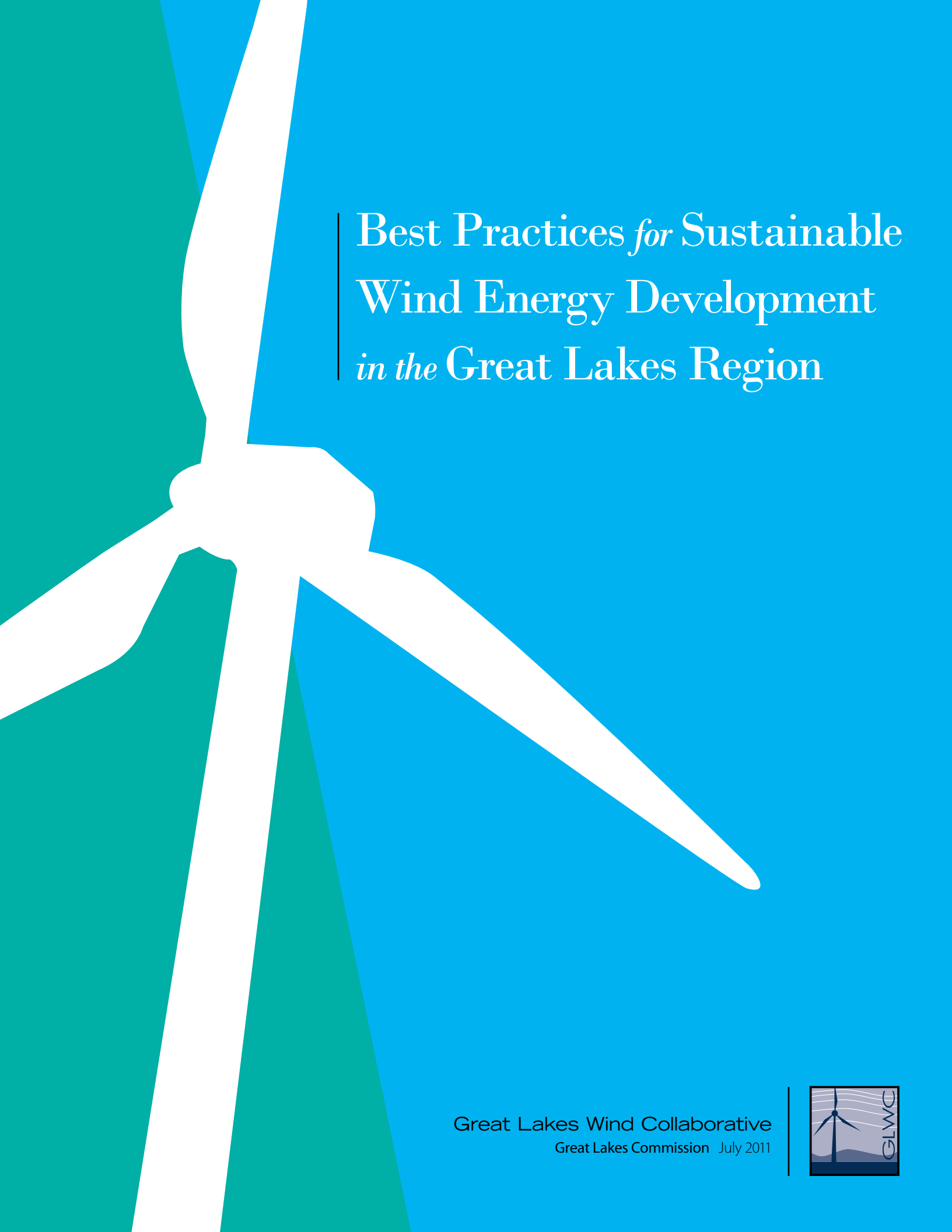

Best Practices *for* Sustainable Wind Energy Development *in the* Great Lakes Region

Great Lakes Wind Collaborative
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Introduction

Wind energy offers the opportunity to generate electricity in a way that has environmental and economic advantages over conventional power generation sources. These include providing local and regional jobs and revenue, increased energy independence, price stability, potential cost savings, as well as significant water use savings and reductions in air pollution emissions. The opportunity to reap these benefits in the Great Lakes region is particularly good due to the region's outstanding wind resources, both on land and over the Great Lakes. For these reasons, wind is also likely to continue to play a leading role in achieving state and provincial renewable energy goals.

However, wind energy, like all energy development, has impacts. The challenge is to understand those impacts and make decisions with the best information available to maximize the positive impacts while minimizing the negative ones. The best practices described in this document are intended to give policymakers, regulators, developers and community leaders useful tools and critical information they need to make well-informed decisions about wind energy development.

When it comes to wind energy development, there is no single best practice or policy. This document offers a menu of 18 different, yet complementary, preferred practices and policies. The best practices cover all phases of the wind energy development process – from the policies that allow for wind development, to the sustainable operation of a wind project, to the best practices for decommissioning a spent turbine – including applications for offshore wind. The best practices described here will not necessarily apply in the same way for every jurisdiction or project. Some policies and best practices are already being implemented by states, local governments or wind developers and should be considered for regionwide application or as standard operating practices industry-wide. At the same time, applying just one best practice or policy to a project does not guarantee high-quality and sustainable wind development; just as neglecting a single best practice may not prevent it. Optimally, a suite of best practices would be applied in an appropriate combination to fit the conditions of a particular wind project or a set of wind projects within a given locality or region.

Making best practices easily accessible enables industry, regulators and community leaders to benefit from the lessons learned from existing wind projects and from policies that have already been tested. These include practices that have been previously tested and shown to be effective, as well as new practices that were identified by experts as needed for future wind developments. Each best practice describes the opportunities and challenges (pros and cons), and offers a case example that illustrates how that best practice is being utilized by a particular jurisdiction or wind project. To better explain the significance of the different best practices, each includes a Wind Energy Development Timeline that illustrates the sequence of that practice within the life of a wind project – whether it is an over-arching policy or addresses a specific construction guideline.

The practices described in this publication were selected by a diverse group of interests from the Great Lakes Wind Collaborative that included environmental groups, industry, academia, and federal, state and local government regulators. The practices were identified through a year-long process that included a literature review, online survey and interviews with individuals from the public, private and non-profit sectors.

These best practices are framed as guidance for wind energy decisionmakers across the binational Great Lakes region. Regulators, communities and developers should choose the mix of policies and practices that best advances the development of responsible and clean Great Lakes wind energy, while also protecting natural resources and respecting the needs of communities.

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Acronyms

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
EA	Environmental Assessment
EIS	Environmental Impact Statement
kW	Kilowatt
kWh	Kilowatt hour
MW	Megawatt
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

Balanced and Uniform Siting Policies

Best Practice #1

Lack of planning and zoning uniformity, both across and within states, is often cited as a major barrier to wind development. All eight Great Lakes states are considered home rule states, which gives local governments the authority to create and enforce their own ordinances and zoning codes. Home rule states are especially prone to issues with differing ordinances across jurisdictions. For instance, one wind project can be spread over multiple units of government, hence many ordinances may apply to one project. Some local policies may also be very strict and make siting wind developments effectively impossible, while many rural areas may have no regulation at all and make siting wind farms a fairly easy process, but with little protection for the environment or local residents. In order to make for a more even "playing field," **regulators should create balanced and transparent policies that are uniform throughout a state or region to help protect communities and the environment, while enabling developers to propose wind farms that meet community approval.**

Challenges and Benefits

While state/provincial level regulations may be seen as an obstacle to some, they provide necessary protection and create more uniform policies. State- or province-wide regulations can simplify the siting process and give developers more confidence that they are satisfying all rules. Such broader regulations have the added benefit of guiding development in areas with no local ordinances. This will help minimize environmental concerns and solve issues of developer liability stemming from lack of regulation. Local units of government may also not have the capacity to enforce local regulations, thus state- and province-wide policies may be welcome in some communities. Extending these policies to regional agreements would also help to minimize problems associated with shared boundaries, particularly in the case of offshore developments over shared waters.

Broader regulations always run the risk, however, of neglecting unique local concerns, such as an area that may provide habitat for threatened species or species with unique needs in a given area. While it is necessary that regulations are rigorous and universally applicable, it is also important that regulations allow for implementation and enforcement at the local level. A balance between local management and broad, comprehensive rules can foster development while protecting communities and the environment.

Who should implement this practice?

State or provincial governments should implement this practice.

Case Example | Wisconsin Statewide Wind Siting Rules[1]

Wisconsin Act 40 of 2009 directed the Public Service Commission of Wisconsin (PSCW) to promulgate administrative rules that specify the restrictions a political subdivision (a city, village, town or county) may impose on the installation or use of a wind energy system, and to help ensure consistent local procedures for local regulation of wind energy systems. Pursuant to Act 40, if a political subdivision chooses to regulate such systems, its regulations may not be more restrictive than the PSCW rules. The PSCW published final rules in December 2010 governing the siting of wind turbines in the state. These rules give local governments jurisdiction over wind projects that are under 100 MW, but

Blue Sky Green Field Wind Farm, Fond Du Lac County, Wisconsin.

Case Example | Wisconsin Statewide Wind Siting Rules, continued

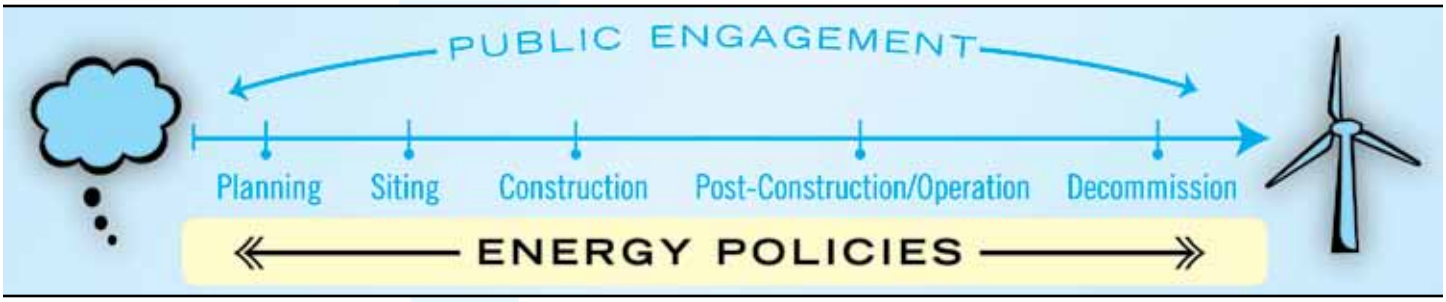
require all larger projects to be sent to the PSCW for review. Pursuant to the PSC rules, all projects larger than 100 MW must apply for a Certificate of Public Convenience and Necessity (CPCN). This entails submitting a detailed report that includes:[2]

- Technical information
- Siting and supply alternatives
- Construction processes
- Substation and transmission information
- Public outreach
- Visual simulation
- Environmental impact assessments
- Wetland permits
- Noise and shadow flicker information

These rules attempt to impartially and responsibly promote wind power throughout Wisconsin by sending review of larger projects for a thorough review at the state level. The PSCW's rules will also function as a uniform ceiling of standards to guide the local regulation of wind siting, operation and decommissioning for projects less than 100 MW in generating capacity. In this way, Wisconsin's structure offers a balance that enables small wind projects to be fully locally controlled while establishing a standard framework at the state level for evaluating larger projects. The state level framework provides a consistent process to ensure that wind projects comply with environmental, health and safety standards. It also prevents projects from being hampered by local opposition that is not based on actual environmental, health or safety risks or impacts. Even though these rules have been suspended in Wisconsin as of March 2011, the state guidelines provide an example of a best practice that balances local control with state oversight, and ensures that large wind projects must comply with a consistent set of environmental, safety and health standards.[3]

When should this practice happen?

Ideally, these policies are in place before wind projects are developed and are periodically adapted and updated to reflect emerging issues and challenges.



Related Tools

The American Wind Energy Association's Wind Energy Siting Handbook | http://www.awea.org/sitinghandbook/ | The 178-page handbook includes information about environmental siting issues relevant to land-based commercial-scale wind energy project development in the United States.

U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines and Eagle Conservation Plan Guidance | http://www.fws.gov/windenergy/docs/Wind_Energy_Guidelines_2_15_2011FINAL.pdf | On February 18, 2011, the U.S. Fish and Wildlife Service two draft guidelines were published in the Federal Register: *Land-Based Wind Energy Guidelines* and *Eagle Conservation Plan Guidance*. As of press time of this document, both sets of guidelines were open for public comment. The documents are part of the agency's ongoing efforts to improve siting and permitting of renewable energy projects. Visit the web site above for updates.

The International Energy Agency Implementing Agreement for Cooperation in the Research, Development, and Deployment of Wind Energy Systems | http://www.socialacceptance.ch/ | The IEA Wind Implementing Agreement website provides resources for research into environmental and social issues surrounding wind development.

1 Photo source: By Royalbroil (Own work) [CC-BY-SA-3.0 (www.creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons

2 http://psc.wi.gov/utilityinfo/electric/construction/documents/V45_Wind Farm.pdf

3 The Wisconsin Joint Committee for the Review of Administrative Rules voted to suspend the state's wind siting rules on March 1, 2011. As of mid-March, 2011, the fate of the PSC rules is uncertain in Wisconsin.

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Financing Mechanisms and Financial Incentives

Best Practice #2

High energy prices can act as a driver for creating and enhancing wind energy policies; however, the true costs of energy production are often not reflected in current energy prices, leading to imbalances in energy rates across sectors. Until price parity is achieved between renewable and fossil energy sources, methods to incentivize renewable will be necessary to cultivate renewable energy development.

Regulators should provide clear, consistent, and well-designed financing mechanisms or financial incentives that assure developers they will be able to recoup costs in a competitive market. There many types of financing mechanisms and incentives; some of these incentives are better suited for utility-scale wind, while others are designed more for commercial- or residential-scale wind projects. (See Related Tools below). Policymakers and regulators should employ financial incentives in ways that support local manufacturing of wind turbine components as well as wind installations and, where possible, try to create a market pull for renewable energy in lieu of providing outright subsidies, or provide for recapture of public investments through, for example, a revolving loan fund. Some of the most promising examples include:

- **Feed-In Tariffs (FITs)**—whereby eligible renewable electricity generators (which can include homeowners and businesses) are paid a guaranteed price or price premium for all **renewable electricity** they produce
- **Tax Credits**—that offset or defer the tax liability associated with wind development projects
- **Loan Guarantees**—contractual obligations between the government, private creditors and a borrower, such as banks and other commercial loan institutions, to help reduce risk to lenders for financing wind projects
- **Net Metering**—whereby consumers who generate renewable energy receive a retail credit for at least a portion of the electricity they generate
- **Payment in Lieu of Property Taxes**—wind projects are "taxed" and payments are made based on the actual electricity they produce rather than on the value of the land where they are located
- **Revolving Loan Funds for Renewable Energy Projects**—whereby financial institutions and authorities capitalize a fund to issue loans to eligible borrowers; repaid loans return to the fund and are then lent to other eligible borrowers
- **Renewable Portfolio Standards (RPS)**—see Renewable Portfolio Standards Best Practice.

Challenges and Benefits

Financial incentives and financing mechanisms that are provided by the public sector must weigh the public costs and benefits and find the balance between providing incentives that stimulate private investment and subsidies that encourage inefficient or inappropriate wind energy projects. Jurisdictions with aggressive and enforceable targets for renewable energy are more likely to justify publicly-backed financial incentives for wind development. Below are some pros and cons for each of the financing mechanisms listed above:

Feed-In Tariffs (FITs) | Pros and Cons

Pros: FIT programs typically require a fixed price – ensuring the developer, small or large, with a certain return. The intent is this guaranteed return encourages development because the developer can count on a certain minimum income.

Cons: The fixed nature of a FIT may not compel a developer to ensure optimum conditions for their project (e.g., a wind

regime that does not provide an economically viable wind project). The consequence of this might include less than optimal performance, and therefore a less cost-effective project. In the end, as many jurisdictions are set up with public service commissions or similar, the utility customer is asked to cover the cost of the program, whether it is a FIT, RPS or some other program. Under a FIT program, it is tough to know whether the fixed price to be paid is competitive or not. Often, a regular review and revision is required to keep prices competitive.

Tax Credits | Pros and Cons

Pros: Tax credits can help level the playing field for an industry that is relatively young and where significant market barriers still exist, compared to more traditional energy sources for which policy incentives have been well established over time.

Cons: Tax incentives are a form of subsidy and result in lost revenue to the taxing entity (e.g., local, state or federal governments) and are difficult to defend in times of financial duress. Tax incentives alone are not enough at present to ensure that wind is competitive in the market compared to other sources of electricity.

Loan Guarantees | Pros and Cons

Pros: Loan Guarantees provide private lenders with assurance that the government will cover the borrower's debt obligation in the event that the borrower defaults. Loan guarantees allow the government to share some of the financial risks of projects that employ new technologies that are not yet supported in the commercial marketplace or where private investment has been inhibited.

Cons: If the borrower defaults on his or her loan, the government must step in and repay that loan on his or her behalf, placing additional financial obligation and possibly burden on governments that may not have adequate funds available to pay such debt, requiring the government to borrow against future revenue, potentially contributing to annual deficits and the national debt.

Net Metering | Pros and Cons

Pros: This consumer-based renewable energy incentive encourages individual consumers to make renewable energy investments, potentially reducing individual energy bills and demand on the electric power grid. Unlike a Feed-in Tariff or time of use metering (TOU), net metering can be implemented solely as an accounting procedure, and requires no special metering, or even any prior arrangement or notification.

Cons: The incentive places the burdens of pioneering renewable energy primarily upon fragmented consumers. Over-burdened energy agencies may not provide incentives on a consistent basis and it is difficult for individual energy consumers to negotiate with large institutions to recover their Net Metering credits and/or rebates for using renewable energy.

Production Taxes in Lieu of Property Taxes | Pros and Cons

Pros: Basing payments to local governments on the actual megawatt hours(MWh) or kilowatt hours (kWh) generated by a wind project may be a more objective measurement for taxing wind projects than basing taxes on the equipment and improvements to the land or on generating capacity. Additionally, this approach may provide additional revenue. When taxation is based on capacity, a 50 MW wind farm on a moderately windy site provides the same local revenue as one on a high wind resource site. If payments were based on actual energy production, more revenue may be available from the project with a higher wind resource, depending on the structure of the tax.

Cons: Tax revenues will vary from year to year due to variations in the wind resource, which may make budgeting difficult.

Revolving Loan Funds | Pros and Cons

Pros: Revolving loan funds provide access to flexible capital often used in combination with conventional funding sources. They generally have reduced borrowing and transaction costs because the money is borrowed from a fund set up for the express purpose of wind or renewable energy projects. With competitive rates and flexible terms, a RLF provides access to new financing sources for the borrower, while lowering overall risk for participating institutional lenders.

Cons: Funds must be available to capitalize the Revolving Loan Fund (RLF). A competent and trained staff is necessary to administer the RLF, including setting proper fees and rates to generate enough of an interest rate return to replenish the fund for future loan allocations and prevent erosion of capital base.

Who should implement this practice?

State or provincial governments, local governments and private financial institutions should implement this practice.

Case Example | Ontario's Feed-in Tariff Program

Ontario's feed-in tariff or FIT Program is North America's first comprehensive guaranteed pricing structure for renewable electricity production. The FIT Program in Ontario was designed to give developers and their lenders the confidence needed to undertake projects and to enable Ontario to build a reliable and sustainable electricity system.

Ontario's FIT Program was enabled by the *Green Energy and Green Economy Act, 2009,* which was passed into law on May 14, 2009. The Ontario Power Authority is responsible for implementing the program.

By encouraging the development of renewable energy in Ontario, the FIT Program will:

- **help Ontario phase out coal-fired electricity generation by 2014, the largest climate change initiative in Canada;**
- **boost economic activity and the development of renewable energy technologies; and**
- **create new green industries and jobs.**

The program is divided into two streams - FIT and microFIT. The FIT Program is for renewable energy projects that can generate more than 10 kilowatts (kW) of electricity. Very small projects at a home or small business that can generate 10 kW or less come under the microFIT Program.[1]

Case Example | Illinois Uniform Tax Policy

In In July 2010, Illinois Governor Pat Quinn signed legislation, Illinois Public Act 096-1036, that creates a stable and uniform tax policy for renewable energy development in the state of Illinois. The new law extends, until the end of 2016, uniform property tax rates on wind turbines and related infrastructure across the state. Property taxes are calculated by multiplying the local property tax rate times 33 percent of the fair cash value. This enables the industry to anticipate operating costs until then.[2]

Illinois Governor Pat Quinn. Photo Credit: Kate Gardiner.

Prior to 2007, property tax assessments for wind farms varied widely across the state. Property taxes for wind farms were assessed based upon the jurisdiction in which they were located.

In October 2007, the Illinois General Assembly addressed this problem by passing Public Act 095-0644, which provides for a consistent valuation procedures throughout the state for commercial wind farm equipment. The law addresses wind energy devices larger than 500 kW and producing power for commercial use, setting a value of $360,000 per megawatt of rated capacity. The law also adds an annual inflation rate for their value and defines an allowance for physical depreciation of the device as well as a limit to the amount that can be depreciated (4 percent per year, up to a maximum depreciation of 70 percent). In order to help assessors assess the devices, the taxpayer is required to provide a plat with a detailed description of the location of the devices as well as any associated roads and improvements.

Since Jan. 1, 2008, the chief county assessment officers in Illinois have been able to add an inflationary increase, called a "trending factor" to the previous year's value; the result being the "trended real property cost basis." An amount for depreciation is then subtracted from the trended real property cost basis to determine the taxable value for the current assessment year. The trending factor is the Consumer Price Index (CPI-U) from the Bureau of Labor Statistics.[3]

The new law also gives local governments the authority to finance green projects in unincorporated areas of the state which are not part of any municipality.

Illinois also has an aggressive renewable portfolio standard that requires utilities there to supply 25 percent of their electricity from renewable sources by 2025, at least 75 percent of which must be generated by wind power.

Case Example | Minnesota Production Tax in Lieu of Property Tax

The state of Minnesota has implemented a wind energy production tax where wind energy projects are exempt from property taxes and are instead required to pay local taxing districts a direct payment based on the electricity production from the wind turbines. The tax is on a sliding scale based on the size of the wind energy project. These changes, implemented in 2002, replace a complicated system of property valuation that increased the amount of wind energy property subject to taxation based on the size of the wind energy project.

The idea of placing a production-based payment on energy resources in place of property taxes was originally proposed by the Institute for Local Self-Reliance (ILSR) in a 1995 report, *Taxing Wind Energy in Minnesota*. The report concluded that a fair rate of production payment would be 0.3 cents per kWh based on a 25 percent capacity factor. This system would have provided significant revenues to local communities and also provided a built in incentive for wind projects to be operated efficiently. Since the release of ILSR's report, the taxing of wind energy in Minnesota has gone through many iterations.

The development of wind energy has grown substantially over the past decade in Minnesota due to market demand for electricity, federal and state legislation, subsidy programs, attractive financing, and economic opportunities for property owners. Today, there are more than 165 companies reporting wind energy production compared to about 20 companies that reported production in 2002. These companies pay a wind energy production tax each year based on their tower locations and total production capacity. It is a personal property tax somewhat like other personal property taxes, generating tax revenues for the local government units. The land areas supporting these wind energy projects are taxed to each parcel as real property to their fee owners. They are valued the same as other land that has not been improved with wind energy systems and are classified for tax purposes according to their most probable use as unimproved.

