Community Wind Project Development

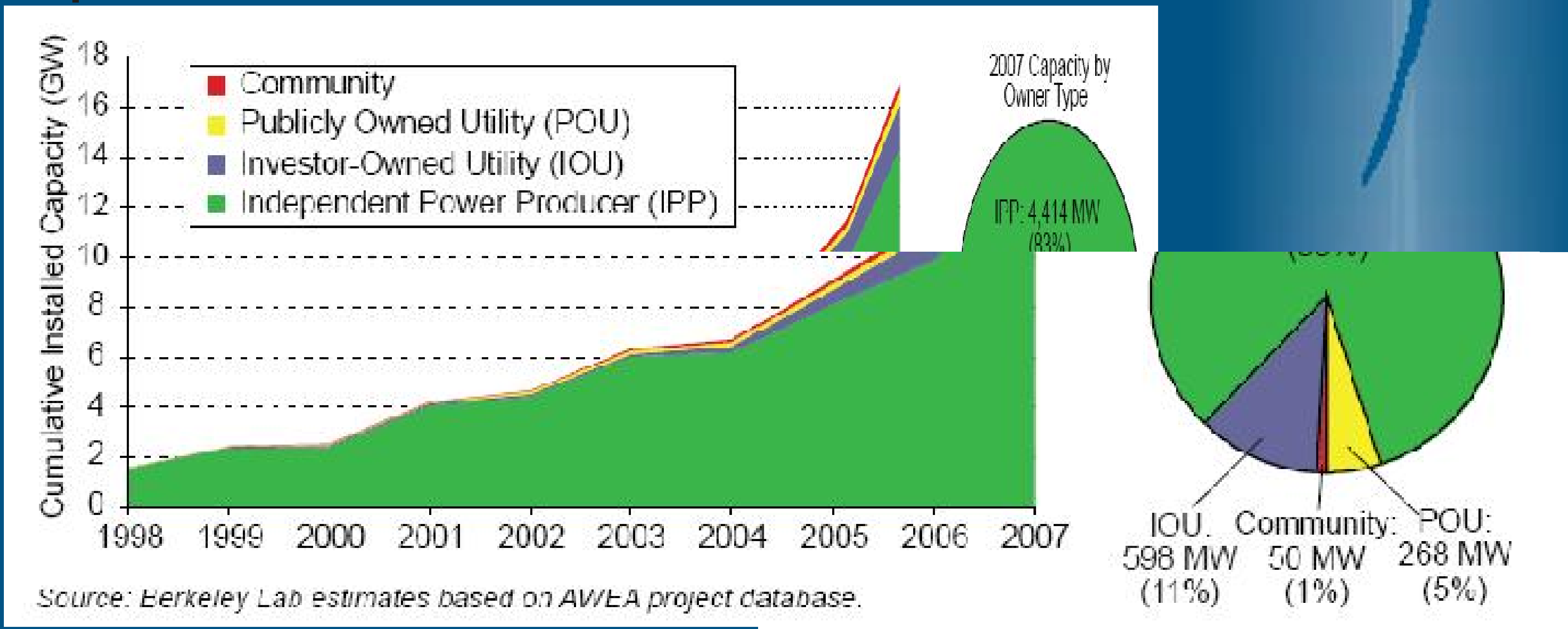
Melissa Peterson
Windustry Program Analyst
April 14,2009
Grand Marais, MN

Outline

- Types of Wind Development
- Community Development Overview
- Steps for a Community Wind Project
  - Project Planning and Management
  - Wind Resource Assessment
  - Siting and Permitting
  - Leases/Easements
  - Financing
  - PPA
  - Interconnection
  - Construction
- Community Wind Resources

