Wind Farm Development

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Rocky Mountain Wind Development

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IBERDROLA Renewables Today:
The worldwide leader\(^{(1)}\) . . .

#1 Worldwide: Presence in 19 Countries \(^{(1)}\)

Europe \(\ldots\) #1  
Spain \(\ldots\) #1  
United Kingdom \(\ldots\) #1  
United States \(\ldots\) #2

#1 in the Pipeline \(^{(2)}\)

NOTES  
(1) Proforma Scottish Power  
(2) Based on pipelines announced to the markets by competitors
#1 Worldwide
- 9,624MW Installed Worldwide
- 3,031MW Installed in USA (31%)
- #2 in USA
- Active in 20 States
- 7 Sites Under Development in Wyoming
  - 6 Counties
  - ~2,500MW
- Corporate Goal: 1,000 MW/yr in USA
Presence in renewable energy in 19 countries.

Source: Company data as of June 30, 2007, Proforma Scottish Power
Project Development

• Preliminary Site Identification
• Land Acquisition
• Development Activities
• Construction
Identify Roadblocks to Success

• Regulatory Uncertainty

• Tax Regimes

• Infrastructure (Transmission)
## Basic Development Schedule

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Duration</th>
<th>Start</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiate Project Development</td>
<td>0 days</td>
<td>Tue 1/27/09</td>
</tr>
<tr>
<td>Site Identification</td>
<td>90 days</td>
<td>Wed 1/28/09</td>
</tr>
<tr>
<td>Site Control</td>
<td>90 days</td>
<td>Wed 6/3/09</td>
</tr>
<tr>
<td>Data Collection</td>
<td>24 mons</td>
<td>Wed 10/7/09</td>
</tr>
<tr>
<td>Interconnection Process</td>
<td>24 mons</td>
<td>Wed 10/7/09</td>
</tr>
<tr>
<td>Permitting</td>
<td>24 mons</td>
<td>Wed 10/7/09</td>
</tr>
<tr>
<td>Detailed Engineering</td>
<td>6 mons</td>
<td>Wed 8/10/11</td>
</tr>
<tr>
<td>Marketing</td>
<td>24 mons</td>
<td>Wed 3/24/12</td>
</tr>
<tr>
<td>Construction</td>
<td>9 mons</td>
<td>Wed 1/25/12</td>
</tr>
<tr>
<td>Complete Project Development</td>
<td>0 days</td>
<td>Tue 10/2/12</td>
</tr>
</tbody>
</table>

- **Prospecting to identify sites**
- **Secure land options**
- **Complete met Studies**
- **Attain permits & access to transmission**
- **Close PPAs**
- **Commercial Operation**
Site Selection

• Wind Resource
• Access to Transmission
• Ownership
• Other Considerations
Acquire Land

• Wind Lease
  – Development Period
    • $/acre
    • 5 years
  – Extended Period
    • Nameplate Capacity
    • Generation
Wind Data Collection

- Install 1-3 met towers in representative locations; # of towers depends on size of project area and topographic complexity
- If available, correlate to nearby long-term reference data point
- After 6-12 months of data collection, create initial turbine layout and add towers within planned corridors
Ongoing Development Activities

- Monitor and analyze wind data
- Request interconnection
- Identify permitting requirements
- Perform environmental/cultural studies
- Market power
- Work with local officials
Interconnection Process

- **OASIS request** establishes queue position
- **Feasibility Study** is initial, high-level report and rough cost estimate (~3-6 months)
- **System Impact Study** is more detailed report and more accurate cost estimate and breakdown (~3-6 months)
- **Facility Study** is very detailed and provides complete explanation of what facilities would be required, whether they would be network upgrades or project-specific (direct assignment) and full cost breakdown (~6-9 months)
- **Interconnection Agreement** sets responsibilities between generator and transmission provider and is typically filed with FERC (~3-6 months)
- **Construction** of necessary upgrades (timing depends on scope, could be anywhere from 6 months to multiple years)
General Permitting Studies

- Biological
  - Collection of existing data
  - Avian point-count field surveys (multiple seasons)
  - T&E, Rare Plants, Wetlands
- Cultural
  - Desktop analysis
  - Tribal consultation
  - Pedestrian Field Surveys
- Other
  - FAA
  - Military (radar and flight paths)
  - Local land use standards (socioeconomic, visual, noise, etc.)
Marketing the Project

• Power Purchase Agreement (PPA)

• Build to Sell (BTS)

• Liquid Market
Working with local officials

• Roads & other impacts

• Economic Development

• Payment in Lieu of Taxes (PILOT)
Final Development Activities

• Final Layout
• Engineering and surveys for roads/collection system
• Contractor bids
• Coordinate turbine delivery and construction schedules
Balance of Plant (BOP) Facilities

• Access Roads – Gravel roads linking wind turbine strings to existing roads.

• Electrical Collection System – Cables that electrically connect wind turbines to the project collection substation.

• Project Collection Substation – Steps up voltage to interconnection level.

• Operations & Maintenance Building – Houses central office, computer systems for facility operations, equipment storage and maintenance areas.
Road and Turbine Staking

- Consult with landowners
- Consult with highway department
Construction

- 1st Land payments
- Landowner consultation
- 1st Economic benefits
Access Road
Trenching Equipment
Complete Foundation
Graded Foundation
Wind Turbines
2.0 MW Gamesa G87 Example

87m D (285')

256'

139'

398'
Blades Delivered
Nacelle Delivery
Nacelle
Tower Erection
Turbine Erection
Rotor on Site
Transmission
Substation Excavation
Substation
O&M Building
Wind Farm
Conclusion

QUESTIONS?

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