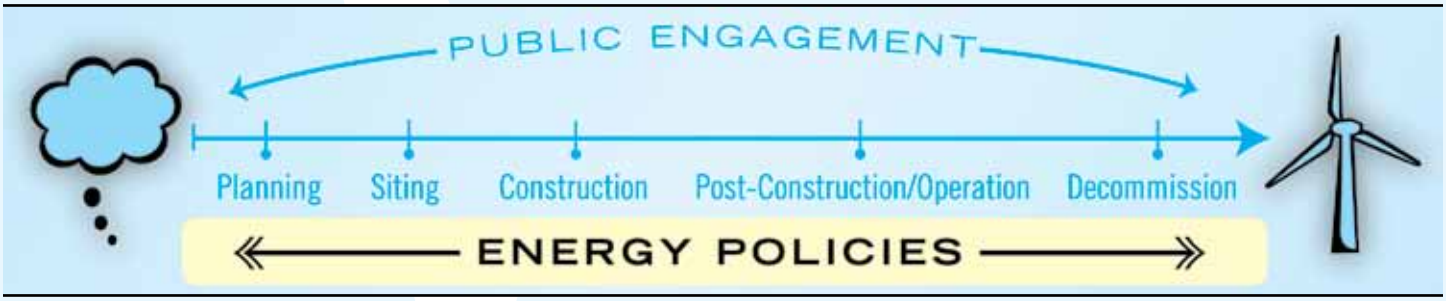
The 2002 Minnesota tax law[4] imposes a production tax on the production of electricity from wind energy conversion systems that were installed after Jan. 1, 1991. Rates of tax are established based on the size of the wind energy conversion system, as follows:

- **Large Scale Wind Energy Conversion System - nameplate capacity of more than 12 MW. Payment of 0.12 cents per kWh.**
- **Medium Scale Wind Energy Conversion System - nameplate capacity of between two and 12 MW. Payment of 0.036 cents per kWh.**
- **Small scale Wind Energy Conversion System - nameplate capacity of between two MW and more than 250 kilowatts. Payment of 0.012 cents per kWh.**

The production payment taxes are paid to the county at the time and in the manner in which personal property taxes are paid, and the revenues are distributed among the taxing jurisdictions in proportion to their tax rates. Small scale wind energy conversion systems with a capacity of 250 kilowatts or less and small scale systems owned by a political subdivision are exempt from the production tax. For wind project systems that were installed or contracted for before Jan. 1, 2002, wind farm owners are allowed to negotiate directly with the counties and local governments a payment in lieu of wind energy production taxes.

When should this practice happen?

Financial incentives should be developed, adapted and improved on a continuing basis to meet shifting needs and challenges but with a sensitivity toward preventing market-disrupting program stops and starts and frequent program changes.



Related Tools

Feed-in Tariffs and Renewable Energy in the USA – a Policy Update | http://www.wind-works.org/FeedLaws/USA/Feed-in_Tariffs_and_Renewable_Energy_in_the_USA_-_a_Policy_Update.pdf | This Policy Update examines the effects of introduced FIT legislation in several states and provides general information on FITs in the U.S.

Distributed Renewable Energy Finance and Policy Toolkit | http://www.cleanenergystates.org/Publications/cesa-financial_Toolkit_Dec2009.pdf The Clean Energy States Alliance released this toolkit that looks at financing tools and tax incentives to promote renewable energy.

Feed-in Tariff Policy: Design, Implementation, and RPS Policy Interaction | http://www.nrel.gov/docs/fy09osti/45549.pdf | The National Renewable Energy Laboratory's document on the design and implementation of Feed-in Tariffs gives general information on FITs, typical types of payment structures, and goes into detail on the interactions between Renewable Portfolio Standards and FITs and how they can complement each other.

State Clean Energy Policies Analysis (SCEPA) Project: An Analysis of Renewable Energy Feed-in Tariffs in the United States | http://www.nrel.gov/analysis/pdfs/45551.pdf | The National Renewable Energy Laboratory's analysis of Renewable Energy Feed-In Tariffs in the U.S. gives detailed information about feed-in tariffs, why and where they do and do not work, how they affect renewable energy development, and current FIT policies in the United States.

Renewable Energy Prices in State-Level Feed-in Tariffs: Federal Law Constraints and Possible Solutions | http://www.nrel.gov/analysis/pdfs/47408.pdf | The National Renewable Energy Laboratory examines states' abilities to create feed-in tariffs and the subsequent challenges encountered at the federal level.

Property Tax: Exemptions and Payment in Lieu of Taxes | http://www.powernaturally.org/ | Part of the *NYSERDA Wind Energy Tool Kit*, this report explains the practice of tax exemptions for wind developers and other forms of payments.

The NREL Local Clean Energy Policy Analysis | http://www.nrel.gov/applying_technologies/state_local_activities/policies_local.html This website provides links to resources for understanding clean energy policies at the local level.

The NREL Geothermal Policymakers' Guidebooks | http://www.nrel.gov/geothermal/guidebooks/ | While designed specifically for geothermal energy, these guidebooks provide insight into effective policies that support renewable energies.

State Support for Clean Energy Deployment: Lessons Learned for Potential Future Policy | http://www.cleanenergystates.org/assets/2011-Files/Renewable-Energy-Finance/49340.pdf | This report reviews the results and lessons learned from a decade of state and utility experience running energy efficiency and renewable energy programs.

1 http://fit.powerauthority.on.ca/Page.asp?PageID=1115&BL_WebsiteID=19
2 Source: http://www.rechargenews.com/energy/wind/article222468.ece?print=true
3 Illinois Department of Revenue, Wind Energy Device Valuation
4 Part of the 2002 Omnibus Tax Bill

Great Lakes Wind Collaborative

Renewable Portfolio Standards

Best Practice #3

Renewable Portfolio Standards (RPS), or renewable energy purchase mandates, are one of the most powerful and popular tools that states have used to promote wind energy. In fact, wind power development has been the primary resource motivated by RPS programs, with wind representing 94 percent of RPS-driven capacity additions from 1998-2009.[1] In general, RPS are policies mandating electric load serving entities (utilities) to generate or procure a percent of its electricity from renewable sources. The obligated entity has a choice of how to fulfill this mandate using a combination of renewable energy sources, including wind, solar, biomass, geothermal, or other renewable sources. Some RPS also establish specific targets for specific technologies or renewable resources to support resource diversity and develop higher cost renewables (solar PV), while others leave it up to the market. These policies have been cited overwhelmingly by experts throughout the field as the most important nonfederal policy that has advanced wind energy development, but many are set at low levels or are due to expire soon. In order to continue this foundational push toward increased renewable energy, **jurisdictions should maintain programs and increase state/provincial RPS/RES targets over time.** Currently, RPS targets for all participating Great Lakes states cap out and end after a certain year, the latest of which is 2026.

Challenges and Benefits

The success of an RPS may be linked to a variety of factors including strong implementation support from the jurisdiction's public utilities commission, a credit-trading system that increases compliance flexibility, and penalties for noncompliance. Not all renewable portfolio standards are equally effective; details in design and implementation make a big difference.

Opponents of the RPS system argue that a policy that forces utilities to develop or purchase renewable energy sources will raise rates for consumers. To date, however, there has been no evidence that RPS policies have had a significant impact on average retail rates, and most states have established rate impact cap mechanisms to contain costs.

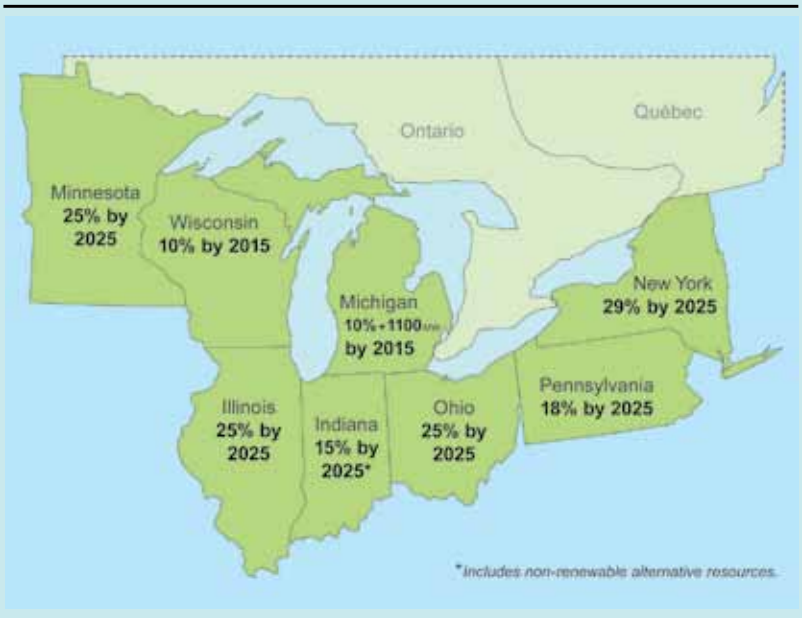
The fact that a jurisdiction has or does not have an RPS is not the sole factor in determining whether wind development advances. Good wind resources, adequate transmission, financial incentives and concise regulations may also foster considerable wind development. However, RPS have been credited with sending appropriate market signals to spur development without compromising environmental and other regulatory concerns. As the wind energy market continues to expand, jurisdictions should consider a gradual increase of their jurisdiction's RPS over time so the market has solid policy support.

Who should implement this practice?

State and provincial governments, and legislatures in particular, should evaluate and modify their RPS policies to increase targets over time.

Case Example | Wisconsin Renewable Portfolio Standards

As part of 2005 Wisconsin Act 141, the Wisconsin Legislature established the current renewable portfolio standard (RPS), requiring investor-owned electric utilities, municipal electric utilities and rural electric coops (electric providers) to meet a gradually increasing percentage of their retail sales with qualified renewable resources. The enabling legislation expressly allows Wisconsin electric providers the option of using Renewable Resource Credits (RRCs) in lieu of providing renewable electricity to their customers.



RPS Standards in the Great Lakes States. Source: Great Lakes Commission, 2011.

Wisconsin's RPS originally required investor-owned utilities and electric cooperatives to obtain at least 2.2% of the electricity sold to customers from renewable-energy resources by 2012. Legislation (S.B. 459) enacted in March 2006 increased renewable energy requirements and established an overall statewide renewable energy goal of 10 percent by Dec. 31, 2015. The requirements are as follows:

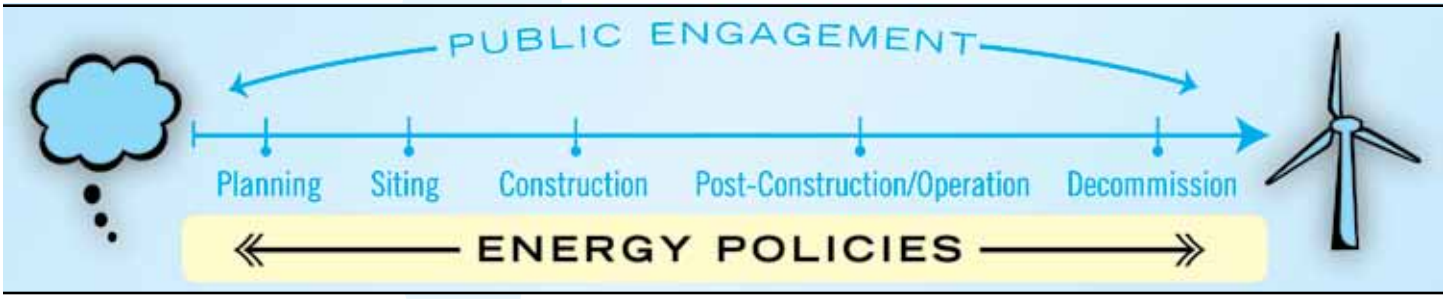
- For the years 2006, 2007, 2008 and 2009, each utility – including municipal utilities – may not decrease its renewable-energy percentage below the utility's average renewable-energy percentage for 2001, 2002 and 2003.
- For the year 2010, each utility must increase its renewable-energy percentage by at least two points above the utility's average renewable-energy percentage for 2001, 2002 and 2003.
- For the years 2011, 2012, 2013 and 2014, each utility may not decrease its renewable-energy percentage below the utility's renewable-energy percentage for 2010.
- For the year 2015, each utility must increase its renewable-energy percentage by at least six points above the utility's average renewable-energy percentage for 2001, 2002 and 2003.
- For each year after 2015, each utility may not decrease its renewable-energy percentage below the utility's renewable-energy percentage for 2015.

Case Example | Massachusetts Renewable Portfolio Standard

The Massachusetts RPS began in 2003 with a modest 1 percent of electricity required to come from renewable sources. The statute obligated the RPS to increase by half a percent every year until it reached 4 percent in 2009. In 2009, the RPS doubled the rate of increase to 1 percent per year, reaching 15 percent of new electricity resources from renewable sources by 2020. This RPS does not currently have an expiration date, so will continue to increase by one percent annually after 2020.

When should this practice happen?

Ideally, these policies are in place before wind projects are developed and are periodically adapted and updated to reflect emerging issues and challenges.



Related Tools

Feed-in Tariff Policy: Design, Implementation, and RPS Policy Interaction | http://www.nrel.gov/docs/fy09osti/45549.pdf | The National Renewable Energy Laboratory's report on feed-in tariffs and interactions with Renewable Portfolio Standards.

States With Renewable Energy Portfolios | http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm | Wind Powering America provides a map and description of the Renewable Portfolio Standards in each state across the country. Clicking on each state provides further information for each state.

Increasing Coordination and Uniformity among State Renewable Portfolio Standards | http://www.cleanenergystates.org/Publications/CESA_Holt-RPS_Policy_Report_Dec2008.pdf | The Clean Energy States Alliance prepared a document on coordinating RPS policies among states and building regional markets.

Rules, Regulations & Policies for Renewable Energy | http://www.dsireusa.org/summarytables/rrpre.cfm | The Database of State Incentives for Renewables & Efficiency hosts a table with links to all federal, state, local and utility rules, regulations, and policies that promote renewable energy in the United States.

Renewables Portfolio Standards in the United States — A Status Report with Data Through 2007 | http://eetd.lbl.gov/ea/emp/reports/lbnl-154e-revised.pdf | By Ryan Wiser and Galen Barbose (2008), this report gives information about RPS policies throughout the United States and their effects on renewable energy development.

Renewables Portfolio Standards: A Factual Introduction to Experience from the United States | http://eetd.lbl.gov/ea/emp/reports/62569.pdf An overview by Ryan Wiser (2007) of the history, concept, and design of the RPS, information on states' experiences with implementation, and an overview of the Federal RPS proposals.

Weighing the Costs and Benefits of State Renewables Portfolio Standards: A Comparative Analysis of State Level Policy Impact Projection http://eetd.lbl.gov/ea/emp/reports/61580.pdf | This analysis by Cliff Chen, Ryan Wiser, and Mark Bolinger (2007) examines issues surrounding Renewable Portfolio standards such as rate increases, renewable technologies, costs, and public benefits.

1 Ryan Wiser, Galen Barbose, and Edward Holt. 2010. Supporting Solar Power in Renewables Portfolio Standards: Experience from the United States. Lawrence Berkeley National Laboratory. http://eetd.lbl.gov/ea/ems/reports/lbnl-3984e.pdf

Great Lakes Wind Collaborative

Integrated Resource Planning, Transmission Planning and Advanced Grid Management

Best Practice #4

Regulators should implement transmission policies supporting the development and implementation of Integrated Resource Planning (IRP) and advanced grid management, consistent with federal and state/provincial legislative authority.

Inter-jurisdictional transmission planning and siting involving state regulators, utilities, regional transmission organizations, project developers, advocates, and others must be strengthened to optimize future transmission investments and ensure that the region's grid infrastructure enables robust development of renewable electricity generation and ensures broader system adequacy.

Transmission developers, regional transmission organizations (RTO) and regulators should engage in transmission planning in early stages of a new transmission project. Where a proposed facility encompasses multiple jurisdictions, planning should determine cost allocation mechanisms and improve system adequacy to lower overall costs of integration. The Eastern Interconnection Planning Collaborative (EIPC) has the potential to be the forum for this type of work – if properly structured – to look at the total issue rather than a summary of the pieces of the issue.

States should engage interested parties in IRP, including the identification of additional transmission resources needed to meet state renewable energy obligations.[1] A number of states have implemented some form of IRP. In the Great Lakes region, Minnesota (see case study below) and Wisconsin have implemented IRP.[2] Such an approach requires a utility to objectively analyze the potential of all available resources – supply and demand – and identify that mix of resources that produces a least-cost, reliable resource plan. This typically results in energy efficiency being selected as a key utility resource because efficiency measures cost less than other, traditional production resources. This greatly increases the role of energy efficiency in the utility's long-term resource portfolio. An Integrated Resource Plan should include the full range of resource options, ranging from traditional power plants to more innovative sources of electricity supply such as power purchases, independent power plants, cogeneration, demand-side management (energy efficiency and load management), and renewable energy sources. The Eastern Interconnection States Planning Council (EISPC) has the potential to be the forum for state discussions on this topic.

Expand collaborative regional transmission planning and siting to enable future development of renewable electricity generation. Using economic evaluation methods that reflect the realities of the state social and political choices, such as including economic development values – rather than 20-year present-worth engineering evaluations or reliability-based analysis methods – may provide study solutions that are consistent with the states' goals. Otherwise, study processes should match the realities of political will.

Finally, a fully modernized grid is essential to provide service that is reliable, secure, cost-effective, efficient, safe, and environmentally responsible. To achieve the modern grid, a wide range of technologies must be developed and implemented. Smarter grid management capabilities, process management, and technologies that leverage key data from near or real-time monitoring, sensing, and decision support systems can enhance current capabilities related to:

- Substation and distribution automation
- Renewables integration
- Transmission line loss optimization
- Outage management

- Use of design processes, economic models and the consideration of technologies that address the potential economic and market uses of the transmission system. The solution for a multi-RTO system may not be appropriate for a single RTO system.

Challenges and Benefits

Key benefits of IRP, regional transmission planning and advanced grid management include:

- IRP provides a common framework for balancing the traditional goals of utility planning – reliable service, economic efficiency, environmental protection, and equity – by considering all supply and demand options as potential contributors and selecting an integrated set of least-cost resources that meets expected needs. The result is an opportunity to achieve lower overall costs than might result from considering only supply-side options. Furthermore, the inclusion of demand-side options presents more possibilities for saving fuel and reducing negative environmental impacts than might be possible if only supply-side options were considered.
- Economic power transfer maximization through the use of dynamic limits. Imposing dynamic limits means that if projects are not economically justified, they should not be built unless there is a reliability need. Some of the Midwest ISO transmission owners are using dynamic limits.
- Economic power transfer maximization through the use of system-wide reactive power applications. Reactive power applications can be installed in a shorter time than transmission lines can be constructed. Benefits could occur within two years.
- Development of economic cost-benefit studies that reflect the practices being used in the integration of renewable energy. A consistent method should be used across jurisdictions.
- All types of generation and demand response are considered equally when economic development and job benefits are considered.

Some of the key challenges with IRP, regional transmission planning and advanced grid management include:

- **Adhering to Proposed New Federal Energy Regulatory Commission (FERC) Rules:** In June 2010, FERC proposed reforms to the rules under which public utilities plan, and recover the costs, for transmission expansion. One significant new provision requires that transmission planning take into account public policy mandates, such as renewable portfolio and efficiency standards at the state level. These policy-driven mandates are leading to significant changes in the resources used to serve customers.
- **FERC authority.** FERC authority has been challenged on several fronts. In 2011 legislation was introduced significantly impacting FERC methodology for allocating costs for regional transmission lines.
- **Information about an engineering economics solution** for a few scenarios of generation forecasts and transmission expansions within the Eastern Interconnection was produced in the Joint Coordination System Planning Study and the Eastern Wind Integration Transmission Study (EWITS). Several reactions have indicated that a whole system conceptual design is not acceptable to some states and RTOs. The push for offshore wind is evidence that other paths will be taken. The study process, such as the EIPC, could be structured to reflect the inclusion of economic development and jobs into the study futures to reflect the realities of state's positions. EISPC could be the forum to choose the futures and the economic criteria that would reflect the realities of the state's positions. DOE could have the engineering approach studied to provide the "whole" future if required.
- **Addressing the variability of wind energy.** The EWITS study provided information about benefits that HVDC transmission could supply to make wind less variable on the aggregate.
- **Siting New Transmission – Jurisdictional Issues:** Poorly coordinated regional and interjurisdictional planning processes can impede the siting process for new transmission lines. Regulatory approval processes for new transmission facilities, routes and right of condemnation must be addressed and improved. Permitting processes at various stages and levels must be better coordinated and more consistent to address issues simultaneously and in a streamlined manner.
- **Rights of Way:** Above-ground lines require very large rights-of-way (as much as 200 feet wide), while underground lines require only a 20-foot right of way. However, underground installation is estimated to cost as much 10 times that of a comparable overhead facility – a price premium rarely deemed tolerable by either companies or public officials.
- **Who Pays:** Cost allocation problems are a serious roadblock for bringing new generation on line – especially for renewable energy that is generated in remote, rural areas. By proposing to tie cost allocation to the regional transmission planning processes, FERC has sought to facilitate the transition from planning to implementation in a way that builds on

existing processes. It allows each region the first opportunity to develop cost allocation mechanisms and identify for itself how the benefits of transmission facilities are to be determined.

- **Cost:** New lines are very expensive – building even 50 miles of transmission can cost hundreds of millions of dollars. Yet, relative to the cost of generation, new transmission is not always so expensive. However, there is no standard policy that determines who shares in that cost, or how much each party should pay. Cost and benefits should be evaluated together. Benefits should include economic development and jobs as well as the price of carbon displacement.

Who should implement this practice?

State or provincial governments, working with RTOs, should implement these practices.

Case Example | Minnesota Integrated Resource Planning

A number of states, including Minnesota and Wisconsin in the Great Lakes region, have implemented some form of IRP. The IRP process is designed to assure consideration of the long-term effects of resource choices and to ensure that the potential for conservation and renewable energy to meet need is fully explored in every case. Resource plans forecast the future energy needs of a utility's service area and describe proposed strategies for meeting those needs.

Minnesota's regulated utilities (via Minn. *Stat.* § *216B.2422*) are required to file Integrated Resource Plans with the Minnesota Public Utilities Commission (MPUC). Electric utilities in Minnesota, broadly defined to include any entity capable of generating 100,000 kW of electric power and serving 10,000 retail customers, must periodically file Integrated Resource Plans with the MPUC.

Minnesota Rules parts 7843.0100-7843.0600 require electric utilities to file proposed IRPs every two years which presents the utility's 15-year demand forecast and the utility's proposed capacity additions to meet the forecasted demand. There are a number of power companies that have filed IRPs with the MPUC.

The MPUC approves, modifies or rejects the resource plans of rate-regulated utilities. For other utilities, the PUC's recommendations are advisory only.

It is important to note that while capacity planning is performed by the individual utilities, the Minnesota Office of Energy Security has prepared a statewide resource plan as required by 2007 Minnesota Law, Chapter 136, Article 4, section 16. This study was completed in 2009 and is available online.[3] This was a one-time study required by the legislature to inform legislative policy. Appropriate resource planning continues to be done by individual utilities.

Minnesota Statutes, section 216B.2422 also prohibits MPUC from approving a new or refurbished nonrenewable energy facility unless the utility has demonstrated that a renewable facility is not in the public interest.

