Wind Farming in the North Country

NYS Association of Towns
New York City
February 20, 2007
Overview of Presentation

• The Maple Ridge wind farm – a case study
• Wind in NYS – some policy issues
• Wind power myths and facts
PPM Wind Power #2 in US Wind Market

- PPM Energy ranks #2 in US wind development
  - 1,405 MW to ‘06; 800MW owned
  - Added 574 MW in ‘06
  - Some 860 MW under construction or announced for ’06/’07

Leading 2005 Wind Developers*

- enXco 6%
- FPL 21%
- Horizon 8%
- Invenergy 8%
- Others 18%
- PPM Energy 16%
- Padoma Wind Power 5%
- AES 5%
- DKRW Energy 6%
- RES America/Puget Sound Energy 6%

* Percentage of total capacity installed in calendar year 2005. Source: American Wind Energy Association
PPM has an Established National Presence in the U.S.

Operating Assets: 1,405 MW
2006 Construction: 362 MW
2007 Approved / Construction: 495 MW
2010 Goal: 3,500 MW
• Projects developed by PPM Atlantic Renewable Energy Corp:

- Mill Run (PA) 2001

- Somerset (PA) 2001
- Backbone Mtn. (WV) 2002

- Meyersdale (PA) 2003
• Fenner (NY) 2001

• Madison (NY) 2000
Project description

195 separate 1.65 MW wind turbine towers...

...built on 74 different host farms...

...along a 12-mile array in Martinsburg, Lowville and Harrisburg in ’05 and ’06
On the eastern edge of the Tug Hill plateau, in the towns of Harrisburg, Martinsburg and west Lowville
Project description (cont.)

• 44 miles of new gravel access roads
• 69 miles of buried 34.5 kV power line
• 8.7 miles of over-head power line
• 2 new power substations
Project development

• Initiated by **Atlantic Renewable Energy** in ’99

• Now jointly owned by:
  - **PPM Energy** of Portland, OR; and
  - **Horizon Wind Energy** of Houston, TX

*Turbine components being unloaded in Oswego after transatlantic voyage*
A 10-mile long 230 kV transmission line will connect the wind farm to the utility high-voltage grid in Watson.

Eighteen landowners will host sections of the power line.
Each 1.65 MW wind turbine generator = power needed by about 600 ave NYS households

(annual average equivalent)

Photos courtesy of J. Harvey, NYSERDA
325 MW Flat Rock Wind farm = power for 160,000 households

= 2% of residential electric load in NYS

(annual averages)
A “clean power” project

...without any:

• smoke or air pollution
• mining wastes or water pollution
• radioactive waste
• “greenhouse” gases that cause global warming
An “open space” project

Wind farms help:

• support local farm economy – a “3rd crop”

• reduce pressures on landowners to sell, subdivide and/or develop the family farm

• …thus helping to preserve open farmland

• …and to sustain some family farms
A “rural farms” project

A complement to conventional farming:

• uses <2% of farm area

• no interference with farming activities after construction is complete
A “rural farms” project

Benefits to farmers:

- rent of $6.6k - $12k
- use of new 16’ gravel access roads
- full indemnification for taxes and other wind farm liabilities
- all power lines between towers underground
A “rural farms” project

Extensive top-soil preservation measures

• detailed work rules est. by NYS Ag & Mkts.

• topsoil carefully “stock-piled” during construction

• post-construction grading re-establishes original contours
A “rural farms” project

Will wind farms in effect help sustain NYS’s topsoil?

• by saving farms and keeping fields under cultivation?

• by preventing far more disruptive uses (e.g., home subdivisions)?

• by sustaining local farm towns?
A boost to Lewis County

The $400 MM Maple Ridge Wind Farm

one of the largest new infra-structure projects in the North County
A boost to Lewis County

With new jobs, new tax revenue – all told a $10+ million annual infusion for the local economy
A boost to Lewis County

Up to 350 construction jobs over a 2-year period...
A boost to Lewis County

...and 15 to 20 permanent operating employees
A boost to Lewis County

Up to $8.5 million in new PILOT “taxes” shared by

• Martinsburg, Harrisburg, Lowville and Watson

• Lowville, Copenhagen & So. Lewis school districts
A boost to Lewis County

About $2.0 million+ in total annual royalty payments to 85 host landowners

(equal to hiring approx. 30 to 40 new employees)
Managing local impacts

PILOT Agreement – Between host town, school board, Lewis County and FRWP. Governs sharing of “Payments in Lieu of Taxes”. Puts project in Empire Zone.

Road agreement – Between FRWP and the towns/county. Specifies the local roads to be used for heavy hauling to construct project, with repairs the responsibility of project company.

