Public Influence on Environmental Decisions

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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).
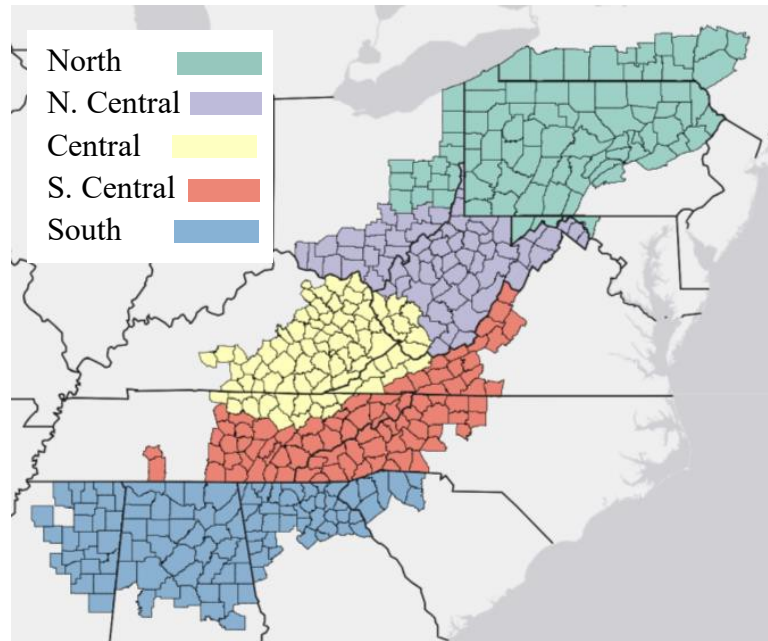

Figure 1. Map of Appalachia, divided into North, N. Central, Central, S. Central, and South (Appalachian Regional Commission, 2021).

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 Virginia, it is important to note that Central Appalachia has the highest poverty rates (by more than 5% in 2019).
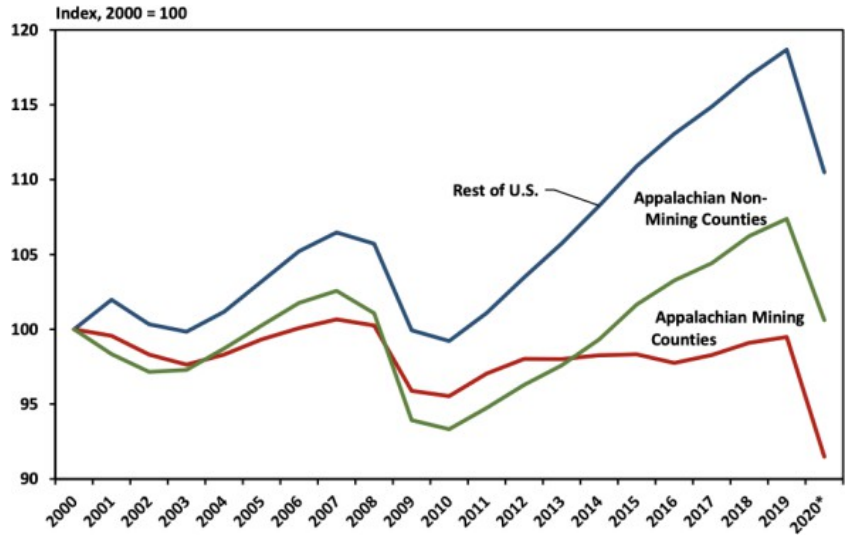
Figure 2. Private Sector Employment, Select Appalachian County Groups. Index created based on employment in the year 2000, where 120 represents 120% of employment in baseline year (Bowen et al., 2020).
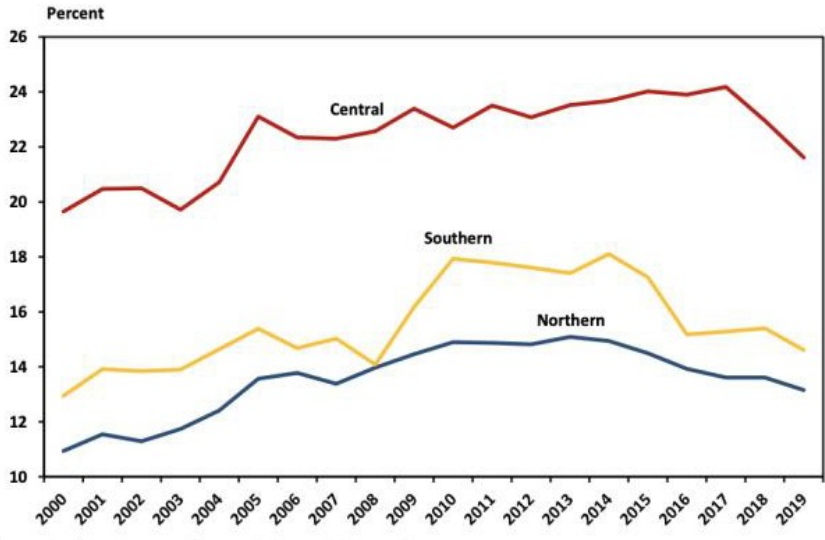