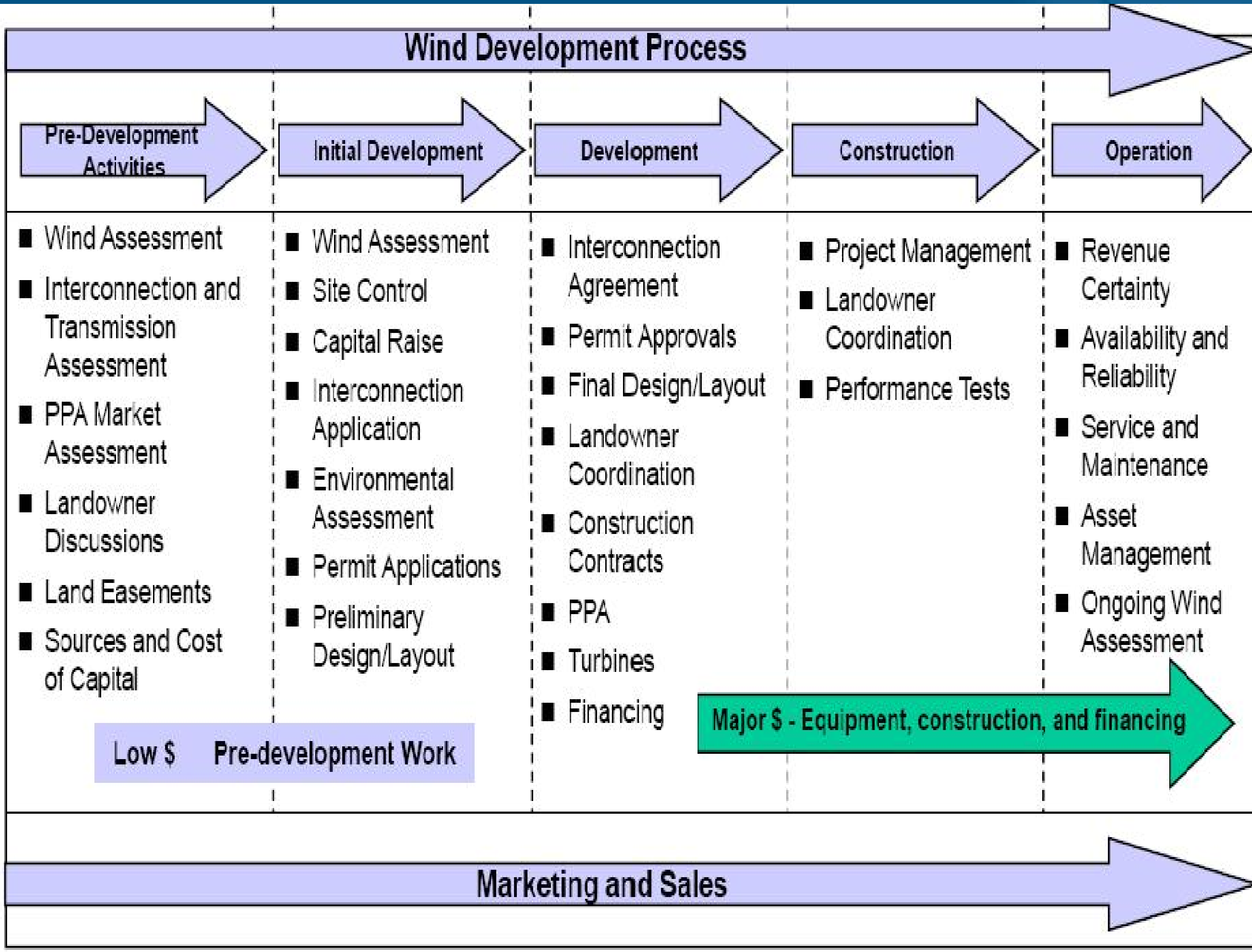
WINDUSTRY™

Types of Wind Development



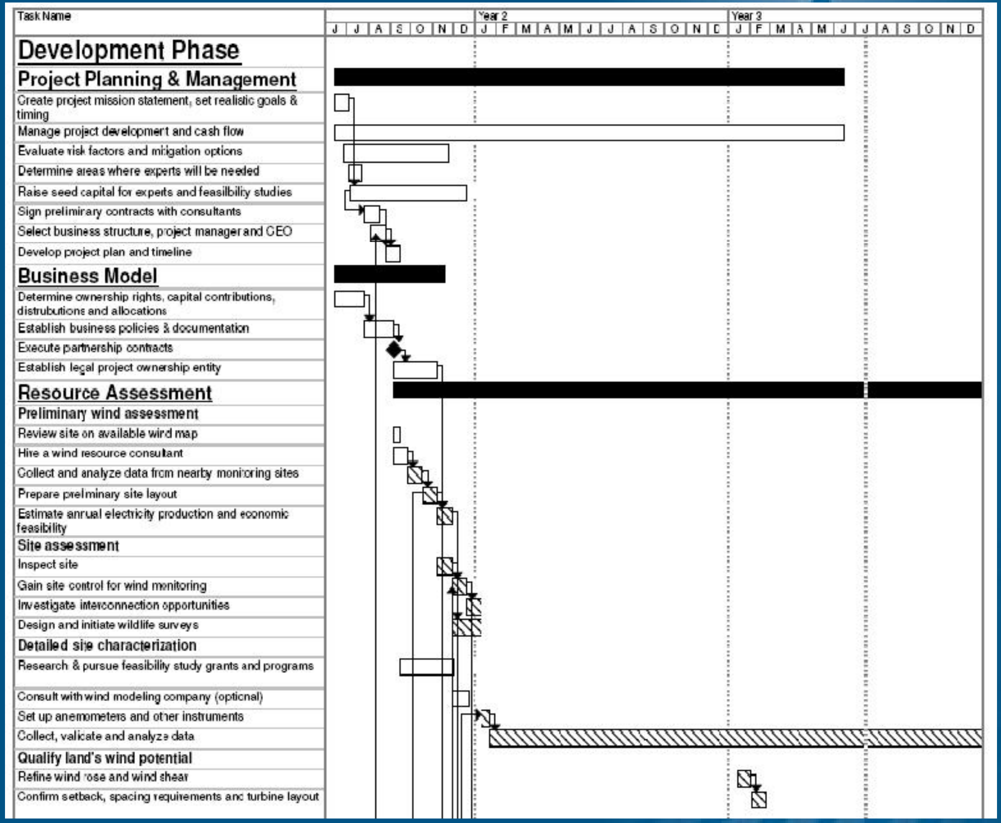
- Corporate Owned Wind
- Community Owned Wind
- Individual Ownership

WINDUSTRY™


Wind Development Process
Pre-Development Activities
Initial Development
Development
Construction
Operation
Wind Assessment
Interconnection and Transmission Assessment
PPA Market Assessment
Landowner Discussions
Land Easements
Sources and Cost of Capital
Wind Assessment
Site Control
Capital Raise
Interconnection Application
Environmental Assessment
Permit Applications
Preliminary Design/Layout
Interconnection Agreement
Permit Approvals
Final Design/Layout
Landowner Coordination
Construction Contracts
PPA
Turbines
Financing
Project Management
Landowner Coordination
Performance Tests
Revenue Certainty
Availability and Reliability
Service and Maintenance
Asset Management
Ongoing Wind Assessment
Low $ Pre-development Work
Major $ - Equipment, construction, and financing
Marketing and Sales

Project Planning/ Pre Development

- Identify your project goals and areas where you will need to hire expertise
- Identify an Appropriate Site Selection
- Raise seed capital to hire experts and perform feasibility studies
- Develop your project plan and timeline



WINDUSTRY™

Feasibility Studies

- Description of the project
- General Setting and Need for the Project
- Market Potential (current and future)
- Material & Equipment Procurement Plan
- Technical characteristics & Specifications
- Development Schedule and Production Plan
- Capital Requirements and Investment Schedule
- Sales Plan & Revenue Schedule
- Development Schedule and Production Plan
- Projected Operating Costs and Net Revenue
- Economic Feasibility
- Financial Plan
- Management Requirements for Project

