Considerations in Wind Project Development

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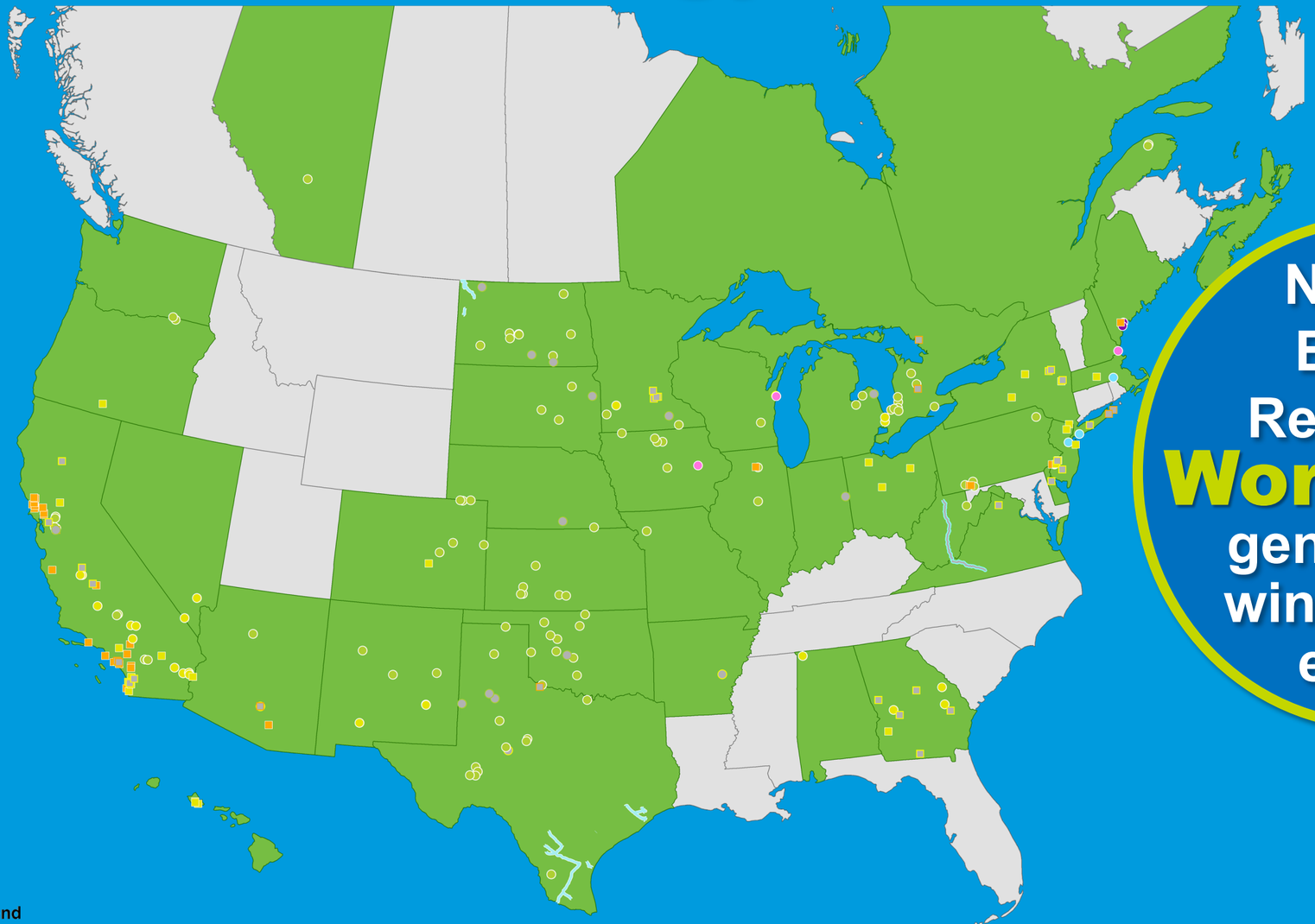
Today’s discussion

- 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



Locations with more than one facility are illustrated with a single dot.