Figure 3. Poverty Rate, Appalachian Coal Producing Regions (Bowen et al., 2020).

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 thesis uses a case study of advocacy organization Appalachian Voices to reveal effective public engagement strategies in environmental activism, highlighting the need for strong communication and collaboration between engineers and stakeholders.

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).
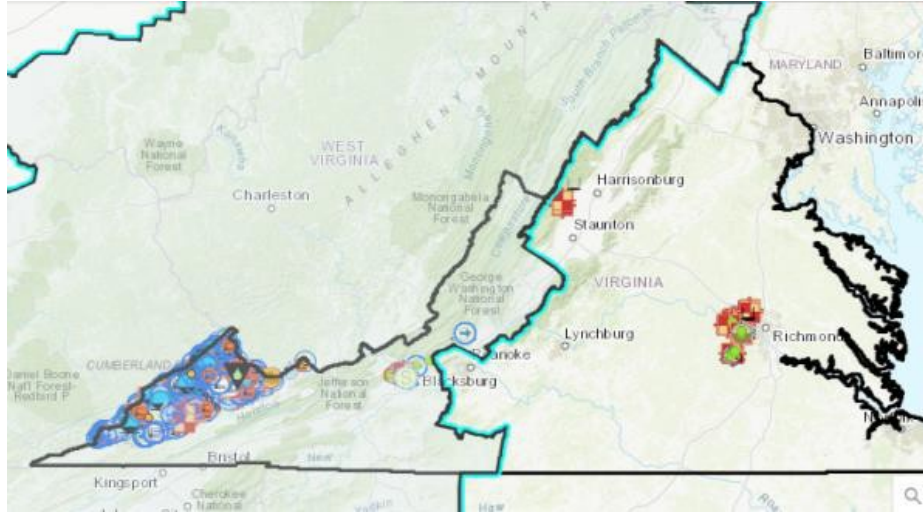
Figure 4. VACMFI dataset, all of Virginia (Appalachia boundary shown). (Virginia DoE, 2022).
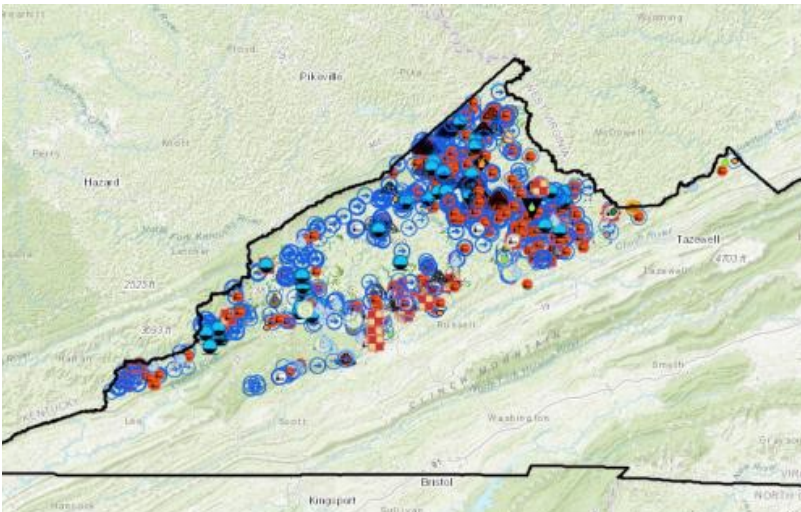

