

C O M M E N T

BROAD UNDERSTANDING AS A STARTING POINT FOR CONSTRUCTIVE SOLUTIONS FOR SITING WIND ENERGY PROJECTS

by Eric Lantz

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Wind energy siting tends to be an emotionally charged issue that requires nuance to address—from my experience and past research those two things don't often go together. With that in mind, Prof. Christiana Ochoa et al.'s *Deals in the Heartland: Renewable Energy Projects, Local Resistance, and How Law Can Help* is a thought-provoking piece that coincides with significant growth in the wind industry, as well as broad-based expansion of county-level ordinances regulating wind power. It is a useful contribution to the literature and to the conversation around this topic, which is a very important one, and one that is dear to me. I do, however, have a handful of comments that I would like to include in the public discourse.

Before I delve into the specifics, I want to say a little bit more about my background and how my perspective has been shaped. I started studying the social acceptance of wind energy in 2007. As a graduate student working at the National Renewable Energy Laboratory, I was invited to be part of an international working group—with researchers from Northern Europe, Japan, and the United States—focused on understanding how we can better integrate wind energy into society. It was a privilege to be able to work with both social scientists and practitioners in that context and at that time. I recognized that to be successful with wind energy projects, we need to have partnerships, and we need to have the buy-in of local communities. I also had the opportunity through participation in the working group to influence the direction of research conducted by colleagues to better understand the subtleties and nuances that are associated with human experiences of wind turbines.

Editors' Note: Eric Lantz's Comment is based on an edited transcription of his remarks at the Environmental Law and Policy Annual Review conference. See 2023-2024 Environmental Law and Policy Annual Review Conference, available at <https://www.eli.org/events/2024-environmental-law-and-policy-annual-review-elpar-conference>.

For example, I was able to participate in the Social Acceptance Baseline Study that was led by colleagues at the Lawrence Berkeley National Laboratory. We focused on studying and surveying the experience of people who live next to wind turbines. Prior to that time, most of the literature internationally had been surveys on general issues such as what people think about wind energy. There were only a few examples where researchers had engaged people who had lived next to wind turbines for an extended period of time and who had been through the process, so had a relatively long-term view on it. We found that, yes, there are some individuals who are frustrated or disappointed—and there are people who moved away. Yet, there is also a significant majority who are supportive or neutral toward wind facilities.

My current role is serving as the Director of the Wind Energy Technologies Office at the U.S. Department of Energy (DOE), which is a slightly different role from my prior research work. We fund a portfolio that spans foundational science to technology demonstration, but also capacity-building for communities to be able to think about how they plan for and implement new deployments of wind energy. We are focused on catalyzing society's access to clean energy technology. We want to think about how we can easily integrate wind energy technologies into the grid, the landscape, and the ecology, including impacts on wildlife and people.

Within the domain of social acceptance or human experience, we are really interested in technologies and technical solutions that can alleviate community impacts and the burdens that people experience. We want to invest in capacity-building that can support an overall energy transition, and of course, we are also interested in financial and regulatory policy solutions. We think there is a lot of work that can be done to create financial, regulatory, and policy structures that can better balance the costs and benefits associated with clean energy deployment, including wind.

I want to emphasize that human experience with wind energy is highly subjective. This is particularly important with respect to the aesthetic perceptions of wind turbines

and wind plants. Throughout my time studying human experiences with wind energy, the opinions have been vastly differing. A lot of people talk about seeing wind turbines as these sentinels of a new age pushing back against climate change and helping to create energy independence for local communities. I've also heard, similar to the authors' points, of wind turbines being perceived as an industrial blight that is ruining the landscape and the aesthetics of a particular area. Ultimately, how people experience the visual effects of wind energy is heavily impacted by what they bring to the table. Essentially the stories that they have lived and whether they see wind energy as the bastion of technological advancement and humans overcoming societal challenges, or something that's a negative transformation of your landscape depends heavily on the individuals.

There is a section in the article that talks about property values and how at least one of the studies that was cited drew a connection between property values and the social experience. In communities where there was less conflict, and where the plants were relatively well-received, property value impacts were negligible and didn't materialize. Whereas, in those communities where it was more negative or more challenging, there was lower willingness to pay for homes and residences.

Ultimately, it is very difficult to find clear objective and predictive measures of whether property values are going to be impacted—positively or negatively—because it can be a bit of a self-fulfilling prophecy. If a community is welcoming to projects, then people tend not to worry about it. On the other hand, if you have high anxiety or are very fearful of what might happen, then of course that gets talked about, and it is reasonably going to affect local home markets.