Neighbor agreements – Between FRWP and WTG neighbors (<3,000’ distant). Annual payments offset minor visual/other impacts.
Air quality benefits

- 920,000 MWh of **conventional power generation** =
  - 627 *tons per year* of NO$_x$
  - 812 *tpy* of SO$_2$
  - 586,117 *tpy* of CO$_2$
  - 19 *tpy* of particulates
  - 2 lbs. per year of mercury
Air quality benefits

- 920,000 MWh of green electricity is the equivalent of:
  - removing 105,000 cars from the road
  - 300 square miles of forest
Wildlife impacts

- 4 yr program to monitor bird and bat collisions
- Impacts on grassland bird nesting behaviors
- 2007 field test of acoustic bat deterrent devices
Economics

- Electric energy sold in NY-ISO wholesale market (*physical transaction*)
- “Green power” (RECs) from MR1 sold to NYSERDA (10 yr. term - *financial*)
- Remainder of RECs ➔ bilateral contracts to NYPA & others (*financial*)
- New NYS wind ≈ new conventional power plants (8-10¢ /kWh)
- since ‘05 wind costs ^ 50% – same as new coal, oil/gas, nuclear
NYS RPS Program

• “Renewable Portfolio Standard”: Sellers required to provide increasing “green power” share of total electric supplies
• Green power from wind, solar, hydro and biomass becomes part of generating portfolio
• Cost shared by all NYS ratepayers
• NYSEERDA contracts: sufficient to secure financing given volatile energy markets
Municipal wind projects

Financed and owned by muni utility:
• Tax exempt financing ➔ lower costs
• RPPI tax credit available
• Locks in power supply cost (i.e., no fuel price risk)
• All-in power costs levelized over 20 yrs.
• Utility buys a turn-key project from WindCo
• Technical + project + wind risks: ➔ utility ratepayers (i.e. town taxpayers)
Municipal wind projects (cont.)

Muni utility buys energy and capacity through PPA (power purchase agreement)
- Tax exempt eligible if 100% ➔ muni
- Utility still locks in 20 yr. levelized cost of power (i.e., no fuel price risk)
- More costly than municipally owned (?)
- Technical + project + wind risk ➔ private lenders and investors
- Market risk ➔ municipal ratepayers
Municipal wind projects

Other options:

• **Private/Public J V** - Municipal utility owns part of larger privately developed and owned wind farm, using TE finance for its share

• **NYPA wind program** – Competitive acquisition of power and/or green tags from private projects

• **Town facilities** – 1 or 2 WTGs installed on town owned land with power ➔ school or water/sewer facilities, displacing utility power purchases
NYS RPS Program (cont.)

• 3,000+ MW of new wind - annual benefits:

  $15 - 30 million in new PILOT payments each year

  $20 million in landowner royalties ( =~ 600 new jobs?)

  150-200 new jobs for “windsmiths”
System and ratepayer price benefits:

- **ISO wholesale market dynamics** - wind projects are a “price taker” (i.e., zero variable costs) so will lower marginal wholesale costs.
- **Displacement** of gas-fired generation will also put downward pressure on NY’s natural gas and electricity prices.
Wind power in New York

Why so controversial?
• Visual impacts seem large
• Concerns about local benefits
• Unclear about social benefits
Wind NIMBYs

- Dislike visual impacts
- Recognize aesthetic complaints are insufficient to block permitting
- Rely on misinformation, distortion
Wind power: facts & myths

Property values

- No evidence of negative impacts on neighboring houses
- One national study (REPP) of 5 different wind farms in 2003
- Fenner (NY) study in 2006
Wind power: facts & myths

Property values (cont.)
Bard Center for Environmental Policy study, May, 2006:
“The report finds no measurable effects of windmill visibility on property values.”

Renewable Energy Policy Project (REPP) study, May, 2003:
“The statistical analysis of all property sales in the view shed and the comparable community provides no evidence that wind development has harmed property values within the view shed. There is no valid empirical support for claims that wind development will harm property values.”

Phoenix Economic Development Group study, October, 2002:
“Views of wind turbines will not negatively impact property values. Based on a nation-wide survey conducted of tax assessors in … areas with wind power projects, we found no evidence supporting the claim that views of wind farms decrease property values.”
Wind power: facts & myths

Property Tax exemption

• “Free ride” for wind due to §487?

• Local Waiver → negotiate a PILOT

• Tax at “full value”? All new businesses in NYS enjoy tax breaks!

• Discriminatory? Property tax based on full assessed value → penalizes capital-intensive renewables like wind & solar
Wind power: facts & myths

Property Tax (cont.)

- **Capital cost** wind 2x – 3x higher than coal/oil/gas ($1900/kW vs $800/kW)

- **Tax at full value** (i.e. capital cost) $18/MWh-wind, $3.5/MWh gas, a tax penalty of 400% = competitive disadvantage

- **Tax at partial value** $7500/MW (wind) = $3.5/MWh
Wind power: facts & myths

Property Tax (cont.)

