

# An Introduction to Environmental Permitting and Key Factors at Minnesota Wind Energy Sites

By Eric Hansen, P.E., P.G.  
VP - Environmental Engineering



Environmental, Industrial and Process Engineering



# Our Mission



*To provide high quality, single-source solutions to the complex environmental issues our clients face.*

- Founded in 1991, Pinnacle provides a full-range of services through our Industrial, Environmental, and Process Engineering Divisions.
- Pinnacle has experienced steady growth through our long-term relationships with clients. We listen to our clients and develop innovative solutions to their problems.

# Minnesota Permitting Process

- Wind Farms are considered Wind Energy Conversion Facilities
- Projects  $< 5\text{MW}$  are permitted at the local level (county)
- Projects  $> 5\text{MW}$  are permitted by the Public Utility Commission as a LWECF

# County Level Permitting

Permit format is specific by county.

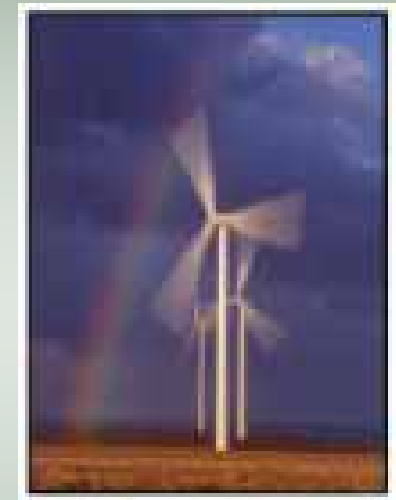
Several counties have ordinances governing wind farms while others use general conditional use permits.

# PUC Permitting

- The PUC represents the Rate Payers
- Environmental Review has been combined into this process
- The Permit must be supported with data and studies

# Components of a PUC Permit

- Project Summary
- 1.1 Introduction
- 1.2 Project Site Location
- 1.3 Site Control
- 1.4 Wind Resource
- 1.5 Projected Output
- 1.6 Siting Plan
- 1.7 Interconnection and Transmission
- 1.8 Environmental Analysis
- 1.9 Permits and Licenses
- 1.10 Construction
- 1.11 Operation and Maintenance
- 1.12 Decommissioning
- 1.13 Project Ownership



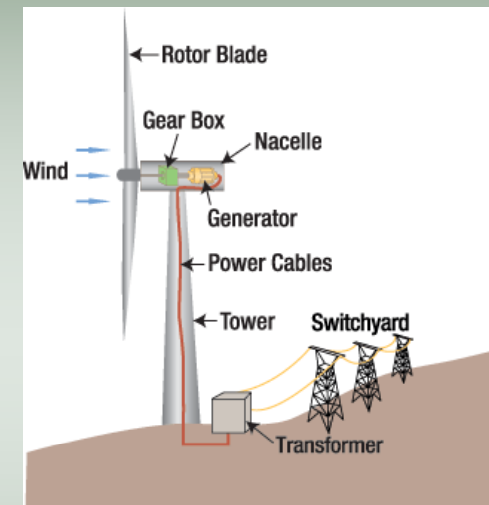
# Components of a PUC Permit

- Applicant
  - 2.1 Contact Information for Applicant, Permittee and Authorized Representative
  - 2.2 Roles
  - 2.3 Other LWECS in Minnesota
  
- Compliance with the Wind Siting Act and Minnesota Rules 7836
  - 3.1 Certificate of Need
  - 3.2 State Policy



# Components of a PUC Permit

- Design of Project
- 5.1 Project Layout
- 5.2 Wind Turbine Components
  - 5.2.1 Rotor
  - 5.2.2 Tower
  - 5.2.3 Foundations
  - 5.2.4 Turbine Safety Systems
- 5.3 Description of Electrical System
  - 5.3.1 Transformers
  - 5.3.2 Electrical Collection System
  - 5.3.3 Substation
  - 5.3.4 Transmission Line
  - 5.3.5 Interconnection
- 5.4 Associated Facilities



