Cooperative Wind Energy
Benefits & Challenges

USDA Outlook 2009

Ron Rebenitsch, PE
126 MEMBER SYSTEMS
Serving:
2.6 Million Consumers

9 of the top 12 Wind States are in the Basin Member Service Territories

126 MEMBER SYSTEMS
Serving:
2.6 Million Consumers
Basin Electric’s Green & Renewable Resources...

Existing:
136 MW Wind;
22 MW Waste Heat

New Agreements:
49.5 MW Wind
22 MW Of Waste Heat

New Wind:
120 MW in ND
150 MW in SD
Enabling Factors for Wind

- Excellent wind regime
- High cost of conventional resources
- Environmental Benefits
- Load growth
- Tax appetite
- Economic development
US Utility Planning?

“Regulatory risks are paralyzing the power industry while demand grows”


Carbon Paralysis
“Wind + Gas” is a viable option, with one concern:

- **Wind**
- **Simple Cycle**
- **Combined Cycle**

**Gas Price Risk**
Wind Offers a Hedge Against Gas Volatility

(Energy Only)
2006 - 2008 Wind Generation at Monthly Peak Hour of Demand

136 MW Nameplate Rating

Summer Peak

MW

2006 - 2008 Wind Generation at Monthly Peak Hour of Demand

January: 101 MW
February: 86 MW
March: 68 MW
April: 68 MW
May: 67 WM
June: 67 MW
July: 109 MW
August: 120 MW
September: 113 MW
October: 68 MW
November: 77 MW
December: 124 MW

2006: [Graph showing data for each month]
2007: [Graph showing data for each month]
2008: [Graph showing data for each month]

Wind Project Costs

Cost per MW (Nameplate)

- 2003: $1,000,000
- 2005: $1,400,000
- 2006: $1,800,000
- 2007: $2,000,000
- 2008: $2,200,000 (Est)
- 2009: $2,300,000 (Est)
Macro-economic Issues...

**Tax Credits?**

*Investor’s Tax Appetite Hit by Recession*

Supply chain constraints predicted to ease by 2011

*Stronger US Dollar*
50+ New Wind Manufacturing Facilities
2008 Built, Expanded, or Announced

Source: AWEA
Challenges & Risks

Environmental Permitting

Transmission

STOP
Major Federal Laws Applicable to Wind Projects

- Endangered Species Act
- Migratory Bird Treaty Act
- Bald and Golden Eagle Protection Act
- Clean Water Act
- National Wildlife Refuge System Improvement Act
- National Environmental Policy Act
Many of these are triggered by Federal Nexus...

*Examples:*

“Major Federal Action” or “Nexus”

- Federal Funding or Loans
- Interconnection to Federal transmission system
- Use of Federal Lands
- Etc.
For a Smaller Project (< 50 Avg MW) Expect....

An Environmental Assessment

Permitting Costs & Schedule

$500,000 to $800,000

2-3 Years to Approval

Risk-Variable
For a Larger Project: (> 50 Avg MW) Expect...

An Environmental Impact Statement

Permitting Costs & Schedule

$1 Million Plus

2-4 Years to Approval

Risk-Variable
Plan for Studies on...

- Visual
- Avian/Bat
- Habitat (Incl. Fragmentation)
- Vegetation
- Biological
- Rare/Endangered Species
- Post Construction Monitoring
A New Regulatory Risk...

Setback from Property Lines

Example: A setback of “Fall Distance” can sterilize over 50% of the site.

Typical Quarter Section: 160 ac

Then add real constraints, such as shadow flicker & noise...

Leaves limited area for wind
Turbine Siting Economics

Siting is Critical

1 MPH Change in Avg. Annual Wind Speed Can Change Production by 15%

$50 Million Over Project Life?
Endangered Species Issues
This map shows the annual average wind power estimates at 50 meters above the surface of the United States. It is a combination of high resolution and low resolution datasets produced by NREL and other organizations. The data was screened to eliminate areas unlikely to be developed onshore due to land use or environmental issues. In many states, the wind resource on this map is visually enhanced to better show the distribution on ridge crests and other features.

**Wind Power Classification**

<table>
<thead>
<tr>
<th>Wind Power Class</th>
<th>Resource Potential</th>
<th>Wind Power Density at 50 m W/m²</th>
<th>Wind Speed at 50 m m/s</th>
<th>Wind Speed at 50 m mph</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Fair</td>
<td>300 - 400</td>
<td>6.4 - 7.0</td>
<td>14.3 - 15.7</td>
</tr>
<tr>
<td>4</td>
<td>Good</td>
<td>400 - 500</td>
<td>7.0 - 7.5</td>
<td>15.7 - 16.8</td>
</tr>
<tr>
<td>5</td>
<td>Excellent</td>
<td>500 - 600</td>
<td>7.5 - 8.0</td>
<td>16.8 - 17.9</td>
</tr>
<tr>
<td>6</td>
<td>Outstanding</td>
<td>600 - 800</td>
<td>8.0 - 8.8</td>
<td>17.3 - 19.7</td>
</tr>
<tr>
<td>7</td>
<td>Superb</td>
<td>800 - 1600</td>
<td>8.8 - 11.1</td>
<td>19.7 - 24.8</td>
</tr>
</tbody>
</table>

*Wind speeds are based on a Weibull k value of 2.0*
Basin Electric has “Shovel-ready” Projects...

- $250 Million of Wind This Year
- $350 Million of Wind Next Year
- Environmental Process: 2 Yrs to Date
- Turbines Bought
- Design Complete

But.....!
We don’t know when/if we can start?

Awaiting Environmental Approvals

USFWS Section 7 Consultation is in Process
When Planning Your 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”
Wind 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) 36 Mo
- Design: 6 Mo
- Order Turbines: 24 Mo
- Construction: 7 Mo
- Startup: 1 Mo
- Land Leases: 6 Mo
- PSC Process: 3-12 Mo
- Start to Finish: 10 to 13 years
Typical Schedule...

Siting/Leasing

Resource Assessment: 1-2 yrs Data Collection

Environmental Studies/Permitting

Order Turbines

Construction

Commissioning

Start to Finish: Roughly 2 ½ years
New DOE/AWEA Wind Study

20% Wind by 2030

290,000 MW of Wind

Requires 16,000 MW/yr by 2018

16,000 MW/yr requires one 1.5 MW turbine every 49 minutes
DOE Study Forecasts...

- 500,000 New US Jobs
- Pmts to Landowners: $600 Million/yr
- Property Tax Revenue: $1.5 Billion/yr

Study Indicates Higher Capital Cost of Wind is Offset by Fuel Savings
Study Identified Challenges

• Transmission Infrastructure Need
  – AEP Study: $60 Billion
  – MISO Report:
    • 22,000 MW for Existing RPSs
    • $80 billion for 15,000 miles (Eastern US Only)
  – Need Larger Transmission Control Areas

• US Manufacturing Capability

• Technology Advancements

• Environmental Constraints
Nationwide...

42% of new US generating capacity in 2008

2nd Only to Natural Gas

Over 300,000 MW of Wind In US Transmission Queues
Resources aren’t near Loads
A Long Term Vision...

A National Backbone Grid
One Draft Concept... (from AEP)

Preliminary Estimates:

- 19,000 Miles
- $60 billion
Checklist if a Developer Calls...

Does the Developer have what it takes?

- **Experience:** Have they ever completed a wind project?
- **Financing:** Are you 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?
A Final Note

Rural Utilities Services support has been invaluable

Thank you, RUS