Framing of Offshore Wind Energy in the United States

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Kelly Boenisch

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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

Advisor

Sean M. Ferguson, Department of Engineering and Society

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As the issue of climate change becomes more and more serious, some groups are calling for the United States to lessen its environmental impact. The country is the second largest producer of carbon emissions, despite being the third largest country in the world, trailing the world's two largest countries by almost one billion residents each. One avenue by which reducing carbon emissions can be achieved is exploring and investing in renewable energy sources to replace the burning of fossil fuels, which contributes to about seventy-five percent of carbon emissions (*Where Greenhouse Gases Come from - U.S. Energy Information Administration (EIA)*, n.d.). This includes not only expanding forms of renewable energy that are already more widely used, such as solar, hydroelectric, and onshore wind energy, but also using funds to develop newer forms of renewable energy, like offshore wind energy. Although onshore wind turbines have been in use for decades in the United States, the field of offshore wind energy is still relatively unexplored, with only two functioning offshore wind farms in the country. Compared to Europe, which has over one hundred operational offshore wind farms, the United States is far behind. The main question this elicits is why isn't offshore wind energy more prevalent in the United States? European countries have not experienced this problem of implementing offshore wind projects, as the technology has been in place in Europe for the past twenty-five years, and accounts for twenty-five gigawatts per year. The difference in reception and implementation of offshore wind likely lies in its framing by scientists, engineers, and politicians, as well as in political differences. By examining the implementation of this technology in Europe, and the few American offshore wind projects, lessons can be garnered that further promote the acceptance and execution of offshore wind energy in the United States. This evaluation is necessary for the country to make any real progress in fighting against climate change.

Renewable Energy in the United States

Although in general, long-term changes make for an easier transition, and are less challenging to implement, the predicted effects of climate change require quick action (Hess, 2014). Scientists are estimating that the world has eleven years left before the damage done by climate change is irreversible (Berwyn, 2020). Although this threat of eleven years is more of a scary headline than a definite deadline, carbon emissions need to be significantly lowered before the middle of the century in order to meet the goal of the Paris climate agreement of "…keep[ing] global temperatures from rising more than 1.5 degrees Celsius…" (Berwyn, 2020). Despite this looming threat, the United States has failed to take enough action to combat its disproportionate contribution to climate change in any real way. It is important to note how the United States differs from other countries, in that new energy technologies are implemented by private companies collaborating with state governments rather than the national government. Thus, it might be unfair to directly compare national requirements and regulations of the U.S. with those of other countries. Some states, such as Washington, Oregon, Idaho, and Maine, have chosen to rely on renewable energy options. In these states renewable energy rates are well above the national average, with over eighty percent of energy coming from renewable sources (*Renewable Energy Production By State*, n.d.). However, many other states have chosen not to pursue renewable energy. In half of U.S. states, often dominated by the oil industry, renewable energy makes up less than twenty percent of energy production, which brings the national average down to only seventeen percent (*Renewable Energy*, 2017). In many cases, oil and gas companies in these areas have held power for over a century, and oppose renewable energy efforts "…that are perceived to threaten their short-term profitability and long-term existence" (Hess, 2014). Thus, stronger national requirements and regulations might be necessary to

motivate these states to implement renewable energy. Collaboration between states could also be useful in achieving implementation in certain cases (Lefevre-Marton et al., 2019).

Benefits of Offshore Wind Energy

Although wind energy is one of the larger sources of renewable energy in the United States, "generat[ing] 6.5% of power delivered to U.S. consumers", there is still enormous untapped potential in the offshore wind energy industry (*Press Releases - Wind In The News | AWEA*, n.d.). The Office of Energy Efficiency and Renewable Energy has posed that U.S. shores have a power potential of nearly double the country's energy use, but the United States has yet to take advantage of this new field (Office of Energy Efficiency and Renewable Energy, 2016). This office acts as a source of information on renewable energy in the United States and as its name suggests, would be considered an advocate for offshore wind. By highlighting the practically unlimited potential for offshore wind in the United States, EERE elicits the question of why the country has barely scratched the surface of offshore wind. Although the United States has just started exploring offshore wind, onshore wind is more popular in the country. Most existing wind farms are placed on land, mainly in large, open fields to avoid the turbulence created by nearby infrastructure or trees. Installing wind turbines offshore avoids the problem of turbulence, and also takes advantage of the higher winds present at sea. In the field of offshore wind, there is also the opportunity for floating wind turbines, which offer the compromise of utilizing the favorable wind conditions present in deep waters and not taking up valuable space on land, while being easier to construct on land and then float out to sea. Unfortunately, the area of floating wind energy is even less explored in the United States than the non-floating variety, therefore they are very expensive to construct. Also, since eighty percent of the U.S. population lives near the coast, offshore wind turbines would be in close proximity to the energy needs of

the majority of the country. Since energy transportation can often be costly and present challenges, it is beneficial that most of the energy produced by offshore wind farms would not have to be transported that far.

