Public Influence on Environmental Decisions

A Thesis Prospectus
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By
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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

Coal production has declined nationwide over the past 20 years, with the Appalachian region of the United States being among the hardest hit (Bowen et al., 2020). Appalachia has historically experienced high poverty and mortality rates, which are compounded by economic slowdown and high unemployment rates (Appalachian Voices, 2015).

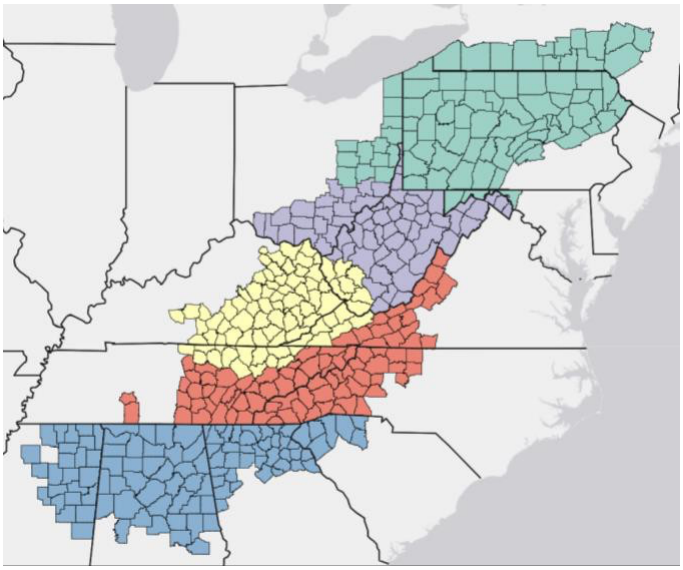

Figure 1. Map of Appalachia, divided into North, N. Central, Central, S. Central, and South (Appalachian Regional Commission, 2021).

Eric Bowen and his colleagues at West Virginia University, in collaboration with the Appalachian Regional Commission, conducted a review of the coal economy in Appalachia in 2020. Among their findings is a gap in private sector growth compared to the rest of the nation, especially in counties where mining is or was the main industry (Figure 2). Below, Figure 3 shows poverty rate broken out by region in Appalachia. With the focus of our project on Southwestern

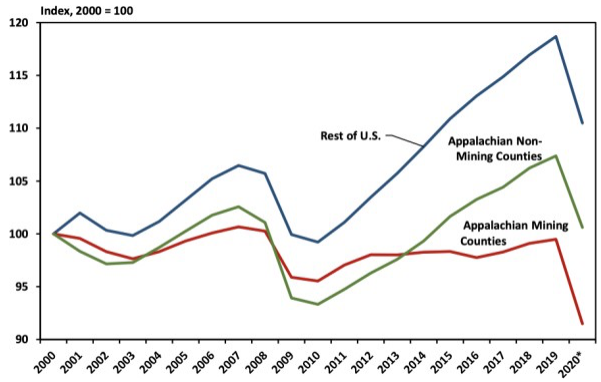

Figure 2. Private Sector Employment, Select Appalachian County Groups (Bowen et al., 2020).

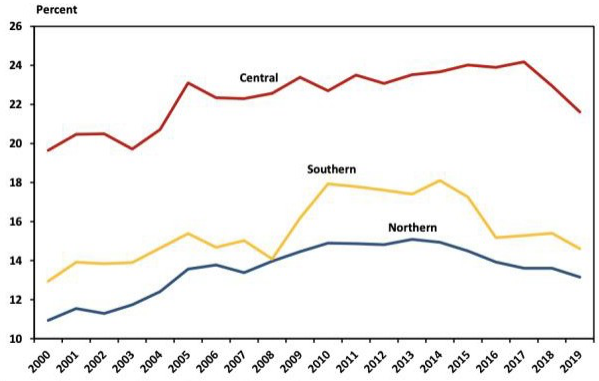

Figure 3. Poverty Rate, Appalachian Coal Producing Regions (Bowen et al., 2020).

Virginia, it is important to note that Central Appalachia has the highest poverty rates (by more than 5% in 2019).