Figure 5. VACMFI dataset, Southwestern Virginia. (Virginia DoE, 2022).

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 4 and 5, 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."

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.

Virginia's Renewable Energy Mix

Wind farms are one component of the proposed renewable energy system. Figure 6 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).
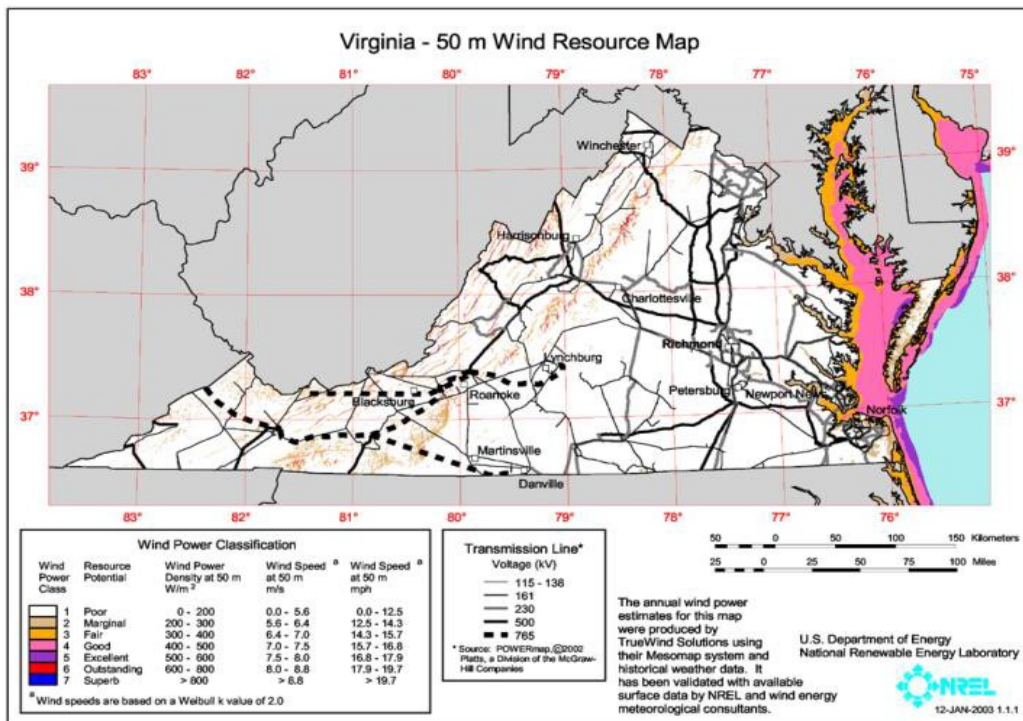

Figure 6. Map of wind speed intensity in Virginia (NREL, 2003).

