

The Social Acceptance of Wind Energy

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Wind is a source of power in which we have only scratched the surface, with 7.3% of the U.S.'s electricity coming from traditional wind turbines (*EIA*, 2020). This staggeringly low number is due to the limited area suitable for wind turbines without public resistance both on U.S. soil and in offshore locations. With almost two-thirds of America's electricity generation coming from fossil fuels, the current situation cannot be supported longer without permanent environmental damage, if it hasn't occurred already. In order to hopefully reverse the ecological impacts that fossil fuels have had on the Earth, renewables must be embraced by society and implemented as soon as possible. Goals have been set, such as Virginia's goal to reach 100 percent carbon-free electricity by 2045, but the not in my backyard (nimby) movement has created many obstacles for goals such as these (*St. John*, 2020). These obstacles exist because of land use regulations and opposition by residents to large developments in their vicinity which can alter their property value (*Martin*, 2017). Wind turbines are very large, noisy, and towering structures which become red flags for nimby groups at the local level. Floating wind turbines are important to solve this problem since they can be implemented in deep water far from sight or earshot, which would eliminate this issue.

In addition to eliminating the inherent issue of wind turbines being an eyesore, a higher and more intimate level of communication with locals to increase their trust in renewables is also necessary to make this relatively novel energy source mainstream. Therefore, in order to make clean energy goals attainable, we must alter the current public perception of renewables through communication with locals and implementation of floating wind turbines. When studying the public perception of wind turbines, we must ask where communication has gone wrong and who has manipulated the conversation. This paper will answer these questions by analyzing how the nimby movement has shifted in the digital era.

Controversies over wind as the result of nimby action

The issues influencing the social acceptance of wind energy are technical characteristics of the project, environmental impacts, societal impacts, economic impacts, contextual factors, and individual characteristics. After examining these key issues, the most dominant factors are the size and visibility of the project from residential areas, potential impacts on birds and bats, the adverse effects on quality of human life such as the cognitive effects of noise pollution, reliability, and the cost of the project (Leiren et al., 2020).

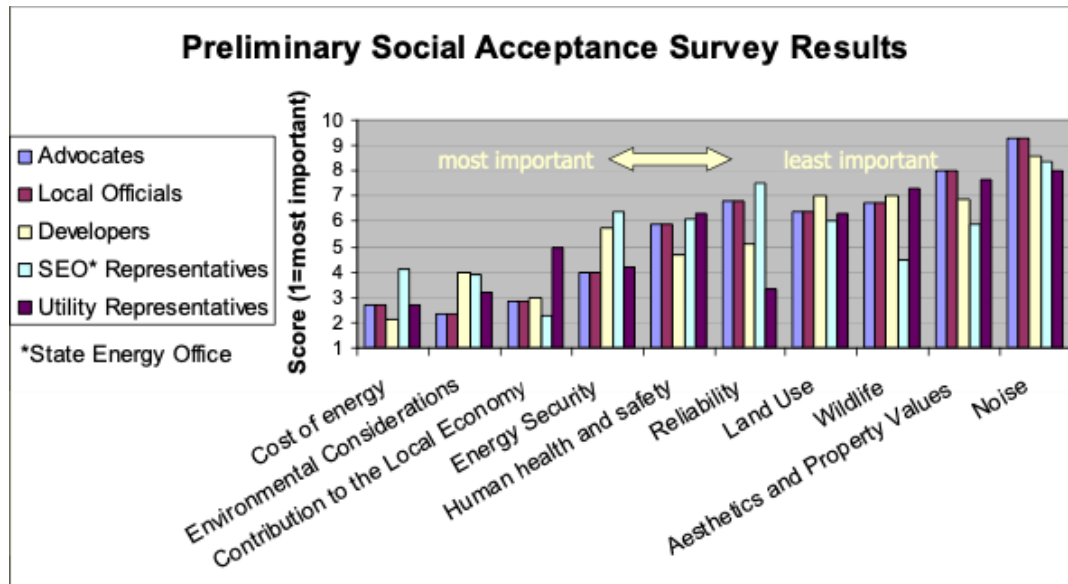


Figure 1: NREL Study(Tegen & Lantz, 2009).