Those living in Central Appalachia have long been affected by coal mines and natural gas pipelines and are weary of further development in their backyard. Mountaintop removal mining in western Virginia, southern West Virginia, and eastern Kentucky has been linked directly to more than 60,000 cases of cancer (Appalachian Voices, 2017). Those living near shale gas drilling sites have reported health concerns such as skin and respiratory irritation. So, when a hydropower project was shut down by residents of Grant County, West Virginia in 2020, it did not exactly come as a surprise. The project, proposed by FreedomWorks LLC, was set to take place entirely on private property, and happened to be the third project proposed in the area by FreedomWorks in three years (Steelhammer, 2020). Residents of affected homes were notified through a newspaper advertisement only two months prior to the proposed start of the project, leading to outcry. The project was eventually canceled after a public meeting of the Grant County Commission.

Renewable energy could be a long-term solution to Appalachia's lagging economy, but because of costs, projects must garner support from the government, the private sector, and the

residents of the region. This project assesses the potential for the implementation of solar, wind, and hydropower in the southwestern region of Virginia and analyzes the associated social and political implications.

The Fossil Fuel Industry

Virginia's largest fossil fuel resources are coal and natural gas, both found primarily in the Appalachian region of the state. According to the U.S. Energy Information Administration (2022), Virginia produces only 2 percent of the nation's coal, and relies primarily on natural gas for its energy needs. To support this need, there are four major natural gas pipelines that run into or through the state of Virginia: the Appalachian Connector, the Mountain Valley Pipeline, the WB Xpress, and the Transco Pipeline. All feed into the Transco Pipeline, which runs from Texas to New Jersey (Heyman, 2016).

In a 2022 project, the Virginia Department of Energy worked to catalog abandoned coal and mineral mines in the state. Some of these are shown in Figures 3 and 4, which contain ArcGIS maps displaying the Virginia Abandoned Coal Mines Feature Inventory (Virginia DoE, 2022). This dataset utilizes symbols to catalog the different hazards associated with each mine site, ranging from "hazardous or explosive gases" to "dangerous pile or embankment."

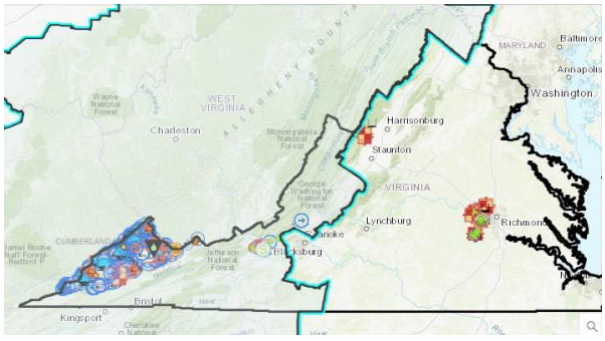

Figure 3. VACMFI dataset, all of Virginia. (Virginia DoE, 2022).

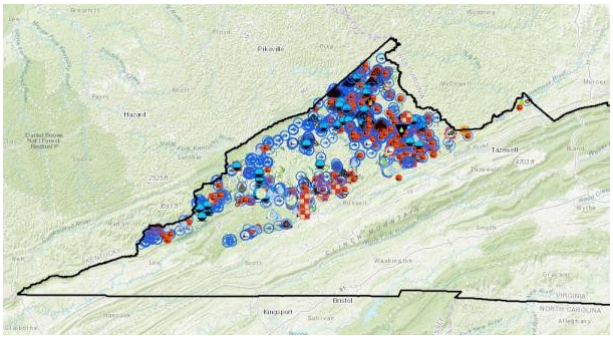

Figure 4. VACMFI dataset, Southwestern Virginia. (Virginia DoE, 2022).

These mines represent the skeletons of the coal industry that was once powerful in this region. Now, they are little more than toxic waste sites. And while Virginia has turned to natural gas as a new solution, pipelines running through Southwestern Virginia have disrupted lives and impacted health (Natural Resources Defense Council, 2021). A solution lies in a multi-faceted renewable energy system.

Pumped Storage Hydropower

Pumped storage hydropower (PSH) is one aspect of the renewable energy model. PSH is a system consisting of an upper and lower reservoir connected by a tunnel that feeds into a generator (U.S. DoE, 2022). This requires a gradient such that water can be pumped to a higher elevation during times of low demand and then released to generate energy during high demand.

The chief advantage of PSH is that it can be built on mine sites, using open coal pits as the system's upper reservoir. Figures 5 and 6 show the design of a pumped storage facility on top of an existing coal mine in Fushun, China (Liu et al., 2022).

