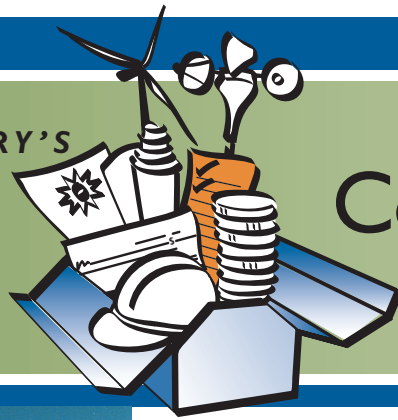


WINDUSTRY'S



Community Wind Toolbox



This chapter is part of Windustry's Community Wind Toolbox which is designed to guide you through various aspects of developing a commercial-scale community wind project. Each section gives you background information about particular steps in project development and provides you with resources to help you to do more in-depth research on your own.

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Chapter 2:

Community Wind Development Overview and Checklist

Community wind project development requires many steps and involves many diverse people and organizations. As a community wind developer you will need to be creative, flexible, and patient in overcoming a variety of challenges. Much of the necessary work will require hiring experienced consultants and lawyers, such as for site assessment, interconnection studies, and developing easements. From the basics of building your project team and creating a realistic plan to the highly technical wind resource assessments and interconnection studies, you will want to manage your risk and exposure to ensure that your investments will pay off.

This section introduces the key players and their roles in community wind development. It gives an overview of the steps involved in the development process, and provides a checklist to help you organize your community wind development project. Here are the main topics covered:

Key Players in the Wind Industry

Community Wind Development Steps

Wind Project Development Checklist

Additional Resources for Developing Community Wind Energy

Key to Toolbox icons:

★ Best Practices ⚠ Caution ⓘ Links to more information 💰 Information that will affect your project's bottom line ➡ Example

Key Players in the Wind Industry

Key players with a role to play in community wind development include: wind turbine manufacturers, dealers, and distributors; wind project developers; consultants and contractors; electric utilities, advocacy groups; government agencies; and rural landowners and communities.

Wind Turbine Manufacturers

The firms dealing with wind energy run the gamut from small retail shops or mail-order catalogs selling micro turbines to corporate wind energy developers with annual revenues in millions of dollars. Fewer than 20 large wind turbine manufacturers worldwide produce commercial Megawatt-scale wind turbines. Many of the large turbine manufacturers are based in Europe, especially in Denmark and Germany. Large wind turbines are either sold directly by the manufacturer or by the manufacturer's regional dealers and distributors. A list of large turbine manufacturers is provided in the [Turbine Selection and Purchase](#) section.

Wind Developers

Wind developers buy or lease windy land, finance the installation of wind turbines and operate and maintain the turbines for an extended period. After a project is constructed, the wind developer's role varies. The developer may own and operate the wind farm, or merely operate the project for a different owner.


I needed a way to diversify my farm operation to survive. There's nothing coming to us so we had to create our own jobs. It's not easy to put a wind energy project together, but it is a good opportunity.

*Dan Moore
Farmer and Small Wind Developer
Blue Earth, MN*

Private Consultants and Contractors

Private consultants and contractors serve the needs of any party in wind turbine transactions willing to pay their fees. They provide specialized skills or knowledge not generally available. A consulting meteorologist can independently evaluate the wind resources at a site. Engineering consultants can offer technical comparisons among competing wind turbines or provide "due diligence" reports to banks

considering loans for proposed wind projects. Contractors are often needed for the construction phase of wind projects for tasks such as pouring concrete and erecting the turbines.

 The American Wind Energy Association (AWEA)'s membership directory can be a good resource for finding consultants: www.awea.org/directory

Electric Utilities

The cooperation of electric utilities is required to interconnect any wind turbine with the power grid. Selling electricity to a utility involves negotiations between the non-utility generator (NUG), such as a farmer, and the electric utility. These negotiations generally result in a contract binding both parties to an agreement for a fixed amount of time. Electric utilities also represent the main market for wind-generated electricity, whether they are interested in wind power for their own purposes or are under political, regulatory, or legal pressure or obligation to invest in wind energy.

Advocacy Groups

Clean energy advocates work to educate the public about the benefits of renewable energy and influence public policy to favor clean energy technologies like wind. The fact that wind energy projects often mean large investments in rural communities has captured the attention of groups interested in rural economic development, such as local elected officials, farm groups, and other rural advocacy organizations.

Government

Government agencies play many roles in wind energy development at the local, state, regional, and national levels. Local government units are responsible for zoning and permitting wind turbines and often for determining how they are taxed. The federal and state governments control many of the incentives available to wind projects and generally play a regulatory role in the energy industry.