Wind power has been somewhat 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).
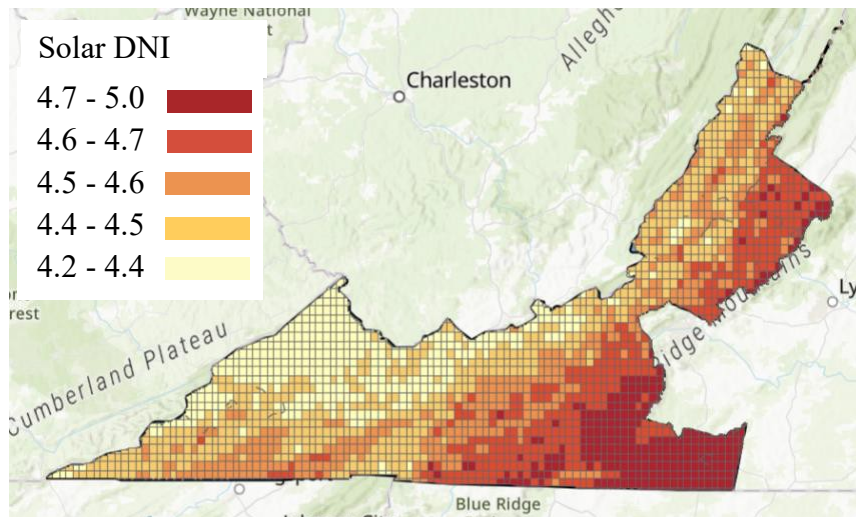

Figure 7. Map of sunlight intensity in Southwestern Virginia (Capstone Team, 2023).

Solar power is a second 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, most solar energy panel systems are residential,

followed by commercial and utility functions (Solar Workgroup of Southwest Virginia, 2017). Figure 7 shows the intensity of sunlight across Southwestern Virginia, with darker red being higher intensity.

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.

Finally, battery storage could allow for a fully renewable power grid in Virginia. Battery storage stations utilize lithium-ion batteries to store energy and release it during times of higher demand (National Grid Group). In February 2024, Appalachian Power announced plans to build two battery storage sites in Southwestern Virginia, allowing 7.5 megawatts of capacity in total (Busse, 2024). One of the facilities is planned to be built on what is now a waste disposal center, which has caused protest from some citizens (Porter, 2024).

Public Engagement and the Knowledge Deficit

The knowledge deficit model originated in the 1980s and describes the belief that the public rejects new technologies because of a lack of scientific understanding (Brunk, 2006). This model assumes that more information, education, and communication can change the public's view. The knowledge deficit model fundamentally describes the need for more scientific involvement with the public.

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.

In line with Rawls' theory, Reynolds, et. al. call for efforts to engage with the public to be frequent, wide-ranging, and initiated early in the decision-making process (Reynolds et. al., 2022). PP&E not only ensures that the public is adequately informed but also facilitates meaningful participation, allowing for a redistribution of power away from technological elites and towards the broader population. The invisible and often 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.

While the knowledge deficit model lays the groundwork for PP&E, it is important to recognize its shortcomings. It has been described as "a serious oversimplification" and "a misrepresentation of the structure and complexity of many [scientific] issues" (Brunk, 2006). Scientists' overreliance on the knowledge deficit model may be referred to as the "knowledge deficit trap." In a 2009 article titled "The New Deficit Model", author Simon Brown rejects the knowledge deficit model. He argues that while facts are important, religion, culture, and personal

experience all contribute to a person's perceived risk associated with a technology. Brown asserts that any effective governing body or organization must be informed, transparent, prospective, and adaptive.

Research Question and Methods

In the scope of this thesis, certain community organizations exist to promote PP&E; one of those is 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. This leads me to my research question: *How has Appalachian Voices succeeded in promoting and defending Appalachia's wellbeing, and how can they broaden their impact to increase support for renewable energy in Appalachian Virginia?*

To investigate, I conducted three interviews with members of Appalachian Voices' team to understand how they interact with the community. I chose interviewees based on their role at App Voices and focused on people who interact directly with stakeholders and related organizations. In each of these interviews, I asked them about their involvement at App Voices, specifically when interacting closely with the community, and to tell me about a successful and an unsuccessful project they have worked on. I hope to reveal that App Voices avoids the pitfalls of the knowledge deficit model through the successes of public participation and engagement.

In addition to interviews, I read articles, blog posts, and press releases from App Voices' website and signed up for their newsletters and alerts.

