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When the Wind is Fair

Best practices for responsible wind development in Alberta

Binnu Jeyakumar, Lee Todd
July 2017

Photo: David Dodge, Pembina Institute

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When the wind is fair

Best practices for responsible wind development in Alberta

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Executive summary

In order to meet the Government of Alberta's goal of generating 30% of electricity from renewable power sources by 2030, 5,000 megawatts (MW) will need to be added to the province's electrical grid, with a large portion of this capacity coming from wind. However, if this additional wind power is going to gain social acceptance, it must be done in a way that is environmentally and socially responsible, to address the concerns of Albertans and maximize the benefits associated with wind development.

This report is based on a series of case studies examining the best practices for wind development around the world. While this report does not represent an exhaustive list of best practices, it does offer some guidance for how wind projects can be responsibly developed in Alberta. Based on the research, there are several practices wind developers and governments can adopt to encourage stakeholders to accept wind projects:

- Effective stakeholder engagement
- Effective siting and permitting of wind projects by local governments
- Ensuring benefits of wind projects are shared equitably within the community
- Regional planning that is able to encourage wind development while mitigating environmental impacts
- Proper regulatory requirements for setback distances, noise, and reclamation
- Wind facility operations that minimize impacts on wildlife

If these best practices can be adopted, the benefits of wind energy will be maximized while concerns and negative impacts will be minimized. Wind projects will be more likely to be accepted by stakeholders, and Alberta will be able to achieve its 2030 goal.

1. Introduction

Under its Climate Leadership Plan and Renewable Electricity Program, the Government of Alberta has set a target of adding 5,000 MW of renewable electricity in order to meet its goal of generating 30% of electricity from renewable energy by 2030. Alberta currently has 1,479 MW of wind capacity, but the Canadian Wind Energy Association predicts that 4,000 MW of wind power will be added to Alberta's grid by 2030.

This will result in lower greenhouse gas emissions and better air quality for Albertans. In addition, wind helps to diversify Alberta's grid, and due to its low cost of power production, it helps stabilize and lower electricity prices. Furthermore, the addition of 5,000 MW of renewable electricity will lead to significant economic development in Alberta — the Renewable Electricity Program is predicted to lead to $10.5 billion in investment and 7,200 jobs in the province.[1]

However, with increased wind development comes concerns about negative impacts on human health, wildlife and habitat. There is also uncertainty regarding the degree of economic benefits that accompany wind development and whether local governments have the capacity to regulate the development in their communities.

This report examines best practices around wind development in Alberta, Denmark, Montana, and Texas in order to determine possible approaches for Alberta to take to address concerns and turn them into an opportunity for successful wind development. The information from these case studies was then integrated with other research conducted by the Pembina Institute to develop potential best practices for wind development in Alberta.

The Pembina Institute hopes that this report will provide some ideas and solutions to ensure that wind development is done in a responsible way that benefits communities, landowners, and Alberta as a whole. This report does not provide an exhaustive list of best practices for wind development. Rather, it is designed to generate ideas and discussion about how Albertans can continue to improve wind development in order to maximize its benefits and minimize its impacts.

[1] Government of Alberta, "Renewable Electricity Program." https://www.alberta.ca/renewable-electricity-program.aspx

This report is written for government, industry, and landowners in order to inform them on how best to capitalize on these opportunities. It will be helpful for those with all levels of knowledge and understanding of wind development.

1.1 Concerns regarding wind development

There are numerous concerns regarding wind development, ranging from environmental damage, to human health, to visual concerns.

The construction of a wind facility is the most disruptive part of the process in regards to land disturbance. If this phase is not properly managed, it can negatively impact native prairie and forested areas due to vegetation clearing, habitat fragmentation and increased accessibility of landscapes to vehicles. There is also a risk of introducing and spreading invasive plants along roads and construction sites. Protecting native prairie is an important environmental issue in Alberta because intact native prairie is rare and sensitive habitat. One of the most important concerns for native prairies is habitat fragmentation since many prairie species require large tracts of unspoiled native grasslands to support their lifecycle.

All types of energy development can impact wildlife through direct effects such as collisions with facilities. In addition, energy development can lead to habitat loss, degradation, fragmentation, and disturbance. Increased human activity can result in decreased productivity for certain wildlife and can cause wildlife to avoid their local habitat. For wind development, the biggest threat is to birds and bats through collisions with turbines and, particularly for bats, fatality through air pressure changes associated with spinning turbine blades. Mortality in bats is of specific concern because they have low reproductive rates.[2] However, in terms of their contribution to bird fatalities, wind turbines rank fairly low compared to buildings or even cat kills.[3]

[2] Alberta Government, *Bat Mitigation Framework for Wind Power Development* (2013), 1. http://aep.alberta.ca/ sh-wildlife/wildlife-land-use-guidelines/documents/ WildlifeGuidelines-BatMitigationFramework-Jun19-2013. pdf

[3] Wallace P. Erickson, Gregory D. Johnson, and P. David Jr., "A summary and comparison of bird mortality from anthropogenic causes with an emphasis on collisions," in *Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference*, March 20-24, 2002; Asilomar, California, Volume 2 General Technical Reports, ed. C. John Ralph and Terrell D. Rich (U.S. Dept. of Agriculture, Forest Service, 2005). https://www.fs.usda.gov/treesearch- beta/pubs/32103

Other concerns regarding wind development relate to human health, noise, shadow flicker, vibrations, blinking lights, and impact on views. These concerns are collectively characterized as "annoyance" and are often linked to negative attitudes towards wind development. Residents living close to wind turbines may express concern that wind turbines will impact local landscapes and views. Visual impacts (i.e. the sight of wind turbines) have been a key contributor to annoyances.[4]

Shadow flicker is another annoyance and can occur when turning wind turbine blades create alternating changes in light at times when the unit is between the sun and the line of sight. It is most obvious when it is experienced in homes and on properties.

Due to the height of wind turbines, federal air traffic navigation regulations require wind energy facilities to use aircraft warning lights. The most common lighting uses multiple red warning lights that blink on and off at regular intervals. These lights are considered by nearby residents to disrupt the night sky.

Despite a comprehensive study released by Health Canada in 2014 and approximately 100 peer-reviewed scientific articles on the issues of wind turbines on health that did not find a link between wind turbines and negative health, concerns regarding the health effects of wind turbines still exist. However, Health Canada did find an association between increased noise from turbines and increased levels of self-reported annoyance. But other annoyance factors (i.e. shadow flicker, blinking lights, vibrations, and visual impacts) were found to be stronger factors for annoyance than noise from turbines. While annoyance can contribute to negative health outcomes through stress, other subjective factors such as attitude towards wind turbines or development in general are more likely to determine individual annoyance levels.[5]

1.2 Opportunities from wind development

Despite concerns with wind development, it can certainly bring benefits. New employment, contracting and procurement, municipal tax revenues, lease payments, and investments in communities are all typical perks.

[4] Loren Knopper and Christopher Ollson, "Health effects from wind turbines: A review of the literature," *Journal of Environmental Health*, 10 (2011). doi: 10.1186/1476-069X-10-78

[5] Health Canada, "Wind Turbine Noise and Health Study: Summary of Results." http://www.hc-sc.gc.ca/ewh-semt/noise-bruit/turbine-eoliennes/summary-resume-eng.php

Since wind development is more widely distributed than other energy sources, its benefits can also be distributed among multiple communities. It can be a significant source of revenue for local governments. This revenue is often used for community development, municipal services and infrastructure investments.

Landowners who lease land to wind generation companies also benefit from a regular revenue stream either through fixed payments or royalties. The amount paid to landowners depends on the land agreement negotiated with the wind company. Compensation rates can vary between provinces and are based on land characteristics, transmission access, land value, turbine size, price of electricity, government policy, competition and alternatives, and community support.

Aside from direct payments to local governments and landowners, wind companies may also invest in community development projects. These include broadband Internet, community facilities, infrastructure, education and community or regional funds.

Wind development may also create a significant number of direct and indirect jobs. Employment opportunities increase with community-scale renewable energy and sustained renewables growth. The construction phase is the largest component of direct and indirect local jobs, while post-construction employment benefits can be more limited in local communities. With remote monitoring and maintenance crews potentially servicing multiple wind farms, fewer direct jobs have to be where the wind turbines are located.