WINDUSTRY™

Wind Development Process

Project Development

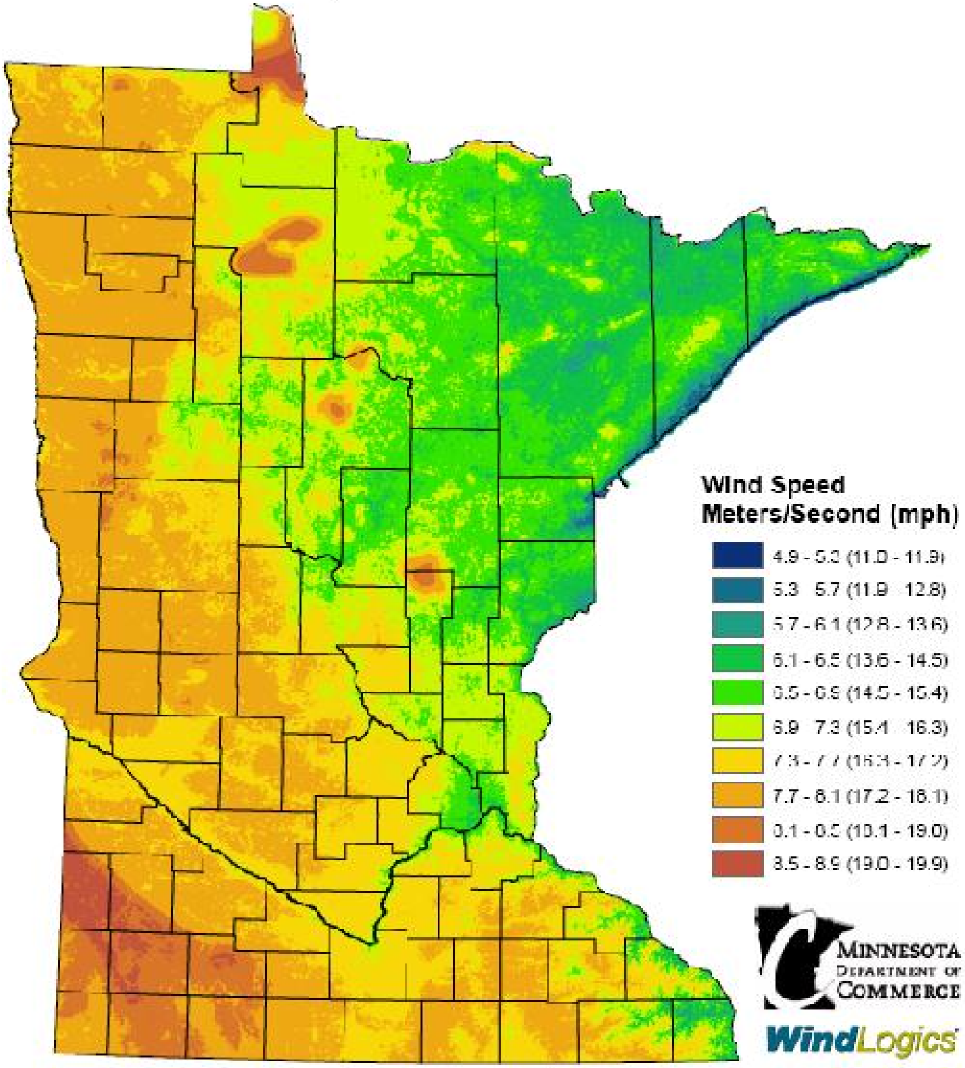
- Wind Resource Assessment
- Land acquisition - Options/Easements
- Permitting /Siting
- Studies
  - Transmission Interconnection
  - Environmental/Wildlife Studies
  - Economic Feasibility
  - Business Plan Feasibility
  - Sound
  - Telecommunications
  - Shadow Flicker
- Turbine Selection and Purchasing
- Power Purchase Agreement
- Interconnection
- Financing
  - Final Feasibility Analysis
  - Risk Analysis
- Preconstruction engineering
- Construction bidding

Wind Resource Assessment

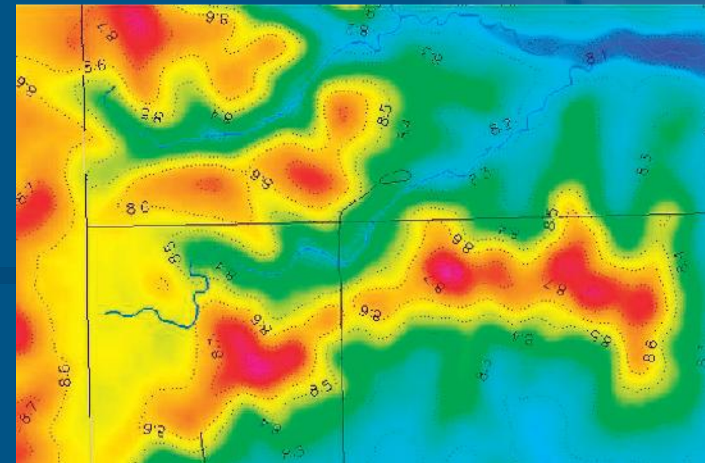
- Initial Assessment
  - Wind Maps
  - Existing Data
- Detailed Site Characterization
  - Computer Modeling
  - Raw Data from Anemometer/Met tower
- Long-term Validation of data (historical reference)
- Detailed Cash Flow projections and Acquiring Financing
  - Project 'Bankability'
  - Typically one plus years of data collection

