LOCAL GOVERNMENT ZONING/REGULATORY ISSUES FOR WIND FARMS

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DEVELOPMENT INFORMATION

- WTG capacity, tower height, blade length
- Foundation size and plans
- Location of collection cables
- Location, size of transmission lines
- Any site substations
- Operation center
- On-site storage and accommodation
- Access roads - internal, external access, heli-pads/fencing
- Parking areas
- View analysis
- 3K radius development survey (existing and potential)
- Management plan
- Decommissioning plan
REGULATORY ISSUES

- Birds and bats
- Blade throw
- Ice throw
- Noise
- Shadow flicker
- Fencing/safety features
- View/landscape compatibility/visual impact
- Electronic/magnetic interference/airports/radar telecommunications
- Management plan
- Decommissioning/mandatory performance requirements
CANADIAN WIND FARMS EXAMPLES

Prince Wind Farm
- shores of Lake Superior
- 126 turbines
- 189 MW per annum
- up to 40,000 homes

Centennial Wind Power Facility
- Swift Current, Saskatchewan
- 150 MW per annum
- 83 turbines

Bais des Sables
- Quebec
- 109 MW
- 73 turbines
Proposed BC Wind Farm

- Hackney Hills near Hudsons Hope
- 1000 MW
- Size of turbines not decided
- Phase 1 possibly 150 turbines (3 MW each)

Environmental Assessment (Federal and Provincial) Terms of Reference

www.eao.gov.bc.ca/projects/hackneyhills/index.html
BIRDS AND BATS

- research is a work in progress
- Maple Ridge Wind Farm - New York State
  - 195 turbines/ 80 metres
  - 2006 → 125 “avian incidents”
  - 326 bat incidents

- Comparators/Bird Death Estimates
  - Cats → 100 million per annum (National Audubon Society)
  - Electric Transmission lines - +/- 174 million (U.S. Fish and Wildlife Service)
  - Communications Towers → 4 → 10 million (U.S. Fish and Wildlife Service)
  - Hunting → 100 million (U.S. Fish and Wildlife Service)
  - Wind Turbines → 40,000 (National Research Council)
BIRDS AND BATS (cont’d)

- Toronto – 10,000 bird fatalities per annum/tall building collisions
- Forecasting Avian Mortality/Siting Wind Turbines
  - see www.ca.audubon.org/wind_conf/08_lee_neher.pdf
- Mitigation
  - migration routes
  - endangered species assessment
  - Turbine Siting Mitigation Strategies
  - see www.ca.audubon.org/wind_conf/04shawn_smallwood_mitigation.pdf
NOISE

- Still a matter of much debate/Industry/person impacted
  - turbine size
  - topography
  - wind speed and direction
  - ambient sound/site specific
  - time of day
- Wind Turbine Syndrome
  - sleep deprivation - noise, pulsation
  - headache
  - dizziness, nausea
  - exhaustion, anxiety, anger, depression
  - lack of concentration
  - Tinnitus (ringing in the ears)
Recommended 1.5 miles (8000 feet) between industrial wind turbines and houses, schools and hospitals
(see Nina Pierpoint, MD PHD (Johns Hopkins 1991))
- testimony before N. Y. State Legislature March 7, 2006
- www.ninapierpoint.com

Industrial Turbine Setbacks
- UK Noise Association – 1 mile (1.6K)
- Academy of Medicine France – 1 mile (1.6K)
- Preponderance of jurisdictions – 700 – 1000 m

Decibel levels
- 30 dBA inside nearby dwelling (WHO)
- 40 dBA outside nearby dwelling (WHO)
THROW

Blade Throw

- full or partial detachment of blade
- Setbacks - based on tower height and blade radius size
  - 1990 – 2007 British Wind Farms - 114 blade failures (CWIE)
    - 400 metres recorded distance
- also see www.physics.rutgers.edu/matilisky/windmills/throw.html where it is calculated that for a blade radius of 100 feet or over blade throw from an industrial turbine can extend to 1700 feet
- suggestion of 1 Km setback between turbines and occupied buildings (CWIF)
THROW (cont’d)

Ice Throw

- ice fragments thrown from a rotating turbine blade

Mitigation

- ice sensors which trigger a shutdown of the blade
- micro-climate analysis/height of tower
- blade heating systems
- blade coating/black blades
- setbacks 750 – 1150 ft from occupied buildings, power lines and roads (assumes 50 m rotor – 164 feet)

See

SHADOW FLICKER

- Visual impact of sun and blade interaction causing flickering as blades rotate.
  - 20/30 hours per year of exposure to flicker is considered a health concern.
- Enbridge, Ontario
  - adopted German standards of no more than 30 hours per year.
  - the analysis at Enbridge found the maximum effect on neighboring dwellings was at its highest 21 hours per annum and acceptable.

SHADOW FLICKER (cont’d)

- Mitigation
  - siting analysis and setbacks as well as position of higher towers
  - shutting down the turbines on specified towers at various hours depending on the time of day and season
  - controlling direction of turbine blade vis à vis the sun
  - Vegetative barriers and screens based on flicker analysis
VISUAL IMPACT

- Whatever the language - still in part subjective/ it is what it is
- View impact/long and short view
- Rural amenity impact/real identity values
- Tourism impact
- Applicant to provide a visual impact assessment for peer review
VISUAL IMPACT (cont’d)

- Mitigation
  - siting control/topography/impact assessment
  - visual clutter avoidance – uniformity in turbine design height
  - color
    - color matte finishing/monopole design
  - lighting assessment and restrictions
  - fencing control/design
  - sign control
  - cabling underground
  - restrict outdoor storage
MANAGEMENT PLAN

- Ongoing positive obligations in relation to all conditions, requirements, remedial and mitigative measures.
  - emergency procedures/protocols/programs
  - vehicular volume and management
  - maintenance schedules and nature of maintenance/construction details
  - on-site safety procedures and protocols
  - ongoing environmental monitoring/birds/bats/other
  - mitigation measures arising from monitoring
  - public process – ongoing complaint management and consultation

- Positive Covenant Obligations
  - run with the land
  - no use if breach
  - security/letter of credit
  - rent charge
DECOMMISSIONING

- removal of towers, turbines, foundations
- removal of buildings/conversion of buildings
- power line removal/collectors and transmission
- waste removal
- remediation/oil and other waste products
- timing and standards

Enforcement Mechanisms
- statutory enabling legislation
- positive obligation covenants that run with the land
- bonding/letters of credit
- rent charge