2. Stakeholder engagement

Stakeholder engagement is a critical component to gaining social support for wind projects. It establishes lines of communication between developers and stakeholders to allow concerns to be discussed and questions answered. It can clear up any confusion or misconceptions and allows developers to receive input into the project to make sure it benefits the community and mitigates negative impacts.

There are intangible aspects to good stakeholder engagement. The process must be built on honesty, transparency, and open communication. This fosters mutual trust between the developer and stakeholder and ideally a good working relationship that allows each party to resolve conflicts. Concrete actions developers can take to build support for wind projects must be through genuine engagement, not simply following prescribed steps.

2.1 Whom to engage

Wind companies need to engage individuals and local governments. The Halkirk case study provides some good examples of effective stakeholder engagement. The Alberta Utilities Commission's (AUC) Rule 007 mandated some of the engagement activities in the Halkirk example, while others were initiated by the developer, Greengate Power.

Since the Halkirk project is over 10 MW, AUC Rule 007 requires the developer to notify every stakeholder within 2 km of the project and consult with every stakeholder within 800 m. However, in the case of Halkirk, the developer also notified and consulted with people outside the 2 km radius. Greengate also measured 2 km from the project property line, instead of from the nearest piece of infrastructure, as required by Rule 007. This led to a significant expansion of the minimum mandated consultation radius and number of community members involved. This undoubtedly helped gain the community's approval and contributed to the project avoiding a hearing.

During the stakeholder engagement process, it is also important to involve local governments and nearby populated areas. It is best to conduct this engagement as early as possible in the planning process so that local governments understand what the developer's plans are and can address anticipated questions or concerns from stakeholders and ratepayers. Furthermore, it is advisable to regularly update local government staff about the project as the consultation process progresses.

2.2 Critical information to provide

Unlike other types of energy development (i.e. oil and gas), land cannot be expropriated for wind development in Alberta. It is important to inform stakeholders of this early in the process to allay any concerns. In addition, it is important to be honest about long-term plans in order to manage expectations of stakeholders. This means that developers should not make unreal promises to landowners regarding whether or not turbines will be placed on their land. It's better to inform landowners that the developer is still in the exploratory phase of the project to determine where turbines will be located. Guarantees about turbine placement should not be made until the developer has determined final siting of turbines and lease agreements are presented to landowners.

As mandated by Rule 007, it is important for wind companies to provide basic information about the project, contact information, and information on how to provide input to the company. In addition, regular updates should be given to individual stakeholders and local governments about project developments. Once the consultation process has come to an end, a project-specific information package is sent to stakeholders within 2 km of the project, while stakeholders within 800 m of the project are consulted.

2.3 Post-consultation project changes

Good consultation is an iterative process that is constantly evolving. Developers will take input from stakeholders and incorporate it into the project design where appropriate. In the Halkirk case, Greengate was able to incorporate feedback into the project design. This led to the orientation of roads being changed and turbines either being moved or removed from the project plan.

3. Local government engagement and responsibilities

In Alberta, municipalities have the ability to establish bylaws determining wind turbine permitting and siting requirements. Some municipalities will have bylaws mandating specific setbacks, while some have no specific regulation on siting, and others refer to the provincial regulatory policies. This means that local governments can make decisions that will have a significant impact on the development of wind projects. However, not every local government has the capacity or experience with wind projects to develop the proper siting requirements.

In the U.S., the Northwest Wind Resource and Action Center was created with initial funding from the U.S. Department of Energy to be a source for information on wind energy issues. The organization has created a toolkit to help local governments create their own permits so they are prepared for wind projects ahead of time. The goal is to create standardized zoning regulations and permitting processes to ensure safe and cost-effective wind energy development that is appropriate for each community.[6]

In certain U.S. jurisdictions, such as Montana, no state laws directly regulate the approval of wind projects. Therefore, regulation has been delegated to local levels of government with an emphasis on developers and local communities working together to implement a project. Montana's Cascade County has taken on responsibilities in order to ensure wind projects are beneficial to the community. Cascade County requires an application and hearing process, similar to the AUC in Alberta. In order for the county to approve a project, the proposed development must not endanger the public health or safety, must not substantially injure the value of adjoining property, and must be consistent with the Cascade County Growth Policy.

As a result of Cascade County's proactive approach to wind development and regulatory certainty, they were able to attract one of the first wind farms in the state and foster community support for the operation.

[6] More information can be found at http://nwwindcenter.org.

4. Sharing benefits

In Alberta, many landowners are familiar with the oil and gas industry and may even have oil and gas development on their land. The oil and gas industry has standardized contracts for lease payments for landowners and also has the Surface Rights Board to resolve disputes between landowners and oil and gas companies. However, oil and gas companies also have the power to expropriate land. For wind development, there are no standardized contracts for lease payments to landowners, nor is there an equivalent of the Surface Rights Board. However, wind companies do not have the power to expropriate land.

These differences between oil and gas compared to wind development means that compensation agreements between landowners and wind companies can vary between each landowner. This allows landowners to negotiate whatever compensation system works best for them and also allows wind companies to get creative when negotiating lease payments.

In the case of Halkirk, the developer was transparent with landowners from the beginning of negotiations to let them know that there was no threat of expropriation if they did not sign a lease agreement. The developer was also careful to manage expectations and communicated to the landowners that they were only exploring the possibility of leasing land for wind turbines.

In addition, the developer used a standardized pooled lease system. Traditionally, wind companies have made lease payments to the landowners who have wind turbines or infrastructure on their land. However, this meant that neighbouring landowners did not receive any payments, but still experienced the visual impacts from the turbine. In the pooled lease model, neighbouring landowners receive a portion of lease payments or royalties as a percentage of their land in the pool. This can help increase the sense of fair distribution of benefits and of shared ownership in the community. In the Halkirk example, the developer also used a standardized system to determine pooled lease payments. This gives the payment system transparency and also means that landowners will be treated equally depending on how close they live to the wind development. Once the final siting of the Halkirk wind project was determined, some landowners as far as 2 km away received lease payments as part of the pooled payment system. This compensation structure was instrumental in gaining acceptance of the project.

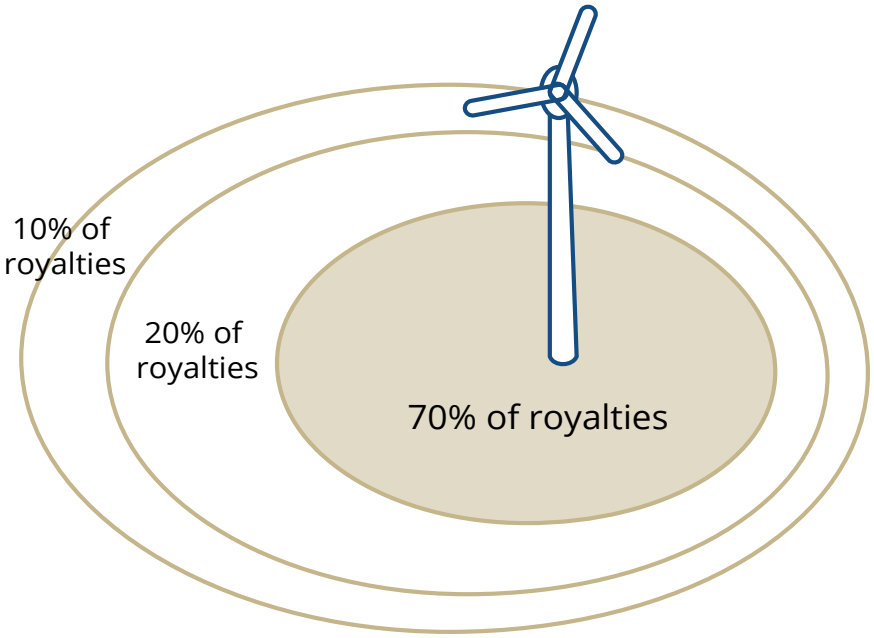

Figure 1. Pooled lease system

In North America, wind project developers commonly own the facility and lease land from a landowner. However, other ownership models can be used to distribute wind development benefits with communities. One model is for community or co-operative ownership of wind projects, where the electricity generated can be used for the owner's consumption or sold into the wholesale electricity market. However, in this model the community or co-operative must have the capacity to develop wind projects and must assume the project risk. In Denmark, co-ownership is legislated so that landowners within 4.5 km must be offered a minimum of 20% of the value of turbines through the purchase of shares. Developers of projects with turbines more than 25 m in height are obligated to compensate project neighbours for loss of value of dwellings if the loss exceeds 1% of property total value.