Operational U.S. Wind Farms

Although there are several offshore wind projects in development around the United States, there are only two that are currently operational and producing viable energy. The country's first offshore wind farm became operational in 2016, and is located southeast of Block Island in Rhode Island. It consists of five turbines that produce thirty megawatts per year, which is enough energy to power 17,000 homes. The second project is located off the coast of Virginia Beach, and only became operational in 2020. Currently, this offshore wind farm features two turbines, producing twelve megawatts per year. The goal for this project is expanding to 8.8 million megawatts by 2026, which would provide power to 660,000 homes in Virginia. The maritime infrastructure in Hampton Roads, and the opportunity for Dominion Energy, one of the country's largest utility companies, to participate in offshore wind energy made Coastal Virginia an ideal location for this project. One of the many obstacles of offshore wind projects in the United States is the coordination that is required between states and the federal government. The Block Island project took thirteen years to bring to fruition. Over this time, state and federal agencies, businesses and other organizations all had to work together. This project would not have been possible without laws that allowed a long-term purchase power agreement with National Grid, which allowed the project to be financed (Leon, 2019). Some of the biggest motivating factors for bringing offshore wind energy to Block Island were the problems with the existing method of powering the island. Block Island had previously been powered by a diesel-fired power plant, which is an extremely costly and environmentally irresponsible way of

supplying energy. One million gallons of diesel had to be shipped to the island every year to operate the power plant. Switching to offshore wind energy also allowed Block Island to be connected to the main electrical grid, which provides more reliable energy to residents, who were experiencing blackouts from the diesel generators. Energy costs are also now reduced by about forty percent, but offshore wind is by no means inexpensive, with energy on Block Island still costing double the national average, and the project costing close to $300 million in total. The reduction in energy costs combined with the environmental benefits of switching to offshore wind energy were some of the main motivators for Rhode Island. Another aspect that drove Rhode Island to complete this project was the competition among U.S. states. The completion of the Block Island wind farm allowed Rhode Island to be first state in the United States with offshore wind energy, which the governor at the time was extremely proud of (Leon, 2019). Now other states are looking to Rhode Island for lessons learned in completing their own offshore wind projects. The Rhode Island Office of Energy Resources is sharing information learned from Block Island, and is looking to expand offshore wind in the state (Leon, 2019). Overall, the Block Island wind farm has been championed in the United States as an inspiration to other states in their own endeavors to embark in offshore wind energy. Despite the project's overall success, there were still some groups that were not entirely onboard with the project. Most of the groups who have opposed the Block Island wind farm cite the possible negative impacts on wildlife, and tourism. Although research is still being conducted at Block Island to determine the turbines' effects on wildlife, tourism has actually been positively affected with the addition of the wind farm to Block Island, with rental occupancy during summer months having increased by nineteen percent (Shuman, 2019). It seems that concerns for wildlife are sometimes used as

an excuse to oppose offshore wind energy, as the impact on wildlife of nonrenewable forms of energy, such as oil, is considerably worse than that of offshore wind.

Steps to Improve Implementation

As seen in the Block Island wind farm, state and federal government support is crucial in order for offshore wind projects to be successful. Unfortunately, this kind of support isn't being seen in certain states where offshore wind could flourish. Almost all of the states in which proposed or operational offshore wind farms are located are along the mid and north Atlantic coast, and with none being in the Gulf of Mexico. Although the Gulf of Mexico presents some unique challenges to offshore wind farms, such as the prevalence of hurricanes, and lower wind speeds, it also offers some benefits, like shallower water, smaller waves, and the existing offshore oil and gas infrastructure (*Two NREL Studies Find Gulf of Mexico Well Positioned for Offshore Wind Development*, 2020). It is possible that this difference in interest in offshore wind energy correlates to the political alignment of these states, with those in the Gulf of Mexico leaning conservative, and those along the mid and north Atlantic coast, and even the countries in Europe where offshore wind is prevalent, leaning more liberal. The South's reluctance toward offshore wind energy is also likely tied to its strong ties to gas and oil companies, which have deeply developed infrastructure, and provide the region with inexpensive energy. This reluctance was also seen in Block Island's Cliff McGinnes, a co-owner of the island's diesel power company. As a Republican with not much interest in the environmental benefits, it was the cost and logistical aspects of diesel that changed his mind on offshore wind energy (McKenna, 2020). He knew that the challenges of operating the diesel power plant, along with the extremely high energy costs were not sustainable for Block Island, and saw a solution in offshore wind energy. Given the energy potential of the Gulf of Mexico, something needs to change in order to get

southern states on board with offshore wind energy. It is possible that in the future, if these southern states saw a large economic benefit of switching to offshore wind energy, they would do so, but this would likely be too late for the United States to see the environmental changes it is hoping to see by mid-century. Offshore wind advocates will have to find another way to appeal to the values of these southern states in order to get them to consider offshore wind as a real possibility. It is also interesting to note the lack of offshore wind projects on the West Coast, including the states of California, Oregon and Washington, which have been leaders in renewable energy and sustainability for decades, and whose political leanings tend to be environmentally conscious. This deficit is likely due to the challenges presented by the ocean depth of the West Coast, which would require floating offshore wind turbines, an even more unexplored and expensive area of offshore wind (Mercure, 2020).