• Competitive factors:
  - NYSEDA RPS solicitation: high tax projects lose
  - WTG allocations: high tax projects in NYS lose
  - Will some towns/counties be left behind?
  - Why not one wind tax rate for all NYS projects?
Health & Safety

• No credible evidence of negative health impacts (i.e. peer reviewed)

• **Noise** - Peak load $\leq 50$ dBA, ave of 45 dBA, at 1,000’

• **Shadow flicker** ($< 25$ hours max) $\rightarrow$ cannot induce seizures

• **Ice** - A minor hazard--like tall structures in North Country

• **Wind turbine syndrome** = mad cow disease!
Incidence of shadow flicker can be modeled precisely
Wind power: facts & myths (cont.)

Reliability

• System impact of intermittent generation = negative energy (or conservation)

• Loads on electricity grid vary stochastically

• Intermittent generation *does not* impose new regulation burden

• 3,000 MW of new NYS wind without any system impacts

• >20% penetration of intermittent generators ➔ system upgrades
Wind power: facts & myths (cont.)

Tax subsidies

• Federal wind PTC important to wind economics – 1.8¢/kWh

• Payable only for energy production (unlike ITC)

• $40 - $60 billion in annual subsidies for conventional generation – PTC “levels the playing field”

• All new energy sources also subsidized: ethanol, biodiesel, hybrid cars, “clean coal”, nuclear (PTC)
Wind power: facts & myths (cont.)

**Economic efficiency**

- Ave. NYS capacity factors = 29-34%
- Energy content of wind = velocity³
- WTGs designed to capture more energetic high speed winds; but will operate about 80% of the time
- Ave capacity factors: Denmark = 25% and Germany = 19%
- Low-capacity gas-fired power plants deliver reliability
Wind power: facts & myths (cont.)

- Graph showing speed bin distribution and hours vs. KW for V82 1.65 MW Turbine.
Wind power: facts & myths (cont.)

Energy Security

• Wind displaces little imported oil!
• Because – only 12% of power plants in NYS are oil-fired
• High natural gas prices=high electric $ and economic insecurity
• Natural gas $ tied to oil $; wind displaces/decreases gas prices
• Technical change: “plug-in” hybrids will use off-peak wind and displace oil in transportation sector
Wind power: facts & myths (cont.)

Excess profits?

- Competitive forces:
  - wind-generated electric energy bid → NYISO wholesale market (i.e. same real-time price for all as-available bidders)
  - all NYS wind competes for NYSERDA RFP

- Competitive result: prices bid down to match IRR% requirements of institutional investors in power sector

- No risk to ratepayers/taxpayers: 0 MWh = 0 PTC/REC
Historic/ Cultural Impacts

• Upstate NY – beautiful landscapes
• All wind sites have historic impacts; are all towns to be “off-limits”?
• Aesthetic impacts are subjective; but strong community support for wind farms in Madison, Fenner and Lowville
• Economic dev. or historic preservation: A local decision?
• Focus on mitigation (e.g., rehab historic bldgs)
they’re just plain beautiful. The windmills of Madison County, sleek, dramatic, mesmerizing. Silver streaks rising high over the horizon, hundreds of feet over our heads, their paddles plying the air almost silently. We stand in awe and in praise of what appears, at least, to be a sensible approach to our energy needs.

*Syracuse Post Standard*

*September 2001*
Wind power: facts & myths

Environmental benefits

• Commercial wind farming endorsed by all major environmental groups
• Direct offset of air emissions for each MWh of wind energy
• Minor wildlife impacts – 2-4 bird deaths per WTG/yr; bat deaths greater; research continues - biological significance?
• Local noise and aesthetic impacts minor compared to the serious, long-term impacts of conventional generation—acid rain, ozone smog, toxic metals, global climate change
Wind power: facts & myths

Local Environmental benefits

• **Open space preservation** – By reducing the development pressure on landowners to sell vacant farmland.
• **Habitat preservation** – Both acid rain and climate change are degrading NYS habitats.
• **Species extinction** – Global climate change predicted to endanger 1/4 of all extant animal and plant species by 2050.
Wind power: global benefits v local impacts

- Challenge of renewable power:
  - wind, solar, biomass are diffuse, so projects are decentralized, and impacts are minor but all local
  - environmental benefits are huge, but are global and largely invisible at local level

- Conventional power sources:
  - local impacts are minor (e.g., smokestack in ind. park)
  - environmental damage is huge, global, irreversible, but invisible at local level (at least for now)
Wind power: global benefits v local impacts

Challenge of renewable power:

- national/global environmental gains
- side effects: minor noise, view, wildlife--but all local

• State, national and international energy policies: go renewable!
• Town, county officials: implementing state & national energy policy goals – you figure it out!
• NYS wind pioneers: Martinsburg, Harrisburg, Lowville and Lewis County officials and board members
## Power plant impacts: global vs local

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<th>Wind farms</th>
<th>Conventional power projects</th>
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<td><strong>Air pollution</strong></td>
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<td><strong>Permanent damage to ecosystems</strong></td>
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Tower sections stockpiled after shipment to Port of Oswego
Each rotor blade is about 136’ in length
Each “nacelle” contains the main drive shaft, a gearbox and the 1.65 MW generator
Please visit us at PPMEnergy.com, or in Lowville at 7612 State Street
376-4316