

## **Thesis Project Portfolio**

### **Assessing the Potential for Renewable Energy Development in Appalachia**

(Technical Report)

### **Investigating Appalachian Cultural Involvement in Renewable Energy Initiatives**

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Spring, 2024

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## **Executive Summary**

Appalachia has long been an energy production center of the United States of America, but recent developments in renewable energy have been slow to be adopted in this region. As the world pushes towards Net Zero Emissions (NZE) by 2050, Appalachia maintains the potential to be an area that can benefit from increased renewable energy development. My technical report focuses on finding areas within Appalachia where this proposed development is feasible. However, the Appalachian cultural and political ideologies can prove to be a barrier to this development. In my thesis, I research why and how these ideologies have been affecting the acceptance of renewable energy initiatives within Appalachia. There is a distinct overlap between these two papers, as no matter how feasible renewable energy development may seem in an area, the social aspects involved can make or break a project. Thus my research on the more technical aspects of development can be augmented by the research I have done surrounding the social and cultural influences on development.

The technical report focuses on assessing the feasibility of renewable energy development in Appalachia. There is a great opportunity to address climate change and provide a boost to local economies that have historically depended on coal mining through the development of both solar and wind sources in Appalachian Virginia. Through our analysis, we focus on finding the ideal counties, and then specific areas within these counties, where renewable energy development is the most feasible in southwestern Virginia. To assess the feasibility of development, we utilized the ArcGIS Pro software to determine the availability of land for renewable energy development, and to analyze metrics related to development over these areas.

Our analysis revealed that Floyd and Carroll counties in Virginia were two of the best counties in Appalachian Virginia for renewable energy development. Specifically, we found that

the north-eastern region of Floyd County, and western-central region of Carroll County are the two best locations in these counties for wind energy development, as well as for solar energy development. However, research on the most optimal energy portfolios for these locations would better inform any future development.

In my STS research report, I evaluated the question *How do Appalachian cultural and political ideologies influence the acceptance of renewable energy development within the region?* I utilized the SCOT framework to analyze how the views of the region actively affect the development of renewable energy technologies in the region. I additionally broke down my research question into multiple distinct areas, such as political change, energy history, cultural history, and societal opinions on development in order to make my research more organized.

Utilizing reports on the history of coal development in Appalachia and its recent decline, as well as the political voting records on renewable initiatives, and social response to renewable energy development plans that have been attempted, I found that much of the economic decline the region has seen has been attributed to pro-environmentalism and pro-renewable energy policies. This has caused societal pushback towards renewable energy development. Recently, there has been progress made in the acceptance of renewables, which is mainly attributable to the limited economic prospects within the region. By investing in education and training for renewable jobs, the Appalachian region can prepare its citizens for the transition as renewable energy development takes a greater hold of the region.