Case Example | California Energy Commission Renewable Energy Transmission Initiative

The California Energy Commission (CEC), in collaboration with the California Public Utilities Commission (CPUC), California Independent System Operator (CAISO), Northern California Power Agency, Southern California Public Power Authority, and the Sacramento Municipal Utility District, launched the Renewable Energy Transmission Initiative (RETI) in July 2007.[4] RETI is as an informal stakeholder collaborative to develop a conceptual statewide transmission plan that minimizes environmental impacts and economic costs and supports California's 33 percent Renewable Portfolio Standard goals. The 30-member collaborative includes state, federal, and local agencies; investor and publicly owned electric utilities; environmental organizations; renewable generation developers; ratepayer advocates; Native American tribal representatives; and others. Though it does not have administrative or legal standing, RETI can influence formal processes and procedures related to renewable energy infrastructure planning and permitting.

Transmission planning in California heretofore has lacked a statewide approach, with limited stakeholder participation. This resulted in transmission plans that did not have broad support, contributing to permitting issues and failures. RETI has helped transmission planning in the state now incorporate renewables. This is important since

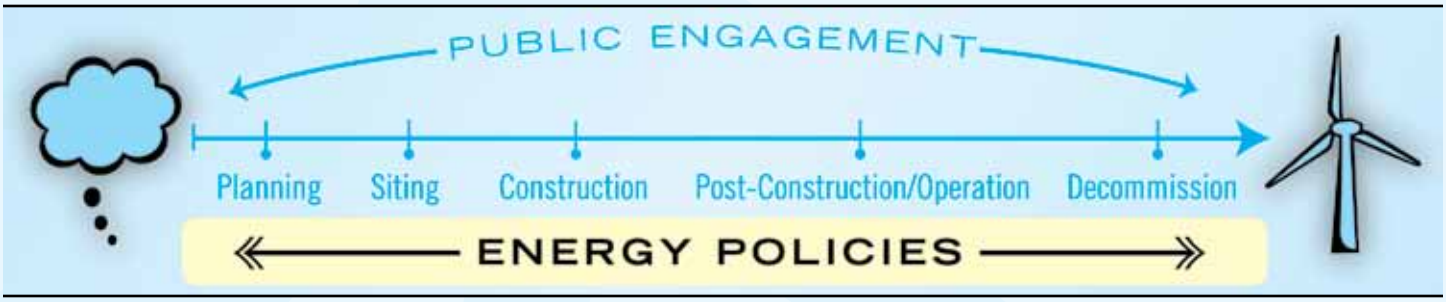
Case Example | California Energy Commission Renewable Energy Transmission Initiative, continued

most renewable energy sites, including wind projects, are remotely located and require lengthy transmission lines to interconnect to the grid. The RETI stakeholder collaborative benefits the public since it bolsters support for renewable energy and strives to improve public perceptions of its infrastructure needs.

The CEC has contributed $1.3 million in RETI facilitation and technical support, while the CPUC has contributed $1.1 million; other members of the Initiative have donated staff resources to it. Overall, RETI has been instrumental in fostering consolidated electric utility transmission planning that will directly feed into the CAISO transmission planning process. Additionally, RETI has catalyzed the CPUC's long-term generation procurement process for renewable energy. Further, it is being implemented by the Western Governors Association and the Western Electricity Coordinating Council under the Western Renewable Energy Zone Initiative.

When should this practice happen?

Integrated resource planning, transmission planning and grid management should occur throughout the development timeline. Ideally, these practices are in place before wind projects are developed and are periodically adapted and updated to reflect emerging issues and challenges.



Related Tools

Green Power Transmission and Consumer Savings | http://www.awea.org/documents/factsheets/Transmission_and_Consumer_Savings.pdf
This factsheet features a broad overview of wind energy and transmission from the American Wind Energy Association.

National Energy Technology Laboratory Smart Grid Implementation Strategy | http://www.netl.doe.gov/smartgrid/ | This site features resources and methods to accelerate the transition to a smart grid in the United States through the development of implementation strategies and tools.

Intelligent Utility | http://www.intelligentutility.com | This website provides a deep look at the smart grid and the systems, process and people necessary to delivering information-enabled energy.

Advanced Control Methods: A Systems View of the Modern Grid | http://www.netl.doe.gov/smartgrid/referenceshelf/whitepapers/Advanced Control Methods_Final_v2_0.pdf | This paper covers the following four topics: • Current state of Advanced Control Methods • Future state of Advanced Control Methods • Benefits of implementation • Barriers to deployment | The advanced control methods (ACM) featured in this paper comprise one of the five key technology areas that must be developed if we are to have a truly safe, reliable, and environmentally friendly modern grid.

Eastern Interconnection States' Planning Council (EISPC) | http://communities.nrri.org/web/eispc | The EISPC represents the 39 states and eight Canadian provinces located within the Eastern Interconnection electric transmission grid. It is comprised of public utility commissions, Governors' offices, energy offices, and other key government representatives. EISPC's charge is to evaluate transmission development options throughout the eastern interconnection. This is the first time in the nation's history that these entities will be working together, supported by funding from the U.S. Department of Energy.

1 http://www.midwesterngovernors.org/Publications/EnergyPlatform.pdf
2 http://www.aceee.org/policy-brief/utility-initiatives-integrated-resource-planning
3 http://www.state.mn.us/portal/mn/jsp/content.do?subchannel=null&programid=536917405&sc3=null&sc2=null&id=-536893812&agency=Energy
4 http://www.cleanenergystates.org/assets/Uploads/Resources-post-8-16/cesa-awardCECRETI.pdf

Great Lakes Wind Collaborative

Strategic Siting for Efficient Transmission Management

Best Practice #5

Strategically site wind developments to take advantage of existing transmission capabilities when possible and develop new electric transmission system infrastructure as needed to provide access to premier renewable energy. This will require collaboration in the planning and execution of transmission projects, while actively engaging the public and federal, state/provincial and local officials.

One effort that looked strategically at incorporating renewable energy projects into the grid is the Dispersed Renewable Generation (DRG) Transmission Study conducted by the Minnesota Office of Energy Security. The study analyzed transmission impacts of 1200 MW of new dispersed renewable generation located statewide in Minnesota. The analysis successfully demonstrated a DRG scenario where 600 MW of renewable energy could be sited without significantly affecting any transmission infrastructure. Extensive study and analysis showed that even dispersed generation can have substantial impacts on the electric grid, along with the possibility of existing interconnection requests in a utility queue or MISO queue that might occupy these potential DRG sites. However, dispersed renewables cannot ultimately provide the generation necessary for a high penetration renewables scenario (e.g., 20 percent wind).

Challenges and Benefits

While it is beneficial for wind developments to tie into the existing transmission infrastructure for cost, efficiency and environmental reasons, wind projects are far from load in many instances; having adequate transmission is key to their development. The need to strengthen, upgrade and expand the electric transmission system has emerged as a major concern of state/provincial and federal policymakers. The interstate high-voltage system has experienced increasing congestion, more instances of outage and failure, and lack of digitalization. Addressing these issues is critical to the country's economic health, its energy independence and security, and the reliability of electric service. Some other key challenges include:

- **Cost:** New lines are very expensive – building even 50 miles of transmission can cost hundreds of millions of dollars. There is no standard policy that determines who shares in that cost, or how much each party should pay.
- **Rights of Way:** Above-ground lines require very large rights-of-way (as much as 200 feet wide), while underground lines require only a 20-foot right of way. However, underground installation is estimated to cost about four times as much – a price premium rarely deemed tolerable by either companies or public officials.
- **Need for better mechanisms to incorporate land use and landscape values** – including private property, public lands, and sensitive environmental and recreational habitats.

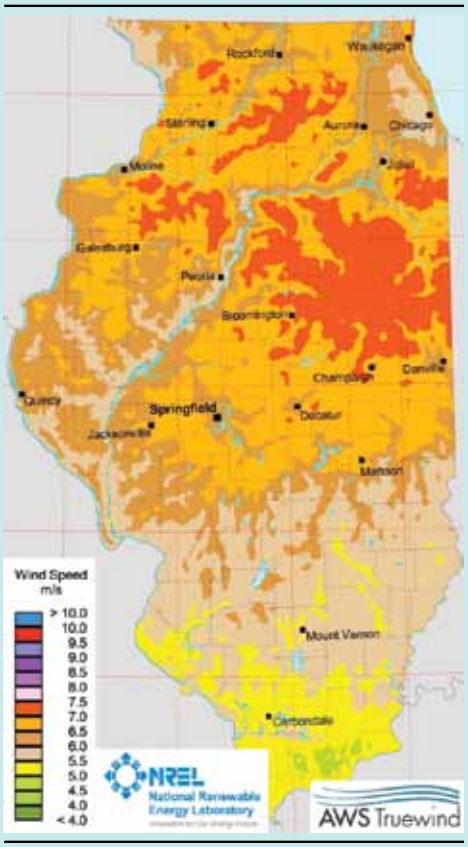
Who should implement this practice?

Developers should implement this practice, with input from transmission planning and state/provincial agencies.

Case Example | Illinois Electric Transmission Grid

Illinois has strong wind resources and a well-developed electric transmission grid. Illinois' electric load is primarily served by large coal and nuclear plants that use hundreds of miles of high voltage transmission lines to deliver power to users. Wind farms can tie into this existing infrastructure. States like Texas and the Dakotas have less-developed transmission infrastructure, and must invest millions of dollars building transmission lines to access their renewable resources.

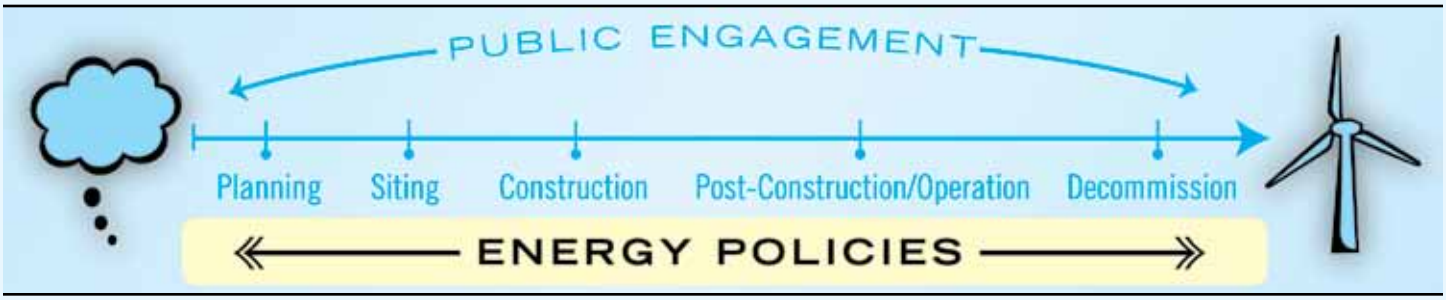
In the near term, companies are opting to harness wind power closer to existing transmission lines, usually near urban areas, to avoid the lengthy and costly process of building new lines.[1]



Huge electric transmission highways cut through many of Illinois' proposed or already-sited wind farms, mainly throughout central and northern Illinois, allowing wind farms to deliver power from project sites to the large electric load in the Chicago area and east throughout the PJM Interconnect. Source: National Renewable Energy Laboratory and AWS Truepower.

When should this practice happen?

Ideally, this practice is conducted before wind projects are developed and are periodically adapted and updated to reflect emerging issues and challenges.



Related Tools

Dispersed Renewable Generation Transmission Study | http://www.uwig.org/DRG_Transmission_Study_Vol_I_061608045236_DRGTransmissionStudyVolI.pdf | In May of 2007, then-Minnesota Governor Pawlenty and the Minnesota Legislature adopted a requirement for a statewide study of dispersed renewable generation potential, in the legislation enacting the Governor's Next Generation Energy Initiative. This report contains the analysis and results of the first phase of this study.

1 http://www.windforIllinois.org

Great Lakes
Wind Collaborative

Accessibility of Wind Project Documents

Best Practice #6

Availability of information is not the same as accessibility. Information may be available – it may have been produced – but it may not be easily accessible – that is, in a location that is easy to find. In many cases, only those who created the information may know it even exists. Making sure that documents and related information about wind projects are developed and made available where people can easily find and access that information can contribute significantly to the overall public perception of a wind project. Communities are more likely to feel comfortable with a proposed development if they have easy access to information about the permitting and approval process. Direct links to project information from state and local agencies and developers' web pages is one type of easy access. Having a staffed phone number to help people locate information online or in a public location can also make that information more accessible.

While some data gathered for environmental and other reviews may be proprietary, **all environmental information generated through publicly funded sources to support project applications or develop environmental review documents should be made available on easily located web pages on the internet.** An exception would be information that would conflict with the proprietary financial interests of the project proponent or sensitive data (e.g., specific locations of endangered or threatened species). Project applicants may apply normal intellectual property protections to information they gather, as long as they do not restrict the review agencies' access to the data or use in conducting their review functions. Where data are private, sharing summaries of the findings or related reports can be part of regulatory requirements. Documents contained in a wind project's application may also be subject to Freedom of Information Act requests (see Related Tools below.)

Challenges and Benefits

Locating information on a proposed wind project may sometimes present a significant challenge. To the extent possible, developers should provide access to wind project documents, including data from surveys and monitoring efforts, to help ensure that the permit review process and all succeeding phases of the project are based on the best information available. Agencies and developers that house this project data and information should enhance public access to this information through more direct outreach to project stakeholders, nearby communities and interested citizens. (See Community Support through Education and Outreach Best Practice.) It may require redesigning and reorganizing how information is conveyed and displayed and where it is located on the host web site to make it easier to find.

Access to wind project data and related information could also be very helpful in improving future policy and regulatory decisions, best practices and research (e.g., follow-up surveys/studies), and garnering public support. Unfortunately, data collected and studies performed with the use of private funds is generally not made available to the public oftentimes because it's not required to be made public or, in some cases, or may be proprietary. This obstacle can be overcome if developers concerned about sharing their data provide summaries of findings as suggested above. Regulators can require that summary materials be provided to the public without revealing the actual source data.

Who should implement this practice?

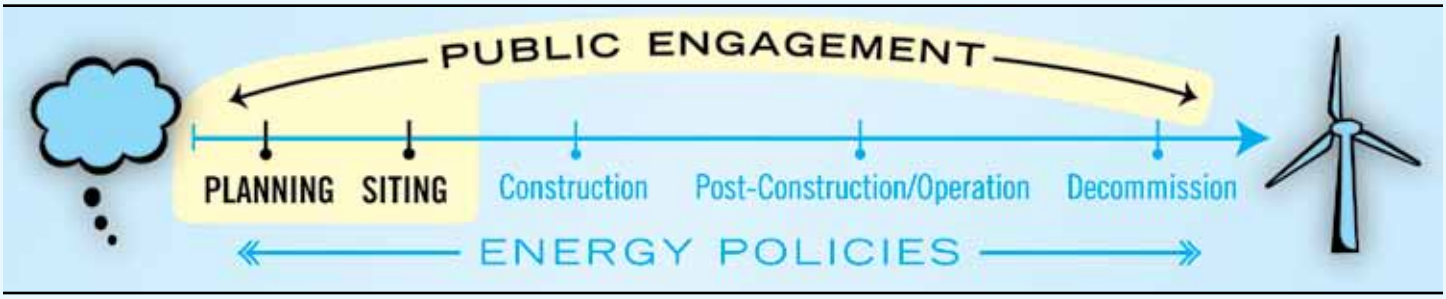
Developers and regulators, and others directly involved in a wind power project should implement this practice.

Case Example | May 1, 2007 Decision and Order of the Department of Energy on a FOIA Request

This case explores the filing under the Freedom of Information Act (FOIA) regarding a request by *Business Week Magazine* for pricing information for Renewable Energy Certificates (RECs). RECs are commodities that represent the environmental attributes of the power produced by renewable energy sources such as wind, solar or geothermal. These certificates can be used by certain energy purchasers to satisfy legislative or regulatory requirements that a percentage of their energy purchases come from suppliers of renewable energy. The case's decision concerns an appeal that *Business Week Magazine* filed in response to a determination that was issued to the magazine by the Department of Energy's (DOE) Western Area Power Administration (Western). In that determination, Western replied to a request for documents that *Business Week* submitted under the Freedom of Information Act (FOIA), 5 U.S.C. § 552, as implemented by the DOE in 10 C.F.R. Part 1004. However, Western withheld pricing information. Western cited FOIA Exemption 4 as its justification for withholding the pricing information. Exemption 4 exempts from mandatory public disclosure "trade secrets and commercial or financial information obtained from a person and privileged or confidential." 5 U.S.C. § 552(b)(4); 10 C.F.R. § 1004.10(b)(4). In its FOIA request, *Business Week* sought access to all contracts for RECs procured by Western on behalf of government agencies on or after Jan. 1, 2002. DOE concluded that Western incorrectly applied Exemption 4 in withholding the pricing information. Consequently, DOE remanded the matter to Western. On remand, Western was required to issue a new determination letter either releasing the information to Business Week or providing a new justification for withholding it. Any such justification was to include a complete explanation of how the FOIA Exemption cited was applied by Western. This case may set a legal precedent for future release of pricing information relative to RECs.[1]

When should this practice happen?

Public accessibility to wind documents should occur throughout the development timeline, but special efforts to apprise the public of the existence of these documents and to seek their feedback should be made throughout the planning, siting and permitting phases of a project.



Related Tools

New York State Wind Industry Code of Conduct | http://www.oag.state.ny.us/media_center/2008/oct/WindCODE%20FINAL.pdf | This set of guidelines for New York wind developers incorporates best industry practices and sets a new standard of transparency and public integrity that goes far beyond existing state law and what other industries must comply with. The Wind Industry Ethics Code for New York[2] calls for facilitating the development of renewable energy while helping assure that the industry is acting properly and within the law. The Code calls for oversight through an advisory Task Force and unprecedented transparency that will deter improper relationships between wind development companies and local government officials.

1 http://www.oha.doe.gov/cases/foia/tfa0197.pdf
2 http://www.ag.ny.gov/media_center/2009/july/pdfs/July 2009 Code of Conduct.pdf

Great Lakes
Wind Collaborative

Community Support through Public Engagement and Outreach

Best Practice #7

Like all sizeable developments, wind projects stand to benefit greatly from public engagement and outreach. Wind projects are relatively new to mainstream energy production, so the public may be less familiar with its advantages and disadvantages, or with the actual development process and ways to get involved. A lack of opportunity to learn more about a wind project or provide input on the development process can quickly turn into misperception leading to misinformation and, in the worse case, unretractable positions based on assumptions and misinformation.

Although there is general agreement that wind energy is cleaner than conventional power production, the footprint of a wind project across the landscape is relatively large. Landscape changes can be an uncomfortable concept for communities, particularly in rural areas where many landscapes have experienced little or no change over long periods of time. Ensuring ample opportunity for public outreach and engagement can improve public perception and even build support for a project. **Developers should maintain a high level of transparency, cultivate relationships with the surrounding communities and increase support for their projects by incorporating public involvement early in the planning process and continuing with public outreach throughout the life of a project.** Engaging a third or objective party that does not stand to benefit from the project to help with or lead the public outreach can help build credibility with local communities.

Information In: Early outreach should include gathering information from local conservation groups, landowners and community residents who can inform project planning – such as valued landscapes, cultural resources and other locally important information. This will help a developer discover which features of an area are important to the community before any decisions are made, and can build positive relations between developers and the community from the beginning. This is especially important when a developer is not locally known or does not have extensive knowledge of the region. Going beyond the required impact assessments can garner public support, which if maintained with other forms of public engagement, will be valuable throughout the life of a project.

Information Out: The community outreach process provides an important opportunity to educate community members not only about a proposed project, but about the related public policy issues of renewable energy, energy costs, and the economic, social and environmental tradeoffs related to energy development and consumption. Developers and community leaders should make specific efforts to educate citizens on these issues to ensure that their feedback on specific projects is well-informed. Transparency of process is an important part of this outreach. (See Accessibility of Project Documents Best Practice.)

Which Type of Outreach? Efforts should be explicit to encourage public engagement over basic outreach. For example, sending out a notice or putting information on a web site can be considered public outreach, but it is not public engagement. True public engagement exists where community members or the public have an active role, either in responding to or commenting on information released or participating in a meeting or workshop. Some methods of public involvement are more engaging than others, so it is important to choose an outreach mechanism that will facilitate dialogue and ensure that questions are answered. For example, an open house format tends to be less confrontational than a town hall meeting, and allows for conversations with members of the community and developers that can relieve fears and settle confusion. Outreach is an iterative process. Project proponents should build in adequate time and resources for multiple outreach events throughout the planning and construction phases of a project.

Where applicable, information should be readily available to the public on tools that will ensure fair and equitable land lease and easement agreements. A model land lease agreement could be such a tool. Such a model should include provisions for landowners who will be leasing their lands as well as "good neighbor" payments whereby developers provide some annual monetary compensation to non-participating residences near a wind farm. Like the lease agreements, good neighbor payments need to be developed in consultation with community members to ensure that they are meaningful but not excessive.

Challenges and Benefits

Projects with continuing public outreach efforts tend to generate greater public support. Beginning outreach early in the planning phase and continuing throughout the life of a project will likely contribute to the ease with which a project is carried out in subsequent phases. Public outreach also helps develop a public that is informed about the specifics of the project as well as the tradeoffs associated with different energy developments.

Involving the public in the planning process, asking for and then making use of input, and answering questions early and often can help appropriately and proactively address concerns. A vocal opposition does not necessarily mean a majority opposition. At the same time, working with a community that is informed or educated about the issues, but does not yet have a firm opinion on a specific project may be ideal, but that is rarely the case. More often, some individuals in a community have diverse levels of knowledge and opinions on a project or policy. Ongoing outreach and community engagement can reach broader segments of a community who may not have yet formed an opinion and who are quietly waiting to learn about how a wind development might impact them, positively or negatively. Special efforts must be made to reach out to members of the community who may be less engaged or less vocal in order to assess the true sentiments of a community. Public outreach and engagement cannot use a 'one size fits all' approach; rather, it must be iterative – which can be costly and time consuming – but is often imperative for a successful wind project.

Who should implement this practice?

Developers and community leaders, but also regulating agencies, consultants, and environmental/nongovernmental organizations should implement this practice.

Case Example | Gratiot County Community Involvement

As of 2011, Gratiot County, in the middle of Michigan's Lower Peninsula, already has one large-scale wind project under construction and is prepared to handle two more that are in the planning stages. The county's mostly agricultural community came together proactively to develop county-wide wind rules and regulations, explore the possibility of local wind farms, and answer questions from community members. The extensive community outreach process included meetings among officials, landowners, and experts, discussions with people who already live close to wind farms, and organized visits to the Mackinaw City Wind Project and a wind farm in Indiana where residents were able to see wind turbines up close and in operation. This thorough and balanced engagement process allowed

Figure 1: Planning Commissions from four townships in Gratiot County held a March 2010 Public Hearing and unanimously approved the Gratiot County Wind Project Special Use Permits.

Case Example | Gratiot County Community Involvement, continued

residents to settle their fears and answer all their questions, creating a community that was educated about and open-minded towards wind development. In turn, the open attitude towards wind and the uniform wind ordinances were an attractive situation for developers, which, combined with existing transmission capabilities and ample wind resources, drew wind developers to begin negotiating leases with landowners.