# Components of a PUC Permit

- Environmental Analysis
  - 6.1 Description of Environmental Setting
  - 6.2 Demographics
  - 6.3 Noise
  - 6.4 Visual Impacts
  - 6.5 Public Services and Infrastructure
  - 6.6 Cultural and Archaeological Impacts
  - 6.7 Recreational Resources
  - 6.8 Public Health and Safety
  - 6.9 Hazardous Materials
  - 6.10 Effects on Land-Based Economies

# Components of a PUC Permit

- 6.11 Tourism and Community Benefits
- 6.12 Topography
- 6.13 Soils
- 6.14 Geologic and Groundwater Resources
- 6.15 Surface Water and Floodplain Resources
- 6.16 Wetlands
- 6.17 Vegetation
- 6.18 Wildlife
- 6.19 Rare and Unique Natural Resources
- 6.20 Summary of Impacts
  - 6.20.1 Visual Impacts
  - 6.20.2 Commitment of Land and Associated Resources
  - 6.20.3 Noise
  - 6.20.4 Impacts to Wildlife
  - 6.20.5 Summary of Disturbances



# Components of a PUC Permit

- Construction
  - 7.1 Construction Management
    - 7.1.1 Construction Management Organization
    - 7.1.2 Quality-Assurance/Control, Environmental, Health and Safety Compliance
  - 7.2 Construction Methodology
    - 7.2.1 Geotechnical Investigations
    - 7.2.2 Site Preparation and Road Construction
    - 7.2.3 Foundation Construction
    - 7.2.4 Electrical Collection System Construction
    - 7.2.5 Project Substation
    - 7.2.6 Wind Turbine Assembly and Erection
    - 7.2.7 Plant Energization and Commissioning (Start-Up)
    - 7.2.8 Project Construction Clean-Up

# Components of a PUC Permit

- Operations and Maintenance
  - 8.1 Project Control, Management, and Service
  - 8.2 Maintenance Schedule
  - 8.3 General Maintenance Duties
  - 8.4 Operations and Maintenance Facility
  
- Cost Analysis
  
- Project Schedule
  - 10.1 Land Acquisition
  - 10.2 Permits
  - 10.3 Financing
  - 10.4 Construction
  - 10.5 Equipment Procurement, Manufacture and Delivery
  - 10.6 Expected Commercial Operation Date



# Components of a PUC Permit

- 11 Energy Projections
- 12 Decommissioning and Restoration
- 13 Identification of Required Permits and Approvals