Figure 1 depicts a study done by the National Renewable Energy Laboratory which shows the importance of factors in the social acceptance of wind energy according to different stakeholders. Stakeholders related to wind energy are local citizens, utility companies, independent private wind energy developers, environmentalists, and local representatives. Factors on the left were seen as the most important by all stakeholders and factors on the right were seen as least important by all parties (Tegen & Lantz, 2009). The visual results above illustrate that cost of energy was most important to social acceptance and that noise, property values, and land use were the least important. These depict the overall opinions of citizens to generalized wind power in surveys. However, what this survey did not take into account is the smaller scale opinions of localities where the nimby movement is

strong and powerful. Everyone appreciates and supports the idea of clean energy such as wind energy until it is implemented in their backyards, and that's why these survey results are skewed. While national opinion polls and attitude surveys will often report socio-political approval for wind energy, communities regularly oppose the siting of concrete wind energy projects (Phadke, 2010). These skewed results are proof that there is a misconception regarding the opinions of locals and that localities are underestimated in their power to prevent clean energy projects from being implemented.

Classic depictions of nimby

It is often believed that the nimby movement is only gauged by studying the proximity of people to a project, however, there are more factors at play. Political orientation, trust, and knowledge of the project are all influences on the perception of a renewable project. This has been proven in a study done by the Paul H O'Neill School of Public and Environmental Affairs at Indiana University, which has examined nimby literature and the adjacent trends. This study found that while Democrats tend to support wind energy and other renewables, Republicans tend to support fossil fuels and nimby groups (Carley, 2020). This doesn't come as a surprise, since conservatives are more likely to oppose change, while liberals are more likely to welcome it. With this information, political ideology can be used as a

new metric to understand the anticipated reactions of locals to renewable projects. Trust also has a significant effect on the support of opposition to wind projects. This is because distrust in a project arms the nimby movement through fears of the unknown. The study found that higher levels of trust were associated with more support for wind in 100% of the cases studied. In fact, mistrust in project developers is most associated with objections to wind farms (Carley, 2020). Knowledge is another important factor because it influences the perceived benefits or drawbacks of local constituents. According to K. Harley McDonald, senior business developer at Avingrid Renewables, things get easier as communities grow accustomed to wind farms. Even when communities do not have direct experience with wind farms, other successful wind farms make it more digestible. McDonald's way of portraying a trustworthy developer is illustrating successful existing projects and developing relationships with community members. (Stromsta, 2020). Knowledge and trust are intertwined because lack of knowledge leads to mistrust, which has a cause and effect pattern. Without the proper knowledge, nimby groups expand quickly and spread mistrust due to the inability to oppose these opinions with prior knowledge.

Nimby in an era of social media

The underestimation of nimby groups stems from the false consensus of the public's approval of green energy and the limited online presence of

independent power producers (IPPs) (Sokoloski et al., 2018). When public polls receive such positive feedback, developers do not see the opposition coming and do not predict future pushback. Those citizens who lead the opposition act as consumers and voters, which leads them to influence which energy sources are opposed by elected officials. These voters are especially powerful in regards to energy infrastructure since local officials are required to find locations for specific projects (Carley, 2020). When working with private energy companies, government officials will work in the best interests of their voters because they want to be re-elected. This opposition by the people in local jurisdictions clearly holds weight in our democratic government system, and these opinions have been amplified by online forums.

Before the existence of online discussions, those who opposed projects could only communicate in person at local government meetings. However, Facebook and other sites have now become an online town square in rural areas where citizens can spread their ideas and band together. This also includes misinformation and fearmongering in which nimby groups can organize online and then show up to government meetings with a plan to end projects. Proof of this opposition being amplified and armed by Facebook and other online forums is also illustrated by the Indiana University study done by the Paul H O'Neill School of Public and Environmental Affairs. This study, which combed through all literature

regarding the nimby movement going back to 1990, did not find literature regarding the nimby movement until 2005. It wasn't until 2007 that the number of articles and studies covering nimby groups increased significantly, and this timing coincides with the general increase and implementation of online public forums (Carley, 2020). The reason these online organizations are so threatening to renewable energy projects is because IPPs do not have a sufficient digital presence. Mike Casey is the founder and president of Tigercomm, which helps companies develop and execute community relations plans for clean energy projects. He has found that developers are facing increasing online nimby opposition, however, few wind IPPs have developed proactive digital strategies to meet or anticipate local critics. This is because of digital constraints in IPPs as well as a reluctance to increase the investment in digital community engagement (Casey, 2020). Many IPPs have restrictive social media policies in place because of global brand concerns regarding social media engagement. Because of this, IPPs are still using old methods of communication which are not effective enough anymore. Years ago, most community engagement programs heavily favored newspapers or in-person communications with local citizens. According to Paul Copleman, director of communications for Avangrid Renewables, Facebook has eclipsed traditional local newspapers which used to be the IPPs' means of communicating with locals (Casey, 2020). These companies are now missing out on the benefits of social

media presence, such as insulating nimby narratives and arguments, amplifying the stories of supporters, and creating a reliable alternative information source to nimby Facebook groups.

