Advancing Wind Power in Illinois Conference 2011

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Monarch/Centerline

Small Wind "How To"
Breakout Session

Friday, July 22, 2011, 11:15 AM

HOW TO RECEIVE A BUILDING PERMIT FOR A WIND TURBINE

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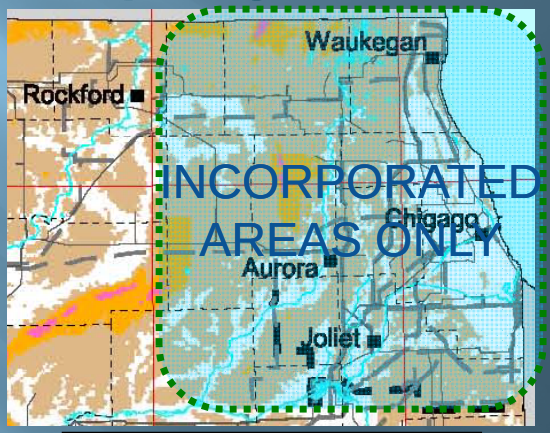
CENTERLINE

Permit Complexity to Wind Power



Wind Power Classification

Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m²	Wind Speed at 50 m m/s	Wind Speed at 50 m mph
1	Poor	< 200	< 5.6	< 12.5
2	Marginal	200 - 300	5.6 - 6.4	12.5 - 14.3
3	Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
4	Good	400 - 500	7.0 - 7.5	15.7 - 16.8

[a] Wind speeds are based on a Weibull k value of 2.0

The ‘Municipal Fear Factor’

- “Wind Power is Great! just not in ‘my backyard’ syndrome”.
- Once a project is located outside of the typical Illinois AG farmland zoning, the building permit process is now governed by the ‘model’ Building Code system.
- A wind turbine is now defined as a ‘structure’ or ‘accessory structure’. The ‘set’ of International Building Codes are used.
- Don’t expect municipal entities to be proactive towards your application. Building Officials and Inspectors are by their official responsibilities need to be cautious.
- Unless there have been previous applications for wind turbines and the same staff member, expect a little hesitation, even a little ‘hysteria’.

Permit “Resistance" Correlation

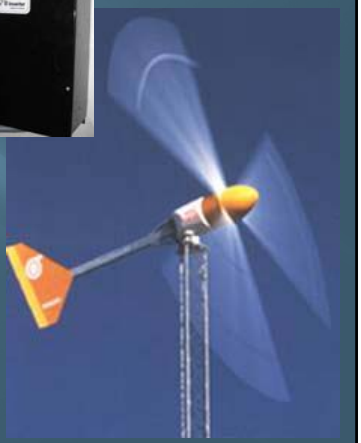
- As one moves further into the urban core towards Chicago, one can expect more tedious or bureaucratic the application process.
- Thus as permit ‘resistance level’ rises expect the construction and submission costs to increase essentially making a project economically unviable.
- There can be major differences in permitting ease from municipality to municipality. Expect increased issues if municipality has adopted many amendments to the model code.
- The ‘Ultimate’ bureaucracy (because being so large) is the City of Chicago, even with their Green Permit process. Also they do not use any of the model codes.

Permit Process "Uncharted Territory"

- Expect a 'Two Step' process with Zoning and Building rolled into one continuum (in Illinois).
- In the Chicago Metro Area almost all municipalities require a site plan review process in order to receive a building permit. By statute a wind turbine could be subject to this process.
- If a wind turbine is not already defined in the municipal code it is not automatically a permitted use or structure and requires an amendment of that Municipal Ordinance.
- Also the model Building Code provides if requirements for a certain item are not listed in the code then it can be the building official's direct ruling.
- This singular ruling does not apply to what would be considered zoning or site planning issues.
- Expect review comments from at least five different departments.

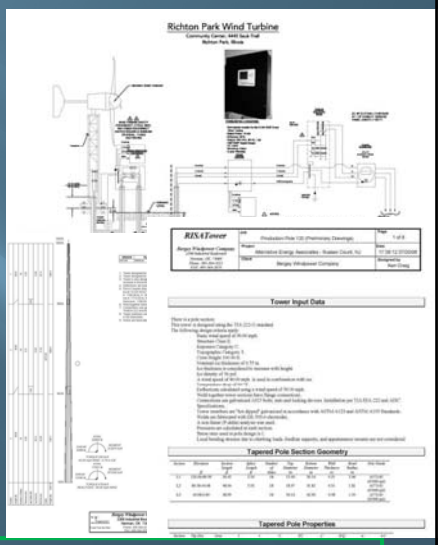
Manufacturer's Data vs Design Team

- Myth 1: Manufacturer's information and data is not the Consultant team's prepared data; only compiled data.
- The permit consultant team cannot represent manufacturer information as their own nor create additional data unless they did the actual design work for the pole/turbine or it is truly 'fiction'.
- In general the consulting team presents manufacturer's data along with their own work for foundations and wiring for anything not supplied by the manufacturer.