While Alberta currently does not mandate that wind companies offer ownership of wind projects to nearby landowners, projects that share benefits equitably are more likely to be accepted and approved.[7]

[7] Chad Walker and Jamie Baxter, ""It's easy to throw rocks at a corporation": wind energy development and distributive justice in Canada," *Journal of Environmental Policy and Planning,* 19 (2017). http://dx.doi.org/10.1080/1523908X.2016.1267614

5. Regional planning

Regional planning can help determine which areas are desirable or less desirable for wind development. It can be based on a variety of factors, including wind resource potential, access to transmission, and native grassland and wildlife habitat.

As illustrated in the Texas case study, governments at all levels have a role to play in regional planning. They can also work together to establish desirable areas, or wind zones, in areas that have excellent wind resource potential and transmission access, but also avoid environmentally sensitive areas. Defining desirable wind areas can reduce upfront project risks, costs and planning time. In addition, stakeholder engagement, permitting, and interconnection processes can be streamlined, which further reduces costs and planning time. However, jurisdictions need to be careful not to streamline the process or reduce regulations too much. If they do, they risk causing environmental damage or not properly addressing concerns of stakeholders.

Governments also have the option of adopting policies, such as tax abatements, that directly incentivize development in desirable wind areas. However, there is debate about the benefits of this approach; some view it as foregone revenue for governments, while others believe the economic development of wind projects outweighs the lost revenue from tax abatements.[8]

If done properly, regional planning can lead to win-win solutions for developers and stakeholders. In Alberta, higher-level regional plans, for example the South Saskatchewan Regional Plan, may also influence development of wind zones.

[8] Christian Brannstrom, Mary Tilton, Andrew Klein, and Wendy Jepson, "Spatial Distribution of Estimated Wind-Power Royalties in West Texas," *Land*, 4 (2015), 1187. http://www.mdpi.com/2073-445X/4/4/1182

6. Regulatory requirements

Stakeholders and the general public may have concerns or annoyances related to wind development in their jurisdictions. However, there are several practices and regulations that can be adopted to ensure responsible wind development that mitigate or even eliminate these concerns.

6.1 Setback

The regulated setback distances for wind turbines can be very important in addressing issues related to road interference, visual impacts, shadow flicker, and noise. These distances can vary by jurisdiction, but must provide enough distance to avoid any safety concerns while also not being too stringent to prevent wind development altogether.

Denmark sets minimum distances to buildings of four times the total height of the turbine, which can be helpful in reducing shadow flicker. No minimums are required for roads and railroads, but a working group from 2011 recommends 1–1.7 times the height of turbines for safety issues. The law also stipulates requirements for landscape effects. If the new wind project is located within 28 times the total height from existing or planned turbines, the developer must explain how view impacts (on landscape) are insignificant. Denmark also prevents municipalities from increasing stringency.

Montana also attempts to address visual impacts with their zoning regulations. Wind farms must not have any advertising signage attached, and must have a matte finish of neutral or subdued tones. Turbines must also be set back at least 1000 ft from other commercial or residential land uses.

While there is not a universally accepted setback distance for turbines, these examples provide some guidance for jurisdictions that are seeking to develop their own setback requirements and regulations to reduce visual impacts or annoyances from wind turbines.

6.2 Noise laws

Restrictions are important to mitigate noise impacts for wind turbines, including audible sound, low-frequency sound and vibrations. Proper siting of turbines can reduce self-reported human impacts of noise.

In Montana, turbines must limit noise production in the evening (8:00 p.m. to 8:00 a.m.). During that time they may not exceed 50 dB in residential districts, 60 dB in commercial districts or 75 dB in industrial districts.[9]

Similarly, Denmark sets the maximum noise levels for dwellings at various levels that depend on wind speed (e.g. 44 dB at 8 m/s or 42 dB at 6 m/s). More stringent requirements are set for sensitive areas (as defined in municipal plans). Since January 2012, noise standards also limit low-frequency noise (within 10 to 160 Hz) to 20 dB. Infrasound, the lowest-frequency noise (below 20 Hz) has been a concern in Denmark, but modern turbines are considered to produce very low levels of infrasound.[10]

In Alberta, noise levels from wind turbines must comply with the Alberta Utilities Commission's Rule 012 – Noise Control. The rule allows the permissible sound levels at dwellings (without adjustments) during summertime conditions to be 40 decibels on a weighted scale (dBA) at night and 50 dBA during the day, both on an equivalent continuous sound level.

Based on the information above, the general practice for allowable noise levels in residential areas for wind turbines is somewhere between 40 and 50 dB. Figure 2 illustrates how this level of turbine sound compares to other common noise sources.

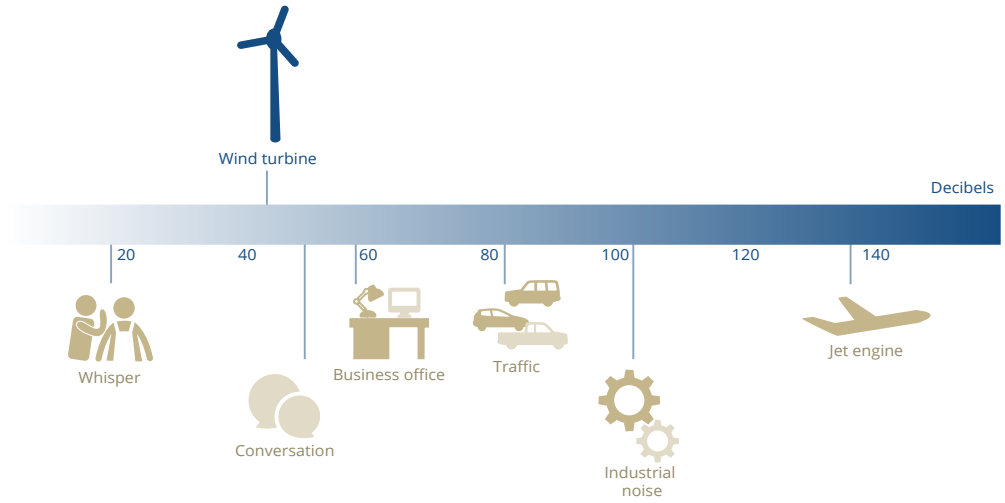

Figure 2. Turbine noise compared to other common noise sources

[9] Cascade County Zoning Regulations, Section 7.2.3.13 (7).

[10] Ministry of Environment and Food of Denmark, "Q&A: Low frequency noise from wind turbines." http://eng.mst.dk/topics/noise/wind-turbines/low-frequency-noise-from-wind-turbines/qa-low-frequency-noise-from-wind-turbines/

6.3 Reclamation

Many concerns have been raised about proper reclamation of wind facilities. In Alberta, many of these concerns are based on observing the number of oil and gas wells that have been abandoned or not properly reclaimed. While it is possible that the same fate could befall wind turbines, there are also some important differences from oil and gas. As a renewable source of power, wind projects will be able to generate revenue as long as the wind still blows. Thus, when wind projects reach the end of their life, it is likely they will be repowered with newer and more efficient technology rather than being decommissioned and reclaimed. Furthermore, if a wind company were to become insolvent before the end of the project life, it is likely that the project would be purchased by another developer because a steady revenue stream is guaranteed for the remainder of a project's long-term contract (usually 20-25 years).