Fossil fuel companies shaping the debate

Although the present fossil fuel industry in the United States creates significantly more harmful issues than turbines including high costs, environmental impacts, and potential health effects caused by greenhouse gasses, it is not as concerning for the nimby movement because people have become accustomed to an electricity system that is essentially “invisible” to consumers. This is owed to centralized infrastructure typically sited far from population centers. The physical removal of power stations from most populated areas also removes them from the minds of the people. However, wind turbines cannot do this since they require a highly dispersed and visible distribution, usually in attractive and unspoiled areas (Rand & Hoen, 2017). The visual impacts from wind turbines have even been sighted as property-rights infringements in some cases because people are so accustomed to the less visible fossil fuel industry.

In addition to the spread of nimby ideas online, these groups are also being strengthened by outside organizers and money, many of these being incumbent energy sources (Casey, 2019). Incumbent energy sources like fossil fuels have been strengthened by recent advancements in hydraulic

fracturing, or fracking, and will support nimby groups if it means they won't lose business. Fracking has sparked significant growth in U.S. fossil fuel production, as domestic production of natural gas and oil has increased by 43% and 59% between just 2000 and 2015. This massive 15-year increase has made the United States the leading producer of oil in the world, surpassing Saudi Arabia and Russia (Carley, 2020). Because of recent improvements in fossil fuel extraction and the status quo of less visible energy production, the fossil fuel industry has made it very difficult for alternative clean energy to rise up and succeed.

While this is true, there is also proof of fossil fuel companies doing just the opposite and actually supporting renewables. Rebranding themselves as energy companies rather than fossil fuel companies, some companies such as BP have found it in their best interests to support the growth of wind energy. Two proposed wind farms called Empire Wind and Beacon Wind, located off of the south coast of Long Island and Massachusetts, respectively, have been invested in heavily by BP. Acquiring half of this project developed by Equinor, BP invested \$1.1 billion for the 2-gigawatt project and is supporting it in hopes of a significant return on their investment (WPED, 2020). From supporting nimby groups to funding wind energy projects, the fossil fuel industry is a stakeholder which has shaped the debate for wind energy in both positive and negative ways.

The clean economy mistake path

Offshore wind has many advantages that have poised offshore wind companies for a potential growth spike like we have never seen in clean energy. This is because offshore wind can generate twice the current power consumption of the United States (Casey, 2020). However, energy potential does not guarantee success for this technology. Even offshore wind projects which provide some distance from locals and nimby groups can be shut down or lose steam due to unaligned groups of citizens, local officials, and green energy companies. This is also known as “The Clean Economy Mistake Path”, as shown in figure 2. This path begins with IPPs developing an idea for a project which seems great and gains steam quickly. Investors are gathered and all is looking well, however, there is a false consensus since local sentiment is not gauged properly as discussed earlier. The false consensus gathered leads the IPPs to developing their plans misguidedly and locals reacting adversely to these late stage designs. Through the use of online forums, formal complaints, and government gatherings, nimby groups sway local officials and create waves which disrupt the plans of the IPPs and shed a negative light on the project. This results in IPPs being restricted, government support shrinking, investors backing out, and eventually the death of the project. This pattern proves that success rests on winning support from local communities and increasing communication at early stages with these communities.



