ASSESSING THE POTENTIAL FOR RENEWABLE ENERGY DEVELOPMENT IN APPALACHIA

SOLAR ENERGY DEVELOPMENT IN APPALACHIA AND THE BARRIERS THAT STAND IN ITS WAY

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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

In a world that is in the middle of a defining transitional period, we find that energy is the crux of many issues. Our society has players on either side: fossil fuels or renewable energy, and this issue is only becoming more prevalent. Many people believe that for our country to thrive we must begin a heavy investment campaign in renewable energy, but others believe that coal and crude oil will continue to fuel our communities despite concerns regarding lack of future supply and environmental impact. One community that has been at the center of this transition is Appalachia. Pennsylvania, Virginia and West Virginia are home to thousands of coal mines that have been essential to the development of the United States, but as reserves run dry and the demand for coal decreases, it is estimated that the labor force in these communities will steadily decrease by 5% a year due to layoffs (Pollin, 2021, pg. 3). For my Technical Project, my group will be taking a dive into the effects of the declining coal industry in Appalachia; additionally, we will assess how these declining conditions allow for the potential implementation of renewable energy systems that could stimulate the surrounding communities. Building off of my Technical Project, I have decided to focus on the implementation of Solar Energy Systems for my STS project. Specifically, I plan to evaluate the challenges facing Solar Energy in the Appalachian region and if there are any solutions that could overcome those challenges. I chose this topic for my STS project because it allows me to gain supplemental knowledge for my technical project, yet it does not require me to search outside the scope of my technical project.

TECHNICAL PROJECT

The Appalachian region is not one that many people think of when it comes to renewable energy systems. Many states in Appalachia have typically depended on fossil fuels because they

were either notoriously closed minded when it came to renewable energy and climate issues, or they were the states that had economies that depended on the demand for fossil fuels. States like Kentucky, Ohio, Pennsylvania, Virginia and West Virginia have long been known for their supply of coal over the last 100 years, and because of this, the economies and residents of these states depend on the coal industry, but in recent years, the coal industry has struggled. Since 2005, coal production in Appalachia has decreased by 64%, accounting for a 24% decrease of all coal production in the United States (Bowen, 2020, pg. 6). The goal of this technical project is to take advantage of this void created by the declining coal industry and discover the potential for renewable energy systems in the region. According to a report highlighting the benefits of renewable energy in West Virginia, a renewable energy program would generate about 25,000 jobs per year for the state (Pollin, 2021, pg. 2) . These job estimates include building new infrastructure and expanding the resources available to the state for renewable energy which will allow people of all backgrounds to benefit from the growth.

The Technical Project will assess five different areas; three technologies: Hydropower, Solar Energy and Wind Power along with two social issues: Community Engagement and The Economy. The plan is to analyze each of these topics within the scope of the communities in western Virginia, and ultimately build a site rendering for a renewable energy system. Some of the milestones that will be crucial will be conducting a full literature review to uncover the primary issues surrounding each of these topics and finding possible solutions to these issues. Once this foundation has been laid, data sets will be found for each topic using ArcGIS, and a set of map renderings will be created. Through this process, a multitude of potential sites will ideally be found using a combination of different metrics that equally represent all five focus areas. The metrics used will help put the maps into multiple “map groups”, similar to user groups, that fit

the needs of specific communities. Some of the metrics being used to assess the different areas in certain site locations will be total days of sun, wind speed, dam volume, political affiliation and economic status. The group believes that using metrics like these will allow us to conduct a thorough review of the many potential sites that could be used to develop renewable energy technologies in Appalachia Virginia.

While the overall project may be missing some hard deadlines and defined deliverables, it is a project that seeks to explore the potential of implementing renewable energy within the Appalachian region. This exploration is on the basis that the Appalachian region is the most untouched region when it comes to its potential with renewable energy. To be exact, there is a projected $65.3 billion of potential economic benefits that can be gained through Solar and Wind Revenue alone in the Appalachian region (Tosado, 2021). Appalachia is the region that stands the most to gain relative to all other regions in the U.S., and this project aims to uncover methods that will help western Virginia unlock some of that potential.