The Gratiot County Wind Project, scheduled to be operational by 2011, is predicted to supply energy security and electricity for 54,000 homes. In addition, it will bring in significant new tax revenue for the county, municipalities and schools, as well as jobs, and Pooling Easement payments for over 250 families, protecting Family Farms for future generations.

Case Example | Cuyahoga County Community Stakeholder Engagement Tactical Plan

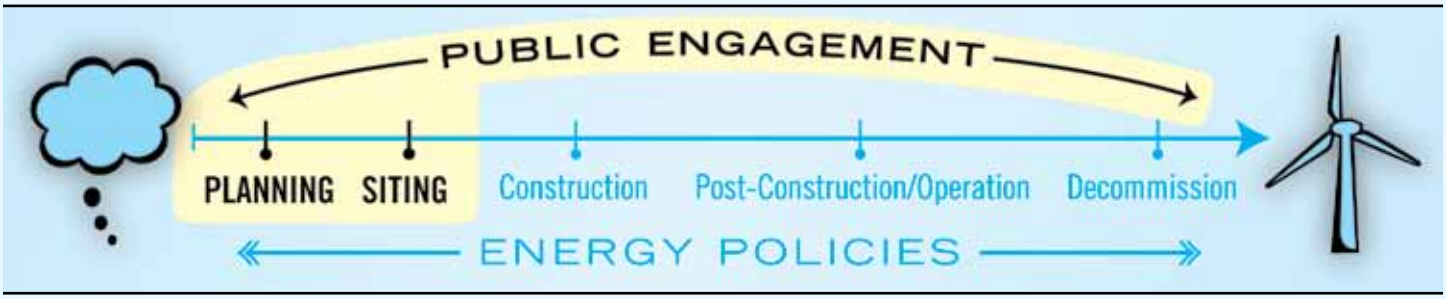
The Great Lakes Wind Energy Center offshore wind development project is a prime example of a project with an excellent plan for transparency, accessibility and public engagement throughout.[1] In a support role to the developer, Cuyahoga County, one of the counties affected by the proposed wind project off of the coast of Cleveland, prepared the project's Feasibility Study, which includes a *Community Stakeholder Engagement Tactical Plan* that calls for:

- Release of the Feasibility Study findings to the public through clear, concise and targeted messaging;
- Raising awareness of potential economic development opportunities;
- Increasing public awareness and education of the potential for wind energy development on Lake Erie by building relationships with local, regional and national stakeholders and media;
- Demonstrating the Great Lakes Energy Development Task Force's commitment to transparency and fiscal responsibility;
- Establishing the County as an advocate for responsible wind energy development and advanced energy;
- Highlighting success stories and positive impact on the community; and
- Engaging local stakeholders in ongoing educational efforts

To increase buy-in, understanding, and support for potential wind energy development on Lake Erie, included in the plan are strategies and tactics for communicating with and involving key members of the community in an effort to promote advanced energy projects in the region.

When should this practice happen?

Public outreach and engagement should occur throughout the development timeline, but special efforts should be made throughout the planning and permitting (siting) phases.



Related Tools

Wind Power Facility Siting Case Studies: Community Response | http://www.nationalwind.org/assets/publications/NWCC_Siting_Case_Studies_Final.pdf | The National Wind Coordinating Committee conducted a series of case studies to examine several communities and their concerns over proposed wind developments.

The American Wind Energy Association's Siting Handbook | http://www.awea.org/sitinghandbook/ | This Siting Handbook includes a chapter on public outreach and engagement. The handbook was created to provide tools and technical information for wind project siting.

Best Practices for Community Engagement and Public Consultation | http://www.canwea.ca/pdf/canwea-communityengagement-report-e-final-web.pdf | These best practices, compiled a set of best practices that address community engagement and public consultation to promote wind energy in Canada. The guide contains principles and practices, current regulations, and tools and source materials to enhance the public engagement process.

Related information for land lease and easement agreements

Wind Energy Easement and Lease Agreements | http://www.windustry.org/sites/windustry.org/files/LandEMain.pdf | This overview of easement and lease agreement goes over the importance of carefully reviewing all documents and general information for creating one.

Leasing Your Land to a Developer | http://www.windustry.org/leases | This Windustry webpage provides an overview of land leases and many additional references for easements and leases for landowners and the general public.

What Landowners Need to Know | http://www.wcirm.colostate.edu/pub_outreach/CourtneyFinal.pdf | A Graduate Student at the Western Center for Integrated Resource Management at Colorado State University put together a quick overview about wind energy land lease agreements.

Best Practices and Policy Recommendations | http://www.windustry.org/sites/windustry.org/files/LandEBestPractices.pdf | This Windustry document outlines general best practices in regards to wind energy easements and leases.

1 http://development.cuyahogacounty.us/pdf_development/en-US/GLWECFeasibilityRpt.pdf

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Visual Impact Assessments

Best Practice #8

Although there is strong public support for renewable energy and many individuals have favorable opinions about the aesthetics of wind turbines, the visual impact of a wind farm is one of the primary sources of public opposition. The large size, strong color contrast, unusual geometry, and blade motion associated with wind turbines, as well as the very large aerial extent of wind farms, can result in visual impacts at long distances from wind farms during the day. The synchronized hazard navigation warning lights on wind turbines can also cause visual impacts at night. Shadow flicker caused by moving wind turbine blades can cause visual impacts at short distances as well. Concerns regarding the visual impacts of utility-scale wind energy facilities have emerged as important factors in public opposition to wind development projects. Assessing visual impacts can help distinguish between real and perceived visual impacts and discern the level of impact on sensitive visual resources**. As part of the public engagement process, developers should conduct a visual impact assessment.**

Best practices for visual impact assessment include the following:

- An assessment of visual resources needs to be part of the project's early pre-planning phases and continued throughout the life of the project. A professional landscape architect should be part of the planning team evaluating visual resource issues as project siting options are considered. The planning team should utilize procedures for conducting detailed visual resource analyses that identify and map landscape characteristics, key observation points and viewsheds, prominent scenic and cultural landmarks, parks, and other visually sensitive areas near the project location.
- Appropriate land management agencies, planning entities and a locally based public should be consulted to provide input on identifying important visual resources in the project area and on the siting and design process. The public should be involved and informed about the visual site design elements of the proposed wind energy projects. Possible approaches include conducting public forums for disseminating information regarding various aspects of wind energy development, such as design, operations, and productivity; offering organized tours of operating wind energy development projects; using computer simulation and visualization techniques in public presentations; and conducting surveys regarding public perceptions and attitudes about wind energy development.
- Spatially accurate and realistic photo simulations of wind turbines in the proposed location should be prepared as part of the impact assessment. Simulations should show views from sensitive viewing locations, such as residences and scenic areas as well as other typical viewing locations. Stakeholders should be involved in selecting key observation points for simulations. Simulations should portray a range of lighting conditions and sun angles. Simulations should be based on accurate spatial information, particularly elevation data, and must account for screening vegetation and structures. Simulations should show enough of the surrounding landscape to show the project in the appropriate spatial context, and should be reproduced at a large enough size to be comfortably viewed from the appropriate specified distance to accurately depict the apparent size of the facility in a real setting.

- The impact analysis should include discussion of the nature and magnitude of potential visual impacts of the project (including roads, non-turbine structures, and associated transmission infrastructure in addition to the wind turbines) on lands within the project viewshed, especially in areas with high aesthetic qualities and where neighboring properties may be impacted by the siting. The analysis should include discussion of both day and night-sky impacts.
- The impact analysis should include accurately determined shadow flicker estimates, which should be made available to stakeholders in advance of project approval. If turbine locations are changed during the siting process, shadow flicker effects should be recalculated and made available to potentially affected stakeholders.

Public engagement and consultation concerning visual impacts and visual impact mitigation should continue throughout the entire siting and development process. (See Community Support through Public Engagement and Outreach Best Practice.)

Challenges and Benefits

Developers typically find it difficult to site wind farms in universally appealing locations, so there will often be some amount of opposition to a project due to concerns about potential visual impacts. Accurate and thorough visual impact assessments will help to reduce opposition based on incomplete or inaccurate information about potential visual impacts, and provide a sound basis for developing effective mitigation strategies.

Visual impact assessments may not be required by regulatory agencies, and therefore developers may not budget in the time or financial resources to conduct a visual impact assessment for their project; however, failure to do so may put the project at risk of delay or cancellation.

Who should implement this practice?

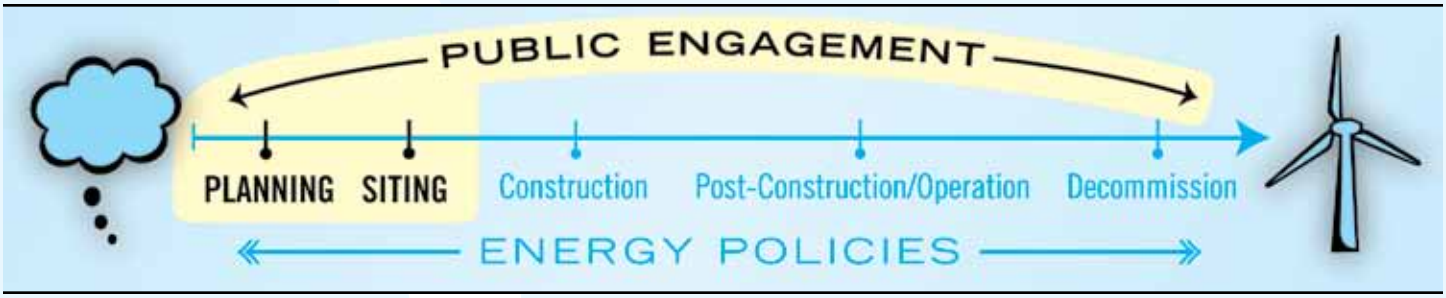
Developers and regulatory agencies should implement this practice.

Case Example | Viewshed Analysis for Proposed New York Wind Farm

Completion of a viewshed analysis for a proposed wind power development in Jordanville, N.Y., led to further analysis of Otsego Lake. The lake, a historic district with views and scenery barely changed for the past 100 years, was an area that might be permanently visually impacted by the installation of 399-foot-tall wind turbines. It was requested that Stone Environmental, Inc. help answer the question "specifically, which towers are most visible from the lake?" It was decided with the client that visibility of a tower needed to be modeled at two heights: nacelle height (262 ft.), and tip-of-blade height (399 ft.). As a result, Stone Environmental produced a location map and 76 maps showing what area of the lake was visible for each of the 76 turbines. Using the tabular portions of resulting data, custom queries were written to aggregate results and produce tables and charts, highlighting statistically, the most visible turbines.

When should this practice happen?

Visual impact assessments should be conducted during the planning and siting phases of a project and used as part of the public engagement process.



Related Tools

A Visual Impact Assessment Process for Wind-Energy Projects | http://www.cleanenergystates.org/assets/2011-Files/States-Advancing-Wind-2/CESA-Visual-Impacts-Methodology-May2011.pdf | The Clean Energy States Alliance produced a set of best practice recommendations for evaluating the visual impacts of wind projects. The report is a thorough look at all parts of a visual impact assessment, including involving the public and issues unique to different types of projects.

Visual Representation of Windfarms: Good Practice Guidance | http://www.snh.org.uk/pdfs/publications/heritagemanagement/Visual Representation of windfarms - excerpt.pdf | This guidance document, developed by consulting firms in Scotland, goes over best practices for developing visual representations and visual impact assessments for wind farms. The report includes detailed technical information for creating visual models and guidance for presenting them to the public.

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Noise Impact Assessments

Best Practice #9

Noise and various sounds emanating from wind turbines, particularly those near human dwellings, are a concern raised by many citizens near wind projects. Wind project developers should be prepared to address noise concerns as part of the project planning process.

Wind turbine manufacturers have made significant strides in reducing turbine noise since the early days of the industry. However, because wind projects are typically located in rural areas where pre-existing background sound levels are low, an assessment of potential impacts to neighbors and other sensitive receptors is a wise investment of resources. Applicable environmental impact review and local land use laws often require that such studies be conducted.

Some states and provinces already have noise ordinances in place, while some local communities have elected to develop their own noise ordinance. Many communities have specific noise limits at property boundaries in the nuisance provisions of their local ordinances. Creating or adapting an already-developed noise model may be a requirement for approval of some wind projects. At the same time, even if not required by law, noise models can be a useful tool to inform and involve the public. **Developers should use available noise models to assess noise impacts from wind energy projects. Similar to visual impact assessments, noise impact assessments should be conducted to effectively communicate to the public the extent of noise impacts throughout the landscape and community.**

There are many factors that may need to be taken into consideration to thoroughly assess noise and sound impacts from wind turbines. Therefore, it is important to have an experienced acoustical consultant evaluate projected sound emissions from a proposed wind project site and help develop appropriate sound mitigation measures when necessary.

It is important to note that each individual may have a different sensitivity to various types of noise. In some situations, those who are opposed to or not part of a wind project may be more annoyed by the same sound than those who are in favor of, or directly involved in the project. Operational noise could also be a barrier to wildlife and should be included in site specific studies.

Challenges and Benefits

Finding accurate and applicable information on noise issues associated with wind turbines can be a challenge for communities. Misinformation can easily sway the public, so it is critical that a developer use the best available science to communicate potential noise impacts of wind turbines to the public. This information should be made available and easily accessible.

Noise can be a serious issue, with alleged health impacts ranging from annoyance and sleep disturbance to headaches and dizziness. There are many factors that affect the discernable sound from wind turbines, such as ambient noise, wind speed, distance, turbine model, and housing construction. These factors need to be considered and evaluated as part of the noise impact assessment.

Wind projects could benefit by implementing any of the following mitigation measures to help meet local sound limits and to address the concerns of sensitive nearby residents or other sound receptors[1]:

- Siting turbines beyond a minimum setback distance to all residential structures (such setbacks may be prescribed by local ordinance or negotiated with local officials);
- Implementing best management practices for noise abatement during construction, including use of appropriate mufflers and limiting hours of construction;
- Limiting the cutting/clearing of vegetation surrounding the proposed substation;
- Adding landscape features to help screen specific receptors;
- Keeping turbines in good running order throughout the operational life of the project.
- Notifying landowners of certain construction noise impacts in advance (e.g., if temporary blasting becomes necessary);
- Pursuing development agreements with neighbors whose residence is located within a certain distance of a project turbine; and
- Implementing a complaint resolution procedure to assure that any complaints regarding construction or operational noise are promptly and adequately investigated and resolved.

Who should implement this practice?

Developers will have the onus of performing a noise impact assessment to either comply with regulatory requirements or to garner necessary public support for a project. However, academic institutions, regulators and consultants can all help in conducting noise impact assessments. Likewise, these same players can contribute in developing new noise assessment models and related analysis tools and methods, as well as ensure their appropriate application and interpretation of results.

Case Example | Port Alma, Ontario Wind Farm Noise Impact Assessment

The Port Alma Wind Farm, owned by Kruger Energy, is located in Southwest Ontario on the north shore of Lake Erie and has 44 wind turbines. As part of the planning process for the wind farm, Kruger Energy requested an environmental noise impact assessment. Aercoustics Engineering Limited, the company who conducted the assessment, first performed tests to find the ambient noise level at various monitoring sites throughout the area affected by the proposed wind farm. Their report details the classification of each part of the affected area, how they are classified, and the sources of noise. The report explains all the different parts of the proposed wind farm that will produce noise, and their cumulative effects throughout the area – based on wind speed, wind direction, location, and other factors.

Construction of Port Alma Wind Farm, Ontario. Photo credit: Ironworkers Local 700, 2007.

The noise impact assessment[2] concluded that "The noise impact from the Project does not exceed the most restrictive nighttime noise limits that apply for areas with acoustic designation of Class 3 (Rural) as defined by the MOE [Ontario Ministry of Environment]. Consequently, there is no need for the application of any mitigation measures and no further studies are contemplated for environmental noise in relation to the Project."

This noise impact assessment included detailed maps of the planned site, graphs for each of the ambient noise testing locations, diagrams for parts of the wind turbines and transformers, and extensive technical information regarding the noise impacts of the wind farm. Notably, the report also included a detailed contour map that showed the projected level of sound throughout the area.

The Port Alma Wind Farm was completed in the fall of 2008 and has an installed capacity of 101.2 MW, about enough electricity to power 30,000 homes each year. The wind farm spans an area of approximately 285 km2, centered around the community of Port Alma. Kruger Energy is under contract to sell renewable energy to the Ontario Power Authority for a period of 20 years.[3]

Case Example | Huron County, Michigan Post-Construction Monitoring Requirements

Huron County, located in the Thumb area of Michigan along Lake Huron and designated as a primary wind zone area, explicitly lays out rules for wind developers regarding noise. The Huron County Wind Energy Conversion Facility Overlay Zoning Ordinance became effective in November, 2005. The ordinance outlines a cap on ambient and short-term noise levels at any residence – up to 50 decibels or the ambient plus 5 dBA (whichever is greater) for no more than 10% of any hour. This criterion applies to both participating and non-participating residences except where waivers have been obtained. According to the ordinance, "the applicant shall be able to provide sound pressure level measurements from a reasonable number of sampled locations at the perimeter and in the interior of the Wind Energy Facility to demonstrate compliance with this standard."

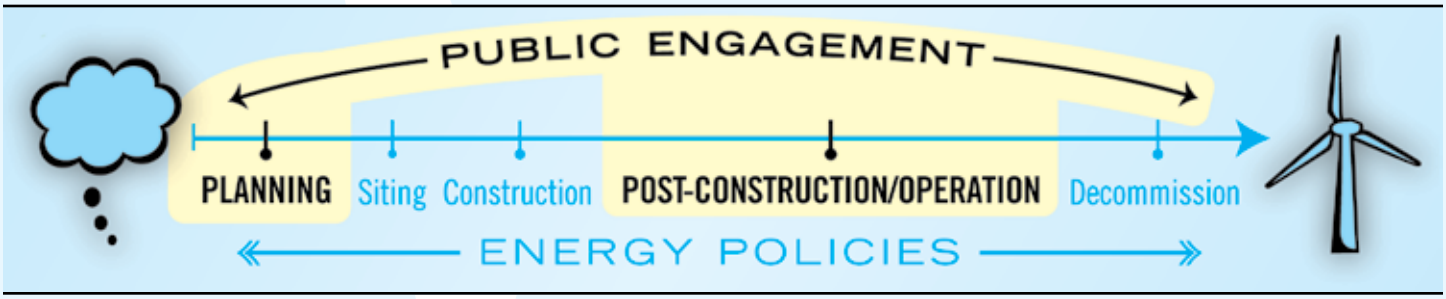
The ordinance addresses community concerns by requiring all developers to conduct post-construction noise monitoring. This post-construction monitoring, submitted as part of a required annual report, must show evidence of continuing compliance with all county codes and ordinances. If the county calls any part of this report into question, however, it can undertake a separate report to investigate compliance, to be reimbursed by the owner of the energy facility. This scrutiny over adherence to the county's noise ordinances (as well as other applicable ordinances) can alleviate community concerns without causing undue financial stress to the county.

An example of where the Huron County ordinance's noise rules have been applied is at the Michigan Wind 1 Wind Farm near the town of Ubly, owned and operated by John Deere Renewables.[4] The wind farm is a 69 MW project consisting of 46 GE 1.5 MW wind turbine generators. Epsilon Associates, Inc. conducted a comprehensive post-construction sound level measurement program in the fall of 2009 around the wind farm. Both A-weighted and one-third octave band sound levels were measured at 14 different locations in the interior and around the perimeter of the wind farm over a 20-day period at both participating and non-participating landowner properties. Measurement locations were selected to represent the closest residences to wind turbines to take into account the worst-case sound levels. Over 4,000 hours of sound level data were collected and analyzed. The American National Standards Institute (ANSI) procedures for outdoor measurement of sound pressure level were followed in collecting, reporting, and analyzing the data.

Results of the noise study found that sound levels due to the wind turbines under peak power output conditions were generally at or below the Huron County noise limit of 50 DBA. However, two participating properties and one non-participating property were measured at 51 DBA under worst-case conditions, which is just over the limit.

When should this practice happen?

Noise impact assessments should be conducted as soon as adequate data is available. Early assessments may need to use assumptions. Post-construction noise impact assessments should be conducted as soon as wind projects are operational and noise monitoring should occur periodically throughout the life of the project.



Related Tools

Utility Scale Wind Energy and Sound | http://www.awea.org/learnabout/publications/loader.cfm?csModule=security/getfile&PageID=4138
This factsheet, prepared by the American Wind Energy Association, provides a quick overview of the science behind wind energy and sound.

Wind Turbine Sound and Health Effects | http://www.awea.org/learnabout/publications/loader.cfm?csModule=security/getfile&PageID=5728
A science advisory panel appointed by the Canadian Wind Energy Association and the American Wind Energy Association has prepared a document on the sound and health effects of wind turbines. This document is intended to be used as a reference for policy makers and regulators and includes a review, analysis, and discussion of peer-reviewed literature.

Wind Turbines and Sound: Review and Best Practice Guidelines | http://www.canwea.ca/images/uploads/File/CanWEA_Wind_Turbine_Sound_Study_-_Final.pdf | The Canadian Wind Energy Association prepared these best practices to address dealing with noise issues and wind turbines in Canada.

1 http://www.awea.org/sitinghandbook/downloads/Chapter_5_Impact_Analysis_and_Mitigation.pdf

2 http://www.krugerenergie.com/imports/pdf/port_alma/en/EnviroScreeningRpt/E - Noise Assessment/PortAlmaENIA.pdf

3 Photo: http://ironworkerslocal700.com/photo_g.php

4 Epsilon Associates, Inc. *Sound Level Measurement Report: Michigan Wind 1 Wind Farm, Huron County, MI.* January 29, 2010.

Great Lakes Wind Collaborative

Comprehensive Environmental Assessments

Best Practice #10

Before a location is selected, the siting process for a wind development should include steps to minimize both environmental and social impacts. Best practices that will help to maximize the effectiveness of this process are outlined below. These include, but are not limited to: determining unique community considerations such as noise and visual impacts, avoiding sensitive wildlife habitats, protecting water quality, and examining other environmental impacts (See Best Practices related to Visual Impact Assessments, Noise Impact Assessments, Site Plans and Constraints Maps, and Stormwater Pollution Prevention Plans.)

Unease about the effects of new wind development on local and migrating wildlife can be a huge concern for the public, hence it is essential to identify and **avoid areas where legally protected wildlife, such as threatened and endangered species, are present or potentially present**, including known migration corridors and breeding areas for these species. (See Site Plans and Constraints Maps Best Practice.) Furthermore, in many areas it is necessary to recognize that other seriously declining or vulnerable species that have no legal protection may also be present and should be avoided.

Local citizens and businesses can be a wealth of knowledge about non-protected species and other local environmental sensitivities. **Developers should consult with appropriate resource management agencies (e.g. federal, state, and/or local) and reach out to local conservations groups and landowners to determine where there are environmental sensitivities such as valued landscapes, sensitive visual resource areas, natural communities, plant communities, wildlife habitat, cultural resources and other local concerns that can be used to inform the environmental assessment.** This discussion should be initiated early in the process to address all resources of special concern in the area under consideration. This outreach to local residents and businesses can help the planning process but may also be considered part of the public engagement process.

Where regulations do not exist to ensure environmental impacts are adequately assessed, avoided and/or mitigated, states should establish or be signatories of state-industry cooperative agreements that call for use of environmental studies to provide guidance and consistency for development of wind project sites. Such cooperative agreements should standardize wildlife monitoring and impact review procedures for vulnerable species such as eagles and bats. (See Standardized Environmental Survey Protocols Best Practice.) Additionally they should address direct and indirect impacts of wind projects on state-listed 'priority' breeding wild birds. Such cooperative agreements may also include guidance for mitigating the visual and noise impacts of wind developments.

