Installing a Small Wind Energy System

John Patten
Director, Manufacturing Research
Western Michigan University
DOE Small Wind Turbines
< 100 kW (1-100 kW)

Entegrity 15/50
50 kW, 100-120 feet

Skystream 3.7
2 kW, 45-70 feet

Northwind 100
100 kW, 121 feet
Wind Turbine Install Guide

Based on experience of KVCC and Western Michigan University
Will Project be viable?

- Relate project to mission
  - KVCC and WMU are educational Institutions
    - leading by example
- Define project goals
  - Educate and Train on wind turbine design, manufacturing, construction, installation, maintenance
- Evaluate financial feasibility
  - Extended payback based on energy savings alone
- Consider Sustainability and Green Aspect
  - Renewable Energy Certificates (RECS)
General project planning

- Analyze the wind resource
  - Wind speed and direction
  - Site specific issues – wind shade analysis, other issues (terrain, etc.)
  - Analyze utility loads and consumption
  - Size of Turbine

- Proximity to utility transmission or campus distribution

- Permit requirements

- Feasibility of hiring wind developer
Michigan’s wind resources and its rich manufacturing history positions the state to be a key player in wind power in the future.

Kalamazoo Valley Community College and WMU are taking action now to be able to meet the wind education and training needs of tomorrow.
100 meter map
Michigan
General project planning

- Proximity to utility transmission or campus distribution
  - Internal use vs. selling power, net metering
  - Planning for future additional turbines

- Permit requirements
  - Township – siting and zoning
  - FAA
  - Utility Interconnection Agreement
Generating Support

- Within the organization and community
  - Board level down
  - Leverage location
  - Leverage for outreach, education and training

- Within the external community
  - Funding
  - Utility
  - Community pride
  - State benefits
  - Training partnerships
Example Timeline WMU

- Idea generation: March
- Approvals: April
- Research: May
- Purchase: June
- Construction: July
- Operation: August
Timeline for KVCC Project

- Board Approval/ RFP – May – July
- Feasibility Study – Aug – October
- Permitting Process – October – November
- Commission Process – February 2009
Choosing a turbine provider

- **RFP Process**
  - Develop Specific questions
- **Vetting the Manufacturers**
  - Interviews important
  - Credit concerns
  - Experience/quality
- **Importance of Due Diligence**
  - Who produced power curve?
  - Has it been independently validated?
  - Interview other current customers
  - Importance of regional presence
  - Site visits, references
- **Realities of Industry**
  - Limited number of US players
  - Growing young Industry
Feasibility Study Phase

- Soil borings and Geo Technical study
  - Will soil hold turbine
- Choosing the site
  - Environment, wind, proximity to power source key
- Understanding Costs
  - Turbine, tower, permitting, construction, electrical, installation, maintenance
- Understanding ROI
  - Relate to primary goal and secondary goal – training benefit vs. energy savings, green energy credits
- Meeting permitting requirements
  - Township Zoning
  - FAA – Turbine and crane
  - Utility Interconnection agreement
- Other Issues
  - renewable energy certificates/credit
  - Bonding the contractor
Construction Phase

- **Foundation Issues**
  - Water lines
  - Time of year
  - Type of Soil

- **Ordering the Tower**
  - Size, rungs, transporting, coordinating with turbine

- **Ordering the Turbine**
  - Payment schedule
  - Getting in the queue
  - Coordinating with tower delivery and installation

- **Coordinating delivery and install**
  - Crane and other equipment
  - Clearing and preparing the site

- **Unforeseen Issues**
  - Trees, birds, bats
  - Zoning special meeting
Installation and Commissioning Phase

- Issues to consider
  - Receiving & storage of components
  - Safety and Insurance
  - Coordination of construction
    - Roads, noise, school disruption, utility disruption
Operational performance and issues

- Actual power offset data vs. expectations
- Measuring operability
- Turbine cut – in speed
- Mechanical Issues
- Working with your monitoring/maintenance company
- Important vendor agreement items
  - Maintenance & Extended maintenance
Making the most of the turbine

- Integrating into business
  - Leverage the turbine
- How to talk about turbine
  - Great green statement (are RECS being sold?)
- Who to inform about project
  - State
  - Federal
  - Utilities
  - Industry
  - Prospective students
- How to leverage project for future
  - Host energy events, seminars, workshops
  - Begin other alternative energy programs
  - Partnership with wind turbine companies
The future is here today!
Some useful links

- **web cam:**
  

- **New wind turbine site:**
  

- **Alt/Renew Energy Web Site:**
  
  [http://www.wmich.edu/mfe/energy/](http://www.wmich.edu/mfe/energy/)

- **Old wind turbine site:**
  