However, this does not mean that a wind project would never need to be reclaimed. Some jurisdictions such as Montana have adopted regulations to protect citizens from bearing the cost of reclamation from wind projects. In early 2017, Montana passed legislation that requires that project developers include a plan for decommissioning and reclamation as well as post a bond to pay for eventual implementation of the plan. In addition, Cascade County in Montana has created zoning regulations that deem wind turbines that are inoperable for one year to be abandoned; these must be removed by the owner or operator.[11]

[11] Cascade County, *Zoning Regulations,* s. 8.1.8.
http://www.cascadecountymt.gov/df/1098/adopted_Dec2016_CascadeCountyZoningRegs.pdf

7. Wind facility operation and monitoring

For wind projects, the biggest threat to wildlife is to birds and bats that may be killed through collisions with wind turbine blades or towers. Bats may also be killed by air pressure changes associated with spinning turbine blades.

One of the best practices to mitigate impacts on wildlife is restricting the operation of turbines at certain times of year (e.g., spring and fall bird migration, or times when bats are most active).

If mortality is due to attraction to lights, other lighting options may need to be considered. It may also be possible to reduce the amount of lighting or even to turn lights off during periods of high risk (e.g., foggy nights during the peak of the passerine migration period).[12]

In addition, there is an opportunity for a regional planning approach by either incentivizing development in areas with low conflict or prohibiting wind development in particularly sensitive areas.

[12] Environment Canada, *Wind Turbines and Birds: A Guidance Document for Environmental Assessment* (2006), 39. http://www.bape.gouv.qc.ca/sections/mandats/ eole_matane/documents/DB15.pdf

8. Conclusion

The Government of Alberta has committed to generating 30% of electricity from renewable energy by 2030, with much of the capacity estimated to come from wind energy. This represents an excellent opportunity for Alberta to take advantage of the many economic, environmental, and social benefits associated with wind. However, despite the numerous benefits of wind energy, there are also many concerns from stakeholders regarding environmental damage, human health, and visual impacts.

These concerns can be addressed through responsible wind development that maximizes the benefits while minimizing the impacts. This can be accomplished through effective stakeholder engagement, sharing of economic benefits, and regulatory requirements that address the concerns of stakeholders while still encouraging wind development to continue.

This report has illustrated several best practices that can be adopted by wind developers and various levels of government to encourage responsible wind development in Alberta. While this list is not exhaustive, it will hopefully guide discussion and provide ideas to all parties involved in wind energy development.

Appendix A. Regulatory tools in Alberta

Electricity production in Alberta is regulated by the Alberta Utilities Commission (AUC). Section 11 of the Hydro and Electricity Act states that "[no person shall construct or operate a power plant unless the Commission, by order, has approved the construction and operation of the power plant."[13] This necessitates an application to the AUC.

The AUC has issued Rule 007, which applies to applications for the construction, alteration, operation, and the discontinuation, dismantling and removal of power plants.[14] Within these rules, slightly different application packages are required from different modes of power generation to reflect the particular characteristics of these operations. This document will attempt to outline how common concerns are addressed by these requirements,[15] what is required for a complete wind power application, and questions/future areas of research.

General public participation

To demonstrate engagement with local government, applicants must provide details and outcome of consultation with local jurisdictions such as municipal districts or counties (PP5). Then, seemingly as an overview of things to come, the project applicant must provide a list of parties that may be affected by the project, confirm that these parties have no concerns regarding the application, and indicate which other agreements are necessary to carry out the project (PP6).

A description of the participant involvement program undertaken is also required for the AUC application (PP19). While guidelines for these programs are outlined in Appendix 1 of Rule 007, the required outputs of this program that must be included in the application package are:

[13] Government of Alberta, RSA 2000 cH-16 s11;2007 cA-37.2 s82(14)

[14] AUC, *Rule 007: Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations and Hydro Development* (June 15, 2017). http://www.auc.ab.ca/acts-regulations-and-auc-rules/rules/Pages/Rule007.aspx

[15] These requirements are laid out in Rule 007, section 3.2: Information requirements, and are numbered PP1 to PP42.

- List all occupants, residents and landowners on land within the radius of the Participation Involvement Program (PIP)[16], as well as interested persons that were consulted as part of the process (PP20).
- Supply a list of mailing addresses and corresponding land locations of the above individuals (PP21).
- Identify individuals who raised concerns about the project and the specifics of these concerns (PP22).
- Summarize discussions held with potentially directly and adversely affected persons (PP23), if concerns were raised, how they were or are being dealt with (PP24), and, if possible, the confirmation of resolution of these concerns (PP25).

View impacts

Applicants are required to provide maps that show the location of the project within the community or region as well as all residents or dwellings within the appropriate notification radius as determined by the PIP (PP33). Further, the AUC requires a plant site drawing showing all major equipment components (PP32), layout of the turbines within the project area (PP14), and the precise turbine height, make, and model (PP28 & PP29). The map issued for public notice does not need this level of detail; a legible map that is suitable for the public will suffice (PP34).

Finally, for wind power projects in particular, the applicant must provide legible maps and/or air photo mosaics upon which the proposed collector power line route or routes have been imposed and showing the residences, landowner names, and major land use and resource features (e.g., vegetation, topography, soil type, existing land use, existing rights-of-way, and superficial and mineable resources) (PP42).

Compensation

Not addressed in Rule 007

Property value

Not addressed in Rule 007

[16] The radius for notification and consultation is determined by the type of project. Details regarding who has to be consulted can be found in Appendix A1 of Rule 007.

Wildlife

The AUC largely defers to the authority of the AEP in regards to environmental evaluations of wind power projects. This means that in support of their application, the applicant must provide the environmental evaluation they submitted to the AEP (PP10 and PP17) along with the sign-off from the AEP addressing the environmental aspects of the project (PP17). This environmental evaluation should:

- Describe the present (pre-project) environmental conditions in the local study area.
- Identify and describe the project activities and infrastructure that may adversely affect the environment.
- Identify what specific ecosystem components (i.e., terrain and soils, surface water bodies and hydrology, groundwater, wetlands, vegetation species and communities, wildlife species and habitat, aquatic species and habitat, air quality and environmentally sensitive areas) within the local study area may be adversely affected by the project.
- Describe the potential adverse effects of the project on the ecosystem components during the life of the project.
- Describe the mitigation measures the applicant proposes to implement during the life of the project to reduce these potential adverse effects.
- Describe the predicted residual adverse effects of the project and their significance after implementation of the proposed mitigation.
- Describe any monitoring activities the applicant proposes to implement during the life of the project to verify the effectiveness of the proposed mitigation.
- Describe the methodology used to identify, evaluate and rate the adverse environmental effects and determine their significance, along with an explanation of the scientific rationale for choosing this methodology.

Particular to wildlife issues, the applicant must also consult directly with an AEP wildlife biologist and obtain a sign-off for their project (PP10).

Existing environmental and land use conditions must also be addressed with potential siting and land use issues being discussed (PP16). Also required is a discussion of the regional setting of the development including regional land use plans in force (PP16).

Land and habitat

Same as above

Safety (ice-throw)

This is not directly addressed in Rule 007 but is indirectly addressed by regulated setback distances from various levels of government. These distances have been deemed to provide the sufficient level of safety from thrown ice.

Noise

A noise impact assessment must be submitted in accordance with the current Rule 012 (PP27). The purpose of Rule 012 is to ensure that the noise from a facility, measured cumulatively with noise from other energy-related facilities, does not exceed the permissible sound level.[17] For a wind turbine or a substation in a wind turbine project, the permissible sound level is determined for the most impacted dwelling(s) from the centre point of the tower of the closest wind turbine, or from the boundary of that substation. If there are no dwellings within 1.5 km from the centre point of the tower of a wind turbine or the boundary of a substation in a wind turbine project, then the permissible sound level is applicable at 1.5 km from this marking point.

Health

Health concerns are not explicitly addressed in Rule 007 but the primary source of these concerns (low-frequency noise) is dealt with under the noise impact assessment that must be submitted in accordance with Rule 012 (PP27).

Environmental assessments

If the power plant project requires preparation of a federal environmental assessment report or a provincial environmental impact assessment report, then that report should be submitted as an appendix to the application as required by PP38, and a separate environmental evaluation report satisfying the requirements of PP17 need not be prepared for the project.

