Virginia Wind Energy Symposium

Wind Energy Siting – How to Start on the Permitting Path

Apex Wind Energy Holdings, LLC
June 2012
Apex is an energy company formed to build, own and operate wind facilities in North America.

Apex has a 300 MW facility under construction (energy for 100,000 homes), and a pipeline of late-stage projects.
The Apex team has decades of combined industry experience including the development, procurement, construction and financing of over $10 billion of wind energy facilities now in commercial operations.
## Representative Projects

### Elk River Wind Farm
**150 MW in Kansas (2005)**
- Largest wind energy project in Kansas at commercial operations date
- Provided funding for prairie chicken research at Kansas State University

**Developed by Greenlight Energy. Sold to PPM.**

### Kumeyaay Wind Farm
**50 MW in California (2005)**
- First utility-scale wind energy project on Native American lands
- First project to use Gamesa wind turbines in the United States
- Single-source negotiated PPA with San Diego Gas & Electric
- Turbines located to ensure that cultural and aesthetic attributes of Campo Indian land is maintained

**Developed by Superior Renewable Energy. Sold to Babcock and Brown.**

### Cedar Creek Wind Farm
**300 MW in Colorado (2007)**
- Largest PPA signed in North America at commercial operations date
- 76-mile transmission ROW substantially completed in six months
- Extensive military coordination with three Minuteman missile sites inside project boundary

**Developed by Greenlight Energy. Sold to Babcock and Brown and BP.**

### Gulf Coast Wind Farm
**283 MW in Texas (2007)**
- First wind energy project built along the Texas Gulf Coast
- First use of integrated avian radar energy management system in the United States
- Located on historic Kenedy Memorial Foundation Ranch

**Developed by Superior Renewable Energy. Sold to Babcock and Brown.**
Industry Trends

Production has increased while the cost has decreased - making wind more competitive

Strong growth
(compound annual growth rate 25.8% since 1995)

Steady productivity gains
(better technology)

Falling capital cost
(increasing competition, economies of scale)

Competitive cost of energy
(30% drop in past 24 months; 50% over past decade)

2000

2011

Scale: relative change since 2000

Cumulative US installed capacity

Energy production at an 8 m/s site

Installed cost per kilowatt of a typical 100 MW wind facility

Levellized cost of energy in $/kWh of a typical 100 MW wind facility

Sources: US Department of Energy, Emerging Energy Research, American Wind Energy Association, Apex internal analysis
Wind Energy for Virginia

Improved Wind Industry Trends Provide a New Opportunity to Put Virginia On the Map

Virginia’s need for new sources of energy
- VA needs new generation to meet demand (2010 VEP: 11,700 MW by 2020)
- VA is the 2nd largest importer of electricity behind California

Virginia’s All-Of-The-Above energy strategy
- Wind energy provides a hedge against rising fuel costs
- 2007 voluntary Renewable Portfolio Standard of 12% renewables by 2022
- Near-term economic development opportunity with in-state generation
Key Elements to Siting a Wind Farm

A Developer Must Balance All Elements of Siting to Find the Right Location

- **Land**
  - Comprehensive Plan, Zoning and Ownership
  - Existing Uses (Agriculture, Timber, Mining, Roads, Transmission)

- **Wind**
  - Wind Speeds, Density, Direction, Turbulence, Shear
  - Diurnal and Seasonal Patterns

- **Transmission**
  - Onsite Power Lines or Distance to a Point of Interconnection
  - Transmission Capacity, Load Flows, Voltage Stability, Thermal Constraints

- **Permitting**
  - Agency Jurisdictional Triggers and Permit Criteria
  - Stakeholder Interests (Local Community, Wildlife, Historical Sites, Viewshed, Airspace)

- **Power Sales**
  - Wheeling between Service Territories
  - Locational Marginal Pricing
Key Elements to Siting a Wind Farm

Federal, State and Local Jurisdiction: 95 Counties and 39 Independent Cities
Key Elements to Siting a Wind Farm

Fundamentally Relies Upon Wind Resource and Transmission Capacity
Key Elements to Siting a Wind Farm

Wind Farms Can Coexist in a Complex Network of Land and Airspace Interests
Starting on the Permitting Path

A Developer Will Evaluate the Merits of Many Sites Before Nominating One

- **Internal Constraints Analysis**
  - Land (Residences, Structures, Roads, Transmission, Wetlands, Terrain, Easements)
  - Airspace (Flight Paths, Radar, Beam Paths, Migratory Paths)
- **Site Suitability Assessment**
  - Research potential for T&E species or sensitive elements
  - Evaluate relative quality of habitat and compatibility with existing land uses
- **Stakeholder Outreach**
  - Landowner and Host Community Communication
  - Collaboration with interest groups (NGO’s, Farm Bureau, Economic Development, Etc.)
- **Permit Agency Consultation**
  - Defining appropriate study protocols
  - Outlining permitting steps and procedures
- **Studies and Permitting**
  - Conduct extensive surveys to inform project design and permit applications
  - Public involvement in permit planning and process