Rural Residents and Landowners

As the suppliers of windy land, rural landowners can have substantial influence over how wind energy develops. As the industry has grown, windy landowners and their communities are gaining an understanding of the tremendous value of their wind resource and are finding ways to keep more of the benefits in the local community. These methods range from farmers negotiating better land leases with developers to local and community investments in wind projects.



Officials from the Twin Cities metro area and Southwestern Minnesota visit a wind farm on Buffalo Ridge in Southwestern Minnesota.

Photo: Windustry staff

Community Wind Project Development Steps

Developing a wind project can be a time-consuming and complex process. Before beginning, you will want to familiarize yourself with all of the necessary steps and gain a solid understanding of the elements of a wind project. The time required to complete development of a community wind project depends on several critical path milestones:

- Securing land with a demonstrated bankable wind resource;
- Securing permits and development financing;
- Completing negotiation of a power purchase agreement (PPA) with a utility or other off-taker;
- Completing interconnection and transmission agreements;
- Arranging capital financing;
- Procuring wind turbines, transformers, and other components, and contracting for construction; and
- Building and commissioning the project.

Although presented as a list, the process of planning and developing a project from beginning to end is a much more organic process with many of these milestones happening in parallel to one another. For instance, although placing deposits for a firm order of turbines is listed toward the end of the critical path sequence, placing your turbine order is a long negotiation process which must be done fairly early in the process in order to complete projects in a timely manner in today's equipment-constrained wind market.

Project Goals – Decisions to be Made Up Front

The scale of a community wind project is often dictated by the number of interested investors, the size of the site, and the utility system's existing ability to interconnect generation without significant and costly upgrades. As a community wind project developer, you will have control over some of these decisions such as the number and types of investors you will work with. Other issues, such as the design of the existing utility grid, are already defined for you. Some questions, such as the area available to you for development, may be somewhat flexible.

You may find that joining forces with others and aggregating your development efforts to achieve a larger project may substantially improve your economic return, as an \$85 million 50 MW project may be more profitable than a \$4 million 2 MW project. On the other hand, a combination of state and federal incentives targeting 2-5 MW projects and constrained electrical infrastructure may not have space for a large project could help make a smaller project more feasible and easier to justify.

★ *Before moving down the development path, you should determine and prioritize your primary project goals so that, as your project evolves and key decisions are required, you can be sure to preserve your most important objectives. You should also have a clear mission statement that will help to frame your project for potential investors and to keep clear in your own mind the objectives of the project as it evolves.*

Like any multi-million dollar business venture, collaboration with experts in various areas of the industry is key to developing a successful project. A capable CEO and a diverse and qualified board of directors will provide sound guidance when making key decisions. A well skilled project manager with a solid understanding of the wind industry and the roles of key players is essential for a successful project. The **Project Management and Planning** section of the Toolbox describes the qualities of vital team members and their roles in the development process. That section also outlines many of the stumbling points in the development process and suggests strategies for hedging against risks.

Characteristics of a Good Community Wind Site

Finding and securing a good site is key for a successful community wind project. A good site not only has strong wind resources but also has access to high voltage distribution or transmission lines, appropriate zoning for wind turbines, minimal environmental concerns, and favorable attitudes toward wind development from neighbors. Once you have identified a promising site to investigate developing a project, if you do not own or otherwise control the land, you will need to obtain an easement or lease from the property owner. For more information about wind energy easements/leases visit the **Leases and Easements** section of the Toolbox.

Once you have control of a suitable wind development site, you can complete more detailed site planning such as micro-siting turbines. For more information about siting turbines, visit the **Siting Guidelines** section of the Toolbox.

Wind Resource Assessment

Once you have determined your project goals and identified a potential site or sites, the next step is typically to determine a rough estimate of the wind class at your sites. A wind resource map of your state can be found online at:

http://www.eere.energy.gov/windandhydro/windpoweringamerica/wind_maps.asp

If your land appears to be Wind Class 4 or higher, is clear of trees and buildings, is higher than its surroundings, and in close proximity to 3-phase distribution or transmission lines, then you are justified to investigate your resource further. Next you will need to undertake site-specific meteorological studies to help you and your financial advisor determine your site's

AT-A-GLANCE

Site Characteristics Checklist

- Strong wind resource
- Access to high voltage distribution or transmission lines
- Appropriate zoning for wind turbines
- Minimal environmental concerns
- Favorable attitudes towards wind energy

economic feasibility. The **Wind Resource Assessment** section of the Toolbox includes detailed information about assessing site wind resources for community-scale development and what it takes to collect “bankable” wind resource data to convince financiers and investors that your project will produce enough energy and generate enough revenue to meet their required returns.

Financing Your Project

The economic rewards of your development effort will depend greatly on your financing mechanisms. It is important to develop a comprehensive budget and investigate possible financing options at the start of your project. Project cost components include the wind resource assessment, the turbines, towers, construction costs, interconnection fees and system upgrades, operations and maintenance, insurance, and any consulting services you use.

i *Summaries of state and federal incentives that you may be able to take advantage of to reduce your project costs can be found at: www.dsireusa.org.*

All of these components must be taken into consideration as you put together your project's pro forma. The **Financing** section of the Toolbox includes detailed information about project financing and helps answer the question “What will your banker want to know?”