Results

  Appalachian Voices defines their vision for the future as "an Appalachia with healthy ecosystems and resilient local economies that allow communities to thrive" (Appalachian Voices, 2021). To achieve this vision, App Voices works closely with its communities to support a variety of projects and initiatives. I discovered that Appalachian Voices has been successful through communication, collaboration, and advocacy, and will remain prominent because of their strong values and vision for the future.

  My first interview was with Autumn Long, director of the Appalachian Solar Finance Fund at App Voices, which works to implement small scale solar projects in Central Appalachia. This means solar panels on various community centers and other tax-exempt entities, like churches. The project is a joint venture between App Voices and six other organizations in the region (Long, 2024). In Long's words, "the Solar Finance Fund is a way to promote renewable energy while also helping local businesses and the community" (Long, 2024). She explained that each organization plays a different role in the SFF, but together create a "360-degree approach to community involvement" (Long, 2024). The SFF's approach builds a solar marketplace in the region, allowing a shift away from fossil fuels, while simultaneously supporting community organizations by reducing their electricity costs. App Voices' ability to collaborate with like-minded groups allows them to expand their impact beyond what they could accomplish alone.

  One of the aspects that stood out to me in the conversation with Long was her response to a question about resistance to solar from the community. She indicated that while politics and regulations certainly vary from state to state or from one presidency to the next, small-scale projects like the ones SFF sponsors receive little to no pushback (Long, 2024). When projects have existing infrastructure, people are much more supportive, and communication and outreach

therefore become easier. This presents an opportunity to reimagine how renewables are implemented, particularly in rural communities.

Jessica Sims, App Voices' Virginia Field Coordinator, and I spoke about a much larger project in the region: Mountain Valley Pipeline (MVP). MVP was introduced in 2014 and spans over 300 miles through West Virginia and Virginia (Mountain Valley Pipeline Project, 2022). Efforts against the widely unpopular MVP were started by Protect Our Water, Heritage, Rights (POWHR), and other community organizations, including App Voices, quickly joined in. Years later, MVP's progress has been stalled repeatedly in response to protests and lobbying efforts.

Sims described communications with MVP leaders as "particularly hostile" in comparison with leaders at her previous projects (Sims, 2024). She directed me to a 140-page document from the Federal Energy Regulatory Commission (FERC), containing permit information, land use proposals, and more than 30 claims made by citizens (Equitrans, 2017). The one below demonstrates the "negative" nature of MVP's communications (Sims, 2024):

"Commenters expressed concerns regarding the potential effect of the projects on property values, mortgages, and homeowners' insurance. Several commenters provided anecdotes about property values and public surveys and opinion polls about perceived reductions of property values. However, anecdotes, public surveys, or opinion polls do not constitute substantial evidence that natural gas projects decrease property values. Accordingly, we conclude here, as we have in other cases, that the proposed project is not likely to significantly impact property values in the project areas" (page 82, Equitrans).

Despite MVP's repeated dismissals of commenters' warnings, many of these concerns became reality. Sims emphasized the importance of communication with the public and cited this as an example of a major failure (Sims, 2024).

The FERC document is an example of how the knowledge deficit model creates a divide between engineers and community members, with engineers insisting that their expertise takes priority over the community's lived experiences. This eliminates equity in the decision-making process and undermines democratic principles, reflecting a cultural problem among scientific leadership. The knowledge deficit model has served to perpetuate this problem, but PP&E can act to counter it.

My final conversation was with Matt Allenbaugh, App Voices' Campaign Coordinator for Virginia. Allenbaugh's work involves lobbying for and educating about new energy policies and regulations in Appalachian Virginia. He described much of this work as "grassroots", consisting of letter-writing, op-eds, town halls, and email alerts sent out to the community (Allenbaugh, 2024). Allenbaugh tells me that in this line of work, wins and losses are always subject to change. Any small victory can quickly be turned upside down by new policies or politicians. He tells me that App Voices navigates this changing environment by forming relationships with lawmakers and activist groups to stay on top of new events that may affect the community (Allenbaugh, 2024).

