fund (CFPF)** has deployed $150M to help communities across Virginia identify and address flood risk, with over 60% of awards going to low-income areas. However, this funding pales in comparison to the climate risk in Virginia, and the Commonwealth currently has no dedicated, reliable stream of funding for this urgent work. Further, there is currently no overarching mechanism or process for prioritizing the limited state funds and resources that are available to ensure the projects being advanced are in line with state flood resilience plans and focused on the most urgent threats – protecting under-resourced communities from flooding and reducing high-risk development in flood-vulnerable areas.

CURRENT LANDSCAPE

Virginia has made noteworthy progress in identifying flood risks and is beginning to address community needs. The **Department of Conservation and Recreation (DCR)** created Virginia's first Coastal Resilience Master Plan to assess coastal flood risk in 2021, and rainfall-based flood risk will be added by the end of 2024. A statewide Flood Protection Master Plan will be completed by the end of 2025.

The CFPF is a statewide program that awards funding to local and regional governments to develop resilience plans, build capacity, collect data, conduct studies, and implement flood resilience projects. With an emphasis on community-scale and **nature-based solutions**, and a requirement to distribute at least 25% of funding to low-income communities, over $150M has been awarded since 2021 with more than 60% going to low-income areas.[2] In addition, the General Assembly allocated $100M for the CFPF in FY25, the first time that general funds have been appropriated for statewide flood resilience.

However, the CFPF has simply not kept pace with the number of applications received. And with Virginia no longer – at least for now – receiving roughly $130M annually from the **Regional Greenhouse Gas Initiative (RGGI)**, a dedicated, long-term revenue source must be identified to address the tens of billions of dollars needed to address the Commonwealth's flood risk.

Virginia also lacks an overarching prioritization process for using the CFPF, **Resilient Virginia Revolving Fund (RVRF)**, or other sources to fund the flood resilience projects and efforts identified or aligned with state flood plans. Although CFPF grants are awarded using a scoring rubric, other resilience funds such as the RVRF do not have the same priorities. Additionally, there is no requirement to award the funds to projects that are included in state flood plans or incentive for localities to submit their priority projects to the state's database to enter a funding queue. As communities embark on Coastal Storm Risk Management (CSRM) studies with the **U.S. Army Corps of Engineers (USACE)**, project costs – and funding requests to the state to help cover the billions of dollars needed – will grow exponentially and a prioritization process will be essential.

In another big advancement in 2024, the General Assembly created a standalone **Chief Resilience Officer (CRO)** position with funding for two additional staff. The CRO is tasked with providing technical assistance and capacity-building support to local governments, acquiring federal funds for resilience efforts, and assisting DCR with coastal and statewide flood planning efforts. This position is also tasked with coordinating and communicating resilience programs, initiatives, and funding opportunities across state agencies through an Interagency Resilience Management Team.

OPPORTUNITIES

A resourced, coordinated, and comprehensive approach to flood resilience is needed to protect Virginia's people, places, economy, and natural resources.

If Virginia does not re-join RGGI, the CFPF lacks a dedicated revenue stream to implement flood resilience plans and projects. The General Assembly must find dedicated, long-term funding to ensure a safe and prosperous future as climate risk grows and does not face higher costs down the road.

To ensure resources are being invested effectively, DCR should ensure that each flood resilience funding program incorporates a project selection process that prioritizes projects that align with the Commonwealth's Resilience Guiding Principles[3] and are included in Virginia's flood resilience plans. Until a clear link is required between Virginia's flood resilience plans and its funding programs, there will be significant pressure to siphon resources to projects that may not be consistent with statewide priorities.

The CRO will submit a funding and staffing needs assessment to the General Assembly by the end of 2025. Given the scope of this issue, it is likely this work will require at least six additional staffing capacities[4] to execute effectively, as well as a dedicated revenue stream.

Road flooding in Norfolk, Va
Photo by Aileen Devlin, Virginia Sea Grant

TOP TAKEAWAYS

Virginians are experiencing climate change firsthand, from rising seas along our coastlines, flash floods in our mountains, and more powerful storms statewide.

Virginia has made noteworthy progress in identifying flood risks and beginning to address community needs through Virginia's first Coastal Resilience Master Plan; deploying $150M through Virginia's Community Flood Preparedness Fund; and creating a standalone Chief Resilience Officer position.

To successfully address increased statewide resilience needs in line with state priorities, flood resilience plans will need a clear link to funding programs along with dedicated and sufficient funding, particularly if Virginia does not rejoin RGGI.

BUILDING COASTAL RESILIENCY WITH LIVING SHORELINES

FLOOD & CLIMATE RESILIENCY

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WHY IT MATTERS

Living shorelines are nature-based approaches for shoreline protection and are the default stabilization method for tidal shorelines in Virginia. In addition to stabilizing shorelines, they conserve and restore natural wetland habitats and provide valuable ecosystem services. Living shorelines use plants, sand, and sometimes rock to protect coastlines by mimicking natural shorelines. Unlike hard structures like riprap or bulkheads, living shorelines create habitats that enhance coastal resiliency, such as tidal marshes and oyster reefs. These features reduce erosion, filter pollutants, support biodiversity, and absorb wave energy, buffering communities from storm surges and flooding.[1]

There is a definitive, mutually beneficial relationship between ribbed mussels and living shorelines. Young ribbed mussels land on low marsh wetland grasses and nestle themselves into the root systems, filter nitrogen pollution from the water column, replenish the sediment, and stimulate wetland growth. This reduces the likelihood of excessive nitrogen in the water body, reducing opportunities for **harmful algal blooms** to thrive and creating healthier ecosystems. The **byssal threads** mussels use to anchor themselves into wetland grasses and oyster structures installed at living shorelines create strong webbing that reduces erosion. Erosion along fringe marshes is a key threat to wetlands throughout the coastal rivers of Virginia. Further research on their lifecycle and restoration potential will greatly benefit our capacity to enhance shoreline resilience and ecosystem health.[2]

CURRENT LANDSCAPE

There are technical and financial assistance programs available to residents to assist with the installation of living shorelines, but these programs are currently insufficient to meet the statewide need for implementing resilient practices to protect tidal shorelines.

The **Virginia Conservation Assistance Program (VCAP)** is a helpful program but is not available to all citizens. Landowners are only potentially eligible for funding if they live in a city or county with a participating Soil and Water Conservation District. The funding is also not available for sites with significant fetch, where wind can travel across open water to create large waves, limiting the types of projects that can be funded.

The **Shoreline Erosion Advisory Service (SEAS)** offers free technical assistance to private landowners and localities in Virginia with erosion problems. The work of SEAS staff had previously been focused on tidal areas of Virginia, however, SEAS services are now available in non-tidal areas of the state as well. The staffing levels at SEAS have remained the same in recent years even as their scope of work (including technical assistance, site investigations, written reports, plan review, and construction inspections) has increased. SEAS staff are critical to helping landowners make informed decisions on managing their shorelines and disseminating information on what is required under state law.

Currently, there are two primary barriers to more use of ribbed mussels in shoreline restoration. One is the absence of mussel research and model projects. Secondly, there is no hatchery in Virginia where ribbed mussels can be sourced for living shoreline projects. Researchers at the **Virginia Institute of Marine Science** are in the early stages of creating a ribbed mussel hatchery that will need consistent financial support to complete this project.

OPPORTUNITIES

A statewide Living Shoreline grant program for landowners seeking to install living shorelines to restore their marshes and protect their properties from erosion would help incentivize the rate of installation of living shorelines, fill the gap not covered by VCAP, and support implementation in vulnerable coastal communities that lack resources to finance shoreline stabilization solutions. Such a program would rely on state funding to fill existing funding gaps and focus on the implementation of large-scale flood resilience projects.

This program would greatly benefit from funding for ribbed mussel research by the Virginia Institute of Marine Science (VIMS) to quantify the phosphorus and nitrogen removal potential of mussels and support the development of a mussel hatchery to grow ribbed mussels for transplanting into living shorelines in Virginia. VIMS relies on state funding for such projects.

Two additional DCR-SEAS Full Time Employees (FTEs) would give dedicated capacity to the program to support property owners and further the use of living shorelines.

TOP TAKEAWAYS

Living shorelines are nature-based approaches for shoreline protection and are the default stabilization method for tidal shorelines in Virginia. They are enhanced by ribbed mussels that settle on low marsh wetland grasses, filter water pollution, and support shoreline resilience.

Virginia Conservation Assistance Program (VCAP) and the Shoreline Erosion Advisory Service (SEAS) provide funding and technical support for living shorelines.

A statewide Living Shoreline grant program would incentivize landowners to install living shorelines and fill the gap not covered by VCAP.

Berkeley Plantation Living Shoreline - Charles City, VA
Photo provided by James River Association

SAFEGUARDING VIRGINIA'S WETLANDS

FLOOD & CLIMATE RESILIENCY

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WHY IT MATTERS

Wetlands—swamps, marshes, and other areas inundated or saturated by surface or groundwater—play a critical role in reducing **storm surge** and absorbing rainfall, filtering pollution, trapping carbon, and providing habitat for wildlife. Virginia has an exceptional diversity of wetlands, from forested swamps and upland bogs to tidal freshwater and salt marshes.

The Commonwealth's approximately 1 million acres of wetlands are vital to Virginia's natural landscape, but they are disappearing at an all-too-rapid pace. Virginia has already lost to development approximately half of the wetlands that existed in the 1780s,[1] and the Commonwealth is projected to lose as much as 89% of its existing tidal wetlands by 2080 due to climate-induced sea-level rise if we do not plan for wetlands migration. [2]

To meet the goals of the **Chesapeake Bay Total Maximum Daily Load, Virginia's Phase III Watershed Implementation Plan** calls for the restoration of hundreds of acres of wetlands across each of the Bay's tributaries[3] — but Virginia is not on track to achieve this initiative.[4] Restoration efforts are simply not enough. We must ensure that our existing wetlands can survive the pace of sea level rise by migrating landward.

CURRENT LANDSCAPE

Virginia has some of the most robust state wetlands laws in the nation, thanks to the 1972 **Tidal Wetlands Act**[5] and 2000 Nontidal Wetlands Act,[6] but a 2023 Supreme Court ruling and climate change impacts are threatening our ability to protect these critical natural resources. The U.S. Supreme Court's decision in **Sackett v. EPA** drastically scaled back federal protections, removing them from vast swaths of the nation's wetlands, with severe repercussions for water quality, flood control, and critical habitat in Virginia. Up to 938,000 acres of Virginia's non-tidal wetlands may no longer be federally protected[7] and may have to rely on private determinations for conservation. It now falls largely to our existing state tidal and nontidal wetlands regulations, and to state and local decision-makers charged with enforcing these regulations, to protect the wetlands that support Virginia's communities, local economies, and cherished resources such as the Chesapeake Bay.

Although Virginia has relatively strong wetlands laws that protect both tidal and nontidal wetlands in the state, that doesn't mean the Commonwealth's wetlands aren't at risk. The Supreme Court's decision has caused confusion among regulators and landowners alike and passes the burden and costs of management onto Virginia's agencies. While the Commonwealth still maintains jurisdiction over nontidal wetlands, the Supreme Court's decision reduced federal involvement in jurisdictional determinations and shifted more responsibility to states. **Virginia Department of Environmental Quality (DEQ)** previously relied on the **U.S. Army Corps of Engineers** to make wetlands determinations, but must now rely on private **Wetlands Delineators** to make these determinations – adding uncertainty, costs, and potential delays to the permitting process.

OPPORTUNITIES

The future of Virginia's wetlands depends on safeguarding the Commonwealth's existing wetlands protection programs and ensuring that agencies receive sufficient funding to fill the federal gap left in the wake of the Sackett decision. With more limited federal participation in wetlands delineations, DEQ, **Virginia Marine Resources Commission**, and local wetlands boards will need increased funding to delineate wetlands, provide quality-control reviews of third-party delineations, and effectively implement wetlands permitting programs.

DEQ should enforce Virginia's existing "no net loss" approach to wetlands protection and maintain Virginia's ability to implement more comprehensive wetlands protections than those under federal law. In addition, creating a permanent wetlands workgroup within the Secretariat of Natural and Historic Resources will give the state the capacity to develop a comprehensive plan to protect, enhance, and create tidal and nontidal wetlands in the face of climate change impacts.

American Bald Eagle on the hunt
Photo by Nancy Sorrells

TOP TAKEAWAYS

Virginia has some of the strongest state-level wetlands protections in the nation and yet we continue to lose wetlands year over year due to climate change and development pressures.

DEQ should enforce Virginia's existing "no net loss" approach to wetlands protection and maintain Virginia's ability to implement more comprehensive wetlands protections than those under federal law.

With more limited federal participation in wetlands delineations, additional financial resources will be needed for state agencies to fill the gap; local wetlands boards will also require additional technical assistance and training to make wetlands permitting decisions.

DISCLOSING FLOOD RISK

FLOOD & CLIMATE RESILIENCY

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WHY IT MATTERS

Climate change is making storms and flood events in Virginia more intense and frequent. Since 2020, Virginia has been affected by 33 events, each costing $1 billion or more.[1] Now more than ever, Virginians deserve to know a home's flood risk before purchasing or renting so they can prepare physically and financially.

Whether you are buying a house or renting an apartment, you should have the right to understand the flood risks associated with that property – particularly when there are existing conditions that only the seller or landlord would know. Transparent disclosure of flood risk empowers Virginians to make informed decisions about their safety and financial security and to take proactive steps such as purchasing flood insurance. Traditional homeowners' insurance policies only cover water damage from accidental appliance or pipe leaks, not flood damage from waterways or stormwater. Flooding can cause significant property damage and loss – only 1 inch of floodwater can cause up to $27K in damages to a home.[2] Knowing the risks helps individuals better assess the true cost of buying or renting a property, including the likelihood of future expenses for repairs and the necessity of insurance. Ensuring sellers and landlords disclose actual flood risk also enables communities to be more prepared for the next disaster and bolsters community resilience.

Finally, flood disclosure promotes transparency and trust in the real estate market. When sellers or landlords disclose flood risks, they help create an environment where buyers and renters can trust they are receiving honest and accurate information about their prospective homes. This transparency is essential for maintaining the integrity of real estate transactions and ensuring that consumers are protected.

CURRENT LANDSCAPE

In 2015, Virginia added flood risk to its list of waived disclosures, reiterating that sellers were not required to inform potential buyers about potential flood hazards. This made clear that Virginia's "buyer beware" philosophy, which puts the burden of identifying risks on buyers, extended to flood risk — buyers were responsible for researching and uncovering those risks on their own, despite there being no public information about a structure's flood history. In 2021, the General Assembly enacted a more specific flood disclosure law (SB 1389), requiring sellers to disclose a very limited category of past flood damage – those considered to be "repetitive risk loss" structures for which the **National Flood Insurance Program (NFIP)** has paid two or more claims of $1,000 or more within a ten-year period. This information is only available to the seller and comes directly from FEMA, but can often be delayed and is therefore not easily accessible. The reach of this provision is extremely limited as only 3% of Virginian properties,[3] even in floodplains, have an NFIP policy.

In 2024, HB 863 aimed to close the significant gap in flood disclosure by making it the seller or landlord's responsibility to disclose additional flood risk factors. These included any instances of past flood damage or flood insurance claims for the property that the owner knows about, and any related flood damage costs for the property, as well as indicating mandatory flood insurance purchase requirements and stating whether the property is in a **100-year or 500-year flood zone**. The bill would have crafted a comprehensive disclosure package to help new homeowners fully understand property risks when committing to a substantial investment in a home. While New Jersey, New York, Vermont, Maine, and Florida have all passed flood risk disclosure bills in the last three years, HB 863 did not pass.

Roads and public access areas begin to nuisance flood as high tide creeps into Norfolk, Va
Photo by Aileen Devlin, Virginia Sea Grant

OPPORTUNITIES

Buying a home is generally the most significant purchase a Virginian will make in their life. Real estate transactions therefore present a prime opportunity to align decision-makers, realtors, mortgage lenders, and insurance agents to support flood disclosure in Virginia. By working together, these stakeholders can ensure that homebuyers and renters receive comprehensive information about flood risks so they can make more informed decisions.

There is an opportunity for the Commonwealth to increase the amount of information available to stakeholders on the risks that flooding poses for infrastructure and investors. Mortgage lenders can incorporate flood risk into their lending criteria, ensuring that properties in high-risk areas are adequately insured. When realtors are equipped with accurate flood risk data, they can guide their clients more effectively and ideally before closing contracts, helping them understand potential risks and prevent costly homeowner surprises in the future. Additional research-based policy solutions may be needed in the future to ensure that low-income Virginians can access insurance as a tool to reduce their financial risk from flooding and aren't trapped in flood-prone housing due to their socioeconomic status and lack of alternative housing options.

To further enhance flood disclosure, the **Department of Conservation and Recreation (DCR)** can update the **Virginia Flood Risk Information System (VFRIS)** to generate easy-to-understand reports on property addresses that compile publicly-available information about flood risk, including flooding from sea level rise, rainfall, and coastal flooding. This can be easily attached to any real estate disclosure forms that realtors and potential buyers can easily find.

TOP TAKEAWAYS

Flood risk disclosure is essential to empower Virginians to make informed decisions about their safety and financial security. Current disclosure requirements are minimal and flood risk is therefore likely to go unreported.

Aligning stakeholders to support comprehensive flood risk disclosure can significantly enhance transparency and community resilience, benefiting both individuals and neighborhoods in Virginia.

DCR needs resources to update VFRIS to provide summaries of publicly available flood risk information for individual properties.

PLASTIC WASTE

BEVERAGE DEPOSIT PROGRAM

Adds a small refundable deposit to the purchase of beverages in containers. The goal of these programs is to encourage consumers to return their containers for recycling or refilling instead of throwing them away or littering.

EXTENDED PRODUCER RESPONSIBILITY (EPR) PROGRAM

A policy that holds manufacturers and importers responsible for a product's entire lifecycle, including its packaging, composition of recycled content, disposal, and waste management after it is no longer useful to consumers.

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

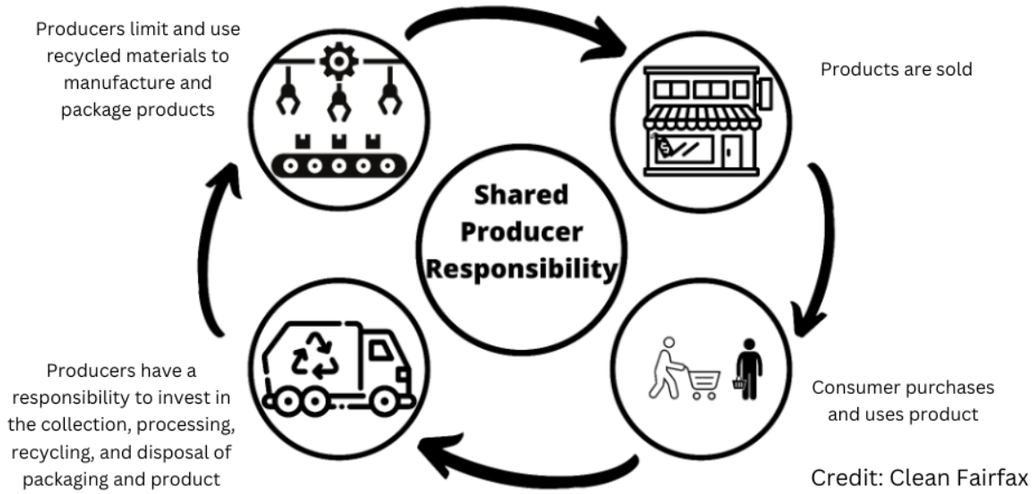
Virginia's environmental agency that is responsible for administering laws and regulations related to air quality, water quality, water supply, renewable energy and land protection. DEQ issues permits, conducts monitoring, performs inspections, and enforces environmental law.

VIRGINIA LITTER TAX

A state tax on manufacturers, wholesalers, and retailers of certain products which contributes to the litter problem.

SHARED PRODUCER RESPONSIBILITY

Sharing responsibility between taxpayers/consumers and producers has these components:



Credit: Clean Fairfax

Abandoned and derelict vessel (ADV) on Tangier Island, Va
Photo by Michael Schimmel

ELIMINATING PLASTIC POLLUTION

PLASTIC WASTE

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WHY IT MATTERS

Eradicating plastic pollution is one of the most pressing concerns for registered Virginia voters.[1] Waters polluted with plastic have negative health effects on humans, wildlife, and the economy.

Our society produces single-use plastic items that are discarded, creating pollution and further extraction of natural resources.[2] When mismanaged, trash ends up in Virginia's natural landscapes and waterways. The unintended consequences of single-use plastics result in devastating impacts on wildlife, including sea turtles, birds, fish, mammals, and important water-filtering bivalves like oysters and mussels through entanglement and ingestion.[3] Plastic pollution harms economic activity, lowers property values,[4] reduces tourism,[5] and decreases spending at local businesses.[6]

Plastics disproportionately impact environmental justice communities at every stage, from oil extraction and plastic production emissions in vulnerable communities to the impacts of pollution on health and local economies. This mismanaged waste disproportionately burdens BIPOC and communities of low wealth.[7]

Up to 80% of debris in the ocean comes from land: mismanaged waste, litter, illegal dumping, and uncovered trucks (e.g., food- and beverage-related items, cigarette butts and plastic grocery bags, tires, etc.). Shipping, boating, and fishing activities are also sources of marine debris.[8,9] As plastics break down, rather than biodegrading, they become microplastics. Microplastics end up in our drinking water and food chain. It is estimated that humans ingest approximately a credit card's worth of plastic every week.[10] Exposure to plastic additives has negative biological effects on humans and wildlife.[11] Recent studies suggest that microplastics are a potential risk factor for cardiovascular disease.[12] Furthermore, studies stress that there are thousands of chemicals used to make plastic products that are known carcinogens, endocrine disruptors, and neurotoxicants, but most products have alarmingly never been tested for toxicity.[13]

In addition to land-based pollution sources, **abandoned and derelict vessels (ADVs)**, most of which are plastic material reinforced with glass fibers, obstruct navigational channels, cause harm to the environment, and diminish commercial and recreational activities.

CURRENT LANDSCAPE

Virginia has made progress in eliminating plastic pollution in previous years, such as banning single-use foam cups and take-out containers, prohibiting intentional balloon releases, and allowing localities to place a fee on single-use plastic bags

Virginia's Litter Tax is paid by retailers and manufacturers whose products contribute to plastic pollution and marine debris. This revenue primarily funds the cleanup of litter that is already in the environment. Virginia's litter tax generates the lowest revenue per capita compared to all other states[14] and it is insufficient to be effective at cleaning up Virginia's litter and marine debris. At the same time, Virginia should not solely rely on cleaning up litter rather than preventing it in the first place.

Virginia's progress focuses on two of the three main parts of the overall solution: eliminating the most harmful sources and funding cleanups. Virginia has not yet improved the third: recycling infrastructure. As noted by the **Virginia Department of Environmental Quality (DEQ),** "Most litter comes from post-consumer waste yet there is no clear information on how much post-consumer waste is recycled or landfilled. Metal and yard waste are heavier and more likely to be industrial than household waste so it skews how well consumers recycle."[15] As a result, recycling rates in Virginia are inflated. Only 4% of all plastic in Virginia is recycled, plastic bottles have an 8% recycling rate in Virginia,[6] glass bottles and jars have a 28% recycling rate, and aluminum cans have a 21% recycling rate. While these recycling rates are higher than plastic bottles, they are still significantly lower than in states with more effective systems.[17]

These low recycling rates are compounded by the lack of access to recycling in Virginia and the increasing cost of recycling programs. These increasing costs have forced 13 localities to end their curbside recycling programs since 2018, including large metropolitan areas like Chesterfield County and Chesapeake.[18]

OPPORTUNITIES

Virginia has the opportunity to tackle plastic pollution through a variety of programs such as eliminating harmful mismanaged waste, incentivizing sustainable disposal, increasing producer responsibility, and shifting to sustainable and reusable products.

Low-quality, flimsy, and single-use plastics such as foam, bags, and packaging are a challenge to manage due to their overabundance and material. These single-use plastics create staggering amounts of mismanaged waste. Eliminating these types of plastics through bans and reduction mandates is proven to be the best way to reduce pollution.[19]

Extended Producer Responsibility (EPR) programs requires manufacturers to reduce waste and pay for recycling infrastructure, rather than taxpayers. It incentivizes a more efficient, productive waste system that decreases waste; increases recycled content; and creates recyclable, reusable, or biodegradable products.

Producer responsibility programs create a vibrant recycling industry by requiring producers to develop the systems needed to dispose of their products. This can reduce the financial burden faced by taxpayers and governments for the disposal and recycling of waste.

One example of successful producer responsibility is **beverage deposit programs.** "Bottle bills"–another name for beverage deposit programs–put small deposit fees on beverage containers. When a customer recycles that container at a collection site, they receive their deposit back. Oregon's program had an 88.5% bottle recycling rate in 2022.[20] These programs best achieve waste reductions and high levels of recycling when they have strong collection mandates, benchmarks, and reporting requirements.

These programs keep valuable materials in the market for longer. According to the 50 States of Recycling report,[21] producer responsibility programs in Virginia could increase recycling-related jobs from 3,600 to 11,000, place $210 million of recycled material back in the market to support a circular economy and reduce the need for virgin material, and avoid emissions of 2.5 million metric tons of carbon dioxide equivalent annually.

TOP TAKEAWAYS

- Eradicating plastic pollution is one of the most pressing concerns for registered Virginia voters.
- Eliminating the most harmful types of plastics through bans and reduction mandates is proven to be the best way to reduce pollution.
- A Virginia producer's responsibility program would require manufacturers, rather than taxpayers, to reduce waste and pay for recycling infrastructure.

PLASTIC-TO-FUEL: A FALSE SOLUTION

PLASTIC WASTE

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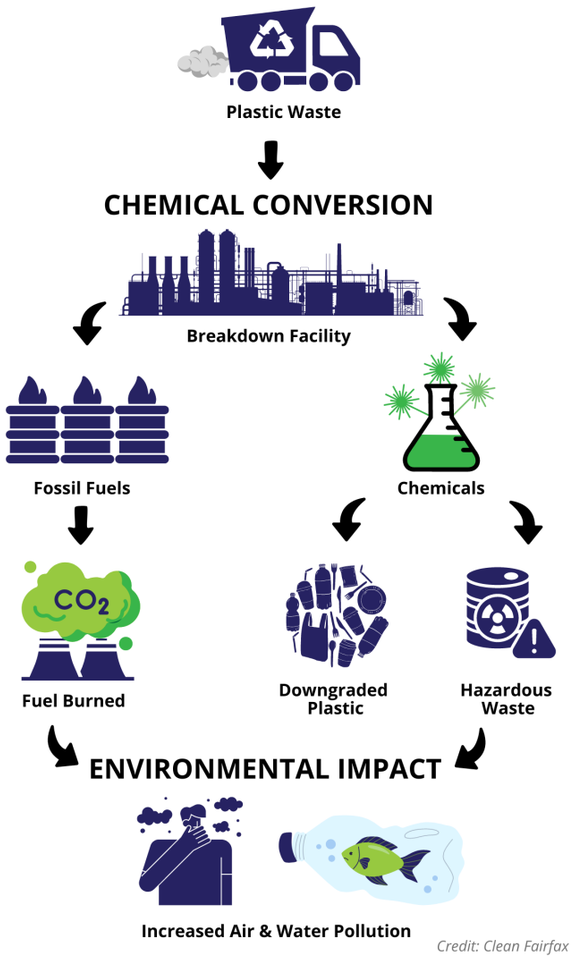
WHY IT MATTERS

Virginia's waterways are under assault by single-use plastic pollution, but **"advanced" or "chemical" recycling**, also known as pyrolysis, gasification, chemical conversion, and chemical depolymerization are not solutions to the plastic pollution crisis. These processes all use chemicals and heat to incinerate plastic waste to create fossil fuels (see graphic to left).[1] These processes do not reduce the use of single-use plastics – rather, they incentivize the continued use of plastics as a feedstock for plastics-to-fuel manufacturing. The resulting air pollution and hazardous waste generated from these processes put Virginia's communities and environmental health at risk.



Credit: Clean Fairfax

"Chemical recycling" has been touted as the answer to plastic pollution by the plastics industry for more than 35 years.[2] In that time, plastic production and plastic pollution have drastically increased, while the plastic industry has used these failed processes as justification to increase plastic production. "Chemical recycling" incinerates plastic in an oxygen-free environment to render a raw material to create fossil fuel (see graphic to right). Despite plastic industry lobbying, these processes are classified as "incineration" by the U.S. Environmental Protection Agency (EPA).[3] In addition, "chemical recycling" produces more greenhouse gasses and hazardous waste than the production of virgin plastic,[4] while also incentivizing the production of more plastic.

In 2018, when the fuel and feedstock produced from one of these facilities alone was burned, over 49,000 tons of toxins went into our air. Pollution disproportionately burdens communities of color[5,6] and, as a result of this environmental injustice, Black people are three times more likely to die from exposure to air pollutants than white people. Eight of the eleven "chemical recycling" facilities in the United States are located in **environmental justice communities**;[7] this, combined with the fact that these facilities are often out of compliance with EPA hazardous waste regulations,[8] further demonstrates that "chemical recycling" is a false, inequitable solution.

CURRENT LANDSCAPE

The American Chemistry Council has succeeded in convincing 24 state legislatures[9] to pass bills that effectively exempt "chemical recycling" facilities from important waste regulations required of other industries. These bills have passed under false pretense, highlighting the "success" of the Agilyx, Regenx, and Amsty partnership for a polystyrene "chemical recycling" facility. Between 2021-2023, this facility lost $4.5 million and the project was shuttered in early 2024 because it failed to produce a marketable product while generating more than 200 tons of styrene waste from 2018-2022, all of which was burned off-site.[10]

Likewise, the short history of "chemical recycling" facilities in Virginia confirms "chemical recycling" as a false solution to the plastic pollution crisis and a burden to taxpayers. Braven Environmental, LLC abruptly canceled its plans to build a facility that would serve as a "solution" to the state's plastic waste problem in Cumberland County[11] after receiving over $200,000 in state grants in 2020.[12] There has been no public acknowledgment of why the facility was canceled or whether the state grant funds have been returned.

OPPORTUNITIES

State solid waste management policy follows the hierarchy: source reduction, reuse, recycling, resource recovery (waste-to-energy), incineration, and landfilling.[13] This hierarchy should be followed when discussing "chemical recycling" because it is considered incineration according to EPA regulations. Solid waste management should continue to focus on reducing single-use plastics in the waste stream and as litter, reusing products where possible, and if recycling is required, elevating solutions that reduce the amount of virgin plastics manufactured. State code should clarify that technologies that turn plastic into fuel are not recycling and should be excluded from **extended producer responsibility** and recycling development programs.

Failed and experimental technologies, such as "chemical recycling", should be robustly evaluated for safety, proof of scalability, and economic viability before being allowed in Virginia. Technologies should be profitable (i.e. not reliant on taxpayer dollars) and proven to achieve goals that advance Virginia's quality of life, such as litter reduction, plastic waste management, and environmental equity. Taxpayer money (loans or grants) should not be used to recruit, retain, or support any private "chemical recycling" businesses.

The "chemical recycling" industry has repeatedly failed for decades due to technology scalability, high volumes of hazardous waste production, energy consumption, and overall inability to turn over a profit. If Virginia is looking to truly tackle the plastic pollution crisis, the Commonwealth should look towards plastic reduction solutions that reduce our reliance on single-use plastic to protect human health, our waterways, the ocean, aquatic animals, and the economy.

TOP TAKEAWAYS

Chemical recycling produces more greenhouse gasses and hazardous waste than production of virgin material while also incentivizing the production of more plastic.

Burning or melting plastics in any way, including via advanced recycling or waste incineration, is not a solution to the plastic pollution crisis and further exacerbates environmental inequities.

Environmental justice communities are disproportionately impacted by "chemical recycling" facilities, with eight of the eleven US facilities that are often out of compliance with EPA hazardous waste regulations sited in low-income and communities of color.

Bald Eagle Release by the Wildlife Center of Virginia in Newport News, VA
Photo by Debbie Thrush

LAND & WILDLIFE CONSERVATION

LAND CONSERVATION

AGRICULTURE AND FORESTRY INDUSTRIES DEVELOPMENT FUND AND GRANT PROGRAM (AFID)

A discretionary, performance-based economic development incentive specifically for agriculture and forestry value-added or processing projects. The AFID program supports agribusinesses of all sizes including produce companies, dairy processors, meat and poultry processors, specialty food and beverage manufacturers, greenhouse operations, forest product manufacturers and more. The fund can also support aquaculture projects such as oyster production and nurseries producing native plants for stormwater BMPs.

BLACK, INDIGENOUS, AND PEOPLE OF COLOR (BIPOC) HISTORIC PRESERVATION FUND

A grant program to protect and support Virginia's historically underserved and underrepresented communities and associated cultural and historical sites. This fund provides grants for the acquisition, protection, and rehabilitation of historic and archaeological sites of significance associated with BIPOC communities.

GET OUTDOORS PROGRAM

Grant program administered through Virginia Outdoor Foundation for projects that increase access to safe open space in Virginia's communities, especially those that are underserved.

HISTORIC REHABILITATION TAX CREDIT (HRTC)

Community redevelopment and economic development tool to adapt and reuse older structures for urban and rural communities.

LAND PRESERVATION TAX CREDIT (LPTC)

A program that encourages voluntary private land conservation by providing tax credits equal to 40% of the value of donated land or conservation easements. Virginia Department of Conservation and Recreation is responsible for verifying the conservation value of LPTC donations.

VIRGINIA BATTLEFIELD PRESERVATION FUND (VBPF)

Provides matching funds to leverage significant local, federal, and private funding sources to preserve historically significant places.

VIRGINIA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES (VDACS)

Promotes the economic growth and development of Virginia agriculture, provides consumer protection, and encourages environmental stewardship.

STATE WATER CONTROL BOARD

Appointed Virginia citizen body that promulgates regulations to implement Virginia's State Water Control Law and sets water quality standards which include regulation of sediment, nutrient, and toxic pollutants.

VIRGINIA FARMLAND AND FOREST LAND PRESERVATION FUND

Encourages voluntary land conservation by providing tax credits equal to 40% of the value of donated land for conservation easements under the Virginia Department of Agriculture and Consumer Services.

RELEVANT PROGRAMS & AGENCIES

See full glossary starting on page 157

VIRGINIA LAND CONSERVATION FOUNDATION (VLCF)

Provides state matching grants on a competitive basis for projects to protect farmland, forestland, natural areas, open space and parks, and areas of historic and cultural importance. State agencies, localities, non-profits, and tribes are eligible to apply for funding.

VIRGINIA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES (VDACS)

Promotes the economic growth and development of Virginia agriculture, provides consumer protection and encourages environmental stewardship.

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

Virginia's environmental agency that is responsible for administering laws and regulations related to air quality, water quality, water supply, renewable energy and land protection. DEQ issues permits, conducts monitoring, performs inspections, and enforces environmental law.

VIRGINIA DEPARTMENT OF FORESTRY (DOF)

Monitors the health, composition, and inventory of Virginia's public and private forests to inform land management practices.

Autumn sunset at Shenandoah River State Park
Photo by T. Anthony Harding

LAND CONSERVATION BENEFITING ALL VIRGINIANS

LAND CONSERVATION

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WHY IT MATTERS

From the forested ridges and vast fertile valleys of the Appalachians to the shores of the Chesapeake Bay and Atlantic Ocean, the lands and waters of Virginia play a vital role in the state's environmental, economic, and social health. However, these important resources are at risk of being lost.

In Virginia, 26,000 acres of forestland[1] are lost each year and farmland[1] is disappearing at a rate of over 99,000 acres annually.[2] Many significant national historic and cultural sites remain unprotected, threatening the loss of important pieces of our shared history. Almost 900 plant and animal species are declining due to habitat loss, threats from invasive species, (see page 69) new diseases, and climate change.[3]

Virginia's lands and waters provide the basis for agriculture, forestry, outdoor recreation, and tourism – key economic sectors in the state, especially in rural communities. For every public $1 invested in land conservation, $4 in natural goods and services is returned to the Commonwealth.[4] Every job in agriculture and forestry supports 1.7 jobs elsewhere in Virginia's economy.[4] In 2021, 102 million visitors spent $25.2B across Virginia's economy and tourism- supported jobs accounted for 5.2% of all jobs in the state.[5]

At least 70% of Virginians support public spending to prevent the loss of natural areas and open spaces, yet Virginia lacks a dedicated source of funding to support Virginia's outdoor spaces.[4] The result is that underfunded and inconsistently funded programs are not able to keep up with the demand for trails, parks, public lands, and the staff and infrastructure needed so that people can use them.

CURRENT LANDSCAPE

More than 80% of land in Virginia is privately owned. Tools and funding are needed for landowners to conserve their land. Fortunately, the Commonwealth has effective land conservation programs already in place. These programs rely on robust and consistent funding to meet the growing demands of our time.

LAND PRESERVATION TAX CREDIT (LPTC)

Virginia's LPTC is one of the most successful and progressive private land conservation programs in the country. It encourages voluntary land conservation by providing tax credits equal to 40% of the value of donated land or conservation easements.

VIRGINIA LAND CONSERVATION FOUNDATION (VLCF)

VLCF provides state matching grants on a competitive basis for the protection of open spaces and parks, natural areas, historic areas, and farmland and forest preservation.

VIRGINIA FARMLAND AND FOREST LAND PRESERVATION FUND

The **Farmland and Forest Preservation Fund** was created in 2024 as part of establishing the **Office of Working Lands Preservation** after the **Virginia Department of Agriculture and Consumer Services (VDACS) Office of Farmland Preservation** was transferred to the **Virginia Department of Forestry (DOF)**. This move creates a new and potent opportunity and a more holistic approach to accelerating the pace of working lands by providing matching funds to leverage significant local, federal, and private funding sources to protect the state's best farm and forest land.

VIRGINIA BATTLEFIELD PRESERVATION FUND

The **Virginia Battlefield Preservation Fund** provides matching funds to leverage significant local, federal, and private funding sources to preserve historically significant places.

BLACK, INDIGENOUS, AND PEOPLE OF COLOR (BIPOC) FUND

The Black, Indigenous, and People of Color (BIPOC) Historic Preservation Fund was established in 2022, creating a grant program to acquire, protect, and rehabilitate historic and archaeological sites of significance to support Virginia's historically underserved and underrepresented communities.

VIRGINIA OUTDOORS FOUNDATION'S GET OUTDOORS PROGRAM

This existing program, which funds small park and trail projects, is much more accessible for small rural and urban localities and nonprofit organizations than Virginia's other grant programs. Many historically underserved community organizations have received funding from this program.

OPPORTUNITIES

Robust, consistent state investments in existing conservation mechanisms are needed to address growing threats on a meaningful scale. The majority of residents support increased investments in conservation. Virginia has developed individual programs over the years that are proven to meet different conservation needs and now is the time to consider how best to fund them as a whole at sustainable levels as outlined below.

$90M per year to the Land Preservation Tax Credit. The entire 2% of the Transfer Fee should go to managing the LPTC and stewardship of protected land, no amount should be diverted to the General Fund.

- $30M per year for the Virginia Land Conservation Foundation
- $5M per year for the Virginia Farmland and Forest Preservation Fund
- $5M per year for the Virginia Battlefield Preservation Fund
- $5M per year for the Virginia BIPOC Historic Preservation Fund
- $5M per year to extend Virginia Outdoors Foundation's Get Outdoors (GO) program throughout the Commonwealth.
- Enact Virginia's Great Outdoors Act, which would provide dedicated funding to provide reliable and consistent support for the Virginia Land Conservation Foundation and Virginia's other existing conservation programs.
- Support additional staff at state agencies: VOF, DCR, DOF, and DWR. Bolster professional resources available from the Office of the Attorney General and Department of General Services to ensure the effectiveness of conservation agencies.

A permanent, dedicated source of revenue that serves the wide array of conservation needs and opportunities, from pocket parks to productive farmland would augment these essential programs. Programs that support urban conservation and underserved communities with a sustained source of reliable funds would also allow localities to better plan their outdoor recreation infrastructure investments with certainty that their needs will be met.

TOP TAKEAWAYS

In Virginia, 26,000 acres of forestland are lost each year and farmland is disappearing at a rate of over 99,000 acres annually.

The Commonwealth has proven land conservation programs in place that rely on robust and consistent funding from the Commonwealth

Dedicated, full funding would augment these programs to effectively address the increasing loss of working lands, achieve conservation goals, and make public lands accessible to all Virginians.

PROTECTING HISTORIC & CULTURAL RESOURCES

LAND CONSERVATION

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WHY IT MATTERS

Virginia boasts a unique and diverse array of historic and cultural resources that tell the story of our Commonwealth and the nation, from Chief Powhatan's capital, Werowocomoco, to American Revolution and Civil War battlefields, to Rosenwald schools and sites related to the struggle for Civil Rights. While incredible work has been done to preserve and protect many sites, there is much left to do. Many of the sites we hold most dear demand further efforts to ensure that we can pass them on to generations that follow us.

As Virginia continues to grow, new development of data centers, warehouse distribution centers, and many others increasingly threaten sites and drive real estate prices sky-high. We also must recognize that many sites of great importance to the history of Virginia's African American and Indigenous communities have not always received equal focus. As we rapidly approach the 250th anniversary of our nation's founding, there is a significant opportunity for Virginia to take its natural place as a national leader in preserving and sharing that history, both positive and negative.

CURRENT LANDSCAPE

Virginia already has several programs that provide irreplaceable funding for the preservation and conservation of historic and cultural sites.

HISTORIC REHABILITATION TAX CREDIT (HRTC)

For 20 years, **Virginia's Historic Rehabilitation Tax Credit (HRTC) program** has been an essential tool to leverage economic development by adapting and revitalizing abandoned historic buildings. This uncapped program has been effective in urban and rural communities and every region generating $6.8 billion in private investment.

LAND CONSERVATION

The **Virginia Land Conservation Fund (VLCF)**, the **Virginia Battlefield Preservation Fund (VBPF)**, and the **Land Preservation Tax Credit (LPTC)** have been the fundamental programs for land conservation in Virginia. VLCF provides funding for a broad array of conservation projects in urban and rural areas. VBPF preserves battlefield land from the American Revolution, War of 1812, and Civil War, including sites associated with the Medal of Honor. VBPF grants are often matched with federal dollars from the National Parks Service as well as private money. On average, each dollar in VBPF grants attracts six dollars in non-state monies.

AFRICAN AMERICAN AND INDIGENOUS RESOURCES

The comparatively new **Virginia Black, Indigenous, and People of Color (BIPOC) Historic Preservation Fund** offers opportunities for a more complete telling of Virginia history by preserving sites that have been disproportionately marginalized in the past.

SEMIQUINCENTENNIAL FUNDING

In FY25, $20M was provided for a new grant program aiming to prepare Virginia for the upcoming 250th anniversary of America's independence. Much like the Bicentennial in 1976, it is anticipated that this event will create heightened interest in sites related to the nation's founding, as well as other sites that tell the country's story over the intervening centuries.

OPPORTUNITIES

While there is overall strong support for preservation and conservation in the most recent budget, there are still critical areas that must be improved to protect endangered sites.

HISTORIC REHABILITATION TAX CREDIT (HRTC)

The HRTC program creates jobs, has a proven return on investment, increases housing inventory, and reduces waste in landfills. Proposals to add an overall cap would have a chilling effect and likely most impact individuals and small business owners.

VIRGINIA LAND CONSERVATION FUND (VLCF)

VLCF is currently funded at $16M per year. While this provides vitally important funding for many fantastic acquisitions in the Commonwealth, improved funding to $30M would allow the program to keep pace with increasing property costs and intense development pressures.

BLACK, INDIGENOUS, AND PEOPLE OF COLOR (BIPOC) FUND

The current budget only provides $1M for the BIPOC Fund, and only in the first year of the biennium. This is a new program that will be unable to meet its full potential at that level. A $5 million investment would allow the fund to increase access to preservation projects that inspire and have been overlooked in the past.

VIRGINIA BATTLEFIELD PRESERVATION FUND (VBPF)

VBPF is currently funded at just over $5M per year. Continued funding at this level would allow for this program to meet the goals as outlined above and continue to help pull in non-state dollars.

SEMIQUINCENTENNIAL FUNDING

The $20M that has been made available for the semiquincentennial preparations will well serve the immediate needs preparing Virginia for the upcoming 250th anniversary of America's independence including site preservation, development of educational materials, museum improvements, and other needs ahead of this exciting event.

TOP TAKEAWAYS

Virginia has several programs that provide irreplaceable funding for preservation and conservation of historic and cultural sites including traditional land conservation programs as well as the Historic Rehabilitation Tax Credit (HRTC) that rely on consistent funding.

Increasing threats and the rise of real estate costs mean that these critical programs are at increased need of consistent and increased funding to allow Virginia to maintain its rightful place as a national leader in historic and cultural resource protection.

Girls Who Hike Group–Old Rag Summit
Photo by Jenn Loving

COMPOSTING FOR WASTE REDUCTION & SOIL HEALTH

LAND CONSERVATION

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WHY IT MATTERS

Returning organic waste to the land as a **soil amendment** raises land productivity, improves soil health, and increases the soil's capacity to sequester carbon from the atmosphere. To accomplish this, a closed-loop system is needed that reduces organic waste and builds local composting capacity.

America's farmland is eroding faster than nature's ability to restore it,[1] and organic compost material is a valuable resource for soil health and carbon sequestration that should not be wasted. At 24%, food is the largest component of waste sent to landfills.[2] Composting programs divert biodegradable material from landfills and incinerators and instead turn it into a valuable product. Less than one percent of all waste is composted.[3]

For localities, composting improves recycling rates; reduces waste and costs to taxpayers; diverts organic waste that emits methane pollution from landfills;[4] produces a soil amendment that raises revenues;[5] and conserves landfill space. The authority of local governments in Virginia to require organic waste diversion from solid waste streams in waste management systems is currently limited. Black and low-income communities are most likely to have toxic waste facilities placed near them, so organic waste disposal also can help alleviate a source of pollution for environmental justice communities.