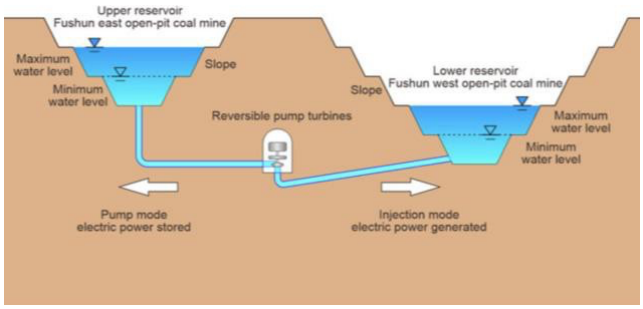

Figure 5. PSH in an open-pit mine. (Liu et al., 2022).

Figure 6. Rendered image of the PSH facility on top of the mine. (Liu et al., 2022).

Bath County, Virginia boasts the world's second largest PSH station. This massive facility is run by Dominion Energy and has been widely supported by residents and community organizations (Graves, 2018).

Wind Power

Wind farms are another component of the proposed renewable energy system. Figure 7 shows the areas of Virginia with the highest wind resource potential (WRP), a metric created by the National Renewable Energy Laboratory. On a scale of 1 to 7, with 7 being the best WRP, NREL considers anything greater than 2 to be acceptable for wind turbine use (Arnette & Zobel, 2011).

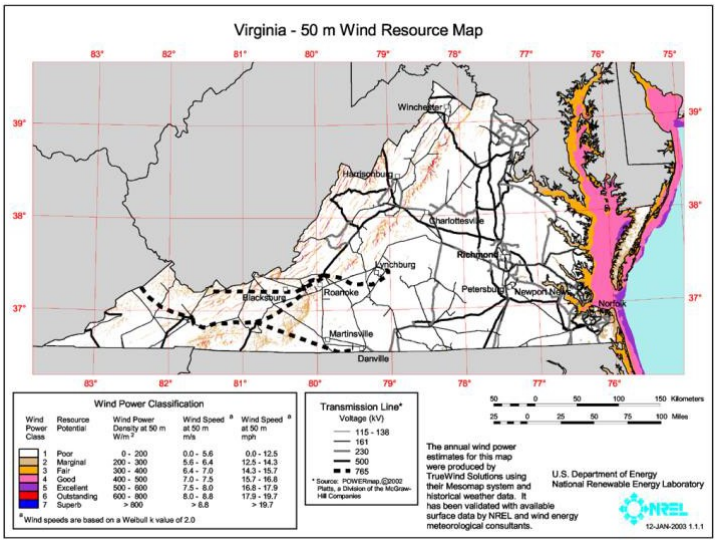

Figure 7. Map of wind speed intensity in Virginia (NREL, 2003).

Unlike hydro power, wind power has been unpopular among residents. Many believe that an emphasis on the tourism industry can pull Appalachia out of its economic slump, and wind turbines are considered an eye sore (Portnoy, 2015). In a 2015 article for the Washington Post, reporter Jenna Portnoy assessed Dominion Energy's proposal to install wind turbines along the East River Mountain in Bluefield, Virginia. A local man named Charles Stacy expressed his distaste for the project, telling Portnoy that he finds it "insulting." Residents of Tazewell County rallied against the project and managed to pass an ordinance banning "tall structures," which, after much debate and some pushback from the Virginia General Assembly, ended Dominion's plans to install the 400-foot-tall wind turbines. So, in 2017, they changed course, announcing plans to use the 2,600 acres of land for a pumped storage hydropower facility. As of September

2023, 14 years after its purchase, Dominion had not broken ground on the project (Owens, 2023).

Solar Power

Solar power is a third facet to Appalachia's renewable energy solution. MarketWatch (2023) named solar energy the fastest growing electricity source in the United States, popular due to its scalability. In Southwestern Virginia, the majority of solar energy panel systems are residential, followed by commercial and utility functions (Solar Workgroup of Southwest Virginia, 2017).