Minimum Manufacturer's Data

- Specific for wiring requirements for turbine and complete wiring schematic of unit to meet utility interconnection submission requirements.
- Cut sheets for pole with metal strength data.
- Some form of tower structural calculation output with Engineer's profession seals or a certification of meeting an applicable model code. Sometimes document accepted as is if turbine deemed a manufactured product.
- Otherwise Illinois Professional seals and recalculations maybe required for the tower.



***Fact*: Illinois professional regulations do not allow what may be described as stamping of documents done by others.**

Shadow/Solar Information

- As one gets into more urbanized areas a type of shadow study maybe required.
- There are 'dynamic' computer modeling shadow software available that come from building energy analysis field.
- There are manual calculation methods which are not too tedious when done for the two solstices and equinox.
- As Shadow Study **IS NOT** a Flicker Study.

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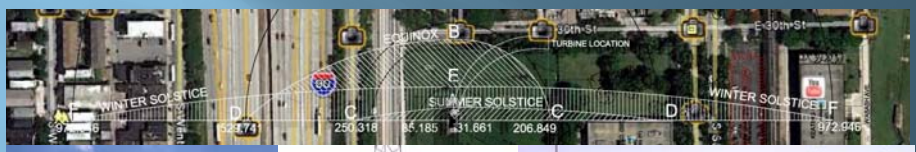
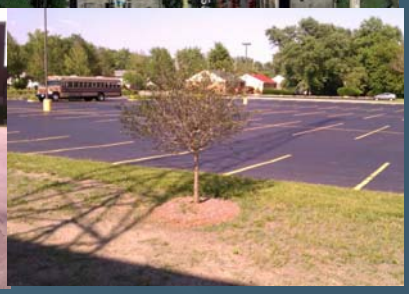
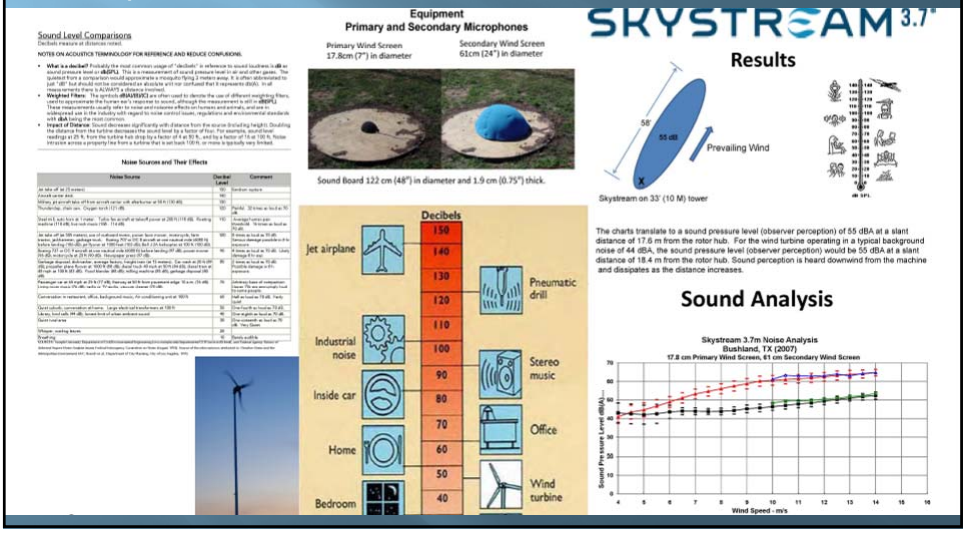




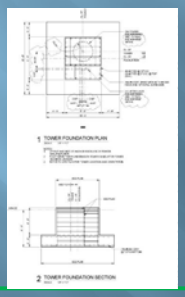
Acoustics Information

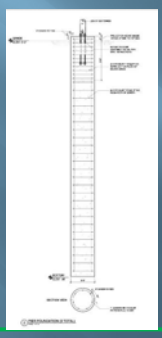
- Almost all municipalities have noise/sound level criteria 'buried' in their zoning ordinance and generally part of a nuisance ordinance.