Universities, hospitals, retirement communities, and corporations with food services are major producers of food waste. Currently, institutions that want to compost cannot access the infrastructure needed to process organic waste into compost, find a service provider to pick up the organic waste on a regular schedule, or find farmers to use the finished product.

Across Virginia, localities are struggling with costly solid waste management issues and do not have access to composting infrastructure. Diverting biodegradable material can reduce solid waste levels and also help improve recycling rates.

CURRENT LANDSCAPE

Of the 15 total composting facilities in Virginia, six are equipped to accept food waste, eight accept yard trimmings, two accept sewage sludge, and five accept manure and other agricultural residuals (most facilities accept more than one material). To achieve higher levels of organic waste diversion and serve all communities in Virginia, more processing capacity is needed. The composting market is shifting to smaller, community-scale facilities, and there is growing interest in facilities linked to local agriculture.[6]

Local produce at Bedford County Orchard
Photo by Patti Black

The General Assembly established a task force in 2020 to advise on state policy for waste diversion and recycling. Recycling of organic material and infrastructure for composting are key policy concerns.[7] In 2021, the General Assembly requested **Department of Environmental Quality (DEQ)** "investigate the role of a composting and food donation infrastructure in reducing the volume of waste that is accepted by landfills, including upgrading and refining existing food donation infrastructure, identifying food material and organic waste generators and haulers, comparing the use of in-house composting with regional composting hubs, studying the ideal distance between composting hubs and waste generators, considering the permitting of composting hubs, and exploring markets and systems for composting services and anaerobic digestion."[8]

Executive Order 17 of 2022[9] charged DEQ and the **Virginia Department of Agriculture and Consumer Services (VDACS)** to develop strategies to reduce food waste from large-scale sources of food surplus through donations to needy individuals, food for animals, or composting. In response, DEQ produced a report in 2023 on food waste reduction strategies.[10] Adequate funding and support is needed to implement these recommended strategies.

OPPORTUNITIES

Research, technical assistance, and funding are needed to advance composting statewide. A capacity and gap analysis study is needed to identify investment opportunities and should include a cost-benefit analysis of potential savings for state institutions if composting is available versus sending food waste to a landfill. Investment recommendations should be framed taking into account environmental justice impacts and potential benefits to communities most impacted by waste issues and lacking capacity and resources.

Technical assistance, incentives, and funding would give municipalities and producers of organic/food waste the resources to implement waste diversion and composting programs.

Funding design and construction upgrades to yard waste composting facilities would enable the processing of food waste and increase the amount of food waste diverted from landfills.

Decentralized community composting facilities would provide compost to local farms and community gardens that supply food assistance programs.

Establishing and funding facilities and infrastructure grants under the **Agriculture and Forestry Industries Development Fund and Grant Program (AFID)** facilities program has the potential to expand organic waste collection, build new composting facilities, and upgrade and expand existing facilities. Including composting as a project category and giving priority to applicants who include composting in their operations would allow Virginia to leverage an existing program for increased composting opportunities.

TOP TAKEAWAYS

America's farmland is eroding faster than nature's ability to restore it, and organic compost material is a valuable resource for soil health that should not be wasted.

Demand for food waste composting from businesses and institutions greatly exceeds Virginia's collection and composting infrastructure capacity.

Expanding statewide capacity to collect and process organic waste, and the authority of localities in Virginia to require organic waste diversion from solid waste streams in waste management systems would help reduce the solid waste going to landfills and the polluting methane it creates.

PRESERVING WORKING FARMS & FORESTS

LAND CONSERVATION

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WHY IT MATTERS

Working farms and forests provide varied and important benefits to all Virginians, from providing food, fiber, and wood products to supporting two of the Commonwealth's largest industries. Agriculture produces about 8.7% of the state's total economic output and accounts for 381,844 jobs, while forestry provides 108,451 jobs and generates $23.6 billion in economic output annually. These industries support a constellation of businesses like suppliers, processors, manufacturing, retailers, and transportation and storage. Farms and forests also provide key opportunities to restore clean water, sequester carbon, mitigate flood risks, sustain wildlife and pollinators, maintain treasured open space, and unite rural communities.

Working with willing landowners to protect farms and forests from development keeps productive agricultural soils and high-quality forest land in use and helps keep rural communities strong. Compensating landowners for conserving their farms and forests allows farmers and landowners to reinvest funds into their businesses and implement long-term land and water stewardship practices. Permanently protecting farms and forests from development can also keep it affordable. In areas with high development pressure, this makes it easier for new farmers and forest owners to acquire land. Ensuring the availability and affordability of high-quality land is a key step toward addressing historic racial and economic disparities in land access.

Retaining farms and forests for the future requires consistent and full state funding for key conservation programs and supported pathways to land ownership, particularly for historically marginalized farmers and forester owners.

CURRENT LANDSCAPE

Between 2012 and 2022, more than 7,000 Virginia farms comprising over 992,000 acres of farmland were converted to other, non-agricultural uses in Virginia.[1] The accelerating loss of farms and forests is hurting rural communities and jobs, negatively impacting Virginia's agricultural and forest product industries, and hindering our ability to adapt to climate change.[2]

State programs like **Virginia Land Conservation Foundation (VLCF)** grants and local initiatives like **Purchase of Development Rights (PDR)** programs compensate willing landowners for permanently protecting their land. PDR programs help localities implement their comprehensive plans and protect highly productive and locally important farms and forests.[3] However, funding and technical assistance for local government PDR programs have historically been insufficient to meet demand statewide. This has suppressed local participation in such programs. VLCF grants have also been oversubscribed and unable to meet the demand from landowners interested in conserving their land.

Nonprofit **land trusts** are already key partners in protecting farms and forests, but changes to state conservation programs could help them accelerate the pace of conservation. State law currently limits experienced accredited nonprofit land trusts to the role of co-holders of **conservation easements** that are purchased with state funding. This creates an unnecessary burden that hinders land conservation.

When effectively managed, farms and forests can capture and clean water, sequester carbon in healthy soils, provide wildlife habitat, and mitigate the effects of a changing climate. Expanding opportunities to compensate landowners for providing these public benefits makes conservation a more viable option for all landowners, most notably new and beginning farmers, historically underserved farmers, and others seeking capital to reinvest in their land, operations, and community.

OPPORTUNITIES

In 2024, the Office of Working Lands Preservation was established when the **Virginia Department of Agriculture and Consumer Services (VDACS)** Office of Farmland Preservation was transferred to the **Virginia Department of Forestry (DOF).** This move creates a new and potent opportunity for land conservation by combining the Office of Farmland Preservation's education, outreach, and funding with DOF's technical expertise and strong track record of land conservation into a single, unified entity for farm and forest conservation. A more holistic approach to working land conservation in Virginia may be on the horizon.

The potential of the new Office of Working Lands Preservation will go unrealized unless DOF and localities can accelerate the pace of farm and forest conservation. Now is the time for the Commonwealth to invest in the new office. With the **Inflation Reduction Act** and other federal action creating unprecedented federal funding for farm and forest conservation, a $5M increase per year in the **Virginia Farmland and Forestland Preservation Fund** could generate an additional $10M in federal funding to achieve conservation outcomes.

Nonprofit land trusts are already working aggressively to leverage state funding from VLCF to tap more federal funding available through the Natural Resources Conservation Service (NRCS) programs such as the **Agricultural Land Easement program**. Matching state and federal funding makes conservation a more financially viable option for landowners, particularly new and beginning farmers and those who have been historically underserved. Removing the VLCF requirement that experienced, accredited nonprofit land trusts must have a co-holder can reduce administrative barriers, increase attractiveness to, and accelerate the pace of farm and forest conservation.

"Sharing Spaces"
Photo by Sara Davis

TOP TAKEAWAYS

The Office of Working Lands Preservation can help localities develop PDR ordinances, advise on best zoning practices for preserving farmland, consider equity in ranking projects that become funded, and provide training and technical assistance to enhance monitoring and enforcement with additional staff capacity and sufficient funding at $500K per year.

The Virginia Farmland and Forest Land Preservation Fund will need robust funding to the tune of $5M per year to achieve land conservation goals.

Removing the co-holding requirements for easements funded by the Virginia Land Conservation Foundation will increase the rate of farmland conservation in Virginia.

VIRGINIA'S GREAT OUTDOORS

GET OUTDOORS PROGRAM
Grant program administered through Virginia Outdoor Foundation for projects that increase access to safe open space in Virginia's communities, especially those that are underserved.

LAND AND WATER CONSERVATION FUND (LWCF)
Federal competitive grant program that provides funding to protect land for national parks, wildlife refuges, forests, trails, and other public lands, help establish state and local parks, protect working forests, and preserve important historic and cultural sites. State agencies, localities, non-profits, and tribes are eligible to apply for funding.

OFFICE OF TRAILS
An interdepartmental office housed at the Virginia Department of Transportation (VDOT) and established in 2022.

VIRGINIA LAND CONSERVATION FOUNDATION (VLCF)
Provides state matching grants on a competitive basis for projects to protect farmland, forestland, natural areas, open space and parks, and areas of historic and cultural importance. State agencies, localities, non-profits, and tribes are eligible to apply for funding.

VIRGINIA DEPARTMENT OF CONSERVATION & RECREATION (DCR)
Agency which oversees Virginia's natural resource management and outdoor recreation.

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)
Virginia's environmental agency that is responsible for administering laws and regulations related to air quality, water quality, water supply, renewable energy and land protection. DEQ issues permits, conducts monitoring, performs inspections, and enforces environmental law.

VIRGINIA DEPARTMENT OF FORESTRY (DOF)
Monitors the health, composition, and inventory of Virginia's public and private forests to inform land management practices.

VIRGINIA DEPARTMENT OF WILDLIFE RESOURCES (DWR)
Agency responsible for the management of inland fisheries, wildlife, and recreational boating for the Commonwealth of Virginia.

Boat wake on the James River
Photo by Patti Black

BUILDING A STRONG OUTDOOR RECREATION ECONOMY

VIRGINIA'S GREAT OUTDOORS

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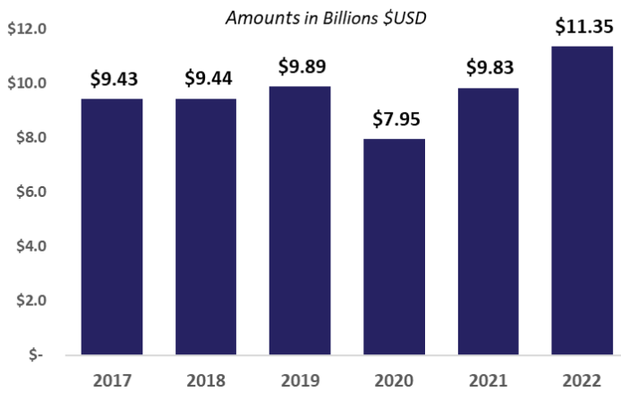
WHY IT MATTERS

Outdoor recreation is a broad and growing sector that supports community health and economic growth. Outdoor recreation includes everything from traditional activities like hiking, camping, and paddling in the far-off outdoors; walking, running, and cycling on local trails; and attending a sporting event or concert at a local park or visiting a historic battlefield. The backbone of outdoor recreation is Virginia's network of public lands, trails, and rivers. Virginia is home to 43 state parks, 47 wildlife management areas, 66 natural area preserves, statewide trail systems, and numerous bodies of water, as well as hundreds of local, county, and regional parks and trails where Virginians and visitors can connect to the outdoors.

Virginians turn to the outdoors as a place for exercise, experiencing nature, stress reduction, and socializing with family and friends.[1] Outdoor recreation is also a frequent draw for local and out-of-state visitors. Localities across the state have identified outdoor recreation assets and opportunities as a way to attract new businesses, workers, and tourists and to strengthen local economies.[2,3]

Annual Economic Impact of Outdoor Recreation in Virginia



In 2022, outdoor recreation generated $11.3B in direct economic output and supported nearly 125,000 jobs in Virginia.[4] Of that, $3.8B went to tourism expenditures in local communities like lodging, restaurants, and retail such as outdoor outfitters.[5] Virginia state parks alone generated $305M in visitor spending, while Shenandoah National Park visitors spent $104M in local communities near the park.[6,7]

Many neighboring states like North Carolina, West Virginia, and Maryland have recognized the importance and value of outdoor recreation for health and local economies and have prioritized making the outdoors available and accessible to all. Virginia has a wealth of natural beauty, diverse landscapes, and interesting history that make it an ideal place to get outdoors - so why aren't we investing in outdoor recreation?

CURRENT LANDSCAPE

An overwhelming 82% of Virginians agree that access to the outdoors for recreation is a priority and want to see the state invest more.[8] Military installations are also recognizing the value of multi-use spaces that support both mission readiness and the well-being of military families through outdoor recreation opportunities.

Demand for accessible outdoor spaces for recreation, particularly in densely populated areas, has begun to exceed the capacity of existing spaces due to a lack of consistent state funding in acquisitions, repairs, and upgrades to outdoor spaces. For example, rangers at Crow's Nest Natural Area Preserve near Fredericksburg are often forced to shut the gates early on weekends because the parking lot fills quickly. **Virginia Outdoors Foundation's Get Outdoors (GO) Fund grant program** helps localities and nonprofits address physical and financial barriers to accessing the outdoors and participating in outdoor recreation activities. Unfortunately, the GO Fund has been heavily oversubscribed and is being suspended due to insufficient funding.

Virginia opened an Office of Outdoor Recreation in 2019 based on successful models in 22 other states, but it went defunct without sustained funding from the state budget. The state has since been unable to replicate the scale of success of states like Maryland, North Carolina, and Pennsylvania to catalyze public and private sector investment in the outdoor recreation sector.[9] Virginia's newly updated Outdoors Plan includes many detailed recommendations on what investments are needed to make the outdoors available, accessible, and appealing to all.

OPPORTUNITIES

Virginia is well-positioned to be a national leader in supporting outdoor recreation if it begins investing in and supporting statewide, regional, and local initiatives to make the outdoors more accessible. We should ensure residents and visitors, who bring dollars into our economy, can continue to experience and enjoy outdoor places that make our Commonwealth a special place to live and visit. Providing dedicated funding for the outdoors, supporting the Office of Outdoor Recreation, and studying the economic impact of outdoor recreation are all necessary for Virginia to become a national leader in outdoor recreation.

Virginia's Great Outdoors Act would provide the dedicated funding needed to create and expand access to safe, comfortable, and enjoyable places for people to recreate in their communities and across the Commonwealth. It would provide funding for state natural resources agencies, the **State Office of Trails**, and the **Virginia Land Conservation Fund (VLCF)** and enable state and local partners to protect more of Virginia's iconic lands and waters for public enjoyment and invest in the infrastructure needed to make them accessible for different forms of outdoor recreation. This will lead to more and better state and local parks, trails, green spaces, and other opportunities for Virginians to get outdoors.

Supporting the Office of Outdoor Recreation and studying the economic impact of outdoor recreation will help ensure funding is spent strategically and delivers the greatest benefit to communities. With full staffing, the Office of Outdoor Recreation would be able to actively coordinate with outdoor recreation partners and stakeholders and provide support to outdoor recreation businesses starting in or moving to Virginia. A statewide economic impact study of outdoor recreation will help quantify economic, environmental, and health benefits and inform priority policies and investments to grow our outdoor recreation sector.

TOP TAKEAWAYS

Every city, county, and town from the coast to the mountains is looking to grow outdoor recreation opportunities. Virginia can support them by:

- Providing at least $200 million in dedicated annual funding for investments in the outdoors, including public lands, trails, state parks, and grant programs that support land conservation and outdoor access.
- Re-establishing and fully staffing the Office of Outdoor Recreation to engage and coordinate among outdoor recreation stakeholders and draw outdoor recreation businesses to Virginia.
- Funding a study on the economic impact of outdoor recreation and related tourism administered by the Virginia Tourism Corporation.

INVESTING IN PUBLIC LANDS FOR ALL

VIRGINIA'S GREAT OUTDOORS

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WHY IT MATTERS

If you have been to a federal, state, or local park, walked on a neighborhood trail, hiked through a natural area preserve in search of songbirds, hunted in a wildlife management area, fished in a public lake, or accessed a river using a public boat launch, you have benefited from public lands! At heart, public lands are green spaces owned and managed by a government entity for lasting public use and benefit.

Most land in Virginia is privately owned, but these pockets of public land across the state and within our cities and towns ensure that everybody, no matter who they are or where they are from, can access and enjoy the outdoors. Access to the outdoors benefits our physical and mental health and provides communities with places to gather and play. Demand for outdoor spaces surged during the COVID-19 pandemic and has remained high. In 2022, Virginia state parks welcomed a record-breaking 8 million visitors and the Blue Ridge Parkway was once again the most visited national park in the country, with 15.7 million visitors - more than Grand Teton, Grand Canyon, Yellowstone, and Yosemite national parks combined for the same year.[1,2]

Public lands are also key to protecting and managing important natural resources for current and future generations. Public lands are the most effective way to provide large enough landscapes to deliver meaningful results like restoring and protecting habitats for rare species, wild game, and fish, wildlife corridors for migratory species, and forests and wetlands that help draw down carbon and prevent pollutants from entering our rivers and streams. Natural resources agencies are a trusted repository of best practices for land management and conservation based on decades of science and experience working with different kinds of large landscapes.

CURRENT LANDSCAPE

Virginia has 43 state parks, 66 natural area preserves, and 47 wildlife management areas, as well as numerous regional, county, and local parks and nature preserves operated by non-profit organizations for public enjoyment. However, there is more work to be done to make public lands easily accessible for all Virginians and ensure our most important and iconic landscapes are protected for future generations.

Many residents across the Commonwealth have a lack of access to nature, especially in urban, low-income communities and poor rural counties. Low-income neighborhoods average 42% less park acreage per resident than high-income neighborhoods. Lack of equitable access to quality parks and green spaces poses a threat to mental and physical health outcomes in these communities.[3,4]

State agencies, non-profits, and localities often work together to make new public lands available because each partner can bring different skills and funding sources to the table to acquire lands, build amenities, and manage public access. **Virginia Land Conservation Foundation (VLCF)**, state capital appropriations and bonds, and federal **Land and Water Conservation Fund (LWCF) grants** all help fund public land acquisitions and development. Maintenance and management investments are also essential. This spending determines whether sites live up to their environmental, experiential, and economic potential.

Unfortunately, Virginia's funding for public lands has been minimal and unpredictable. We have missed opportunities to acquire important natural areas and urban greenspaces because state agencies, localities, and nonprofits could not secure sufficient match funding to leverage federal opportunities. We also face a $300M maintenance and repairs backlog at state parks, long waiting lists for visitors looking to enjoy overnight stays, and public lands closing early on weekends because there weren't enough staff and parking facilities to accommodate visitors.[5]

OPPORTUNITIES

Virginia needs to increase investments in our great outdoors to catch up to neighboring states like North Carolina and Maryland. Public lands help connect Virginians with the outdoors, keep us healthy, and underpin a growing $11.3B outdoor recreation economy that supports nearly 125,000 jobs in our communities.[6] This will take significant increases in annual appropriations for natural resources agencies and programs that support public lands so that Virginia can successfully:

MAKE PUBLIC LANDS ACCESSIBLE TO ALL

We need to prioritize creating, expanding, and investing in public lands so that all Virginians, no matter their background or place of residence, have easy physical and financial access to safe outdoor spaces. This is particularly important in under-resourced communities. We also need to plan for the future and identify where we will need more outdoor spaces to serve growing populations.

PROVIDE WORLD-CLASS FACILITIES AND EXPERIENCES

A key component of making public lands accessible and appealing to visitors is ensuring they can meet user needs. All Virginians should feel welcome in their parks, regardless of language, ethnicity, socioeconomic background, or physical and mental abilities.

We can achieve this through constructing and maintaining accessible parking, multilingual signage, bathrooms, overnight lodging facilities, and more - as well as ensuring adequate staffing and offering interpretive programming that helps visitors of all ages and backgrounds learn about and enjoy their surroundings.

MANAGE PUBLIC LANDS FOR OPTIMAL CONSERVATION OUTCOMES

Successful land management requires a long-term commitment. Whether eradicating invasive species, bringing back healthy populations of native plants and animals like elk, restoring coastal marshes, or reducing wildfire risk by introducing carefully managed intentional burning, conservation takes significant investments of time, expertise, and labor. Conservation workforce needs, particularly within state agencies, are already large and still growing.

43 state parks
8 million state park visitors in 2022
$364M economic impact
$300M maintenance and repair backlog

TOP TAKEAWAYS

Public lands help keep Virginians healthy, provide environmental benefits like clean water, support the growing outdoor recreation industry and jobs, and protect critical natural resources for future generations.

Virginia's public lands and natural resource agencies need higher and sustained levels of annual investment in staff, maintenance, operations, and acquisitions to make them accessible, inclusive, and desirable destinations.

An annual dedicated funding source that could support $200M for public lands, trails, state parks, and grant programs that support land conservation and outdoor access would help Virginia catch up with neighboring states in our investments in our great outdoors.

NATIVE HABITATS & SPECIES

OYSTER REPLENISHMENT FUND
Fund that maximizes the reuse of the state's oyster shell resources to incentivize shell recycling programs.

VIRGINIA CONSERVATION ASSISTANCE PROGRAM (VCAP)
Cost-share program providing assistance as well as financial incentives to urban landowners installing Best Management Practices (BMPs) on their property. Eligible practices include the removal of impervious surfaces, rainwater harvesting, and other efforts to mitigate the effects of erosion and stormwater runoff.

VIRGINIA DEPARTMENT OF CONSERVATION & RECREATION (DCR)
Agency which oversees Virginia's natural resource management and outdoor recreation.

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)
Virginia's environmental agency that is responsible for administering laws and regulations related to air quality, water quality, water supply, renewable energy and land protection. DEQ issues permits, conducts monitoring, performs inspections, and enforces environmental law.

VIRGINIA DEPARTMENT OF WILDLIFE RESOURCES (DWR)
Agency responsible for the management of inland fisheries, wildlife, and recreational boating for the Commonwealth of Virginia.

VIRGINIA INVASIVE SPECIES MANAGEMENT PLAN (VISMP)
Provides an overview of invasive species that threaten Virginia's natural and agricultural resources, state agency responsibilities, and goals shared by the many stakeholders who are part of the Virginia Invasive Species Working Group.

VIRGINIA INSTITUTE OF MARINE SCIENCE (VIMS)
A marine research and education center that operates as a branch of the College of William and Mary. VIMS has a legal mandate to provide research, education, and advisory services to government, citizens, and industry.

VIRGINIA MARINE RESOURCES COMMISSION (VMRC)
State agency in charge of overseeing Virginia's marine and aquatic resources, and its tidal waters and homelands. One of the primary functions of VMRC is to zone water areas for recreation, oyster and clamming grounds, and commercial/recreational fishing.

VIRGINIA TREES FOR CLEAN WATER GRANT PROGRAM
Currently funds tree-planting projects that raise public awareness of the benefits of trees and their impacts on water quality.

WILDLIFE CORRIDOR ACTION PLAN (WCAP)
Legislatively required plan to identify and protect wildlife corridors in Virginia, helping both people and wildlife travel more safely.

Yellow-bellied sapsucker (sphyrapicus varius) - Roanoke, VA
Photo by Sara Davis

CONNECTING WILDLIFE HABITATS FOR RESILIENT COMMUNITIES

NATIVE HABITATS & SPECIES

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Jessica Roberts, PhD // Wild Virginia // jessica@wildvirginia.org

WHY IT MATTERS

Wildlife crossings are infrastructure, such as overpasses, underpasses, culverts, or fencing, that allow animals to move between habitats. Properly built crossings make our roads safer for wildlife and people, enhance our **resilience** to climate change, and protect disadvantaged communities.

More wildlife will move across roads as human development increases and animal populations migrate to adapt to changing climates. Virginia is already ranked the 9th worst state in the U.S. for deer-vehicle collisions, worsening from 15th in 2022, with over 60,000 accidents annually costing $41,000 per collision.[1,2,3] Most of our existing underpasses lack simple fencing that could significantly reduce wildlife-vehicle conflict.[3]

Virginia's existing road infrastructure is not prepared to withstand the expected increased flooding as single rainy days and days with heavy rainfall are becoming more frequent in Virginia.[4] For instance, over 50% of Virginia's culverts block aquatic organism passage and are unprepared for increased flooding, posing significant risks to wildlife.[5] Properly constructed stream underpasses follow the "geomorphic simulation approach" that allows for "natural system processes including flood resilience and aquatic organism passage. "Virginia's culverts and bridges need improvements to be wide enough to maintain the natural stream bank, facilitating the passage of terrestrial organisms, and deep enough to preserve the natural stream channel, ensuring safe passage for aquatic organisms. This thoughtful design not only supports diverse wildlife movement but also accommodates increased flooding, providing a comprehensive solution that benefits both ecosystems and human communities.[6]

Increased flooding and improperly designed infrastructure also impact human communities, especially already overburdened and underfunded communities. Governor Youngkin highlighted this pressing reality in his 2022 Flood Awareness Week proclamation: "Low-income neighborhoods and communities of color are disproportionately affected by flooding events and have a more difficult road to recovery."[7]

CURRENT LANDSCAPE

Connected habitats allow wildlife to move and adapt to changing conditions, yet current Virginia environmental action plans intended to improve climate resilience fail to integrate connectivity and animal passage efforts. For instance, planning documents like the 2021 Coastal Resilience Master Plan and VDOT's Resilience Plan do not address wildlife passage needs despite emphasizing "the construction of features that replicate or enhance natural conditions and ecosystem services."[8,9]

Even with recent laws aimed at enhancing connectivity, like the recently released 2023 **Virginia Wildlife Corridor Action Plan (WCAP)**, state agencies are still not required to address barriers to wildlife movement and climate resilience on road projects. The WCAP identifies areas of high wildlife-vehicle conflict, yet merely encourages the consideration of wildlife crossings with no specific wildlife passage design standards akin to the geomorphic simulation approach mentioned above.[10] Without stronger requirements and design standards, critical wildlife crossings can be overlooked amidst other priorities or built poorly. Also, requiring wildlife passage and flood resilience standards for all infrastructure projects will help secure more federal funding, like how the priorities outlined in WCAP helped VDOT secure $600K for the federal Wildlife Crossings Pilot Program in 2023.[11]

In addition to lacking design standards that integrate wildlife movement with climate resilience, state agencies do not have the budget for the research and construction of infrastructure that would benefit ecological and human communities. A dedicated state Wildlife Corridor Fund will fill these budget gaps and give access to federal funding by providing state matches. By establishing such a fund and harnessing climate resilience funds like the $2B available through the Environmental and Climate Justice Community Change grant program, Virginia could significantly bolster its ability to attract federal resources for wildlife crossings and infrastructure resilience.

OPPORTUNITIES

Incorporating clear requirements for aquatic and terrestrial wildlife passage and provisions for **habitat connectivity** into road infrastructure planning would enhance the resilience of Virginia's wildlife and communities. Statewide standardized data collection from state agencies, local advocacy groups, and citizen scientists could guide infrastructure development and future planning based on the most accurate data available on wildlife-vehicle collisions and key **corridor** protection opportunities. Mandating the inclusion of wildlife crossings in all road development projects can boost climate resilience, promote safer communities, and create more connected landscapes for wildlife.[12] Utilizing updated design standards that reflect the latest science on wildlife movement for crossing ensures infrastructure delivers functional habitat connectivity and increases human safety while fortifying ecosystems against changing environmental conditions.

A dedicated state Wildlife Corridor Fund would allow Virginia to take advantage of any potential required state match to access federal dollars drawn from both habitat connectivity and climate resilience funds. Additionally, allowing state, private, and non-profit partners access to a Wildlife Corridor Fund increases the likelihood of statewide corridor goals being implemented appropriately at local and regional levels, prioritizing safety, connectivity, and environmental justice. To ensure proper distribution of resources, state agencies could allocate funding based on WCAP priorities with a bulk of the funding for projects in communities overburdened from climate effects and underserved. Lastly, this state fund could also collect and manage private donations to foster public input and long-term enthusiasm for community connectivity efforts. In summary, a state fund would help build state staff capacity and foster public-private partnerships for wildlife crossings, corridor efforts, and landscape-scale connectivity.

TOP TAKEAWAYS

Virginia is already ranked the 9th worst state in the U.S. for deer-vehicle collisions, but improvements to current infrastructure can lessen wildlife-vehicle conflict while also enhancing flood resilience.

The 2023 WCAP identifies areas of high wildlife-vehicle conflict; however, state agencies are still not required to take action and mitigate barriers to wildlife movement.

A dedicated state Wildlife Corridor Fund would allow Virginia to leverage federal dollars available through habitat connectivity and climate resilience programs.

PROTECTING MIGRATORY FISH SPECIES

NATIVE HABITATS & SPECIES

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WHY IT MATTERS

Migratory fish species, especially those that move between our fresh waters and the ocean, are of critical economic, ecological, and recreational importance to Virginia. These migratory fish are defined by the need to move to a new environment to reproduce – like an American shad leaving the coastal Atlantic Ocean to spawn in one of the many tributaries of the Chesapeake Bay. During their spawning run, anglers flock to the river to catch the upstream swimmers, and after the eggs hatch, the juvenile fish will mature in our rivers and estuaries before leaving for the ocean. Throughout this process, migratory fish play a vital role in local food webs.

Despite their importance, many of our valued migratory fish species such as river herring, American shad, striped bass, American eel, menhaden, and the endangered Atlantic sturgeon are at risk. Migratory fish species face a growing suite of challenges ranging from reduced water quality, loss of habitat [*see page 59*], climate change, overharvesting, and increasing surface water withdrawals. As a result, fishery managers continue to struggle with managing and rebuilding fish populations. The combined effects on these depleted fish populations necessitate prioritizing investment in better understanding the cumulative impacts of these changes on our migratory fish species.

CURRENT LANDSCAPE

Virginia's migratory fish are facing pressure on multiple fronts. Restoring fish stocks will require a concerted effort on a number of issues including protecting water quality and habitat, mitigating water withdrawal impacts, addressing high predation pressures (including from invasive species), and a continued focus on offshore **bycatch** and habitat access including instream barriers like dams and impoundments. Progress is needed on each of these issues, and it will take a sustained effort to bolster Virginia's fisheries.

Surface water withdrawals can have a tremendous impact on already-depleted migratory fish stocks. As groundwater levels in the **Potomac Aquifer** continue to decline east of Interstate 95 and human populations increase in the same corridor, localities are being forced to look for alternate sources of water to reduce their reliance on groundwater wells. Increasingly they are looking to surface water withdrawals from Virginia's rivers to supply the water needed to meet current and future demands. These municipal surface water withdrawals kill huge quantities of fish eggs and larvae each year through impingement (organisms being pinned against mesh screens because of strong withdrawal velocity) or entrainment (organisms that go through a facility's water system because mesh size is too large). New withdrawal projects might assess the fish impacts deriving from each intake structure but do not take into account the cumulative impacts from all surface water intakes on migratory fish species in our river systems. Further, many older facilities have little or no technologies or systems in place to prevent impingement or entrainment of aquatic life. Once more, for facilities with large withdrawals, the **Department of Environmental Quality (DEQ)** can enforce federal regulations under §316(b) of the Clean Water Act to protect fish populations, including fragile species needing additional safeguards; however, many significant withdrawals affecting migratory fish, such as the Surry Nuclear Power Station's intake of over 1 billion gallons daily,[1] continue operating without these essential protections.

Fishery managers, recreational anglers, conservation interests, and researchers have long raised concerns about the amount of menhaden harvested in the Chesapeake Bay. In addition, the fishery has been plagued in recent years by a quota exceedance, numerous fish spills that have washed up on area beaches, and the bycatch of highly managed species such as red drum. In 2023, the Virginia General Assembly tasked **the Virginia Institute for Marine Science (VIMS)** with developing plans for studying a host of important issues related to the ecology and economic impact of menhaden on the Commonwealth. After reviewing the outcomes of this work and continued dialogue with stakeholders, the General Assembly did not fund the study during the 2024 General Assembly session.

Unfortunately, improved menhaden fishery management continues to be sidelined by a lack of data specific to the population of menhaden in the Chesapeake Bay. Current data is needed to better gauge the impacts that are taking place from climate change and the menhaden **reduction fishery**.

OPPORTUNITIES

Evaluating the cumulative impacts of all existing and proposed permitted and non-permitted surface water withdrawal intakes on the mortality of fish larvae and eggs would give Virginia the best understanding of what is needed to protect migratory fish. With sufficient funding, the Virginia Institute of Marine Science (VIMS) could appropriately study the cumulative impacts of these projects to inform permitting decisions and help fisheries managers better understand the impacts on fish populations. In tandem, DEQ should promptly enforce federal regulations of the **Clean Water Act** for cooling water intakes at power plants and large industrial withdrawals to reduce the ongoing impacts of outdated infrastructure on already imperiled fish populations.

Sufficient funding from the Commonwealth would also allow VIMS and its appropriate partners, such as the Atlantic States Marine Fisheries Commission (ASMFC), to begin work studying issues related to the ecology and economic impact of menhaden to the Commonwealth.

One particularly vulnerable migratory fish species, the American shad, has been managed under a complete fishing moratorium in Virginia for decades. In the James River, American shad have been below 1% of the Bay Program's recovery goal for the species since 2019,[2] and in 2022 the General Assembly funded the development of a recovery plan for American shad in the James River. The recovery plan, "A Framework for the Recovery of American Shad, Alosa Sapidissima, in the James River, Virginia,"[3] was completed by VIMS and partner experts at the end of 2023. Now, Virginia has a roadmap for the recovery of this important migratory species, and many of the projects and actions identified in this plan could benefit other imperiled migratory fish species in the James River as well.

TOP TAKEAWAYS

Many of our valued migratory fish species such as river herring, American shad, menhaden, and the endangered Atlantic sturgeon face a growing suite of challenges ranging from reduced water quality, loss of habitat, overharvesting, and both unprotected and increased surface water withdrawals.

With additional funding, VIMS can conduct a comprehensive menhaden stock assessment and model the cumulative impacts of existing and proposed permitted and non-permitted surface water withdrawal intakes to inform future decisions to protect migratory fish species and surface water intake permitting decisions.

Funding the recovery and restoration projects identified in the James River American Shad Recovery Plan ($2.7M) would directly improve conditions for American shad and other migratory fish across the James River Watershed.

RESTORING THE OYSTER

NATIVE HABITATS & SPECIES

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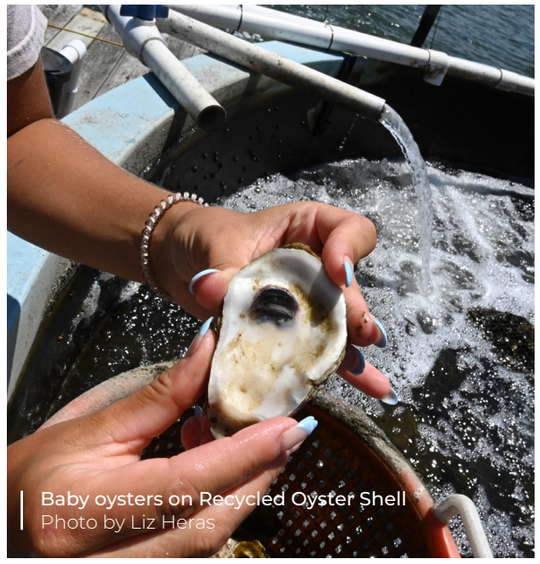
WHY IT MATTERS

The native oyster (Crassostrea virginica) is one of the Chesapeake Bay's keystone species and of great ecological, economic, and historical importance for communities and Tribal nations across the Commonwealth. Oysters filter sediment and remove excess nutrients from the water. **Oyster reefs** create benthic habitat for many marine species, from mud worms to predator fish species like striped bass. For centuries, oysters have been harvested from the Chesapeake Bay and its tributaries and remain one of the most economically important fisheries. Whole communities and regions are synonymous with the oyster and their cultures were formed around its harvest and processing. Today, people travel to Virginia's coastal areas to experience the many benefits oysters provide.

CURRENT LANDSCAPE

The Chesapeake (meaning "great shellfish bay'' in Algonquin) Bay once boasted oyster reefs so expansive they posed navigation hazards to explorers and watermen. Today, oyster populations in the Chesapeake Bay and its tributaries remain a fraction of their historical numbers. Overfishing, disease, and pollution have all taken their toll on this keystone species. There was a time when the oyster population in the Bay was so vast, the entire 19 trillion gallons of water could be filtered in less than a week. Today, our current population takes a whole year to filter the Bay.



Baby oysters on Recycled Oyster Shell
Photo by Liz Heras

Today oysters are experiencing a renaissance. Populations are rebounding thanks to oyster aquaculture, wise resource management by the **Virginia Marine Resource Commission (VMRC),** and investments in oyster reef restoration. As oyster restoration efforts have increased to meet Bay cleanup goals, the available supply of shells has dwindled while the cost per bushel has increased. This has created logistical problems in finding enough shells to complete reef restoration projects.

OPPORTUNITIES

Restoring Virginia's oyster population will continue to require broad partnerships, wise management of the existing oyster resources, and adequate resources. To meet the growing demand for oyster shells, oyster shell recycling programs need to be supported by funding that will incentivize people to donate oyster shells to an organization that is engaged in oyster replenishment projects and exempt from taxation under §501(c)(3) of the Internal Revenue Code. $250,000 per year in the Oyster Replenishment Fund would allow the Commonwealth to maximize the reuse of the state's oyster shell resources to incentivize shell recycling programs.

In addition, the Virginia Marine Resources Commission and the **Virginia Institute of Marine Science** should comprehensively map and sample all oyster-growing areas in the waters of the Commonwealth to complete an oyster stock assessment for the Commonwealth of Virginia.

Recycled oyster shells
Photo by Sue Mangan

TOP TAKEAWAYS

As oyster restoration efforts have increased to meet Bay cleanup goals, the available supply of shells has dwindled while the cost per bushel has increased.

Virginia's oyster shell recycling programs incentivize people to donate oyster shells to an organization that is engaged in oyster replenishment projects through tax incentives.

These recycling programs rely on consistent and adequate funding from the Commonwealth of Virginia.

PROTECTING FRESHWATER MUSSELS

NATIVE HABITATS & SPECIES

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WHY IT MATTERS

Freshwater mussels represent a great source of biodiversity, natural heritage, and ecological services and have significant cultural value to tribal communities. A single mussel can filter up to 15 gallons of water per day,[1] which in turn can prevent pollutants such as nitrogen from reaching downstream waters.[2] Unfortunately, mussels represent the most endangered class of organisms with 70% of species vulnerable to extinction.[3]

CURRENT LANDSCAPE

Virginia has 80 freshwater mussel species, many of which have incurred significant population losses. Many of these are listed in **Virginia's Wildlife Action Plan** as "Species of Greatest Conservation Need".[4] Since the Endangered Species Act's adoption in 1973, the largest single loss of endangered species occurred in the Clinch River, which is a biodiversity hotspot, due to a toxic chemical spill in 1998.[5] Water quality, dams, and loss of habitat have degraded these resources and threats will be further exacerbated by climate change.

Freshwater mussels have elaborate reproductive cycles which are linked with fish populations, often associated with specific species. As such, restoration of mussels is complicated and challenging, as it requires consideration of both mussels and fish populations. Further, the diversity of mussels combined with a lack of robust historical surveys presents challenges to identifying restoration sites.[6] Investments to protect mussels have largely been limited to mitigation dollars but restoring these beneficial organisms will require greater investments.

Fortunately, our ability to propagate and restore populations of mussels has significantly advanced in the past decade. Hatcheries have vastly improved their ability to propagate mussels by using fish hosts in recent decades and are very capable of restoring populations given available funding mechanisms. Still, very limited resources have been appropriated and these funds have primarily come from mitigation events. Mitigation is only aimed at returning what was lost, not necessarily to restore species and rivers that require intervention to prevent local extinction or decline. Virginia has partnered with businesses and public organizations in Southwest and Central Virginia to create tributary-specific mussel restoration plans and to augment and monitor mussel populations in the Tennessee River and James River drainages of Virginia. These efforts have seen progress towards creating self-sustaining populations of endangered mussels. Further, **Virginia's Department of Wildlife Resources (DWR)** is embarking on a similar statewide planning process as a result of legislation from 2022.

Virginia has recognized the benefits of shellfish in previous conservation efforts, and freshwater mussel restoration offers an opportunity to extend those successful initiatives into the headwaters of the state. Virginia has a willing coalition of partners that can help with mussel restoration, but the Commonwealth needs to support the implementation of freshwater mussel restoration.

OPPORTUNITIES

To meet the needs that will be identified in the statewide plan, public and private programs that support hatcheries in efforts to grow and release mussels across the Commonwealth need sufficient funding from the Commonwealth.

Virginia's two hatcheries, the Aquatic Wildlife Conservation Center in Marion and the Virginia Fisheries and Aquatic Wildlife Center in Charles City, require a total of $20 million in infrastructure and facility upgrades. The Virginia Department of Wildlife Resources also needs to maintain current funding to support staff for freshwater mussel restoration.

Restoration actions, including those identified in the James River Basin Mussel Restoration Plan[7] and Clinch River Mussel Restoration Plan[8] also rely on sufficient state funding.

Mussel grow tanks at Harrison Lake Hatchery
Photo provided by James River Association

Laser-tagged mussel from Harrison Lake Hatchery
Photo provided by James River Association

TOP TAKEAWAYS

Mussels have significant ecological, water quality and cultural significance and represent the most endangered class of organisms with 70% of species vulnerable to extinction.

Our ability to successfully propagate and restore populations of mussels has significantly advanced in the past decade.

Restoration programs and VA DWR need sufficient state funding to be successful in implementing their mussel restoration programs.

MAXIMIZING TREE CANOPY

NATIVE HABITATS & SPECIES

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WHY IT MATTERS

Virginia's tree canopy provides many economic, social, and ecological benefits. Trees cool our cities and clean the air, reduce stormwater runoff and localized flooding, and stimulate the economy. Trees are a tool to help Virginia achieve its carbon reduction goals and mitigate against the most harmful impacts of climate change. Unfortunately, according to data from the Chesapeake Bay Program, Virginia lost 9,548 acres of tree canopy between 2014 and 2018.[1] Of the amount of forest and urban trees lost each year, roughly 10% became **impervious surfaces** – increasing stormwater runoff and amplifying the heat island effect.

Forests and trees act as **carbon sinks** and offset 13% of U.S. emissions.[2] Localities across Virginia are developing ambitious climate action plans to reduce their greenhouse gas (GHG) emissions, with trees as a part of many of the plans.

Virginia is forecasted to be hotter and wetter, with more damaging storms and increased risk of heat-related illness and deaths.[3] Preserving and expanding tree canopy strengthens the resilience of communities in the face of these challenges by:

- Reducing temperatures in urban and suburban neighborhoods as well as heat-related emergency room visits, which are higher in formally redlined communities. Studies have found up to 16-degree difference between neighborhoods with canopy and those without.[4]
- Intercepting millions of gallons of stormwater, reducing polluted runoff and reducing coastal and inland flooding of, and damage to, businesses, homes, roads, and other critical infrastructure.
- Stabilizing streambanks, reducing erosion and sediment into our waterways.
- Diminishing cooling costs by up to 30%, reducing the energy burden on Virginia residents and GHG emissions.

Trees also provide a myriad of mental and physical health benefits, such as cleaning the air of street-level particulates that cause asthma attacks and other respiratory problems. Trees also reduce municipal water treatment costs by filtering pollutants from our drinking water.

CURRENT LANDSCAPE

During the 2024 General Assembly session, Virginia passed the **Forest Conservation Act**. This stakeholder-led study will evaluate where and why Virginia is losing canopy and will recommend funding and policy initiatives to reverse the loss.

Currently only localities within Planning District 8[5] have the authority to conserve mature tree canopy during construction.

In addition,localities cannot require more than the bare minimum replacement percentages. For example, for a site zoned as business, commercial, or industrial, the ordinance cannot require a developer to replace more than 10% of the canopy. Many localities have expressed support and interest in Virginia setting a floor, not a ceiling, on its tree canopy replacement percentage as evidenced by the localities that testified and wrote letters in favor of these initiatives.

Only the tree conservation statute contains language that enables a locality to create a tree fund which a developer can pay into in lieu of planting on site. With this additional authority, local governments would have additional funds to support tree planting and maintenance programs.

Community-based organizations meet resistance when planting new trees in older neighborhoods, particularly where residents are living on a fixed income because they lack the capability to care for the trees they already have. Preserving healthy, mature trees is equally important to planting new ones as it will take decades for a newly planted tree to provide the same **ecosystem services** as the mature tree. Programs that help residents keep their existing trees healthy will preserve more trees on private property and enable localities to achieve their canopy goals. The **Trees For Clean Water grant program** should be expanded to include tree maintenance for underserved communities. Investing in routine maintenance when a tree is young will help to minimize future costs while helping to maximize benefits and extend the tree's functional lifespan.

Despite decades of data[6] showing expanding highways doesn't reduce traffic congestion, policymakers continue to pour billions into more roads, removing large swaths of trees for new road construction/expansion and from right-of-ways and on-ramps/off-ramps. As an example, new lanes on Interstates 95 and 64 have resulted in the loss of many acres of tree canopy in these corridors.

OPPORTUNITIES

Trees are critical infrastructure. Enabling developers to pay into a tree fund if they cannot achieve the mandated canopy replacement percentages on site and would provide local governments with additional funds to maintain and plant more trees on public and private property within the locality's boundaries.

Adequately funding the Virginia Trees for Clean Water grant program annually and expanding it to include maintenance of both young and mature trees would reduce homeowner burdens and help owners preserve healthy trees on private property. In turn, this would enable local governments to achieve their tree canopy goals, which are frequently tied to their carbon reduction goals.

Linear transportation projects, like roads and highways, should incorporate trees into their designs and budgeting processes. If trees are lost to construction, the agency responsible for the project should mitigate the loss by paying into the Trees for Clean Water Fund if they are not able to plant the required amount of trees by themselves.

As Virginia localities approve higher density residential developments in an effort to make housing more affordable, the need to maintain urban trees cannot be underestimated, especially as heatwaves and intense rainfall become increasingly frequent. Higher density development should include setbacks for green space, explore incentives to preserve mature trees, and reduce road widths to accommodate tree lawns, tree wells and bioswales in order to not exacerbate urban heat islands.