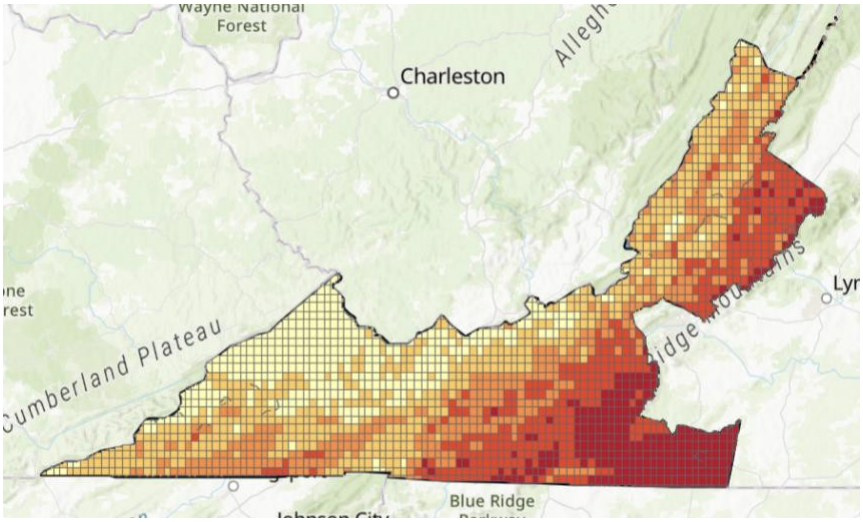

Figure 8. Map of sunlight intensity in Southwestern Virginia (Capstone Team, 2023).

Despite this, solar energy has faced significant opposition in a few Virginia counties. In July 2023, Henry County passed an amendment limiting the number of acres of solar farm development (Frolo, 2023). Amherst and Clarke counties are in the process of developing similar ordinances (Faulconer, Powell, 2023). These decisions align with groups like Citizens for Responsible Solar, an activist group allied against renewable energy in all forms (Green, et al.,

2023). Anti-energy transition rhetoric was popularized in part by former President Donald Trump and some conservative members of the Republican Party.

Public Participation and Engagement

In their piece for the Journal of Responsible Innovation, Jesse Reynolds, Eric Kennedy, and Jonathan Symons (2022) assess the increased call for "public participation and engagement" (PP&E) in scientific decision making. The authors begin by examining the history of public engagement in the United States and cite environmental issues requiring large scale public support, like the implementation of a new pipeline. Science, Technology, and Society (STS) scholars assert that the public more and more does not understand the complexities of new technologies and how these interact with human systems. They use John Rawls' theory of public reason – the idea of justifying decisions through moral principles – to explain freedom and the public's right to participate.

The invisible and undetermined risks associated with any new technology often cause hesitation in support for new initiatives. Public participation and engagement aims to open lines of communication between leaders and the public, allowing everyone to feel both informed and heard.

In the scope of this capstone project, certain community organizations exist to promote PP&E; one of those is Appalachian Voices.

Appalachian Voices

Appalachian Voices is a non-profit, grassroots organization promoting the welfare of Appalachia's environment and economy. Since 1997, they have served as a voice for the

community, providing insight on upcoming projects, informing residents of their rights, and posting press releases about hearings and decisions affecting Appalachians.

Some of Appalachian Voices' significant recent work has been an effort against Mountain Valley Pipeline (MVP), which extends through West Virginia and Virginia. In a March 2023 edition of their "Front Porch Blog", field coordinator Jessica Sims provided updates on MVP opposition efforts. These include new statements from the U.S. Fish and Wildlife Service and progress in ongoing court cases. Embedded in the post are calls to action, hyperlinks to petitions, and ways to contact representatives. Since construction on the pipeline began in 2018, MVP has faced delays and legal challenges, largely due to such community efforts (Hammack, 2023).

Appalachian Voices' work protects the livelihood of the Appalachian people and champions a more sustainable future in the region.

Research Question and Methods

The political and social values of Appalachia make it difficult to emphasize the urgency of their environmental and economic peril. This leads me to my research question: How has Appalachian Voices succeeded in promoting and defending their values, and how can they broaden their impact to increase support for renewable energy in Appalachian Virginia?

To investigate, I will analyze the archives of Appalachian Voices to catalog metrics such as methods of engagement, community involvement, and political capital. I will also analyze stakeholder groups that oppose Appalachian Voices' values and compare the impacts of these contradicting groups on local projects and ordinances.

Conclusion

Appalachia has long suffered at the hands of fossil fuel development. Environmental degradation and economic downturn have left communities across the region struggling and lost. The region now has a chance to redefine its future through a transition to renewable energy.

This project aims to identify and develop plans for a site best suited for renewable energy development in Southwestern Virginia. In my STS thesis, I will additionally deliver a study of recent community movements for and against renewable energy. This research represents a necessary shift towards clean energy solutions and a commitment to understanding the people that define this region.

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