Differences Between Europe and the United States

One of the advantages of the United States' slow development of offshore wind is the ability to apply lessons from projects from around the world. Europe has twenty-five years of experience on the United States in this field, and thus the successes and failures of European projects can be applied to those in the United States. Europe is so much of an expert in offshore wind, that a European company was actually behind both of the United States' operational wind farms, and is behind most of the ones in development as well. This company, Ørsted, is actually majority owned by the Norwegian government. So not only is Norway implementing renewable energy projects at home, but also in other countries, which demonstrates its commitment to executing the changes necessary to combat climate change. One of the reasons why Europe has been able to implement offshore wind projects more easily than the United States is the lesser amount of coordination that is required. In the United States, local, state, and federal government

cooperation is necessary for offshore wind projects to come to fruition. This is in contrast to European countries, where projects are headed, supported, and approved by national governments. This difference was exemplified in the Office of Energy Efficiency and Renewable Energy's study of the country's wind potential, which stated that "… the Energy Department generally does not perform in-depth, site-specific analyses that would support project development and finance…" and states instead that these responsibilities fall on "…industry and project developers who are considering a project…" (Office of Energy Efficiency and Renewable Energy, 2016). This demonstrates how instead of leading and championing offshore wind projects, the role of the United States' energy department consists more of providing the necessary approval for these projects. Even though the federal government has some renewable energy goals, the responsibility falls on states to meet them. This separation of responsibility, although helpful in some cases, makes implementing renewable energy projects in states that lack concern for the environment difficult. Not only are there differences in the implementation of sustainability transitions, like offshore wind energy, between Europe and the United States, but also in their analysis. The study of sustainability transitions is heavily biased toward a European perspective, which makes it even more difficult to improve the implementation of sustainable practices in the United States (Hess, 2014). The federalism present in the United States also leads to another challenge for offshore wind projects. Since most offshore wind farms need to be located a few miles offshore, most of the ideal locations for these projects are in federal waters. This requires even more cooperation between the states, who are developing the wind farms, and the national government. This hurdle was overcome by the Coastal Virginia Offshore Wind project, which provides hope for the many other projects that are also being planned for federal waters.

Involvement of the Public

The lack of knowledge of the general population highlights one of the main obstacles in the framing of offshore wind. When talking about offshore wind energy in the United States with a group of engineering students at the University of Virginia, most of the students were unable to express their opinion on the topic because they had not heard enough about it. None of the students I spoke to were aware of the Coastal Virginia Offshore Wind project, even though it is located in the state in which they reside. I would assume that a group of undergraduate engineering students would be more likely to be educated about renewable energy than the general population, so it was not encouraging that the students I talked with were not well informed about it. This highlights one of the shortcomings of the framing of offshore wind energy, being a lack of awareness of groups outside of scientific or political circles. Despite this lack of knowledge surrounding renewable energy in general, it is reassuring that Americans support the idea of increasing renewable energy in the country. The Pew Research Center found that "large majorities of Americans favor expanding renewable sources to provide energy [and are] far less supportive of increasing the production of fossil fuels…" (*Americans' Opinion on Renewables and Other Energy Sources,* 2019). Although this support exists for renewables, there is less that individuals can do to promote their implementation, specifically for offshore wind energy. Unlike solar panels, which individuals can choose to install in their own homes, offshore wind energy must be done on a large scale, which leaves little room for individual involvement. The main way that the public would be connected to offshore wind projects would be using the energy supplied through the electrical grid. This is why the responsibility mostly falls on politicians and scientists to promote the implementation of offshore wind energy. In this way, the role that the public can take in supporting offshore wind through framing is by calling on their

power suppliers to explore and implement more renewable sources, and making their representatives aware of their importance.

Conclusion

Overall, the framing of offshore wind in the United States has been positive, with it being portrayed as a way to meet the demanding renewable energy goals proposed to combat climate change. Positive framing alone however will not give offshore wind energy the support needed to implement the many projects that are hoped for around the country. In order to truly promote offshore wind energy, more needs to be done by policymakers, scientists, and the public. The federal government will need to play a more active role in implementation, scientists need to appeal to those who will not support offshore wind with its environmental benefits alone, and the public must call on energy providers to promote cleaner sources of energy. Offshore wind energy is an essential component of the United States lessening its impact on the environment, so it is important that it receives the necessary support for implementation.

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