STS TOPIC

As renewable energy sources become more popular, it is undeniable that solar energy is the simplest and cheapest to implement. The rise of solar power can be seen all over the U.S. as states like California and Arizona have taken noticeable strides to building renewable energy infrastructure in their states. While many people have rejected the idea of renewable energy, solar power is one of the cheaper energy sources as its cost per kWh is ~$0.10 while fossil fuels tend to cost ~ $0.15 - $0.20 /kWh. (Inspire Clean Energy). Additionally, solar panels are the easiest renewable energy to implement as companies do not have to worry about installing large wind turbines or managing the negative environmental impacts of hydropower. Even with all of

these low barriers to entry, many people refuse to implement solar panels in their communities. An example of this can be seen in western Virginia where the group "Citizens for Responsible Solar" have effectively banned solar power in the region (Green, 2023). The group has lobbied for years in the region to increase the barriers to entry for solar power, leaving many struggling farmers upset. Solar energy has already made an impact on the region as solar power companies typically lease land from farmers in the region to build solar farms on - providing a source of passive income for the farmers. "Citizens for Responsible Solar" has directly stopped farmers from benefiting from developing solar energy projects on their land while citing that the group aims to stop solar development in the name of protecting "counties and their residents' interests" (Taft, 2023).

The political nature of the issue between the farmers of western Virginia and the "Citizens for Responsible Solar" is a primary example of the social factors that stand in the way of true renewable energy growth in Appalachia. In Winner's, *Do Artifacts have Politics,* he argues that "the adoption of a given technical system actually requires the creation and maintenance of a particular set of social conditions," (Winner, 1980, pg. 130). In the context of the western Virginia issue, this argument describes a world where renewable energy carries more weight than just a renewable form of energy. In our current society, there is no doubt that many technologies carry this weight, but solar energy's main goal is not to inflict a political opinion on the constituents of the U.S. - its goal is to lower the price of energy generation, establish a reliable source of energy for small communities and help curb the damage done to the environment by the use of fossil fuels.

There is no doubt that the historically republican population in Appalachia has reservations about solar power. Historically, the GOP has pushed against the growth of

renewable energy and a recent poll reveals that 57% of Republicans believe that the U.S. should never stop using fossil fuels (Kennedy, 2023). For Appalachia, a notoriously fossil fuel driven region, this sediment does not provide much hope.

RESEARCH QUESTION

Despite the many positives that solar energy presents, there has been a stream of issues that has suppressed the growth of the technology. Other than social issues that have been described above, there are some problems regarding the energy storage and usability aspect of the technology. These issues are more approachable, as they are purely technological and not as complex as the social issues that surround the topic. With the positives and negatives being noted here, I beg the question: *What are the main challenges facing the implementation of Solar Energy in Appalachia, and what steps, if any, can be taken to help overcome these challenges?* I believe this question will allow me to uncover the full scope of the issues surrounding solar energy development in Appalachia, while also supplementing my knowledge in my technical project.

The stakeholders that will be assessed will be the key to uncovering the primary issues facing the implementation of solar energy in Appalachia. The project will look at landowners, constituents of the community and energy companies; additionally, research regarding local politics and coal companies will also be done to supplement the stakeholder motives. The analysis conducted will do a comprehensive dive into the relationships between all stakeholders and how the dynamics of these relationships could put strain on the potential for solar energy implementation. Factors such as socioeconomic status, political view, age and education levels will be used to assess these relationships to ensure a comprehensive process. These factors have

been specifically chosen due to empirical data suggesting that differences in these categories may impact an individual's opinion regarding renewable energy (Ozcicek, 2017, pg. 50).

As I analyze my question, I plan on using the Social Construction of Technology Framework (SCOT) to analyze the relationship between the stakeholders and the inherent technology in this scope (Pinch and Bijker, 1984). I believe that this methodology will allow me to analyze both the social and physical issues with solar power, and how each of these spheres are creating barriers for its implementation. For an issue like this, it is important that all angles are used to look at the situation, and I believe that the SCOT STS framework will allow me to do just that. Specifically, I will aim to uncover how society is shaping the role of solar energy in Appalachia and what steps can be taken to have society encourage the growth of renewable energy rather than tear it down.

RESEARCH METHODS

Due to the nuanced nature of the issues surrounding Solar Energy implementation in Appalachia, I will be conducting my research into this topic in a few different ways. First, I plan on conducting a full literature review that examines each stakeholder group and what they believe are the positives and negatives of implementing solar energy. The sources from which I read my literature will be from a combination of current events articles and google scholar pieces. I aim to grasp a better understanding of the motives of each stakeholder group so that I can understand the issue in a deeper way. It is also important that I go outside the scope of western Virginia in this process because I believe there is valuable knowledge to be found in examining relationships where these issues have already been overcome. Many communities in California and Arizona have embraced Solar energy, as it is projected that the Solar energy

market generated nearly $15 Billion in economic activity in Arizona in 2021. (Sanguaro Solar, 2022).