When selecting indicator or representative species to consider, focus on those likely to use the blade swept area, known to be affected by turbine presence and operations (e.g., structure sensitive species), and germane to the setting for the proposed wind farm. Establish baseline data about numbers, usage, population trends, etc. from literature and expert interviews.

Challenges and Benefits

A comprehensive assessment of environmental, cultural and community impacts requires gathering a large amount of baseline information from many disparate sources. It is often difficult to gather all necessary information in a timely manner. Additionally,

due diligence in gathering information still may still not guarantee that the best and most recent information is available. Scientific research and frequent communication with regulators is essential, as well as seeking involvement from and consultation with local communities. Not all states have a formal EIS or EA process; an environmental assessment can address these issues where such a regulatory process is not in place.

Although scientific research and communication with regulators and local residents to assess impacts and analyze all constraints can be difficult and time consuming, it will often lead to wind development projects that are sited in areas with lower environmental impacts and that are less subject to public opposition.

Who should implement this practice?

Developers should take the lead in conducting the actual assessment and gathering the necessary information to ensure comprehensiveness, but regulators and local communities should assist in providing the necessary and desired information.

Case Example | Chanarambie Wind Power Facility – Murray County, Minnesota

This 57-turbine, 85.5 MW wind farm site is located on Buffalo Ridge in Murray County, Minnesota (including Cameron and Chanarambie townships), on a site of approximately 6,000 acres. Murray County has a population of about 9,000 people and a land area of 704 square miles. The area is located in southwestern Minnesota and is mostly rural.

Wind Turbines along Buffalo Ridge, Minnesota. Photo credit: Joe Karlisch, 2006.

The Minnesota Environmental Quality Board (MEQB) is the permitting body with authority to issue site permits for large projects. It is Minnesota state policy to site large wind energy conversion systems (systems over 5 MW) in "an orderly manner compatible with environmental preservation, sustainable development, and the efficient use of resources."

Minnesota siting application permits must contain, among other things, an analysis of the potential environmental impacts, proposed mitigation measures, and any adverse environmental effects that cannot be avoided. Review and comment on this analysis constitutes environmental review.

The Chanarambie wind project had a very comprehensive environmental analysis[1] conducted. Consistent with MEQB regulations, various exclusion and avoidance criteria were taken into account in the selection of the project site from a large area under consideration. To support this siting decision, surveys and studies of the proposed project site were undertaken to assess the presence or absence of:

- National and state parks, wildlife refuges, wildnerness areas, monuments, historic sites and districts and special designation riverways and trails
- State wildlife management, scientific and natural areas
- Nature Conservancy preserves
- County and municipal parks
- Registered historic sites and districts
- Prime farmlands
- Vegetation
- Wildlife
- Rare and Unique Natural Resources
- Streams and wetlands
- Avian nesting areas and migration routes

Case Example | Chanarambie Wind Power Facility – Murray County, Minnesota, continued

The environmental analysis also included studies, impacts and mitigative measures for other environmental factors including:

- Cultural/Archaeological
- Topography
- Soils
- Geologic and Groundwater Resources
- Surface Water and Floodplain Resources
- Adverse Human and Environmental Effects Which Cannot be Avoided

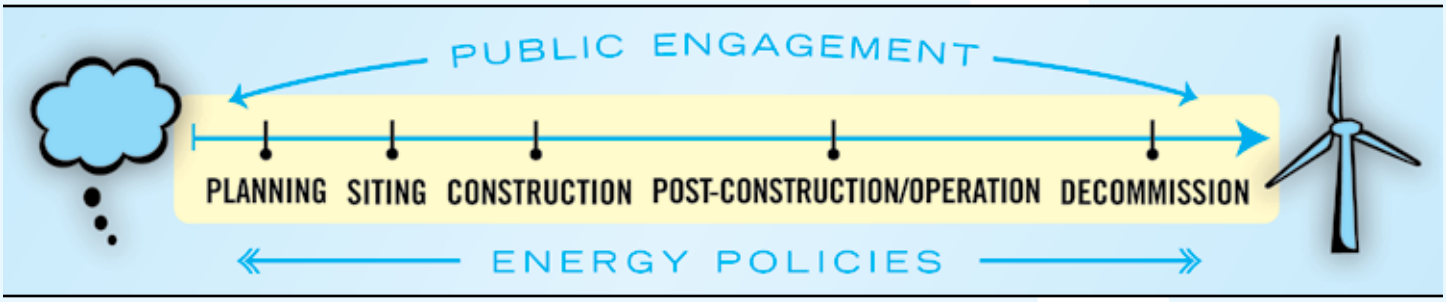
Additionally, effects on the surrounding human environment were studied including residential areas, potential visual resource impacts, public services/infrastructure, public health and safety, land-based economics, tourism and community benefits, and recreation resources.

As a requirement for the first permit issued for a large wind energy conversion system in 1995, the MEQB required Northern States Power Company (now Xcel Energy) to conduct an avian study to determine the effect of the turbines on avian mortality. These studies were evaluated by the MEQB in approving the project. After a four-year study, investigators reported no significant avian impacts in the Buffalo Ridge area from the turbines.

An additional two-year study was required to determine the effect of the turbines on bats. The final report indicated migratory bats as the primary bat deaths occurring and a higher number of dead bats were found during July and August, when the turbines were least operational. The study was completed by Western Eco Systems Technology. [2]

When should this practice happen?

Initial outreach to gather information from the community and written documentation should begin early in the planning phase, but the environmental assessment should be used to inform siting, and construction activities, as well as any post construction monitoring and decommissioning.



Related Tools

U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines and Eagle Conservation Plan Guidance | http://www.fws.gov/windenergy/ On February 18, 2011, the U.S. Fish and Wildlife Service two draft guidelines were published in the Federal Register: *Land-Based Wind Energy Guidelines and Eagle Conservation Plan Guidance.* As of press time of this document, both sets of guidelines were open for public comment. The documents are part of the agency's ongoing efforts to improve siting and permitting of renewable energy projects. Visit the web site above for updates.

Ohio Department of Natural Resources Terrestrial Wind Energy Voluntary Cooperation Agreement | http://www.dnr.state.oh.us/LinkClick.aspx?fileticket=GsssB%2BJeczA%3D&tabid=21467 | Through this Voluntary Cooperation Agreement, the Ohio Department of Natural Resources (ODNR) sought to coordinate wind energy projects with wind energy developers in order to work collaboratively to ensure that wind-energy development project sites are developed in both an environmentally conscientious manner and with best regard to the conservation of the state's wildlife resources.

Pennsylvania Game Commission's Wind Energy Voluntary Cooperative Agreement | http://www.portal.state.pa.us/portal/server.pt?open=514&objID=622430&mode=2 | On April 18, 2007, the Pennsylvania Game Commission signed cooperative, voluntary agreements with 12 companies to avoid, minimize and potentially mitigate any adverse impacts the development of wind energy may have on the state's wildlife resources. There are now 30 wind industry cooperators who have signed on.

New Jersey Department of Environmental Protection Ocean/Wind Power Ecological Baseline Studies | http://www.nj.gov/dep/dsr/ocean-wind/ The objective of this 2010 effort was to conduct baseline studies in waters off New Jersey's coast to determine the current distribution and usage of this area by ecological resources. This is a good example of data gathering by regulators that resulted in leveraging existing data to expedite environmental review processes for offshore wind projects.

Siting Guidelines for Windpower Projects in Kansas | http://www.kansasenergy.org/documents/KREWGSitingGuidelines.pdf | The Environmental and Siting Committee of the Kansas Renewable Energy Working Group drafted these guidelines for use by wind power project stakeholders to consider potential project sites in the State of Kansas.

AWEA Wind Energy Siting Handbook - Chapter 3: Critical Environmental Issues Analysis | http://www.awea.org/sitinghandbook/downloads/Chapter_3_Critical_Environmental_Issues Analysis.pdf | This handbook informs wind energy developers and other interested parties about environmental siting issues relevant to land-based commercial-scale wind energy project development in the United States. The handbook was designed to provide technical information and useful tools based on the industry's collective experience in siting wind energy projects and assessing potential impacts.

National Wind Coordinating Collaborative (NWCC) Permitting of Wind Energy Facilities handbook | http://www.nationalwind.org/assets/publications/permitting2002.pdf | This 2002 revision of the original 1998 handbook provides guidance to decision-makers and agency staff at all levels of government, wind developers, interested parties and the public in evaluating wind projects.

1 http://www.eqb.state.mn.us/pdf/2001/Chanarambie.pdf

2 http://www.nationalwind.org/assets/publications/NWCC_Siting_Case_Studies_Final.pdf

Great Lakes Wind Collaborative

Site Plans and Constraints Maps

Best Practice #11

A successful and well-received wind development requires extensive research and careful planning. **Developers should create a site plan with sufficient detail to describe the nature and scope of the proposed project, the attributes of the specific location, as well as any potential issues or questions relating to the site chosen.** Important considerations in creating a site plan include using the latest information from a comprehensive environmental assessment, and making sure to address the potential environmental and community resources/concerns below, including any regulatory buffers surrounding them.[1] (See Environmental Assessments Best Practice.)

a.	Wildlife, vegetation and critical habitat, including wetlands, floodplains and other sensitive and/or protected areas	b.	Surface waters, drinking water supplies
c.	Visual resources	d.	Noise (identified by state and local standards)
e.	Historic, cultural, and archeological resources	f.	Roads, trails and recreational areas
g.	Existing commercial uses of site (e.g. agriculture, commercial fishing, recreational boating, etc.)	h.	Electric transmission lines; oil and gas wells; oil and gas transmission, gathering and service lines; sub-surface mining operations; and other infrastructure/facilities
i.	Aviation and defense radar resources	j.	Marine transportation resources (offshore)
k.	Soil erosion and dust impacts	l.	Safety issues
m.	Community and residential area issues, including schools, hospitals, and churches	n.	Areas of known geotechnical instability
o.	Fire risks (e.g., grassland fires at site)	p.	Other resources/concerns and land use constraints of local importance

Using the information gathered through the environmental assessment including both regulated and non-regulated environmental and cultural sensitivities, **developers should develop a constraints map to document and visually communicate all of the environmental concerns and restrictions that apply to an area, thereby illuminating the best location to site a wind development** (e.g., where there are few or no constraints). The constraints map should also reflect local zoning regulations, including setback requirements, land use restrictions, and infrastructure constraints.

Because impacts to some resources may occur at substantial distances from the project site, e.g. noise and visual impacts, the constraints map should include all important potentially affected resources near the project site; for visual resources, within the project viewshed, impacts may occur 15 miles (40 km) or more from the project site.

Challenges and Benefits

Like environmental assessments, successful site planning and constraints mapping requires gathering a large amount of information from many disparate sources. It may often be difficult to gather all necessary information in a timely manner. Starting the ef-

fort early in the planning process is important, as is frequent communication with regulators, and proactively seeking involvement from and consultation with local communities.

Identifying potential issues early in the planning process leads to better quality planning, and better public engagement – this normally translates into better results. A constraints map is a useful tool for graphically depicting the environmental and land use constraints that limit the desirable area for development at a site. The constraints map enables the developer to ascertain the number of turbines that can be located on the site. It also identifies features that may present challenges for siting ancillary facilities. The constraints map uses a base map that shows the wind resource and parcel information. Mandatory or other appropriate setbacks can be overlaid on the map.

A constraints map facilitates better tradeoff analysis when considering impacts to multiple resources. Effective early site planning can also identify poor sites for a wind development, as well as hidden project costs before a lot of resources and public goodwill is spent. The constraints map is a very effective communication tool for stakeholder engagement.

Who should implement this practice?

Developers should take the lead in conducting the actual assessment and gathering the necessary information to ensure comprehensiveness, but regulators and local communities should assist in providing the necessary and desired information.

Case Example | Ontario Power Authority Analysis of Future Wind Farm Development in Ontario

In 2006, the Ontario Power Authority (OPA) prepared an Integrated Power System Plan (IPSP) to guide the evolution of Ontario's power system and ensure that it will satisfy increased demand. Amongst numerous other objectives, the IPSP assembled data and characteristics of individual renewable energy supply options and defined the characteristics of future potential renewable energy projects. In this context, Helimax Energy Inc. (Hélimax) was commissioned by the OPA to identify the best locations for future wind power projects in the province.

The purpose of the study was to identify and prioritize sites for the development of large wind farms. The sites identified in the study were chosen based on a number of specific criteria. These criteria – the basis for the location, evaluation and ranking of sites – fell into two categories: constraints and factors. Constraints were used to zone out or discard areas considered unsuitable for wind development, while factors served to qualify and rank the remaining potential sites.

Hélimax's approach first consisted of combining wind speed data from the Ontario Wind Resource Atlas with a land-use and topographic analysis. By superimposing the results of the constraints analysis on the wind speed maps, it was possible to understand the geographical distribution of the resource and quantify the constrained potential within the province. The retained sites were then ranked based on a number of site-specific factors and a weighting mechanism was employed to reflect the relative importance of one factor versus another in project siting.

The constraints used were attributed values of either 1 or 0. For example, an airport is considered unsuitable for wind energy development and was assigned a value of zero and excluded from all further analysis. Areas that were considered developable were assigned a value of 1 and included in the analysis. In some cases certain constraints had associated buffers. The table below provides the constraints considered in this analysis and their associated buffer zones. These buffer zones are generally considered appropriate during the site selection process. For example, while the buffer zone of 550 m around houses is restrictive, especially in densely populated southern Ontario, it is a reasonable distance to ensure conformity with the Ministry of the Environment's noise specifications.

Case Example | Ontario Power Authority Analysis, continued

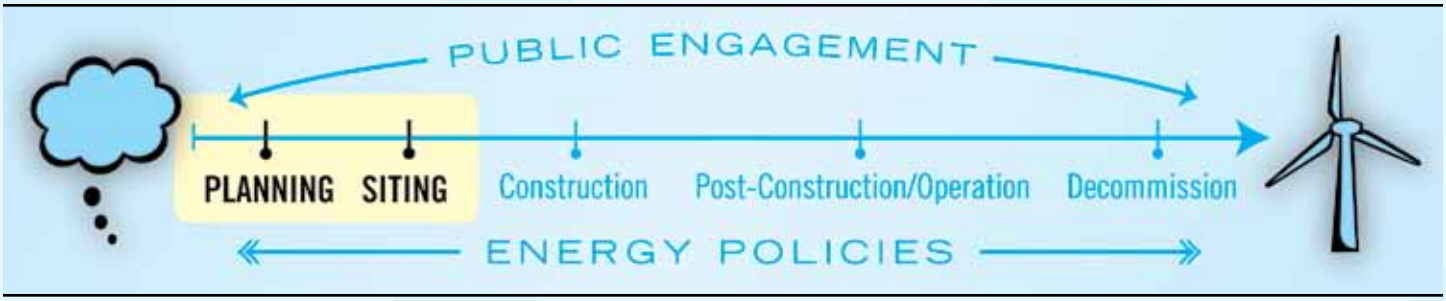
Constraints and Buffer Distances

Constraint	Action Taken
Wind speed less than 6.5 m/s at 80 m	Avoided (no buffer zone)
North of the 50th parallel	Avoided (no buffer zone)
Offshore Avoided (no buffer zone)	Avoided (no buffer zone)
Existing wind projects	Buffer zone applied (1500 m)
National park	Avoided (no buffer zone)
Provincial park	Avoided (no buffer zone)
Important Bird Area	Avoided (no buffer zone)
Hydrography (waterbody, wetland or watercourse)	Buffer zone applied (100 m)
Airport	Buffer zone applied (4000 m)
Railroad	Buffer zone applied (150 m)
Road	Buffer zone applied (150 m)
Building	Buffer zone applied (550 m)
Slope	Avoided (no buffer zone)

Source: http://amherstislandwindinfo.com/helimax_onshore_finalv2.pdf

When should this practice happen?

Site plans and constraints maps should be initiated during the planning phase and used during the siting phase.



Related Tools

Great Lakes Wind Collaborative Online Wind Atlas | http://erie.glin.net/wind/ | This Great Lakes Wind Atlas serves as an online clearinghouse of ecological, geophysical and socio-economic geospatial datasets that can be used to identify environmental constraints and screen specific areas in the Great Lakes region in terms of their suitability for potential wind development.

AWEA Wind Energy Siting Handbook - Chapter 3: Critical Environmental Issues Analysis | http://www.awea.org/sitinghandbook/downloads/Chapter_3_Critical_Environmental_Issues Analysis.pdf | This handbook informs wind energy developers and other interested parties about environmental siting issues relevant to land-based commercial-scale wind energy project development in the United States. Chapter 3 of the handbook provides an example of a constraints map. The handbook was designed to provide technical information and useful tools based on the industry's collective experience in siting wind energy projects and assessing potential impacts.

Ohio's Wind Turbine Placement Favorability Map Viewer | http://www.ohiodnr.com/tabid/21234/Default.aspx | Launched in November 2010 by the Ohio Department of Natural Resources (ODNR), Office of Coastal Management, this interactive map viewer showcases the resources that may play a role in where offshore wind turbines might be placed in Lake Erie. Map layers include bird habitat, fish habitat, commercial and sport fishery efforts, lakebed sediments, distance from shore, land transportation, harbor navigation, shipping and ferry routes, shipwrecks, restricted areas, industries and utilities.

Michigan Great Lakes Offshore Wind Council Mapping Recommendations | http://www.michiganglowcouncil.org/GLOW Report 9-1-09_FINAL.pdf | The September 2009 Report of the Michigan Great Lakes Wind Council included an effort to determine the geographic areas that might accommodate future offshore wind power development in Michigan. Executive Order No. 2009-1 called on the council to recommend criteria to identify and map areas that should be categorically excluded from offshore wind development as well as those areas that are most favorable to such development. The council recommended a set of criteria to help guide future efforts to select and evaluate sites for wind energy development in Michigan's Great Lakes.

National Wind Coordinating Collaborative (NWCC) *Permitting of Wind Energy Facilities* handbook | http://www.nationalwind.org/assets/publications/permitting2002.pdf | This 2002 revision of the original 1998 handbook provides guidance to decision-makers and agency staff at all levels of government, wind developers, interested parties and the public in evaluating wind projects.

U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines and Eagle Conservation Plan Guidance | http://www.fws.gov/windenergy/ On February 18, 2011, the U.S. Fish and Wildlife Service two draft guidelines were published in the Federal Register: *Land-Based Wind Energy Guidelines* and *Eagle Conservation Plan Guidance*. As of press time of this document, both sets of guidelines were open for public comment. The documents are part of the agency's ongoing efforts to improve siting and permitting of renewable energy projects. Visit the web site above for updates.

Wind Energy: Guidelines for Siting and Operating Wind Turbines in the Great Lakes States | These yet unpublished guidelines by The Nature Conservancy provide information for siting wind developments and operating wind turbines throughout the Great Lakes Region. [Ewert, D.N., J.B. Cole, E. Grman. 2011. Wind energy: recommendations for siting and operating wind turbines in the Great Lakes states. Unpublished report, The Nature Conservancy]

1 Best practices for addressing some of these specific impacts, such as noise, water quality and preventing hazardous spills are provided separately in this best practices toolkit.

Great Lakes
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Stormwater Pollution Prevention Plans

Best Practice #12

A Stormwater Pollution Prevention Plan (SWPPP) should be developed during the planning phase and used to guide site management during construction. An SWPPP lays out the steps and techniques used to reduce pollutants in stormwater runoff leaving a construction site – in this case a wind development site. Building a wind farm and the roads to enable access to that wind farm necessarily disturbs the natural ground cover, which can exacerbate runoff and erosion. Proper development and implementation of an SWPPP can ensure that when the soil is disturbed, erosion and runoff and their negative impacts are minimized. An SWPPP must be developed and implemented consistent with the requirements of the applicable stormwater construction permit.

Best management practices (BMP) for erosion and sediment control should be employed during the construction phase. (See Construction Impact Mitigation Best Practice.) to limit the amount and rate of erosion and to capture the transported sediment before it has the opportunity to enter a stormwater collection system or water course. The selection of BMPs is site-specific with regard to activity, topography, soil conditions, and stormwater facilities. The "Related Tools" section below includes several reputable sources on stormwater BMPs.

SWPPPs are often required as part of the environmental impact assessment. They may include, but are not limited to, the following best practices:

- Sediment, soil erosion and scouring control plans for environmentally sensitive areas as determined in consultation with regulators;
- Use of erosion and sediment control practices between construction area and waterbodies and/or wetlands;
- Installation of temporary water diversions at water channel crossings;
- Use of erosion control blankets or mats on slopes near waterbodies and/or wetlands
- Construction of temporary bridges and culverts;
- Restoration of vegetative cover to the greatest extent practicable at the site.

In addition to complying with federal and state/provincial stormwater management requirements, developers can be good stewards by going above and beyond these requirements. One way to do this is by employing natural stormwater management techniques. Natural stormwater management is a fast-growing alternative to conventional stormwater management. The different methods that comprise natural stormwater management for low impact development (LID) are generally cheaper, more aesthetic, and more effective at controlling pollution and flooding.

Natural stormwater management methods are decentralized techniques that manage rainfall at the source through infiltration and detention. Infiltration basins and constructed wetlands are generally not considered LID because they are larger, more complex techniques. Despite this, constructed wetlands and infiltration basins can be very useful natural techniques when used on a larger scale, such as for wind developments.

In addition to dealing with regular precipitation and construction practices, a good stormwater management plan would be able to handle any kind of runoff, including hazardous spills. This may be in conjunction with the development of a Hazardous Materi-

als Management Plan, and would take into account all potential hazardous material spills from construction, maintenance, and decommissioning.

Challenges and Benefits

Stormwater management, erosion and sediment control are issues faced by any development project. State and local regulations establish minimum standards for stormwater management and soil erosion and sedimentation control and prevention. Local regulations can vary significantly. Costs associated with environmental planning and mitigation for an SWPPP can add to overall project costs and development timelines, which can deter developers from doing anything beyond what is required by law. However, a project that goes beyond minimum standards is likely to receive broader public support and result in fewer environmental problems down the road.

An additional challenge is the actual implementation of the SWPPP – once the project is in the construction phase, there must be assurance that someone on site is qualified and taking notice of whether the recommendations contained in the SWPPP are being implemented properly.

The main benefit and use of an SWPPP is to identify all potential pollution sources that could come into contact with stormwater leaving a site. It describes the methods used to reduce pollutants in a construction site's stormwater discharges, and includes written records of site inspections and any follow-up maintenance that is performed.

Natural, "green infrastructure" or "soft engineering" methods for stormwater management offer greater environmental benefits, are more visually attractive, and in many cases, can be less expensive than conventional methods of stormwater control. Techniques such as infiltration basins and constructed wetlands utilize natural soils and vegetation to slow and filter stormwater and to allow it to soak into the ground. This reduces flooding and pollution problems and replenishes ground water sources. These types of approaches cannot solve all stormwater problems, particularly in areas where large amounts of pollution and sediment are carried with stormwater runoff, but they are ideally-suited for wind farm developments which are generally spread out over a large area of mostly impervious rural landscape.

Who should implement this practice?

