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Utility-scale wind energy projects: managing public perception and environmental risk

Slattery, M.C.[1], Bennett, V.[1] and Hale, A.[2]

[1]School of Geology, Energy, and the Environment and Institute for Environmental Studies, Texas Christian University, m.slattery@tcu.edu
[2]Department of Biology and Institute for Environmental Studies, Texas Christian University

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In this paper, we provide an overview of the "lessons learned" from eight years of research on the social, economic, and environmental impacts of utility-scale wind power development in the U.S. and how these lessons may be applied to the deployment of wind energy projects in Africa. We address three broad questions: (1) how does investment in wind energy affect regional and local communities where wind farms are built? (2) How does public perception impact wind power development as it relates to siting farms and overall acceptance and community involvement? (3) How do wind farms impact wildlife and can we effectively mitigate these impacts? The main issues are that, while general public and political support for wind energy is often high, siting wind farms frequently raises concerns in local communities, and individual projects often fail because of effective public opposition.

Key findings:

Investment in wind power creates an impact on rural economies in the form of an increase in jobs, income, and taxes. For example, during the construction of 1,400 MW of wind power in Texas, 1,050 total jobs were created (average annual for four years, including onsite labour and supply chain) generating $52 million/year in wages and $150 million/year in economic output for the state. The *total economic activity* to the state from the two wind farms studied equated to more than $1.8 billion (assuming four years of construction and 20 years of operation) or $1.3 million/MW of installed capacity.

We found a high level of public support for wind energy, with more than two-thirds of respondents throughout the 'wind corridor' in the U.S. being in favour of building more wind farms, either in their community or within the U.S. as a whole. However, siting must be done judiciously with all stakeholder involvement. We suggest that, rather than proposing strategies to 'overcome' opposition, developers and researchers shift course and focus on proposing how to make siting successful.

Finally, while siting decisions are based on pre-construction surveys that identify habitat quality for wildlife, the presence of certain resources, such as migratory pathways, are often difficult to ascertain. Subsequently, our research shows that longer term post-construction monitoring (>3 years) is essential to (1) identify these resources, and (2) account for the annual variability in factors such as climate. Thus, if any wildlife issues are identified during these surveys, there are strategies available that can reduce potential impacts. For example, for bats, operational minimization (curtailment) can reduce mortality by >50% if cut-in speeds are raised to 5 m/s

during their fall migration. Such mitigation strategies, however, only address the proximate causes of bat mortality; there is still a great need for strategies that address the ultimate causes (i.e. why bats are coming in to contact with turbines in the first place).

Figure 1: TCU scientists monitoring bird fatality, Wolf Ridge Wind Center, Texas, USA.