Plus over 80 small consumer turbines under 100 kW size
Green & Renewable Projects

Existing:
350+ MW Wind
44 MW Waste Heat

New PPAs:
99 MW Wind in SD

New Owned Wind:
151.5 MW in SD
Economy of Scale Matters!

Typical Target: 100 MW

Transmission is Complex

Wind Data (1-2 years)

Financing, Permits, Turbines, Market, etc
Harvesting the wind is feasible, but...

Economics drives decisions!
Wind Project Cost Trend

Cost per MW (Nameplate)

- 2003: $1,000,000
- 2005: $1,400,000
- 2006: $1,800,000
- 2007: $2,000,000
- 2008: $2,200,000
- 2009: $2,300,000
- 2010: $2,200,000
Some “Back-of-the-Envelope” Numbers...

Rough Cost at 39% Capacity Factor: ¢/kWh

- Capital Cost ($2.2 Million/MW, 6%, 23 yrs): 5.2 ¢/kWh
- Land Lease: 0.1 ¢/kWh
- O & M: 0.7 ¢/kWh
- Property Taxes: 0.2 ¢/kWh

Total Estimated Cost: 6.2 ¢/kWh

Less Offsets...
  - Production Tax Credit
  - Accelerated Depreciation
  - Green Tag Sales

Net Cost After Tax -- Less than 4¢/kWh
Market Prices for Renewable Energy Credits (Green Tags)

Futures Pricing
Taxes Drive the Economics of Wind Projects
Real Value of 2.1¢/kWh Production Tax Credit

Pre-Tax Income: 3.2¢
Income Taxes @35% Tax Rate: (1.1¢)
Net Income after Tax: 2.1¢

Value of PTC After Tax = 2.1¢

Assumption: Other Taxable Income to be Sheltered
The high cost of projects makes the 5 yr accelerated depreciation more valuable than the PTC.

$/MWh levelized over the life of the Project

- $15-20/MWh (Accelerated Depreciation)
- $11-14/MWh (Production Tax Credit)

Actual numbers depend on assumptions.
Tax Investors Hit by Recession

Congress’ Response....

PTC Extended to Dec. 31, 2012

Stimulus Alternative to PTC
The 30% Treasury Grant

But:
Under Sect. 1603, Cooperatives, Govt. Entities, etc. Excluded
Typical Financial Structures...

- LLC “Flip”
- Sale/Leaseback
- 30% Treasury Grant (using a Blocker “C” Corp)
- 30% ITC Grant

Seek Professional Counsel!
Co-op Power Supply Cost Chain

Fuel/O&M (1.27¢) + Local Losses (0.2¢) = 1.5¢ /kWh

Generator/Admin
3.0-4.0¢/kWh

Transmission
~ 0.6¢/kWh

Distribution/Subtransmission
~ 3.0-4.0¢/kWh

Intermittent Power

Fixed Cost ~ 6.5¢

Delivered Cost: ~ 8.0¢/kWh

Delivered Cost: ~ 8.0¢/kWh
Net Metering Concern:
Co-op Rates are "Bundled"

Over ½ the cost of power supply is "wires"... Not Electricity
Challenges & Risks

Environmental Permitting

Transmission
Major Federal Laws Applicable to Wind Projects

- Endangered Species Act
- Migratory Bird Treaty Act
- Bald & Golden Eagle Protection Act
- Clean Water Act
- National Wildlife Refuge System Improvement Act
- National Environmental Policy Act
When Planning A Project:

Expect Uncertainty

Involve Multiple Federal Agencies Early

- 3 years of pre-approval biological studies?
- Section 7 Consultation - Endangered Species
- Section 106 Cultural Resource
  - General Consultation
  - Native American Consultation
- Mitigation Requirements Are An “Unknown”
- Limited Staff – Long Review Times
- Post Construction Monitoring

Make Sure Your Schedule Allows For Delays
“Perfect” Project Schedule

- Siting: 6 Mo
- Preliminary Env. Surveys: 12 Mo
- Transmission Interconnection Queue: 24-36 Mo
- Wind Measurements: 12-24 Mo
- Environmental Studies; (EA or EIS): 18-30 Mo
- Design: 6 Mo
- Order Turbines: 24 Mo
- Construction: 7 Mo
- Start to Finish: 10 to 13 years
- Startup: 1 Mo
- PSC Process: 3-12 Mo
- Land Leases: 6 Mo
- Preliminary Env. Surveys: 12 Mo
Typical Schedule:

- Siting/Leasing
- Resource Assessment: 1–2 yrs Data Collection
- Environmental Studies/Permitting
- Order Turbines
- Construction
- Commissioning

Start to Finish: Roughly 2 1/2 years
Smaller Projects (< 50 Avg MW)

Environmental Assessment

Permitting Costs & Schedule

- $500,000 to $800,000
- 18-30 months to Approval

Risk ~ Variable
Larger Projects (> 50 Avg MW)

*Environmental Impact Statement*

Permitting Costs & Schedule

- $1 Million plus
- 2 to 4 Years to Approval

Risk ~ Variable
Plan for Studies on...

- Visual
- Cultural Resources (i.e. Sect. 106)
- Avian/Bat
- Habitat (Incl. Fragmentation)
- Vegetation
- Biological
- Rare/Endangered Species
- Post Construction Monitoring
Typical Exclusion Criteria

- 1400 feet from residences
- Roads & section lines: 400 feet
- Microwave paths
- Various Utilities
- Shadow Flicker
- Noise
Siting is Critical!

Wind Energy increases with the cube of the wind speed

A 1 MPH Change in average annual wind speed can change production by 15%
Power Curve: Generation vs Wind Speed

- 8 MPH Cut-in
- 250 kW @ 13 MPH
- 1475 kW @ 26 MPH
- Reaches Rated Cap. at 27 MPH
- 56 MPH Cutout
Effect of Wind Speed on Cost

Pre-Tax Costs ($/MWH)

Class 6: 17.9-19.7 MPH
$62

Class 5: 16.8-17.9 MPH
$76

Class 4: 15.7-16.8 MPH
$93

Class 3: 14.3-15.7 MPH
$120

Wind Resource Category
Wind Rights Issue

- Nearby Landowners
- Setback Distances
- Value of Nearby Sites

Litigation or Regulation?
Typical Turbine Spacing

- Predominant Wind Direction
- ~1000 ft
- ~2000 ft
800 feet is greater than 3 rotor diameters
Investment & Risk Comparison

Project Developer

- Transmission Risk
- 2-3 years wind studies
- Engineering $$$
- Permitting Risk
- Operating Risk
- Market Risk
- Tax Risk

Cost: $3-5 Million/turbine

Landowner

¼ to ½ acre of land per turbine

Revenue: $4-$6000/turbine/yr
Questions for Developers...

• **Experience:** Have they ever completed a wind project?

• **Financing:** Who is being asked to “fund the dream”?

• **Transmission:** Interconnection requests? Timing?

• **Market:** Is there a customer for the power?

• **Environment:** Can the project be permitted?

• **Cost:** Are the cost estimates realistic?