WINDUSTRY™

Minnesota's Wind Resource by Wind Speed at 80 Meters



This map has been prepared under contract by WindLogics for the Department of Commerce using the best available weather data sources and the latest physics-based weather modeling technology and statistical techniques. The data that were used to develop the map have been statistically adjusted to accurately represent long-term (40 year) wind speeds over the state, thereby incorporating important decadal weather trends and cycles. Data has been averaged over a cell area 500 meters square, and within any one cell there could be features that increase or decrease the values shown on this map. This map shows the general variation of Minnesota's wind resource and should not be used to determine the performance of specific projects.



1)Anemometer and Wind Direction Vane 2) Datalogger 3) MetTower

Land Acquisitions

- Main way for landowners to participate in wind energy development –including for community wind projects
  - No cash outlay
  - Low financial risk
- Landowners can provide their land to a community wind project
  - Providing land in exchange for an equity share
  - Leasing their land for monetary compensation
- Compensation varies widely based on turbine size, wind resource, price of energy and many other factors.
- Long term commitments – usually last 20 to 40 years.
- Options for easements and leases are typical components of most wind energy projects, large and small.

WINDUSTRY™

Permitting

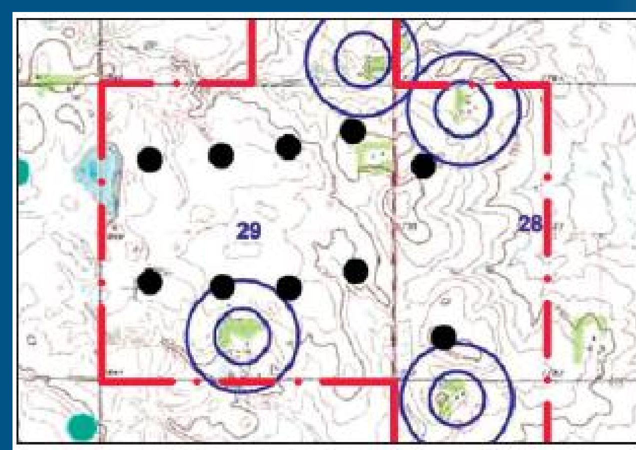
- Permitting Wind Energy in Minnesota
  - >5 MW permitted by PUC
  - <5 MW permitted by local ordinances
  - Project between 5 and 25 megawatts can, in lieu of PUC permitting, be permitted according to local ordinances if the applicable counties assume permitting responsibility and provide notice to the PUC.
- Federal permitting Agencies
  - Federal Aviation Administration
  - US Fish and Wildlife Service
  - US Forest Service or Bureau of Land Management
  - Army Corp of Engineers
  - Federal Communications Commission
- When federal agencies or federally managed lands and resources (monetary or otherwise) are involved, the requirements of the National Environmental Policy Act (NEPA) will apply.

WINDUSTRY™

Siting

- Site Layout and Design
  - Setbacks
  - Turbine Layouts
    - Single vs. Multiple Turbines
  - Turbine Color and Signage
  - Appropriate safety measures (fencing, drainage, erosion controls)
  - Project Plans
    - Construction
    - Wildlife Surveys
    - Roadway Maintenance
    - Site restoration

- Factors to consider:
  - Land Use
  - Aesthetics
  - Property Values
  - Sound
  - Public Safety
  - Environmental and Cultural Impacts
  - Construction Impacts