TOP TAKEAWAYS

Tree canopy provides many benefits yet Virginia is losing tree canopy at a staggering rate.

Tree replacement programs rely on consistent funding - allowing developers to pay a fee in lieu of planting would help fund localities' urban forestry programs. Also, increasing funding for Virginia Trees for Clean Water and expanding this grant program to allow for tree maintenance in underserved communities would help preserve mature trees on private property as well.

State agencies, in particular VDOT, should mitigate loss of tree canopy stemming from transportation projects.

PREVENTING HARMS FROM INVASIVE PLANTS

NATIVE HABITATS & SPECIES

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WHY IT MATTERS

The **Virginia Department of Conservation and Recreation (DCR)** lists 103 invasive plants that "pose a threat to Virginia's forests, native grasslands, wetlands or waterways."[1] Across Virginia, invasive plants are growing in number, spreading quickly, and radically altering our natural environments. Trees like Callery (Bradford) pear proliferate throughout our forests and farmlands, creating dense monocultures that prevent the growth of native species and ruin crops. Native shrubs that are critical for migratory birds and wildlife are being replaced by **non-native** invasive shrubs like Autumn olive and Chinese privet. Japanese stiltgrass and Wavyleaf grass form dense mats on the forest floor, preventing our native trees from regenerating. Among the most dire threats are vines like English Ivy, Asiatic Bittersweet, Mile-a-Minute, Kudzu, and Porcelain-berry that smother mature trees and tear down the forest canopy. These plants move slowly enough to not be noticed by laypeople, but fast enough that in another generation we will lose large amounts of tree cover and the integrity of our local ecosystems.

The changes go beyond the trees, shrubs, and ground covers. Native plants are the foundation of our local ecosystems. Our native wildlife and pollinators are interdependent with native plants and generally are unable to utilize the non-native invaders. Approximately 20-45% of our native bees are entirely dependent on a single native plant species or genus for their nectar; if their food source is eliminated by invasive plants, they will become extinct, and the plant will not be able to reproduce.[2] Other impacts include documented changes in soil chemistry, increased run-off and erosion, and warmer stream temperatures as streamside forest canopies disappear. The result will be a degradation to our natural heritage, loss of ecological stability and resilience, and a decline in all the lifeforms that currently thrive in our native environments.

CURRENT LANDSCAPE

Virginia has made recent policy progress on **invasive species** and in 2024 has initiated partial funding of the **Virginia Invasive Species Management Plan (VISMP)**. The VISMP needs sufficient, sustained financial and technical support to achieve its goals.

Recently enacted policies in Virginia include: prohibiting state agencies from planting, selling, or propagating invasive plants; requiring tradespersons involved with proposing or installing plants to provide written notification to property owners for all plants proposed for installation that are included on the list of invasive plants; and allowing localities to permit the supervised use of herbicides by volunteers on public lands. These are important policies but their scope only allows them to make incremental progress, whereas measurable reductions to the harms caused to our state's economy, environment, or human and animal health are needed statewide.

Current research in deploying drone technology is proving promising. A 2023 study found that the cost of detecting and controlling invasive pines using drones "was reduced to approximately one-third compared with traditional methods [and the] time needed to detect and control invasive trees was more than seven times less compared with traditional active search and control."[3]

Efforts to eradicate invasives have engaged thousands of landowners and volunteers across the Commonwealth. For example, in Fairfax County, the Invasive Management Area program had 5,847 volunteers in 2023, a 17% growth over the prior period.

Education and awareness are increasing; however, approximately 49 invasive plant species are still available for sale in Virginia. Per the Virginia Invasive Species Working Group, the impact of all invasive flora and fauna on the Commonwealth's economy is estimated to be more than $1 billion per year.[4]

OPPORTUNITIES

EDUCATING CONSUMERS

Citizens have demonstrated they do not want to unwittingly purchase invasive plants.[5] Requiring that all vendors who wish to continue selling invasive plants label their inventory as such will assist consumers in making educated decisions.

DETERMINING SCOPE

Solving problems requires comprehensive, accurate data to ensure the interventions will be timely and sufficient. Virginians need a current study to fully understand the impact of invasive plants on our environment, economy, and health; and adequately determine the most cost-effective reduction measures.

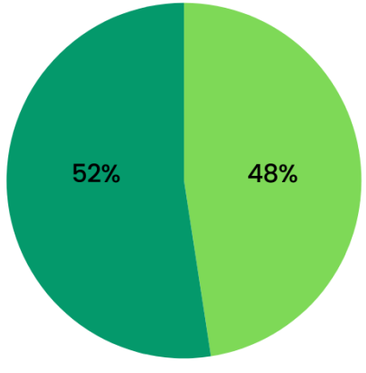
SUPPORTING LANDOWNERS

More than 80% of land in Virginia is privately owned.[6] Treating invasive plants is time-consuming, labor-intensive, and expensive work. Property owners have demonstrated that they are willing to put in time and materials but need assistance to remediate and remove invasive plants that have encroached on their land and help protect neighboring public lands such as our state forests and local parks. A pilot cost-share program, similar to the **Virginia Conservation Assistance Program (VCAP)**, could help Virginia residents pay for the removal of invasive plants.

INTRODUCING TECHNOLOGY

Drones are currently being deployed to reduce the impact of invasive plants in agricultural fields. Invasives in remote areas are particularly challenging. Using drones would allow agencies and volunteers to reach less accessible locations. UVA is designing a study to show that specific plants can be both mapped and treated with drones over a wide area. This project will need state funding.

INVASIVE PLANTS IN COMMERCE



Sold in Nurseries
49 of the 103 invasive plants listed on the Virginia DCR Invasive Plant Species List are still sold in nurseries or available online across the state.

Non-commercial
54 invasive plants isted on the Virginia DCR Invasive Plant Species List were imported unintentionally or have been removed from the trade.

TOP TAKEAWAYS

- DCR lists 103 invasive plants that "pose a threat to Virginia's forests, native grasslands, wetlands or waterways" and approximately 49 of these invasive plant species are still available for sale in Virginia.
- Virginians have demonstrated they do not want to unwittingly purchase invasive plants and are struggling to manage and control the explosion of harmful invasive plants on their properties.
- Labeling plants, cost-share programs for landowners, and drone technology are all policy solutions that have been shown to reduce invasive plants.

Burnside Sunflower Farm in Prince William County, VA
Photo by Blaine Fitzgerald

LAND USE & TRANSPORTATION

3

RESPONSIBLE DEVELOPMENT

RELEVANT PROGRAMS & AGENCIES

See full glossary starting on page 157

JOINT LEGISLATIVE AUDIT & REVIEW COMMISSION (JLARC)

Conducts program evaluation, policy analysis, and oversight of state agencies on behalf of the Virginia General Assembly.

PENNSYLVANIA-NEW JERSEY-MARYLAND INTERCONNECTION (PJM):

Regional transmission organization that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia, including Virginia.

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT (DHCD)

A Virginia state agency that oversees policies, programs, and funding to support affordable housing, community development, and energy efficiency projects, contributing to the state's overall development and sustainability goals.

Gainesville data center construction–Prince William County, VA
Photo by Hugh Kenny, Piedmont Environmental Council

SUSTAINABLE HOUSING GROWTH

RESPONSIBLE DEVELOPMENT

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WHY IT MATTERS

Housing has a profound effect on our lives.[1] Not only does it shape where we work, how we get around, and the community around us, but housing is also the most valuable asset for many people. Yet, while people are moving to the Commonwealth for jobs and opportunities, we are not building enough housing near jobs, services, and transit to keep up with demand, fueling a state-wide housing crisis. And increasing climate threats are bringing new risks and rising costs, threatening Virginians' ability to mitigate housing-related financial risks.

Zoning policies in Virginia's cities and counties limit a huge amount of our residential land to single-family only housing,[2] which typically consumes twice the energy of multi-family homes.[3] If zoning doesn't allow new homes at different levels of affordability to be built in our cities, towns, and existing suburbs, people will be forced into living farther out in car-dependent sprawl, leading to more carbon pollution from longer commutes.[4] Virginians already face one of the nation's longest commutes,[5] which strain household budgets.

If we sprawl farther outward, Virginia will lose valuable farmland, forests, and wetlands, destroying carbon sinks and impacting the resilience of our communities. This is a real threat, with our neighbors in North Carolina seeing 10 new houses built in the floodplain for every 1 home in the floodplain that is demolished.[6]

Dense housing in cities and towns could even help reduce **urban heat islands** and stormwater runoff if cities shrink roadway width to add space for tree wells and bioswales to the public right-of-way. Green space and housing growth need not conflict. When built to high standards and in climate-safe and transit-oriented places, new housing can be a powerful tool to make more liveable and resilient communities.

CURRENT LANDSCAPE

Virginia's restrictive zoning and land use policies are a primary cause of a shortage of over 105,000 housing units in the Commonwealth and are a leading factor causing housing prices to shoot up to an all-time high.[7] Consequently, families are facing financial insecurity, struggling to live close to jobs and services, and being priced out of communities they have called home for decades. The same housing stock that was affordable a generation ago is out of reach for young families, and almost 30% of middle-income families aged 50+ are paying over 30% of their income on housing.[8]

Local zoning codes can artificially limit residential land to single-family detached homes, limiting housing supply and driving up housing costs. Other zoning provisions like large minimum lot sizes and parking mandates further restrict the types and amount of housing we can build–and drive up the cost of housing that is built. Many localities do not currently allow for more affordable **accessory dwelling units (ADUs)**, and those that do often have regulations so complicated as to make them unfeasible to build.

Currently, some localities have taken steps to upzone beyond single-family housing and legalize and streamline more diverse and accessible housing types. Unfortunately, these local efforts alone without state policy will never meet the needs of all Virginians, or fully protect Virginia's environment.[9]

Indeed, when cities loosen zoning restrictions, we can see a decrease in housing costs in the immediate jurisdiction,[10] but the region surrounding it may remain just as costly, and regional commutes and sprawl just as bad. We need state solutions to complement local efforts to address Virginia's housing shortage while reducing sprawl and ensuring solutions to create housing also mitigate climate risks, such as urban heat islands and localized flooding, for residents and their homes.

OPPORTUNITIES

The best opportunities to add more housing are in our urban and suburban areas, particularly cities, towns, and counties that have over 100,000 residents. With climate change making Virginia hotter and wetter, it's important to ensure that new housing does not exacerbate heat islands or flood risks or put more Virginians in harm's way. We recommend that state policymakers take bold action to pass and implement the following:

TRANSIT-ORIENTED DEVELOPMENT

Incentivizing local governments to zone for multi-family housing and eliminate parking minimums within a half mile of all bus rapid transit, light-rail, and Metro routes in Virginia can come in a variety of forms, including having the **Department of Housing and Community Development** administer a grant-based incentive program to localities who upzone such areas.

ACCESSORY DWELLING UNITS

Accessory dwelling units include mother-in-law suites and backyard cottages. By-right development of accessory dwelling units in urban and suburban localities for long-term rentals would provide more housing in existing communities. They can house family members, facilitatie intergenerational living and community support, and increase property values and wealth-building for homeowners.

HOUSING IN JOB CENTERS

Converting acres of parking lots in commercial areas into mixed-use, walkable, and tree-lined communities will enable more Virginians to live near where they work, retail businesses to thrive, and employers to access nearby talent. Allowing housing and mixed-use development in commercial areas within approved Urban Development Areas to be built without a lengthy rezoning process would encourage more in-fill development.

AFFORDABLE HOUSING ON FAITH-BASED PROPERTIES

Faith-based organizations can offer free or lower-cost land for affordable housing and are among our most supportive communities for low-income Virginians and vulnerable populations like seniors. Implementing a "Faith in Housing" policy would allow long-term, by-right low-income housing on land owned by faith-based organizations, in locations within approved Urban Development Areas with nearby access to jobs, services, green space, and transit.

TOP TAKEAWAYS

Virginia's restrictive zoning and land use policies are a primary cause of a shortage of over 105,000 housing units in the Commonwealth and a primary factor in causing housing prices to shoot up to all-time highs.

We must prioritize building new climate-safe homes at a variety of affordability levels in our existing cities, towns, and suburbs so that people will not be forced to live farther away in car-dependent sprawl, leading to much higher carbon pollution from long commutes and lower climate resilience.[11]

Allowing more types of dense in-fill housing will provide a myriad of benefits, including economic growth, increased tax base, fewer carbon emissions, lower combined housing and transportation costs, more conserved land, and decreased homelessness and housing insecurity.

RESPONSIBLE DATA CENTER DEVELOPMENT

RESPONSIBLE DEVELOPMENT

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WHY IT MATTERS

Virginia is home to the largest concentration of **data centers** in the world, with a combined power consumption capacity about four times greater than the next closest American markets, Dallas and Silicon Valley.[1] This massive industry is continuing to grow rapidly, requiring huge amounts of energy, land, and water to operate, resulting in widespread community impacts.

One data center can use as much energy as thousands of households; in fact, a large "hyperscale" data center can consume over 100 **megawatts (MW)** of power,[2] which equates to the power consumed by approximately 80,000 households. As of early 2023, data centers make up 21% of Dominion Energy's power load in Virginia,[3] with PJM's projections indicating a doubling of the state's peak electricity demand through 2038.[4]

While Dominion has a long history of predicting more growth than occurs, electricity consumption has increased significantly over the past four years.[5] Dominion's high projections[6] and "electric service agreements"[7] with the data center industry are being used to justify dozens of new substations and expensive transmission projects to serve data center load requests throughout the state.[8,9] These new polluting gas facilities would increase all ratepayers' electric bills significantly despite the need being driven almost entirely by data centers.

Data centers can also have significant local air quality impacts. Data centers around Virginia rely on diesel generators as a backup electricity source. In Northern Virginia, data centers have obtained air permits for over 4,000 diesel generators with a combined capacity of over 11GW of power[10,11] more than all of Dominion's entire gas generator fleet. There is no monitoring of the impacts on air quality from periodic testing of these generators, which is usually done monthly,[12] or any analysis on the impact if there were a transmission level outage.

Data center campuses are getting larger, requiring massive amounts of land and water. Projects over 1,000 acres have been proposed directly adjacent to national and state parks, threatening the integrity of Virginia's landscapes and **wildlife corridors**. Despite prioritizing reclaimed water for data center cooling in the past, Loudoun County's data center potable water consumption is now higher, having increased by 250% in the last 4 years, totaling 899 million gallons in 2023.[13] Data center development expectations in other parts of the state are also triggering additional surface water withdrawal requests.[14]

The nexus of land, energy, water, and ratepayer impacts represents a complex challenge–and immense opportunity–to protect Virginia's environmental resources.

CURRENT LANDSCAPE

For years, statewide tax incentives and active recruitment by both state and local economic development offices have encouraged data centers to continue siting in Northern Virginia, despite its existing heavy concentration of data centers.[15] Coupled with skyrocketing demand following the 2020 pandemic, Northern Virginia as well as other markets throughout the state are experiencing exponential growth. Unfortunately, there has been no proactive planning or adjustment to the state tax incentives to address this shift and the need to protect the resources of the state. Without sufficient regional or statewide oversight, localities continue to approve more facilities without considering the statewide and nationwide impacts on the electric grid, ratepayers, water supply, national and state parks, or air pollution.

The concentrated data center growth in Northern Virginia has also resulted in a congested grid that is already in need of significant transmission projects. **PJM**, for example, recently approved a $5B portfolio of transmission projects that would expand grid connections from West Virginia, Pennsylvania, and Maryland to the Northern Virginia data center market. One of the major projects in that portfolio is the Mid-Atlantic Resiliency Link traversing from data center alley out to West Virginia where the power generation is primarily coal and gas-fired power plants.[16]

In December 2023, the **Joint Legislative Audit & Review Commission (JLARC)** passed a resolution[17] to study data centers and better understand these wide-ranging impacts. That study remains ongoing, and it should help guide decision-makers. However, the energy costs[18,19] and many of the environmental impacts of data centers are already well known.

OPPORTUNITIES

It is time for the state to play a larger role in planning for and mitigating the impacts of this explosive industry. As one of the largest industries in the state, data centers require greater transparency and oversight to ensure that their development is happening in a sustainable manner that benefits communities without harming our health and natural resources.

The current review process is inadequate at both the local and state level. Localities, for example, are making decisions about large data center projects with little to no information about the significant ramifications on the state's electric grid and ratepayers, water supplies, air quality, or carbon emissions. During the local approval process, localities should be required to consider information about the potential grid impacts of a data center proposal, including energy demand, required infrastructure, and interconnection conditions. For particularly large data center projects, this review could happen at the state level to help ensure continued grid reliability and prevent excessively high costs from falling to the ratepayers. In addition, a state-level review could evaluate impacts on shared regional resources or state goals not usually in the localities' purview to address, such as the protection of national and state parks, water supply, and air quality.

In addition, as grid infrastructure costs add up, Virginia needs to be sure that the SCC and other agencies have the appropriate tools to ensure that data center companies are paying their fair share of transmission, distribution, and generation costs.

A final important opportunity is to revisit the state's tax incentives. The current approach continues to attract development but has failed to incentivize data center companies to mitigate environmental and community impacts. A revamped tax incentive could encourage clean energy commitments, energy efficiency standards, innovative demand shifting and peak shaving that reduce facility's energy consumption, diesel generators phase-out, efficient cooling w ater systems, and buffers from parks, homes, schools, and nearby communities.

TOP TAKEAWAYS

Local review of data center developments is inadequate to evaluate widespread impacts on the grid, electric ratepayers, water resources, parks, air quality, and emissions, and a state review process is necessary.

With data centers representing the driving force behind significant load growth projections, it is important to ensure the industry is paying its fair share and costs aren't falling on all utility ratepayers.

Virginia already has the largest data center market in the world, so state incentives should be tightened to encourage data center proposals that are more sustainable.

TRANSPORTATION

SMART SCALE

A nationally-recognized transportation funding prioritization process that evaluates and ranks proposed projects based on key factors to help determine which ones should be funded. Projects are evaluated on anticipated benefits such as safety, reduced congestion, accessibility, economic development, efficient land use, and environmental impact.

TRANSFORMING RAIL IN VIRGINIA PROGRAM (TRVA)

A multi-corridor, multi-year, multi-phase passenger rail development program. An agreement between CSX and Norfolk Southern will allow six new roundtrip Amtrak Regional trains, with an extension of service from Roanoke to Christiansburg, and five more Virginia Railway Express (VRE) trains on the Fredericksburg line.

VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT)

State agency responsible for building, maintaining, and operating the state's roads, bridges, and tunnels.

"Smart growth in small towns" photo contest winner: Downtown Bristol, VA
Photo by Lucas Manweiler

TRANSFORMING TRANSPORTATION

TRANSPORTATION

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WHY IT MATTERS

Virginia urgently needs a cleaner, more equitable transportation system.

The Commonwealth's approach to transportation has profound effects on our communities and our environment. For decades, funds have primarily gone to road projects—to the detriment of safer, healthier, cleaner alternatives. As a result of this asphalt-centered approach, transportation is Virginia's largest source of climate pollution—generating about half of all statewide carbon pollution[1]—and it is a significant source of other air pollutants that cause serious environmental and health damage. Communities of color and under-resourced communities bear a disproportionate share of the health burdens from transportation-related pollution.[2]

New and expanded roads also destroy critical natural resources—such as forests and wetlands—that absorb carbon and increase communities' resilience to flooding. They also add to the maintenance costs taxpayers must cover. They also perpetuate reliance on private vehicles, exacerbating inequities for those who cannot afford a car and those with disabilities for whom a standard vehicle is undrivable, while frequently doing little to relieve the congestion faced by those who do drive.

CURRENT LANDSCAPE

Significant transportation reforms have been adopted in recent years, including increases in funding for transit, rail, and highway maintenance, the groundbreaking Transforming Rail in Virginia initiative, and the use of **SMART SCALE** to provide a more objective and transparent basis for selecting projects for funding. Even so, the bulk of our transportation funding is still allocated to highways[3] despite decades of studies and experience showing that new and wider highways incentivize sprawling development, encourage more driving and generate more pollution, and fail to provide long-term congestion relief[4] while transit investments have been shown to provide a significant return on investment.[5]

Efforts also continue to weaken or sidestep SMART SCALE, including using budget earmarks to fund particular projects that have yet to go through or fared well in the prioritization process. Recent changes to the program by the Commonwealth Transportation Board are almost certain to reduce funding for cleaner transportation projects—especially bicycle and pedestrian projects—and increase funding for larger highway projects. And in another major step backward, Governor Youngkin announced in June that, contrary to state law, he intends to unilaterally withdraw Virginia from the Clean Cars Standards at the end of 2024, which would reverse the most significant step the state has taken to cut tailpipe pollution.[6]

OPPORTUNITIES

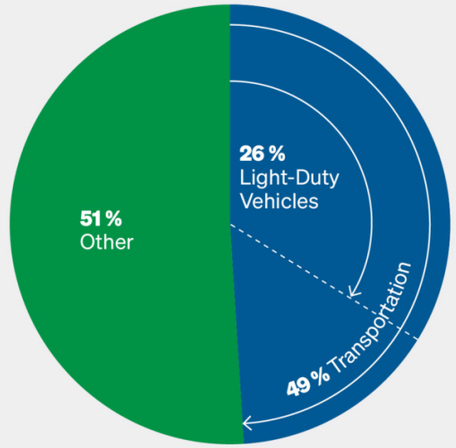
Addressing the climate crisis, spending tax dollars more wisely, and improving Virginians' health, equity, and mobility requires moving away from a highway-focused transportation paradigm. Instead, a "fix it first" approach should be prioritized for the maintenance, resilience, and safety of existing infrastructure and the focus of our state and regional transportation budgets should shift from primarily funding highway construction to funding transit, rail, bicycle, and pedestrian facilities. This shift not only offers substantial environmental, health, and equity benefits, but the Commonwealth needs to remain economically competitive. Transit and other alternatives to driving can increase transportation equity by providing critical access to jobs, healthcare, and essential services for all, and today's businesses and workforce increasingly seek to locate in walkable communities with good access to public transportation.

As record federal funding continues to flow into Virginia under the new infrastructure laws, we need to seize the moment to pursue competitive grants for cleaner, more equitable transportation. In addition, we must defend the data-driven, objective approach of the SMART SCALE prioritization process, oppose attempts to fund projects outside of the prioritization process, and extend those principles to other transportation funding decisions such as federal and regional funding allocations.

We also need to strengthen consideration of the climate change effects of transportation plans, proposals, and funding decisions, and ensure that state and regional plans serve to reduce—rather than exacerbate—carbon emissions and other harmful pollutants. Virginia should set a specific goal for reducing vehicle miles traveled and implement policies to achieve it. Finally, we must also ramp up funding and other efforts to accelerate vehicle electrification and expand charging infrastructure for the driving we continue to do.

CO_2 Emissions

According to the most recent data available from the Virginia Department of Environmental Quality, transportation is the largest source of carbon pollution in Virginia and light-duty vehicles are responsible for most of those emissions.



Transportation is the largest source of climate pollution. Light-duty, personal vehicles are responsible for most of these emissions.
Graph provided by Southern Environmental Law Center

TOP TAKEAWAYS

Transportation is Virginia's largest source of carbon pollution, and the health burdens of transportation-related pollution fall disproportionately on communities of color and under-resourced communities.

The bulk of our transportation funding is still allocated to highways, despite decades of studies and experience showing that new and wider highways incentivize sprawling development, encourage more driving, and fail to provide long-term congestion relief while transit investments have been shown to provide a significant return on investment.

Virginia needs to transform its transportation approach and focus on: fixing our existing infrastructure; prioritizing cleaner, more equitable transportation (primarily transit, rail, bicycle, and pedestrian facilities); accelerating vehicle electrification; and promoting sustainable, affordable, and resilient communities.

MODERNIZING PUBLIC TRANSIT

TRANSPORTATION

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WHY IT MATTERS

Public transportation opens doors to opportunities and provides mobility for those who need it most. Transit provides access to resources such as employment, housing, and healthcare, to ensure economic, environmental, and social sustainability. Studies have proven that transportation is the largest source of greenhouse gas emissions in Virginia,[1] equaling 42.1% of all emissions.

Promoting the use of alternative modes of transportation including buses, trains, and ferries contributes to lowering the **vehicle miles traveled** in the state: The more people who ride transit, the fewer cars are on the road.

Transit also provides financial benefits for the community, as a recent study from AAA found that the total cost of owning and operating a personal vehicle is over $12,000[2] annually. Over half of all transit users in the US earn less than $55,000 a year, and installing infrastructure is a vital asset for personal economic growth and social mobility. Not to mention the simple fact that over 1.1 million Virginians over the age of 16 don't have a driver's license, including 26% of our population between the ages of 16 and 34.

Lastly, public transportation is an economic value to the Commonwealth, generating over $8.9B in economic benefits in FY 2022 while creating and sustaining over 16,000 jobs.[3]

CURRENT LANDSCAPE

The pandemic battered our transportation network, but especially our public transit systems including impacting ridership, staff recruitment and retention, and operational and capital costs. While many industries were battening down the hatches, Virginia's transit agencies were pushing the envelope by expanding micro-transit, implementing reduced or zero-fare programs, redesigning service and networks, investing in zero-emission technology, and improving our "last foot" infrastructure including investing in more shelters and benches. Instead of relying on the transit plan of yesteryear, our systems are looking to build the transit network of tomorrow.

Those investments are now starting to pay dividends. Since FY 2021, even with the rapid advancement in work-focused technology and schedules (virtual meetings, work-from-home or hybrid capability, and improved cloud services) Virginia's transit systems have seen robust ridership growth coming out of their pandemic-era lows with large systems like Metro on-pace to grow 232% from FY 2021-23 to small systems like Mountain Empire which serves Wise, Lee, and Scott counties in Southwest Virginia growing 183% that same period. Overall, transit ridership across the entire Commonwealth has grown 140% since FY 2021.[4]

The environmental impact of this growing ridership cannot be understated. In FY 2024, public transit is on-pace to carry 663 million passenger miles, which is the equivalent of removing an additional 36,000 cars from our roads compared to FY 2021. This reduction in potential automobile trips also eliminates the potential release of over 67,000 metric tons of carbon emissions.[5]

OPPORTUNITIES

With the significant increase in ridership for transit agencies across Virginia, progress is being made in enhancing technology and service improvement projects. The successful launch of microtransit systems across the state—for example, **Greater Richmond Transit Company (GRTC)**'s LINK in Ashland and MetGo! in Wise-Norton County—has demonstrated a need for mobility in areas underserved by local bus routes, allowing residents in decentralized geographic areas accessibility to places like hospitals, grocery stores, and work. Zero emission technology implementation in Blacksburg and Alexandria is leading the way to meet sustainable environmental, mobility, and energy goals. Additionally, many systems are advancing network redesigns to more efficiently and effectively serve their communities.

Like nearly every facet of post-pandemic life, the cost to operate and maintain our public transit network has far outpaced funding levels. A snapshot of staffing costs across the Commonwealth's largest transit agencies shows an annual cost increase of 6.5% from 2019 to 2023. In addition to higher staffing costs, fuel, primarily diesel fuel, doubled in cost from mid-2019 to mid-2022 with fuel costs still over 25% above 2019 averages today. Lastly, the capital costs for our transit systems have also gone through the roof with the average costs of a transit bus going up anywhere from 15% for diesel buses to 30% for electric buses with delivery times extending from months to potentially years.

With transit ridership continuing to grow, operating costs becoming larger shares of transit agency budgets, and pandemic-era funding beginning to go away – now is the time to begin looking at expanded regional and statewide dedicated funding for public transportation to create and maintain the 21st-century modern transit network that Virginians deserve.

TOP TAKEAWAYS

Transit ridership has grown 140% since 2021 and is on pace to exceed 121 million trips in 2024.

Virginia's transit agencies are continuing to innovate by expanding micro-transit, implementing reduced or zero-fare programs, redesigning service and networks, investing in zero-emission technology, and improving our "last foot" infrastructure including investing in more shelters and benches.

Operating costs have far outpaced state and federal transit funding.

Promoting public transit lowers the vehicle miles traveled in the state
Photo by Andrew Kreydatus

EXPANDING RAIL
TRANSPORTATION

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WHY IT MATTERS

Compelling energy, economic, and environmental benefits flow from maximizing the use of rail to move both people and goods. Virginia has made significant progress on passenger rail in recent years. Virginia's efforts to improve and expand passenger rail service resulted in a 74% increase in service, a 135% increase in ridership, and expanded daily Amtrak Regional service to 2.5 million more Virginians.[1] Recent ridership on our Regional trains is setting new records, with our Regional's projected to carry nearly 1.4 million passengers this year[2]–avoiding an estimated 328 million passenger miles on our roads, reducing fuel consumption by about 7 million gallons, and preventing the release of 61,000 metric tons of carbon pollution.[3]

CURRENT LANDSCAPE

Since December 2019, the state has finalized agreements with CSX and Norfolk Southern to purchase a total of 412 miles of railroad right-of-way and 251 miles of railroad track, as well as construct 50 miles of new railroad track and double the rail capacity between Washington, DC and Virginia by expanding the Potomac River railroad crossing. These agreements are core parts of the **Transforming Rail in Virginia program (TRVA)** which is a multi-corridor, multi-year, multi-phase passenger rail development program. These agreements will allow six new roundtrip Amtrak Regional trains, an extension of service from Roanoke to Christiansburg, and five more Virginia Railway Express trains on the Fredericksburg line (including weekend service). In addition to the increased service, these projects should reduce travel time and increase the reliability of our trains.

The TRVA agreements will allow for future phased electrification of our rail service when the DC-Richmond-North Carolina corridor is fully built out, however, we should look for opportunities and technologies that will allow the state to begin to decarbonize our rail corridors sooner.

The state has completed a feasibility study for the return of direct east-west passenger rail service along the Commonwealth Corridor as part of their 2022 Virginia Rail Plan which they have submitted to the Federal Railroad Administration's (FRA) Corridor Identification Program, and which has been accepted, to place it in the federal project pipeline, and they are also updating their station modernization and improvement plan.

Atlantic Coastline train bridge
Photo by Lisa L. Watkins

OPPORTUNITIES

Passenger rail needs continued investment to achieve even greater benefits. Train travel times and reliability need to be improved, many stations need repair and updating, and transit connections between rail stations and activity centers are frequently limited or lacking altogether.

Additional service is needed as well. Our passenger rail network is primarily set up for north-south travel and there is very limited east-west service.

And although train travel is far less polluting and more energy efficient than driving, electrifying rail in Virginia—which is already in place from Washington, DC north—would be much cleaner and save passengers' time. To date, however, cost and other barriers have blocked this.

As for freight rail, a central challenge is that the major railroads are privately owned and focus on maximizing short-term returns to shareholders rather than the public interest. Recently, railroad companies have concentrated on downsizing and disinvesting their assets and workforce, resulting in longer freight trains and more frequent breakdowns.

It is also important to redirect freight traffic from roads to rail to reduce pollution and congestion and support the transition to zero-emission trains. We should look at incentives for moving freight from trucks to rail while being prepared for abandonments of rail lines by the major freight railroads (CSX/NS) and ensuring the Commonwealth is ready to purchase them for future passenger and/or freight rail service. And we should explore opportunities to make freight railroads more responsive to public interest concerns—including the need to decarbonize their train fleets.

TOP TAKEAWAYS

Virginia's Amtrak ridership is growing, breaking 2 million passengers for the first time in FY 2023, and we need to continue to support our Virginia-supported Amtrak trains.

The success of Virginia's rail system depends on consistent and increased funding and the advancement of the Transforming Rail in Virginia program.

Our Amtrak trains are much more environmentally friendly than other modes of travel but transitioning to more zero-emissions technologies would be much cleaner and save passengers' time.

WALKABLE, BIKEABLE COMMUNITIES

RELEVANT PROGRAMS & AGENCIES

See full glossary starting on page 157

OFFICE OF TRAILS
An interdepartmental office housed at the Virginia Department of Transportation (VDOT) and established in 2022.

VIRGINIA DEPARTMENT OF CONSERVATION & RECREATION (DCR)
Agency which oversees Virginia's natural resource management and outdoor recreation.

VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT)
State agency responsible for building, maintaining, and operating the state's roads, bridges, and tunnels.

VIRGINIA SAFE ROUTES TO SCHOOL PROGRAM
Helps schools and communities make walking and biking to school a safe, convenient, natural activity.

Biker on Mount Vernon Trail
Photo by Robin Kent

SAVING PEDESTRIAN LIVES

WALKABLE, BIKEABLE COMMUNITIES

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WHY IT MATTERS

Transportation continues to be the leading generator of greenhouse gases in Virginia, and encouraging active modes is essential to achieving any meaningful climate goals. Pedestrian and vulnerable road user crashes continue to climb in Virginia at an alarming rate, up 15% in 2023. Virtually all roadway fatalities, which affect Black and Brown people at more than twice the average rate, are preventable with the right infrastructure and enforcement.

Without adequate policies and funding, traffic fatalities will continue to take nearly 1,000 lives each year. Virginia needs policy and resources to reverse this tragic trend, such as simple sidewalks and pedestrian refuges. Specific steps must be taken to reduce car speeds, educate all road users, and redesign our roadway network for better pedestrian protection. Creating safer streets for pedestrians, cyclists, and all vulnerable road users will improve air quality, reduce fossil fuel extraction, production, and consumption, and reduce demand for the destructive expansion of highways.

CURRENT LANDSCAPE

In 2023, 1,554 pedestrians were injured as a result of a driver of a vehicle crashing into them, up 15% from 2022.

Traditional police enforcement has and can not effectively reduce traffic fatalities. The most reliable way to slow drivers is to redesign our roads with safety-oriented infrastructure such as raised crosswalks, speed humps, narrower lanes, bump-outs, and pedestrian refuges. The **Virginia Department of Transportation's (VDOT)** $8 billion annual budget has not prioritized these designs at the scale necessary to significantly curb the danger to vulnerable road users.

In light of record road fatalities, it is time to redesign and reissue the Virginia Driver's Manual to put safety first. Drivers must be taught how to operate their vehicles safely around pedestrians, cyclists, and other road users. All people are pedestrians at some point, even those who primarily drive or who are unable to walk, and improving pedestrian safety increases safety outcomes for all other road users.

OPPORTUNITIES

Speed cameras are an effective deterrent to speeding, which is the number one predictor of crash mortality. Not only do they lessen the staff burden of traffic enforcement, but they also apply enforcement equitably, consistently, and without bias. Although automated photo speed enforcement (ASE) has been shown to reduce the number of drivers speeding by up to 60%, this safety tool is currently only authorized in school zones and work zones. Speed cameras must be enabled in other high pedestrian traffic areas such as residential and business districts and areas with a history of traffic fatalities.

Another important safety program is VDOT's Neighborhood Traffic Program. The purpose of the program is to work with communities to decrease the impacts of traffic and enhance safety in area neighborhoods. Typically the county DOT and VDOT analyze traffic calming options to make the residential roads safer but after the safety study is done, VDOT requires 50.1% of the residents in a neighborhood to approve traffic calming designs to be installed. This popularity contest should be eliminated so transportation safety decisions can be made by professionals and those in charge of saving lives.

Pedestrian-focused safety infrastructure is not being built to outpace the growth in fatalities, so more funding and safety programming needs to be dedicated to saving these lives. This includes dedicating more state funding to quick-build projects that do not take 6-8 years to implement. The Virginia driver's manual deemphasizes pedestrian safety and does not include updated information about safe street designs and how to drive around them. It needs an overhaul to meet this safety challenge, ensuring all Virginians know how to drive safely around people walking.

TOP TAKEAWAYS

Localities need authorization to use Automated Photo Speed Enforcement systems in residential neighborhoods and business districts, and in areas with a history of traffic fatalities to more effectively reduce loss of life.

For residential roads where a locality and VDOT have studied and recommended street design calming measures, the 50.1% neighborhood vote requirement should be eliminated because safety should not be a popularity contest.

A higher proportion of VDOT's funding to safety infrastructure should be dedicated to safety, and vulnerable road user safety in particular.

Potterfield Bridge - Richmond, VA
Photo by Andre Eanes

INCREASING ACCESS TO BIKING

WALKABLE, BIKEABLE COMMUNITIES

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Family outing on the Virginia Creeper Trail
Photo by Patti Black

WHY IT MATTERS

Transportation is Virginia's largest generator of climate change emissions. Shifting trips to bicycling will reduce emissions, but safety concerns are a key deterrent to more people of all ages and abilities bicycling. Virginia Department of Motor Vehicles report a 36% increase in bicyclist fatalities in 2023.[1] Bicyclists often have to share the road with motor vehicles, which can be intimidating and dangerous. Virginia needs a commitment to improving safety for people who bike or are interested but hesitant to bike, especially in communities with disproportionate rates of traffic fatalities and serious injuries. This effort will require dedicated funding to build safer bicycling infrastructure, the **Bicyclist Safety Stop**, and updating the Commonwealth's bicycling policies for the 21st Century.

A key strategy for shifting our transportation paradigm is starting with the next generation: youth. Providing safe bike routes to school and implementing **"Bike Bus" programs** can increase attendance and reduce chronic absenteeism while reducing vehicle emissions and reliance on fossil fuels.[2] Active transportation to school increases regular physical activity, improves long-term health outcomes, and improves the air quality in and around schools.[3] In addition to its climate impact, motor vehicle crashes have been and continue to be the leading cause of death for children in the United States.[4] It's imperative to shift our transportation model away from reliance on automobiles by taking concrete steps to make transportation biking realistic for more Virginians of any age.

CURRENT LANDSCAPE

Virginia has not legalized the Bicyclist Safety Stop, otherwise known as the Idaho Stop or Stop-As-Yield, which limits bicyclist access and convenience in transportation and recreation settings and fails to afford bicyclists the crash-prevention benefits of yielding at certain intersections. The Safety Stop has been shown in Delaware, Idaho, and more than 8 other states to reduce crashes because bicyclists can clear intersections faster, reducing crashes from behind and from oncoming side traffic.

Virginia has not updated its State Bike Policy Plan since 2011. A modern update to this plan is critical to decision-making for investments in bicycle infrastructure, policies supportive of behavior change and safety, and implementing accessible and equitable connectivity to bicycling focusing on transportation, economic opportunity, and Safe Routes to School development.

Students & families rely on safe, bike-friendly infrastructure to get to school and other places where they live, work, play, and learn. The **Virginia Safe Routes to School program** has been active in Virginia since 2007 and helps schools and communities make walking and biking to school a safe, convenient, natural activity.

OPPORTUNITIES

Virginia needs to provide safe and accessible accommodations for people of all ages and abilities who are interested in bicycling. The safer our transportation network, the greater freedom people have to choose cleaner modes. People bicycling are safest when they are physically separated from drivers, for example on protected and separated trails. The Virginia Capital Trail between Richmond and Jamestown experienced more than 1.2 million trail users in 2020; the Custis Trail in Rosslyn experienced more than 3.5 million trail users in 2021. To add to our trail systems in the Commonwealth, we need dedicated funding for multi-use trails.

Localities also need funding from all government levels to provide safe bicycling infrastructure for people of all ages and abilities. Stable, accessible funding for Safe Routes to School programs, with a priority focus on school communities that have the highest need for safe biking/walking conditions. Incentivizing e-bike purchases, particularly for low-income residents, and implementing proven safety measures will make Virginia more accessible for bicycling. For example, the Safety Stop, which allows people on bicycles to yield at stop signs, was shown to contribute to a 23% reduction in bicycle crashes at intersections in a Delaware 5-year study. Allowing people on bicycles to proceed on walk signals and to ride two abreast also improves safety and should be allowed. Allowing people the freedom to choose their safest course will reduce the number of people injured riding bicycles in Virginia.

Virginia's "State Bicycling Policy Plan" and Complete Streets Policy should be updated to better incorporate trails, bike lanes, reconfigured roads, shoulders, and other safety and access measures. Adopting proven safety measures and updated guidelines will lead to more people choosing bicycling as a transportation option.

TOP TAKEAWAYS

Climate goals require a heavy transition to alternative transportation, and bicycling has a high potential for change. Improving safety is essential for encouraging behavior change, and infrastructure is the most effective action to take.

There are several policies throughout the country that have been proven to increase bicycling safety, such as the Safety Stop.

Starting with youth is an effective strategy for developing a generation of people who use active transportation, and schools are the perfect place to implement programs and safe infrastructure.

TRAILS FOR SUSTAINABLE GROWTH

WALKABLE, BIKEABLE COMMUNITIES

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WHY IT MATTERS

Trails and outdoor recreation are vital to Virginia's economic development and livability. In 2022, outdoor recreation contributed over $11 billion to the Commonwealth's economy, reflecting a 15% increase from the previous year.[1] This growth underscores the significant and rising demand for outdoor activities, opportunities, and spaces. Moreover, the economic impact extends beyond direct spending on recreation. Supporting activities, particularly travel and tourism, generated nearly $3.9 billion in economic activity and sustained over 47,000 jobs in Virginia's restaurants, hotels, arts, recreation, and entertainment industries.[2]

Virginia's trails attract millions of visitors. In 2022, nearly 11% of the 42.2 million overnight visitors to Virginia participated in hiking-related activities, while half engaged in various outdoor activities.[3] This influx of visitors underscores the role of outdoor recreation in driving tourism, which is crucial for the state's economy.

Virginia Creeper Trail Cyclist
Photo by Patti Black

Additionally, trails and outdoor recreation amenities enhance the appeal of Virginia for new and future residents. High-quality natural amenities drive amenity migration, particularly among high-skill, high-income workers who prefer remote-capable industries.[4] This migration bolsters local economies and supports broader economic development efforts across the Commonwealth.

The Virginia Tech Center for Economic and Community Engagement highlights the role of trails in promoting economic development while conserving green spaces. Rural resort communities exemplify how trails and green spaces are the main attractions that differentiate these areas from urban environments.[5] The availability of trails and outdoor activities not only improves livability but also positions Virginia as a competitive destination for both visitors and residents, driving economic growth and community well-being.

CURRENT LANDSCAPE

Virginia's trails are thriving, thanks to $89 million in dedicated state funding for significant regional projects like the Shenandoah Rail Trail, Eastern Shore Rail Trail, and the Fall Line Trail. This funding has been crucial to the success of building Virginia's **multi-use trails** over the past two years and should create a source of recurring, dedicated funding for trails.

An additional milestone achieved in 2022 was the establishment of the **Office of Trails**, whose first task has been the development of a statewide plan to create a comprehensive network of regional multi-use trails. The **Statewide Trails Plan** encompasses an inventory of existing and proposed trails, identifies key gaps in the network, outlines development steps and best practices, and seeks to offer opportunities for community engagement and visioning. However, it's worth noting that the Office of Trails does not address single-use recreational trails, indicating a gap in trail development that limits the agency's role and benefits in many communities.[6]

The **Department of Conservation and Recreation (DCR)** has also made significant progress, opening its 42nd park, Sweet Run State Park, in October 2023, which introduced new hiking and equestrian trails to the community.[7] Additionally, the DCR administers the federal Recreational Trails Program, providing $2 million in grants annually. Nonetheless, this amount falls short of the growing need for trails in Virginia, as grant applications totaled over $6.3 million last year alone.[8] Recreational trails in Virginia have been underfunded for decades, necessitating a new source of recurring annual dollars dedicated to trail development.

An exciting update regarding Virginia's trails is the upcoming 100th anniversary of the Appalachian Trail Conservancy in 2025, commemorating a century of dedication to one of the nation's most iconic trails.[9] This statewide trail serves as an economic and tourism catalyst for the entirety of Virginia but shares the same needs as the state trail system. Improving trailheads and road crossings is critical to the Appalachian Trail's ability to drive tourism, regional identity, and outdoor engagement throughout Virginia.

OPPORTUNITIES

Virginia has an excellent foundation of trail resources that drive vibrant urban and rural economies, support regional identity, and contribute significantly to the unique character of every community. Getting the most out of our trails requires purposeful action.

Maximizing the value of outdoor recreation to Virginia's communities requires a high-quality visitor experience and attractive, functional, and safe trailheads. The **Office of Outdoor Recreation** and **Virginia Department of Transportation (VDOT)** can support communities that rely on trails for tourism, community character, or new commercial investments by ensuring that Virginia makes the best possible first impression to those visiting our trails.

Improving access points is also a critical step in making trail experiences more attractive to communities that have been historically excluded from outdoor recreation. Whether it's a local visitor's first time to the Trail in their backyard, an out-of-state tourist hiking the Appalachian Trail's 544 miles in the Commonwealth, or a business looking to relocate to a trail-friendly community, nothing says "you belong here" more than a well designed and inviting trailhead.

Road crossings remain one of the most dangerous parts of on-trail recreation, whether it's the Appalachian Trail, the Capital Trail, or a smaller community trail. Prioritizing the development and implementation of safe trail crossing plans increases the value of trails to all, and in Virginia, we have the personnel to do it. Our Office of Outdoor Recreation and the dedicated workforce at VDOT can ensure our trail and road interfaces are safe for hikers and motorists alike.

Funding for DCR to support the development of single-purpose trails will allow for 'all boats to rise' as the Office of Outdoor Recreation focuses on multi-use trails. This is a critical step in ensuring that Virginia has the widest spectrum of recreational experiences available.

TOP TAKEAWAYS

Virginia's trails are thriving: $89M in dedicated state funding has been crucial to the success of building Virginia's multi-use trails over the past two years.

Improving access points is a critical step in making trail experiences more attractive to communities that have been historically excluded from outdoor recreation.

Road crossings remain one of the most dangerous parts of on-trail recreation. Prioritizing safe trail crossing plans increases the value of trails to all.

‘Hiker along Skyline Drive - Shenandoah National Park
Photo by Lori A Cash

CLIMATE & ENERGY

DECARBONIZING OUR GRID

BOARD OF HOUSING AND COMMUNITY DEVELOPMENT (BHCD)

The governing body in Virginia that partners with state, federal, local, and nonprofit housing and community and economic development initiatives. Responsible for promulgating the Uniform Statewide Building Code (USBC).

CLEAN CAR STANDARDS

A set of regulations to reduce transportation pollution and greenhouse gas emissions. This program requires automakers to provide an increasing amount of EVs each year to states with Clean Car Standards. States can only adopt federal regulation of clean car standards, but cannot make their own standards.