Choosing a Business Structure

Once you have confirmed that your site has a strong wind resource and the property is suitable for development, you will want to decide what level of involvement in the project you are comfortable with. If you own the land yourself, there are three basic ways to participate in wind energy development:

- 1) You can lease your land to a wind developer,
- 2) You can join with others in investing, or
- 3) You can own the turbine(s) yourself.

Any combination of the above is possible. If you do not own the land, then options 2 and 3 are still available. Your commitment level will depend upon a few factors, including the time and effort you want to put in, the risk and return you are willing to take on, your tax liability (or tax credit appetite), and the legal feasibility of your situation.

Your overall project motivations will help determine your ownership structure. Is your intention for local community members to be the project owners? Do you want to develop a wind project as a hedge against rising energy prices for a farming operation? Or is your goal to create a steady, long-term stream of revenue for a public school district? Financial incentives typically are designed for specific business models, so you may find it necessary to modify your business plan to be eligible for the variety of wind energy incentives, tax shelters, and financing options available to help develop community wind projects. Some of your investors may require certain rates of return from a project, and this will likely direct project outcomes to some degree. Hiring a legal consultant familiar with community wind development can walk you through the benefits and drawbacks of potential ownership models.

The Toolbox section on [Business Models](#) includes descriptions of many of the innovative ways that projects have been structured to help you decide which is right for you. The Toolbox also features an in-depth analysis of the model most widely used to date for community wind projects: the “Minnesota Flip.” Written by an attorney experienced in setting up such projects, this section provides detail unprecedented in the public domain on how this complex business structure works in practice.

Power Purchase Agreements

One of the most formidable tasks in developing a community wind project is attaining the power purchase agreement (PPA). PPAs are lengthy legal documents which define the financial obligations between your wind project and the utility purchasing your energy. They contain language defining when your project can and can not produce energy, payment schedules, reporting obligations, and indemnity clauses in addition to the rate or rates at which the utility will purchase your energy. It is strongly advisable to enlist the help of an attorney with experience in power purchase agreements. This will be a significant but worthwhile expense that can keep your project out of legal and financial trouble after your project begins producing energy. The Toolbox section on [Power Purchase Agreements](#) has descriptions of typical terms found in wind energy PPAs as well as excerpts from agreements for actual projects with annotations by an attorney with experience in negotiating wind project PPAs.

Interconnection

Installing wind turbines and generating electricity is meaningless unless you can get that electricity onto the electric grid. In order to sell electricity you will need to interconnect with your local utility's transmission lines. Interconnection requires that the correct voltage distribution or transmission lines be located nearby, and that they are capable of handling the additional electricity you produce. You will need to obtain an interconnection study to determine the capacity and cost, and then negotiate an interconnection agreement with your utility. The Toolbox section on [Interconnection](#) will guide you through the process.

Turbine Selection and Purchase

The turbine that you select for your project will depend on your wind resource and the goals of your project, as well as on the price, availability and down payment required to secure a turbine. Keep in mind that there are long waiting lists for many wind turbines, often more than a year. When deciding which turbine is right for your project, you should talk with other wind developers in your area to learn about their experiences working with various manufacturers. For a list of turbine manufacturers that service the U.S. and guidance on selecting a turbine, visit the [Turbine Selection and Purchase](#) section of the Toolbox.

Legal Issues

There are many complex legal issues associated with any wind energy project. You may need to secure land control, often through **leases and easements**; you must make sure that you have all of the necessary **permits** and are in compliance with local zoning laws; you will need to understand the **tax structure** of your project in order to take advantage of all the possible incentives; and you will need to negotiate a **power purchase agreement** with your utility. All of these issues will require a great deal of paperwork and legal knowledge, as well as interaction with multiple regulatory agencies and governmental entities. We have included a number of sample legal agreements throughout the Toolbox to give you an idea of what each entails.

Next Steps: Building and Operating a Community Wind Project

Once you have fully developed your project plan and performed all the necessary pre-development steps, as laid out in the preceding section, you can begin the construction phase of your project. The delivery and installation of your turbine(s) will be managed by an experienced construction manager and we will not deal with that stage in this Toolbox. Your project

does not end after construction, however, as your turbine will need periodic maintenance checks. This Toolbox also does not cover the operations and maintenance phase of your project, as this is usually managed by hired experts.

Construction

One of the key members of a wind project development team is the construction manager. When hiring a construction contractor, you should talk with experienced developers in your area to gauge their experiences. Once all of the essential project elements are in place, the construction manager can begin site preparation for delivery and installation of the turbine(s).