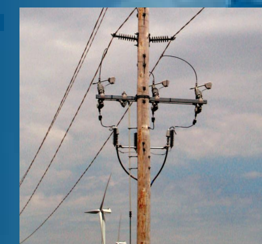
WINDUSTRY™

Turbine Procurement

- Based on wind resource, project goals, availability, operations & maintenance, and reliability
- Turbines
  - Size (few kw to 3 MW)
  - Design (Horizontal vs. Vertical Axis)
  - Used/Re-manufactures Machines
- Cost (range from few thousand to few million)
  - Typically manufactures require 10-25% down
  - Lag time (few years, but beginning to change)

WINDUSTRY™

Power Purchase Agreement



- Contract to buy the electricity generated by a wind project
  - Secure long term stream of revenue through the sale of electricity
- Typically 20 years in length from project commercial operation date
  - Provision that allow one or both parties to terminate if certain stipulations are not met
- Project Commissioning
  - Number of steps that must be met in order for a project to become commercially operational. Assures that the seller will be able to provide the buyer power
    - All testing and studies completed, Meets interconnection requirements, Communications between systems, Size determination, Security, permits received
- Price range (4.0¢/kWh to 6.4¢/kWh). Based on wind resource, geographic region, financing, transmission resources, turbine performance.
- Provisions- Transmission, Curtailment, RECs, Insurance

WINDUSTRY™

Interconnection

- The first step is to have conversations with those who have an understanding of the system in the area where you propose to connect your project.
- If applicable, the next step is to go through the Midwest Independent System Operator (MISO) In most cases you will likely need to complete a MISO study, which includes the following:
  - Interconnection Application, Feasibility Study, System Impact Study, Facility Study, Interconnection Agreement
- Executing the agreements & constructing additional infrastructure to get power on the lines
- For one or two turbine projects, it is advisable to connect the project at distribution level voltages, reducing need to build substation
- Early and open communication with MISO is suggested
- MISO Queue Process
  - Different for project > 20 MW and < 20 MW
  - Feasibility study, System Impact Study, Facility Study
  - Execute an Interconnection Agreement

Finance

Project Costs

In the table below are two examples of cost breakdowns for a 2 MW project and a 50 MW project. This is to give you a rough idea about the percentage of total project budget that could be allocated for different project costs.

	2 MW	$/kW		50 MW	$/kW	
Feasibility	$20,000	$10	1%	$200,000	$4	0.2%
Project Design & Development	$60,000	$30	1%	$2,000,000	$40	2.5%
Pre-Construction Site Development	$20,000	$10	1%	$200,000	$4	0.2%
Turbine Deposits' (20% of cost)	$680,000	$340	17%	$14,000,000	$280	17.2%
Construction	$500,000	$250	13%	$9,000,000	$180	11.1%
Balance on Turbines (80%)	$2,720,000	$1,360	68%	$56,000,000	$1,120	68.8%
Total	**$4,000,000**	$2,000		**$81,400,000**	$1,628	
Annual Project Expenses *(including O&M)*	$85,000	$43	2%	$2,250,000	$45	2.8%

- Financial viability of your Project
- Equity and Debt
  - Typically 10-15 year loans for conventional projects, up to 20 for bond financing
  - Equity is up-front money into the project
- Getting a Loan
  - Detailed Cost and Production Estimates
    - Proforma financial statements, use of incentives, information on owners, list of all permits/contracts, risk mitigation plans, construction plans, insurance
  - Credit Guidelines
    - Majority lenders want equity contribution of 30 % of project costs

WINDUSTRY™

Development Milestones

- Analyze value of wind resource
- Secure footprint
- Negotiate a PPA
- Interconnect to the grid
- Finance and develop the project
- Obtain regulatory approvals
- Complete construction and secure operational maintenance

WINDUSTRY™

Construction

- Site Preparation and Project Management
- Construction and Commissioning

Major Points to Keep in Mind

- Projects take hard work, innovation, champions and public policy support
  - Planning and development typically takes several years
  - Dedicated team of professionals with consultants in business, finance, easements, PPAs, engineering, construction & project management
- Provide major new economic opportunities connecting main street America with a new industry

WINDUSTRY™

Toll free (800) 946-3640

Melissa’s phone (612) 870-3465

e-mail melissa@windustry.org

www.windustry.org

WINDUSTRY™