COMMUNITY FLOOD PREPAREDNESS FUND (CFPF)

State-sponsored grant fund that provides financial assistance to localities to reduce the impacts of flooding within Virginia. High emphasis on projects that align with local, state, and federal floodplain management standards and plans. The only statewide source of funding for flood resilience capacity building and studies, as well as project implementation. Revenue derived from Virginia's participation in the Regional Greenhouse Gas Initiative.

INFLATION REDUCTION ACT (IRA)

Aims to curb inflation by reducing the federal government budget deficit, lowering prescription drug prices, and investing in domestic energy production while promoting clean energy.

INFRASTRUCTURE INVESTMENT AND JOBS ACT (IIJA)

Also known as the Bipartisan Infrastructure Law, is federal legislation that authorizes the largest investment in the resilience of physical and natural systems in American history.

REGIONAL GREENHOUSE GAS INITIATIVE (RGGI)

A cooperative plan among twelve Northeast and Mid-Atlantic States to reduce power sector carbon emissions by requiring power plants to purchase allowances for their greenhouse gas emissions. The proceeds from allowances are being used to create more energy-efficient, affordable housing units, help low-income families reduce energy bills, and enhance community flood prevention and protection.

RENEWABLE PORTFOLIO STANDARD (RPS)

A standard established by the Virginia Clean Economy Act that sets annual requirements for the generation of renewable energy in a utility's service territory.

STATE AIR POLLUTION CONTROL BOARD

Citizen board authorized to make regulations for the control and abatement of air pollution throughout the Commonwealth.

RELEVANT PROGRAMS & AGENCIES

See full glossary starting on page 157

STATE CORPORATION COMMISSION (SCC)

A state agency with regulatory authority over many business and economic interests in Virginia including public utilities. It is an independent department of state government with delegated administrative, legislative, and judicial powers.

VIRGINIA CLEAN ECONOMY ACT (VCEA)

Virginia law outlining a clear path to achieving a zero-carbon energy future by mandating the retirement of fossil fuel electricity generators, sets renewable energy standards through wind and solar power, and sets energy efficiency standards. The VCEA also establishes a renewable energy portfolio standard (RPS), which mandates that the two major utilities in the state, Dominion Energy and Appalachian Power Company, produce 100 percent renewable electricity by 2045 and 2050, respectively.

VIRGINIA HOUSING TRUST FUND (VHTF)

Creates and preserves affordable housing and reduces homelessness in the Commonwealth.

Electric vehicle chargers - Virginia Beach, VA
Photo by Sue Mangan

ACHIEVING 100% CLEAN ENERGY

DECARBONIZING OUR GRID

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WHY IT MATTERS

Experts continue to warn that governments across the world must cut greenhouse gas emissions significantly in the short term to ensure a stable, healthy climate for current and future generations.[1] Decarbonizing the economy begins with the electric sector, which is directly responsible for nearly a third of Virginia's carbon pollution, and is particularly important as we electrify cars and buildings.[2]

Virginia committed to fully decarbonizing our electric grid by 2050 through the passage of the **Virginia Clean Economy Act (VCEA)** in 2020. The VCEA outlines a clear path to achieving a zero-carbon future by mandating the retirement of fossil fuel generators; requiring the construction of solar, wind, and battery storage; gradually increasing our reliance on zero-carbon electricity sources; and instructing utilities to meet energy efficiency standards.

The VCEA's **Renewable Portfolio Standard (RPS)** ensures that utilities remain on track to meet 2045 and 2050 targets for a zero-emission electric sector. To facilitate this transition, utilities will need to deploy the suite of proven tools that can bring clean energy online faster, including **advanced reconductoring**, **distributed energy resources (DER)**, and **grid-enhancing technologies (GETs)**.

CURRENT LANDSCAPE

The passage of the VCEA established Virginia as a leader in the clean energy transition. The State Corporation Commission oversees the four main components of the VCEA to ensure a reliable and affordable transition to clean energy:

100% RENEWABLE ENERGY PORTFOLIO STANDARD

The RPS ensures that the state's electric mix gradually moves to zero-carbon by mid-century by gradually increasing the percentage of the electricity mix that must be derived from renewable, zero-carbon sources.[3] State-level renewable portfolio standards are highly effective – responsible for over 50% of clean energy growth in the country.[4] To jumpstart RPS compliance, the VCEA requires Virginia's utilities to petition for a total of 16.7GW of solar and on-shore wind capacity, as well as 5.2GW of offshore wind.[5]

BATTERY STORAGE

The VCEA sets a target of 3100MW of energy storage by 2035 and requires 10% of energy storage projects to be deployed for power backups at hospitals, government facilities, and other essential services.[6]

ENERGY EFFICIENCY RESOURCE STANDARD

The **Energy Efficiency Resource Standard (EERS)** requires Dominion and Appalachian Power to meet a specific portion of their electricity demand through energy efficiency.[7] Under the VCEA, utilities may not build out new fossil fuel generation if they have not hit their EERS targets – unless they can demonstrate energy reliability concerns. Such facilities are likely to become expensive stranded assets as we move to a zero-carbon grid, saddling Virginians with higher energy bills and more pollution.

Solar facility in Shenandoah, VA
Photo provided by Virginia Conservation Network

FOSSIL FUEL RETIREMENT

The VCEA requires Dominion and Appalachian Power to retire their fossil fuel plants by 2045 and 2050, respectively, including almost all of Dominion's coal-fired power plants by 2030.[8] The VCEA allows utilities to petition the SCC to keep those plants open longer if closing them could negatively affect reliability.[9]

Unfortunately, utilities have been slow to adopt cleaner tools to meet energy demand, and Virginia's electricity is still reliant on fossil fuels, which collectively make up over 60% of our generation at present.[10] However, Virginia is proceeding in the right direction as we move down the path outlined in the VCEA.

OPPORTUNITIES

The VCEA, along with the **Regional Greenhouse Gas Initiative (RGGI)**, put Virginia on a clear and stable path to a zero-carbon grid by 2050 (*see page 101*). It must be implemented to its fullest potential to ensure a healthy environment for all Virginians.

The VCEA provides a roadmap for how Virginia's future energy needs will be met with new, clean energy sources. While the VCEA allows for possible new, zero-carbon technologies to contribute to those efforts, the VCEA must continue to incentivize proven clean energy technologies, such as offshore wind, solar, and energy storage. It is important to note that Virginia is facing significant **load growth** from data centers and other sources in the coming years. Under the VCEA, 100% of this load should be met with clean energy (*see page 77*). Because the VCEA requires utilities to procure most of their renewable energy from sources within Virginia, their doing so will incentivize the development of a strong renewable energy industry in the Commonwealth.

Utilities can achieve these 100% goals by continuing to adhere to the VCEA's roadmap. They also can and should utilize tools to improve energy efficiency (*see page 111*) and encourage more rapid development of new clean energy sources. Advanced reconductoring, DER, and grid-enhancing technologies all would help get new solar, wind, and storage sources integrated into the grid more quickly *(see page 113)*. The same is true for efforts to address untimely delays or unreasonable costs associated with **grid interconnection**. Utilities and regulators can and should do more to promote those efforts (*see page 137*).

TOP TAKEAWAYS

The VCEA outlines a pathway to achieve a zero-emission electricity sector through a Renewable Portfolio Standard, an Energy Efficiency Resource Standard, a responsible fossil fuel generation retirement schedule, and the buildout of clean energy and battery storage.

As written, the VCEA already allows for new, zero-carbon technologies to contribute to our clean energy goals. With that being said, the incentives within the VCEA should remain dedicated to proven clean energy technologies such as wind, solar, and battery storage.

New fossil fuel generation risks our health, environment, and economy. Energy efficiency, distributed energy resources, advanced reconductoring, and grid-enhancing technologies should be embraced to accelerate an affordable clean energy transition.

REJOINING THE REGIONAL GREENHOUSE GAS INITIATIVE

DECARBONIZING OUR GRID

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WHY IT MATTERS

Climate change represents a major threat to the health, safety, and economy of Virginia. Climate change has already hit Virginia in numerous ways–increasingly frequent extreme precipitation events, coastal and inland flooding, and dangerous heat waves and drought conditions that put workers, livestock, and crop yields at risk.

Greenhouse gas emissions from power plants are a significant contributor to this problem. Thankfully, Virginia has a proven solution to tackle this source of air pollution. The **Regional Greenhouse Gas Initiative (RGGI)** is a program that requires power plant owners to begin to account for their pollution and the harm it imposes on Virginians by purchasing an **allowance** for every ton of carbon dioxide their plant emits. The supply of these allowances reduces over time, which is how RGGI has successfully driven down emissions while providing billions in economic and health benefits in participating states since its start about 15 years ago.[1]

In addition to driving down greenhouse gas emissions, RGGI is also an important customer protection tool, requiring power plant owners to steadily reduce their reliance on fossil fuels, costs of which have increased dramatically in recent years resulting in significant customer bill increases.[2]

Moreover, RGGI produces consistent funding for participating states for critical programs like improving community resilience to flood impacts and increasing **energy efficiency** in low-income households.

CURRENT LANDSCAPE

The General Assembly passed a law in 2020 requiring Virginia to participate in RGGI.[3] Despite multiple repeal attempts at the General Assembly, the 2020 law that brought Virginia into RGGI remains on the books. Unfortunately, the **Virginia Air Pollution Control Board** removed Virginia from the cooperative effort through a regulatory action at the behest of the administration.[4] This administrative action is the subject of an ongoing lawsuit, but as of January 1, 2024, Virginia is no longer participating in RGGI.

Fisherman at Rudee Inlet - Virginia Beach
Photo by Michale Schimmel

When Virginia joined RGGI, it quickly experienced the same success that other states have seen: from 2021 to 2023, Virginia saw its carbon pollution drop by 22%.[5] Without RGGI in place, emissions have already jumped back up—a troubling but predictable result. Comparing the first quarter of 2024 (not in RGGI) to the first quarter of 2023 (in RGGI), for example, Virginia's emissions have leaped 27.6%.[6]

Moreover, without RGGI in place, Virginia is losing out on the steady funding source that the program has been providing. Under the 2020 law, Virginia was using its funds to help constituents both reduce their energy burden and adapt to the climate risk created by carbon pollution across the state. 45% of revenues generated from RGGI, or over $372 million, was directed to the **Community Flood Preparedness Fund** and to support state flood planning efforts. 50% of the revenues had been helping low-income families slash their energy bills and their climate impact, by upgrading existing homes and creating highly-efficient new affordable housing (*see page 111*).

Localities that had begun to develop the expertise needed to address flooding issues in their communities now face tremendous difficulties with uncertain funding sources. The RGGI-funded programs that were helping low-income households reduce electric bills have also seen their steady funding disappear.

OPPORTUNITIES

Participation in RGGI is a critical opportunity to put Virginia on track to meet its climate goals, while also improving air quality and improving public health. With emissions already jumping back up following Virginia's withdrawal, it is more important than ever that Virginia find a way to get back into RGGI as quickly as possible. While Virginia is continuing its transition to clean energy in line with other policies, like the **Virginia Clean Economy Act**, RGGI is a necessary piece of this transition. RGGI is the tool that ensures utilities across Virginia steadily reduce their reliance on fossil fuels while tackling the impacts of climate change. Without our reentry to RGGI, Virginia faces mounting costs in flood mitigation and energy efficiency improvement efforts and risks falling behind in our efforts to build a more resilient Commonwealth.

Virginia agencies have received inconsistent guidance regarding the fate of December 2023 RGGI auction proceeds and they are currently not being allocated to the DCHD and DCR grant funding pots. This revenue (over $97M) should be allocated by the appropriate agencies according to the 2020 Clean Energy and Community Flood Preparedness Act.

TOP TAKEAWAYS

RGGI was working well in Virginia for three years, steadily and cost-effectively reducing carbon pollution from power plants.

Virginia should rejoin RGGI as soon as possible to come into compliance with existing law.

RGGI is the best source of revenue for the Community Flood Preparedness Fund and Low-Income Energy Efficiency programs, which must otherwise be funded via general funds or another dedicated source of revenue.

ACCELERATING TRANSPORTATION ELECTRIFICATION

DECARBONIZING OUR GRID

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WHY IT MATTERS

We cannot effectively fight climate change without tackling the largest source of carbon dioxide in Virginia: transportation.[1] Virginians' personal vehicles collectively emit more carbon pollution than our power plants.[2] Vehicles are also major sources of harmful tailpipe pollution like **sulfur and nitrogen oxides**, carbon monoxide, and **particulates**, which have been linked to respiratory and heart diseases and premature death.[3,4] Diesel trucks are especially harmful; pollution from freight disproportionately impacts communities of color and low-income communities.[5] Students suffer exposure to these pollutants on Virginia's diesel school buses.

The most important strategy to reduce traffic pollution is to help people become less dependent on cars (*see page 81*). We must also rapidly transition to electric vehicles (EVs) which have zero harmful tailpipe emissions.[6] Electricity to power an EV emits less than one-sixth of the carbon pollution of an equivalent gas-powered vehicle, and will emit even less over time as the power sector becomes cleaner.[7]

Cleaner vehicles will save Virginians money. EVs require significantly less maintenance than gas cars.[8] EV drivers typically spend the equivalent of $1.28 per gallon for a full charge in Virginia.[9] Owning an EV will save an average driver $6,000 to $12,000 over the lifetime of the vehicle.[10]

Electric vehicles - Richmond, VA

However, the benefits of EVs are not equally accessible to all drivers in Virginia. More affordable models of EVs are not always available at local dealerships. People living in rural areas, multi-unit housing, and rental properties often have limited charging options. Public EV charging infrastructure, which has grown dramatically in the past few years, still has gaps that the free market has been slow to fill. For all these reasons, policymakers have an essential role to play in supporting the equitable transition to electric transportation.

CURRENT LANDSCAPE

The 2021 **Clean Cars Standards** represent the most significant step Virginia has taken to cut carbon emissions and tailpipe pollution, which will have significant public health and environmental benefits.[11] These standards ensure that Virginians have access to an increasing number of both cleaner gas-powered vehicles and zero-emission vehicles in the Commonwealth. The Governor announced that he plans to unilaterally–and illegally–withdraw Virginia from **Clean Cars Standards** at the end of 2024. If the Governor succeeds, Virginia will revert to less protective federal emission standards in 2025, forgoing the many benefits of Clean Cars Standards.[12]

Contrary to misinformation, the standards do not ban gas-powered cars.[13] Rather, they provide new car buyers with more choices, since automakers prioritize sending EV models to states with Clean Cars Standards.[14] Before the standards took effect, one-third of registered EVs in Virginia were purchased out of state.[15]

While most EV drivers typically charge at home, a comprehensive, statewide public charging system is critical. Virginia received $106M through the **Infrastructure Investment and Jobs Act (IIJA)** to ensure fast chargers are available every 50 miles along major highway corridors.[16] However, there continue to be major gaps in the public charging network, particularly in rural and ex-urban areas.

An additional barrier to adoption is up-front costs. While EVs are now close in cost to traditional cars and much cheaper over the lifetime of a vehicle, polling indicates lowering the up-front cost would significantly encourage EV adoption.[17] In 2021, the General Assembly passed a rebate to do just that, with significant investments targeted at low-income communities; however, the rebate has repeatedly gone unfunded.

Nearly one million Virginia students are transported daily on the Commonwealth's 16,000 school buses.[18] Phasing out fossil fuel school buses will help protect Virginia students, reducing asthma and other respiratory illnesses. Currently, less than 2% of Virginia's school buses are electric.[19] Virginia needs supportive state policy to leverage billions in time-limited federal funding for clean school buses.

OPPORTUNITIES

While the market is shifting towards bringing more electric vehicles into the market, a suite of complementary policies is needed to support a rapid and equitable transition to electric transportation. The Clean Car Standards are one of the most successful Clean Cars laws.

Many states that have adopted Clean Cars have funded state rebates or tax credits, as well as non-participating states like Kansas and Nebraska.[20] Funding programs such as these have been shown to increase EV adoption. Virginia's existing rebate, which provides $2500 off the up-front price of a vehicle or up to $4000 for low-income qualified households, remains unfunded.

Another significant barrier to EV adoption is equitable access to charging infrastructure–both in urban and rural areas. Because most people charge their cars at home, Virginia should develop a plan for the installation of EV charging stations or EV-ready parking spaces at multi-unit dwellings like apartment complexes, where residents currently have little authority to install their charging infrastructure. This should be complemented by a statewide buildout of public charging infrastructure in the numerous areas of the Commonwealth not eligible for funding through the National Electric Vehicle Infrastructure program.

A sustainable, consistent source of state funding for electric school buses would complement federal funding programs and provide the resources school districts need to transition to zero-emissions bus fleets.

Critics often cite threats to grid reliability as reasons to stymie transportation electrification. But even under rapid adoption scenarios, EV electricity demand can be managed without harm to grid reliability or operations. Proactive planning and smart policies, like **time-of-use rates** and **vehicle-to-grid** technology, can make the transition more efficient and reduce electricity rates for everyone.[21]

TOP TAKEAWAYS

Virginians' personal vehicles collectively emit more carbon pollution than our power plants and are also a major source of harmful pollutants such as sulfur and nitrogen oxides, carbon monoxide, and particulates.

The 2021 Clean Cars Standards represent the most significant step Virginia has taken to cut carbon emissions and tailpipe pollution. These standards ensure Virginians have access to an increasing number of both cleaner gas-powered vehicles and zero-emission vehicles.

A suite of complementary policies necessary to support a rapid and equitable transition to electric transportation includes the Clean Car Standards, support for public charging infrastructure, funding of the EV rebate program, and planning for grid improvements.

DECARBONIZING BUILDINGS

DECARBONIZING OUR GRID

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WHY IT MATTERS

The average building constructed today will last beyond 2075.[1] New buildings built today will either help us meet our climate, environment, and public health goals or will burden Virginians with decades of toxic pollution, higher energy bills, and expensive retrofit costs.

Our homes, schools, and businesses all contribute to the climate crisis. 12% of Virginia's climate pollution comes from on-site fossil fuel combustion in buildings, such as **methane** gas and propane.[2] These pollutants also threaten public health and safety. Methane combustion causes over 50,000 annual U.S. childhood asthma cases.[3] Additionally, methane is highly flammable, causing house fires every 40 hours.[4] Methane explosions occur nearly annually in Virginia, including recently in Bristol.[5]

Another 13% of Virginia's greenhouse gas emissions come from electricity consumption in buildings.[6] Although Virginia is making strides to decarbonize its electricity supply, significant electricity still comes from fossil fuels. Many buildings are also energy-inefficient, consuming excessive electricity to heat, cool, and run appliances.

The General Assembly committed Virginia to achieve a net-zero carbon economy by 2045 through the **Virginia Clean Economy Act (VCEA)**, but that goal is unattainable if we keep constructing energy-inefficient, polluting buildings.[7] We can reduce buildings' direct and indirect emissions through building **decarbonization**—constructing energy-efficient buildings that incorporate renewable energy sources, and replacing costly fossil-fuel-powered appliances with less expensive electric ones. This approach will produce significant energy cost savings and public health gains for minority, rural, and low-income households, whose communities disproportionately contain older, less-maintained structures.[8, 9, 10]

It is cheaper to build smart now than to pursue expensive retrofits later.[11] Virginia needs an additional affordable 200,000 rental units, and more than half of our school buildings are over 50 years old.[12,13] If we build highly efficient, electrified structures today, we'll reap cost savings, job creation, and public health benefits. If we wait, localities, households, and businesses will pay higher costs for renovations later.

CURRENT LANDSCAPE

Most states rely on building energy codes, which set minimum efficiency and appliance standards for new buildings, to ensure public health and energy cost savings. Unfortunately, parts of Virginia's code are 15-18 years behind the nationally recognized **International Energy Conservation Code (IECC)**, placing Virginia at an unnecessary, costly disadvantage compared to states with the latest standards.

The **Board of Housing and Community Development (BHCD)** revises Virginia's codes triennially. Unfortunately, because several **Inflation Reduction Act (IRA)** funds require the adoption of the latest IECC, BHCD's unwillingness to implement basic energy efficiency measures costs Virginia millions in funding. Adopting the latest IECC standards would save Virginians $4 billion in energy costs by 2050, largely benefiting poor, rural, and minority households with higher utility bills.[14, 15, 16]

Despite 2021 legislation calling to adopt or exceed IECC standards, BHCD has not made necessary changes.[17] BHCD representation is unbalanced: 70% of members serve the building industry, excluding critical environmental, health, and consumer representation.[18] BHCD's restrictive "consensus" policies allow a single member to block fixes of past amendments significantly weakening the code while recently approving further weakening amendments without consensus.

Ultimately, the IECC sets the bare minimum level of energy efficiency necessitated by science and public health, and over 10 states allow localities to employ "stretch codes" with stronger standards than the IECC —often based on a uniform model. Virginia's "Dillon Rule" currently prevents this progress.

Additionally, energy consumption is the second-largest operational expense for cash-strapped schools, with 30% wasted in aging, inefficient buildings. Stretch codes and additional funding for public building upgrades would yield significant local school district savings and bolster statewide efficiency efforts.

Workforce development investments can unleash the job-creating potential of efficient buildings. Energy efficiency comprises the largest share of energy jobs (though women and people of color remain underrepresented in higher-skilled construction trades).[19,20,21]

OPPORTUNITIES

If Virginia does not construct energy-efficient, electrified buildings from the start, Virginia's climate goals will become harder and more expensive to reach.

To ensure building codes prioritize the Commonwealth's net-zero policies, BHCD should adopt or exceed the latest IECC standards with stronger resident protections; furthermore, the composition of the BHCD appointments should include expertise in electrification, efficiency, public health, and environmental justice. It is also important that the Commonwealth's energy policy include building energy codes as a tool to reach net-zero goals.

Local authority should remain intact to set ordinances for electric-only new construction; local stretch code adoption should be authorized; and BHCD should be required to develop a more efficient "model stretch code" for localities to go beyond the latest IECC baseline.

Stakeholders should work to develop complementary concepts that will maximize justice and good job creation in the following areas:

- Schools: Identify opportunities for localities to raise additional tax revenue to prioritize energy efficiency and electrification upgrades
- Affordable Housing: The **Virginia Housing Authority**'s application process for Federal Low-Income Housing Tax Credits should give additional points to energy-efficient and electrified housing. Explore similar criteria for grant and loan applications through the **Virginia Housing Trust Fund** within the **Department of Housing and Community Development (DHCD.)** This will ensure public funds do not further burden low-income populations with unnecessarily high energy bills and indoor air pollution.
- Labor/Workforce: Invest in energy efficiency and electrification workforce development programs. Promote project-labor agreements and hire 40% of workers from disadvantaged groups, particularly for public projects.

TOP TAKEAWAYS

Our homes, schools, and businesses all contribute to the climate crisis through fossil fuel combustion on-site and electricity demand.

Studies demonstrate that it is more cost-effective to build energy-efficient, electrified buildings now than to pursue expensive retrofits after the fact.

Virginia's building codes are nearly 20 years behind the nationally recognized IECC standards—costing Virginia $4 billion in potential energy savings and eligibility for millions in direct IRA funding.

CLEAN ENERGY

BROWNFIELD AND COAL MINE RENEWABLE ENERGY GRANT FUND AND PROGRAM

Administered by Virginia Energy for the purpose of awarding grants to renewable energy projects that are located on brownfields or previously coal-mined lands.

COMMUNITY BENEFIT AGREEMENT (CBA)

Legally binding contracts between coalitions of community-based organizations and developers that shape how local development projects will contribute to improving the quality of life of nearby residents.

ENERGY EFFICIENCY RESOURCE STANDARD (EERS)

A component of the Virginia Clean Economy Act which establishes specific, long-term targets for energy savings that utilities must meet through customer energy efficiency programs.

HOME EFFICIENCY REBATES (HOMES)

Grants awarded to State energy offices to provide rebates that discount the price of energy-saving retrofits in single-family and multi-family buildings. These, along with the Home Electrification and Appliance Rebates, comprise the Home Energy Rebates programs authorized through the Inflation Reduction Act.

HOME ELECTRIC APPLIANCE REBATES (HEAR)

Grants awarded to State energy offices and tribal entities to develop and implement a high-efficiency electric home rebate program. These, along with the Home Efficiency Rebates, comprise the Home Energy Rebates Programs authorized through the Inflation Reduction Act.

HOUSING INNOVATIONS IN ENERGY EFFICIENCY FUND (HIEE)

Designated to support energy efficiency improvements in low-income housing through the Virginia Department of Housing and Community Development. Funded exclusively by the Regional Greenhouse Gas Initiative (RGGI).

INFLATION REDUCTION ACT (IRA)

Aims to curb inflation by reducing the federal government budget deficit, lowering prescription drug prices, and investing in domestic energy production while promoting clean energy.

REGIONAL GREENHOUSE GAS INITIATIVE (RGGI)

A cooperative plan among twelve Northeast and Mid-Atlantic States to reduce power sector carbon emissions by requiring power plants to purchase allowances for their greenhouse gas emissions. The proceeds from allowances are being used to create more energy-efficient, affordable housing units, help low-income families reduce energy bills, and enhance community flood prevention and protection.

RENEWABLE PORTFOLIO STANDARD (RPS)

A standard established by the Virginia Clean Economy Act that sets annual requirements for the generation of renewable energy in a utility's service territory.

RELEVANT PROGRAMS & AGENCIES

See full glossary starting on page 157

STATE AIR POLLUTION CONTROL BOARD

Citizen board authorized to make regulations for the control and abatement of air pollution throughout the Commonwealth.

STATE CORPORATION COMMISSION (SCC)

A state agency with regulatory authority over many business and economic interests in Virginia including public utilities. It is an independent department of state government with delegated administrative, legislative, and judicial powers.

VIRGINIA CLEAN ECONOMY ACT (VCEA)

Virginia law outlining a clear path to achieving a zero-carbon energy future by mandating the retirement of fossil fuel electricity generators, sets renewable energy standards through wind and solar power, and sets energy efficiency standards. The VCEA also establishes a renewable energy portfolio standard (RPS), which mandates that the two major utilities in the state, Dominion Energy and Appalachian Power Company, produce 100 percent renewable electricity by 2045 and 2050, respectively.

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

Virginia's environmental agency that is responsible for administering laws and regulations related to air quality, water quality, water supply, renewable energy and land protection. DEQ issues permits, conducts monitoring, performs inspections, and enforces environmental law.

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT (DHCD)

A Virginia state agency that oversees policies, programs, and funding to support affordable housing, community development, and energy efficiency projects, contributing to the state's overall development and sustainability goals.

VIRGINIA ENERGY

State agency tasked with developing the plan for Virginia's energy future.

Sunflower morning - Nokesville, VA
Photo by T. Anthony Harding

MAXIMIZING OFFSHORE WIND GENERATION

CLEAN ENERGY

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WHY IT MATTERS

The climate crisis demands rapid development of renewable energy resources. Offshore wind has the potential to deliver upwards of 30% of Virginia's 100% clean energy goals,[1] (*see page 99*). It can increase energy independence, provide a more stable and efficient means of power, and complement solar energy in a carbon-free power grid by generating electricity at night and at greater capacity during winter months. Not only will it help the Commonwealth confront head-on the climate crisis, it also will provide massive economic development opportunities and create thousands of local, long-term, family-supporting jobs for Virginians,[2] including high school and college graduates, returning citizens, and veterans transitioning to the civilian workforce.

Offshore wind can be developed responsibly, with protections for marine mammals and other wildlife. Responsible siting of **onshore infrastructure** and **transmission lines** is equally important and feasible. Companies can work with the affected communities to minimize impacts to neighborhoods, environmentally sensitive areas, and environmental justice communities.

CURRENT LANDSCAPE

The **Virginia Clean Economy Act (VCEA)** outlines the development of 5,200 **megawatts (MW)** of offshore wind by 2035. This substantial commitment helps position the Commonwealth to become a hub for the offshore wind industry, which can create thousands of jobs for Virginians, build wealth, and support communities.

Dominion Energy, one of Virginia's **investor-owned utilities**, has already started construction of the **Coastal Virginia Offshore Wind (CVOW)** project offshore of Virginia Beach. CVOW is one of the largest offshore wind projects in the country and is expected to be completed by the end of 2026. Once CVOW is operational, it will produce 2.6 **gigawatts (GW)** of electricity - enough clean energy to power up to 660,000 homes and avoid as much as 5 million tons of carbon emissions annually.[3] Dominion Energy is implementing strong protective measures for North American right whales and other endangered species and is also making efforts to minimize the onshore impacts of transmission lines on natural and cultural resources and environmental justice communities to the maximum extent practicable.

Dominion and Avangrid, a renewable energy development company, are both planning projects near Kitty Hawk, North Carolina, which have the potential to deliver another 3.2 GW of wind power to Virginia's electric grid. Moreover, in 2024, the federal government is leasing an additional area for Virginia offshore wind development, which, if procured and developed, is easily capable of producing at least another 2.6 GW of clean energy and emissions reductions similar to the CVOW project.

TOP TAKEAWAYS

Virginia is well positioned to be a leader in offshore wind and to experience the energy, environmental, and economic benefits from such work, including significant job creation.

Increasing Virginia's offshore wind goal from 5.2 GW to 8 GW by 2035 would continue to position Virginia as a leader on wind.

Offshore wind can continue to be developed responsibly when state agencies and boards ensure that the onshore infrastructure and transmission lines minimize impacts on wildlife, neighborhoods, natural areas, community resources, and environmental justice communities.

These three wind energy areas - which could come online by 2030 - have the potential to deliver over 8.0 GW of clean power to Virginia, power over 2.3 million homes, and avoid approximately 17 million tons of carbon emissions. That emissions reduction is equivalent to removing 4 million gas-powered cars from the road or 45.4 gas plants being shut down.[4]

OPPORTUNITIES

Virginia is a natural fit to become an offshore wind hub, with its deep water ports, world-class shipbuilding and maritime industries, and unrestricted access to open ocean waters with no overhead barriers (i.e., bridges) impeding the shipping of large offshore wind components. The economic benefits could be enormous, potentially upwards of $109 billion in potential revenue from the offshore wind industry and related supply chains, along with the creation of thousands of jobs for Virginians.[5,6] For Virginia to secure the economic investment and jobs attached to being a hub for offshore wind, we must have a vision, goals, and policies to establish and promote a strong and steady pipeline of wind projects.

Virginia's current offshore wind goals are much lower than neighboring states. Maryland and North Carolina, for example, are aiming for 8.5 GW and 8.0 GW, respectively.[7] These higher goals make those states more attractive investment targets for the offshore wind industry, delivering jobs and wealth-building opportunities to those states. Increasing Virginia's offshore wind goals above the current goal of 5.2 GW to 8.0 GW would have clear economic benefits for Virginians, particularly for those in historically disadvantaged communities, and provide jobs and training programs to local community members.

As seen by the protections Dominion has put in place for CVOW, increasing offshore wind in the Commonwealth can be done in a way that protects wildlife and minimizes impacts from onshore development. State and federal agencies can continue to ensure the responsible development of future offshore wind infrastructure using least-conflict siting and the best available science to avoid, minimize, and mitigate impacts to ocean and on-shore wildlife and habitat, cultural resources, and communities.

| Offshore wind turbines

LOWERING COSTS & POLLUTION WITH ENERGY EFFICIENCY

CLEAN ENERGY

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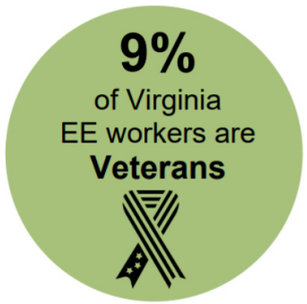
WHY IT MATTERS

The cleanest, cheapest energy is the energy never generated. We need many tools to decarbonize Virginia's power sector effectively and affordably. We have a powerful, underutilized tool to limit the increase in energy demand in Virginia: **energy efficiency**. Energy efficiency means performing the same function using less energy. Tapping fully into our energy efficiency potential will make our renewable energy goals more achievable by reducing demand and increasing grid reliability.

Eighty percent of the buildings that will be standing in 2050 have already been built.[1] This paper focuses on these buildings. Improving energy efficiency in homes and businesses lowers energy bills and pollution. It can help low-income households, which can have higher energy bills because their housing tends to have less insulation and less efficient heating and cooling systems. The benefits of energy efficiency and **weatherization** can extend to improved comfort and health outcomes.[2] Energy efficiency programs can address historic injustices by reducing high energy costs that have disproportionately impacted Black and Latinx families.[3] Over 74,500 Virginians work in energy efficiency,[4] more than in any other sector in the power industry; more are needed.[5]



Related to energy efficiency, **demand-side management** helps electric utility customers shift their energy use away from **peak demand** times, so the most polluting, most expensive fossil-fuel plants do not have to be activated. For example, time-of-use rates charge less for electricity use at times when electricity demand is lower, incentivizing customers to wait until lower-demand times to run appliances. Another utility program recruits customers to voluntarily reduce their energy use on very hot or very cold days to decrease overall energy demand.

Energy efficiency and demand side management are wins for the environment, economy, and utility customers. When the overall energy demand is reduced and peak demand is lowered, new sources of generation do not need to be built, keeping electricity bills more affordable for all.

CURRENT LANDSCAPE

In 2020, the **Virginia Clean Economy Act (VCEA)** established the **Energy Efficiency Resources Standard (EERS)**,[6] requiring utilities to provide energy efficiency programs for customers and achieve annual energy savings targets. Utilities earn the same percentage profit on these programs as on building new generation. Dominion Energy is not on track to meet its 2024 and 2025 targets.[7]

Beginning in 2026, the **State Corporation Commission (SCC)** will set EERS savings targets. Recently passed legislation, the SAVE Act, will strengthen the SCC's ability to set future targets, beginning in 2029.

Virginia Energy is designing the state implementation of two major new energy efficiency programs that are part of the federal **Inflation Reduction Act (IRA)**. The **Home Efficiency Rebates (HOMES)** will enable rebates for energy efficiency improvements in existing residential homes, and the **Home Electric Appliance Rebates (HEAR)** will enable rebates for electrification in existing and new residential buildings.[8] The **Training for Residential Energy Contractors (TREC)** provides funds for state energy offices to train, test, and certify residential energy efficiency and electrification contractors.[9] These programs require dedicating some funds to low-income households.

The **Housing Innovations in Energy Efficiency (HIEE) fund** was created when Virginia joined the **Regional Greenhouse Gas Initiative (RGGI)** in 2020. Half the revenue from participation in RGGI was designated by law for energy efficiency programs for low-income housing. Overseen by the **Department of Housing and Community Development (DHCD)**, the HIEE funds can make new affordable and special needs housing more energy efficient. They are also used to repair existing housing so it can safely support energy efficiency improvements. The Governor illegally removed Virginia from RGGI in 2023. There are no plans to replace the approximately $125 million annual energy efficiency funds that the program would have generated.

OPPORTUNITIES

Homes and businesses waste 35% of the energy they pay for.[10] This energy inefficiency presents tremendous opportunities to reduce energy usage and save money. Energy customers cannot take full advantage of this opportunity because of several barriers. Upfront costs of energy efficiency **retrofits** are prohibitively expensive for lower-income households and businesses, although they are investments that will more than pay for themselves through lower energy bills. Many consumers lack knowledge about the benefits of energy efficiency. Landlords do not have incentives to improve energy efficiency when tenants pay the utility bills. Though the best time to add energy efficiency measures is when a structure is built, builders often prefer to lower their costs by minimizing energy efficiency features.

These barriers present opportunities for lawmakers and regulators to decrease obstacles for residents and business owners and reduce the strains of growing energy demand.

It's critical to set high standards for energy savings, incentivize those standards, and make the progress toward them transparent and understandable to the public. One approach is to tie part of utilities' rate of return to their success in energy efficiency programs *(see page 135)*. Another way is to share energy usage information of commercial buildings with potential tenants, incentivizing landlords to improve their buildings' efficiency.

Federal IRA funding has created additional responsibilities for state agencies. State funding for departments like Virginia Energy and DHCD should sustain staffing levels sufficient to manage programs smoothly and to distribute funds quickly.

Rejoining RGGI (*see page 101*) would allow Virginia to regain access to the millions of dollars that reduce spending gaps in low-income energy efficiency that other funding streams don't cover. The HIEE funds from previous RGGI auctions that have not yet been spent are needed for their intended purpose and should not be redirected.

TOP TAKEAWAYS

Improving energy efficiency in buildings is a cost-effective strategy that significantly reduces energy usage, peak demand, air pollution, and utility bills.

To overcome barriers like upfront cost, lack of information, and misaligned incentives, government policy, assistance, and incentives can maximize access to energy efficiency.

Legislators and regulators have the authority to set appropriate expectations for utilities to save energy and hold them accountable for their performance.

MAXIMIZING THE ROLE OF DISTRIBUTED ENERGY RESOURCES

CLEAN ENERGY

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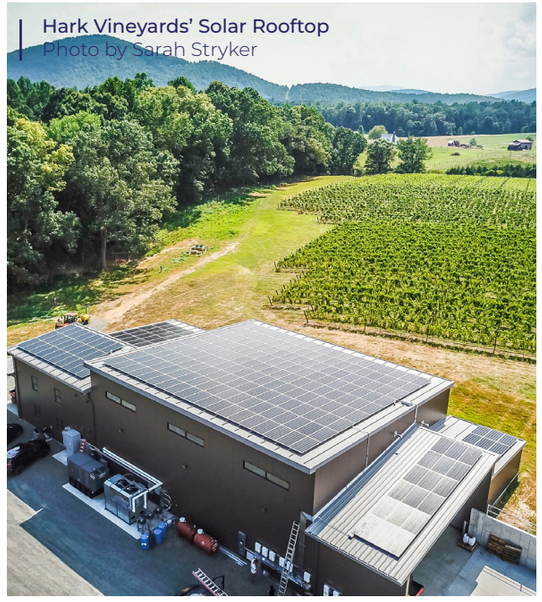
WHY IT MATTERS

Virginia – and the rest of the nation – had been seeing relatively flat electricity demand for decades mostly thanks to improvements in **energy efficiency**.[1] Now, we are facing escalating demand for power from new data centers being built around the Commonwealth. While building large, expensive fossil fuel power plants was the primary tool to meet growth in the '50s - '80s, there is now a wider spectrum of tools to meet electricity demand available, including **distributed energy resources (DERs)**.

DERs refer to a variety of technologies that produce power or moderate power usage close to where that power is being used. This includes resources like rooftop, commercial, and community or shared solar, as well as smaller battery systems and **demand response programs**.[2] **Virtual power plants (VPPs)** are aggregated networks of DERs able to be flexibly managed by utilities, pooled to supply larger amounts of electricity to the grid. For example, on a hot day in the summer, a utility could draw upon numerous commercial and residential rooftop solar arrays and distributed battery systems with excess output to meet a surge in overall customer demand.



Hark Vineyards' Solar Rooftop
Photo by Sarah Stryker

DERs can play a significant role in decarbonizing Virginia's power sector while helping to meet demand. They also increase grid resilience by decreasing strain on transmission lines, freeing up production from larger power plants, and shifting supply to follow demand. At a time when many Virginia families are struggling to pay high electricity bills due to high fuel costs, these grid-wide benefits lower costs for **ratepayers**, particularly during periods of high demand.[3]

CURRENT LANDSCAPE

Virginia is committed by law to powering the Commonwealth with 100% carbon-free electricity by 2050 through the passage of the 2020 **Virginia Clean Economy Act (VCEA)**. The VCEA requires that **investor-owned utilities**, Dominion and Appalachian Power, meet one percent of their annual **Renewable Portfolio Standard ("RPS")** requirement through DERs.

The Commonwealth's **net metering** law[4] allows customers to install solar systems on their property and receive full retail credit for electricity that they generate up to their previous year's usage, so long as the total electricity provided through the program does not exceed 6% of the utility's peak load in Virginia. However, DERs can contribute more than 6% of capacity – but customers may not be compensated at the full retail rate. The **State Corporation Commission (SCC)** is currently re-evaluating an appropriate rate structure for net metering.[5]

While rooftop solar installations are on the rise statewide, Virginia lacks robust programs that incentivize rooftop solar, especially for low-income residents unable to afford the upfront costs of these systems. Parking lot solar projects remain largely unexplored and underfunded in the Commonwealth.[6]

In 2024, Dominion's shared solar program was expanded to 350 MW and a 50 MW program was created in Appalachian Power Company's territory, bringing shared solar to most of Southwest Virginia.[7] Dominion's current minimum bill–$55 per month–is among the highest in the country and has hampered participation, except for the low-income customers who are exempt from this charge.[8]

Virginia Energy will deliver a report to the General Assembly in November 2024 outlining the types and amounts of incentives that may be necessary to steer projects onto rooftops, **brownfields**, landfills, parking lots, and dual-use agricultural facilities.[9] In addition, each utility will have a proceeding to determine a new minimum bill for each program as soon as their net metering proceedings conclude, with a balanced consideration of costs and benefits.[10] This balanced consideration should lead to a more affordable minimum bill for all Virginians.

OPPORTUNITIES

An exciting opportunity for Virginia in the distributed generation space is Virginia Energy's recent award of $156 million from the EPA's Solar for All program, which will fund residential and shared solar projects for low-income and disadvantaged Virginians. Virginia Energy will begin a stakeholder process to help guide the implementation of the program in September 2024, with awards expected to arrive in September 2025.

Permitting timelines for rooftop solar vary widely by locality and can often take months, adding additional unnecessary costs. Free permitting software such as SolarApp+ can speed up permitting, save county/city resources, and signal rooftop solar companies to grow business in localities with faster permitting - and have been implemented to great success in places such as Culpeper and Harrisonburg.

Parking lots provide significant opportunities for distributed generation and shared solar in the built environment.[11] A specific program dedicated to increasing parking lot solar in the Commonwealth would align with Virginia's land conservation values and clean energy goals.

Residential batteries, when paired with rooftop solar, are an increasingly important part of the clean energy transition because they provide energy independence in outages and alleviate grid pressures by storing extra energy on-site.[12] By combining the power of a network of residential batteries, utilities can use VPP software to incentivize battery owners to discharge power to the grid during peak demand times. This VPP software can also flexibly charge, discharge, or manage EVs and their chargers, heat pumps, smart thermostats, and even industrial mechanical equipment.[13] This process can achieve the same result as natural gas peaker plants, without the same level of infrastructure costs, ratepayer and community impacts, and greenhouse gas emissions.

TOP TAKEAWAYS

Distributed energy resources (DER) refer to a variety of technologies that produce power or moderate power usage close to where that power is being used such as rooftop, parking lot, and community solar and smaller battery systems and demand response programs.

In order to hit VA's clean energy goals and improve grid resilience, distributed generation must play a more important role in our clean energy transition. This can happen in a variety of ways: on-site solar energy, faster permitting, and innovative new programs like virtual power plants.

$156M from the Solar for All program will be the largest single investment in low-income and disadvantaged solar in Virginia's history.

DEPLOYING LARGE-SCALE SOLAR WHILE PROTECTING NATURAL RESOURCES *CLEAN ENERGY*

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WHY IT MATTERS

Utility-scale solar facilities are crucial to Virginia's transition to a clean energy future. Utility-scale solar is the cheapest form of new generation available, and its environmental impacts pale in comparison to the fossil fuels we are transitioning away from.[1]

To achieve a carbon-free electric grid that is consistent with U.S. climate goals, wind and solar must comprise 60-80% of the nation's electricity mix by 2035, while approximately tripling generation capacity as demand grows.[2] While **distributed energy resources** play an important role in decarbonization, demand management, and grid resiliency, we will not be able to meet our energy needs with these sources alone (*see page 113)*.[3] Utility-scale solar projects will play a critical role in Virginia and across the globe.

At the same time, the construction and build-out of utility-scale solar necessary to meet our goals will result in one of the largest land use changes in Virginia history, with most projects constructed in rural communities.[4] Therefore, the Commonwealth must have protections in place to avoid impacting Virginia's important natural resources and to minimize and mitigate such impacts where they cannot be avoided.

On average, utility-scale solar requires five to ten acres per megawatt of electricity produced.[5] As of March 2023, the **Virginia Department of Environmental Quality (DEQ)** had permits and applications for over 8 gigawatts worth of solar, expected to cover nearly 86,000 acres in Virginia.[6] Many of these facilities are being sited in rural localities with little experience permitting large construction projects, and a majority of these localities do not have established solar ordinances.[7]

CURRENT LANDSCAPE

As a start, the **Virginia Clean Economy Act (VCEA)** requires Dominion Energy to propose 16,100 MW of onshore wind and solar by the end of 2035, and Appalachian Power Co. must propose 600 MW of onshore wind and solar by the end of 2030.[8]

DEQ will soon propose regulations that will require mitigation for impacts to prime agricultural soils and contiguous forest lands for solar projects that seek approval through the permit by rule (PBR) process.[9] The final regulations will aim to create an environment that continues to support a growing solar industry while minimizing impacts to prime agricultural soils and our most ecologically valuable forests by incentivizing developers to use less disturbing construction practices, incorporate different types of agrivoltaics, and offsite **conservation easements**. Increasingly cost-effective technologies, such as **all-terrain trackers**, can help developers minimize grading disturbance and its associated adverse impacts such as stormwater runoff and delays in vegetation growth.[10] DEQ also finalized a new stormwater handbook that took effect July 1, 2024 with sections specific to utility-scale solar, including treating solar panels as impervious surfaces to calculate stormwater management facilities.[11]

At the state level, Virginia has created an attractive environment for utility-scale solar through potential tax exemptions and revenue sharing.[12] At the local level, counties have already approved a significant amount of solar, roughly 12,000 MW.[13] However, roughly two-thirds of these projects have yet to commence construction. There is no guarantee that they will be used for our utilities' compliance with the VCEA and some may fail to come to fruition due to financing or interconnection issues. Despite this early approval of projects, an increasing number of Virginia localities have recently enacted restrictive ordinances that severely limit, and in some cases, ban the development of utility-scale solar.

Unfortunately, some early pioneer projects employed inadequate construction practices that raised local concerns. In some Virginia counties, local resistance has been fueled by misinformation.[14] If the trend toward restrictions and bans continues, the Commonwealth's ability to meet the mandates of the VCEA might be endangered.