In Alberta, the Environmental Assessment Director determines if a project requires an Environmental Impact Assessment report to be prepared based on the Environmental Assessment (Mandatory and Exempted Activities) Regulation. The regulation lists specific activities which are either mandatory and will require an Environmental Impact Assessment report, or exempted and do not require one. All projects not on either list

[17] AUC, *Rule 012: Noise Control* (June 21, 2017). http://www.auc.ab.ca/acts-regulations-and-auc-rules/rules/Pages/Rule012.aspx

are classified as discretionary, and the director decides whether further consideration under the environmental assessment process is required.

Wind projects 1 MW in size or less do not require an Environmental Impact Assessment report. For projects larger than 1 MW, it is up to the discretion of the Environmental Assessment Director to determine whether an Environmental Impact Assessment report will be required.

Decommissioning

In Alberta, wind developers are required to submit a decommissioning plan specific to their project, which covers the following:

- Equipment and infrastructure that would be dismantled
- Restoration of municipal rights of way, where applicable
- Restoration of access roads, where applicable
- Plans for soil remediation
- Removal of turbines and turbine foundations
- General environmental remediation work during decommissioning activities.

Section 22 of the Hydro and Electric Energy Act states that a person who holds an approval for a power plant, "shall provide written notice to the Commission and the Independent System Operator established under the Electric Utilities Act before permanently discontinuing the operation of, or permanently dismantling or removing any works or installations forming part of, the power plant." Similar to applying for approval to construct a power plant under Rule 007, a PIP must also be conducted by an applicant when decommissioning an existing electric facility. The applicant must provide notification to occupants, residents and landowners on or directly adjacent (within 100 metres) to the existing facility.

Reclamation

The Renewable Electricity Act was passed in 2017 to enshrine into law the Government of Alberta's target to produce 30% of Alberta's electricity from renewable sources by 2030. The legislation also amended the Environmental Protection and Enhancement Act (EPEA) by adding wind and solar generation to the list of activities that are regulated under the Act. As a result, wind power plants are required to reclaim any disturbed lands once the power plant is decommissioned.

Appendix B. Case studies

B.1 Halkirk, Alberta

Context

Halkirk is one of the largest wind power projects in Alberta. It provides 150 MW from 100 wind turbine generators located 40 km east of the town of Stettler. This project is a good example of effective public consultation and large community buy-in. In fact, despite the large size of the project, no hearing was required as no local landowners directly affected by the project sought intervener standing. This makes Halkirk a valuable case to examine the regulatory framework and the actions of the project developer that led to its success.

As is typical for many wind projects, the project was scoped and developed by a developer (Greengate Power), and then constructed and operated by an operator (Capital Power).

Stakeholder engagement

All the public engagement leading up to the construction, including signing of landowner agreements, was conducted by the developer. Since the project is over 10 MW, AUC Rule 007 requires the developer to notify every stakeholder within 2 km of the project and have conversations with every stakeholder within 800 m of the project.

For the Halkirk project, the developer went beyond the minimum requirements for AUC Rule 007 and consulted with people beyond 2 km. In addition, they measured the 2 km distance for consultation from their property line instead of from the nearest infrastructure as required by Rule 007.[18] This list was populated first by publicly available ownership records and then added to with secondary sources and direct contact with nearby landowners. As soon as a new stakeholder was identified, they were promptly sent up-to-date project information.

Greengate has attempted through its engagement and messaging to be seen as a transparent and honest broker and to manage expectations. In the land acquisition phase they informed every landowner that wind development on their land was

[18] Based on interview with representative from Greengate Power, June 9, 2017.

optional, that there was no threat of expropriation, and that the company was only in the early stage of exploring opportunities. Greengate was also able to incorporate feedback into the project design. This led to the orientation of roads being changed and turbines either being moved or removed from the project plan.[19]

Pooled lease payments

The developer used a pooled lease system that also allocated compensation to non-participating landowners (i.e. landowners without turbines on their land) adjacent to turbines. The payment structure was standardized so that every landowner was treated fairly. This was done to more equitably compensate landowners for the use of their land or any associated impacts the wind development might have on them or on nearby landowners. After the final project siting and footprint was complete, this resulted in some people as far away as 2 km receiving compensation.[20] While this system benefited more people than just the immediate landowners, it is different than a shared ownership model where a project is wholly or partially owned by the community and revenue from the project goes directly back to the community.

Municipal engagement

The developer also engaged with staff of Paintearth County (location of project) and Town of Halkirk (nearest population centre) at an early stage. The staff was provided with information about the project to help them address anticipated questions and concerns by stakeholders and their ratepayers. As the consultation process progressed, the developer regularly updated the staff.

Engagement plan

The developer engaged the public and local government through the following communication mechanisms:

- Introductory meeting with County of Paintearth representatives
- Information session with Paintearth County Council
- Initial information letters mailed to all stakeholders within 2 km of project. Provided basic information on the project, contact information, and an invitation to the upcoming open house.

[19] Based on interview with representative from Greengate Power, June 9, 2017.

[20] Based on interview with representative from Greengate Power, June 9, 2017.

- Open house held at the Halkirk Community Hall with more specific information about project size, location, and environmental program; visual impact simulations; and a noise comparison chart showing wind turbine noise compared to other sources. Following the meeting, comments and questions of particular stakeholders were addressed through individual letters. Input from the stakeholders resulted in turbines being moved, the orientation of roads being changed and some turbines removed from the plan.
- Project update letters were mailed to stakeholders and interested parties to keep them up-to-date on modifications to the project plan.
- As mandated by AUC's Rule 007, once the consultation process had come to an end, and before submitting their application, Greengate had a final project-specific information package mailed to all stakeholders within 2 km of the project and final telephone and/or in-person conversations with all stakeholders within 800 m of the project.

Best practices for Alberta

The success of the project in terms of public support can primarily be attributed to standardized pooled compensation scheme that includes non-participating landowners. In addition, the developer's stakeholder engagement process was based on early engagement of stakeholders, frequent updates and subsequent follow-up that showed that stakeholder input had been considered. Finally, the stakeholder engagement process conducted wider engagement of residents beyond the minimum requirements of AUC Rule 007.

B.2 Denmark

Context

Denmark has set a target to have 50% of electricity consumption procured from wind by 2020.[21] In addition to the desire for sustainable energy sources, the target is also driven by opportunities for rural populations. While rural areas of Denmark have seen steady emigration and stagnation of local economies, they also have an opportunity to actively make use of the best and largest wind energy resources in the country to contribute to

[21] Department of Food and Resource Economics, University of Copenhagen, *Mapping of the legal framework for siting of wind turbines — Denmark* (2015), 3. http://curis.ku.dk/ws/files/143884872/IFRO_report_239.pdf

local economic development plans. The development of the country's wind energy strategy has been based on consensus negotiation process[22] and a national policy perspective that wind energy development should link energy policy, land planning, and rural development.

Denmark has evolved from procuring 100% of its electricity from coal, to 40% from wind.[23] The wind industry has installed 4,750 wind turbines and employs 31,000 people.[24] The country has also extensively invested in locally owned and distributed generation, and over half of the electricity is now produced by distributed generation. This high level of participation by the public has been one of the primary reasons for the widespread support for wind in Denmark.

Planning Act

The Planning Act was amended to allow municipalities to incorporate climate change adaptation and prevention.

Promotion of Renewable Energy Act (2008)[25]

This act covers various aspects of wind energy development:

1) Connection and safety requirements for wind turbines
2) Measures to promote development of wind turbines:
   i. Loss of value for real properties where wind turbines are erected
   ii. Local ownership options on individual wind turbines
   iii. 'Green scheme' to fund actions that support local scenic and recreational value
   iv. Loans to local groups to conduct for feasibility studies for wind projects
3) Subsidies for wind turbines and power generation from RE sources. Energinet.dk is responsible for the connection of wind turbines to the grid as well as paying electricity production subsidies.[26]

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[22] Dan Haugen, "How Denmark turned an efficiency obligation into opportunity," *Midwest Energy News,* October 8, 2013. http://midwestenergynews.com/2013/10/08/how-denmark-turned-an-efficiency-obligation-into-opportunity/

[23] State of Green, *Wind Energy Moving Ahead: How wind energy has changed the Danish energy system* (2017), 18. https://stateofgreen.com/en/infocus/publications/wind-energy-moving-ahead-how-wind-energy-has-changed-the-danish-energy-system

[24] *Wind Energy Moving Ahead,* 3.

