Considerations in Wind Project Development

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Today’s discussion

- Early stage wind development
- Planning process
- What studies occur during design?
- Design guidelines
- Quality of life considerations
- Benefits of successful development
NextEra Energy Resources overview

NextEra Energy Resources

World’s #1 generator of wind & solar energy
Early stage wind development

Three primary factors when prospecting a potential new wind farm:

1. Wind resource
   - Meteorological testing can take 1-2 years

2. Costs to connect to the grid
   - Studies administered by regional grid operators
   - Can take three or more years or longer to complete

3. Community support
   - Surveys and open houses
Stakeholder outreach

► Extensive coordination is made with stakeholders, examples include:

» Townships Officers
» County Commission, Environmental Services, and Engineers
» Minnesota Department of Transportation
» Minnesota Department of Natural Resources
» Native American Tribal Outreach
» United States Fish & Wildlife Service
» Minnesota Department of Commerce
» Minnesota Public Utilities Commission
Early Stage Analysis

Customer Coordination

Permitting Phase

Construction

Operations

Development planning process

Area studies completed

County and State regulators

25 to 30 year lifetime

Development can take 2-3 years and millions of dollars

Development can take 2-3 years and millions of dollars.
What studies occur during design?

► Environmental
  » Wildlife Conservation Strategy, Wetlands and Public Waters, Visual Resources

► Cultural resources
  » Native American tribes invited to participate in surveys and siting process

► Design suitability
  » Wind resource analysis, Interconnection Capacity; Road and Highway Survey, Construction Requirements; FAA safety reviews

► Impact to community residences
  » Sound and shadow flicker measuring and modeling

► Decommissioning analysis
  » Forecasting to remove equipment and restore area to original condition
Siting turbines can be difficult
Design considerations

► Most impacts are mitigated by regulating setback distance

► In Minnesota, the “3x5 Rule” regulates turbine setbacks for non-participants:
  » 5x the height of the turbine in the prevailing wind direction
  » 3x the height of the turbine in other directions

► Developers must work to provide participation offers and compensation to all residences inside of the “3x5 Rule” area
Concerns and mitigations

► View shed concerns:
  » Mitigation: Siting process; Aircraft detection radar and light dimming systems

► Sound and shadow flicker concerns:
  » Minnesota regulation prohibits excessive sound and shadow flicker impacts
  » Mitigation: Proper siting consideration, as well as pre-construction modeling and post-construction monitoring

► Road use concerns:
  » Mitigation: Pre-construction measurements, county engineer engagement, post-construction monitoring
Benefits of a project

- Jobs construction & operations
- Ongoing compensation for participating landowners
- Economic benefits to the community
- Increased local business
- Delivers clean energy