Developers, state and local policy makers and regulators should implement this practice. Developers should take the lead, but state and local regulators can help by providing clear information about what is required to comply with environmental laws. State and local regulators should evaluate their stormwater management policies against what is recommended in this Best Practice and, if necessary, modify their policies to better accommodate potential wind development impacts. Regulators should then collaborate to provide this information in a single location that is easy for developers to access. In addition, regulators can suggest ways that developers can go beyond minimum standards and even provide incentives for doing so. It is important that a project hires a qualified entity to address the issues at the site and for states/provinces to identity the minimum requirements to address in a SWPPP.

Case Example | Stormwater Pollution Prevention Plan (SWPPP) for Stony Creek Wind Farm – Town of Orangeville – Wyoming County, New York[1]

In New York State, any construction activity that disturbs more than one acre of land is required to seek coverage under the SPDES General Permit for Stormwater Discharges associated with Construction Activity. As part of the General Permit, preparation and implementation of a SWPPP is required. The principle objective of the SWPPP is to specify the

manner in which the project will comply with the requirements in the General Permit by planning and implementing the following practices:

- Reduction or elimination of erosion and sediment loading to water bodies during construction;
- Control of the impact of storm water runoff on the water quality of the receiving waters;
- Control of the increased volume and peak rate of runoff during and after construction;
- Maintenance of stormwater controls during and after completion of construction.

The Stony Creek Wind Farm SWPPP was prepared by American Consulting Professionals of New York, PLLC, in accordance with the requirements of the New York State Standards and Specifications for Erosion and Sediment Control (NYSSSESC), and the New York State Stormwater Management Design Manual (NYSSMDM). The SWPPP demonstrates stormwater management and erosion control features and procedures that are being used by Stony Creek.

The proposed Stony Creek Wind Farm is an electric generating facility of 59 wind turbines installed on a mixture of wooded and agricultural land located on a plateau in the Town of Orangeville, Wyoming County, New York. The project is owned and operated by Stony Creek Energy LLC.

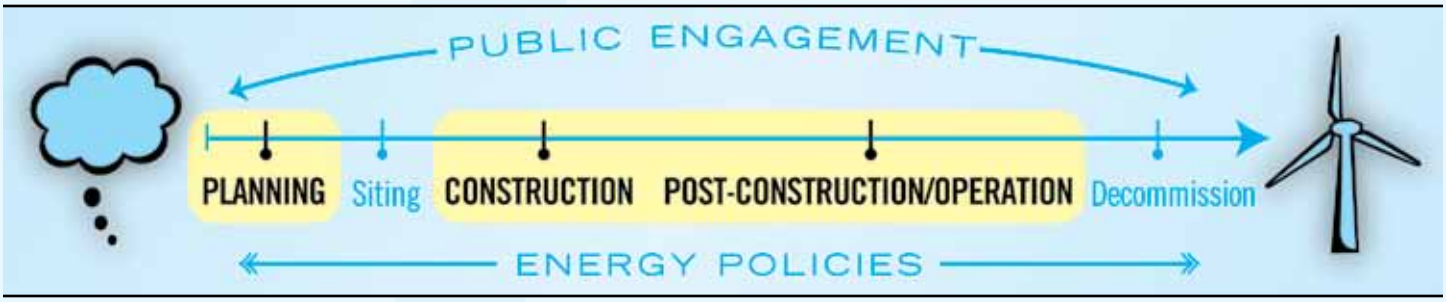
The proposed project includes construction of the following components:

- Installation of 59 turbines (WTG);
- Construction of access roads connecting to each wind turbine to public roads to allow vehicle and equipment access during construction and operation of the project;
- Construction of an electrical collection system (ECS) consisting of buried transmission lines that will deliver electricity generated from the wind turbines to a substation. Where practicable, the electrical collection system will be installed along the project's proposed access roads;
- Construction of a new substation on a site located along Centerline Road in the central portion of the project area;
- Construction of an approximate 10 acre temporary lay-down area to house construction trailers, parking area, and graveled areas for temporary of construction materials such as cables, transformers, foundation hardware, etc.;
- Installation of a permanent meteorological tower; and
- Construction of an Operations and Maintenance Building for project offices, garages, workspace, and storage areas for parts and tools.

The majority of the Stony Creek Wind Farm will be constructed in areas designated as Agricultural Districts by the NYS Department of Agriculture and Markets (NYSDAM); a portion of the construction activities will occur in active agricultural fields. To address wind projects and their potential impact on agricultural activities, NYSDAM developed a document titled "Guidelines for Agricultural Mitigation of Wind Power Projects." Stony Creek will implement the guidelines during construction, and these guidelines are incorporated into the civil design for the project.

When should this practice happen?

Stormwater pollution prevention plans should be created during the planning process and utilized during construction and operation.



Related Tools

Essential Resources for the Stormwater Program, Revised September 2008, EPA 833-F-04-003 | http://www.epa.gov/npdes/pubs/sw_resource_list.pdf | This is a list of helpful resources for stormwater program managers. It highlights U.S. EPA's tools and resources, along with selected non-EPA resources, to get stormwater program managers started on developing or improving their programs. This list is divided into seven sections—general stormwater information, public education and outreach, illicit discharge detection and elimination, construction site runoff control, post-construction site runoff control, pollution prevention/good housekeeping, and funding sources.

Catching the Rain: a Great Lakes Resource Guide for Natural Stormwater Management | http://www.americanrivers.org/site/DocServer/CatchingTheRain.pdf?docID=163 | This report by American Rivers outlines natural stormwater management approaches appropriate for the Great Lakes region. It demonstrates alternative stormwater management techniques.

Stormwater Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices | http://cfpub.epa.gov/npdes/stormwater/swppp.cfm | This U.S. EPA guidance manual provides detailed guidance on the identification of best management practices for construction activities and development of storm water pollution prevention plans. It includes a set of worksheets, a checklist, and a sample SWPPP.

National Menu of Stormwater Best Practices | http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm | This site contains over 120 best management practices fact sheets on all stormwater program areas.g data to expedite environmental review processes for offshore wind projects.

AWEA Siting Handbook - Chapter 5: Impact Analysis and Mitigation | http://www.awea.org/sitinghandbook/downloads/Chapter_5_Impact_Analysis_and_Mitigation.pdf | This chapter of the AWEA Siting Handbook reviews Mitigation practices for impacts to surface waters and wetlands that may be required for both the temporary and permanent impacts of a wind project.

California Stormwater Quality Association Handbooks | http://www.cabmphandbooks.com/Development.asp | This professional association web site provides a series of stormwater handbooks for new development.

Hazardous Materials and Spills in the Great Lakes Region | http://www.great-lakes.net/envt/pollution/hazmat.html | The Great Lakes Information Network provides a list of resources and contingency plans for hazardous spills throughout the Great Lakes.

Pennsylvania Stormwater Best Management Practices Manual | http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-8305 | This manual provides guidance, options and tools that can be used to protect water quality, enhance water availability and reduce flooding potential through effective stormwater management. It presents design standards and planning concepts for use by local authorities, planners, land developers, engineers, contractors, and others involved with planning, designing, reviewing, approving, and constructing land development projects.

1 http://www.invenergyllc.com/stonycreek/pdf/1/01_Application/Enc4_SC_Application_Section_8_SWPPP.pdf

Great Lakes
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Construction Impact Mitigation

Best Practice #13

Developers should ensure the construction of wind projects complies with general construction regulations and uses best management practices to minimize the construction footprint. This includes:

- Eliminate or reduce the discharge of pollutants from construction sites to water bodies on or adjacent to the site. (See Stormwater Pollution Prevention Plans Best Practice.)
- Implement seasonal restrictions on construction that are appropriate to regional site characteristics. When possible, the developer should initiate and complete construction and conduct maintenance when the ground is frozen or when soils are dry and the native vegetation is dormant. This will both minimize the impact of construction and vehicles and reduce the amount of post-construction habitat mitigation necessary. An exception to this is in wetlands and waterways where various wildlife species hibernate in the soil and cannot escape construction during the winter months. Developers should coordinate with state wildlife agencies to discern the best timing of construction to avoid and minimize risks to wildlife.
- Minimize vegetation and soil disturbance by avoiding steep slopes, reducing crane pad size, planning construction laydown areas and temporary roads carefully, and restricting vehicles to existing roadways where possible.
- Maintain roadways during construction through agreements with road maintenance entities. Damage to roads caused by over-sized trucks and heavy equipment should be restored to their original condition. To the extent feasible, route heavy truck traffic supporting construction activities away from residences and other sensitive receptors.
- Save topsoil removed during construction and use to reclaim disturbed areas upon completion of construction activities.
- Dispose of excess excavation materials in approved areas to control erosion and minimize leaching of hazardous materials.
- Dispose of waste properly and effectively control dust.
- Restore the construction site as needed. Restore offshore, nearshore, and onshore habitat to the greatest extent possible in construction zones and staging areas. Reclaim or apply protective covering on disturbed soils as quickly as possible, during or immediately after construction. Native vegetation of local ecotypes should be used when reseeding disturbed areas.
- Implement mitigation measures such as acquisition of replacement habitat (conservation easement, maintaining or restoring connectivity, wetland, etc.) where habitat cannot be restored to its original state.
- Develop and implement a Hazardous Materials Management Plan, which establishes standard procedures for reporting, handling, disposal, and cleanup of hazardous material spills and releases. These types of plans might be easily overlooked due to low amounts of hazardous materials at a wind developments compared to other types of construction projects, but are important nonetheless – especially with the frequent siting of wind projects in environmentally pristine areas, farmland, and offshore. As part of this plan, design engineering controls such as catch basins into site plans, use biodegradable lubricants and non-hazardous fluids whenever feasible, and perform off-site maintenance and repair of turbine components and vehicles when possible.
- Whenever feasible, schedule different noisy activities (e.g., blasting and earthmoving) to occur at the same time since additional sources of noise generally do not add a significant amount of noise.
- Educate workers on the consequences of unauthorized collection or sale of fossils or cultural artifacts.
- Implement standard safety precautions and practices throughout construction.

Some of these practices may be ensured by complying with state and local environmental and construction regulations. These construction practices, however, are much more specific to the actual construction phase and should be given attention throughout all steps in the construction process. A checklist of construction best management practices should be developed using the items listed above as a starting point while adding those necessary to accommodate the specific needs of the site.

Challenges and Benefits

New wind developments are frequently planned on remote land or near farms, where protecting the surrounding landscape is critical to wildlife habitat or farming. Following best practices for quality construction and effectively mitigating any damage is sometimes required by law, but specific attention throughout the construction process can make a big difference on the level of compliance and ultimately, in ensuring minimal impacts throughout the construction phase. Where mitigation would require additional land acquisition or a conservation easement, extra time or money would be needed. Furthermore, timing construction to minimize environmental impacts might be difficult when projects are also constrained by short construction windows.

As with many best practices, a responsible and attentive developer or contractor that minimizes overall impact and takes care of a construction site is more likely to be viewed positively by the public, and will find communities to be more receptive of future projects.

Who should implement this practice?

Developers should implement these best practices and ensure their effectiveness by making a checklist of best management practices using the items listed above as a starting point and adding in any construction management practices to accommodate the specific needs of the site.

Case Example | Glacier Hills Wind Farm Project, Columbia County, Wisconsin

In 2010, Wisconsin Electric Power Company (WEPCO) proposed to build a new wind electric generating facility in the townships of Randolph and Scott in northeast Columbia County, Wisconsin. Glacier Hills Wind Park is slated to be the largest wind farm in Wisconsin. Approved in January 2010, the project will have a 207 MW capacity and is targeted for completion and operation in 2011.On October 30, 2008, WEPCO submitted an application to the Public Service Commission of Wisconsin (PSCW) for a Certificate of Public Convenience and Necessity (CPCN)[1]i. Plans called for 90 turbines of 1.8 megawatt each, access roads to the turbines, an underground 34.5 kilovolt (kV) cable system to collect the power produced at each turbine. The plans include a new interconnection substation to connect to the existing electric transmission system, and an operations and maintenance (O&M) building that would house a supervisory control and data acquisition (SCADA) system to monitor turbine operation.

Glacier Hills Wind Park, located northeast of Madison, Wisconsin, is slated to be Wisconsin's largest wind farm. The capital cost of the wind farm is estimated at $414 million.

To comply with the Wisconsin Environmental Policy At (WPA), an Environmental Impact Statement (EIS) was prepared by staff of the PSC and the Wisconsin Department of Natural Resources. The EIS evaluates the temporary and per-

Case Example | Glacier Hills Wind Farm Project, continued

manent impacts generated throughout the realization of the project and opportunities for remediation. Impacts of construction are a major aspect of this evaluation.

Different measures are being implemented to ensure that temporary impacts are mitigated and that there are as little permanent impacts as possible in result of the construction of the wind farm:

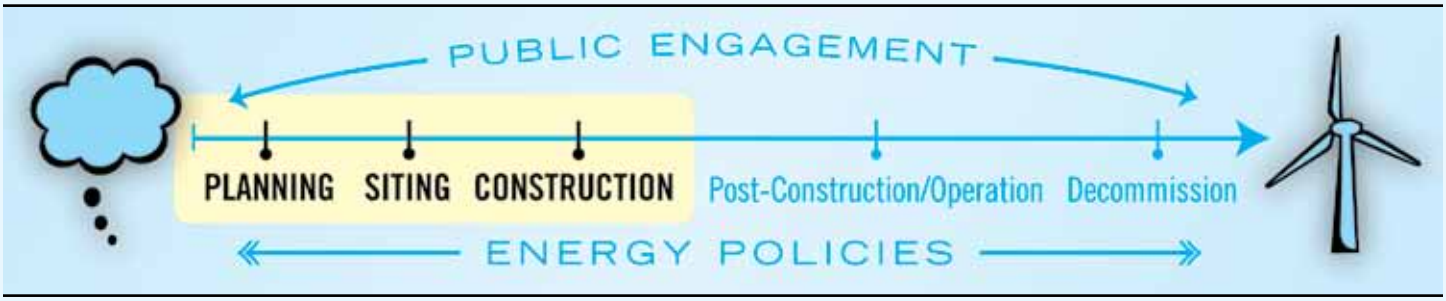
- **Roads:** Roads are videotaped before and after the construction to evaluate the changes that occurred and bring them to their initial state;
- **Waterways and wetlands:** Different plans, such as a soil erosion plan and a hazardous materials management plan are being developed for construction happening in and over waterways and wetland. In fact construction work will avoid wetlands and waterways as much as possible. Specific construction methods will be used to avoid disturbances of the little percentage of waterways and wetlands that will be affected, and mitigation measures will be applied to restore any damage made to these lands;
- **Forests and other ecologically important habitats:** Efforts will be made to avoid construction in woodlands, endangered and threatened species habitats and archaeological and historical resources;
- **Bird and bat mortality:** Pre and post-construction studies have and will be initiated to evaluate potential impacts of wind turbines on birds and bats. These pre-construction studies made sure that nesting habitat, and especially nesting habitats of state-listed threatened species, will not be affected by construction;
- **Post-construction phase:** Mitigation, restoration and monitoring processes have been conducted following the construction phase to make sure all temporary impacts are addressed.

As part of the EIS process, public meetings were held and over 60 public comments were received. As is the case with almost any wind power project, there were a wide range of comments, some in support of and some opposed to the project. Most of the comments received were considered as the final EIS was prepared and many of them called for changes in the project. For example, after its Certificate of Public Convenience and Necessity application was filed at the PSC, WEPCO altered its project design to eliminate overhead collector circuits. This was clarified in the final EIS.[2] Also, as a result of public comment, changes were made regarding the number and location of wind turbines.

Overall, the Glacier Hills Wind Farm's EIS has demonstrated a thorough approach that minimizes permanent impacts to the site as much as possible. Restoration is an integral part of the construction process.

When should this practice happen?

This best practice is focused on the construction phase of wind development, including work that must occur prior to construction in the planning and siting phases of a project.



Related Tools

AWEA Wind Energy Siting Handbook | http://www.awea.org/sitinghandbook/ | This handbook informs wind energy developers and other interested parties about environmental siting issues relevant to land-based commercial-scale wind energy project development in the United States. The handbook was designed to provide technical information and useful tools based on the industry's collective experience in siting wind energy projects and assessing potential impacts.

U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines and Eagle Conservation Plan Guidance | http://www.fws.gov/windenergy/ On February 18, 2011, the U.S. Fish and Wildlife Service two draft guidelines were published in the Federal Register: *Land-Based Wind Energy Guidelines and Eagle Conservation Plan Guidance*. As of press time of this document, both sets of guidelines were open for public comment. The documents are part of the agency's ongoing efforts to improve siting and permitting of renewable energy projects. Visit the web site above for updates.

BMPS for Wind Energy | http://windeis.anl.gov/documents/fpeis/maintext/Vol1/Vol1Ch2.pdf - Section 2.2.3. | The Bureau of Land Management developed BMPs for each major step of the wind energy development process, including site monitoring and testing, plan of development preparation, construction, operation, and decommissioning

Pennsylvania Game Commission Endorsed Best Management Practices for Pennsylvania Wind Energy Facilities | http://www.portal.state.pa.us/portal/server.pt?open=514&objID=613068&mode=2 | This document contains best management practices that are an element of the Pennsylvania Game Commission's (PGC) Wind Energy Voluntary Cooperative Agreement. They include BMPs for construction, operations, and decommissioning.

1 Pursuant to Wis. Stat § 196.491(3) and Wis. Admin. Code § PSC 111.53, for authority to construct and operate the wind farm

2 http://www.we-energies.com/environmental/gh_final_eis.pdf

Great Lakes Wind Collaborative

Standardized Environmental Survey Protocols

Best Practice #14

Standard environmental survey protocols should be developed by federal and state natural resource management agencies as appropriate. Developers should adhere to those standardized environmental survey protocols for both pre- and post-construction monitoring. This includes assessing bird and bat activity at proposed wind energy sites, designing pre-permitting and operations monitoring plans, and developing impact avoidance, minimization, and mitigation measures. Provisions should be instituted by federal and state agencies to **ensure that survey results can be incorporated into a database that documents and provides the best sense of bird/bat usage of an area at any given time.**

Environmental assessments of wind energy projects now commonly require pre-construction and post-construction monitoring of the project area. Surveys include researching the biological resources within the project area, migration patterns of birds/bats passing through the project area, and the protective status of migratory and nesting/resident species in an area where turbines are being considered.

The U.S. Fish and Wildlife Service has released voluntary draft guidelines for siting commercial wind turbines that include a "tiered approach" for assessing potential effects on fish, wildlife, and their habitats. These guidelines "provide an iterative decision-making process for collecting information in increasing detail, quantifying the possible risks of proposed wind energy projects to fish, wildlife, and their habitats." The USFWS guidelines should be used as basis for developing specific protocols to address the survey needs for a specific wind development site. Survey methods chosen should be scientifically robust and consistent with USFWS guidelines even as the particular needs of natural communities and species differ by site.

The following survey methods provide a starting point for a comprehensive checklist and development of a more consistent and common survey protocol for wind projects.

- One year of point counts that vary in seasonal intensity based on the habitat (e.g., farm fields get more surveys during migration than summer and winter). Surveys include documentation of estimated height of each bird and direction of flight, which is used to determine potential use of rotor swept area. Surveys that include counts near better habitat that is outside the main project area are a slight step above minimum standards. More than one year of pre-construction monitoring is a step above the minimum. Some surveys include additional detail on habitat type and behavior for any raptors recorded.
- Operational surveys for dead birds/bats for at least one year, preferably several years, are important.
- Surveys of potential avoidance are important to determine if the turbines have changed bird behavior. These are more specialized surveys that are most needed where there are concerns of avoidance. For example, American Golden Plovers seem to favor open habitats without much vertical structure.
- Raptor nest surveys. These are often two-stage surveys: a leaf-off survey to determine if nests are present, then a follow-up early in the leaf-on condition to determine nest usage.
- Review Breeding Bird Survey route information for any routes through the project area.
- Review Christmas bird count data if any are available.

- Acoustic bat surveys and mist netting. These are typically coordinated by the U.S. Fish and Wildlife Service. Acoustic surveys typically use existing meteorological towers and a few other detectors placed on step ladders in appropriate locations. Permits are needed due to the potential of handling a federally endangered species.
- Specialized surveys for specific organisms. For example, the state of Indiana has requested additional spring migration surveys to better count the American Golden Plover and have proposed that developers conduct crane (Sandhill and Whooping) usage surveys of nearby fields at certain times of the year.
- Incidental notes of wildlife usage taken when in the project area doing other work or while in transit from one survey location to another.

The USFWS gives detailed recommendations of methods and metrics for site assessments, surveys, and monitoring related to wind development and its effects on eagle populations in their Draft Eagle Conservation Plan Guidance (see Related Tools below). The guide also gives information for conducting a risk assessment and developing an eagle conservation plan, and post-construction monitoring.

Challenges and Benefits

A primary challenge lies in developing a federal survey protocol to which all of the states will adhere. Natural survey institutions within states often have their own methods that they have used for decades and may not be receptive to a federal monitoring protocol that is superimposed on pre-existing state methods. Further, limited authority and funds exist for the U.S. Fish and Wildlife Service to develop such a common monitoring protocol. **An alternative may be to establish a regional task force comprised of federal and state representatives to work jointly to develop common bird, bat and wildlife survey protocols for wind projects the Great Lakes region.** Getting commitment to the process and authorization for state and federal agency personnel to participate in such a task force would be a challenge to overcome.

It is important to conduct surveys early enough in the planning process so their results can help drive siting decisions. Bird and bat surveys are often conducted during the spring and fall seasons to identify the migratory patterns of birds and/or bats as they pass through the project area.

Post-construction studies are often conducted for multiple years after construction to access the impact of the wind turbines on the environment. Post-construction surveys may include some of the surveys listed for pre-construction to compare before/after construction abundance levels. This information will help determine whether the project results in indirect impacts to birds and bats from habitat avoidance, disruption, and displacement. Mortality studies are also conducted concurrently during this post-construction monitoring. These studies estimate the number of birds/bats killed by the turbines.

Who should implement this practice?

At the federal level, the U.S. Fish and Wildlife Service should coordinate with their Canadian counterpart, Natural Resources Canada and Great Lakes states and provinces to develop a standard survey protocol that is responsive to U.S. and Canadian federally listed species, state and provincial species of concern, and provides a framework for surveying all birds, bats and other wildlife in the region, regardless of status. Once developed, developers should use these protocols in their pre and post-construction survey activities.

Case Example | Ohio Department of Natural Resources Terrestrial Wind Energy Voluntary Cooperative Agreement

In March 2005, the Ohio Department of Natural Resources established a Voluntary Cooperative Agreement for the siting and development of wind farms larger than 5 megawatts. As part of this Agreement, the agency has developed an

Figure 1: Lake Erie Aerial Survey at Cleveland. Photo credit: Jim McCormac.

Case Example | Ohio Department of Natural Resources, continued

On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio. The protocol presents the different survey requirements that could be asked of a commercial wind facility manager prior to the approval of his project and following the construction of the facility. The surveys are distinguished between minimum, moderate and extensive efforts, depending on the site's location and specific characteristics. Timing of surveying efforts and standardized materials are also made available through the document.[1]

Case Example | Pennsylvania Game Commission's Wind Energy Voluntary Cooperative Agreement

On April 18, 2007, the Pennsylvania Game Commission signed cooperative, voluntary agreements with 12 companies to avoid, minimize and potentially mitigate any adverse impacts the development of wind energy may have on the state's wildlife resources. There are currently 30 wind industry cooperators participating in the agreement. This is approximately 85% percent of total wind industry participation in the Commonwealth of Pennsylvania. Brokered with substantial input from wind energy industry representatives and assistance from the Pennsylvania Wind and Wildlife Collaborative (PWWC), the agreement aims to provide guidance and consistency – in the absence of compulsory regulations for private lands – for development of wind turbines sites, which have become one of the state's fastest-growing industries.