[25] Government of Denmark, *Bekendtgørelse af lov om fremme af vedvarende energy.* https://www.retsinformation.dk/forms/r0710.aspx?id=139075

[26] *Mapping of the legal framework for siting of wind turbines — Denmark.*

4) Environmental impact assessment requirements

A public meeting is required to be held to discuss the consequences for surrounding properties. There are specific requirements for how notices for public meetings are advertised.

Other

The Danish government owns access rights to access land for purpose of feasibility studies; subsequent use of energy can only take place after the Climate Energy & Building (CEB) Ministry provides authorization.

CEB can also take other specific actions:

- Reserve area specifically for testing and development of wind turbines (with specific requirements and eye for local ownership and involvement)
- Provide permission for feasibility study, which is then tendered by Energinet.dk to bidders. The ultimate authority is with the government minister (not Energinet.dk)
- Set specific rules and requirements for managing environmental impacts

Moving from study to construction must occur within three months of approval of feasibility study report.

Wind Turbine Planning Executive Order

Executive Order 1590/2014 on Wind Turbine Planning sets minimum requirements for planning. This includes planning jurisdiction limitation for municipalities (up to 150 m turbines) and minimum distances to buildings of four times the total height of the turbine. No minimums are required for roads and railroads, but a working group (2011) recommends 1–1.7 times the height of turbine for safety issues. The order also prevents municipalities from increasing stringency.

The order also stipulates requirements for landscape effects. If the new wind project is located within 28 times the total height of turbine from existing or planning turbines, the project must explain how view impacts (on landscape) are insignificant. Wind turbine shadows can also be a nuisance from rapid flicker to direct light. The movement of long shadows in the early morning and late evening can be mitigated by the minimum distance requirement (four times turbine height) from dwellings.

Act on Environmental Assessment of Plans and Programmes

The Act on Environmental Assessment of Plans and Programmes is a localized version of the EU Directive covering the same subject matter. It applies to various sectors, including onshore wind energy development. Under the act, an environmental impact assessment is required for any project with turbines greater than 80 m and for groups of three or more turbines. Projects for which an EIA is required must include an EIA permit in the permitting process. The Danish Energy Agency decides whether an EIA is required (based on above rules).

Specific habitat and bird requirements for EIAs are derived from EU directives (Habitats and Birds). Natura 2000 areas require protection of species, bats, and birds.[27] The EU Habitats Directive also has strict protection requirements for species in all areas. EIA permits may not be authorized if projects lead to "deterioration or destruction of breeding sites or resting places". The Hunting Act also prohibits any deliberate disturbance of birds. Appropriate Assessment is also required to determine how the project ensures conservation of rare and endangered species and habitat that are of European interest. Appropriate Assessments are legally binding.

The principles of the EU's Habitats and Birds directives are conservation and protection. Conservation status implies that species and habitats are able to survive long term across their entire natural range within Europe. For species, this means maintaining populations and sufficiently large habitat. For habitats, this means areas are stable or increasing and that specific structures and ecological functions are present for long-term maintenance, and that species within have a favourable status.[28]

Public law

Noise requirements for wind turbines are regulated by public law (not nuisance, or neighbour law). Claims based on neighbour law have not been successful since neighbours receive compensation for the presence of wind turbines.[29] National government, through Executive Order, sets maximum noise levels for dwellings at various levels that depend on wind speed (e.g. 44 dB at 8 m/s or 42 dB at 6 m/s). More stringent requirements are required for sensitive areas (as defined in municipal plans).

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[27] Natura 2000 Network is an ecological network spanning 27 EU countries and consisting of nearly 26,000 sites, almost 18% of the EU's land area.

[28] European Commission, *Wind energy developments and Natura 2000 — Guidance Document* (2011), 15-21. http://ec.europa.eu/environment/nature/natura2000/management/docs/Wind_farms.pdf

[29] *Mapping of the legal framework for siting of wind turbines — Denmark, 22.*

Since January 2012, noise standards also include low frequency noise within 10 to 160 Hz limited to 20 dB. Infrasound, the lowest-frequency noise (below 20 Hz) has been a concern in Denmark, but modern turbines are considered to produce very low levels of infrasound.[30] Municipal governments are responsible for enforcement.

Compensation and co-ownership

For any turbine over 25 m, any person (or group) up to 4.5 km away from the turbine must be offered a minimum of 20% of the value of turbines through the purchase of shares. Rules are also in place that stipulate minimum requirements for public announcements of the shares.[31] The developer is responsible for preparing material for the tender process, while Energinet.dk is tasked to approve the process and information.[32]

Developers of projects with turbines more than 25 m in height are obligated to compensate project neighbours for loss of value of dwellings if the loss exceeds 1% of property total value.[33] If the loss of value is greater than 1%, as determined by the valuation authority (Energinet.dk), the owner of the turbine must compensate the nearby landowner the amount in depreciation of their property. Compensation schemes must be explained to project neighbours by Energinet.dk. Claims for compensation are submitted within four or eight weeks (depending on whether or not an EIA is required) of project developers meeting with neighbours.

Local government and municipalities

Planning onshore wind turbines is the responsibility of the municipality. Many of these local governments have entered into formal climate policy agreements with carbon-neutral aspirations. Local authorities are responsible for siting and environmental assessment procedures. For large turbines (taller than 150 m), the Ministry for the Environment is the EIA authority.[34]

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[30] Ministry of Environment and Food of Denmark, "Q&A: Low frequency noise from wind turbines." http://eng.mst.dk/topics/noise/wind-turbines/low-frequency-noise-from-wind-turbines/qa-low-frequency-noise-from-wind-turbines/

[31] Government of Denmark, *Bekendtgørelse af lov om fremme af vedvarende energy.* https://www.retsinformation.dk/forms/r0710.aspx?id=139075

[32] Karl Sperling, Frede Hvelplund, Brian Vad Mathiesen, "Evaluation of wind power planning in Denmark — Towards an integrated perspective," *Energy* 35 (2010), 6.

[33] *Mapping of the legal framework for siting of wind turbines — Denmark*, 24.

[34] *Mapping of the legal framework for siting of wind turbines — Denmark*, 5.

Municipal planning guidelines for wind turbine areas are required before project plans may be elaborated. Strategic planning requirements have been around in Denmark since 1994. They stipulate where projects are allowed, maximum number of turbines and their sizes, minimum distances to existing buildings, etc. The national government, through Executive Order, has set minimum requirements for these guidelines. The Nature and Environmental Appeals Board hears appeals of turbine site location decisions.

Municipalities may also establish their own utility company, which can take advantage of favourable financing schemes available through the municipal financing company (akin to municipally-owned credit union). An excellent example that uses this model is the island of Samso's local utility company.[35]

Best practices for Alberta

The success of wind development in Denmark can, in part, be attributed to co-ownership of wind projects. This can be done by mandating ownership by landowners within a certain distance and by enabling municipal utilities to participate in renewables. Another contributing factor to Denmark's wind development is the steps taken to address annoyances from wind turbines through setback requirements to mitigate shadow flicker, view impacts, etc.

B.3 Montana

Context

Montana is a sparsely populated U.S. state just across the Alberta border with abundant wind resources. Montana is also a large electricity exporter and, as of 2000, was sending up to 45% of its total generation outside its borders.[36] Within the state, while significant efforts have been made to promote commercial wind projects,[37] wind power still faces much opposition from the public.[38] For example, in a 2010 study published in *Energy*

[35] *Evaluation of wind power planning in Denmark — Towards an integrated perspective*, 6.

[36] Miriam Fischlein et al., "Policy stakeholders and deployment of wind power in the sub-national context: A comparison of four U.S. states," *Energy Policy* 38 (2010), 4436. https://doi.org/10.1016/j.enpol.2010.03.073

[37] For example, a number of tax and other incentives are provided for renewable energy projects; see http://deq.mt.gov/Energy/EnergizeMT/Renewable/TaxIncentRenew.

[38] Miriam Fischlein et al., "Which Way Does the Wind Blow? Analysing the State Context for Renewable Energy Deployment in the United States," *Environmental Policy and Governance*, 24 (2014).