# Key Environmental Issues

- Wetlands



# Key Environmental Issues

- Vegetation



# Key Environmental Issues

## ■ Wildlife



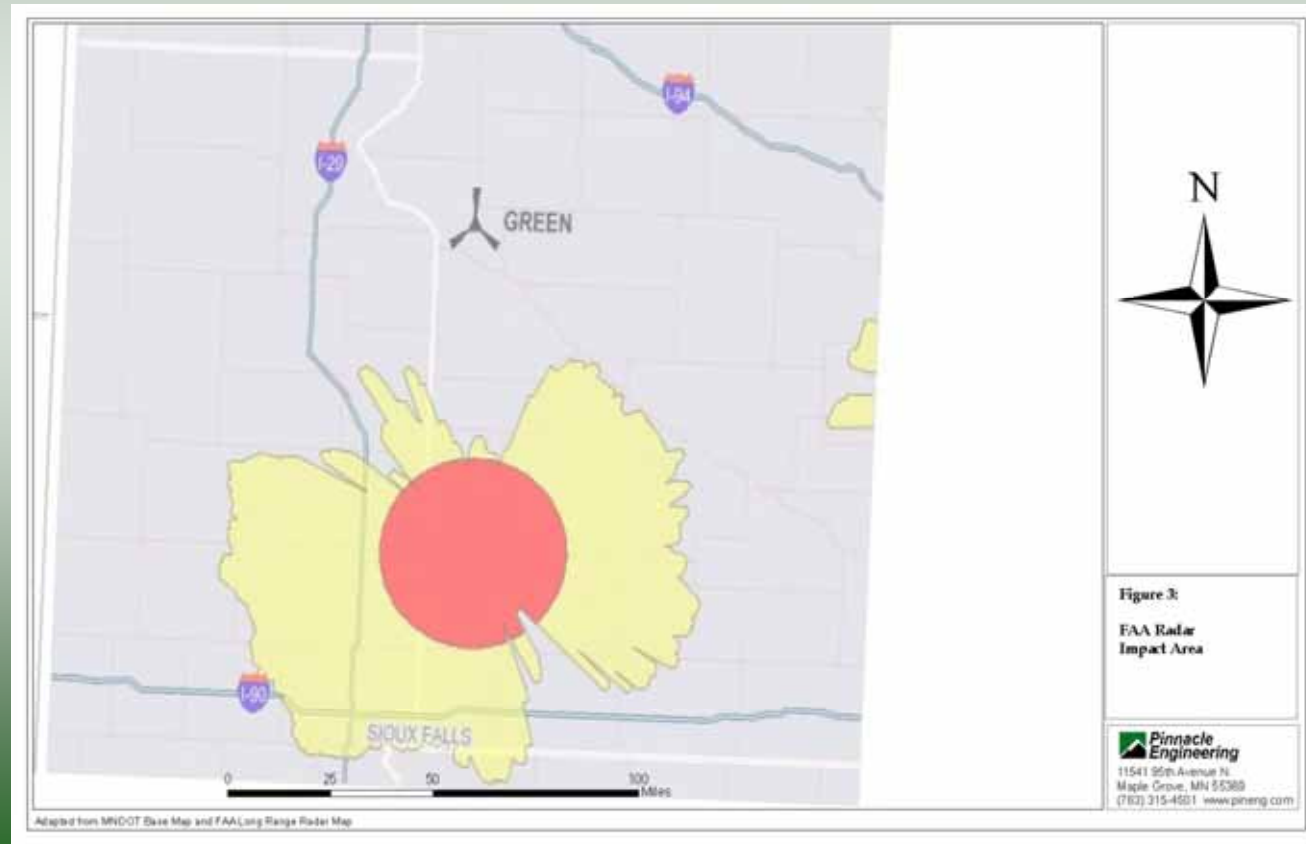
# Key Environmental Issues

- Rare and Unique Natural Resources



# Key Environmental Issues

- FAA Clearance



# Key Environmental Issues

- Cultural Resources



# Wind Energy

**Pinnacle provides a full-service expertise to our wind developer clients, combining environmental expertise for siting and geotechnical for construction considerations.**



- The lines between traditional project development services and EPC are blurring. Developers are benefiting from construction expertise being blended into the planning portions of many greenfield projects.
- Pinnacle can offer strategic advise from initial fatal flaw studies to site permitting and regulatory approvals to final construction considerations.



Environmental Division

# Wind Energy - Services

- **Site Development**

- Fatal Flaw Studies
- Mapping and GIS Data Reduction
- Corridor Studies
- Powerline Routing Analysis

- **Permitting**

- Federal / State / Local Permits
- FAA Submittals
- Archeological Surveys
- Avian Studies



# Wind Energy - Services

- **Site Construction**
  - Soil Investigations and Geotechnical Reports
  - Soil Resistivity
  - Electrical Resistivity
  - Foundation/Deep Footing Design
  - Roadway Design
  - Construction Material Testing





***Pinnacle  
Engineering***

11541 - 95<sup>th</sup> Avenue North

Maple Grove, MN 55369

Phone: (763) 315-4501

Fax: (763) 315-4507

[ehansen@pineng.com](mailto:ehansen@pineng.com)

[www.pineng.com](http://www.pineng.com)