Operations and Maintenance

Once the wind project is operational, it must be maintained for its lifespan by a qualified firm. Operating costs also include warranties, administrative fees, insurance, property taxes, land-lease payments, and a contingency fund for unforeseen problems. How well you maintain your turbine will affect your project's lifetime and return on investment. After the useful lifetime of the turbine, decommissioning costs will be incurred for removal of the machines and restoration of the site.

Wind Project Development Checklist

The checklist below is intended to give you an idea of the steps involved in developing wholesale community wind energy projects and to help you organize your development process. It is important to understand that many of the steps in the list below will happen simultaneously or may be dependent upon the completion of other steps and that the path to development is not linear. This checklist is meant to provide a framework, not a hard-and-fast rulebook for the exact steps you must take or a set order for the process. Each community wind project is unique and distinct from others, and your project may require additional steps or it may be less involved.

Development Phase

Project Management & Planning

- Identify your project goals and areas where you will need to hire an expert
- Make preliminary contacts with consultants
- Select your business structure, project manager and CEO
- Raise seed capital to hire experts and perform feasibility studies
- Identify risk factors and how to mitigate them
- Develop your project plan and timeline

Wind Resource Assessment

- Preliminary wind assessment
 - Review your site on state/county wind maps
 - Collect information from nearby monitoring sites
 - Estimate annual electricity production
 - Estimate economic feasibility
- Detailed site characterization
 - Research feasibility study grants and anemometer loan programs
 - Set up anemometers and other instruments
 - Consult with a wind modeling company (optional)
 - Collect, validate, and analyze data
 - Develop detailed production estimates and cash flow projections

Siting

- Site Assessment
 - Inspect site: How much open space is available? Are there substantial wind obstacles? What is the topography like? How close are distribution and transmission lines?
 - Gain control of site for installation of anemometer through easement or land purchase
 - Investigate interconnection opportunities
 - Investigate site access
 - Design and initiate wildlife surveys
 - Discuss project with your neighbors
- Qualify your land's potential for wind energy
 - Create a wind rose
 - Calculate wind shear
 - Review setback and spacing requirements
 - Determine turbine layout

Permitting and Zoning

- Investigate which Federal, State, and Local permits are required for your project
- Meet with permitting authorities to process pre-applications
- Conduct community informational meetings
- Prepare and submit permit applications
- Permit review and determination

Land Control

- Determine existing right-of-way easements
- Negotiate easements and royalties for landowner(s)
- Establish control of land and secure easements

Financing

- Research loan and grant options
- Identify tax incentives and eligibility requirements
- Develop cash flow, balance sheet, and income statements
- Complete applications for loans and grants
- Conduct equity drive
- Negotiate and execute agreements with equity investors
- Negotiate and execute Power Purchase Agreement
- Negotiate and execute contract to sell renewable energy credits

Business Model

- Establish legal entity
- Determine ownership rights, capital contributions, distributions and allocations
- Execute contracts

Cost Estimates

- Define insurance requirements and solicit estimates
- Execute insurance and other agreements

Interconnection

- Meet with utility and agree on interconnection studies
- Perform interconnection studies
- Complete interconnection application
- Negotiate and execute transmission agreement (if needed)

Turbine Selection and Purchase

- Review turbine spec sheets and determine which turbine is best for your project based on capacity rating, size, price, and availability
- Negotiate and execute turbine purchase agreement and warranty
- Place turbine order with deposit

Next Steps**Construction Preparation**

- Investigate potential construction companies and solicit estimates
- Execute construction contract

Construction Phase

Site Preparation

- Grading and road improvements/construction
- Trenching, cable-laying, and transformer installation
- Foundation and crane pad construction
- Fencing and erosion projects
- Substation construction/improvements and testing

Turbine Installation

- Turbine and tower transportation
- Turbine and tower installation
- Interconnection

Testing and Commissioning

Site Restoration

Inspections Completion

Operations and Maintenance Phase

Establish maintenance contract

Perform routine maintenance checks and repairs

Decommissioning and site restoration

Additional Resources for Developing Community Wind Energy

U.S. Department of Energy, Wind Powering America

State Wind Resource Maps:

http://www.eere.energy.gov/windandhydro/windpoweringamerica/wind_maps.asp

Database of State Incentives for Renewable Energy (DSIRE)

www.dsireusa.org

Windustry

Wind Energy Companies and Consultants:

<http://www.windustry.org/resources/companies.htm>

American Wind Energy Association (AWEA)

Membership directory:

www.awea.org/directory

New York State Energy Research and Development Authority (NYSERDA)

Wind Energy Toolkit:

www.powernaturally.org/Programs/Wind/toolkit

Energy Trust of Oregon and Northwest Sustainable Energy for Economic Development

Community Wind: An Oregon Guidebook:

www.nwseed.org/publications