To wrap up each of my interviews with the App Voices staff, I asked them about their vision for the future of the organization. Interestingly, they all gave me similar answers: visions of equity, expansion, and impact, and hopes for a bright and productive future for their projects and communities. The strength of App Voices' values demonstrates their lasting impact on the region and its people.

Table 1. Methods of community engagement employed by App Voices in projects they have opposed (Sims, 2024) (Hilt, 2024) (Modi, 2024).

	Mountain Valley Pipeline	Chesterfield Power Plant Project	Moriah Energy Center	Kingston Gas Plant
Lobbying	✓	✓	✓	
Letter writing	✓		✓	
Op-eds	✓			
Town halls	✓	✓	✓	✓
Partnerships	✓	✓	✓	✓
Blog posts	✓	✓	✓	✓
Petitions	✓	✓		✓
Press releases	✓	✓		✓

Table 1 summarizes four case studies of App Voices' work through an analysis of engagement methods. Larger, ongoing projects, like MVP, are more likely to employ the full range of methods, while smaller-scale projects rely on localized approaches. Town halls, partnerships with other organizations, and blog posts are three of their strongest methods of engagement, appearing in all four sampled projects. Together, these methods form a strong argument for how App Voices avoids the knowledge deficit trap and employs PP&E.

Town halls serve as inclusive forums where community members can voice their experiences, values, and concerns regarding new projects. By providing this space for open communication, App Voices effectively navigates the knowledge deficit model, ensuring that community perspectives are acknowledged and understood.

Appalachian Voices leverages their "Front Porch Blog" to disseminate information and maintain strong lines of communication with stakeholders. The blog keeps community members

informed about ongoing projects and developments, with language that is clear, accessible, and free of technical jargon.

Finally, App Voices' ability to form strong relationships with similar organizations in Appalachia serves as the foundation for all other engagement methods. App Voices collaborates with these organizations to lobby, protest, organize town halls, and build renewable energy solutions in the region. By aligning with these groups, App Voices expands their reach and influence.

Their broad commitment to transparency and accessibility and reliance on public participation and engagement allows them to bridge the gap between technical expertise and community values.

Discussion

Appalachian Voices demonstrates the importance and efficacy of PP&E in environmental decision-making. They actively involve community members through town halls, blogs and emails, and meetings with local leaders. In addition to one-on-one engagement methods, App Voices relies on partner organizations to form a broad network of likeminded activists. With this network, they capture more of their constituents and ensure that all voices are heard. This also allows them to take on complex projects, like the Solar Finance Fund and the anti-MVP effort. The implementation of PP&E has allowed App Voices to succeed in promoting their vision for a clean, equitable future in Appalachia.

Shortcomings of this research are mostly due to limited connections and resources. I was only able to secure three interviews at Appalachian Voices despite sending eight emails and

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making three phone calls. I was also limited in resources such as time and travel, which prevented me from observing any community events first-hand.

In the future, this work would be complemented by an observational study of App Voices' involvement in the community. This would include attending town halls and sitting in on meetings with local leadership. I would also speak with community members about their knowledge and perception of ongoing events (such as MVP) and about their knowledge and perception of App Voices' involvement with said event. Together, these would allow me to rank methods of engagement and understand the strengths and weaknesses of PP&E.

Conclusion

Appalachia's environmental history and political values make it an ideal case study for the complicated nature of sociotechnical decision making. The work of Appalachian Voices has been crucial to Appalachia's ongoing recovery, made possible by their interactive, inclusive approach. Their success in promoting renewable energy solutions highlights the importance of effective communication, collaboration, and advocacy in reviving disadvantaged communities. Additionally, this research represents a necessary shift towards clean energy solutions and a commitment to understanding the people that define this progress.

Similar organizations should look to replicate App Voices' work by partnering with like-minded groups, emphasizing communication, and listening to stakeholders' values. This requires a mindset and commitment to change that is shared among all members as well as ongoing collaboration within communities.

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