THE BASICS OF WIND FARM DESIGN & ENGINEERING
Wind Farm Design Considerations

- Apply for electrical interconnection.
- Conduct interconnection studies.
- Payments to transmission operator.

- Establish contiguous block of wind leases.
- Evaluate community attitudes toward wind farm.
- Open communication with community leaders and government officials.
- Hold informational meetings during design, construction and operations.

- Multi-year measuring campaign (MET Towers).
- Use results to inform turbine siting.

- Conduct desktop level environmental and cultural resource studies early on.
  - Preliminary risk assessments.
  - Multi-year avian and bat surveys.
  - Sensitive habitat assessments.
  - Cultural resources studies.
  - Noise and flicker modeling.
  - Final risk assessments.
  - Use results to drive design.

- Strong Wind Resource
- Low Impact
- Community Support / Land Base
- Transmission / Interconnection
Wind Farm Planning Process

- Site Selection & Preliminary Evaluations
- Land Leasing
- Interconnection
- Project Design & Engineering
  - Multi-year detailed studies (wind resource, environmental, cultural, etc)
- Desktop Evaluations (wind resource, environmental, cultural, etc)
- Permitting
- Construction
- Operations

Effective Communication & Periodic Project Evaluation
Turbine Siting Considerations

- Energy Production
- Regulations (Federal, State, local)
- Strong Lease Block
- Setbacks from residences
- Minimize sound and flicker
- Setbacks from Natural & Cultural Features
- Landowner and Community Input
- Construction Logistics

After considering these factors, the land available for turbine siting is reduced by 70-80%!
# Due Diligence

## Avian & Bat Studies
- Spring & Fall Migration Surveys
- Eagle Surveys
- Summer and Breeding Surveys
- Anabat or Mist-netting Bat Surveys

## Other Environmental Studies
- Wetland Surveys
- Threatened and Endangered Species Surveys
- Agency Consultations
- Cultural Resources Studies

## Engineering Studies
- Geotechnical Investigations / Foundation Design
- Site Surveys
- Delivery and Construction Logistics
- Transmission and Interconnection Studies
- Sound and Flicker Studies

## Other Considerations
- Access Roads and Turbines along field divides
- Minimize impact to existing agriculture
- Electrical infrastructure installed below plow depth
CONSTRUCTION
Road Construction

- Typical road is 16’ wide and has 12” of stone to accommodate the weight of the turbine and crane components
• Each site has a crane pad constructed with 12” of stone to support the 660-ton Manitowoc 18000 crane
• The pad measures 75’ x 55’
• Layout for mud mat and foundation
• The 80M design contains 400 yards of concrete.
• Our 100M design incorporates 500 yards.
• Site ready for turbine components
• Tower Base
Intensive manual labor
• Communication between crew and crane
• Middle tower section
The rotor is assembled, and torque on the ground is completed before the unit is lifted.
• Two cranes are utilized until the rotor is vertical.
• Blade socks with ropes are also used to guide the other two blades.
• Blade socks with ropes guide the rotor.
- Completed Site takes approx 1/3 acre.
- Land can be farm right to the edge of turbine site.