The agreement standardizes wildlife monitoring and impact review procedures for primarily migrating raptors - particularly eagles - and bats. It also engenders heightened focus on project sites for direct and indirect impacts to 'priority'

breeding wild birds listed in Pennsylvania's Wildlife Action Plan. But if problems for other, more common, species arise, the protocols should identify them.

This agreement was the product of cooperation and mutual interest to safeguard wildlife resources - as thoroughly and uniformly as possible - by all parties involved. The agreement established protocols that pave the way for wind energy development to occur in a more amenable and disciplined manner that is expected to largely satisfy developers and address potential bird and bat impacts identified by the Game Commission's wildlife managers.[2] Site specific risk assessments are conducted to determine potential impacts, including survey efforts for birds and bats.

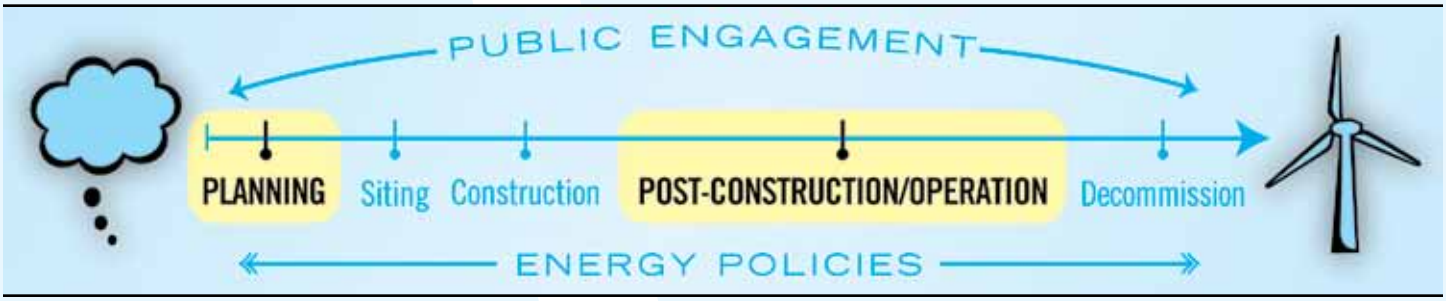
Overall, Pennsylvania's Voluntary Cooperative Agreement has had a number of successes, including its effectiveness for data gathering, developers coordinating with the PGC early in the planning stages, as well as other states using the agreement as a model for creating similar agreements. Challenges encountered to date include: not all Pennsylvania wind developers have signed on; adherence to protocols; various mortality estimators; protecting abandoned high risk sites from development; and defining what are acceptable levels of 'take'.

Case Example | California Energy Commission's voluntary California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development

The California Energy Commission (in association with the California Department of Fish and Game) provides recommendations on methods to assess bird and bat activity at proposed wind energy sites; design pre-permitting and operations monitoring plans; and develop impact avoidance, minimization, and mitigation measures. The methods described in the Guidelines are suggestions for local permitting agencies to use at their discretion and as a resource for other parties involved in the permitting process.[3]

When should this practice happen?

Survey protocols should be employed whenever surveys are conducted. Pre-construction surveys should be performed early in the planning phase while post- construction surveys should be conducted once the wind farm is operational.



Related Tools

Ohio Department of Natural Resources Terrestrial Wind Energy Voluntary Cooperation Agreement | http://www.dnr.state.oh.us/LinkClick.aspx?fileticket=GsssB%2BJeczA%3D&tabid=21467 | Through this Voluntary Cooperation Agreement, the Ohio Department of Natural Resources (ODNR) sought to coordinate wind energy projects with wind energy developers in order to work collaboratively to ensure that wind-energy development project sites are developed in both an environmentally conscientious manner and with best regard to the conservation of the state's wildlife resources.

Pennsylvania Game Commission's Wind Energy Voluntary Cooperative Agreement | http://www.portal.state.pa.us/portal/server.pt?open=514&objID=622430&mode=2 | On April 18, 2007, the Pennsylvania Game Commission signed cooperative, voluntary agreements with 12 companies to avoid, minimize and potentially mitigate any adverse impacts the development of wind energy may have on the state's wildlife resources. There are now 30 wind industry cooperators who have signed on.

Birds and Bats: Potential Impacts and Survey Techniques | http://www.powernaturally.org/programs/wind/toolkit/4_birdsbatsrevised.pdf This paper reviews the potential impacts from utility-scale wind energy development on birds and bats, how impacts can be studied, and how impacts may be mitigated. It also attempts to place potential impacts from wind energy development in context with potential impacts of other power generating technologies with which the reader may be more familiar.

California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development | http://www.energy.ca.gov/2007publications/CEC-700-2007-008/CEC-700-2007-008-CMF_MINUS_AP-E.PDF | These voluntary guidelines provide information to help reduce impacts to birds and bats from new development or repowering of wind energy projects in California. They include recommendations on preliminary screening of proposed wind energy project sites; pre-permitting study design and methods; assessing direct, indirect, and cumulative impacts to birds and bats in accordance with state and federal laws; developing avoidance and minimization measures; establishing appropriate compensatory mitigation; and post-construction operations monitoring, analysis, and reporting methods.

Bat and Wind Energy Cooperative | http://www.batcon.org/wind | The Bat Conservation International has teamed up with government agencies, industry organizations, and academic organizations to study the interaction of bats with wind turbines and help develop siting practices that will minimize bat deaths resulting from collision with wind turbines.

National Wind Coordinating Collaborative National Avian-Wind Power Planning Meetings | http://www.nationalwind.org/publications/avian/avian04/default.htm | This site lists several presentations on survey techniques, research questions, and monitoring survey results.

U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines and Eagle Conservation Plan Guidance | http://www.fws.gov/windenergy/ | On February 18, 2011, the U.S. Fish and Wildlife Service two draft guidelines were published in the Federal Register: *Land-Based Wind Energy Guidelines* and *Eagle Conservation Plan Guidance*. As of press time of this document, both sets of guidelines were open for public comment. The documents are part of the agency's ongoing efforts to improve siting and permitting of renewable energy projects. Visit the web site above for updates.

1 http://www.dnr.state.oh.us/LinkClick.aspx?fileticket=loJTSEwL2uE%3d&tabid=21467
2 http://www.portal.state.pa.us/portal/server.pt?open=514&objID=622430&mode=2
3 http://www.energy.ca.gov/2007publications/CEC-700-2007-008/CEC-700-2007-008-CMF_MINUS_AP-E.PDF

Great Lakes
Wind Collaborative

Using Brownfields for Wind Projects

Best Practice #15

Brownfields are vacant, neglected or blighted properties with real or perceived contamination. Legacies of a once-thriving industrial economy, these lands are peppered throughout urbanized areas in the Great Lakes region. **Both large and small brownfields should be explored as candidate sites for wind development projects and should be selected over undeveloped greenfields in areas where both types of property are available for wind development.** Local policies in many of the eastern states are very conducive to developing small landfills for wind projects and closed landfills have become prime candidates for wind development. The Great Lakes region could emulate this strategy.

Brownfields present several unique opportunities for wind projects. Because wind projects are a commercial land use, brownfields need only be cleaned up to levels required for commercial or industrial land uses, which are generally less strict than those for residential use because there are fewer pathways for contaminant exposure. Also, brownfields are generally closer to load centers requiring less transmission infrastructure. In some cases, wind projects on brownfields may even be able to benefit (and reduce costs) by using existing transmission infrastructure associated with prior uses at the site. Many of the more desirable brownfields around the Great Lakes region have been redeveloped, but there are still many others that, for a variety of reasons, remain undeveloped. The use of existing infrastructure at a brownfield site could particularly be useful for small distributed generation projects on a community level, where interconnecting small sites can be much easier. Using brownfields for wind projects is an innovative way to utilize delinquent properties that may not be suitable for other types of commercial development where more people would be working on or around the property. While the aesthetic state of a brownfield can vary, they are often considered a nuisance to the public. Siting wind farms on brownfields could be viewed positively by a community because it shows an investment in an otherwise problematic parcel of land in a productive manner that can, if planned well, benefit the community.

Challenges and Benefits

Brownfields tend to be in urbanized locations, near population centers so there are potentially more people who might feel impacted by noise or other aspects of a wind development. However, properly executed, these projects can aid in the general public perception of wind energy and this non-quantifiable piece of the project should be considered. Care must be taken to ensure the property is large enough to accommodate the turbines with appropriate setbacks. Even where contamination issues have been addressed, fears and perceptions about liability or environmental risks present ongoing obstacles to investing in and redeveloping these sites. Additionally, there are instances where there is very little load at the site for the responsible party to conduct their treatment or operations, so some attention should be given to this potential constraint.

All of the Great Lakes states have programs and institutional mechanisms to reduce liability risks for non-responsible parties at brownfield sites, encourage environmental assessments (to determine if contamination exists and at what level) and cleanup (where necessary), and redevelop these properties into productive uses. Many states have financial incentive programs for assessments and cleanup through grants, loans or tax abatements. Even though site assessment and cleanup may add to the overall cost of redeveloping a brownfield, those costs can be offset with these financial incentives. Many Great Lakes states have Memoranda of Agreements with the USEPA which protect developers from lawsuits under federal environmental laws, such as CERCLA (Superfund). These programs and mechanisms have been around for about a decade and are showing resiliency with the test of time, which should reassure developers who might otherwise shy away from a brownfield site.

Many brownfields in the Great Lakes region are remnants located on or very near the lakeshore. Lakeshores are generally highly valued by the public for their scenic values, but in the case of brownfields, where the property is already compromised, development of a wind farm may be more acceptable. Lakeshores can be environmentally valuable areas for migratory and local bird populations; therefore, developers must be careful to undertake appropriate bird and wildlife studies to avoid developing projects in migratory bird pathways and important habitats, such as nesting areas. These sites also generally offer a more robust wind resource than inland sites,, which further their potential for being economically viable projects.

Who should implement this practice?

Regulators should create policies that promote brownfields as potential sites for wind farms, and developers should prioritize brownfields when planning and siting wind developments. This is also a welcome strategy for communities seeking to redevelop brownfield sites. Landowners of brownfield sites should be proactive in working with communities, regulators and developers to consider wind projects as a means to establish valued re-use of their contaminated or blighted property. As an example, the Kingston, Mass., Green Energy Committee decided to locate a 1.65 MW wind turbine on the town's capped landfill instead of next to its sewer plant.[1] This also contributed to meeting state renewable energy goals.

Case Example | Steel Winds Project – Lackawanna, New York

On the shore of Lake Erie, in the suburb of Lackawanna just south of Buffalo, N.Y., the Steel Winds project is situated on a portion of the former Bethlehem Steel facility. Lackawanna was the center of steel production in the region in the early 20th century. By the 1940s, the Lackawanna steel mill employed more than 20,000 people, and was the world's largest steel factory.[2] In the second half of the 20th century, the city enjoyed boom years, but they were followed by a slow decline that culminated with the plant closing in the mid-1980s leaving a 1,600-acre blighted and contaminated site in its wake. The entire site became the subject of a RCRA Facility Investigation (RFI), under the federal Resource Conservation and Recovery Act (RCRA).

Steel Winds, Lackawana, NY. This project is highlighted on the NYSDEC website as a Brownfield success story. Photo Credit: Wikipedia.

Environmental liabilities and financing the cleanup of the site hindered its cleanup and redevelopment for nearly two decades. Changes in New York State and federal environmental laws in the early 2000s provided financial and legal incentives to investigate and remediate contaminated sites and return these sites to productive use.

The RFI process created substantial interest in redeveloping contaminated RCRA sites. In 2001, The University of Buffalo published a report that identified Buffalo's waterfront as a potential source of wind energy development, which created additional interest in wind energy development. After several years of planning, locations of the eight wind turbines were chosen and 30 acres of the site along the waterfront were removed from the RCRA program and placed under the New York State Brownfields Cleanup Program (BCP).[3] Separating those 30 acres from the rest of the property enabled the Steel Winds project to benefit from financial assistance offered under the BCP. After the wind turbines and service roads were constructed, one foot of soil cover was placed over the property, capping any residual contamination. Limited groundwater treatment and disposal of solid waste from the foundation excavation was required.

Construction of Steel Winds began in September 2006. In addition to the environmental benefits, building the Steel Winds project on a previously industrial site had other advantages: the old roads could be reused, as could the old power lines to the steel mill, which are used to push power back into the New York Independent System Operator grid for sale

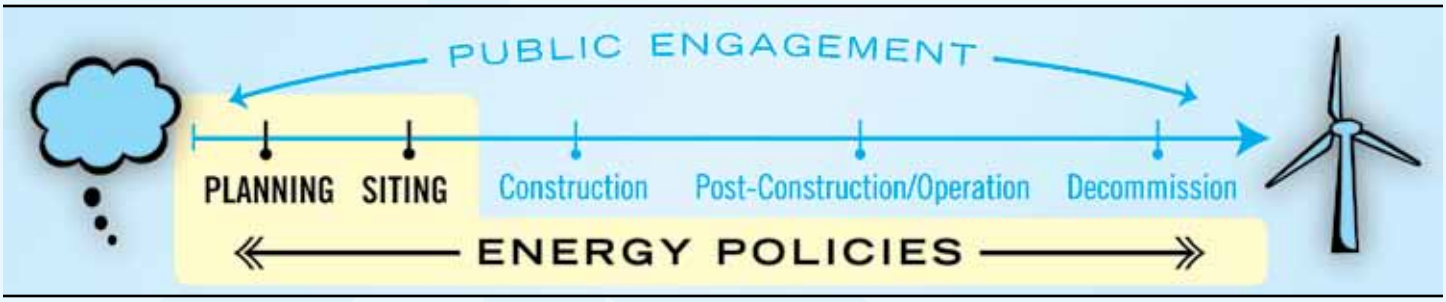
Case Example | Steel Winds Project, continued

to retail customers.

Today, the stark contrast of eight white turbines standing amid the remnants of abandoned factories juxtaposes the area's past with its hopes for the future.[4] Steel Winds has the capacity to generate 20 MW of electricity, approximately enough to serve the needs of 6,000 American homes.

When should this practice happen?

Promoting brownfields for wind development should be incorporated into energy policies, and brownfields should be considered during the planning and siting parts of the wind development process.



Related Tools

Siting Renewable Energy on Potentially Contaminated Land and Mine Sites | http://www.epa.gov/oswercpa/ | This USEPA initiative identifies the renewable energy potential of these sites and provides other useful resources for communities, developers, industry, state and local governments or anyone interested in reusing these sites for renewable energy development.

Great Lakes Sustainable Land Use | http://glc.org/bridges/brownfields.html | This website provides links to Great Lakes state, provincial and relevant federal programs and regional publications that address brownfields, urban revitalization, smart growth and land use planning.

Linking Brownfields Redevelopment and Greenfields Protection for Sustainable Development in the Great Lakes Region. | http://glc.org/bridges/finalreport.pdf | This 2001 publication includes an overview and assessment of brownfields cleanup and redevelopment programs in each of the Great Lakes states and examines some of the key challenges and opportunities in reusing brownfields over greenfields for new development projects.

1 http://www.wickedlocal.com/kingston/news/x1458584004/2010-Wind-turbine-to-go-on-landfill#axzz1JYUV90O2
2 http://en.wikipedia.org/wiki/Lackawanna_Steel_Company#cite_ref-Staba_81-1
3 http://www.dec.ny.gov/chemical/8450.html
4 http://www.powermag.com/issues/cover_stories/Steel-Winds-Project-Lackawanna-New-York_232.html

Great Lakes Wind Collaborative

Decommissioning and Reclamation

Best Practice #16

A decommissioning plan is an important part of a comprehensive wind development project plan. **Developers should create provisions for future site decommissioning and reclamation** to ensure that the entire development life cycle is accounted for. Decommissioning plans should outline the expected end of the project life, explain when and under what circumstances decommissioning and reclamation would occur, and include a proposed schedule for decommissioning. Plans should describe the anticipated manner in which the project will be decommissioned and the procedures for equipment dismantling and demolition, site restoration, and final residue disposal. To minimize environmental impact, the plan should include descriptions of removal methods, procedures for disposal of the turbines, resources that could be affected by the decommissioning, results of recent biological surveys in the area, and descriptions of measures taken to prevent discharge of pollutants, including proper handling, storing, transporting, and disposing of operational wastes at a licensed facility that complies with applicable regulations.

The decommissioning plan should also include site reclamation with a focus on restoring native vegetation. Prior to decommissioning, and in coordination with the landowner, the facility owner and operator should develop a re-vegetation plan for native plant species in order to enhance the wildlife habitat value of the project area.

Finally, decommissioning plans should contain the estimated decommissioning costs net of salvage value in current dollars, and how the plan will be secured (e.g., bonds, contract). A decommissioning plan can be part of other plans such as a project business plan or site development plan, or it can be a stand-alone document that is cross referenced with these and other relevant plans. Beyond a plan, decommissioning and demolition costs money. To ensure that adequate funds are available to cover those costs when the time comes, the permitting agency should require a bond or financial assurances from the developer to ensure that decommissioning costs do not become the responsibility of the local community.

Challenges and Benefits

Although it may be difficult to know the specific circumstances that will determine the life of a wind project, it is reasonable to anticipate that some day it will come to the end of its functional life span. Consideration of demolition and dismantling can guide construction plans and may prevent design flaws or other procedures that would hinder efficient disassembly. Moreover, scrap value credits may be able to offset some demolition costs, particularly if a local permitting authority may allow for a salvage credit.

Planning for decommissioning requires foresight and funding to develop the actual plan. If a bond is required, this can add to overall project costs. However, virtually all energy development projects require some sort of reclamation plan to account for impacts once an operation is complete (e.g., mining reclamation), so the requirement for wind is consistent with public policy

goals to minimize negative environmental and community impacts from energy development. Some communities may see a decommissioning plan as a sign that a wind project would be short-lived and deconstructed sooner rather than well cared for and maintained for many years. An emphasis on the benefits of careful and well-planned deconstruction can show that when a project is finally ready to be dismantled, it will be properly taken care of instead of abandoned and left in disrepair for the community to contend with or even pay for.

Who should implement this practice?

Developers should create decommissioning plans, in consultation with appropriate regulatory agencies.

Case Example | Ontario Renewable Energy Approvals

In 2009, the province of Ontario enacted a regulation, the Ontario Renewable Energy Approvals (OREA), under the Ontario Environmental Protection Act (EPA). This regulation aims to monitor the development of renewable energy in the region and regulate energy generations facilities. As part of the monitoring process, utility managers interested in developing wind energy in Ontario must submit a set of reports, including a Decommissioning Report. The Decommissioning Report requires information on three elements:

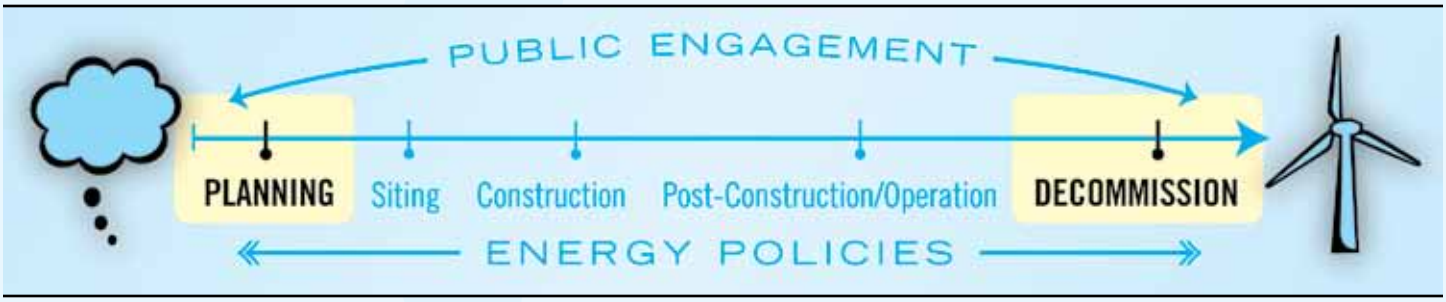
- The planned procedures for the dismantlement or demolition of the facility after its lifespan;
- The activities related to the restoration of any land and water that have been negatively affected by the facility;
- The planned procedures for the management of excess materials and waste.

Case Example | Application of the OREA to the Ostrander Point Wind Energy Park, Peterborough, Ontario

The case of the Ostrander Point Wind Energy Park in Peterborough, Ontario is a good example of the application of the decommissioning requirements stipulated in the OREA. The Decommissioning Report, prepared by STANTEC, establishes the different procedures that would take place if the project was decommissioned during the construction, i.e. if Gilead, the utility in charge of the project, could not successfully complete the construction of the wind turbines, or after ceasing operation, at the end of the turbines operational lifespan. The report provides specific details answering the three main requirements above as well as additional information regarding the operation of the decommissioning procedures. The Decommissioning Report also gives specifications in the event of emergencies such as spills and releases and how to handle such problems.

When should this practice happen?

Decommissioning plans should be developed during the planning stage and implemented at the end of the useful life of a project's wind turbines and associated infrastructure.



Related Tools

Ostrander Point Wind Energy Park – Draft Decommissioning Plan Report | http://www.gileadpower.com/pdf/Draft_Decommissioning_Plan_Report/Decommissioning Plan Report.pdf | This report is one component of the Renewable Energy Approval Application for the Ostrander Point Wind Energy Park (the Project) in Prince Edward County, Ontario. It was prepared in accordance with O. Reg. 359/09 and the Ontario Ministry of Natural Resources' *Approval and Permitting Requirements Document for Renewable Energy Projects* (September 2009).

Decommissioning and Complaint Resolution Plans, Marble River Wind Farm | http://www.horizonwindfarms.com/northeast-region/documents/under-dev/marble-river/Permit-Application-Ellenburg/Exhibit-15R-decommissioning-compliant.pdf | This document provides a good example of the various sections of a decommissioning plan including • Anticipated Life of Wind Turbines • Estimated Cost of Decommissioning • Estimated Decommissioning and Site Restoration Funds • Decommissioning Process Description • Site Restoration Process Description

Pennsylvania Game Commission Endorsed Best Management Practices for Pennsylvania Wind Energy Facilities | http://www.portal.state.pa.us/portal/server.pt?open=514&objID=613068&mode=2 | This document contains best management practices that are an element of the Pennsylvania Game Commission's (PGC) Wind Energy Voluntary Cooperative Agreement. They include BMPs for construction, operations, and decommissioning.

Great Lakes
Wind Collaborative

An Adaptive Regulatory Roadmap for Offshore Wind

Best Practice #17

The lack of regulatory certainty is a leading obstacle to pursuing offshore wind development. Current permitting and approval processes are complex, unfamiliar, and often unprecedented, and frequently change depending on jurisdiction. In the Great Lakes, states own the bottomlands and therefore have authority to determine whether and how those lands are used. (See Bottomlands Leasing Best Practice.) Multiple federal agencies also have either a regulatory or a review interest in offshore wind permitting in the Great Lakes. The Great Lakes region is in a high state of uncertainty regarding how an offshore wind proposal is to be pursued and what is necessary to ensure it complies with regulatory and non-regulatory review requirements. The result is a regulatory quagmire that has the potential for unnecessary duplication, protracted timelines, and litigation when decisions are made. **A clear process or roadmap is needed that sets out which agencies must or should be consulted, the information those agencies require, and the timing of those reviews.** Such a roadmap will help create an environment in which developers understand the information requirements and processes necessary to pursue offshore wind developments.