OPPORTUNITIES

Many of the localities that are seeing an increasing number of solar projects do not have the resources necessary to appropriately review these projects. State-supported technical assistance could provide localities with the tools or employees they need to regulate solar land use within their jurisdictions, or even at a more regional level.

Agrivoltaics, or solar facilities where agricultural activities are also taking place, are an area ripe for enormous growth. As many utility-scale projects will continue to be sited on agricultural lands, encouraging and incentivizing beneficial dual-use of these lands can reduce the impact of these projects on soils while also helping to generate greater support for these projects. When developed effectively, these projects not only help maintain better quality land, they also decrease carbon emissions and costs from site landscaping requirements. An increase in projects growing crops under panels will help minimize the degradation of prime agricultural soils, conserve water,[16] and provide dual economic benefit to the owner, all while dispelling the perception that agriculture and clean energy cannot co-exist.

Community Benefit Agreements (CBAs) are legally enforceable contracts between the developer of a project and the community, or a coalition of community-based organizations. CBAs stipulate the benefits that a project developer agrees to fund or implement, in exchange for community support of the project. Benefits can include commitments to hire directly from the community, local workforce training guarantees, contributions to local environmental remediation projects, and flexibility to address local concerns.

Between the VCEA[17] and the **Brownfield and Coal Mine Renewable Energy Grant Fund and Program**,[18] Virginia's laws incentivize the development of utility-scale solar in the built environment. This includes brownfields, previous coal mines, landfills, parking lots, retail, commercial, and industrial sites. Virginia should continue to incentivize projects in these locations to the maximum extent possible by pursuing federal funding and appropriating state funding.

Grid storage projects will be critical to maximize our renewable energy as it grows, so excess energy can be used at a later time. Incentivizing the deployment of grid-scale batteries with new or existing renewables is critical to maximizing the potential of renewables.

TOP TAKEAWAYS

The VCEA requires 16,100 MW of new solar and onshore wind for Dominion by 2035, and it's likely that utility-scale solar will compose the majority of this build-out.

All utility-scale solar projects should minimize grading, tree removal, and impacts on topsoil. Agrivoltaics should be encouraged and incentivized as an effective dual use of land that also preserves its future viability.

Projects should continue to be incentivized on the built environment. Increasing the allocation of renewable energy on "previously disturbed project sites" in the VCEA and allocating $35M to the Coal Mine Renewable Energy Grant Fund and Program could speed the development of these projects.

TRANSITIONING ENERGY INFRASTRUCTURE

RELEVANT PROGRAMS & AGENCIES

See full glossary starting on page 157

CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY (CPCN)

A requirement for a utility company to construct and operate electrical generating facilities, showing that the project is needed, will not negatively impact reliability, and is not otherwise contrary to the public interest.

FISCAL RESPONSIBILITY ACT (2023)

A federal law to lift the debt ceiling while attempting to greenlight the Mountain Valley Pipeline. The bill included provisions that require the U.S. Army Corps of Engineers to issue permits for the Mountain Valley Pipeline within 21 days and attempted to prohibit any judicial review of permits issued for the project by any government agency.

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

A body of the United Nations whose job is to advance scientifically-based assessments about climate change.

NUCLEAR REGULATORY COMMISSION (NRC)

The federal agency tasked with regulating the nuclear industry.

POWER INNOVATION FUND

A fund created in 2023 to be used for the purposes of research & development of innovative energy technologies, including nuclear, hydrogen, carbon capture and utilization, and energy storage.

RENEWABLE PORTFOLIO STANDARD (RPS)

A standard established by the Virginia Clean Economy Act that sets annual requirements for the generation of renewable energy in a utility's service territory.

STATE AIR POLLUTION CONTROL BOARD

Citizen board authorized to make regulations for the control and abatement of air pollution throughout the Commonwealth.

STATE CORPORATION COMMISSION (SCC)

A state agency with regulatory authority over many business and economic interests in Virginia including public utilities. It is an independent department of state government with delegated administrative, legislative, and judicial powers.

Mayo Bridge - Richmond, VA
Photo by Isaiah Ramadane

APPROACHING NUCLEAR & HYDROGEN DEVELOPMENT WITH CAUTION *TRANSITIONING ENERGY INFRASTRUCTURE*

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WHY IT MATTERS

Many experts predict that carbon-free hydrogen ("**green hydrogen**") and new nuclear electricity generation will play a role in decarbonizing the economy. As Virginia works towards a net-zero economy, decision-makers must examine specific nuclear and hydrogen proposals with caution.

New nuclear generation may play a role in achieving our federal and state carbon reduction goals for the electricity sector depending upon a number of variables, including the availability of new transmission lines.[1] However, the U.S. has only placed three new nuclear facilities into service since the 1990s,[2] and Georgia Power's recently commissioned Vogtle units 3 and 4, were delivered 7 years late and cost $35 billion[3]—possibly the most expensive power plants ever built. The challenges facing nuclear development today are the lengthy development timelines (about 15 years) and accompanying financial risk. Nuclear power will always carry significant safety and security risks that must be managed, along with the burden of storing nuclear waste.

Hydrogen presents different potential and challenges. The federal government estimates that green hydrogen could be used to mitigate up to 25% of global greenhouse gas emissions, particularly in the industrial, chemical, and heavy-duty transportation sectors.[4] However, nearly all commercially produced hydrogen is currently processed from natural gas; this process produces carbon dioxide and carbon monoxide as byproducts.[5] By contrast, green hydrogen is produced by using carbon-free electricity.[6]

Production of green hydrogen will require a tremendous amount of carbon-free electricity. The U.S. DOE estimates that "up to 200 GW of new renewable energy sources would be needed by 2030 to support clean hydrogen production."[7] It will be difficult for Virginia to achieve our net-zero goals if green hydrogen production is not deployed strategically given the current challenge of decarbonizing the grid while electricity demand increases.

The gas industry is increasingly attempting to justify new polluting gas infrastructure by claiming that it may be used to transport or burn hydrogen in the future.[8] These claims should be met with extreme skepticism, as existing turbines and pipelines can only utilize and transport lower hydrogen blends;[9] in other words, they will remain primarily fossil fuel resources.

CURRENT LANDSCAPE

The **Virginia Clean Economy Act (VCEA)** rewards our existing nuclear and new nuclear and zero-carbon technologies that come online after 2030, by reducing each utility's **renewable portfolio standard (RPS)** requirement in proportion to those resources.[10]

However, new nuclear technology faces high financial risks due to lengthy development timelines. **Small modular reactors (SMRs)** have yet to produce electricity for the grid in the U.S., and the only project to receive a license from the **Nuclear Regulatory Commission (NRC)** was canceled when costs almost tripled.[11] To address these financial barriers, the U.S. Department of Energy is offering billions of dollars in financing as a "bridge to bankability."[12] Congress recently sent legislation to the President that would streamline federal permitting for advanced nuclear, reduce permitting fees, and strengthen the NRC's workforce.[13]

Virginia has taken steps to support nuclear, establishing the **Power Innovation Fund** in 2023 to assist with research and development.[14] In 2024, the General Assembly passed legislation allowing early SMR development costs to be passed onto customers—placing the financial risk on Virginia ratepayers instead of project developers, even if the project never produces electricity.[15]

Virginia lawmakers also considered proposals that would allow nuclear projects to avoid a litigated **Certificate of Public Convenience and Necessity (CPCN)** process at the **State Corporation Commission (SCC)**, and instead proceed via an updated **Permit by Rule (PBR)** program.[16] However, new nuclear projects should receive full scrutiny given their inherent safety, environmental, and financial risks.

There have been numerous proposals to add both nuclear and hydrogen to Virginia's RPS.[17] Nuclear already reduces our utilities' RPS obligations, so no change is needed. As for green hydrogen, most applications are expected to occur in sectors outside of electricity generation.[18] According to the U.S. Energy Information Administration, further "research, development, and demonstration is needed before hydrogen will qualify for utility-scale power generation."[19] It takes a tremendous amount of renewable power to produce green hydrogen at scale so its application in the power sector may be extremely limited.[20]

OPPORTUNITIES

Virginia should approach efforts to speed up or "streamline" permitting around nuclear and hydrogen with extreme caution and a thorough understanding of the risks involved with nuclear development. These risks include but are not limited to:

- lifecycle environmental pollution—including uranium mining, transport, and waste
- operational risks—including accident risk and security
- financial risks–including long timelines and uncertainty around emerging designs.[21]

Ratepayers should be shielded from the financial risks associated with the development of new technologies. If utilities choose to pursue new nuclear or hydrogen investments, they should be required to exhaust the numerous federal funding options available before any additional costs are borne by ratepayers.

Another opportunity to share the financial risk is emerging from the private sector. Earlier this year, Google, Microsoft, and steelmaker Nucor announced an initiative to aggregate their large energy needs to drive investment in new carbon-free, dispatchable generation, including advanced nuclear and clean hydrogen.[22] Amazon joined these companies in announcing the development of special rate structures for large customers in North Carolina; these voluntary tariffs are intended to reduce the financial risks of new carbon-free generation investments while meeting corporate goals.[23] More recently, Google entered into an agreement with the Nevada utility NV Energy under which the utility will add roughly 110 MW of geothermal electricity to the grid for Google's operations over the next six years.[24] These large energy users are showing a willingness to come to the table and voluntarily take on additional risk to help them achieve their corporate carbon-free goals. Virginia should explore these options with private industry before placing any more risk on ratepayers.

The U.S. DOE characterizes the potential for green hydrogen as a **baseload power source** as "low," but there is strong potential to decarbonize other sectors of the economy using green hydrogen.[25] Hydrogen should not be included in Virginia's existing RPS. Instead, green hydrogen should be considered in applications that the U.S. DOE characterizes as having high potential, such as chemical processing and heavy-duty transportation.

TOP TAKEAWAYS

Virginia should keep its focus on proven low-cost technologies like wind, solar, and battery storage.

A thorough permitting process is needed for nuclear technology given the significant safety, environmental, and cost risks. In addition, emerging technologies like SMRs and green hydrogen should exhaust all federal incentives and private-sector opportunities before additional costs are placed on ratepayers.

Virginia should be discerning about what applications are appropriate for green hydrogen, such as chemical processing and heavy-duty transportation. Currently, hydrogen is not appropriate for electricity generation or home heating.

PREVENTING PIPELINE HARMS

TRANSITIONING ENERGY INFRASTRUCTURE

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WHY IT MATTERS

Continued expansion of fossil fuel infrastructure is at odds with a healthy future for the Commonwealth, and it runs counter to climate mitigation measures recommended by the **Intergovernmental Panel on Climate Change (IPCC)**.[1] Although Virginia has passed laws to promote clean energy and improve accountability measures for public health and safety, new fossil-fuel pipeline projects continue to be licensed and ultimately harm Virginia communities.[2,3] Water and air pollution from fossil fuel development impedes the goals set in federal and state policy, and the resulting harms tend to fall disproportionately on communities of color, households of low-income, and elderly communities.[4]

Construction of new methane-gas pipelines further traps Virginia into fossil fuel dependency. Pipelines can also pose enormous safety risks for those along the route and within the **evacuation or blast zone**.[5] The operation of these facilities is associated with the emission of methane, a potent greenhouse gas, as well as carbon dioxide emissions driven by end use, and **volatile organic compounds** and toxic substances, including benzene and formaldehyde during compressor station **blowouts**.[6] These emissions pose serious consequences to the climate and environment. Ultimately, Virginia communities bear the brunt of negative public health impacts to water and air quality, along with economic harm to farmland and other critical agricultural lands. Virginia must strengthen protections for the water resources and communities jeopardized by fossil fuel infrastructure.

CURRENT LANDSCAPE

Virginia is home to multiple examples of the negative impacts of fracked-gas pipelines. Construction of the poorly planned **Mountain Valley Pipeline (MVP)** in Southwest Virginia damaged fragile water resources and ecosystems. MVP accrued over 350+ violations of water quality protections in Virginia, revealing deficiencies in current erosion and sediment control requirements.[7] The pipeline's construction also damaged Indigenous cultural and sacred sites, and adversely impacted rural communities and residents' livelihoods.[8]

The use of degraded construction materials, its route through steep slopes, fragile **karst** areas and seismic zones, and the lack of **odorant** in the line now add to the risk of failure or explosion during operation.[9] MVP received unprecedented Congressional interference via the pipeline's inclusion in the unrelated 2023 **Fiscal Responsibility Act.**[10] This set a dangerous precedent for Virginia's autonomy to protect its natural resources and should signal the need to strengthen environmental review processes.

Mountain Valley Pipeline
Photo by Mountain Valley Watch

If fully operational, MVP could be responsible for nearly 1% of all US energy sector greenhouse gas emissions.[11] That massive increase in emissions is reason enough to limit new methane-gas infrastructure, as the impacts on our climate are felt widely through intensified weather and recurrent flooding in both coastal and inland areas. New infrastructure negates the climate progress Virginia has made in recent years.

Unfortunately, more pipeline expansion projects are now proposed for Southside and Eastern Virginia. The proposed **Southgate extension of Mountain Valley Pipelines** and the **Southeast Supply Enhancement Project** would both be large, high-pressure pipelines routed through Pittsylvania County, the site of multiple existing lines and polluting compressor stations. The **Virginia Reliability Project** would be constructed through eastern counties in areas already overburdened with existing infrastructure and pollution.[12] These projects would negatively impact wetlands and private wells – especially in areas prone to recurrent flooding and sea level rise.

OPPORTUNITIES

New fossil fuel infrastructure should not be pursued as we work towards our clean energy goals in Virginia. We have learned from projects like the Mountain Valley Pipeline that current laws and regulations do not adequately protect water resources, public health, or the environment from the construction of new fossil fuel infrastructure. MVP's violations highlight the dangers of construction in fragile karst landscapes and through seismic zones and reinforce the need for agencies to hear from local communities about the real-world impacts they experience from pipeline construction.

Absent a ban, any new fossil fuel build-out, including both interstate and intrastate pipelines, must be thoroughly and holistically scrutinized through processes that fully engage and respect the public's views and interests. Fossil fuel projects should receive a comprehensive review, including cumulative health and environmental impacts on nearby communities. For projects already in process, enforcement of pollution laws must be prioritized, and companies must be held fully accountable, regardless of project completion or abandonment. Review processes should include bonding requirements for appropriate funding or insurance coverage, and include stringent environmental restoration requirements.

Virginia can strengthen state review of projects and increase public involvement and participation in those reviews and streamline opportunities to report problems. Ultimately, policy improvements could be used to appropriately address the current climate crisis, prevent future harm, and protect and restore communities and areas negatively impacted by existing projects.

TOP TAKEAWAYS

New fossil fuel infrastructure increases greenhouse gas emissions and is harmful to the health and safety of Virginians. New construction should be limited.

Methane-gas pipelines that are proposed and built without bonding or safety funding requirements leave communities and local emergency services footing costs if the pipeline is abandoned or has a leak or explosion.

Communities are often left without proper notice of surveying, route changes, and permit review dates. Public access to information about proposed projects should be increased.

RECLAIMING COAL MINES

TRANSITIONING ENERGY INFRASTRUCTURE

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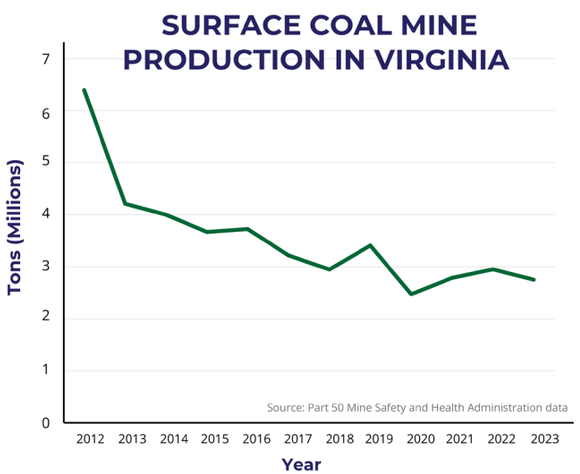
WHY IT MATTERS

Numerous modern surface coal mines across Southwest Virginia have not been cleaned up due to decades of under enforcement of reclamation requirements, including the requirement to guarantee money is available for clean-up through reclamation bonds. Some mines are functionally abandoned — having neither produced coal nor made appreciable reclamation progress in years. These mines threaten the health of surrounding communities and the environment through water pollution, landslides, and exacerbating flooding. Money from the federal Abandoned Mine Land Fund cannot be used for these mines as it is only available for mines abandoned before the passage of the Surface Mining Control and Reclamation Act, passed in 1977.

Coal production in Virginia has declined 33% in the last decade. Reclamation has stalled at many mines, raising the question of whether adequate regulations are in place to ensure that mined land is properly reclaimed. Stalled reclamation not only results in fewer jobs for miners reclaiming mines but also prevents the land from being put back into productive use. As more coal companies declare bankruptcy, fewer companies remain to take over mines, so the number of companies forfeiting reclamation bonds and deserting their cleanup responsibilities will only increase. The funds available through the Virginia bonding program may fall short of the actual reclamation costs that fall to the Commonwealth.



CURRENT LANDSCAPE

Virginia has nearly 53,000 acres of current surface mine permits in need of reclamation.[1] Determining whether bonds adequately cover reclamation liability is difficult, due to a lack of data and to uncertainty regarding how many permits will need to be reclaimed using bonds. Virginia Energy does not regularly evaluate reclamation liability at coal mines. Appalachian Voices' 2021 analysis of seven Eastern states, including Virginia, highlighted that the state's bonding program covers only 39-47% of the total reclamation liability.[2] This shortfall primarily stems from inadequately low permit-specific bond amounts, reliance on a pool bond system, and continued use of self-bonds at certain mines.

Under federal and state mandates, coal companies must secure bonds to ensure funds are available for reclamation if they fail to fulfill their obligations. In Virginia, all companies provide a permit-specific bond, usually provided by a third-party surety company, or less commonly through financial or property collateral. Approximately half of Virginia's permits take part in a state-managed pool bond fund, the Coal Surface Mining Reclamation Fund. Participation in the pool allows for lower permit-specific bonds in exchange for collective coverage. In the event of a permit forfeiture, bond shortfalls are made up from the pool. The pool is not intended to fund reclamation for all participating permits fully.

Historically, Virginia allowed self-bonds, where companies guaranteed bond amounts without cash or collateral, but this practice ceased in 2014. Nonetheless, 20 mine permits still rely on legacy self-bonds, with 19 participating in the pool bond system. Many of these mines have been inactive for years.[3] According to Virginia Energy estimates, the forfeiture of the three most costly self-bonded mines would bankrupt the pool bond.

These challenges are compounded by the consolidation of bonds among a smaller number of surety companies, notably Indemnity National Insurance Company (INIC). As of 2022, INIC covered 45% of all bonds in Virginia. Other states also have many bonds covered by INIC.[4] Many states may be vulnerable if companies with bonds predominantly through INIC were to face bankruptcy.

OPPORTUNITIES

Virginia can take active steps to require timely reclamation from coal companies and ensure funding for reclamation if coal companies fail to complete reclamation. Completing the cleanup will improve health and safety for nearby communities and put miners back to work.

Successful mine reclamation relies on clear standards for reclamation timelines and adequate reclamation bonding so that Virginia Energy can take action when mines are not reclaimed. While the law requires reclamation to happen concurrently with coal removal, exceptions are made to these requirements frequently. Regulations should be put in place to limit how long and how often mine permits can be idled and strengthen reclamation timeline requirements.

The bond system should be overhauled to ensure that each mine permit is adequately bonded. This should include ensuring the pool bond does not create more risk than a traditional bonding system. The Joint Legislative Audit and Review Commission should review the adequacy of Virginia's coal bonding system, including the solvency of the Coal Surface Mining Reclamation Fund, and produce a public report.

The remaining self-bonds should be replaced by full-cost bonds. Where coal companies are unable or unwilling to provide adequate bonding or complete reclamation within 3 years, the Commonwealth should revoke their permits and ensure the company and its affiliates are no longer eligible for new permits.

Virginia Energy should improve transparency and public access to information regarding bonding amounts and how they are calculated, mining permit details, environmental compliance, and reclamation progress. Only some of this information is currently available but is cumbersome to access and understand. Virginia Energy should strive to make mining data user-friendly and accessible online.

TOP TAKEAWAYS

- Virginia has nearly 53,000 acres of land on current surface mine permits in need of reclamation.
- Completing coal mine cleanup will improve health and safety for nearby communities, restore land productivity, and create jobs for miners.
- As more coal companies declare bankruptcy, the system in place to ensure the Commonwealth has adequate funding for cleanup at unreclaimed coal mines may be inadequate to cover the full cost.

Handstand at Back Bay National Wildlife Refuge at Virginia Beach, VA
Photo by Kathleen Trace

GOOD GOVERNANCE

EQUITY, ACCESS, & ACCOUNTABILITY

RELEVANT PROGRAMS & AGENCIES

See full glossary starting on page 157

STATE CORPORATION COMMISSION (SCC)

A state agency with regulatory authority over many business and economic interests in Virginia including public utilities. It is an independent department of state government with delegated administrative, legislative, and judicial powers.

VIRGINIA CLEAN ECONOMY ACT (VCEA)

Virginia law outlining a clear path to achieving a zero-carbon energy future by mandating the retirement of fossil fuel electricity generators, sets renewable energy standards through wind and solar power, and sets energy efficiency standards. The VCEA also establishes a renewable energy portfolio standard (RPS), which mandates that the two major utilities in the state, Dominion Energy and Appalachian Power Company, produce 100 percent renewable electricity by 2045 and 2050, respectively.

VIRGINIA DEPARTMENT OF CONSERVATION & RECREATION (DCR)

Agency which oversees Virginia's natural resource management and outdoor recreation.

VIRGINIA DEPARTMENT OF EDUCATION (DOE)

State agency that leads and facilitates the development and implementation of a quality public education system.

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

Virginia's environmental agency that is responsible for administering laws and regulations related to air quality, water quality, water supply, renewable energy and land protection. DEQ issues permits, conducts monitoring, performs inspections, and enforces environmental law.

VIRGINIA ENERGY

State agency tasked with developing the plan for Virginia's energy future.

VIRGINIA ENVIRONMENTAL JUSTICE ACT (VEJA)

Virginia law established to promote the fair treatment and meaningful involvement of all people regardless of race, color, national origin, income, faith, or disability with respect to the development, implementation, and enforcement of environmental laws and policies.

VIRGINIA ENVIRONMENTAL LITERACY PLAN (VELP)

Provides a framework for integrating environmental education into the K-12 curriculum, emphasizing hands-on, outdoor learning experiences.

Snow in Roanoke
Photo by Sara Davis

IMPLEMENTING ENVIRONMENTAL JUSTICE

EQUITY, ACCESS, & ACCOUNTABILITY

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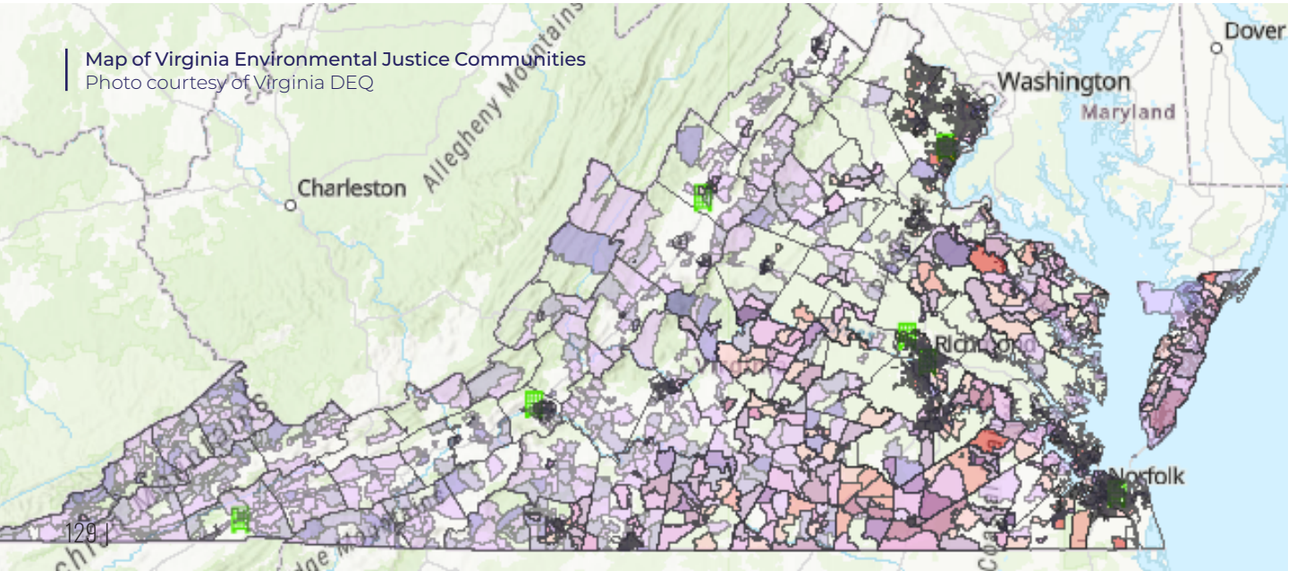
WHY IT MATTERS

Environmental Justice is "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."[1] No one should have their health, home, or livelihood negatively impacted by the built environment around them. For too long, certain neighborhoods have suffered disproportionately from higher asthma rates, lower amounts of green space, and higher concentrations of pollution from living near heavy industries. Recent studies have found that communities of color are consistently exposed to higher levels of fine particulate matter air pollution,[2] and because of these exposures, communities of color experienced 7.5 times higher pediatric asthma rates and 1.3 times higher premature mortality from particulates compared with mostly White communities.[3]

It is long past time that all Virginians are treated fairly and are free from environmental hazards that negatively impact their health and wellness. There is no quick fix to centuries of injustice, but there are currently opportunities to create employment and new healthy resources in the very communities that have faced unfair treatment and disinvestment.

CURRENT LANDSCAPE

The movement for environmental justice (EJ) has roots in the civil rights movement of the 1960s and gained momentum throughout the 1970s and 1980s, as Black communities organized to oppose the siting of toxic facilities in their neighborhoods, and academics and government agencies began studying racial disparities in the siting of solid waste landfills.[4] In the 1990s, the U.S. EPA created the Office of Environmental Justice and the National Environmental Justice Advisory Council, which holds public meetings to discuss EJ issues across the country.[5] Executive Order 12898 (1994) directed federal agencies to identify and address the adverse environmental and health impacts that agency actions have on minority and low-income populations, and it established an Interagency Working Group to coordinate federal efforts to address environmental injustices.[6]



Map of Virginia Environmental Justice Communities
Photo courtesy of Virginia DEQ

Virginia has lagged behind. Virginia established its first Advisory Council on Environmental Justice under Executive Order 73 (2017),[7] and the council was reestablished under Executive Order 29 (2019).[8] The General Assembly established the council as a permanent advisory body in the executive branch in 2020.[9]

In 2020, the General Assembly went further and passed the **Virginia Environmental Justice Act (VEJA)**, which determined that it is "the policy of the Commonwealth to promote environmental justice and ensure that it is carried out throughout the Commonwealth."[10] Since that time, the integration of environmental justice into agency operations has been uneven. For example, **Virginia Department of Environmental Quality (DEQ)** commissioned a report with recommendations on EJ from a consulting group, but the agency has not acted upon or achieved several of these goals.[11] In addition, the agency published draft guidance on how to incorporate EJ into permitting processes,[12] but the draft guidance failed to account for the full spectrum of adverse impacts and did not discuss the circumstances under which DEQ would deny a permit or impose additional permit conditions based on disproportionate impacts. To date, the guidance has not been finalized.[13]

OPPORTUNITIES

Virginia can improve its implementation of the Environmental Justice Act by following examples from across the nation. For instance, while DEQ's EJ guidance for permitting sits on the shelf, Executive Order 14008 reinvigorated federal commitment by, among other things, directing EPA to provide real-time data on current pollution levels in fenceline communities.[14] To carry this out, the agency is in the process of strengthening its scientific research processes to better understand cumulative adverse impacts.[15] Establishing current exposure levels to a variety of environmental stressors is a necessary step for incorporating EJ into permitting decisions, and these new federal resources could assist Virginia DEQ in doing so.

The federal government recently broadened its approach to EJ with Executive Order 14096, which creates a "whole of government" approach to environmental justice.[16] The Order includes the first-ever government-wide definition of environmental justice and applies it to all executive agencies (as opposed to the 13 agencies named in the 1994 EO).[17] The Order directs all agencies to incorporate EJ into their decisions and activities, including "any agency rulemaking, guidance, policy, program, practice, or action that affects or has the potential to affect human health and the environment, including an agency action related to climate change."[18]

Virginia should follow these examples by ensuring that all agencies of the Commonwealth provide for fair treatment and meaningful involvement of environmental justice and **fenceline communities**, whether in permit decisions or any other policy, program, or action.

TOP TAKEAWAYS

Virginia law defines environmental justice 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."

Implementing environmental justice will create a Commonwealth where every person will thrive, regardless of their racial, social, or economic background.

State departments and agencies should create ways to meaningfully involve environmental justice and fenceline communities in the decision-making process for agency activities, including permits, because people of color are disproportionately exposed to higher levels of pollution.

ADVANCING ENVIRONMENTAL LITERACY

EQUITY, ACCESS, & ACCOUNTABILITY

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WHY IT MATTERS

Virginia's environmental challenges require future generations to be knowledgeable about conservation strategies and environmental issues. According to the Virginia Department of Education's (VDOE) website, "Environmental Literacy is having the knowledge, skills, and dispositions to solve problems and resolve issues individually and collectively that sustain ecological, economic, and social stability." Environmental literacy is more than simply understanding our natural environment; it is a necessary structure for a healthy community.[1]

Environmental education plays a crucial role in student achievement across the curriculum. Studies show that students benefit in critical and creative thinking, collaboration, communication, and citizenship. VDOE's website states, "Environmental Education allows students to strengthen their critical thinking and creative thinking skills as they work to solve environmental problems. They achieve positive environmental changes through collaboration and communication within their communities, all of which strengthens a student's sense of citizenship."

CURRENT LANDSCAPE

Virginia's environmental literacy is primarily advanced through the Virginia Standards of Learning concepts and community partnerships with the schools. VDOE mandates that schools include environmental education through the science standards and encourages interdisciplinary approaches to environmental education. There are some state initiatives, such as the Virginia Naturally Schools program, which recognizes schools that are implementing environmental education programs. The Virginia Environmental Literacy Plan (VELP) is a cornerstone document. It provides a framework for integrating environmental education into the K-12 curriculum, emphasizing hands-on, outdoor learning experiences.

However, many school districts in Virginia lack access to necessary curriculum resources, funding, and professional development opportunities. Under-resourced schools often struggle to provide students with effective environmental education programs, including meaningful watershed education experiences (MWEEs), which allow students to gain a deeper understanding of the challenges facing their local watersheds.[2]

Students searching for Chincoteague ponies
Photo Lis Heras

Funding for these initiatives comes from a mix of private, state, and federal sources. The Department of Conservation and Recreation (DCR) manages the Virginia Watershed Educational Program grant fund. For FY25, this fund awarded $250,000 to 12 schools, school divisions, and community partner groups. This fund is woefully inadequate to support the needs of Virginia; DCR reported receiving over $1M in funding requests. Other sources of funding come from federal government grant programs, such as the U.S. EPA Environmental Education Local Grants Program and NOAA B-WET grants. VDOE also facilitates a support fund that pays for approved professional development activities for teachers.

Despite these efforts, several barriers impede the full realization of environmental literacy in Virginia. Limited funding and resources at the local school level can restrict the implementation of comprehensive environmental education programs. Additionally, variability in teacher training and preparedness to deliver environmental education content can affect program effectiveness. Logistical challenges, such as arranging outdoor learning experiences and field trips, further complicate environmental education integration. Lastly, competing educational priorities and standardized testing pressures can limit the time and attention devoted to environmental literacy.

OPPORTUNITIES

Increasing access to funding and training can lead to a more engaged and environmentally literate community, ultimately contributing to the well-being of Virginia's natural resources and residents. Increased and sustained funding is crucial to supporting environmental literacy programs.

Through the Chesapeake Bay Agreement, Virginia has committed to providing students across Virginia a MWEE three times during their schooling. It costs roughly $50/student to provide this quality educational program. The total state funding directly allocated to MWEEs is currently at $250,000 per year, which is far below nearby states, such as Maryland, Pennsylvania, and Delaware. Virginia should allocate at least $2M for this effort ($1M in each year of the biennium). This long-term strategy is necessary to remain competitive and provide Virginians with a high-quality education.

To increase funding and the resources that are needed to ensure all students have an opportunity to experience hands-on learning through MWEEs and other environmental education programs, we recommend that Virginia:

- Increase the DCR Virginia Watershed Education Program Fund from $250K to $1M annually
- Expand the scope of the DCR Virginia Watershed Education Program Fund to be statewide, and include additional allowable environmental education activities beyond MWEEs.
- Support a full-time coordinator for the Virginia Environmental Literacy Network to ensure state agency collaboration with community partners and schools.

TOP TAKEAWAYS

Environmental Education allows students to strengthen their critical thinking, creative thinking, communication, and collaboration skills as they work to solve environmental problems – all of which strengthen a student's sense of citizenship.

Virginia's students need to be prepared to tackle the environmental challenges that lie ahead of them.

Additional funding will increase the quality and quantity of environmental education programming, creating a more environmentally literate community.

CURBING ELECTRIC UTILITIES' POLITICAL INFLUENCE

EQUITY, ACCESS, & ACCOUNTABILITY

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WHY IT MATTERS

The political influence of electric utility monopolies actively obstructs Virginians' ability to access affordable energy and more renewable energy solutions.

Most Virginians receive power through two **investor-owned electric utilities**, Dominion Energy and Appalachian Power Company, which are monopolies in their respective service territories. Unfortunately, Virginia has some of the weakest campaign finance laws in the country—affording these entities outsized influence over the Commonwealth's energy policy through their monopoly status and unrestricted financial contributions to lawmakers.

Since 1996, regulated utility monopolies have donated nearly $40 million to Virginia legislators to influence public policy in their favor. But over $20 million was spent by Dominion Energy between 2020-2024.[1,2]

The result: Virginians now pay the 10th highest electricity bills in the nation, and have been overcharged more than $1.9 billion since 2009.[3,4] Notably, regulated electric utilities have employed their influence to secure rate freezes costing consumers millions of dollars in potential savings. These expenses are not equally distributed and often fall hardest on poor, rural, and minority households with disproportionately higher **energy burdens.**[6,7]

Moreover, utility lobbyists have worked with legislative allies to block or minimize the type of innovative, distributed energy resources that would both empower customers and protect our environment because they are not as financially lucrative for the monopoly. Specifically, Dominion and Appalachian Power often lobby against measures like rooftop solar and stronger regulatory oversight from the **State Corporation Commission (SCC)**.[8] As a result, Virginia's electricity mix skews towards expensive and polluting fossil fuel generation plants rather than maximizing the benefits of environmentally friendly distributed technologies like solar and battery storage.

For far too long, investor-owned utility monopolies have taken advantage of Virginia's weak campaign finance system to write the very laws that govern them. Shifting more political power to Virginians will pave the way for a just, affordable, clean energy future.

Transmission line–Ashburn, VA
Photo by Hugh Kenny, PEC

CURRENT LANDSCAPE

Virginia grants investor-owned electric utilities, Dominion Energy and Appalachian Power Company, a monopoly in their respective service territories. In exchange for a captive customer base, Virginians are entitled to diligent regulation and oversight by the General Assembly. The SCC, which has only recently filled all three Commissioner seats, is the regulatory body responsible for overseeing the utilities it regulates. The General Assembly appoints SCC members and provides policy guidance. Because the primary purpose of for-profit corporations is to produce profit for investors, it is necessary to balance this objective with a strong regulatory atmosphere that ensures the public interest.

Virginia is one of 11 states with no limits on campaign finance contributions, while also allowing candidates to use campaign donations for personal uses. Virginia also allows legislators to own stock in corporations and vote on measures that could potentially increase their wealth, creating a troubling conflict of interest. Ultimately, investor-owned utility monopolies have multiple avenues of influence over the government officials who are tasked with regulating them, while Virginia's captive customers have no choice but to subsidize their electricity provider's political spending every time they pay their monthly bills.

OPPORTUNITIES

A ban on political contributions from publicly regulated utilities would benefit a more equitable and fair legislative process. **Publicly regulated utilities** are a specific set of 60 corporations in Virginia that provide public services–electricity, gas, water, and sewer–and have been granted a monopoly by the state. Over half the country bans these kinds of political contributions in some form and 22 states ban corporate contributions altogether. More than half of U.S. states ban or restrict contributions from utilities, better ensuring that energy policy is determined by the public interest, including strong energy efficiency measures and environmental protections, rather than a utility's bottom line. With stronger campaign finance laws, energy policy can be developed in an open and fair legislative process. Prohibiting public utility monopolies from contributing to the political campaigns and committees of lawmakers would help shrink the outsized influence of electric utilities on the legislative process.

Further, the Joint Subcommittee to Study Comprehensive Campaign Finance Reform has recommended legislators be prohibited from using campaign funds for personal use. Virginia is behind nearly all other states and the Federal government in banning the personal use of campaign funds. There is currently nothing stopping a legislator or candidate from using campaign funds to buy a vacation house or a country club membership. Finally, common-sense limits on campaign finance contributions would help ensure legislative actions align with the public interest over one individual or one donor's perspective.

TOP TAKEAWAYS

39 states place reasonable restrictions on campaign contributions to reduce the influence of donors on policymaking.

It is a conflict of interest to have public utility monopolies contribute to the political campaigns and committees of the government officials who are tasked with regulating them.

It is a conflict of interest for legislators to own stock in public investor-owned electric utilities.

SHIFTING UTILITIES' INCENTIVES FOR EQUITY & AFFORDABILITY

EQUITY, ACCESS, & ACCOUNTABILITY

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WHY IT MATTERS

Virginians pay some of the highest energy bills in the nation, disproportionately impacting low-income households and historically marginalized communities.[1,2,3] High energy costs are tied to the regulatory system governing Virginia's **investor-owned utility (IOU)** monopolies that incentivize expensive investments rather than cost-saving measures – i.e., the more expensive an energy project is, the more profits the utility collects.[4]

Under the current "cost-of-service" (COS) model, utility monopolies in Virginia profit from (i) selling electricity and (ii) building infrastructure.[5] Initiatives like reducing energy bills with **energy efficiency** improvements and expanding customer-owned **distributed energy resources** like rooftop solar conflict with utilities' profit sources.[6] The current model also conflicts with buying clean energy from third-party developers through **power purchase agreements (PPAs)**, even when it saves customers money.

This model does not align with solutions to minimize costs and harmful environmental and social impacts. Without rethinking alternatives to the current COS model, the transition toward a carbon-free energy system will likely be slower and more costly, and justice priorities could be relegated.

Dominion power station–West Virginia
Photo by Hugh Kenny, PEC

CURRENT LANDSCAPE

States nationwide have implemented several modifications to the COS model using a variety of **performance-based regulation (PBR)** tools. PBR is a group of reforms—including revenue decoupling, multiyear rate plans, and performance incentive mechanisms—that aim to make cost-saving measures—like energy efficiency, **demand response**, customer-owned resources, and PPAs—as financially attractive as capital investments.

For example, in 2013, New York utility Con-Edison needed to upgrade a portion of its grid due to increased demand. Instead of a $1 billion substation upgrade, the regulator established the Brooklyn-Queens Demand Management program, implementing several incentives to ensure the utility would benefit from non-capital-intensive solutions. Costs were reduced by half with an alternative investment package that included energy efficiency, demand response, and storage.[7] PBR frameworks require careful consideration, and justice needs to be at the forefront of implementation.[8] In 2023 and 2024, the General Assembly passed two bipartisan legislative initiatives to advance PBR.

In 2023, the General Assembly enacted legislation to establish a **State Corporation Commission (SCC)** proceeding to implement "performance-based adjustments," also known as **performance incentive mechanisms (PIMs)**.[9] PIMs reward or penalize utilities for specific target outcomes that the current system is not designed to incentivize. States have seen good results using PIMs to incentivize higher utilization of demand response—programs that reward customers for using less electricity during periods of high demand (peak hours). Demand response programs can decrease system costs and displace the need for new generation plants.[10]

In 2024, the General Assembly passed legislation establishing a study process in which the SCC, **Virginia Energy**, and stakeholders will further evaluate PBR tools. The study will examine how the current financial incentives of utility monopolies conflict with state policy goals, outline tools to better align utility incentives with the state's environmental and justice goals, assess risks, and identify implementation steps.[11]

OPPORTUNITIES

The initiatives outlined above should generate a comprehensive evaluation of long-term solutions for the misalignment of IOUs' financial incentives with the state's energy policy goals. The General Assembly and the SCC will also need to generate short-term solutions to specific barriers stemming from utilities' incentives and other legal impediments.

For example, although the cost of PPAs for utility-scale solar has dramatically declined nationwide, the current statute caps PPAs at 35% of utilities' clean energy investments under the **Virginia Clean Economy Act (VCEA)**.[12] Thus, utilities cannot consider PPAs to meet more than 35% of their clean energy goals under the VCEA, even when there are qualified PPAs that would be cheaper than utility-owned projects. Regulators should be allowed to consider all qualified and cost-competitive PPAs to reduce clean energy costs.

Furthermore, although it is the policy of the Commonwealth to "enable widespread integration of distributed energy resources,"[13] distributed solar is facing unreasonable interconnection costs and timelines. Utilities in Virginia are requesting projects under 3 MW to pay $1 to $3 million for grid upgrades, making projects unfeasible.[14] On average, it takes Dominion Energy 300 business days to get small facilities (less than 2 MW) interconnected; an SCC expert suggested 195 days as a more reasonable processing time benchmark.[15] The SCC needs to accelerate fair interconnection rules and could use PBR tools like tracking metrics and PIMS to boost distributed generation.

Finally, Dominion reported it would not meet the net energy efficiency targets of the VCEA[16] and in a recent SCC filing, Appalachian Power (APCo) and Dominion Energy proposed low energy efficiency targets for the 2026-2028 period.[17,18] The proposed targets are lower than those of top energy efficiency-performing utilities.[19] The SCC needs to refine existing incentives and ensure utilities leverage their maximum energy efficiency potential (*see page 111*).

TOP TAKEAWAYS

Current incentives for utilities are counterproductive to an equitable and affordable clean energy transition. These incentives are hindering the Commonwealth's distributed energy and energy efficiency goals. Decision-makers should establish short- and long-term systemic solutions.

The SCC and Virginia Energy should thoroughly explore all performance-based regulatory tools to shift utility incentives so that Virginia can successfully meet its clean energy policy goals.

Increasing the percentage of qualified third-party-owned solar and wind resources that the SCC can approve for our utilities' portfolios will ensure ratepayers receive lower prices for clean energy.

ENDNOTES

PREVENTING POLLUTED STORMWATER RUNOFF

1. Michael J, Allen and Thomas R. Allen, *Precipitation Trends across the Commonwealth of Virginia* (1947 – 2016), Virginia Journal of Science, Volume 70, Issue 1 & 2, Spring & Summer 2019. https://digitalcommons.odu.edu/cgi/viewcontent.cgi?article=1447&context=vjs.
2. "Stormwater Runoff." *Chesapeake Bay*. https://www.chesapeakebay.net/issues/threats-to-the-bay/stormwater-runoff.
3. Hanson Jeremy, Chesapeake Research Consortium; Tom Schueler and Cecilia Lane, Chesapeake Stormwater Network, *Recommendations of the Expert Panel to Define Removal Rates for Erosion and Sediment Control Practices*, Final Report, January 4, 2014, at 14, https://d38c6ppuviqmfp.cloudfront.net/channel_files/21243/attachment_c.2--final_short_draft_esc_expert_panel_01072014.pdf.
4. Virginia DEQ database of active sites at myDEQ Portal, Active Permit List - 2024, https://portal.deq.virginia.gov/reports/tableau/swcgp-active-permit-list. (last accessed August 13, 2024).
5. Jeremy et al., Recommendations of the Expert Panel, 30.
6. Parker Agelasto, Capitol Region Land Conservancy, *Virginia is Losing Farmland at a Record Pace*, March 1, 2024. https://capitalregionland.org/2024/03/virginia-losing-farmland-at-record-pace.
7. EPA was authorized to permit CSW activities under the CWA in 1987; EPA regs.1990; VA delegated auth. for general permits 1991.
8. General VPDES Permit for Discharges of Stormwater from Construction Activities (CSW) (9 VAC 25-880-70).
9. Foundation for Community Association Research, Fact Book 2023 Dashboard. https://foundation.caionline.org/publications/factbook/fact-book-2023-dashboard.

INVESTING IN WASTEWATER IMPROVEMENTS

1. "Achieving Water Quality Goals in the Chesapeake Bay: A Comprehensive Evaluation of System Response." Scientific and Technical Advisory Committee (STAC) (2023). https://www.chesapeake.org/stac/wp-content/uploads/2023/05/CESR-Final-update.pdf.
2. Chesapeake Bay Total Maximum Daily Load Indicator Chesapeake Bay Commission Meeting Presentation. Gary Shenk, United States Geologic Survey. 2024. https://www.chesbay.us/library/public/documents/Meetings/May-2024/7-Gary-Shenk_TMDL-Indicator.pdf.
3. Jeremy Fox and Ad Crable, "As rain fell, sewage systems across the Bay region buckled," *Chesapeake Bay Journal*, April 2, 2024, https://www.bayjournal.com/news/climate_change/as-rain-fell-sewage-systems-across-the-bay-region-buckled/article_caea3c08-ed55-11ee-974f-4f73412c6c8b.html.
4. Item C-53.50 (CCO) improvements: Wastewater treatments upgrades. HB6001 - chapter 2. Accessed June 13, 2024. https://budget.lis.virginia.gov/item/2024/2/HB6001/Chapter/2/C-53.50.
5. "Wastewater," *Chesapeake Bay Program*, accessed June 13, 2024, https://www.chesapeakebay.net/issues/threats-to-the-bay/wastewater.
6. "FY 2021 Chesapeake Bay and Virginia Waters Clean-up Plan," Secretary of Natural Resources (November 2021). https://rga.lis.virginia.gov/Published/2021/RD682/PDF.
7. "Diseases Involving Sewage," Indiana Department of Health (2022). https://www.in.gov/health/eph/onsite-sewage-systems-program/diseases-involving-sewage.
8. "Richmond, VA," Data USA (June 10, 2022). https://datausa.io/profile/geo/richmond-va.
9. "Richmond Combined Sewer Overflow Progress Report to the General Assembly," (December 20, 2022). https://rga.lis.virginia.gov/Published/2022/RD880/PDF.
10. Commonwealth of Virginia Wastewater Infrastructure Needs Assessment"
Virginia. (June 13, 2024). https://rga.lis.virginia.gov/Published/2023/RD814/PDF.
11. Va. Code § 62.1-44.19:14, https://law.lis.virginia.gov/vacode/62.1-44.19:14/.
12. "Water, Health, and Equity: Infrastructure Crisis Facing Low-Income Communities & Communities of Color — and How to Solve It," Clean Water for All, https://www.policylink.org/sites/default/files/CWC_Report_Full_report_lowres.pdf.
13. "WaterWorks: The Job Creation Potential of Repairing America's Water Infrastructure," BlueGreen Alliance. https://www.bluegreenalliance.org/wp-content/uploads/2020/07/BGA-Water-Works-Report-vFINAL.pdf.