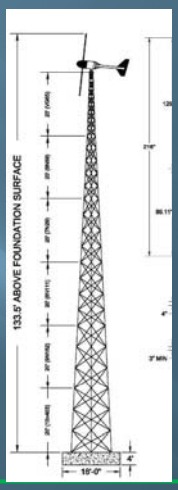


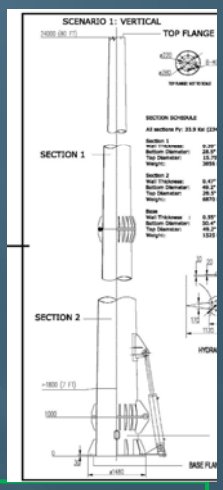
Tower & Foundation Selection

- Assuming towers between 90 feet and 140 feet.
- Self Supporting Lattice or SSV
- Monopole
- Spread Footing
- Piers or Caissons









<u>No Guyed Lattice towers</u>: In the Chicago Metropolitan incorporated areas, it is doubtful that any guyed lattice towers will be allowed or even fit on the site.

Summary of Permit Requirements

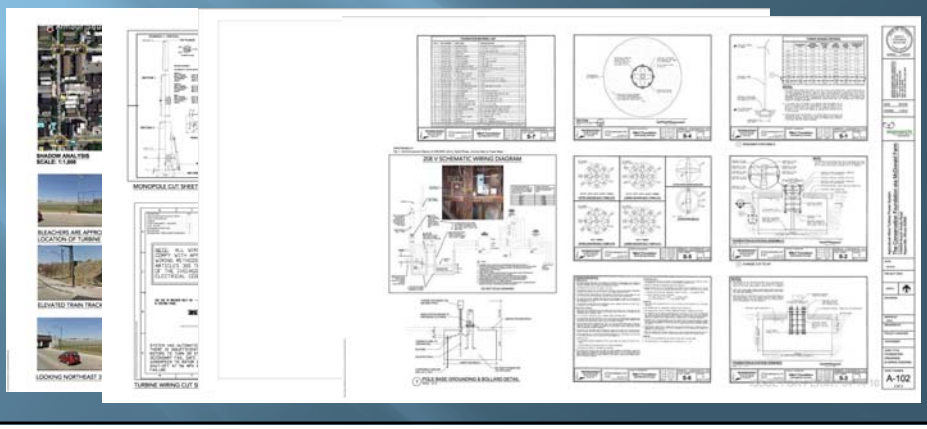
- **Minimum Document if Turbines is considered a manufactured product**.
  - Manufactures' information on the wind turbine and tower as integrated unit proving that it meets a code standard and design wind speed of the location.
  - A Plat of Survey (Topographic information is generally not required by statute but could be requested)
  - Site Plan with all site entitlement information
  - Site Development Plan
  - Code Plan
  - Electrical Plan or Wiring Diagram
  - Soils Report (Requires Geotechnical Consultant)
  - Foundation Design
  - Structural Calculations for the foundation
  - Statement of compliance to Illinois Accessibility Code

- **Possible Additional Information Requested**
  - Shadow Analysis
  - Topographic Information
  - Elevations or Context Studies
  - Site Restoration Information

- **Seals Required**
  - Structural Engineers (SE) (Not Professional Engineer PE) for the Foundation. Illinois does not recognize a PE for structural engineer
  - Architect (More of a State Statute and IAC requirement). State Statute allows Architect to seal electrical but local codes can override.
  - Possible PE seal for Electrical Work.
  - Possible Illinois Seal SE for manufacturer's tower or pole.

Putting It All Together

- For permit submission it will be a combination of drawings and reports.
- The building permit application is typically centered around a general contractor applying.
- There will varying degrees of licensing and bonds required to receive a permit.



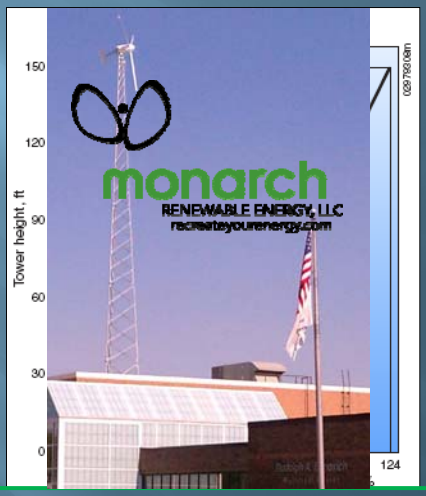
Construction 'Time'

- The bulk of a wind turbine is the foundation so concrete curing is the main time constraint after weather.

Challenges Towards Becoming Mainstream

"Beauty is in the Eye of the Beholder"

In Conclusion - Tall is Good



120 ft Bergey, no wind on the ground. Android Weather app says 2 MPH, flags at a stand still, turbine is still rotating.