Policy, Montanans interviewed referred more often to the risks rather than the benefits of wind power projects. Further, they were the only state in the study that viewed wind power as providing more economic risk than benefit.[39] This is not to say that there has not been success for wind projects in Montana. Most notably, the completion of Glacier I, Glacier II, and RimRock wind farms in the northwest of the state have significantly expanded production. In fact, between 2010 and 2015, electricity generated from wind farms more than doubled in Montana.[40]

Montana does not have any state laws that directly regulate the approval of wind projects. As such, regulation has been effectively delegated to local levels of government with an emphasis on developers and local communities working together to implement a project. The Northwest Wind Resource and Action Center has published a detailed guide on how these counties, cities, and towns can effectively institute wind energy permit systems.[41] This document provides details on different approaches to regulating wind projects locally, suggestions on how to integrate wind projects into broader community plans, and a model ordinance that embodies the best practices for local government. Many counties, however, do not have zoning authority or the ability to issue/withhold building permits. For these communities, wind power does not appear to be regulated by any local powers.

Unlike 21 other states,[42] Montana has, in certain situations, retained some regulatory control over wind power projects. In particular, there are regulations that establish parameters for wind easements and energy rights as well as other activities that may trigger requirements from other agencies. For example, the Montana Department of Environmental Quality may require permits if the project will affect air and/or water quality, crosses wetlands, has storm-water requirements, or requires a major transmission line to be built. Also, commercial wind development may trigger federal endangered species or migratory birds acts. In these cases, wind developers must

[39] "Which Way Does the Wind Blow?," 179-180.

[40] U.S. Energy Information Administration "Electricity Data Browser." http://www.eia.gov/electricity/data.cfm

[41] The Northwest Wind Resource & Action Center "Wind Energy Permit Toolkit," 2015. http://nwwindcenter.org/sites/default/files/windpermittoolkit_mt_sept-2015.pdf

[42] For a list of states that fully delegate wind power regulation to local government see: James M. McElfish, Jr. and Sara Gersen "State Enabling Legislation for Commercial-Scale Wind Power Siting and the Local Government Role" *Environmental Law Institute Report*, 2011.

comply with these acts, take the necessary steps to minimize impact, and obtain the necessary permits for their project to proceed.[43]

Environmental impact mitigation

An Environmental Impact Assessment may be required for any parts of the project located on state land. This is done under the Montana Environmental Policy Act. An environmental assessment may also be required of the project under the National Environmental Policy Act if any parts are located on federal lands. This includes land managed by groups such as the U.S. Forest Service and the Bureau of Land Management. If located entirely on private lands no comprehensive environmental review is needed, but individual permits may be required by the Department of Environmental Quality for things such as stormwater approvals and wetland permits.[44]

If the proposed project may affect species protected under the Endangered Species Act or the Migratory Birds Treaty Act, the applicant must notify the Fish and Wildlife Service in order to consult and develop a mitigation plan. If necessary, they must also apply for "incidental take" permits for the animals killed incidental to the operation of the turbines. Some bat species fall under the Endangered Species Act; impacts to these species need to be addressed by wind project applicants.

On May 3, 2017, Montana passed legislation that requires that project developers include a plan for decommissioning and reclamation as well as post a bond to pay for eventual implementation of the plan. The Department of Environmental Quality sets the bonding amount and administers the program.[45]

Local government control

County and city governments appear to have, in some cases, a large amount of control over the approval of wind power projects in their jurisdiction. Local governments can use a number of tactics including adopting an energy overlay zone that identifies

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[43] Montana Energy and Telecommunications Interm Committee, *A Citizen's Guide to Montana Energy Law: An Overview of Laws Related to Energy Generation, Transmission, and Consumption in Montana* (2011), 61. http://leg.mt.gov/content/Publications/Committees/interim/2011-2012/2011-energy-law.pdf

[44] Montana Environmental Information Center, "Montana Environmental Policy Act." http://meic.org/issues/constitution-of-montana-and-mepa/montana-environmental-policy-act/; Personal Communication with Garrett Martin of the Montana Department of Facility Siting on June 3, 2016.

[45] Montana Legislature, *HB 216 – Require bonding for wind development.* http://leg.mt.gov/bills/2017/sesslaws/ch0247.pdf

acceptable locations for wind energy; incorporating wind energy into a comprehensive community planning document; or, if they have the power to institute zoning regulations, implementing an ordinance that specifies the requirements for a wind project to be approved in that jurisdiction.[46]

The ordinance-based approach has been utilized successfully by Cascade County in Montana. In 2005 the county proactively integrated wind power projects into their zoning laws. In doing so, Cascade County managed to draw in one of the earliest wind farms in the state as well as foster community support for the operation. While there is some evidence to suggest this support is beginning to wear thin,[47] the county still remains a leader in its state due to the regulatory certainty they have created for all stakeholders involved.

In Cascade County, commercial scale wind farms are subject to special use permits.[48] This type of permit is for activities said to "possess characteristics of such unique and special forms that each specific use shall be considered as an individual case."[49] This process requires 1) a pre-application meeting with the planning department, 2) the submission of an application describing the proposed land use and layout, 3) a public hearing where proponents and/or opponents give testimony, and 4) a final decision from the Zoning Board.

If the Zoning Board wishes to approve a special use permit, they must reach the following conclusions:

- The proposed development will not materially endanger the public health or safety.
- The proposed development will comply with all regulations and standards generally applicable within the zoning district and specifically applicable to the particular type of special use.
- The proposed development will not substantially injure the value of adjoining property, or is a public necessity.
- The proposed development will be in harmony with the area in which it is located.

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[46] *A Citizen's Guide to Montana Energy Law,* 2.

[47] Kevin Rackstraw "Permitting Utility-Scale Wind Energy Systems at the Local Level," *Planning for Wind Energy*, 96. http://resources.cleanenergyroadmap.com/WND_P_permitting_utility_scale_wind.pdf

[48] Cascade County Zoning Regulations, Section 7.2.3.13.

[49] Ibid., Section 8.1.

- The proposed development will be consistent with the Cascade County Growth Policy.

In addition to these sweeping requirements, several more specific requirements are unique to commercial wind projects; they demonstrate how Cascade County addresses the concerns most often raised by local stakeholders:

- Wind farms must not have any advertising signage[50] attached to them.
- Wind farms must have a matte finish of neutral or subdued tones.[51]
- They must be set back 1000 feet from most other commercial or residential land uses.[52]
- Turbines must limit noise production in the evening (8:00 p.m. to 8:00 a.m.) During that time they may not exceed the following levels:
  - Residential districts: 50 dB
  - Commercial districts: 60 dB
  - Industrial districts: 75 dB[53]
- Wind turbines that remain non-functional or inoperative for a continuous period of one year are be deemed to be abandoned, constitute a public nuisance, and must be removed by the owner or operator.

Best practices for Alberta

The Montana case study is an example of how local governments can take on the responsibility of conducting their own engagement processes, as well as developing their own siting regulations that address safety, visual, and noise concerns. Montana appears to take a dramatically different approach to wind power regulation than Alberta's current model. With no one agency such as the AUC controlling the destiny of wind projects, project developers face more uncertainty in gaining approval and require a greater level of engagement and cooperation with their local communities. While the current Alberta model does not require the support of the local jurisdiction, perhaps shifting some authority back to the most local and community-based levels of government could aid in fostering a more positive social impact for wind power in Alberta.

[50] Cascade County Zoning Regulations, 7.2.3.13 (2).

[51] Ibid., 7.2.3.13 (8).

[52] Ibid., 7.2.3.13 (5).

[53] Ibid., 7.2.3.13 (7).

B.4 Texas

Context

The electricity market in Texas is deregulated, with few imports and exports to neighbouring states. The Electricity Reliability Council of Texas (ERCOT) operates the electric grid and manages the deregulated market for 75% of the state.