Figure 2: Clean Economy Mistake Path (Casey, 2020)

Cape Wind Mistake Path

This path has been unfortunately taken by many clean energy projects including Cape Wind, which was developing a very significant offshore windfarm in the Northeast. Positioned off the coast of Massachusetts in the Nantucket Sound, this massive 130 turbine project was planned to produce enough clean energy to power 170,000 households and reduce annual carbon dioxide emissions by 880,000 tons. Cape Wind began as a promising project in 2001 which had support from government agencies and investors. In an environmental impact study, the Army Corp of Engineers concluded that there were significant social, environmental, and economic benefits of this wind energy project (Phadke, 2010). It is clear that the project was fool

proof in the eyes of Cape Wind's founder Jim Gordon. He found what he thought the perfect location was, known as Horseshoe Shoal, located just 6 miles off of Cape Cod. They found that this location could hold enough turbines to supply three-quarters of the Cape's electricity needs. Additionally, Horseshoe Shoal was clear of flight paths, ferry routes, shipping channels, and was sheltered enough from crashing waves to limit construction costs. This information was so pleasing to Gordon and his stakeholder circle consisting of environmentalists, investors and developers that he referred to it as "so optimal" (Phadke, 2010).

However, once the project was announced to the public in 2004, the tides began to turn for Cape Wind. Plans were released and there was a swarm of local backlash that accused the project of spoiling the tranquility of the Nantucket Sound and the coast of Massachusetts. The mistake made here is that Cape Wind waited too long to release their plans and gained a false sense of success because they did not gauge their locals early enough. They also did not engage with them early enough. Instead, the news of the project shocked the opposition into a defensive position. Ultimately, this opposition led to local representatives and investors pulling out which killed the Cape Wind project and manifested the clean economy mistake path. The way that wind energy projects are presented shapes the reaction of the public, and it is clear that the reaction will not be very positive if the public is not engaged at an early stage in the process. The Cape Wind case signals

that enculturating renewable energy will be as much about new civic processes as it is about new projects (Phadke, 2010).

Hywind Scotland and the new face of wind energy technology

Along with the aforementioned methods to reduce nimby resistance, floating wind turbines can also do this by eliminating many complaints of the opposition. When the opposition is navigated correctly and resistance is met with the proper response, there are beneficial results, and floating wind can contribute to this navigation. This is because floating wind turbines can be implemented in deep waters far from the coast where fixed-bottom turbines cannot reach. While fixed bottom offshore turbines can only reach 60-meter-deep waters, floating wind turbines can be installed in waters far deeper. When implemented past the line of sight and sound, floating wind turbines would provide less visibility than even the fossil fuel industry. This demonstrates that they could disrupt local nimbyism and be out of sight and out of mind.

One example of a successful implementation of floating wind turbines is the Hywind Scotland project. These turbines are located 18 miles off the coast of Scotland while the human eye can rarely see more than 12 miles, even on a clear day (Team, 2012). This eliminates most factors that create resistance against wind energy, such as sight and sound. The remaining factors, such as environment and economic impact are also reduced. This is

because less birds and wildlife are found at these far distances compared to the coast and the highly reliable winds at these depths of the ocean guarantee energy production that will produce a return on investment faster than any other wind turbine.

However, floating wind turbines are more expensive than their traditional counterparts. For example, one floating turbine built for Hywind Scotland had a project cost of \$30 million, while the average wind turbine costs around \$5 million (Renewables First, 2015). Although this seems like a massive imbalance, the constant energy produced by the reliable winds encountered by a floating wind turbine make up for some of this added expense compared to the varied winds that a traditional turbine has.

Negative public sentiment caused by wind turbines can be mitigated by floating wind due to an improvement in noise, sight, efficiency, and environmental damage. Because of this, I believe that they are a likely solution to the lack of social acceptance with traditional turbines and will help to promote the generation of renewable energy. However, methods of mitigating nimby opposition such as increasing communication and awareness of clean energy would need to be paired with the new technology to guarantee its success.

Conclusion

The promotion and implementation of wind turbines has been challenged by the strength and success of the nimby movement. After evaluating examples of promising wind energy projects dying due to nimby opposition, such as Cape Wind, and analyzing studies which illustrate the origins and power of nimby groups, there is a clear path to improve the success of wind energy. In addition to creating new projects and technologies, it was found that new civic procedures can be implemented to shape the narrative of wind turbines. To improve future results, independent power producers can increase their social media presence to improve the awareness and trust of local citizens. This was also found to be one step that can mitigate the penetration of nimby ideas in local communities. As Cape Wind illustrated, it is also important to include locals in the early stages of wind projects, as this improves the public perception of the project by allowing them to interact with the idea from the beginning. IPPs have made many mistakes along the way and had a large learning curve when the nimby movement surged through the use of online forums. Now, IPPs have the chance to learn from those trials and shape the wind energy narrative in a way that improves the trust of locals and disarms the nimby movement.

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