The Wind Project
Development Process

Developed for the
National Renewable Energy Laboratory

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The Wind Project
Development Process

- Site Selection
- Land Agreements
- Wind Assessment
- Environmental Review
- Economic Modeling
- Interconnection Studies
- Permitting
- Sales Agreements
- Financing
- Turbine Procurement
- Construction Contracting
- Operations & Maintenance
Site Selection

- Evidence of Significant Wind
- Preferably Privately Owned Remote Land
- Proximity to Transmission Lines
- Reasonable Road Access
- Few Environmental Concerns
- Receptive Community
Land Agreements

Term: Expected Life of the Turbine

Rights
Wind Rights, Ingress/Egress Rights, Transmission Rights

Compensation: Percentage of Revenues

Assignable
Financing Requirement

Indemnification

Reclamation Provision
Wind Assessment

Corollary Data
Military Installations, Commercial Airports

Install Meteorological Tower

Collect Hourly Wind Speed and Direction Data

Minimum One Year of Data

Quality Report by Recognized Meteorologist

Output Projections for Several Turbine Designs
Environmental Review

Cursory Review for Endangered Species

Avian Studies

Raptors

Migratory Birds

Review With Interested Parties

- Local Audubon
- Federal Authorities
- Local Stakeholders
- State Authorities

Prepare, Conduct, and Report Studies as Required
Environmental Review

Visual Studies

- Photo Simulation
  - Multiple Views and Distances

Review With Local Authorities

Historical and Archeological Review

- Prepare, Conduct, and Report Studies as Required
  - Review w/ Interested Parties

Wetlands Review
Economic Modeling

Obtain Key Data

Output projections

Turbines, Blades, Electronics, and Tower Costs

Balance of Plant Costs

Foundation

Padmount Transformer

Collection System

Cables

Erection

Substation

Communication and Control System
Economic Modeling

Continued

Debt: Rate and Term

Coverage Ratios

Debt/Equity Ratio
Interconnection Studies

- Capacity Limitation
- Load Flow Analysis
- Voltage Controls
- System Protection
Permitting

Local, State, Federal

- Public Land
- Private Land

Land Use Permit

Building Permit
Sales Agreements

- Power Purchase Agreement
  - Kilowatt Price
    - Real or Nominal Levalized
  - Term
  - Credit Worthy Buyer
- Facility Sales Agreement
  - Turn Key Price
    - Complete Wind Power facility
Financing

Source of Equity
Rate of Return 16-18%

Source of Debt
Market Rates

Term of Debt

Assignable Documents

Third Party Due Diligence
Turbine Procurement

Power Curve
  Output Projections

Capital Cost
  Turbine, Tower, Blades, and Electronics

Turn-key Construction Cost
  Padmounts, Interconnection, and Erection

Warranties
  Equipment and Maintenance

Construction Financing
Construction Contracting

Turn-key Contract

- Excavation
- Trenching
- Foundation Assembly
- Concrete
- Cabling
- Tower Assembly and Erection
- Turbine Installation
- Interconnection to Utility
- Commissioning
Operations & Maintenance

- Fixed Cost per Turbine per Year
- Fixed Price per kWh Produced
- Availability Warranties
- Penalties for Non-performance