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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

Development planning process

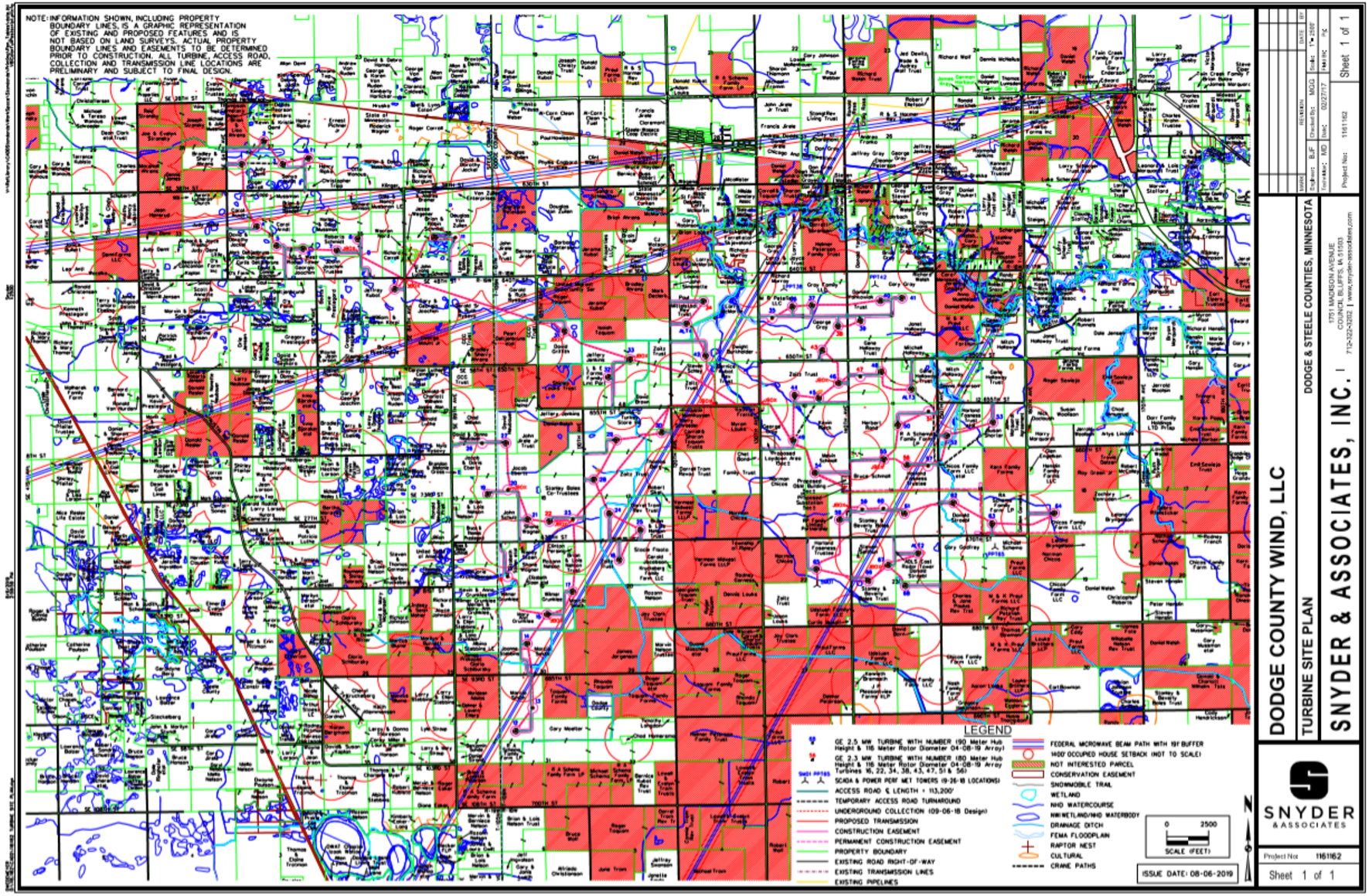
Development can take 2-3 years and millions of dollars

- **Early Stage Analysis** — Area studies completed
- **Customer Coordination**
- **Permitting Phase** — County and State regulators
- **Construction**
- **Operations** — 25 to 30 year lifetime

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**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