DOE has funded many studies, mostly at the national level, looking at property values impacts. We applied a statistical approach (there are clearly anecdotes that can be exceptions), and the latest work in this space has shown that there can be impacts during the period immediately following the announcement of a project. And, of course, that is the point at which the unknowns are the greatest. You know a project is coming, you know it's going to mean a change, but you don't know what that change is going to look like—so you might be more fearful in those situations. However, what they also see in the statistical trends is that on average within five years home prices, even in those communities where you see a dip, return to a more normal long-term trend. This suggests that the impacts are not long-lasting and that with time and experience these impacts are generally resolved.

Further, unlike a nuclear facility, a coal-powered electricity generation plant, or even a natural gas facility, by and large, at the end of a wind project's life, it can be decommissioned and all the equipment disposed of in a relatively economical and safe manner. Some of the foundation concrete can be left in place, but it is much easier to dig a wind turbine foundation out of the ground and restore that to a relatively pristine pre-wind facility condition than it is to decommission and restore the land impacted by a nuclear power plant to its preconstruction

status (nuclear power is often talked about in terms of future clean electricity generation so in a sense, it's an alternative to wind power). The legacies, however, at least for these two technologies are tremendously different. If there are particularly problematic turbines or if there is a plant that ultimately doesn't work in a community, it doesn't have to be a permanent land transformation. At the same time, maybe people will become accustomed to living next to wind turbines in the same way that we live next to other sorts of human infrastructure, whether it's an interstate highway, a shopping mall, or even a collector road that runs by many of our houses. The turbines could be integrated into the landscape and integrated into our culture, and more broadly accepted over time.

We know a lot about the science and engineering that drives the critical factors that affect human experiences. I had a colleague in Germany who did great work looking at when people are bothered by the sound. For example, people find it particularly bothersome when there is a lot of turbulence in the atmosphere interacting with the blades. These conditions produce aerodynamic sounds that are like shoes bouncing around in a dryer. Shadow flicker is another problem that is talked about frequently. Shadow flicker is actually relatively easy to manage from an engineering perspective, because we know what track the sun is going to take every year and how the shadows are going to be formed so we can very precisely model when and where shadow flicker could occur. As a result, plant operators and developers actually have tools that they can use to alter the operation of individual turbines or plants to mitigate particularly bothersome periods of wind plant operations. This is one of those areas where the nuance is incredibly important—we have tools that can manage impacts so it doesn't have to be a binary yes/no on wind.

One of the challenges though is that oftentimes what we hear in our conversations with both manufacturers and technology developers who are pursuing these types of solutions is that the customers, in this case the developers, are not asking for those tools. There are a couple of reasons this may be the case. One is the slim margins that exist in this industry. We often, as wind technology researchers, get compared to the aerospace industry because we are dealing with composites and air foils, but the profit margins in the electricity generation field are orders of magnitude different than in an industry like aerospace—the margins are really razor thin.

There is also stiff competition from other sources of electricity generation and societal pressure to keep power prices low. For example, many utilities are regulated such that they have to accept the lowest cost form of electricity generation. Although low-cost electricity is good for society, there are trade offs—here, it seems the legal and the regulatory frameworks are almost working against each other. In sum, profitability pressures coupled with low expressed demand for changes to wind plant design or operation means that available engineered solutions are not being developed and deployed at the levels that might be expected based on their availability and potential to mitigate community concerns.

Further, the development period is the highest-risk portion of the capital stack that goes into a wind energy facility. It is a relatively small piece compared to the overall cost of the facility, but it is totally exposed. When developing a project, you don't know if you actually have a project or not—you could lose all of the investment. This creates reasonable challenges for developer-funded, long, and participatory development processes that may not work in an industry like electricity where the margins are thin and there is a lot of pressure on power producers to keep prices very, very low.

Another point I want to make is that wind energy is not a monolith. Wind facilities exist in all different sizes. In the Netherlands, there are turbines sprinkled here and there, squeezed into niches in industrial landscapes and urban centers. We need to exploit the diversity that is possible with wind energy to help solve some of these challenges.

I also want to acknowledge the complexity of balancing the costs and benefits. The regulations and the way prices are set in power markets are controlled by so many different factors, none of which—I'll go out on a limb and say—account for the experiences of the local communities where projects are sited. This applies to any power generation technology, not only wind.

Lastly, there are significant power imbalances that exist both on the side of the developers and on the communities. We heard today about how developers may not be transparent and can leverage information asymmetries and the balance of power to try to get projects through. On the other hand, because we have broad-based home rule policies in this country, and in many localities around the world, the success of a project can come down to the votes of a few individuals. I think that is a power imbalance on the community side. I would love to see objective criteria developed that can help inform both how projects are developed and how they are approved so that we can achieve a rebalance.

Ultimately, we should not just be asking what the wind energy industry can do differently. We should also ask what communities can do differently. Communities can take a proactive approach here. They can think about how they want to develop wind energy or solar energy or other clean energy technologies in their community, and then they could even go out and solicit proposals for projects and pick from among those. I don't think communities have to be purely in a reactive space.