SUPPORTING AGRICULTURE FOR CLEAN WATER

1. "Economic Impacts of Agriculture and Forest Industries in Virginia," *Weldon Cooper Center for Public Service* (2022).
2. Chesapeake Assessment and Scenario Tool (CAST) Version 2019. Chesapeake Bay Program Office, accessed June, 2024.
3. "Achieving water quality goals in the Chesapeake Bay: A comprehensive evaluation of system response" Scientific and Technical Advisory Committee (STAC). (K. Stephenson & D. Wardrop, Eds. 2023).
4. "Virginia Soil and Water Conservation Board Electronic Meeting Minutes," *Virginia Department of Conservation and Recreation* (May 20, 2021): 10-11, https://www.dcr.virginia.gov/document/SWCB-May-20-2021-DRAFT-minutes.pdf.

ENFORCING WATER QUALITY STANDARDS

1. Review of Virginia DEQ, Virginia's 2024 305(B)/303(D) Water Quality Assessment Integrated Report, Appendix 1a - 2024 Impaired Waters - 303(D) List, Category 5 - Waters Needing Total Maximum Daily Load Study. *Virginia Department of Environmental Quality*. https://www.deq.virginia.gov/home/showpublisheddocument/23287/638490456973830000.
2. "Middle Chickahominy PFAS Study." ArcGIS StoryMaps. (February 9, 2023). https://storymaps.arcgis.com/stories/1d68144adf54432198e7d56229862d31.
3. Wasteload allocations for nutrients and sediment, set in relation to the Chesapeake Bay TMDL, are imposed through permits but do not ensure compliance with WQS in local streams.
4. 9 VAC 25-260-20.A. https://law.lis.virginia.gov/admincode/title9/agency25/chapter260/section20.
5. Virginia Department of Environmental Quality. n.d. Review of Approved TMDLs. Accessed June 12, 2024. https://www.deq.virginia.gov/our-programs/water/water-quality/tmdl-development/approved-tmdls.
6. Sierra Club Virginia Chapter. "We Are Back at the State Water Control Board!" Facebook video, June 26, 2024. https://www.facebook.com/vasierraclub/videos/2310315712360416.
7. Virginia Code Commission. 2021. Review of Virginia Register of Regulations, April 12, 2021. https://register.dls.virginia.gov/vol37/iss17/v37i17.pdf.

STOPPING PFAS AT ITS SOURCE

1. "PFAS," *National Institute of Environmental Health Sciences*, https://www.niehs.nih.gov/health/topics/agents/pfc/index.cfm.
2. "Toxicological Profile for Perfluoroalkyls," *Agency for Toxic Substances and Disease Registry* (May 2021). https://www.atsdr.cdc.gov/ToxProfiles/tp200.pdf.
3. Arlene Blum, Simona A. Balan, Martin Scheringer, Xenia Trier, Gretta Goldenman, Ian T. Cousins, Miriam Diamond, et al, "The Madrid Statement on Poly and Perfluoroalkyl Substances (PFASs)," *Environmental Health Perspectives* 123 no. 5 (May 1, 2015). https://doi.org/10.1289/ehp.1509934.
4. Toxicological Profile for Perfluoroalkyls Draft for Public Comment." 2018. https://www.atsdr.cdc.gov/toxprofiles/tp200.pdf.
5. US EPA. 2023. "Our Current Understanding of the Human Health and Environmental Risks of PFAS," (June 7, 2023) https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas.
6. Our Current Understanding of the Human Health and Environmental Risks of PFAS," *Environmental Protection Agency* (June 7, 2023), https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas.
7. Genna Reed, "PFAS Contamination Is an Equity Issue, and President Trump's EPA is Failing to Fix It," *Union of Concerned Scientists* (October 30, 2019). https://blog.ucsusa.org/genna-reed/pfas-contamination-is-an-equity-issue-president-trumps-epa-is-failing-to-fix-it.
8. "Communities of Color Disproportionately Exposed to PFAS Pollution in Drinking Water," Press Release, *Harvard University T.H. Chan School of Public Health* (May 15, 2023). https://www.hsph.harvard.edu/news/press-releases/communities-of-color-disproportionately-exposed-to-pfas-pollution-in-drinking-water.
9. Kazwini, Tayma, Sudesh Yadav, Ibrar Ibrar, Raed A. Al-Juboori, Lovdeep Singh, Namuun Ganbat, Elika

Karbassiyazdi, Akshaya K. Samal, Senthilmurugan Subbiah, and Ali Altaee, "Updated Review on Emerging Technologies for PFAS Contaminated Water Treatment." *Chemical Engineering Research and Design* (2022). https://doi.org/10.1016/j.cherd.2022.04.009.
10. Virginia General Assembly, HB586 (2020), https://lis.virginia.gov/cgi-bin/legp604.exe?201+ful+CHAP0611.
11. Virginia General Assembly, HB1257 (2020), https://lis.virginia.gov/cgi-bin/legp604.exe?201+ful+CHAP1097.
12. "Listing of Waterworks and Owners," *Virginia Department of Health*, https://www.vdh.virginia.gov/drinking-water/information-for-consumers/listing-of-waterworks-and-owners/.
13. "Per- and Polyfluoroalkyl Substances (PFAS) in Drinking Water," *Virginia Department of Health*, https://www.vdh.virginia.gov/drinking-water/pfas.
14. "Per- and Polyfluoroalkyl Substances (PFAS): Final National Primary Drinking Water Regulation," *United States Environmental Protection Agency*, (May 22, 2024). https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas.
15. "Private Well Water Information," *Virginia Department of Health*, https://www.vdh.virginia.gov/environmental-health/onsite-sewage-water-services-updated/organizations/private-well-water-information.
16. Virginia General Assembly, PFAS Identification & Monitoring & PFAS Expert Advisory Committee Established, SB245/HB1085 (2024), https://lis.virginia.gov/cgi-bin/legp604.exe?241+ful+CHAP0316.
17. PFAS Testing Dashboard," *Virginia Department of Environmental Quality*, https://www.deq.virginia.gov/topics-of-interest/per-and-polyfluoroalkyl-substances-pfas.
18. Ibid.
19. Va. Code Ann. § 9.1-207.1 (2023).
20. "Office of Drinking Water, State Water Commission Briefing," *Virginia Department of Health*, (December 2023), https://studiesvirginiageneralassembly.s3.amazonaws.com/meeting_docs/documents/000/001/906/original/VDH_-_Water_Commission_Briefing_12.2023_%281%29.pdf?1702596393.
21. Ibid.
22. Barbo, Nadia, Tasha Stoiber, Olga V. Naidenko, and David Q. Andrews. 2023. "Locally Caught Freshwater Fish across the United States Are Likely a Significant Source of Exposure to PFOS and Other Perfluorinated Compounds." *Environmental Research* 220 (March): 115165. https://doi.org/10.1016/j.envres.2022.115165.
23. "Fish and Game Guidelines," *Maine Division of Environmental and Community Health* (2024). https://www.maine.gov/dhhs/mecdc/environmental-health/eohp/fish/.

REDUCING WELL WATER NITRATE CONTAMINATION

1. Essien, Eno E., Kassim Said Abasse, André Côté, Kassim Said Mohamed, Mirza Muhammad Faran Ashraf Baig, Murad Habib, Muhammad Naveed, et al. 2020. "Drinking-Water Nitrate and Cancer Risk: A Systematic Review and Meta-Analysis." *Archives of Environmental & Occupational Health* 77 (1): 51–67. https://doi.org/10.1080/19338244.2020.1842313.
2. Oun A, et al., "Effects of Biosolids and Manure Application on Microbial Water Quality in Rural Areas in the US. Water" (2014).
3. "Private Well Program." Environmental Health. (June 12, 2024). https://www.vdh.virginia.gov/environmental-health/private-well-program.
4. "Well Informed Virginia," *Well Informed Virginia*, (June 12, 2024). https://www.wellwater.bse.vt.edu/well-informed-virginia.php.
5. "National Primary Drinking Water Regulations," *US EPA*, (March 22, 2018). https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations.
6. "Private Well Program." *Environmental Health*, https://www.vdh.virginia.gov/environmental-health/private-well-program/.
7. Ibid.

PROTECTION FROM TOXIC COAL ASH

1. "Final Rule: Legacy Coal Combustion Residuals Surface Impoundments and CCR Management Units," *Environmental Protection Agency,* (April 25, 2024). https://www.epa.gov/coalash/final-rule-legacy-coal-combustion-residuals-surface-impoundments-and-ccr-management-units.
2. "Coal Ash Contaminates Our Lives," Earthjustice, (May 7, 2024). https://earthjustice.org/feature/coal-ash-contaminates-our-lives.
3. "Coal Ash," *Centers for Disease Control and Prevention*, (October 15, 2018). https://www.atsdr.cdc.gov/substances/coalAsh.html.
4. "Final Rule - Legacy Coal Combustion Residuals Surface Impoundments and CCR Management Units," *Environmental Protection Agency*, (June 2024). https://www.epa.gov/coalash/final-rule-legacy-coal-combustion-residuals-surface-impoundments-and-ccr-management-units.

5. "Frequent Questions about the 2015 Coal Ash Disposal Rule," *Environmental Protection Agency*, (October 2024). https://www.epa.gov/coalash/frequent-questions-about-2015-coal-ash-disposal-rule.
6. Michael Miller, "Dispatch: Plant Must Find Safer Solution for Coal Ash," UC News, (November 29, 2022). https://www.uc.edu/news/articles/2022/11/uc-environmental-expert-explains-health-risks-of-coal-ash.html.

PREVENTING HARMS FROM METALS MINING

1 "Gold," *Virginia Department of Mines, Minerals and Energy* (2007). https://energy.virginia.gov/geology/gold.shtml.
2 "Toxic Release Inventory National Analysis 2022: Releases by Chemical and Industry," *Environmental Protection Agency* (March 2024). *https://www.epa.gov/trinationalanalysis/releases-chemical-and-industry*.
3 "Acid Mine Drainage," *Earthworks*, (Jun 8, 2022), https://www.earthworks.org/issues/acid_mine_drainage.
4 "Mining 101," *Earthworks*, (June 8, 2022), https://www.earthworks.org/issues/mining.
5 "Aston Bay Announces Exploration Agreement For Gold Exploration Property In Virginia, USA," *Aston Bay Holdings*, (March 4, 2019) https://astonbayholdings.com/news/aston-bay-announces-exploration-agreement-for-gold-exploration-property-in-virginia-usa.
6 "Aston Bay Holdings Intercepts 37.70 G/T Au Over 1.5 M And 6.56 G/T Au Over 2.18 M In Completed Phase 2 Results At Its Buckingham Gold Project, Virginia, USA," *Aston Bay Holdings, LLC* (October 13, 2020). https://astonbayholdings.com/news/aston-bay-intercepts-37.70-g-t-au-over-1.5-m-and-6.56-g-t-au-over-2.18-m-in-completed-phase-2.
7 Aston Bay Offering Document under the Listed issuer Financing Exemption," *Aston Bay*, (April 23, 2024): https://astonbayholdings.com/site/assets/files/1645/bay_-_listed_issuer_financing_form_45-106f19_april_2024-1.pdf.
8 "An Act to require the establishment of a workgroup to study the mining and processing of gold in the Commonwealth; report." https://lis.virginia.gov/cgi-bin/legp604.exe?212+ful+CHAP0423+pdf.
9 "Potential Impacts of Gold Mining in Virginia," *National Academies of Sciences, Engineering and Medicine*, (2023): https://nap.nationalacademies.org/catalog/26643/the-potential-impacts-of-gold-mining-in-virginia.
10 "An Act to amend and reenact § 45.2-1105 of the Code of Virginia, relating to mineral mining and processing; use of cyanide or a cyanide compound prohibited; report." https://lis.virginia.gov/cgi-bin/legp604.exe?241+ful+CHAP0135+pdf.
11 "Virginia Map," *Mapping for Environmental Justice*, https://mappingforej.berkeley.edu/virginia.
12 Virginia Environmental Justice Act. https://law.lis.virginia.gov/vacodefull/title2.2/chapter2/article12.
13 "Virginia's Surface Drinking Water Systems Downstream of the Gold-Pyrite Belt," *SELC*. https://static1.squarespace.com/static/619bd6e54d45ff6263eef5a7/t/619d531a13f8a334f9967a9a/1637700412250/Gold-Pyrite_DrinkingWater_November+3+2021.pdf.
14 "State of the James," *James River Association* (2023), https://thejamesriver.org/about-the-james-river/state-of-the-james.
15 "Mineral Mining," *Virginia Department of Energy* (2022). https://energy.virginia.gov/mineral-mining/mineralmining.shtml.
16 Whitney Pipkin, "Developers strike contamination from Virginia gold mines," *Bay Journal* (February 25, 2022). https://www.bayjournal.com/news/pollution/developers-strike-contamination-from-virginia-gold-mines/article_e13b5500-958c-11ec-b325-e7be704ed91b.html.

ENSURING LONG-TERM FLOOD RESILIENCE

1. Virginia Coastal Resilience Master Plan," *Virginia Department of conservation and Recreation*, (2021), https://www.dcr.virginia.gov/crmp/plan.
2. "Community Flood Preparedness Fund," *Virginia Department of Conservation and Recreation*, https://www.dcr.virginia.gov/dam-safety-and-floodplains/dsfpm-cfpf.
3. Virginia Coastal Resilience Master Planning Framework: Principles and Strategies for Coastal Flood Protection and Adaptation" *Virginia Department of Conservation and Recreation*, page 6, (October 22, 2020). https://www.dcr.virginia.gov/crmp/document/Virginia-Coastal-Resilience-Master-Planning-Framework-October-2020.pdf.
4. "Hampton Roads Planning Development Commission, Legislative & Regulatory Activity" *2024 Regional Legislative Agenda*, Pg. 6, (2024), https://www.hrpdcva.gov/DocumentCenter/View/8813/2024-Regional-Legislative-Agenda-PDF.

BUILDING COASTAL RESILIENCY WITH LIVING SHORELINES

1. Bilkovic, Donna M., Robert E. Isdell, Amanda G. Guthrie, Molly M. Mitchell, and Randolph M. Chambers, (2021) "Ribbed mussel Geukensia demissa population response to living shoreline design and ecosystem development" *Ecosphere* 12(3):e03402. 10.1002/ecs2.3402
2. Bilkovic, D. M., M. M. Mitchell, R. E. Isdell, M. Schliep, and A. R. Smyth, (2017) "Mutualism between ribbed mussels and cordgrass enhances salt marsh nitrogen removal," *Ecosphere* 8(4):e01795. 10.1002/ecs2.1795

SAFEGUARDING VIRGINIA'S WETLANDS

1. "Wetlands Losses in the United States 1780s to 1980s," table 1. *U.S. Fish & Wildlife Services*, (1990), https://www.fws.gov/sites/default/files/documents/Wetlands-Losses-in-the-United-States-1780s-to-1980s.pdf.
2. "Wetlands Losses in the United States 1780s to 1980s," table 1. *U.S. Fish & Wildlife Services*, (1990), https://www.fws.gov/sites/default/files/documents/Wetlands-Losses-in-the-United-States-1780s-to-1980s.pdf.
3. "Chesapeake Bay TMDL Phase III Watershed Implementation Plan." *Virginia Department of Environmental Quality*. (2019), https://www.deq.virginia.gov/home/showpublisheddocument/4481/637469262077670000.
4. Va. Code Sec. 62.1-44.15(16).
5. "Tidal Wetlands Act, 1972." Chapter 1, Title 28.2, Code of Virginia. Virginia General Assembly, 1972. https://law.lis.virginia.gov/vacodefull/title28.2/chapter13/.
6. "Nontidal Wetlands Act, 2000." Chapter 2.2, Title 62.1, Code of Virginia. Virginia General Assembly, 2000. https://law.lis.virginia.gov/admincode/title9/agency25/chapter210/section10/.
7. "Estimating federal wetlands protections in the wake of a 2023 Supreme Court decision: preliminary results." *Environmental Defense Fund*, (2024), https://experience.arcgis.com/experience/4ee055766699446485fd98bd9d539a37/.

DISCLOSING FLOOD RISK

1. "Virginia State Summary of Billion-Dollar Weather and Climate Disasters." *National Centers for Environmental Information*. (June 9, 2024). https://www.ncei.noaa.gov/access/billions/state-summary/VA.
2. "The Cost of Flooding." *Federal Emergency Management Agency*. https://www.floodsmart.gov/cost-flooding.
3. Federal Emergency Management Agency. Virginia State Profile, (March 2021). https://www.fema.gov/sites/default/files/documents/fema_virginia-state-profile_03-2021.pdf.

ELIMINATING PLASTIC POLLUTION

1. L. McKay, K. Register, and S. Raabe, "Plastic Pollution: Virginia's Voters Support Action: 2022 Public Perception Survey," *Virginia Coastal Zone Management Program, Clean Virginia Waterways, and OpinionWorks*, (May, 2022). https://static1.squarespace.com/static/662fb7fa0784b14dfacd87d7/t/6645470b8661cc697e0636c6/1715816205803/Voter+Survey.pdf.
2. "Advancing Sustainable Materials Management: 2016 and 2017 Tables and Figures, Tables 1-4," *U.S. Environmental Protection Agency*, (November 2019), https://www.epa.gov/sites/default/files/2019-11/documents/2016_and_2017_facts_and_figures_data_tables_0.pdf.
3. Ken Christensen. "Guess What's Showing Up in Our Shellfish? One Word: Plastics." *National Public Radio*, (September 19, 2017), https://www.npr.org/sections/thesalt/2017/09/19/551261222/guess-whats-showing-up-in-our-shellfish- one-word-plastics.
4. Heidi Wachter. "The High Cost of Litter," *Experience Life*, (June 13, 2024). https://experiencelife.lifetime.life/article/the-high-cost-of-litter/.
5. "Economic Impacts of Marine Debris on Tourism-Dependent Communities." *National Oceanic and Atmospheric Administration*, (June 13, 2024). https://marinedebris.noaa.gov/research/economic-impacts-marine-debris-tourism-dependent-communities.
6. "The Hidden Cost of Plastic," *World Wide Fund for Nature (WWF)*, (June 13, 2024). https://www.wwfdrc.org/en/?36252/The-hidden-cost-of-plastic.
7. "Neglected: Environmental Justice Impacts of Marine Litter and Plastic Pollution," *United Nations Environment Programme*, (April, 2021), https://wedocs.unep.org/bitstream/handle/20.500.11822/35417/EJIPP.pdf.
8. "2021-2025 Virginia Marine Debris Reduction Plan," *Virginia Coastal Zone Management Program*, (2021), https://www.deq.virginia.gov/coasts/marine-debris.
9. "Data from the 2023 International Coastal Cleanup in Virginia," *Clean Virginia Waterways*, https://www.cleanvirginiawaterways.org/virginia-waterways-cleanup.
10. "No Plastic in Nature: Assessing Plastic Ingestion from Nature to People," (2019) https://d2ouvy59p0dg6k.cloudfront.net/downloads/plastic_ingestion_web_spreads.pdf.
11. Hale, Robert C., Meredith E. Seeley, Mark J. La Guardia, Lei Mai, and Eddy Y. Zeng, "A global perspective on microplastics," *Journal of Geophysical Research: Oceans* 125, no. 1 (2020): e2018JC014719.
12. Raffaele Marfella, Francesco Prattichizzo, Celestino Sardu, Gianluca Fulgenzi, Laura Graciotti, Tatiana Spadoni, Nunzia D'Onofrio, et al, "Microplastics and Nanoplastics in Atheromas and Cardiovascular Events." *The New England Journal of Medicine* 390 (10): 900–910. (2024) https://doi.org/10.1056/nejmoa2309822.
13. Landrigan, Philip J., Hervé Raps, Maureen Cropper, Caroline Bald, Manuel Brunner, Elvia Maya Canonizado, Dominic Charles, et al. 2023. "The Minderoo-Monaco Commission on Plastics and Human Health." *Annals of Global Health* 89 (1). https://doi.org/10.5334/aogh.4056.
14. Based on 2020 data from Tennessee, Nebraska, and Washington Departments of Revenue.
15. "An Economic and Environmental Impact Assessment of Recycling In Virginia: A Report to the General Assembly," (May 2024) https://rga.lis.virginia.gov/Published/2024/RD272/PDF.
16. "The 50 States of Recycling." Ball Corporation, December 2023. https://www.ball.com/getmedia/dffa01b0-3b52-4b90-a107-541ece7ee07c/50-STATES_2023-V14.pdf.
17. Ibid.
18. "Where Curbside Recycling Programs Have Stopped and Started in the US," (January 9, 2023), https://www.wastedive.com/news/curbside-recycling-cancellation-tracker/569250/.
19. Nikiema, Josiane, and Zipporah Asiedu. "A Review of the Cost and Effectiveness of Solutions to Address Plastic Pollution." *Environmental Science and Pollution Research* 29, no. 17 (January 23, 2022): 24547–73. https://doi.org/10.1007/s11356-021-18038-5.
20. Monica Samayoa, "Oregon's Bottle Bill Reaches Huge Milestone – More than 2 Billion Containers Redeemed in 2022,"(April 10, 2023). https://www.opb.org/article/2023/04/07/oregons-bottle-bill-reaches-huge-milestone-more-than-2-billion-containers-redeemed-in-2022.
21. "The 50 States of Recycling."

PLASTIC-TO-FUEL: A FALSE SOLUTION

1. Recycling Lies: "Chemical Recycling" Greenwashing Incineration." Natural Resources Defense Council. New York, NY, (2022). https://www.nrdc.org/sites/default/files/chemical-recycling-greenwashing-incineration-ib.pdf.
2. Bertolini, Gerard E., and Jacques Fontaine. "Value Recovery from Plastics Waste by Pyrolysis in Molten Salts." *Conservation & Recycling* 10, no. 4 (1987): 331-343. https://doi.org/10.1016/0361-3658(87)90064-6.
3. "Pyrolysis Proposed Provision Withdrawal Notice," *U.S. Environmental Protection Agency*, (May 2023), https://www.epa.gov/system/files/documents/2023-05/Pyrolysis%20Proposed%20Provision%20Withdrawal%20Notice_%20ADMIN%2BDISC.pdf.
4. Xing, Chao, Mohamed Zihua, Rachid Skouta, Nitin K. Laha, and Jonathan E. Sokolov. "Assessment of the Environmental Impacts of Advanced Recycling Technologies for Plastic Waste." *ACS Sustainable Chemistry & Engineering* 11, no. 3 (2023): 3075-3084. https://doi.org/10.1021/acssuschemeng.2c05497.
5. Robert D. Bullard and Beverly Hendrix Wright, "The Politics of Pollution: Implications for the Black Community." *Phylon* 47, no. 1 (1986): 71–78. https://doi.org/10.2307/274696.
6. Di, Q., Wang, Y., Zanobetti, A., Wang, Y., Koutrakis, P., Choirat, C., Dominici, F.,Schwartz, J., "Air Pollution and Mortality in the Medicare Population," *New England Journal of Medicine* 372 no. 26 (2017): 2513-2522. https://doi.org/10.1056/NEJMoa1702747.
7. "Chemical Recycling," *Beyond Plastics*, (June 13, 2024). https://www.beyondplastics.org/fact-sheets/chemical-recycling.
8. "Recycling Lies: "Chemical Recycling" Of Plastic Is Just Greenwashing Incineration," *Natural Resources Defense Council*, (2022), https://www.nrdc.org/sites/default/files/chemical-recycling-greenwashing-incineration-ib.pdf.
9. Marissa Heffernan, "2023 Sees Growing Chemical Recycling Lawmaking Activity." *Resource Recycling*, (July 18, 2023), https://resource-recycling.com/plastics/2023/07/18/2023-sees-growing-chemical-recycling-lawmaking-activity.
10. "Oregon Chemical Recycling Facility Closes," *Beyond Plastics*, Press release, (March 6, 2024), https://www.beyondplastics.org/press-releases/oregon-chemical-recycling-facility-closes-3-6-24.
11. Rachel Austin. "Braven No Longer Coming." *Farmville Herald*, (January 25, 2022), https://www.farmvilleherald.com/2022/01/braven-no-longer-coming.
12. Clare Goldsberry. "Braven Environmental Will Establish Pyrolysis Facility in Virginia," *PlasticsToday*, (June 13, 2024), https://www.plasticstoday.com/sustainability/braven-environmental-will-establish-pyrolysis-facility-in-virginia.
13. "Local, State, and Regional Solid Waste Planning," *Virginia Department of Environmental Quality*, (June 13, 2024). https://www.deq.virginia.gov/our-programs/land-waste/solid-hazardous-waste/solid-waste/local-state-and-regional-solid-waste-planning.
14. Xing, Chao, Mohamed Zihua, Rachid Skouta, Nitin K. Laha, and Jonathan E. Sokolov. "Assessment of the Environmental Impacts of Advanced Recycling Technologies for Plastic Waste." *ACS Sustainable Chemistry & Engineering* 11, no. 3 (2023): 3075-3084. https://doi.org/10.1021/acssuschemeng.2c05497.

LAND CONSERVATION BENEFITING ALL VIRGINIANS

1. "Forestland Loss - Culpeper Soil and Water Conservation District," Culpeper Soil and Water Conservation District, (February 19, 2015). https://www.culpeperswcd.org/natural-resource-issues/forestland-loss.
2. National Agricultural Statistics Service, *Census of Agriculture*, (2024) https://www.nass.usda.gov/AgCensus/.

3. “Virginia’s Wildlife Action Plan,” Virginia Department of Wildlife Resources, (June 24, 2024), https://dwr.virginia.gov/blog/virginias-wildlife-action-plan.
4. “Our Virginia Outdoors,” Our Virginia Outdoors, (June 24, 2024), https://ourvirginiaoutdoors.com.
5. “ECONOMIC IMPACT of VISITORS in VIRGINIA 2021,” (2022), https://www.vatc.org/wp-content/uploads/2022/09/2021-Economic-Impact-of-Visitors-in-Virginia.pdf.

COMPOSTING FOR WASTE REDUCTION & SOIL HEALTH

1. Horrigan, Leo et al, “How Sustainable Agriculture Can Address the Environmental and Human Health Harms of Industrial Agriculture,” *Environmental Health Perspectives*, 110, no 5:445-456 (2002), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240832/pdf/ehp0110-000445.pdf.
2. U.S. Environmental Protection Agency, “Quantifying Methane Emissions from Landfilled Food Waste,” EPA-600-R-23-064, (October 2023), https://www.epa.gov/land-research/quantifying-methane-emissions-landfilled-food-waste.
3. DEQ, “2024 Annual Solid Waste Report for CY2023”, (June 2024), 2024 Annual Solid Waste Report for CY2023, https://www.deq.virginia.gov/home/showpublisheddocument/24299/638551795838170000.
4. EPA, “Quantifying Methane Emissions.”
5. Kaza, Silpa, et al, “Sustainable Financing and Policy Models for Municipal Composting,” *World Bank Group Urban Development Series*, no 24, (2016) https://openknowledge.worldbank.org/server/api/core/bitstreams/214517cd-46b6-5372-b03f-8dcb7810c3eb/content.
6. Coker, Craig, “Composting in the United States and Virginia,” presentation to the George Washington Regional Commission (not published), www.cokercompost.com.
7. Virginia Department of Environmental Quality (DEQ), “Report of the Waste Diversion and Recycling Task Force to the Governor and General Assembly of Virginia,” (2021), https://rga.lis.virginia.gov/Published/2021/SD16/PDF.
8. Virginia General Assembly. Senate Bill 1319 to study waste control and recycling, 2021, https://lis.virginia.gov/cgi-bin/legp604.exe?212+ful+SB1319.
9. Office of the Governor, Executive Order 17 Recognizing the Value of Recycling and Waste Reduction, (2022), https://www.governor.virginia.gov/media/governorvirginiagov/governor-of-virginia/pdf/eo/EO-17-Recognizing-The-Value-of-Recycling-and-Waste-Reduction.pdf.
10. DEQ, “Report on Food Waste Reduction Strategies,” (2023) https://www.deq.virginia.gov/home/showpublisheddocument/22217/638409984844730000.
11. Ibid.

PRESERVING WORKING FARMS & FORESTS

1. USDA National Agricultural Statistics Service, 2022 Census Volume 1, Chapter 1: State Level Data Table 1. Historical Highlights: 2022 and Earlier Census Years, https://www.nass.usda.gov/Publications/AgCensus/2022/Full_Report/Volume_1,_Chapter_1_State_Level/Virginia/.
2. “Agriculture and Forest Industries in Virginia,” *Weldon Cooper Center for Public Service*, (2022), https://www.coopercenter.org/research/economic-impact-agriculture-forest-industries-virginia.
3. Bilyeu, Greg. “Forest Products Week in Virginia, October 16-20: Celebrating the People and Products of Virginia’s Forest Industry,” VA Department of Forestry, (October 16, 2023), https://dof.virginia.gov/wp-content/uploads/nr_2023-10-16_Forest-Products-Week-in-Virginia-October-16%E2%80%9320.pdf.

BUILDING A STRONG OUTDOOR RECREATION ECONOMY

1. “Chapter 2 - Virginia’s Outdoors Demand Survey,” *Virginia Outdoor Plan*, Department of Conservation and Recreation, (2018). https://www.dcr.virginia.gov/recreational-planning/document/vopchapt02.pdf.
2. “DRIVE 2.0: 2020-2025 Strategic Tourism Plan,” Virginia Tourism Corporation, (2019), https://www.vatc.org/drive-2-0-strategic-tourism-plan/.
3. O’Brian, Patrick, and Cora Gnegy. “Community Action Plan: Recreation Economy for Rural Communities.” Giles County, (May 2021). https://virginiasmtnplayground.com/wp-content/uploads/2021/10/RERC-Community-Action-Plan_GilesCoVa-Final.pdf.
4. “Outdoor Recreation Satellite Account - 2022 Virginia,” US Bureau of Economic Analysis, (November 17, 2023), https://apps.bea.gov/data/special-topics/orsa/summary-sheets/ORSA%20-%20Virginia.pdf.
5. Roberts, Dan. “The Economic Impact of Outdoor Recreation in Virginia,” Fredericksburg, VA, (May 15, 2024), https://vaunitedlandtrusts.org/wp-content/uploads/2024/05/B-Economic-Impact-of-Outdoor-Recreation-in-Virginia.pdf.
6. Wells, Matt, “DCR Agency Update to Senate Finance & Appropriations Committee – Economic Development and Natural Resources Subcommittee,” Richmond, VA, (January 29, 2024). https://sfac.virginia.gov/pdf/economic_development/2024/01292024_No1_DCR%20Budget%20Presentation%20SFAC%20EDNR%201-26-2024.pdf.
7. U.S. National Park Service, “Tourism to Shenandoah National Park Contributes $145 Million to Local Economy - Shenandoah National Park,” (August 31, 2023), https://www.nps.gov/shen/learn/news/tourism-to-shenandoah-national-park.htm.
8. Wells, “DCR Agency Update”.
9. “Confluence of States 2023 Outdoor Report,” Confluence of States, (2023), https://recreationroundtable.org/wp-content/uploads/2023/11/FY2023-COS-Outdoor-Report.pdf.

INVESTING IN ACCESSIBLE PUBLIC LANDS FOR ALL

1. Wells, Matt. “DCR Agency Update to Senate Finance & Appropriations Committee – Economic Development and Natural Resources Subcommittee.” Richmond, VA, (January 29, 2024). https://sfac.virginia.gov/pdf/economic_development/2024/01292024_No1_DCR%20Budget%20Presentation%20SFAC%20EDNR%201-26-2024.pdf.
2. “Blue Ridge Parkway Is Most Visited National Park in 2022,” Blue Ridge Parkway Foundation, (March 16, 2023). https://www.brpfoundation.org/blog/blue-ridge-parkway-most-visited-national-park-2022.
3. Chapman, Ronda, Lisa Foderaro, Linda Hwang, Bill Lee, Sadiya Muqueeth, Jessica Sargent, and Brendan Shane. “Parks and an Equitable Recovery.” Trust for Public Lands, (May 27, 2021). https://www.tpl.org/parks-and-an-equitable-recovery-parkscore-report.
4. Larson, Lincoln R., and J. Aaron Hipp. “Nature-Based Pathways to Health Promotion: The Value of Parks and Greenspace.” *North Carolina Medical Journal* 83, no. 2 (2022): 99–102. https://doi.org/10.18043/ncm.83.2.99.
5. Wells, “DCR Agency Update”.
6. “Outdoor Recreation Satellite Account - 2022 Virginia.” US Bureau of Economic Analysis, (November 17, 2023). https://apps.bea.gov/data/special-topics/orsa/summary-sheets/ORSA%20-%20Virginia.pdf.

CONNECTING WILDLIFE HABITATS FOR RESILIENT COMMUNITIES

1. State Farm Mutual Automobile Insurance Company. “Where Are Animal (Deer) Collisions Most Likely?” State Farm. (May 21, 2024). https://www.statefarm.com/simple-insights/auto-and-vehicles/how-likely-are-you-to-have-an-animal-collision?agentAssociateId=Q0SZD1YS000.
2. “Virginia Wildlife Corridor Action Plan,” Virginia Department of Wildlife Resources, Virginia Department of Transportation, Virginia Department of Conservation and Recreation, Virginia Department of Forestry (May 2023). https://dwr.virginia.gov/wp-content/uploads/media/Virginia-Wildlife-Corridor-Action-Plan.pdf.
3. Donaldson, B.M. and K.E.M. Elliott. 2021. “Enhancing Existing Isolated Underpasses with Fencing Decreases Wildlife Crashes and Increases Habitat Connectivity,” *Human-Wildlife Interactions* Vol. 15, Issue 1, Article 20. https://digitalcommons.usu.edu/hwi/vol15/iss1/20.
4. Digital Commons @ ODU. “Virginia Journal of Science Vol. 69 No. 1,” *Old Dominion University*, 2020, https://digitalcommons.odu.edu/vjs/vol69/iss1/.
5. “NAACC Data Center.” North Atlantic Aquatic Connectivity Collaborative, (May 21, 2024). https://naacc.org/naacc_data_center_home.cfm.
6. Coastal Resources, Inc. “Recommendations for Aquatic Organism Passage at Maryland Road-Stream Crossings.” Chesapeake Bay Program’s Fish Passage Workgroup (May 2021). https://d18lev1ok5leia.cloudfront.net/chesapeakebay/documents/recommendations_for_aquatic_organism_passage_at_maryland_road-stream_crossings_draft_05262021.pdf.
7. Governor of Virginia. “Proclamation—Flood Awareness Week,” *Commonwealth of Virginia—Office of the Governor*, (February 15, 2022). https://www.governor.virginia.gov/newsroom/proclamations/proclamation-list/flood-awareness-week.html.
8. Virginia Department of Transportation. 2022. “VDOT Resilience Plan,” Roadmap towards a resilient transportation system. 1.0. https://www.vdot.virginia.gov/media/vdotvirginiagov/doing-business/technical-guidance-and-support/environmental/VDOT_Resilience_Plan_Nov_2022_FINAL_acc112222.pdf.
9. Virginia Department of Conservation and Recreation, “Virginia Coastal Resilience Master Plan,” Phase 1, (December 2021), https://www.dcr.virginia.gov/crmp/plan.
10. Code of Virginia. 2021. “§ 29.1-579. Wildlife Corridor Action Plan; adoption,” https://law.lis.virginia.gov/vacode/29.1-579/.
11. “Griffith announces $600,000 to Virginia Department of Transportation to identify wildlife crossing sites,” Office of Morgan Griffith, (2023), https://morgangriffith.house.gov/news/documentsingle.aspx?DocumentID=402960.
12. “Wildlife Crossings Along U.S. Roads Can Benefit Animals, People, and Climate.” Pew Trusts, (February 14, 2023), https://www.pewtrusts.org/en/research-and-analysis/articles/2023/02/14/wildlife-crossings-along-us-roads-can-benefit-animals-people-and-climate.

13. National Caucus of Environmental Legislators, “Wildlife Corridors and Crossings Fact Sheet,” (July 2021), https://www.ncelenviro.org/app/uploads/2021/07/Wildlife-Corridors-and-Crossings-Fact-Sheet.pdf.
14. Boston Society of Civil Engineers Section, “Steps Towards Climate Change Resilience for Critical Infrastructure,” (June 13, 2024). https://www.bsces.org/news/industry/steps-towards-climate-change-resilience-for-critical-infrastructure-3228.

PROTECTING MIGRATORY FISH SPECIES

1. Virginia Department of Environmental Quality surface water withdrawal reporting data, requested 2023.
2. Virginia Institute of Marine Science, “Monitoring Data,” https://www.vims.edu/research/units/programs/american_shad/results/Monitoring_data.
3. VIMS, “A Framework for the Recovery of American Shad (Alosa sapidissima) in the James River, Virginia,” (November 2023). https://rga.lis.virginia.gov/Published/2023/RD587/PDF.

PROTECTING FRESHWATER MUSSELS

1. Kreeger, Danielle A., Catherine M. Gatenby, and Peter W. Bergstrom. “Restoration Potential of Several Native Species of Bivalve Molluscs for Water Quality Improvement in Mid-Atlantic Watersheds,” *Journal of Shellfish Research* 37, no. 5 (December 2018): 1121–57. https://doi.org/10.2983/035.037.0524.
2. Vaughn, C. C. “Ecosystem Services Provided by Freshwater Mussels,” *Hydrobiologia* 810, no. 1 (March 15, 2018): 15–27. https://doi.org/10.1007/s10750-017-3139-x.
3. “Freshwater mussels and fish: a timeless love affair,” United States Fish and Wildlife Service (USFWS), (2023). https://www.fws.gov/story/2023-05/freshwater-mussels-and-fish-timeless-love-affair.
4. “Virginia’s 2015 Wildlife Action Plan,” Virginia DWR. https://dwr.virginia.gov/wildlife/wildlife-action-plan/wildlife-action-plan-2015.
5. “Freshwater Mussel Restoration,” Virginia Department of Wildlife Resources, (2022), https://dwr.virginia.gov/waterbody/clinch-river.
6. Wood, J., P. Bukaveckas, H. Galbraith, M. Gattis, M. Gray, T. Ihde, D. Kreeger, R. Mair, S. McLaughlin, S. Hahn, A. Harvey, “Incorporating Freshwater Mussels into the Chesapeake Bay Restoration Effort,” *STAC* Publication Number 21-004, Edgewater, MD (2021). 39 pages.
7. “James River Basin Mussel Restoration Plan,” James River Association, (2024). https://thejamesriver.org/wp-content/uploads/2024/07/Mussel-Plan.pdf.
8. “Virginia Freshwater Mussel Restoration Strategy: Upper Tennessee River Basin,” Virginia Department of Game and Inland Fisheries, (2010). https://dwr.virginia.gov/wp-content/uploads/media/Virginia-Freshwater-Mussel-Restoration-Strategy-UTRB.pdf.
9. United States Fish and Wildlife Service, “Freshwater mussels and fish.”

MAXIMIZING TREE CANOPY

1. “Tree Canopy.” Chesapeake Progress, (June 18, 2024). https://www.chesapeakeprogress.com/abundant-life/tree-canopy.
2. “Inventory of U.S. Greenhouse Gas Emissions and Sinks,” Environmental Protection Agency, (2024), https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks.
3. Hafner, Katherine, “How will climate change affect Virginia? Massive new report is a window into the future.” VPM News, (2023), https://www.vpm.org/news/2023-11-16/climate-change-affect-virginia-new-report-is-a-window-into-the-future.
4. Shandas, Vivek, Jackson Voelkel, Joseph Williams, and J. S. Hoffman, “Integrating Satellite and Ground Measurements for Predicting Locations of Extreme Urban Heat.” MDPI, (2019), https://doi.org/10.3390/cli7010005.
5. “Introduction to PDCs.” VAPDC, (Accessed June 18, 2024). https://www.vapdc.org/introduction-to-pdcs.
6. Weingart, Eden, and Alyssa Schukar, “Widening Highways Doesn’t Fix Traffic. So Why Do We Keep Doing It?” The New York Times, (January 6, 2023), sec. U.S. https://www.nytimes.com/2023/01/06/us/widen-highways-traffic.html.

PREVENTING HARMS FROM INVASIVE PLANTS

1. “Invasive Plants Species List,” Virginia Department of Conservation and Recreation, https://www.dcr.virginia.gov/natural-heritage/invsppdflist.
2 “Native Bees,” Master Gardener, (June 12, 2024). https://extension.psu.edu/programs/master-gardener/counties/monroe/news/native-bees?.
3 Rafael Barbizan Sühs, Silvia R Ziller, and Michele Dechoum, “Is the Use of Drones Cost-Effective and Efficient in Detecting Invasive Alien Trees? A Case Study from a Subtropical Coastal Ecosystem.” Biological Invasions, (November 2023), https://doi.org/10.1007/s10530-023-03190-5.
4 “About Invasive Species in Virginia.” Virginia Invasive Species, (Accessed June 12, 2024). https://www.invasivespeciesva.org/about.
5 “Sign the Petition.” Change.org. https://www.change.org/p/stop-home-depot-from-selling-invasive-plants.
6 “Featured Map: Land Ownership Types across the U.S.,” Texas A&M NRI, https://nri.tamu.edu/blog/2021/september/featured-map-land-ownership-types-across-the-us/.
7 Rafael Barbizan Sühs, Silvia R Ziller, and Michele Dechoum, “Is the Use of Drones Cost-Effective and Efficient in Detecting Invasive Alien Trees? A Case Study from a Subtropical Coastal Ecosystem.” Biological Invasions, (November 2023), https://doi.org/10.1007/s10530-023-03190-5.

SUSTAINABLE HOUSING GROWTH

1. Myers, John, Sam Bowman, and Ben Southwood. “The Housing Theory of Everything.” *Works in Progress*, (September 14, 2021). https://worksinprogress.co/issue/the-housing-theory-of-everything/.
2. Badger, Emily, and Quoctrung Bui. “Cities Start to Question an American Ideal: A House with a Yard on Every Lot.” *The New York Times*, (June 18, 2019). https://www.nytimes.com/interactive/2019/06/18/upshot/cities-across-america-question-single-family-zoning.html.
3. “2009 California Residential Appliance Saturation Study: Executive Summary,” *California Energy Commission*, (June 2010). https://web.archive.org/web/20190602112009/https://www.energy.ca.gov/2010publications/CEC-200-2010-004/CEC-200-2010-004-ES.PDF.
4. Hudson, Stephen, “This Map Shows How Low-Density Sprawl Makes Climate Change Worse,” *Greater Greater Washington*, (May 2, 2022). https://ggwash.org/view/84816/this-map-shows-how-low-density-sprawl-makes-climate-change-worse.
5. Stebbins, Samuel, “States With the Longest Commutes,” *24/7 Wall St.*, (April 23, 2022). https://247wallst.com/special-report/2022/04/23/states-with-the-longest-commutes/.
6. Hino, Miyuki, Todd K. BenDor, Jordan Branham, Nikhil Kaza, Antonia Sebastian, and Shane Sweeney, “Growing Safely or Building Risk? Floodplain Management in North Carolina.” *Journal of the American Planning Association* (2023) 90 (1): 50–62. doi:10.1080/01944363.2022.2141821.
7. Horowitz, Alex, and Chase Hatchett, “How Restrictive Zoning in Virginia Has Hurt Housing Affordability,” *The Pew Charitable Trusts*, (January 22, 2024). https://www.pewtrusts.org/en/research-and-analysis/articles/2024/01/22/how-restrictive-zoning-in-virginia-has-hurt-housing-affordability.
8. “Housing Underproduction in the U.S.” *Up for Growth*, (2022). https://upforgrowth.org/apply-the-vision/housing-underproduction/.
9. “Loss of Housing Affordability Threatens Financial Stability for Older Middle Class: Summary,” *AARP Public Policy Institute*, (2013). https://www.aarp.org/content/dam/aarp/research/public_policy_institute/security/2013/loss-of-housing-affordability-threatens-financial-stability-for-older-middle-class-summary-AARP-ppi-sec.pdf.
10. Millsap, Adam A. “It Is Time for Virginia to Enact Pro-Housing Reforms.” *Forbes*, (May 8, 2024). https://www.forbes.com/sites/adammillsap/2024/01/23/it-is-time-for-virginia-to-enact-pro-housing-reforms/.
11. Horowitz, Alex, and Ryan Canavan. “More Flexible Zoning Helps Contain Rising Rents.” *The Pew Charitable Trusts*, (April 17, 2023). https://www.pewtrusts.org/en/research-and-analysis/articles/2023/04/17/more-flexible-zoning-helps-contain-rising-rents.
12. McNulty, Steven G., Jeremy S. Hoffman, Claudia Brown, Kathie D. Dello, Pamela N. Knox, Aranzazu Lascurain, Carl Mickalonis, et al. “Fifth National Climate Assessment, Chapter 22: Southeast.” *Fifth National Climate Assessment*, (November 14, 2023). https://nca2023.globalchange.gov/chapter/22/.