Market deregulation in Texas began in 1995 when the Public Utility Commission of Texas granted non-discriminatory access to the transmission system. To help development of renewable energy, and specifically wind, Texas has established a Renewable Portfolio Standard obligation with a 5,880 MW installed capacity target for 2015, and 10,000 MW by 2020. Both the 2015 target and 2020 goal have already been surpassed. Texas has a high level of wind energy penetration,[54] and in 2006, the state became the number one state for installed capacity.[55] Wind energy's contribution to total monthly generation in Texas grew from less than 2% to more than 12% from the early 2000s to 2012.

In 2005, Texas passed Senate Bill 20 to establish a renewable energy program, which directed the Public Utility Commission of Texas (PUCT) to develop Competitive Renewable Energy Zones (CREZs). Competitive Renewable Energy Zones are areas where wind generation facilities are installed and from which transmission facilities will be built to various other areas of the state to deliver renewable power to end-use consumers in the most cost-effective manner. CREZs were introduced as a way to alleviate grid congestion and to meet Texas's goals for integrating renewable energy resources by expanding electricity infrastructure.

Various states, including Colorado and Texas, have engaged in efforts to designate specific renewable energy zones. Such efforts have been necessary to resolve the issues of transmission constraints and access. The development of CREZs in Texas led to 3,600 miles of transmission lines being built and an investment of $6.9 billion.[56]

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[54] NREL, *Integrating Variable Renewable Energy in Electric Power Markets* (2013). http://www.nrel.gov/docs/fy12osti/53732.pdf

[55] Texas Parks and Wildlife Department, *Voluntary Recommendations for Wind Energy Development* (2008), 1. https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/habitat_assessment/media/tpwd_wind_recommendations.pdf

[56] ERCOT, *The Competitive Renewable Energy Zone Process*. https://energy.gov/sites/prod/files/2014/08/f18/c_lasher_qer_santafe_presentation.pdf

Government is involved in initial wind resource assessments and transmission infrastructure planning. Utility companies are usually involved in defining the CREZ area. The comprehensive process includes resource assessment, geotechnical and environmental assessments, securing land rights, and working with local communities. Ultimately, the area is released for requests for proposals to develop projects. The approach reduces upfront project risks, costs and planning time. It also helps streamline permitting and interconnection.

Transmission developers are required to submit multiple transmission route alternatives to the CREZ, and the PUCT must make a final decision for application within six months. Public and private input into route siting is an involved process. Public meetings are required if 25 or more people live within 300 feet (91.4 m) of a transmission line (less than 230 kV) or 500 feet (greater than 230 kV).

Environmental regulations

Texas has draft guidelines for wind development, published by the Texas Parks and Wildlife Department,[57] regarding concerns with wind project impacts on wildlife (birds, bats, and habitats). A voluntary review process is in place. Otherwise, all zoning and siting is left to local government.[58] Texas is one of 34 states that delegates a significant autonomy to local governments for wind energy development. In fact, the state delegates all siting decisions to local governments.[59] Recommendations to avoid adverse impacts to wildlife and habitats are provided for different stages of wind energy projects: siting and development, construction, operations and decommissioning. Siting should "avoid and/or reduce potential adverse impacts of a site," construction should "avoid important habitat" and construction should be "at appropriate times of year when practicable." Operations should "minimize ongoing impacts."[60]

Developers are highly unregulated in Texas in terms of project environmental and local impacts. For example, the developer is not required to review projects for wildlife, bird

[57] *Voluntary Recommendations for Wind Energy Development.*

[58] National Conference of State Legislatures, *State Legislative Approaches to Wind Energy Facility Siting.* http://www.ncsl.org/research/energy/state-wind-energy-siting.aspx

[59] Ashira Ostrow and Patricia Salkin, "Cooperative Federalism and Wind: A New Framework for Achieving Sustainability," *Hofstra Law Review* 37 (2009), 117. https://ssrn.com/abstract=1529292

[60] Ibid.

and bat impacts; but can choose to request a review by the Texas Parks & Wildlife Department. The department uses national environmental policy methods.[61]

Development of CREZs

Public meetings are required during the planning stages of CREZs. These are found to be more effective in an 'open house' format with several stations staffed with experts, in contrast to traditional question and answer sessions. Landowners may become formal parties to transmission planning cases at the PUCT, thereby acting as "interveners," or may file comments as "protesters."

After the CREZs are defined in Texas, there is no public engagement process for wind turbines. In fact, wind siting is unregulated by state or county government and is a purely private matter between the developer and the landowner. In addition, local governments do not review siting decisions.[62]

Siting in Texas also does not include discussion of local government tax abatements and landowner royalties (compensation). Similar to siting, the compensation of landowners is determined through private contracts, which is an intensive process.

While the CREZ approach cannot direct the process of selecting wind turbine site locations, it can significantly influence siting decisions with incentives to locate turbines in CREZ areas.[63]

Local (county level) governments can use tax abatements to influence choice of wind development site; these are seen as "legitimate" means of attracting developers.[64] Combined with the federal production tax credit for renewable power generation and Texas's simple permitting of wind farms that require no public consultation or deliberation, these proved to be strong economic and political incentives for wind

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[61] Association of Fish & Wildlife Agencies, *Wind Power Siting, Incentives and Wildlife Guidelines in the United States* (2007), 109. https://www.fws.gov/habitatconservation/windpower/AFWA%20Wind%20Power%20Final%20Report.pdf

[62] George Washington Journal of Energy & Environmental Law, "Why is Texas the Leading State for Wind Power?" March 20, 2011. https://gwjeel.com/2011/03/20/why-is-texas-the-leading-state-for-wind-power/

[63] Environmental Law Institute, *State Enabling Legislation for Commercial-Scale Wind Power Siting and the Local Government Role* (2011), 16. https://www.eli.org/sites/default/files/eli-pubs/d21-02.pdf

[64] Christian Brannstrom, Wendy Jepson and Nicole Persons, "Social Perspectives on Wind-Power Development in West Texas," *Annals of the Association of American Geographers* 101 (2011), 848. http://www.wind.tcu.edu/wp-content/uploads/2012/04/Social-Perspectives-on-Wind-Power-Development-in-West-Texas.pdf

farms.[65] Furthermore, the fact that CREZs are characterized by good wind resources and access to transmission infrastructure acts as a further incentive to develop wind projects in these areas.

Many politicians view tax abatements as essential to attracting wind projects; however, some officials believe that foregone tax revenue will be detrimental to public finances and infrastructure. However, county officials justify tax abatements by arguing that the positive economic benefits — increased employment and economic activity — are greater than property tax forgone through abatements.[66]

Economic variables are the driving force behind wind energy development,[67] with local economic development and opportunities for tax abatements being two important factors.[68] The majority of Texas wind farms are constructed on private land, with the developers establishing land use agreements with the landowners. Agreements include royalty payments, and enable landowners to seek tax abatements from county authorities.[69] The supplementary income has helped farmers preserve their way of life and allowed them to continue to farm.

However, there have been some negative effects and perceptions about wind development in some areas. Resurgent economic activity is blamed for increases in consumption and rising crime levels.[70]

In sum, a West Texas study of individual's perceptions of wind found that "respondents on average believe that wind energy decreases property values, deem wind farms safe for wildlife and are seen as part of an innovation that brings renewed interest to the area".[71]

[65] Christian Brannstrom, Mary Tilton, Andrew Klein, and Wendy Jepson, Spatial Distribution of Estimated Wind-Power Royalties in West Texas (2015), 1187. www.mdpi.com/2073-445X/4/4/1182/pdf

[66] Ibid.

[67] Groth, Vogt, Rural wind farm development: Social, environmental and economic features important to local residents (2014), 4.

[68] "Social Perspectives on Wind-Power Development in West Texas,", 842.

[69] Ibid., 841.

[70] Ibid., 847.

[71] Theresa Groth and Christine Vogt, "Rural wind farm development: Social, environmental and economic features important to local residents" *Renewable Energy* 63 (2014), 4. http://www.sciencedirect.com/science/article/pii/S0960148113004370

Best practices for Alberta

Texas has the most installed wind capacity in the United States. Part of this success can be attributed to effective regional planning that identifies areas with good wind resources and access to transmission infrastructure. In addition, Texas has been able to incentivize development in these areas through financial incentives, as well as by streamlining the approval process for proposed wind projects for developers that build wind projects in these areas.