Recommended steps for the roadmap include:

1. **Every federal and state agency with a regulatory or review role in offshore wind in the Great Lakes should develop an internal roadmap that sets forth the information requirements, timing and process by which an offshore wind proposal is reviewed in that agency.** Furthermore, regulators should establish a centralized point of contact within a jurisdiction for obtaining needed information and to provide assistance throughout the process.
2. **Information from individual agencies should be integrated into a single Regulatory Roadmap for offshore wind in the Great Lakes.** This Regulatory Roadmap would identify the appropriate federal and state agencies to be consulted, necessary permits and approvals needed, and outline the steps necessary for obtaining such approvals, including studies and timelines. References to individual state regulatory requirements can be general in this document and point to the detailed state information generated by agencies under item #1 above. The case example below describes how relevant federal and state agencies could cooperate to determine who would actually develop the Roadmap.
3. **Mechanisms should be built in to streamline the siting and permitting processes for offshore wind.** Although siting and permitting processes are still quite undeveloped in the region, it is likely that as they are developed and implemented, lessons will be learned and ideas will come forth on how to make the regulatory processes more efficient. Greater efficiencies can save time and money for both the taxpayer (e.g., via regulators) and the developer. Regulatory programs for offshore wind should include evaluative mechanisms that can enable adaptive management and improvements over time as lessons are learned and new information becomes available. This will relieve some of the apprehension surrounding the permitting and approval processes and ensure that there is no duplication of regulatory requirements.

Challenges and Benefits

Getting all of the relevant federal and state agencies to agree to produce individual offshore wind guidance and to cooperate in the preparation of a regulatory roadmap for the region will require political leadership, a coordinative entity at the interstate level and a coordinative agency at the federal level. Getting the attention of harried state officials to develop and/or review documents

on offshore wind at a time when they are consumed by state budgets and other pressing priorities will require patience, skill and determination. Some education will be necessary, particularly when states encounter transition in executive branch leadership. Policies should be revisited periodically and adapted to reflect the most current knowledge and lessons learned to ensure that only high quality, scientifically rigorous, environmentally sound projects will be realized.

While getting federal, state, and local agencies to cooperate "on paper" may look good in theory, how this actually plays out for each project could create untimely hurdles and cross-agency project review issues if checks and balances are not put in place. It will be important to review the coordinative processes periodically to ensure that they improve efficiencies over time.

Who should implement this practice?

Federal and state agencies with a regulatory or permit review role related to offshore wind in the Great Lakes should implement this practice.

Case Example | Memorandum of Understanding to Improve State and Federal Permit Coordination in the Development of Offshore Wind Energy Projects on the Great Lakes

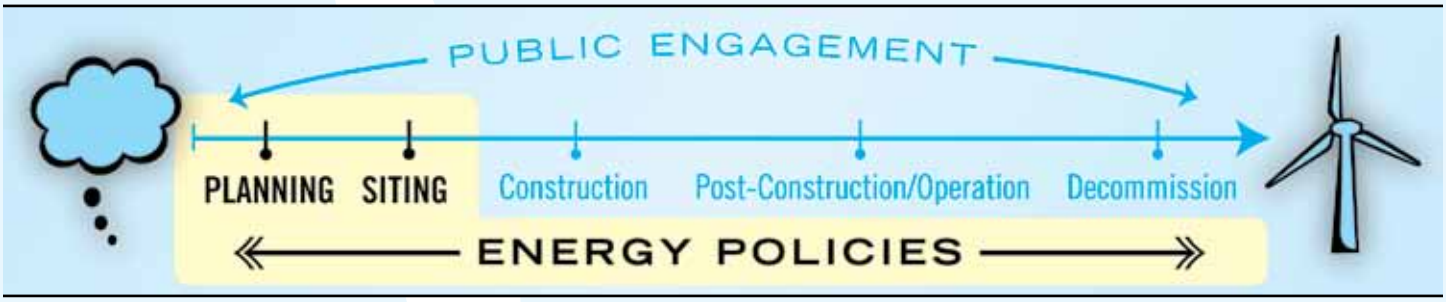
In October 2010, the Great Lakes Wind Collaborative, in cooperation with the White House Council on Environmental Quality and the U.S. Department of Energy hosted a two-day workshop focused on offshore wind in the Great Lakes. More than 70 wind energy professionals participated in the workshop, including representatives from 11 federal agencies, seven Great Lakes states, and several developers interested in offshore wind in the Great Lakes. A key recommendation from the workshop was a call for a federal-state institutional mechanism to address the regulatory uncertainties and lack of coordination across the region that would establish terms, conditions and timelines for interagency coordination and cooperation. A *Memorandum of Understanding (MOU) to Improve U.S. Federal and State Coordination for the Development of Offshore Wind Energy in the Great Lakes* has been drafted and offers a mechanism to compel relevant federal and state agencies to identify processes and timelines that would ensure a predictable, comprehensive, consistent, and timely permitting and siting process for offshore wind in the Great Lakes. Specifically, the draft MOU calls for:

- Creation of a regulatory roadmap to identify current permitting processes and conduct an analysis of those processes to identify overlaps, gaps and opportunities for permitting and review efficiencies.
- Improvement of interagency and federal-state communications and collaboration through the identification of agency Points of Contact (POCs) and development of mechanisms to promote early coordination, minimize duplication and increase efficiencies; and
- Application of administrative efficiencies to existing and future projects.

Offshore wind turbines such as those above will be permitted in the Great Lakes under a more efficient, effective and consistent process state-to-state if a Memorandum of Understanding to Improve U.S. Federal and State Coordination for the Development of Offshore Wind Energy in the Great Lakes is signed by all applicable federal and state agencies in the Great Lakes region.

When should this practice happen?

This practice is generally a policy but has implications throughout the development process.



Related Tools

National Wind Coordinating Collaborative's *Permitting of Wind Energy Facilities* | http://www.nationalwind.org/assets/publications/permitting2002.pdf | This document is a useful tool for understanding permitting during the wind development process.

Great Lakes
Wind Collaborative

Bottomlands Leasing Policy

Best Practice #18

Enact policies which provide a clear, coordinated and fair process for leasing lake bottomlands to facilitate appropriate offshore wind development.

Various statutes give the states and provinces authority to regulate structures placed on their submerged lands, including requirements affecting design and location. In the U.S., the Submerged Lands Act grants the Great Lakes states the authority to manage, administer, lease, develop and use the lands beneath navigable waters within each state's boundaries. For all of the Great Lakes states, the lakeward boundary of state jurisdiction extends to the international boundary between the U.S. and Canada, except in Lake Michigan where the boundaries have been determined by the states bordering that lake.[1]

United States Great Lakes bottomlands are owned and managed by the states on behalf of their citizens. In Canada, Great Lakes bottomlands are considered "crown lands"—also public—and are managed by the provinces. All Great Lakes jurisdictions have some form of regulations regarding bottomland permitting/leasing, but few have legislation that specifically addresses offshore wind. In some jurisdictions, new legislation or a modification of existing rules may be necessary to address offshore wind permitting and leasing.

Importantly, the terms of a lease of publicly-managed bottomlands should be structured to ensure a fair price for the lease or permit and ensure that the offshore wind project has a public benefit. States and provinces should also work with affected communities to examine whether they are allowed to share revenues generated from leasing Great Lakes bottomlands with local communities, and determine an equitable formula for compensating the communities affected.

Fair bottomlands leasing should enable equal access and include rules and procedures that must be followed by all applicants. A Request for Proposals (RFP), Request for Qualifications (RFQ) or other mechanism should ensure that applicants are serious and qualified, and deter speculative dealings where unqualified applicants obtain leases and sell them to appropriate developers. Such an RFP or RFQ for leases would create a consistent, clear process more likely to produce projects that are economically viable and environmentally sound, and ensure a transparent, competitive, and credible process.

Beyond an RFP or RFQ, policies are needed that set standards for siting individual projects in the bottomlands of the Great Lakes. The most likely administrative vehicles for approving use of those bottomlands for offshore wind are leases and permits. Recommended leasing or permitting provisions include[2]:

- Provisions for installing required transmission facilities, which may be the function of entities other than prospective developers[3];
- Provisions for lease renewal to provide for increased stability in the Great Lakes offshore wind industry.[4] Stability in the leasing process will be valuable both to lessees, who will not be forced to remove productive turbines following the initial term of their leases,[5] and to electricity consumers, who will benefit from consistent long-term electricity supply and prices[6];
- Application of joint and several liability applies if a lessee desires to transfer the lease to a third party.[7] Such a provision would ensure that environmental risks are adequately considered by all parties to the transfer of a lease[8];

- Collection of rent and royalties from lessees, and for distribution of those funds to the state affected by the facilities installed. Revenue directed to the states would help offset the impacts of offshore wind development[9];
- Requirement for lessees to provide a financial insurance instrument in the event that the lessee becomes insolvent or fails to comply with the provisions of the lease. This would provide additional protection of the public trust in the Great Lakes.[10]
- Requirement for detailed compliance plans at each important stage of the development process in order to ensure that each action taken by the lessee complies with state and federal law[11]; and
- A mechanism to evaluate and approve decommissioning plans in the event a lessee terminates a lease.[12] (See Decommissioning and Reclamation Best Practice.)

Any rules adopted should provide clarity and consistency to developers and the public as to the regulatory standards, and related informational and review requirements for offshore wind proposals and the criteria by which such proposals will be evaluated or a project proponent selected. Conditions are routinely attached to such permits or leases to ensure compliance with existing environmental and public safety laws and policies, such as protecting essential aquatic habitat and minimizing interference with coastal processes. States and provinces can also attach conditions to permits or leases that require monitoring of approved structures and projects to ensure that the projects perform as expected and that adverse impacts have indeed been avoided and/or minimized. Bottomlands leasing or permitting policies should include provisions to ensure coordination among relevant Great Lakes regulatory and review agencies to avoid a "race to the bottom" by individual jurisdictions, potentially compromising important regional environmental goals. (See An Adaptive Regulatory Roadmap for Offshore Wind Best Practice.)

Challenges and Benefits

Clear leasing policies that are grounded in existing state laws and authorities are important to avoid, or quickly resolve, potential legal challenges.[13] Because the submerged lands in the Great Lakes are subject only to state control, the offshore renewable energy permitting process administered by the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) under the authority of Outer Continental Shelf Lands Act has no application within the Great Lakes.[14] Within the Great Lakes, developers face regulatory uncertainty and must continue to contend with multiple potentially overlapping permitting agencies and opposition groups that will use this uncertainty to discourage development. Until there is a level of regulatory certainty comparable to that established by the BOEMRE regulations, the development of offshore wind projects in the Great Lakes will likely be out-paced by projects on the coasts. This, in turn, could slow any related economic activity in the region and postpone the environmental and human health-related benefits of wind-generated electricity.[15]

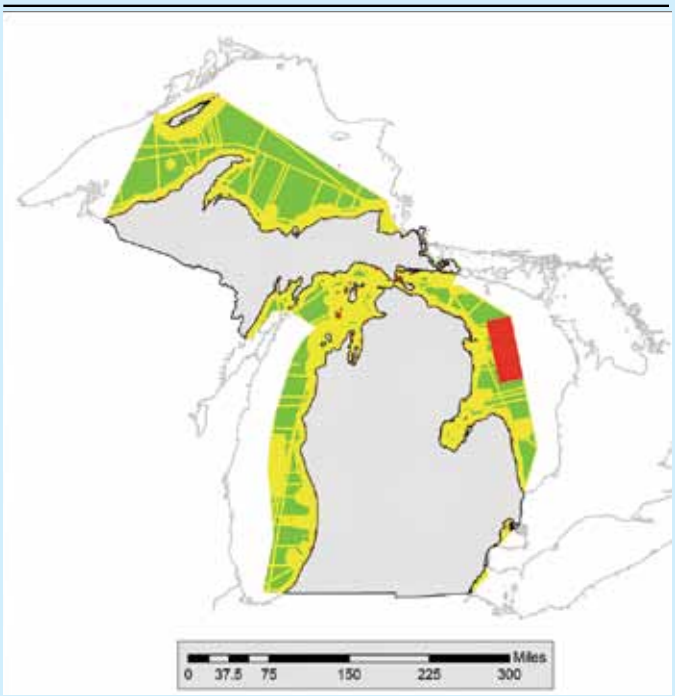
On the U.S. side of the basin, the Public Trust Doctrine creates an affirmative duty for the states to protect their publicly-owned submerged lands and other trust resources, and also creates a legal basis for citizens and environmental groups to challenge a state's decision in court if they believe it is contrary to its trust responsibilities. The public trust doctrine virtually insulates the states from any regulatory taking claim because it is the publicly-owned bottomlands that are being controlled and regulated, not privately owned property.[16]

Who should implement this practice?

State and provincial governmental regulators should implement this practice.

Case Example | Michigan Legislation to Guide Leasing of Great Lakes Bottomlands

A bill introduced into the Michigan legislature in 2010 (HB 6564)[17] would establish regulations for leasing of bottomlands of the Great Lakes owned by the state. Under Sec. 32409, the legislation includes provisions to minimize delay and duplication and to coordinate leasing, permitting, and other regulatory processes with the many federal, state and tribal entities involved.



Application of mapping criteria for Michigan offshore wind siting. Red=categorically excluded; yellow=conditional; green=most favorable. Source: Report of the Michigan Great Lakes Wind Council, Oct. 1, 2010.

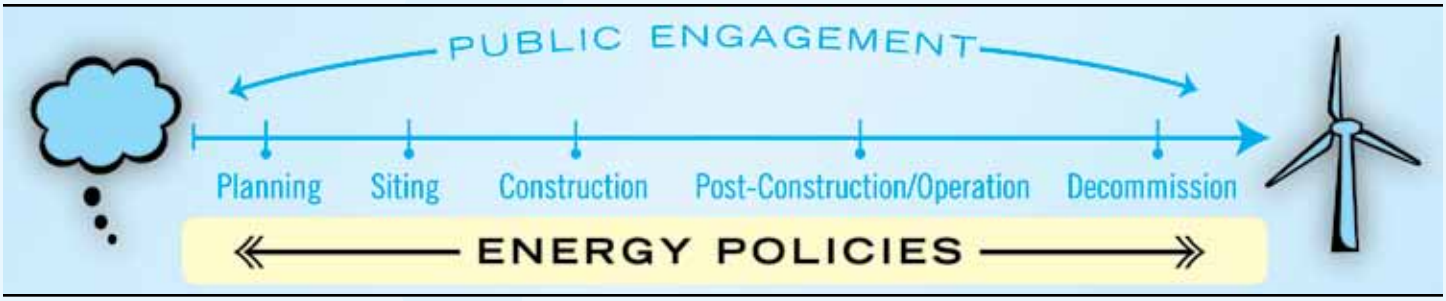
The state's coordination process calls for use of the same applications as required by other state or federal agencies, use of information from reports, analyses, environmental impact statements, environmental assessments, and other documents as required by those agencies, and holding hearings jointly with other agencies.

The bill includes specific requirements for the siting, construction, operation and decommissioning of offshore wind energy facilities in the Great Lakes and criteria for reviewing applications thereof. It also outlines the steps to nominate Great Lakes bottomland parcels for lease and an auction process to acquire a bottomland parcel. The bill includes provisions that must be included in a public notice of parcels nominated for lease, including a minimum bid. The bill also outlines criteria for lease bidders, procedures for the lead state agency to award the successful lease bidder, terms of leases, and royalty payments by lessees and their public benefits. HB 6564 proposes that an Offshore Wind Energy Trust Fund is created within the State of Michigan's Treasury for which royalty payments are deposited and used for public purposes as described in the legislation. These purposes include – but are not limited to – protecting and managing bottomlands, enhancing and restoring Great Lakes aquatic environments and nearshore habitat, and managing submerged cultural resources. Preference is given to activities located not more than 30 miles from the shoreline of a county with shoreline nearest to any particular (1) offshore wind energy facility.

There are several opportunities for the general public to review and provide comment on proposed bottomland parcel nominations and permit applications for site assessment, construction and operation, and decommissioning work through public comment periods and public hearings.

When should this practice happen?

Ideally, these policies are in place before wind projects are developed and are periodically adapted and updated to reflect emerging issues and challenges.



Related Tools

Issue Paper 3: Michigan's Great Lakes Bottomlands and Wind Energy | http://www.michiganglowcouncil.org/meeting_materials/042309/issue_papers/IssuePaper3_Bottomlands.pdf | This issue paper examines a range of issues for that the Michigan Great Lakes Wind Council considered as it developed recommendations for its final report issued in 2010.

1 Isely, E. S. and V. Pebbles. 2009. U.S. *Great Lakes Policy and Management: A Comparative Analysis of Eight States' Coastal and Submerged Lands Programs and Policies*, Coastal Management, 37:2,197 — 213.

2 *Renewable Energy and Alternate Uses of Existing Facilities on the Outer Continental Shelf*, 74 Fed. Reg. 19,638–40 (Apr. 29, 2009).

3 Commercial leases issues by the BOEMRE include the right to transmit electricity produced on the outer continental shelf across federally-controlled land. 30 C.F. R. § 285.200.

4 Alliance to Protect Nantucket Sound v. Energy Facilities Siting Bd., 932 N.E.2d 787 (Mass. 2010) (describing a prospective wind farm developer's struggle to acquire transmission rights within both state and federal waters).

5 30 C.F.R. § 285.425 (allowing a lessee to continue to conduct activities upon renewal of a lease).

6 *Supra* Part II.A (explaining that volatility in the price of electricity generated by natural gas causes uncertainty and concern among consumers).

7 30 C.F. R. § 285.411 (providing for joint and several liability among prior and subsequent lessees on the outer continental shelf and referencing environmental and operational problems as specific sources of liability).

8 *Id.*

9 H.R. 6564, 95th Leg., Reg. Sess. (Mich. 2010); see also *Report of the Michigan Great Lakes Wind Council,* http://www.michiganglowcouncil.org/GLOWreportOct2010_with%20appendices.pdf.

10 30 C.F.R. §§ 285.515-.521 (requiring financial assurances for commercial and limited leases issued by the BOEMRE for parcels on the Outer Continental Shelf); *id.* § 285.535 (requiring forfeiture of a bond if a lessee fails to comply with a term of a lease issued by the BOEMRE); *id.* § 285.913 (requiring forfeiture of a bond if a lessee fails to comply with a decommissioning plan).

11 *Id.* §§ 285.611-612 (requiring developers submitting SAPs to include sufficient information to allow the BOEMRE to comply with NEPA and CZMA); *id.* §§ 285.646-647 (requiring developers submitting GAPs to submit the same information).

12 *Id.* § 285.905 (requiring developers on the OCS to submit decommissioning plans to the BOEMRE).

13 Conger, H. 2011. *A Lesson from Cape Wind: Implementation of Offshore Wind Energy in the Great Lakes Should Occur Through Multi-State Cooperation.* Unpublished Draft anticipated for Loyola University Chicago Law.

14 43 U.S.C. § 1337(p)(1) (allowing the Secretary of the Interior to issue renewable energy leases only on the outer continental shelf).

15 Conger, H., 2011, p. 137.

16 Shafer, Chris A., January 2006. *Legal Framework Pertaining to Lakebed Alterations.* Thomas M. Cooley Law School, Lansing, Michigan.

17 http://www.legislature.mi.gov/documents/2009-2010/billintroduced/House/htm/2010-HIB-6564.htm

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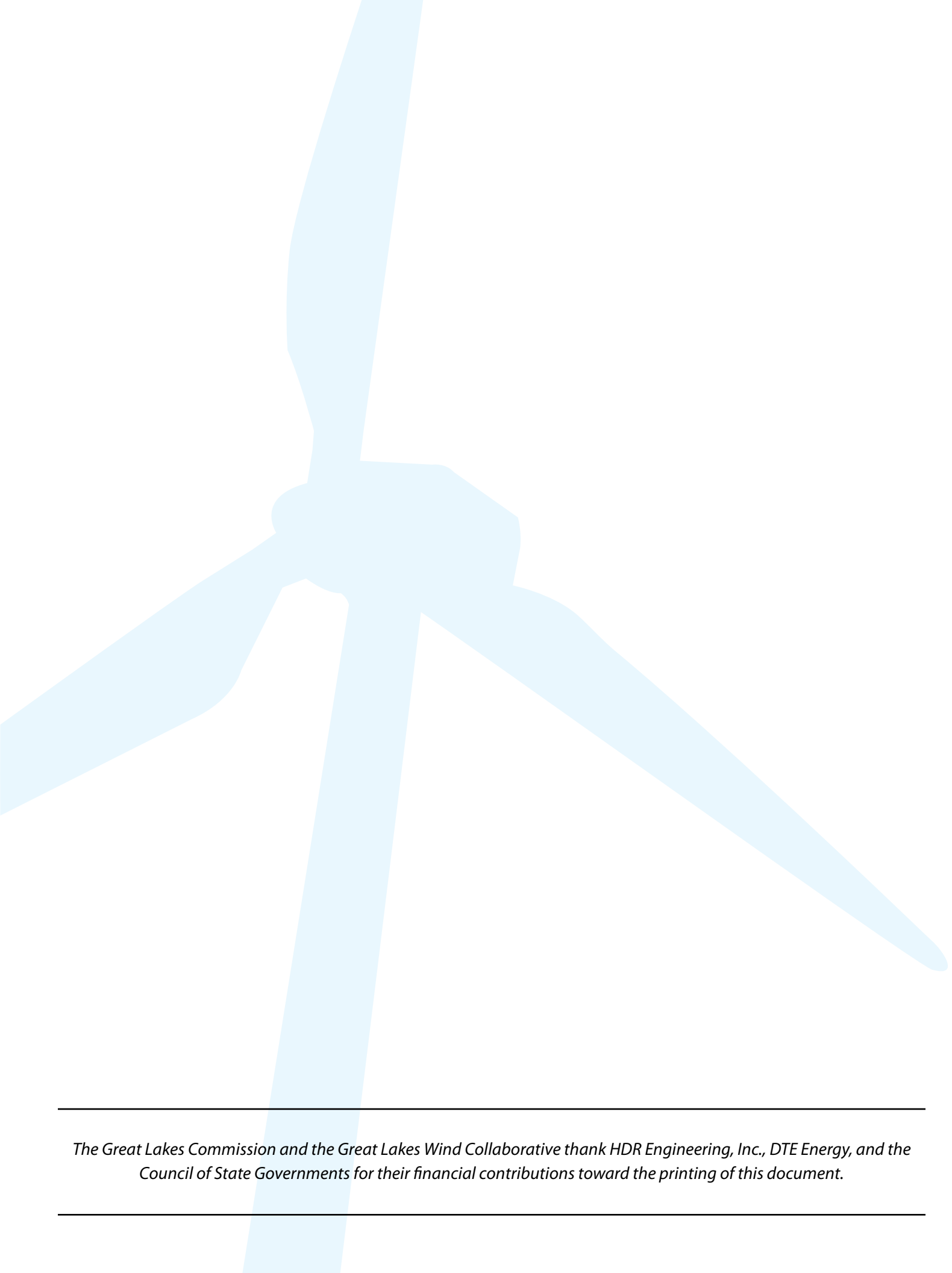

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