RESPONSIBLE DATA CENTER DEVELOPMENT

1. Peasley, Julie, “Ranked: Top 50 Data Center Markets by Power Consumption,” *Visual Capitalist,* (June 28, 2024). https://www.visualcapitalist.com/cp/top-data-center-markets/.
2. Powell, Phill and Ian Smalley, “What is a Hyperscale Data Center?” *IBM.* (June 28, 2024). https://www.ibm.com/topics/hyperscale-data-center.
3. Dominion Energy. “Quarterly Report Q4 2022,” (June 26, 2024). https://investors.dominionenergy.com/financials-and-reports/quarterly-materials/default.aspx.
4. “PJM Load Forecast Report,” PJM Resource Adequacy Planning Department, (January 2023). https://www.pjm.com/-/media/library/reports-notices/load-forecast/2023-load-report.ashx.
5. “Commercial electricity demand grew fastest in states with rapid computing facility growth,” *U.S. Energy Information Administration*, (June 28, 2024). https://www.eia.gov/todayinenergy/detail.php?id=62409.
6. Wamstead, Dennis, “Dominion Virginia’s Improbable IRP,” *Institute for Energy Economics and Financial Analysis*,

(November 2023), https://ieefa.org/sites/default/files/2023-11/Dominion%20Virginias%20Improbable%20IRP_November%202023.pdf.
7. Miller, Rich, "Dominion: Virginia's Data Center Cluster Could Double in Size," *Data Center Frontier*, (October 11, 2023), https://www.datacenterfrontier.com/energy/article/33013010/dominion-virginias-data-center-cluster-could-double-in-size.
8. Swinhoe, Dan, "Dominion connected 15 data centers totaling 933MW in Virginia in 2023, 15 more expected in 2024." *Data Center Dynamics*, (May 3, 2024), https://www.datacenterdynamics.com/en/news/dominion-connected-15-data-centers-totaling-933mw-in-virginia-in-2023-15-more-expected-in-2024/.
9. "Dominion Supplemental Projects." Dominion Energy, PJM Transmission Expansion Advisory Committee (July 9, 2024), https://www.pjm.com/-/media/committees-groups/committees/teac/2024/20240709/20240709-item-08---dominion-supplemental-projects.ashx.
10. "FOIA request-Local variance for data centers located in the Counties of Fairfax, Loudoun, and Prince William (request #716-23-0961)," Virginia Department of Environmental Quality, FOIA request made by Piedmont Environmental Council. (Received February 12, 2023).
11. "Air quality, public health at risk from data center diesel generators," Piedmont Environmental Council, (February 24, 2023), https://www.pecva.org/work/energy-work/take-action-the-air-we-breathe-is-at-risk/.
12. Loritz, Justin, "Power Systems Topic 130: Diesel Generator Maintenance (2023)," *Kohler Energy Division*, (July 24, 2024), https://resources.kohler.com/power/kohler/industrial/pdf/WF335951%2023IND%20No%20Load%20White%20Paper%20Update%20singpg.pdf.
13. "Data Center Usage - Reclaimed and Potable_FOIA Request," Loudoun Water, FOIA request made by Piedmont Environmental Council. (Received on March 11, 2024).
14. "Caroline County Water Withdrawal Open Comment," Friends of the Rappahannock, (July 5, 2024), https://riverfriends.org/caroline-county-water-withdrawal-open-comment/.
15. "Global Data Center Trends 2024," *CBRE*, (June 24, 2024), https://www.cbre.com/insights/reports/global-data-center-trends-2024.
16. Antonio, Olivio., "Internet data centers are fueling drive for old power source: Coal," *Washington Post*, (April 17, 2024), https://www.washingtonpost.com/business/interactive/2024/data-centers-internet-power-source-coal/.
17. "Study Resolution: Data Centers," Joint Legislative Audit and Review Commission. (Authorized by the Commission on December 11, 2023). https://jlarc.virginia.gov/pdfs/resolutions/2024_Data%20centers_JLARC.pdf.
18. "Transmission Expansion Advisory Committee (TEAC) Recommendations to the PJM Board," PJM Interconnection, (December 2023), https://pjm.com/-/media/committees-groups/committees/teac/2023/20231205/20231205-pjm-teac-board-whitepaper-december-2023.ashx.
19. "Reliability Analysis Report: 2022 RTEP Window 3," PJM, (December 8, 2023), https://pjm.com/-/media/committees-groups/committees/teac/2023/20231205/20231205-2022-rtep-window-3-reliability-analysis-report.ashx.

TRANSFORMING TRANSPORTATION

1. Virginia Department of Environmental Quality, "Greenhouse Gases" https://perma.cc/BY8Q-FDVG.
2. "The Road to Clean Air: Benefits of a Nationwide Transition to Electric Vehicles," American Lung Association, (2020), www.lung.org/getmedia/99cc945c-47f2-4ba9-ba59-14c311ca332a/electric-vehicle-report.pdf.
3. Farmer, Laura, "FY 2025 – 2030 Commonwealth Transportation Fund (CTF) Six-Year Financial Plan," Commonwealth Transportation Fund presentation, (April 16, 2024), https://ctb.virginia.gov/media/ctb/agendas-and-meeting-minutes/2024/june/pres/6.pdf.
4. Todd Litman, "Generated Traffic and Induced Travel: Implications for Transportation Planning," (March 8, 2024), www.vtpi.org/gentraf.pdf.
5. Economic Impacts of Public Transportation in Virginia," Virginia Department of Rail and Public Transportation, (Feb. 2020), https://drpt.virginia.gov/wp-content/uploads/2023/05/economic-benefits-of-public-transportation-in-virginia.pdf.
6. Sarah Vogelsong, "Youngkin Pledges to Decouple Virginia from California Vehicle Emissions Standards by End of 2024," *Inside Climate News* (June 5, 2024), https://insideclimatenews.org/news/05062024/youngkin-virginia-vehicle-emissions-standards-rollback/.

MODERNIZING PUBLIC TRANSIT

1. "Greenhouse Gases," Virginia DEQ, https://www.deq.virginia.gov/our-programs/air/greenhouse-gases.
2. Moye, Brittany, "Annual New Car Ownership Costs Boil over $12K," AAA Newsroom, (August 30, 2023). https://newsroom.aaa.com/2023/08/annual-new-car-ownership-costs-boil-over-12k.
3. Plaugher, Daniel, "Review of 2024 Virginia Transit Overview," Virginia Transit Association, (January 1, 2024), https://vatransit.starchapter.com/images/2024_VA_Transit_Overview.pdf.
4. "Open Data Portal – DRPT." Virginia Department of Rail and Public Transit (2022), https://drpt.virginia.gov/data/.
5. Data generated by the Virginia Transit Association via several sources including the Federal Highway Administration, Environmental Protection Agency, VA Dept. of Rail and Public Transportation, and Federal Transit Administration.

EXPANDING RAIL

1. Calculations based on data from Amtrak and US Census.
2. "Monthly Performance Report: YTD April FY 2023," Amtrak, (May 30, 2023), https://www.amtrak.com/content/dam/projects/dotcom/english/public/documents/corporate/monthlyperformancereports/2023/Amtrak-Monthly-Performance-Report-April-2023.pdf.
3. Calculations based on data from the US EPA, US Dept. of Energy, US Dept. of Transportation, and Amtrak
4. "Transforming Rail in Virginia," Virginia Passenger Rail Authority, https://vapassengerrailauthority.org/transformingrail.

SAVING PEDESTRIAN LIVES

1. "Neighborhood traffic programs," Virginia Depatmern of Transportation, (June 27, 2024). https://www.vdot.virginia.gov/about/programs/neighborhood-traffic/.
2. "Commonwealth of Virginia 2023 Virginia Traffic Crash Facts," Department of Motor Vehicles and Virginia Highway Safety Office, https://www.dmv.virginia.gov/sites/default/files/documents/VA-traffic-crash-2023.pdf.

INCREASING ACCESS TO BIKING

1. "Virginia Traffic Crash Facts 2023," Virginia Department of Motor Vehicles, (Accessed August 12, 2024). https://www.dmv.virginia.gov/sites/default/files/documents/VA-traffic-crash-2023.pdf.
2. "ODOT Safe Routes to School Bike Bus Toolkit," Oregon Safe Routes to School, (February 2024). https://www.oregonsaferoutes.org/wp-content/uploads/2024/02/ODOT-SRTS-Bike-Bus-Toolkit_v8.pdf.
3. Davison, Kirsten K., Jessica L. Werder, and Catherine T. Lawson, "Children's Active Commuting to School: Current Knowledge and Future Directions." Preventing Chronic Disease 5, no. 3 (July 2008): A100. http://www.cdc.gov/pcd/issues/2008/jul/07_0075.htm.
4. "Child Safety," Insurance Institute for Highway Safety (IIHS) and Highway Loss Data Institute (HLDI), (Accessed July 8, 2024). https://www.iihs.org/topics/child-safety.

TRAILS FOR SUSTAINABLE GROWTH

1. "Outdoor Recreation Satellite Account," US Bureau of Economic Analysis, (November 17, 2023), https://www.bea.gov/news/2023/outdoor-recreation-satellite-account-us-and-states-2022.
2. "Outdoor Recreation Satellite Account - 2022 Virginia," US Bureau of Economic Analysis, (November 17, 2023), https://apps.bea.gov/data/special-topics/orsa/summary-sheets/ORSA%20-%20Virginia.pdf.
3. "Travel Data and Profiles," Virginia Tourism Corporation, https://www.vatc.org/research/travel-data-and-profiles/.
4. Gosnell, Hannah, and Jesse Abrams, "Amenity Migration: Diverse Conceptualizations of Drivers, Socioeconomic Dimensions, and Emerging Challenges," *GeoJournal* 76 (4): 303–22. (2009). https://doi.org/10.1007/s10708-009-9295-4.
5. "Virginia Remote Work Study," Virginia Tech, (2023), https://cece.vt.edu/content/dam/cece_vt_edu/projects/Virginia%20Remote%20Work%20Study.pdf.
6. "State Trails Office," Virginia Department of Transportation, (2024). https://www.vdot.virginia.gov/about/programs/state-trails-office/.
7. "2023: Year in Review," Virginia Department of Conservation and Recreation, https://www.dcr.virginia.gov/insights/2023-year-in-review.
8. "Virginia Recreational Trails Program," Virginia Department of Conservation and Recreation, https://www.dcr.virginia.gov/recreational-planning/trailfnd.
9. "ATC 100th Anniversary," Appalachian Trail Conservancy, (April 21, 2023). https://appalachiantrail.org/atc-100-year-newsletter/.

ACHIEVING 100% CLEAN ENERGY

1. AR6 Synthesis Report: Climate Change 2023." Intergovernmental Panel on Climate Change, (2023). https://www.ipcc.ch/report/ar6/syr/.
2. "Environment," *U.S. Energy Information Administration (EIA)*, (2000). https://www.eia.gov/environment/emissions/

state/.
3. “Renewable Portfolio Standards: State, Local, and Tribal Governments,” *NREL,* (2013). https://www.nrel.gov/state-local-tribal/basics-portfolio-standards.html.
4. Joshua S. Hill, “Renewable Portfolio Standards Responsible for over 50% of US Renewable Electricity Growth,” CleanTechnica, (April 21, 2016). https://cleantechnica.com/2016/04/21/renewables-portfolio-standards-responsible-half-us-renewable-electricity-growth/.
5. Va. Code § 56-585.5.
6. “The Virginia Clean Economy Act (HB1526 and SB851): Putting Virginia on the Path to 100% Clean Electricity Create New Ratepayer Protections to Keep Bills Low.” CCAN Action Fund, (June 14, 3, 2023). https://ccanactionfund.org/media/Virginia-Clean-Economy-Act-update-factsheet.pdf.
7. “Energy and Environment Guide to Action - Chapter 4.1: Energy Efficiency Resource Standards,” US Environmental Protection Agency (June 23, 2017). https://www.epa.gov/statelocalenergy/energy-and-environment-guide-action-chapter-41-energy-efficiency-resource.
8. “The Virginia Clean Economy Act,” CCAN Action Fund.
9. Charlie Paullin, “Regulators Question Decision-Making Power for Fossil Fuel Plant Closures,” *Virginia Mercury*, (September 6, 2022). https://www.virginiamercury.com/2022/09/06/regulators-question-decision-making-power-for-fossil-fuel-plant-closures.
10. “Virginia - State Energy Profile Overview,” U.S. Energy Information Administration (EIA). https://www.eia.gov/state/?sid=VA.

REJOINING THE REGIONAL GREENHOUSE GAS INITIATIVE

1. Stuart, D, and P Hibbard. “The Economic Impacts of the Regional Greenhouse Gas Initiative on Ten Northeast and Mid-Atlantic States.” Analysis Group, (May 2023). https://www.analysisgroup.com/Insights/publishing/the-economic-impacts-of-the-regional-greenhouse-gas-initiative-on-ten-northeast-and-mid-atlantic-states2/.
2. “SCC Seeks Public Comments on Application of Appalachian Power Company to Decrease Its Fuel Factor,” State Corporation Commission, (October 5, 2023). https://www.scc.virginia.gov/newsreleases/release/Comments-Sought-on-APCo-Fuel-Factor-Reduction.
3. Va. Code §§ 10.1-1329 to 1331 (Clean Energy and Community Flood Preparedness Act).
4. Charlie Paulin, “Virginia air board approves withdrawal from regional carbon market,” *Virginia Mercury*, (June 7, 2023). https://virginiamercury.com/2023/06/07/virginia-air-board-approves-withdrawal-from-regional-carbon-market/.
5. Clean Air Markets Program Data: Virginia 2020-2023, U.S. Environmental Protection Agency, (May 23, 2024). https://campd.epa.gov/data/custom-data-download?bookmarkId=1281.
6. Clean Air Markets Program Data: Virginia 2024 Q1 vs 2023 Q1, U.S. Environmental Protection Agency, (May 23, 2024). https://campd.epa.gov/data/custom-data-download?bookmarkId=1366.

ACCELERATING TRANSPORTATION ELECTRIFICATION

1. “Greenhouse Gases,” Virginia Department of Environmental Quality, https://perma.cc/BY8Q-FDVG.
2. “Environment,” U.S. Energy Information Administration (EIA),” (July 12, 2023). https://www.eia.gov/environment/emissions/state/.
3. “The Road to Clean Air: Benefits of a Nationwide Transition to Electric Vehicles,” American Lung Association, https://perma.cc/T5SK-AGKR.
4. Mary Angelique G. Demetillo, et al., “Space-based observational constraints on NO2 air pollution inequality from diesel traffic in major U.S. cities,” 48, no. 17 (2021), https://perma.cc/3ZT2-CFSH.
5. “Diesel Engines and Public Health,” *Union of Concerned Scientists*, February 11, 2022, https://perma.cc/73ZV-V5SB.
6. “Alternative Fuels Data Center: Emissions from Electric Vehicles.” U.S. Department of Energy, (2022). https://afdc.energy.gov/vehicles/electric-emissions.
7. Bieker, Georg, “A Global Comparison of the Life-Cycle Greenhouse Gas Emissions of Combustion Engine and Electric Passenger Cars,” *International Council on Clean Transportation*, (July 20, 2021). https://theicct.org/publication/a-global-comparison-of-the-life-cycle-greenhouse-gas-emissions-of-combustion-engine-and-electric-passenger-cars/.
8. Preston, Benjamin, “Pay Less for Vehicle Maintenance with an EV,” *Consumer Reports*, (September 26, 2020). https://www.consumerreports.org/car-repair-maintenance/pay-less-for-vehicle-maintenance-with-an-ev/.
9. Kirk, Karin, “Gasoline Is Cheap Right Now — but Charging an EV Is Still Cheaper,” *Yale Climate Connections*, (January 8, 2024). https://yaleclimateconnections.org/2024/01/gasoline-is-cheap-right-now-but-charging-an-ev-is-still-cheaper/.

10. “EV NET OWNERSHIP COST SAVINGS RESULTS,” *Consumer Reports*, (2023). https://advocacy.consumerreports.org/wp-content/uploads/2023/06/CR_EVSavings_FACTSHEET_6.2023.pdf.
11. “The Road to Clean Air: Benefits of a Nationwide Transition to Electric Vehicles,” American Lung Association, https://perma.cc/T5SK-AGKR.
12. “Driving Down Pollution,” Southern Environmental Law Center, (2024), https://perma.cc/T5QW-RP33.
13. Ibid.
14. “Electric Vehicle Market and Policy Developments in U.S. States,” International Council on Clean Transportation, (2023), https://perma.cc/9N76-BFDT.
15. Kevin Reilly & David Friedman, “Opinion: Virginia Can Help Ease the Transition to Clean Cars.” The Washington Post, (February 11, 2021), https://perma.cc/976S-C8K8.
16. Paullin, Charlie. 2024. “VDOT Announces Sites for Electric Vehicle Charging Stations,” *Virginia Mercury*, April 2, 2024. https://virginiamercury.com/2024/04/02/vdot-announces-sites-for-electric-vehicle-charging-stations/.
17. “Virginia Drives Electric 2022 Virginia Electric Vehicle and Clean Energy Survey.” Generation180. (2022). https://generation180.org/wp-content/uploads/Generation180_Virginia-Drives-Electric-2022.pdf.
18. Pupil Transportation,” Virginia Department of Education, (2022). https://www.doe.virginia.gov/programs-services/school-operations-support-services/pupil-transportation.
19. McGowan, Elizabeth, “Virginia Districts Roll on with Electric School Buses despite Lack of State Funding,” *Energy News Network*, (January 11, 2024). https://energynews.us/2024/01/11/virginia-districts-roll-on-with-electric-school-buses-despite-lack-of-state-funding.
20. Porter, Kim, “Review of Electric Vehicle Incentives by State,” *Insurify*, (August 12, 2024). https://insurify.com/car-insurance/knowledge/electric-vehicle-incentives-by-state/.
21. “Driving Down Pollution,” Southern Environmental Law Center.

DECARBONIZING BUILDINGS

1. “Architectural Longevity: What Determines a Building’s Lifespan?” *MIT Architecture*. 2024. https://architecture.mit.edu/news/architectural-longevity-what-determines-buildings-lifespan.
2. “State Carbon Dioxide Emissions Data,” *U.S. Energy Information Administration*, (2024). www.eia.gov/environment/emissions/state.
3. “Gas Stoves Spread Harmful Pollution Beyond the Kitchen, Study Finds,” *Washington Post*, (May 3, 2024). https://www.washingtonpost.com/climate-environment/2024/05/03/gas-stoves-asthma-homes/.
4. “Early Warning,” *NFPA Journal*, (November 1, 2020). https://www.nfpa.org/news-blogs-and-articles/nfpa-journal/2020/11/01/gas.
5. “Explosion Destroys Home in Bristol Virginia,” *WJHL*, (September 10, 2022). https://www.wjhl.com/news/local/explosion-levels-home-in-bristol-virginia/.
6. “Independent Statistics and Analysis,” *U.S. Energy Information Administration*, (2022). www.eia.gov/state/?sid=VA#tabs-2.
7. “SB 94 Virginia Energy Plan,” SB 94 (2020). Virginia’s Legislative Information System. https://lis.virginia.gov/cgi-bin/legp604.exe?201+sum+SB94.
8. “State Energy Code Methodology,” *Building Energy Codes Program*, (August 20, 2024). https://www.energycodes.gov/status.
9. “Rural Families Overburdened with Higher Energy Costs,” *NRDC*, July 18, 2018. www.nrdc.org/bio/khalil-shahyd/rural-families-overburdened-higher-energy-costs.
10. “How High Are Household Energy Burdens? An Assessment of National and Metropolitan Energy Burdens across the US,” *American Council for an Energy-Efficient Economy*, (2006). https://www.aceee.org/research-report/u2006.
11. “Cost Study of the Building Decarbonization Code,” *New Buildings Institute*, (2024). https://newbuildings.org/resource/cost-study-of-the-building-decarbonization-code/.
12. “Affordable Housing in Virginia,” Joint Legislative Research Committee, (December 13, 2021). https://virginiamercury.com/wp-content/uploads/2021/12/Affordable-Housing-in-Virginia-1.pdf.
13. “Needs and Conditions of Virginia School Buildings,” Joint Legislative Research Committee, (June 3, 2021). https://studiesvirginiageneralassembly.s3.amazonaws.com/meeting_docs/documents/000/000/979/original/Needs_and_Conditions_of_Virginia_School_Buildings_6.3.21.pdf.
14. “State Energy Code Methodology,” Building Energy Codes Program.
15. “Rural Families Overburdened,” NRDC.
16. “How High Are Household Energy Burdens?” American Council for an Energy-Efficient Economy.
17. “HB2227: Uniform Statewide Building Code,” HB 2227 (2021). Virginia’s Legislative Information System. https://lis.virginia.gov/cgi-bin/legp604.exe?212+sum+HB2227.
18. Main, Ivy. “Houses Can Be Built to Use Much Less Energy. Why Aren’t They?” *Virginia Mercury*, (October 19, 2023).

https://virginiamercury.com/2023/10/19/houses-can-be-built-to-use-much-less-energy-why-arent-they/.
19. "Energy Efficiency Jobs in America," E4theFuture, (2023). https://e4thefuture.org/wp-content/uploads/2023/10/Energy-Efficiency-Jobs-in-America-2023.pdf.
20. Advisory Committee on Apprenticeships, *ACA Interim Report*, (May 2022). https://www.apprenticeship.gov/sites/default/files/aca-interim-report-may-2022.pdf.
21. "Building for the Future: Advancing Equal Employment Opportunity in the Construction Industry," U.S. Equal Employment Opportunity Commission, (May 2023). https://www.eeoc.gov/building-future-advancing-equal-employment-opportunity-construction-industry.

MAXIMIZING OFFSHORE WIND GENERATION

1. "Decarbonizing Virginia's Economy: Pathways to 2050," University of Virginia, (Jan. 2021), https://www.coopercenter.org/research/decarbonizing-virginias-economy.
2. "Offshore Wind Economic Development," Mangum Economics for the Hampton Roads Alliance, https://hamptonroadsalliance.com/wp-content/uploads/2024/04/Future-Workforce-Needs-Offshore-Wind.pdf.
3. "EPA Greenhouse Gas Equivalency Calculator," U.S. Environmental Protection Agency, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results.
4. Ibid.
5. "Supply Chain Contracting Forecast for US Offshore Wind Power," National Offshore Wind Research and Development Consortium, https://nationaloffshorewind.org/wp-content/uploads/SIOW-supply-chain-report-2021-update-FINAL.pdf.
6. "Offshore Wind Economic Impact Report," Dominion Energy, https://coastalvawind.com/img/offshore-wind-economic-impact-report.pdf&sa=D&source=docs&ust=1718394008051171&usg=AOvVaw0GXP-q6TkB_R277jH5ifH.
7. "The Road to 30 Gigawatts: Key Actions To Scale an Offshore Wind Industry in the United States," Center for American Progress, https://www.americanprogress.org/article/the-road-to-30-gigawatts-key-actions-to-scale-an-offshore-wind-industry-in-the-united-states/.

LOWERING COSTS & POLLUTION WITH ENERGY EFFICIENCY

1. Blanco, Jose Luis, et. al "Seizing the Decarbonization Opportunity in Construction," (2021). https://www.mckinsey.com/industries/engineering-construction-and-building-materials/our-insights/call-for-action-seizing-the-decarbonization-opportunity-in-construction.
2. "Occupant Health Benefits of Residential Energy Efficiency," (2016). https://e4thefuture.org/wp-content/uploads/2016/11/Occupant-Health-Benefits-Residential-EE.pdf.
3. Drehobl, Ariel, and Lauren Ross, "Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities," (2016). https://www.aceee.org/sites/default/files/publications/researchreports/u1602.pdf.
4. "MILLION AMERICANS WORK in ENERGY EFFICIENCY," Energy Efficiency Jobs in America Energy Efficiency Jobs in America, (2023). https://e4thefuture.org/wp-content/uploads/2023/10/Energy-Efficiency-Jobs-in-America-2023.pdf.
5. "Report: Energy Efficiency Remains Energy Industry's Largest Workforce and Its Numbers Are Growing, but Many More Trained Workers Are Needed," E2, (2023), https://e2.org/releases/report-energy-efficiency-remains-energy-industrys-largest-workforce-and-its-numbers-are-growing-but-many-more-trained-workers-are-needed/.
6. "Energy Efficiency Resource Standards," American Council for an Energy Efficient Economy, (2022), https://database.aceee.org/state/energy-efficiency-resource-standards.
7. Demitri, Anna. "Commission Staff Response to the Company's Legal Memorandum Introduction CASE NO.PUR-2023-00217," (April 9, 2024). https://www.scc.virginia.gov/docketsearch/DOCS/7y%24q01!.PDF.
8. "Home Energy Rebates Programs.," U.S. Department of Energy, https://www.energy.gov/scep/home-energy-rebates-programs.
9. "Training for Residential Energy Contractors Grants (Formula)," U.S. Department of Energy, https://www.energy.gov/scep/training-residential-energy-contractors-grants-formula.
10. "Energy Flow Charts," Lawrence Livermore National Laboratory, https://flowcharts.llnl.gov/commodities/energy.

MAXIMIZING THE ROLE OF DISTRIBUTED ENERGY RESOURCES

1. Eric Gimon et al., "Meeting Growing Electricity Demand Without Gas, Energy Innovation Policy & Technology LLC," (2024) at 3.
2. "Understanding the Value of Distributed Energy Resources," *Yale Environment Review*, (March 20, 2023). https://environment-review.yale.edu/understanding-value-distributed-energy-resources.

3. "Virtual Power Plants," US Department of Energy, (June 4 2024). https://liftoff.energy.gov/vpp/.
4. Va. Code § 56-594.
5. Order, In *Re: Future net energy metering proceedings of Appalachian Power Company and Virginia Electric and Power Company pursuant to Code § 56-594*, Case No. PUR-2024-00047 (May 6, 2024).
6. "SB 234 Parking Lot Solar Development Program." Virginia Legislative Information System, (February 26, 2024). https://lis.virginia.gov/cgi-bin/legp604.exe?241+sum+SB234.
7. 2024 Va. Acts chs. 715, 716, 763, 765.
8. Ryan Kennedy, "Virginia approves $55 minimum bill for community solar – the highest nationwide," *PV Magazine* (July 11, 2022).
9. 2024 Va. Acts chs. 715, 716, 763 765, Enactment cl. 2.
10. 2024 Va. Acts chs. 715, 716, 763 765, Enactment cl. 3.
11. Nugent, Ciara. "The Overlooked Solar Power Potential of U.S. Parking Lots." *Time*. (December 8, 2022). https://time.com/6239651/solar-parking-lots-france-us/.
12. "California's Growing Solar and Wind Problem." *EcoBlock*. (December 5, 2023). https://ecoblock.berkeley.edu/blog/californias-growing-solar-and-wind-problem/.
13. Liza Martin and Kevin Brehm, "Clean Energy 101: Virtual Power Plants," *RMI* (Jan. 10, 2023), https://rmi.org/clean-energy-101-virtual-power-plants/.

DEPLOYING LARGE-SCALE SOLAR WHILE PROTECTING NATURAL RESOURCES

1. Lazard, "Levelized Cost of Energy 9," (June 2024), https://www.lazard.com/media/gjyffoqd/lazards-lcoeplus-june-2024.pdf.
2. "100% Clean Electricity by 2035 Study," National Renewable Energy Laboratory, (June 19, 2024) https://www.nrel.gov/analysis/100-percent-clean-electricity-by-2035-study.html.
3. Pieter Gagnon et al.,"Rooftop Solar Photovoltaic Technical Potential in the United States: A Detailed Assessment," National Renewable Energy Laboratory (Jan. 2016) at 36.
4. Va. Code § 56-585.5 D.5.
5. "Virginia Solar Development Analysis," *LandGate Corp*, Prepared in Q4 2023, https://www.landgate.com/_files/ugd/fe762a_929afacdcf4a436da4fec2dcbec3503e.pdf.
6. "Renewable Energy Permit Database," Virginia Department of Environmental Quality, https://geohub-vadeq.hub.arcgis.com/datasets/8abcbea47e7e4faa898a602028efcf4d_98/explore.
7. "Virginia Solar Survey: Results and Initial Findings," Virginia Department of Energy, and Virginia Solar Initiative, (April 2022). https://energy.virginia.gov/renewable-energy/documents/VASolarSurvey_ReportofResults_FINAL.pdf.
8. Va. Code § 56-585.5 D.
9. See https://www.townhall.virginia.gov/L/ViewStage.cfm?stageid=10341. (noting that the regulation is still in review).
10. "Virginia Solar Project Using Nevados Trackers Receives State Environmental Award," *Solar Power World*, (April 2024), https://www.solarpowerworldonline.com/2024/04/virginia-solar-project-using-nevados-trackers-receives-state-environmental-award/.
11. "Stormwater Handbooks," Virginia Department of Environmental Quality, https://www.deq.virginia.gov/our-programs/water/stormwater/stormwater-construction/handbooks.
12. "SolTax Tool," University of Virginia Weldon Cooper Center for Public Service, https://www.coopercenter.org/soltax-tool.
13. Lerch, Joe, "Commentary: Virginia Counties Step up to Meet Solar Energy Demand," Richmond Times-Dispatch, (May 3, 2024). https://richmond.com/zzstyling/view-oped-sig/virginia-counties-are-meeting-demand-for-solar/article_4f49078e-065d-11ef-baee-4fded4336c2b.html.
14. Miranda Green et al., An activist group is spreading misinformation to stop solar projects in rural America, NPR (Feb. 18, 2023). https://www.npr.org/2023/02/18/1154867064/solar-power-misinformation-activists-rural-america.
15. Matthew Eisenson, Jacob Elkin, Harmukh Singh & Noah Schaffir, "Opposition to Renewable Energy Facilities in the United States: June 2024 Edition," *Sabin Center for Climate Change Law* (June 2024) at 286-291, https://scholarship.law.columbia.edu/sabin_climate_change/226.
16. Altyeb Ali Abaker Omer et al., "Water evaporation reduction by the agrivoltaic system development," Solar Energy Vol. 247 (Nov. 15, 2022). https://www.researchgate.net/profile/Altyeb-Ali-Abaker-Omer/publication/364350834_Water_evaporation_reduction_by_the_agrivoltaic_systems_development/links/634f721e6e0d367d91a983c9/Water-evaporation-reduction-by-the-agrivoltaic-systems-development.pdf.
17. Va. Code § 56-585.5 D 2.
18. Va. Code § 45.2-1725.

APPROACHING NUCLEAR AND HYDROGEN DEVELOPMENT WITH CAUTION

1. "A Review of Grid Modernization and Energy System Resilience Research," National Renewable Energy Laboratory,PR-5A00-81644, (2022). https://www.nrel.gov/docs/fy22osti/81644.pdf.
2. "U.S. Crude Oil Production Hits New Record High in 2023," U.S. Energy Information Administration, (August 14, 2024). https://www.eia.gov/todayinenergy/detail.php?id=61963.
3. Meyer, David. "After Vogtle, What's Next for Nuclear?" *E&E News*, (August 16, 2024). https://www.eenews.net/articles/after-vogtle-whats-next-for-nuclear/.
4. "Pathways to Commercial Liftoff: Clean Hydrogen," U.S. Department of Energy, (May 2023). https://liftoff.energy.gov/wp-content/uploads/2023/05/20230523-Pathways-to-Commercial-Liftoff-Clean-Hydrogen.pdf.
5. "Production of Hydrogen," U.S. Energy Information Administration, (June 14, 2023). https://www.eia.gov/energyexplained/hydrogen/production-of-hydrogen.php.
6. Ibid.
7. "Pathways to Commercial Liftoff: Clean Hydrogen," U.S. Department of Energy, (May 2023). https://liftoff.energy.gov/wp-content/uploads/2023/05/20230523-Pathways-to-Commercial-Liftoff-Clean-Hydrogen.pdf.
8. Baldwin, Sarah, et al. "Assessing the Viability of Hydrogen Proposals: Considerations for State Utility Regulators and Policymakers," *Energy Innovation Policy & Technology*, (March 2022). 7.
9. Ibid.
10. Va. Code § 56-585.5 A, C (2024).
11. Baker, David. "Cancelled NuScale Contract Weighs Heavy on New Nuclea," *Reuters*, (January 10, 2024). https://www.reuters.com/business/energy/cancelled-nuscale-contract-weighs-heavy-new-nuclear-2024-01-10/.
12. "Advanced Nuclear Energy Projects," U.S. Department of Energy, (August 20, 2024). https://www.energy.gov/lpo/advanced-nuclear-energy-projects.
13. Palmer, Doug. "How a Nuclear Bill Became This Congress' First Big Energy Win," E&E News, (August 20, 2024). https://www.eenews.net/articles/how-a-nuclear-bill-became-this-congress-first-big-energy-win/.
14. Va. Acts Ch. 504; Ch. 505 (2023). https://lis.virginia.gov/cgi-bin/legp604.exe?231+ful+CHAP0504+pdf.
15. Va. Acts Ch. 789 (2024). https://lis.virginia.gov/cgi-bin/legp604.exe?241+ful+CHAP0789+pdf.; Va. Acts Ch. 836 (2024). https://lis.virginia.gov/cgi-bin/legp604.exe?241+ful+CHAP0836+pdf.
16. H.B. 741 (2024). https://lis.virginia.gov/cgi-bin/legp604.exe?241+sum+HB741.; S.B. 561 (2024). https://lis.virginia.gov/cgi-bin/legp604.exe?ses=241&typ=bil&val=sb561.
17. HB 2311 (2023). https://lis.virginia.gov/cgi-bin/legp604.exe?231+sum+HB2311; HB 2197 (2023). https://lis.virginia.gov/cgi-bin/legp604.exe?231+sum+HB2197; HB 1074 (2024). https://lis.virginia.gov/cgi-bin/legp604.exe?241+sum+HB1074; SB 557 (2024). https://lis.virginia.gov/cgi-bin/legp604.exe?241+sum+SB557.
18. "Pathways to Commercial Liftoff: Clean Hydrogen," U.S. Department of Energy, (March 2023). https://liftoff.energy.gov/wp-content/uploads/2023/05/20230523-Pathways-to-Commercial-Liftoff-Clean-Hydrogen.pdf.
19. "Hydrogen Explained," U.S. Energy Information Administration, (May 24, 2023). https://www.eia.gov/energyexplained/hydrogen/use-of-hydrogen.php.
20. "Pathways to Commercial Liftoff: Clean Hydrogen," U.S. Department of Energy, (March 2023). 8. https://liftoff.energy.gov/wp-content/uploads/2023/05/20230523-Pathways-to-Commercial-Liftoff-Clean-Hydrogen.pdf.
21. Jealous, Ben. "The Fiction of a Nuclear Silver Bullet," Sierra, (June 15, 2023). https://www.sierraclub.org/sierra/fiction-nuclear-silver-bullet.
22. "Google, Microsoft, and Nucor Announce Initiative," Nucor, (August 20, 2024). https://nucor.com/newsroom/google-microsoft-and-nucor-announce-initiative.
23. "Responding to Growing Demand, Duke Energy, Amazon, Google, Microsoft, and Nucor Execute Agreements to Accelerate Clean Energy Options," *Duke Energy News*, (August 19, 2024). https://news.duke-energy.com/releases/responding-to-growing-demand-duke-energy-amazon-google-microsoft-and-nucor-execute-agreements-to-accelerate-clean-energy-options.
24. "Google Partners with Nevada Utility for Geothermal to Power Data Centers," Reuters, (June 13, 2024). https://www.reuters.com/business/energy/google-partners-with-nevada-utility-geothermal-power-data-centers-2024-06-13/.
25. "Pathways to Commercial Liftoff," U.S. Department of Energy.

PREVENTING PIPELINE HARMS

1. "IPCC Sixth Assessment Report," International Panel on Climate Change (February 28, 2022). https://www.ipcc.ch/report/ar6/wg2/resources/press/press-release.
2. "An Act to amend and reenact §§ 10.1-1308, 56-576, 56-585.1, 56-585.1:4, 56-594, and 56-596.2 of the Code of Virginia and § 1 of the first enactment of Chapters 358 and 382 of the Acts of Assembly of 2013, as amended by Chapter 803 of the Acts of Assembly of 2017; to amend the Code of Virginia by adding sections numbered 56-585.1:11, 56-585.5, and 56-585.6; and to repeal § 56-585.2 of the Code of Virginia; report." https://lis.virginia.gov/cgi-bin/legp604.exe?201+ful+CHAP1193+pdf.
3. "An Act to amend and reenact §§ 67-100, 67-101, 67-102, and 67-201 of the Code of Virginia, relating to the Commonwealth Energy Policy and Virginia Energy Plan; report." https://lis.virginia.gov/cgi-bin/legp604.exe?201+ful+CHAP1191+pdf.
4. Ihab Mikati et al., "Disparities in Distribution of Particulate Matter Emission Sources by Race and Poverty Status," American Public Health Association (Mar. 7, 2018), https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2017.304297.
5. "The Status and Impact of the Mountain Valley Pipeline," Appalachian Voices, (May, 2023). https://appvoices.org/resources/reports/MVP_Report_2023_AppalachianVoices.pdf.
6. "Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking and Associated Gas and Oil Infrastructure," Physicians for Social Responsibility, (April 2022). https://psr.org/wp-content/uploads/2022/04/compendium-8.pdf.
7. "MVP, LLC To Pay More Than $2 Million, Submit To Court-Ordered Compliance and Enhanced, Independent, Third-Party Environmental Monitoring," Office of the Attorney General, (Oct. 11, 2019), https://www.oag.state.va.us/media-center/news-releases/1548-october-11-2019-mvp-llc-to-pay-more-than-2-million-submit-to-court-ordered-compliance-and-enhanced-independent-third-party-environmental-monitoring.
8 ."Petition for Rehearing and Immediate Stay of the Order of the Rosebud Sioux Tribe, the Cheyenne River Sioux Tribe, the Blue Ridge Environmental Defense League, and Affected Individual Landowners," Federal Energy Regulatory Commission ELibrary Docket CP16-10. FERC, (May 18, 2018). https://elibrary.ferc.gov/eLibrary/filelist?document_id=14666892.
9. "The Status and Impact of the Mountain Valley Pipeline," Appalachian Voices, (May, 2023). https://appvoices.org/resources/reports/MVP_Report_2023_AppalachianVoices.pdf.
10. H.R.3746 Fiscal Responsibility Act, 118th Congress. https://lis.virginia.gov/cgi-bin/legp604.exe?212+ful+CHAP0423+pdf.
11. Carl Zipper, "Social Environmental Impacts of MVP GHGs," Federal Energy Regulatory Commission ELibrary Docket CP21-57 (March 22, 2021). https://elibrary.ferc.gov/eLibrary/filelist?accession_num=20210322-5387.

12 Katherine Hafner, "Nansemond tribe, environmental groups concerned about Hampton Roads pipeline," (April 6, 2023). https://whro.org/news/local-news/37144-nansemond-indian-nation-environmental-groups-concerned-by-pipeline-project-in-hampton-roads.

RECLAIMING COAL MINES

1. "Repairing the Damage: The cost of delaying reclamation at modern era mines," Appalachian Voices, (2021) https://appvoices.org/resources/RepairingTheDamage_ReclamationAtModernMines.pdf.
2. Ibid.
3. Southern Appalachian Mountain Stewards, Appalachian Voices, and Sierra Club v. A&G Coal Corporation, Case 2:23-cv-00002-JPJ-PMS, Doc. 1, Complaint for Declaratory and Injunctive Relief, 2023 https://appvoices.org/images/uploads/2023/01/AandG-Complaint.pdf.
4. Kaufman, Leslie and Will Wade, "The tiny insurance company standing between taxpayers and a costly coal industry bailout," Bloomberg, (November 8, 2022), https://www.bloomberg.com/news/features/2022-11-08/the-tiny-insurance-company-standing-between-taxpayers-and-a-costly-coal-industry-bailout.

IMPLEMENTING ENVIRONMENTAL JUSTICE

1. Va. Code § 2.2-234.
2. Tessum, Christopher W., David A. Paolella, Sarah E. Chambliss, Joshua S. Apte, Jason D. Hill, and Julian D. Marshall, "PM2.5 Polluters Disproportionately and Systemically Affect People of Color in the United States." Science Advances 7 (18), (2021), https://doi.org/10.1126/sciadv.abf4491.
3. "Communities of Color across the US Suffer a Growing Burden from Polluted Air," Milken Institute School of Public Health, George Washington University, https://publichealth.gwu.edu/communities-color-across-us-suffer-growing-burden-polluted-air.
4. "Environmental Justice," United States Environmental Protection Agency, (February 6, 2019). https://www.epa.gov/environmentaljustice.
5. Ibid.
6. Summary of Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," United States Environmental Protection Agency, (September 10, 2019). https://www.

epa.gov/laws-regulations/summary-executive-order-12898-federal-actions-address-environmental-justice.
7. "PDS SSO," Lib.va.us. (2024). http://digitool1.lva.lib.va.us:8881/R/QBN4UTS2Y2ENIKVAS1BN1I4B7F7EQAPENYJR3PSSQK4I9CA11V-00944?func=results-jump-full&set_entry=000099&set_number=612684&base=GEN01 (Gov. Terrence McAuliffe, E.O. 73 (2017)).
8. Williams, Emma, 2019-2020 "Report of the Secretary of the Commonwealth to the Governor and General Assembly of Virginia," Office of the Secretary of the Commonwealth, (January 2020). https://www.bluebook.virginia.gov/media/governorvirginiagov/bluebook/2019-2020-Bluebook-of-the-Commonwealth-of-Virginia.pdf.
9. 2020 Va. Acts Ch. 113, 1274.
10. Va. Code § 2.2-235.
11. "Environmental Justice Study for the Virginia Department of Environmental Quality," Skeo Solutions, Inc. and Metropolitan Group, (October 2020). https://www.deq.virginia.gov/home/showpublisheddocument/8624/637727534058630000.
12. "Draft Guidance Memo No. 23-XXXX – Environmental Justice in the Permitting Process," Virginia Department of Environmental Quality,(Accessed August 1, 2024). https://www.deq.virginia.gov/home/showpublisheddocument/17431/638144773847470000.
13. "Environmental Justic," Virginia Department of Environmental Quality, (Accessed August 1, 2024). https://www.deq.virginia.gov/our-programs/environmental-justice.
14. "Tackling the Climate Crisis at Home and Abroad," Federal Register, (February 1, 2021). https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad.
15. "Cumulative Impacts Research," U.S. Environmental Protection Agency, (January 27, 2022). https://www.epa.gov/healthresearch/cumulative-impacts-research.
16. "Revitalizing Our Nation's Commitment to Environmental Justice for All," Executive Office of the President, Executive Order 14096, (April 21, 2023). https://www.federalregister.gov/documents/2023/04/26/2023-08955/revitalizing-our-nations-commitment-to-environmental-justice-for-all.
17. Perls, Hannah, "President Biden Issues Long-Awaited Update to Clinton-Era Environmental Justice Executive Order Executive Summary," *Harvard Law School Environmental & Energy Law Program*, https://eelp.law.harvard.edu/wp-content/uploads/HPerls_EJ-EO-Analysis_FINAL-8.2.23.pdf.
18. "Revitalizing Our Nation's Commitment," Executive Office of the President.

ADVANCING ENVIRONMENTAL LITERACY

1. "Environmental Literacy," Virginia Department of Education, (Accessed June 26, 2024). https://www.doe.virginia.gov/teaching-learning-assessment/instruction/environmental-literacy.
2. "Meaningful Watershed Educational Experience (MWEE)," Virginia Department of Conservation and Recreation, (Accessed June 10, 2024). https://www.dcr.virginia.gov/environmental-education/mwee.

CURBING ELECTRIC UTILITIES' POLITICAL INFLUENCE

1. "Donors Per Industry," Virginia Public Access Project (accessed June 12, 2024). https://www.vpap.org/money/donors-per-industry/52/?recip_type=all&year=all.
2. "Top Donors," Virginia Public Access Project (accessed June 12, 2024). https://www.vpap.org/money/top-donors/?year=all.
3. Cimarusti, Sarah. "Utility Bills 101: Utilities Tips, Average Costs, Fees, and More." Move.org, (July 1, 2024). https://www.move.org/utility-bills-101/.
4. Waters, Amy. "Blog: Dominion Energy's Outsized Influence in Virginia Politics," Clean Virginia, (March 1, 2024). https://www.cleanvirginia.org/2023/12/18/dominion-energys-outsized-influence-in-virginia-politics/.
5. Walton, Robert. "Virginia Lawmakers Struggle with Dominion Rate Freeze Bill." Utility Dive, (January 31, 2018). www.utilitydive.com/news/virginia-lawmakers-struggle-with-dominion-rate-freeze-bill/516046/.
6. Shahyd, Khalil. "Rural Families Overburdened with Higher Energy Costs," Be a Force for the Future, (July 18, 2018). www.nrdc.org/bio/khalil-shahyd/rural-families-overburdened-higher-energy-costs.
7. Drehobl, Ariel, "How High Are Household Energy Burdens? An Assessment of National and Metropolitan Energy Burdens across the U.S.," American Council for an Energy-Efficient Economy, (September 10, 2020). https://www.aceee.org/research-report/u2006.
8. Paullin, Charlie. "Solar Developers Continue to Fight Dominion's Solar Interconnection Rules," Virginia Mercury, (November 21, 2023). https://virginiamercury.com/2023/11/21/solar-developers-continue-to-fight-dominions-solar-interconnection-rules/.