Additionally, I plan to supplement my literature review with ArcGIS datasets concerning socioeconomic and political data in the western Virginia region. Maps provide insight to empirical data that comes from these communities, and can provide knowledge regarding the prevalent issues within each community. Lastly, there is a potential for doing research by conducting interviews with some residents of communities in western Virginia. While this is unlikely, I believe that interviewing people in these communities opposing renewable energy could uncover many opinions that cannot be found online. I note that this portion of my research is unlikely because it is not determined yet if the technical project will include a site visit or not.

NEXT STEPS

As I continue to research the issues surrounding solar energy in Appalachia, I will primarily focus on how the factors of socioeconomic status, political party, age and education influence the opinions of each of the stakeholders. While I believe it is too early for me to state a clear hypothesis, I believe that these factors play a large role in determining the reasons for the social blockade by some people in Appalachia. As I continue on, I will focus on finding primary resources that are dependable and provide first hand information. Additionally, I will look to my technical project to learn more about the region in general, and once I feel that I have a comprehensive understanding, I will begin to form my hypothesis.

KEY TEXTS

Bijker, W. E., Hughes, T. P., Pinch, T. J., & Pinch, T. (Eds.). (1989). *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. MIT Press.

Bijker and Hughes' book describes a framework for the analysis of technological systems. The framework focuses on how different social groups define a technology and then how that technology is portrayed in a public light. In my piece, I am using the idea of this book as my STS framework for analyzing my question. I find that a portion of the political nature is due to the social construction of technology that came about with the creation of solar power. Throughout my research, I will be looking at this issue through the lens of the SCOT method.

Green, M. (2023, February 18). How misinformation about solar power hinders the fight against climate change. *NPR*.

This piece is an NPR article about a group in rural Appalachia that has made efforts to block renewable energy growth in the region. The article describes that the group, called "Citizens for Responsible Solar", is a nationwide group with a conservative backing that aims to slow the growth of solar energy. The piece is used in my paper to describe how many of the issues surrounding solar energy are social and political issues that have no reason to stop the implementation of solar energy systems into small communities in Appalachia.

Ozcicek, O. (2017, December). The Role of Education on Renewable Energy Use: Evidence From Poisson Pseudo Maximum Likelihood Estimations. *Journal of Business and Economic Policy*, *4*(4), 13.

This is an article that analyzes empirical data and suggests that factors such as socioeconomic status, political affiliation and education level have influence over an individual's opinion regarding renewable energy. The contents of this article were used to justify the factors I chose to analyze each group of stakeholders.

Winner, L. *Do artifacts have politics.* United States.

This piece by Winner does a deep analysis of the inherent politics each technology or artifact possesses. The arguments are that technology can be inherently political or they can be political by nature. In my use of Winner's writing I supplement an argument of how solar power has become politicized due to its ideological ties to a political agenda. I find that Winner's piece is highlighted perfectly in this modern day example

ADDITIONAL CITATIONS

Bowden, E. (n.d.). An Overview of Coal and the Economy in Appalachia - Fourth Quarter 2020 Update (PDF: 2 MB). *Appalachian Regional Commission*.

LandGate Resources. (2023, August 25). Solar Energy – An Economic Opportunity for Landowners. *LandGate.com*.

Pollin, R., Wicks, J., Chakraborty, S., & Kosnik, L. (2021, February). IMPACTS OF THE REIMAGINE APPALACHIA & CLEAN ENERGY TRANSITION PROGRAMS FOR WEST VIRGINIA. *Political Economy Research Institute*.

Tosado, G., Siegner, K., Stone, L., & Dyson, M. (2021, September 21). Reality Check: Appalachia Poised to Become Clean Energy Country. *RMI*.

Inspire Clean Energy. (n.d.). Is Renewable Energy Cheaper Than Fossil Fuels? | Inspire Clean Energy. *Inspire Clean Energy*.

Kennedy, B. (2023, June 28). How Americans view transitioning from fossil fuels to renewable energy. *Pew Research Center*.

Saguaro Solar. (2022, March 29). The Solar Industry is Growing. Saguaro Solar is Tucson's Premier Solar Installer. *Saguaro Solar Electric*.

Taft, M. (2023, February 21). Republican Operatives Are Astroturfing Opposition to Solar Power. *Gizmodo*.