SHIFTING UTILITIES' INCENTIVES FOR EQUITY & AFFORDABILITY

1. "Electric Sales, Revenue, and Average Price," Table 5.a. Energy Information Administration (2021), https://www.eia.gov/electricity/sales_revenue_price/.
2. Ariel Drehobl and Roxana Ayala, "Review of How High Are Household Energy Burdens? An Assessment of National and Metropolitan Energy Burdens across the U.S. Washington, D.C." American Council for an Energy-Efficient Economy, (2020). https://www.aceee.org/research-report/u2006.
3. "Electricity Burden and the Myth of Virginia's Rate Utopia," Virginia Poverty Law Center, (August 15, 2018). https://vplc.org/electricity-burden-and-the-myth-of-virginias-rate-utopia.
4. J. C. Kibbey, "Utility Accountability 101: How Do Utilities Make Money?" NRDC, (January 20, 2021). https://www.nrdc.org/experts/jc-kibbey/utility-accountability-101-how-do-utilities-make-money.
5. Shea, Daniel, "Performance-Based Regulation Harmonizing Electric Utility Priorities and State Policy," Page 5. (Accessed July 1, 2024). https://documents.ncsl.org/wwwncsl/Energy/Performance-Based-Regulation-Primer-f01.pdf.
6. "Aligning Utility Incentives with Investment in Energy Efficiency," National Action Plan For Energy Efficiency, Page ES-1. Environmental Protection Agency. https://www.epa.gov/sites/default/files/2015-08/documents/incentives.pdf.
7. Coley Girouard, "BQDM program demonstrates the benefits of non-traditional utility investment," Utility Dive, (March, 2019). https://www.utilitydive.com/news/bqdm-program-demonstrates-benefits-of-non-traditional-utility-investments/550110/.
8. Welch, Kaniqua, "Shalanda Baker's New Book, Revolutionary Power, Arms Vulnerable Communities with Tools to Upend the Energy System," Kresge Foundation,(December 14, 2020). https://kresge.org/news-views/shalanda-bakers-new-book-revolutionary-power-arms-vulnerable-communities-with-tools-to-upend-the-energy-system/.
9. Senate Bill 1265. Virginia General Assebly. 2024. https://lis.virginia.gov/cgi-bin/legp604.exe?231+sum+SB1265.
10. Gold, Rachel, Amanda Myers, and Michael O'boyle, "Performance Incentive Mechanisms for Strategic Demand Reduction," American Council for an Energy-Efficient Economy, Report U2003, (February 2020). https://energyinnovation.org/wp-content/uploads/2020/02/Performance-Incentive-Mechanisms-for-Strategic-Demand-Reduction.pdf.
11. "Improving Utility Performance Incentives in the United States: A Policy, Legal and Financial Framework for Utility Business Model Reform," Regulatory Assistance Project, (Accessed July 1, 2024). Page iv. https://www.raponline.org/knowledge-center/improving-utility-performance-incentives-in-the-united-states-a-policy-legal-and-financial-framework-for-utility-business-model-reform/.
12. State Corporation Commission Final Order, case Case No. PUR-2022-00124. https://www.scc.virginia.gov/docketsearch/DOCS/7rkr01!.PDF.
13. § 45.2-1706.1. Commonwealth Clean Energy Policy. https://law.lis.virginia.gov/vacodefull/title45.2/chapter17/article3/.
14. CHESSA-SEIA Testimony. Kevin M. Lucas. Case No. PUR-2021-0014. Page 24. https://scc.virginia.gov/docketsearch/DOCS/681v01!.PDF.
15. SCC Staff Testimony. Michael Cizenski. PUR-2021-00127. Page 27. https://scc.virginia.gov/docketsearch/DOCS/5_vr01!.PDF.
16. Dominion Energy Testimony. David F. Walker. Case No. PUR-2023-00217.
17. Virginia Electric and Power Company's Proposed Energy Efficiency Savings Targets Report (Part 1 of 2). Case No. PUR-2023-00227. Page iii.
18. Appalachian Power Company Petition for approval of energy efficiency savings targets. Case No. PUR-2023-00227. Page 2.
19. Specian, Mike, Weston Berg, Sagarika Subramanian, and Kristin Campbell, "2023 UTILITY ENERGY EFFICIENCY SCORECARD," page 111, American Council for an Energy-Efficiency Economy, (August 2023), https://www.aceee.org/sites/default/files/pdfs/U2304.pdf.

GLOSSARY

TERMS & DEFINITIONS: A – C

100-year flood zone: A 100-year flood zone is a mapped floodplain area with a 1% chance of flooding in any given year, translating to a 26% chance over a 30-year mortgage.

Abandoned and derelict vessel (ADV): Boat without an owner or with an unknown owner that is no longer maintained. These vessels can make navigational channels unsafe, damage ecosystems, and diminish the recreational and environmental value of an area.

Accessory Dwelling Unit (ADU): A smaller, independent residential dwelling unit located on the same lot as a stand-alone (i.e., detached) single-family home.

Advanced reconductoring: Replacing old conductors with new ones that have a higher capacity for carrying electrical current.

Advanced recycling / chemical recycling / chemical conversion: Broad terms encompassing a variety of failed and experimental processes where plastic is incinerated in an oxygen-free environment to render a raw material for creating fossil fuel.

Agriculture and Forestry Industries Development Fund and Grant Program (AFID): A discretionary, performance-based, economic development incentive specifically for agriculture and forestry value-added or processing projects. The AFID program supports agribusinesses of all sizes including produce companies, dairy processors, meat and poultry processors, specialty food and beverage manufacturers, greenhouse operations, forest product manufacturers and more. The fund can also support aquaculture projects such as oyster production and nurseries producing native plants for stormwater BMPs.

Agricultural best management practices (BMPs): Conservation or technological practice, such as stream fencing, that reduces the amount of non-point source pollutants, such as nutrients and sediments, to protect waterways.

Agricultural Land Easement Program: USDA program helps private and tribal landowners, land trusts, and other entities such as state and local governments protect croplands and grasslands on working farms and ranches by limiting non-agricultural uses of the land through conservation agreements.

Agrivoltaics: Ground-mounted solar facilities where agricultural activities such as animal grazing, foraging, or crop production are simultaneously taking place alongside clean energy generation. Also referred to as agrisolar or dual-use solar.

All-terrain tracker: Solar panel mounting technology that eliminates the need for land grading and allows a large scale solar facility to adapt to an area's natural landscape.

Allowance: A limited authorization for a power plant owner to emit a certain amount of greenhouse gases. These allowances are available for purchase through auctions run through the Regional Greenhouse Gas Initiative.

Aquifer: A body of porous rock or sediment saturated with groundwater. Groundwater enters an aquifer as precipitation infiltrates the soil.

Automated speed enforcement (ASE): Cameras that detect speeding cars and issue a civil fine for exceeding 10mph over the posted limit. Currently only authorized in school and work zones in Virginia.

Base-load power source: A facility that is normally operated to take part or all of the minimum load of a system, which produces electricity at an essentially constant rate and runs continuously.

Bicyclist Safety Stop: Allows bicyclists to treat stop signs as yield signs and/or red-light signals as stop signs. These laws allow bicyclists to mitigate risk to their advantage.

Bike Bus program: A bike bus, also known as a bike train, is a group of students who bicycle together along a predetermined route to get kids to school, often accompanied by one or more adults.

Biosolid: Treated sewage sludge, often applied to land as fertilizer.

Black, Indigenous, and People of Color (BIPOC) Historic Preservation Fund: A grant program to protect and support Virginia's historically underserved and underrepresented communities and associated cultural and historical sites. This fund provides grants for the acquisition, protection, and rehabilitation of historic and archaeological sites of significance associated with BIPOC communities.

Blast or evacuation zone: Area that persons would need to move beyond in order to avoid risk of a burn injury in the event of a pipeline explosion.

Blowout: When a fracked-gas compressor station is closed and the gas within the compressors and piping is manually or automatically vented to the atmosphere or sent to a flare. This occurs when there are operational or maintenance needs, emergencies, or during emergency shutdown (ESD) system testing. A concentrated amount of toxins is released during this procedure.

Board of Housing and Community Development (BHCD): The governing body in Virginia that partners with state, federal, local, and nonprofit housing and community and economic development initiatives. Responsible for enacting the Uniform Statewide Building Code (USBC).

Bonding program: A set of requirements under state and federal law for coal companies to provide financial guarantees to be available for reclamation should the coal company fail to complete reclamation.

Brownfield: Abandoned or unused commercial or industrial site.

Brownfield and Coal Mine Renewable Energy Grant Fund and Program: Administered by Virginia Energy for the purpose of awarding grants to renewable energy projects that are located on brownfields or previously coal-mined lands.

Bycatch: Discarded catch of marine species and unobserved mortality due to a direct encounter with fishing vessels and gear.

Byssal threads: Also known as byssus, these strong threads are created from proteins and allow some mussels to attach to surfaces such as rock, pilings and other bivalves.

Carbon sink: A forest, ocean, or other natural environment viewed in terms of its ability to absorb and sequester carbon dioxide from the atmosphere.

Certificate of Public Convenience and Necessity (CPCN): A requirement for a utility company to construct and operate electrical generating facilities, showing that the project is needed, will not negatively impact reliability, and is not otherwise contrary to the public interest.

Chesapeake Bay TMDL Phase III WIP: Provides scientific and technical guidance on the Chesapeake Bay Program on measures to restore and protect the Chesapeake Bay. Works to enhance scientific communication and outreach through reports, discussion groups, reviews, and workshops.

Chief Resilience Officer (CRO): A government employee (either at city or state level) who coordinates across agencies, departments, and stakeholders to develop strategies, programs, and funding applications to advance resilience-building activities. In Virginia, the CRO reports to the Secretary of Natural and Historic Resources and serves as the primary coordinator of resilience and adaptation initiatives and the primary point of contact regarding issues related to resilience for the Commonwealth.

Clean Car Standards: A set of regulations to reduce transportation pollution and greenhouse gas emissions. This program requires automakers to provide an increasing amount of EVs each year to states with Clean Car Stan-

dards. States can only adopt federal regulation of clean car standards, but cannot make their own standards.

Clean energy: Electricity that is generated from renewable resources and by facilities that do not directly emit greenhouse gases such as carbon dioxide during the generating process.

Clean hydrogen: Hydrogen produced with a carbon intensity equal to or less than 2 kilograms of carbon dioxide-equivalent per kilogram of hydrogen produced.

Clean Water Act: The primary federal law in the US governing water pollution established regulations on pollutant discharges into bodies of water and regulated water quality standards. The CWA recognizes both federal and state roles in its implementation and enforcement.

Coal combustion residual (CCR): Toxic-containing byproduct from the burning of coal in power plants, including fly ash, bottom ash, and boiler slag.

Coastal Resilience Master Plan: A plan that seeks to acknowledge climate change and its consequences, identify and address socioeconomic inequities, work to enhance coastal adaptation and protection efforts, recognize the importance of protecting and enhancing natural infrastructure, utilize community and regional scale planning, and focus on the most cost-effective solutions. The overall goal is to protect Virginia's highly vulnerable coastline communities from sea level rise and natural disasters.

Coastal Virginia Offshore Wind (CVOW): Offshore wind project being constructed by Dominion Energy about 27 miles offshore of Virginia Beach. When completed in 2026, it will have a total capacity of 2.6 GW.

Coliform bacteria: A strain of bacteria that is used in testing to signify the likelihood of other bacterial contaminants that would render food or water unsafe for consumption.

Combined sewer overflow (CSO): An antiquated system where rainwater runoff, domestic sewage, and industrial wastewater are combined and routinely overflow into nearby bodies of water. These systems can cause beach closures, algae growth, and reduced oxygen levels in waterways.

Community benefit Agreement (CBA): Legally binding contracts between coalitions of community-based organizations and developers that shape how local development projects will contribute to improving the quality of life of nearby residents.

Community Flood Preparedness Fund (CFPF): State-sponsored grant fund that provides financial assistance to localities to reduce the impacts of flooding within Virginia. High emphasis on projects that align with local, state, and federal floodplain management standards and plans. The only statewide source of funding for flood resilience capacity building and studies, as well as project implementation. Revenue derived from Virginia's participation in the Regional Greenhouse Gas Initiative.

Community solar: A centralized solar facility capped at 5MW that electricity users within a certain region can buy in or subscribe to take advantage of the clean power. Also referred to as Shared Solar.

Conservation easement: A binding legal agreement between a landowner and land trust and/or agency designed to protect identified conservation values of a particular property.

Construction stormwater general permit: Construction projects resulting in at least one acre of land disturbance must apply for this state permit to mitigate stormwater runoff at the construction site.

Data center: Industrial facility housing computers that store, process, and distribute large amounts of digital information and require massive amounts of energy, land, and water to operate.

Decarbonization: The process of reducing carbon emissions by improving energy efficiency, electrifying appliances, and integrating renewable energy sources.

Demand response program: Balancing the demand on power grids by encouraging customers to shift electricity demand to times when electricity is more plentiful or other demand is lower, typically through prices or monetary incentives. Demand response is an important source of flexibility for managing the stability and reliability of electricity grids.

Demand-side management: Strategies used by energy utilities to lower customer energy use during times of peak energy demand or to shift customer energy use to times when energy demand is lower.

Dissolved oxygen (DO): A measurement of available oxygen that is incorporated into a body of water and available for use by aquatic organisms.

Distributed energy resource (DER): 5 MW or less of energy that produces power near the point of use, including rooftop solar, parking lot solar, and shared solar facilities. Many distributed solar energy systems are sited on rooftops and are oftentimes referred to as "rooftop solar".

Ecosystem service: Any positive benefit that wildlife or ecosystems provide to people. The benefits can be direct or indirect, small or large.

Energy burden: The percentage of gross household income spent on energy costs. Allocating greater than 6% of income towards energy costs is considered a high energy burden, and allocating over 10% is considered a severe energy burden.

Energy efficiency: The practice of using less energy to perform the same function, thereby reducing energy waste and lowering costs while achieving the same level of energy service.

Energy Efficiency Resource Standard (EERS): A component of the Virginia Clean Economy Act which establishes specific, long-term targets for energy savings that utilities must meet through customer energy efficiency programs.

Enhanced Nutrient Removal Program: This program incorporates technologies that allow sewage treatment plants to provide a highly advanced level of nutrient pollution removal by building on previously set biological nutrient removal (BNR) systems.

Environmental justice: The fair treatment, meaningful involvement, and remediation of environmental harms for 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.

Environmental justice community: Specific population or neighborhood that is disproportionately impacted by environmental hazards, pollution, and/or climate change. These communities are at a higher risk of experiencing adverse health outcomes.

Equity: The quality of justice, impartiality, and fairness within the procedures, processes, and distribution of resources by institutions or systems. Avoid confusing equity and equality, as equity refers to fairness and justice while equality refers to 'sameness.'

Fenceline community: A community with an increased health risk to its residents due to its proximity to a major source of pollution, often comprised of majority low income residents or people of color.

Fiscal Responsibility Act (2023): A federal law to lift the debt ceiling while attempting to greenlight the Mountain Valley Pipeline. The bill included provisions that require the U.S. Army Corps of Engineers to issue permits for the Mountain Valley Pipeline within 21 days and attempted to prohibit any judicial review of per-

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mits issued for the project by any government agency.

Forest Conservation Act: A stakeholder-led study will evaluate where and why Virginia is losing canopy and will recommend funding and policy initiatives to reverse the loss.

Full-time equivalent (FTE): This unit indicates the workload of an employee or student in a way that makes effort comparable across various contexts. An FTE of 1.0 is equivalent to a full-time worker.

Get Outdoors Program: Grant program administered through Virginia Outdoor Foundation for projects that increase access to safe open space in Virginia's communities, especially those that are underserved.

Gigawatt (GW): Unit of energy equivalent to one billion watts.

Gold-pyrite belt: A nine- to sixteen-mile wide, nearly 140-mile-long northeast trending mineral deposit that extends from Fairfax County to Halifax County.

Greater Richmond Transit Company (GRTC): A local government-owned public service company that operates an urban-suburban bus line based in Richmond, Virginia.

Green hydrogen: Hydrogen produced by using renewable energy which can then be used to generate more energy. Has the potential to contribute to climate warming if handled improperly.

Grid interconnection: Connecting electricity generation sources to the power grid.

Grid-enhancing technology (GET): Technology that maximizes electricity transmission across the existing system including sensors, power flow control devices, and analytical tools.

Grid-scale batteries: Batteries with at least 1 MW of energy storage capacity that are mostly owned by electric utilities or independent power producers to provide grid services.

Habitat connectivity: The ability for wildlife to move between significant patches of habitat; crucial for sustaining wildlife and ecosystems.

Harmful algal bloom (HAB): Overgrowth of toxin-producing algae that increases toxicity of water and leads to illness of humans and animals. Algae blooms frequently result from excessive nutrient pollutants such as nitrogen and phosphorus.

Historic Rehabilitation Tax Credit (HRTC): Community redevelopment and economic development tool to adapt and reuse older structures for urban and rural communities.

Home Efficiency Rebates (HOMES): Grants awarded to State energy offices to provide rebates that discount the price of energy-saving retrofits in single-family and multi-family buildings. These, along with the Home Electrification and Appliance Rebates, comprise the Home Energy Rebates programs authorized through the Inflation Reduction Act.

Home Electric Appliance Rebates (HEAR): Grants awarded to State energy offices and tribal entities to develop and implement a high-efficiency electric home rebate program. These, along with the Home Efficiency Rebates, comprise the Home Energy Rebates Programs authorized through the Inflation Reduction Act.

Housing Innovations in Energy Efficiency fund (HIEE): Designated to support energy efficiency improvements in low-income housing through the Virginia Department of Housing and Community Development. Funded exclusively by the Regional Greenhouse Gas Initiative (RGGI).

Impervious surface: Impenetrable surfaces, often made of asphalt or concrete, prevent water from naturally filtering into soils and groundwater and increase stormwater runoff.

Intergovernmental Panel on Climate Change (IPCC): A body of the United Nations whose job is to advance scientifically-based assessments about climate change.

International Energy Conservation Code (IECC): A model code developed by the International Code Council (ICC) that sets minimum energy efficiency requirements for residential and commercial buildings, promoting energy conservation and sustainability.

Inflation Reduction Act (IRA): Aims to curb inflation by reducing the federal government budget deficit, lowering prescription drug prices, and investing in domestic energy production while promoting clean energy.

Infrastructure Investment and Jobs Act (IIJA): Also known as the Bipartisan Infrastructure Law, is federal legislation that authorizes the largest investment in the resilience of physical and natural systems in American history.

Investor-owned utility (IOU): A private, for-profit company with a defined monopoly service territory that operates as an electrical utility. In Virginia, the two largest utilities–Dominion Energy and Appalachian Power–are investor-owned utilities.

Impoundment: In the case of coal combustion residual, a structure used to retain or store waste materials, often in the form of a pond or landfill.

Invasive species: With regard to a particular ecosystem, a non-native organism whose introduction causes or is likely to cause economic or environmental harm, or harm to human, animal, or plant health.

Joint Legislative Audit & Review Commission (JLARC): Conducts program evaluation, policy analysis, and oversight of state agencies on behalf of the Virginia General Assembly.

Karst: An environmentally sensitive landscape underlain by limestone that has been eroded by the dissolving of bedrock, producing ridges, towers, fissures, sinkholes, and interconnected caves. Karst provides habitat for rare animal and plant species, and many private and public water supplies in Virginia are sourced from karst groundwater.

Land and Water Conservation Fund (LWCF): Federal competitive grant program that provides funding to protect land for national parks, wildlife refuges, forests, trails, and other public lands, help establish state and local parks, protect working forests, and preserve important historic and cultural sites. State agencies, localities, non-profits, and tribes are eligible to apply for funding.

Land Preservation Tax Credit (LPTC): A program that encourages voluntary private land conservation by providing tax credits equal to 40% of the value of donated land or conservation easements. A program that encourages voluntary private land conservation by providing tax credits equal to 40% of the value of donated land or conservation easements. Virginia Department of Conservation and Recreation is responsible for verifying the conservation value of LPTC donations.

Land trust: An accredited nonprofit land conservation organization that meets best management practices and ethical standards in governance, financial management, and land protection as determined by the Land Trust Accreditation Commission, an independent third party organization.

Living Shoreline: A shoreline management practice that provides erosion control and water quality benefits; protects, restores, or enhances shoreline habitat; and maintains coastal processes through the strategic placement of plants, stone, sand fill, and other structural and organic materials.

Low-income: A classification for households or individuals who earn less than a specific threshold, often making them eligible for various forms of assistance and support due to financial constraints.

Maximum contaminant level (MCL): The threshold set by the Environmental Protection Agency setting the highest legally allowed level of a contaminant in drinking water.

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Meaningful Watershed Education Experience (MWEE): Learner-centered framework that focuses on investigations into local environmental issues and leads to informed action. MWEEs are made up of multiple components that include learning both outdoors and in the classroom and are designed to increase environmental literacy by actively engaging students in building knowledge and meaning through hands-on experiences.

Megawatt (MW): A unit of power equal to one million watts often used as a measure of the capacity output of a power station.

Metals mining: Metal mining specifically refers to the mining of gold, copper, zinc, and lead. The metal mining process is land-intensive and pollutes land and water.

Methane (CH_4): A potent greenhouse gas that is the primary component of natural gas. It has a global warming potential over 28 times higher than carbon dioxide, primarily emitted from natural gas systems, livestock, and landfills, contributing significantly to climate change.

Microtransit: Tech-enabled shared transportation that lives in the space between traditional fixed-route transit and ride-hailing technology.

Mineral Mining: The industrial breaking or disturbing of the surface soil for the extraction or removal of minerals to make them suitable for commercial, industrial, or construction use.

Mountain Valley Pipeline (MVP): A multi-billion dollar natural gas pipeline project that cuts through 303 miles of mountains, rivers, and farmlands from northwestern West Virginia to southern Virginia to transport fossil fuel across state borders. It has received over 500 water quality protection violations and was subject to a safety order from the Pipeline and Hazardous Materials Safety Administration.

Mountain Valley Pipeline Southgate Extension (MVP SE): Newly-redesigned, proposed 31-mile, 30-inch diameter pipeline routed to start in Pittsylvania, Va. at the terminus of the MVP mainline, and travel into Rockingham, N.C.

Multi-use trail: Designed for use by pedestrians, bicycles, and other non-motorized users.

Municipal Separate Storm Sewer System (MS4): Large drainage system designed to carry stormwater runoff in urban and suburban areas directly to nearby bodies of water. Virginia's largest localities must be permitted for these systems.

Narrative and numeric criteria: Statements or quantitative measures that describe the desired goals for conditions of quality in waterbodies.

National Flood insurance Program (NFIP): Provides flood insurance and encourages floodplain management to reduce flood damage across the United States.

Nature-based solution: An approach that reduces the impacts of flood and storm events through the use of environmental processes and natural systems. A nature-based solution often provides additional benefits beyond flood control, including recreational opportunities and improved water quality.

Net-metering: A metering and billing agreement that allows customers to interconnect approved renewable generation systems to the electric grid and provide electricity to their own residence or business facility. The agreement credits solar energy system owners for the electricity they add to the grid.

Nitrate (NO_3): A class of chemicals often concentrated in agricultural fertilizers that is highly leachable, and can travel via water from soil into groundwater sources. High concentrations have demonstrable negative health impacts on humans if consumed.

Nitrogen oxides (NO_x): Group of gases that cause damage to the human respiratory tract and increase vulnerability to, and the severity of, respiratory infections and asthma. Long-term exposure can cause chronic lung disease.

Non-native species: With respect to a particular ecosystem, an organism, including its seeds, eggs, spores, or other biological material capable of propagating that species, that occurs outside of its natural range.

Non-point source pollution: Pollution from land runoff, precipitation, drainage, seepage, or hydrological modification. NPS pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources.

Nuclear Regulatory Commission (NRC): The federal agency tasked with regulating the nuclear industry.

Odorant: Chemical additive added to fracked gas to add an artificial smell to gas. As methane gas is odorless, odorant is used as a safety precaution to help detect leaks in homes.

Office of Trails: An interdepartmental office housed at the Virginia Department of Transportation (VDOT) and established in 2022.

Offshore wind (OSW): Energy derived from winds at sea moving windmills, which is then transformed into electricity and supplied to the electrical grid onshore.

Onshore infrastructure: Equipment located on the mainland–including transmission lines and substations–that receives electricity from offshore wind facilities and then conveys it to the onshore electrical grid.

Oyster reef: Rocks, old shells, wrecks, and piers accumulate oysters that grow together and create important habitats for hundreds of species. Organisms like mussels, barnacles, and sea anemones settle on them, creating abundant food sources for commercially valuable fish.

Oyster Replenishment Fund: Fund that maximizes the reuse of the state's oyster shell resources to incentive shell recycling programs

Particulate matter: Microscopic solid or liquid droplets that are 2.5 – 10 micrometers and are sourced from pollutants. These harmful particles are inhaled by humans, can get into the lungs and/or bloodstream, and cause high levels of infections, cancer, and disease.

Peak demand: The highest level of energy consumption within a specific period, which can strain energy supply systems and lead to higher energy costs.

Pedestrian refuge: A place for pedestrians to stand safely in a median if unable to cross a wide or fast street in one pass.

Pennsylvania-New Jersey-Maryland Interconnection (PJM): Regional transmission organization that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia, including Virginia.

Per- and polyfluoroalkyl substances (PFAS): Also known as "forever chemicals", PFAS are a group of thousands of chemicals used to make fluoropolymer coatings and products that resist heat, oil, stains, grease, and water. PFAS do not break down in nature because of their strong chemical bonds. PFAS have been found in the blood of humans and animals. Studies show PFAS may cause a variety of health effects, including cancer, thyroid disease, liver damage, reduced immune response, and impacts on pregnancy.

Performance based regulation (PBR): An approach to utility regulation designed to: strengthen utility incentives to improve performance and align utility priorities with those of customers and public policy.

Performance incentive mechanism (PIM): Metric, target, and/or financial incentive designed to improve utility performance in targeted areas.

Permit by rule (PBR): Process used by DEQ to enable the construction and operation of renewable energy projects.

Permit-specific bond: A bond provided by a coal company for a specific mining permit, which corresponds to a specific geographic area. The bond may be a third-party bond provided by

an independent company, a deposit of money held by a bank, or a combination of the two.

Phase III Watershed Implementation Plan (WIP): A comprehensive strategy developed by states within the Chesapeake Bay watershed to achieve and maintain water quality standards and pollution reduction goals by 2025, as part of the Chesapeake Bay Total Maximum Daily Load (TMDL) requirements.

Pool bond: In Virginia, coal companies may pay into a pool bond fund, known as the Coal Surface Mining Reclamation Fund. In exchange, the coal companies provide a lower permit-specific bond. A portion of the pool bond would pay for a portion of reclamation at any forfeited permit that takes part in the pool.

Potomac aquifer: The largest and deepest aquifer in eastern Virginia and its primary groundwater supply.

Power Innovation Fund: A fund created in 2023 to be used for the purposes of research & development of innovative energy technologies, including nuclear, hydrogen, carbon capture and utilization, and energy storage.

Power Purchase Agreement (PPA): A long-term contract in which a third-party electricity provider installs, owns, and operates an energy system on a customer's property. The customer then purchases the system's electricity for a predetermined price. A PPA allows the customer to receive stable and often low-cost electricity with no upfront costs.

Publicly-regulated utility: A specific set of 60 corporations in Virginia that provide electricity, gas, water, and sewer services to the public.

Purchase of Development Rights (PDR) program: Compensate landowners who voluntarily place an agricultural conservation easement on their property.

Ratepayer: A customer, regardless of rate class, of an electric utility.

Reclaimed water: Domestic wastewater (sewage) that is treated and tested for use for specific purposes.

Reclamation: All clean-up activities required at coal mines, including regrading and re-vegetating the land, addressing sources of water pollution, and removing any coal loading facilities.

Reduction fishery: Fishery that uses, or 'reduces,' its catch to produce fish meal or fish oil rather than for direct human consumption.

Regional Greenhouse Gas Initiative (RGGI): A cooperative plan among twelve Northeast and Mid-Atlantic States to reduce power sector carbon emissions by requiring power plants to purchase allowances for their greenhouse gas emissions. The proceeds from allowances are being used to create more energy-efficient, affordable housing units, help low-income families reduce energy bills, and enhance community flood prevention and protection.

Renewable Portfolio Standard (RPS): Standard established by the Virginia Clean Economy Act that sets annual requirements for the generation of renewable energy in a utility's service territory.

Resilience: In the context of climate change, resilience means the capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats. The first step towards resilience is understanding the infrastructure's vulnerability to climate change.

Resilient Virginia Revolving Loan Fund (RVRF): Provides financial assistance to localities for projects that mitigate flood impacts to private properties through low- to no-interest loans. Projects can include hazard mitigation of buildings, locality-operated loan programs, and relocation. Primarily a loan program with limited grant funds; revenue comes from the Federal Emergency Management Agency, Regional Greenhouse Gas Initiative, and General Fund.

Retrofit: The process of updating existing buildings with new technologies or systems to improve energy efficiency, reduce emissions, and enhance overall performance.

Sackett v. EPA: 2023 US Supreme Court decision removing federal protections from vast swaths of the nation's wetlands.

Self-bond: Permit-specific bond that does not have any financial guarantee from a third party, but consists only of the word of the coal company.

Shoreline Erosion Advisory Service (SEAS): Department of Conservation and Recreation program that assists private landowners and localities in Virginia to complete site investigations, written reports, design and permit reviews, construction inspection, and more.

Small Modular Nuclear Reactor (SMR): An expensive, underdeveloped, and untested type of nuclear technology. Previous attempts to deploy small-scale nuclear reactors in South Carolina proved to be so expensive that it had to be canceled, but ratepayers are still paying billions of dollars to cover the cost of initial construction.

SMART SCALE: A nationally-recognized transportation funding prioritization process that evaluates and ranks proposed projects based on key factors to help determine which ones should be funded. Projects are evaluated on anticipated benefits such as safety, reduced congestion, accessibility, economic development, efficient land use, and environmental impact.

Soil amendment: A substance added to soil to improve its physical or chemical properties, with the goal of providing a better environment for plant growth and improving water retention, permeability, water infiltration, drainage, aeration, and structure.

Soil and Water Conservation Board: This body provides soil and water conservation services to residents. The board oversees Virginia's Soil and Water Conservation Districts (SWCDs), oversees dam safety and floodplain management programs, and approves loan criteria for loans from the Dam Safety Flood Prevention and Protection Assistance Fund.

Soil & Water Conservation Districts (SWCDs): Develops comprehensive programs and plans to conserve soil resources, control and prevent soil erosion, prevent floods, and protect and conserve water resources. Agency staff provide education and stewardship programs across the state to support conservation.

Statewide Trails Plan: A statewide plan developed by the Office of Trails to create a comprehensive network of regional multi-use trails that encompasses an inventory of existing and proposed trails, identifies key gaps in the network, outlines development steps and best practices, and seeks to offer opportunities for community engagement and visioning.

State Air Pollution Control Board: Citizen board authorized to make regulations for the control and abatement of air pollution throughout the Commonwealth.

State Corporation Commission (SCC): A state agency with regulatory authority over many business and economic interests in Virginia including public utilities. It is an independent department of state government with delegated administrative, legislative, and judicial powers.

State Water Control Board: Appointed citizen body that enacts regulations to implement Virginia's State Water Control Law and sets water quality standards which include regulation of sediment, nutrient, and toxic pollutants.

State Water Control Law: State legislation to protect state water from pollution, prevent increases in pollution, reduce existing pollution, promote water conservation, and promote reuse of wastewater in a manner protective of the environment and public health.

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Storm surge: Increased coastal water levels caused by large storms. Storm surge can cause severe flooding.

Stormwater: Rainwater or melted snow that runs off surfaces, collecting debris and pollutants. With more intense and frequent storm events due to climate change, there is a higher risk of pollution and debris from these surfaces ending up in local waterways

Stormwater Local Assistance Fund (SLAF): A 50-50 state and local matching grant program that protects and improves the health of our waterways by funding local stormwater resiliency projects.

Stretch code: A local building energy code with energy efficiency and electrification requirements beyond a state's minimum code. Several states offer "model" stretch codes for municipalities to use, while Virginia's Dillon rule status currently prevents localities that wish to adopt stretch codes from doing so.

Sulfur oxide (SO_x): A pollutant that contributes to the formation of acid rain and particulate pollution.

Surface mine: Surface feature of a coal mine, including mountaintop removal mining, area mining, auger mining, contour mining, coal processing and loading facilities, and surface features of underground mines.

Tidal Wetlands Act: Virginia law adopted in 1972 that recognizes the environmental value of tidal wetlands, establishes a permitting system for their protection, and authorizes localities to establish a local wetlands board and adopt a wetlands ordinance.

Time-of-use rate: Method of shifting demand and lower costs by charging customers for electricity usage based on system-wide power demand, including by charging lower rates when electricity is plentiful and higher rates when availability is constrained.

Total Maximum Daily Load (TMDL): The maximum amount of a pollutant (e.g. phosphorus, nitrogen, and sediment) that the Chesapeake Bay can receive while still meeting water quality standards.

Traffic calming: Methods to reduce speeding and to increase compliance with speed limits and other traffic direction built into the roadway rather than relying on voluntary compliance and police enforcement.

Training for Residential Energy Contractors (TREC): Provides funds for state energy offices to train, test, and certify residential energy efficiency and electrification contractors.

Transforming Rail in Virginia Program (TRVA): A multi-corridor, multi-year, multi-phase passenger rail development program. An agreement between CSX and Norfolk Southern will allow six new round-trip Amtrak Regional trains, with an extension of service from Roanoke to Christiansburg, and five more Virginia Railway Express (VRE) trains on the Fredericksburg line.

Transit-oriented development (TOD): A type of urban development that maximizes the amount of residential, business, and leisure space within walking distance of public transportation.

Transit Ridership Incentive Program (TRIP): Provides funding to transit agencies for the purpose of supporting the deployment of zero-fare and/or reduced-fare pilot programs to support low-income communities. These programs will aim at increasing a system's ridership and accessibility.

Transmission line: Conductors designed to carry electricity over large distances in a way that minimizes energy losses.

Tree canopy: A measurement that encompasses the layer of leaves, branches, and stems of trees that shelter the ground when viewed from above. This measurement is expressed as a percentage of ground area that is covered by tree crowns and relates to the branching spread of the trees in an urban forest.

Turbidity: A measure of the amount of particles, such as sediment, plankton, or other organic matter, that are present in water. One source of turbidity is suspended solids, which are fine particles of sediment that remain in the water column of a waterbody.

U.S. Army Corps of Engineers (USACE): The military engineering branch of the United States Army.

U.S. Environmental Protection Agency (EPA): An independent agency of the United States government tasked with environmental protection matters.

Urban heat island: Highly urbanized community containing a high level of brick, cement, and asphalt. These materials absorb the sun's heat, and cause temperatures within city structures to be 1-7 degrees higher than compared in a rural area.

Utility-scale solar: A large-scale solar facility, over 5 MW, that generates renewable energy and feeds it into the grid.

Vehicle-to-grid: Technology that allows electric vehicle batteries to supply electricity to the grid, compensating enrolled customers for the electricity provided.

Vehicle miles traveled: Measures the amount of travel for all vehicles in a geographic region over a given period of time, typically a one-year period.

Virginia Agricultural Cost Share Program (VACS): Funds the implementation of a wide suite of agricultural best management practices that reduce pollution while enhancing farm productivity.

Virginia Battlefield Preservation Fund (VBPF): Provides matching funds to leverage significant local, federal, and private funding sources to preserve historically significant places.

Virginia Clean Economy Act (VCEA): Virginia law outlining a clear path to achieving a zero-carbon energy future by mandating the retirement of fossil fuel electricity generators, sets renewable energy standards through wind and solar power, and sets energy efficiency standards. The VCEA also establishes a renewable energy portfolio standard (RPS), which mandates that the two major utilities in the state, Dominion Energy and Appalachian Power Company, produce 100 percent renewable electricity by 2045 and 2050, respectively.

Virginia Conservation Assistance Program (VCAP): Cost-share program providing assistance as well as financial incentives to urban landowners installing Best Management Practices (BMPs) on their property. Eligible practices include the removal of impervious surfaces, rainwater harvesting, and other efforts to mitigate the effects of erosion and stormwater runoff.

Virginia Department of Agriculture and Consumer Services (VDACS): Promotes the economic growth and development of Virginia agriculture, provides consumer protection and encourages environmental stewardship.

Virginia Department of Conservation & Recreation (DCR): Agency which oversees Virginia's natural resource management and outdoor recreation.

Virginia Department of Education (DOE): State agency that leads and facilitates the development and implementation of a quality public education system.

Virginia Department of Environmental Quality (DEQ): Virginia's environmental agency that is responsible for administering laws and regulations related to air quality, water quality, water supply, renewable energy and land protection. DEQ issues permits, conducts monitoring, performs inspections, and enforces environmental law.

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TERMS & DEFINITIONS: V – W

Virginia Department of Forestry: Monitors the health, composition, and inventory of Virginia's public and private forests to inform land management practices.

Virginia Department of Health: State agency that oversees public health throughout the state, including the regulation of public drinking water.

Virginia Department of Housing and Community Development (DHCD): A Virginia state agency that oversees policies, programs, and funding to support affordable housing, community development, and energy efficiency projects, contributing to the state's overall development and sustainability goals.

Virginia Department of Transportation (VDOT): State agency responsible for building, maintaining, and operating the state's roads, bridges, and tunnels.

Virginia Department of Wildlife Resources (DWR): Agency responsible for the management of inland fisheries, wildlife, and recreational boating for the Commonwealth of Virginia.

Virginia Energy: State agency tasked with developing the plan for Virginia's energy future.

Virginia Environmental Justice Act (VEJA): Virginia law established to promote the fair treatment and meaningful involvement of all people regardless of race, color, national origin, income, faith, or disability with respect to the development, implementation, and enforcement of environmental laws and policies.

Virginia Environmental Literacy Plan (VELP): Provides a framework for integrating environmental education into the K-12 curriculum, emphasizing hands-on, outdoor learning experiences.

Virginia Farmland and Forestland Preservation Fund: Encourages voluntary land conservation by providing tax credits equal to 40% of the value of donated land for conservation easements under the Virginia Department of Agriculture and Consumer Services.

Virginia Flood Risk Information System (VFRIS): Offers detailed flood risk data and mapping tools for Virginia residents.

Virginia Household Water Quality Program (VAHWQP): A voluntary testing program for households served by private water supplies; led by the Virginia Cooperative Extension and Virginia Tech.

Virginia Institute of Marine Science (VIMS): A marine research and education center that operates as a branch of the College of William and Mary. VIMS has a legal mandate to provide research, education, and advisory services to government, citizens, and industry.

Virginia Invasive Species Management Plan (VISMP): Provides an overview of invasive species that threaten Virginia's natural and agricultural resources, state agency responsibilities, and goals shared by the many stakeholders who are part of the Virginia Invasive Species Working Group.

Virginia Land Conservation Foundation (VLCF): Provides state matching grants on a competitive basis for projects to protect farmland, forestland, natural areas, open space and parks, and areas of historic and cultural importance. State agencies, localities, non-profits, and tribes are eligible to apply for funding.

Virginia Litter Tax: Virginia manufacturers, wholesalers, distributors, and retailers of frequently-littered products are subject to the litter tax. The fee is intended to fund litter reduction education and cleanups.

Virginia Marine Resources Commission (VMRC): State agency in charge of overseeing Virginia's marine and aquatic resources, and its tidal waters and homelands. One of the primary functions of VMRC is to zone water areas for recreation, oyster and clamming grounds, and commercial/recreational fishing.

Virginia Pollutant Discharge Elimination System (VPDES): Program administered by the Department of Environmental Quality (DEQ) designed to prevent pollutants from getting into state waters. DEQ issues permits for all point source discharges; stormwater discharges from Municipal Separate Stormwater Sewer Systems (MS4s); and stormwater discharges from industrial sites.

Virginia Reliability Project: A proposed 48-mile fracked-gas pipeline extension project that would replace two existing segments of the Columbia Gas Transmission pipeline system and expand gas compression at a station in Petersburg, Va.

Virginia Safe Routes to School program: Helps schools and communities make walking and biking to school a safe, convenient, natural activity.

Virginia Trees for Clean Water Grant Program: Currently funds tree-planting projects that raise public awareness of the benefits of trees and their impacts on water quality.

Virginia Watershed Educational Program grant fund: Funds school environmental education programs, managed by the Virginia Department of Conservation & Recreation.

Virtual power plant (VPP): A network of small-scale energy resources that work together to balance energy supply and demand on a large scale. VPPs can be made up of hundreds or thousands of households and businesses, including their thermostats, electric vehicles, appliances, batteries, and solar arrays.

Volatile organic compound (VOC): Compound emitted as gas from some solids or liquids and contains a variety of chemicals.

Wastewater: Liquid waste or sewage that originates from households, industrial and commercial sites, and agricultural operations.

Water Quality Improvement Fund (WQIF): Fund that directs Virginia Department of Environmental Quality to assist local government and individuals in reducing point source nutrient loads to the Chesapeake Bay.

Water quality standards (WQS): A regulatory condition administered by the DEQ that identifies the designated use for water bodies and establishes standards to protect state waters. Water bodies are then categorized as either "supporting" their designated use or "impaired", generally based on pollutants present in the water body.

Weatherization: The practice of protecting buildings from the elements (e.g., wind, rain) and improving energy efficiency by sealing leaks and adding insulation, which reduces energy consumption and enhances comfort.

Wetland: A swamp, marsh, and other area saturated by surface or groundwater. Wetlands reduce storm surges and absorb rainfall, reducing flood risk, and also regulate water quality, trap carbon, and provide habitat for wildlife.

Wetlands delineator: Certified professional that visits sites to determine the boundaries of wetlands.

Wildlife corridor: Large areas of undeveloped habitat that connect critical core habitats, allowing for animal movement and healthy genetic dispersal.

Wildlife Corridor Action Plan (WCAP): Legislatively required plan to identify and protect wildlife corridors in Virginia, helping both people and wildlife travel more safely.

Wildlife crossing: Infrastructure that provides safe road crossings for wildlife. Crossings can take the form of overpasses, underpasses, culverts, and fencing.

VCN NETWORK PARTNERS

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Community Climate Collaborative
Environment Virginia
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Garden Club of Virginia
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James River Garden Club
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Lynnhaven River NOW
Mothers Out Front
Natural Resources Defense Council
New Virginia Majority
Northern Virginia Conservation Trust
Potomac Conservancy
Potomac Riverkeeper Network
Powered by Facts
Shenandoah National Park Trust
Sustainable Mobility for Arlington County
The Conservation Fund
The Electrification Coalition
The Nature Conservancy in Virginia
Valley Conservation Council
Virginia Aquarium and Marine Science Center Foundation
Virginia Interfaith Power & Light
Wetlands Watch

TIGER SWALLOWTAIL BUTTERFLY

Allegheny-Blue Ridge Alliance
Appalachian Voices
Bike Norfolk
BlueGreen Alliance
Blue Ridge PRISM
Capital Region Land Conservancy
Capital Trees
Center for Progressive Reform
Chesapeake Climate Action Network
Clean Fairfax Council
Clean Virginia Waterways
Coalition for Smarter Growth
Concerned Citizens of Charles City Council
Cowpasture River Preservation Association
East Coast Greenway Alliance
Edith J Carrier Arboretum at JMU
Fairfax County Park Foundation
Faith Alliance for Climate Solutions
Friends of the Lower Appomattox River
Friends of the North Fork of the Shenandoah River
Keep Virginia Beautiful
Loudon Wildlife Conservancy
Nansemond River Preservation Alliance
Nature Forward
New River Land Trust
Northern Virginia Bird Alliance
Northern Virginia Conservation Trust
Oceana
Partnership for Smarter Growth
Preservation Virginia
Prince William Conservation Alliance
Rockfish Valley Foundation
RVA Rapid Transit
Scenic Virginia
Shenandoah Valley Bicycle Coalition
Southern Appalachian Mountain Stewards
SouthWings
Spotswood Garden Club
Trust for Public Land
Tuckahoe Garden Club of Westhampton
Unitarian Universalist Church of Roanoke
UVA Law School, Environmental & Regulatory Law Clinic
Virginia Association for Biological Farming
Virginia Association for Parks
Virginia Association of Soil & Water Conservation Districts
Virginia Capital Trail Foundation
Virginia Clinicians for Climate Action
Virginia Living Museum
Virginia Native Plant Society
Virginia Organizing
Virginia Urban Forest Council (TREES Virginia)
Virginia Wilderness Committee
Virginia's United Land Trusts
Virginians for High Speed Rail
Waterkeepers Chesapeake
Wild Virginia
Wildlands Network

DOGWOOD

Albemarle Garden Club
Ashland Garden Club
Back Bay Restoration Foundation
Bike Walk RVA
Black Family Land Trust
Blue Ridge Garden Club
Boxwood Garden Club
Bus Riders of Roanoke Advocacy Group
Climate Action Alliance of the Valley
Conservation Park of Virginia, Inc.
Drive Electric RVA
EcoAction Arlington
Elders for Climate Action
Fifteen Minute Fredericksburg
Friends of Accotink Creek
Friends of Buckingham
Friends of Dyke Marsh
Friends of the Dahlgren Railroad Heritage Trail
Friends of the James River Park
Friends of the Rivers of Virginia
Garden Club of Norfolk
Garden Club of the Middle Peninsula
Garden Club of the Northern Neck
Goose Creek Association
Groundwork RVA
Hands Across the Lake
Henrico Conservation Action Network
Hunting Creek Garden Club
Leesburg Garden Club
Loudon Climate Project
Mattaponi & Pamunkey Rivers Association
Mill Mountain Garden Club
Nelson County Garden Club
New River Valley Bicycle Association
Northern Virginia Families for Safe Streets
Rail Solution
Rappahannock League for Environmental Protection
Rappahannock Valley Garden Club
Richmond Audubon Society
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Sierra Club – Chesapeake Bay Group
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Sierra Club – Great Falls Group
Sierra Club – New River Valley Group
Sierra Club – Piedmont Group
Sierra Club – Potomac Region Outings
Sierra Club – Potomac River Group
Sierra Club – Rappahannock Group
Sierra Club – Roanoke Group
Sierra Club – Shenandoah Group
Sierra Club – York River Group
Southside ReLeaf
Surfrider Foundation – Virginia Chapter
The Clinch Coalition
The Wildlife Society – Virginia Chapter
TrailHead Collective
Tree Fredericksburg
Virginia Association for Environmental Educators
Virginia Bicycling Federation
Virginia Council of Trout Unlimited
Virginia Green Travel Alliance
Virginia Society of Ornithology
Virginia Transit Association
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Williamsburg Garden Club
Winchester-Clarke Garden Club
YIMBY Hampton Roads
YIMBYs of Northern Virginia
York River Stewards

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