

ROCKY MOUNTAIN LAND USE INSTITUTE

17th Annual Conference

University of Denver Sturm College of Law

March 6 – 7, 2008

LOCAL GOVERNMENT ZONING/REGULATORY ISSUES FOR WIND FARMS

RAYMOND YOUNG

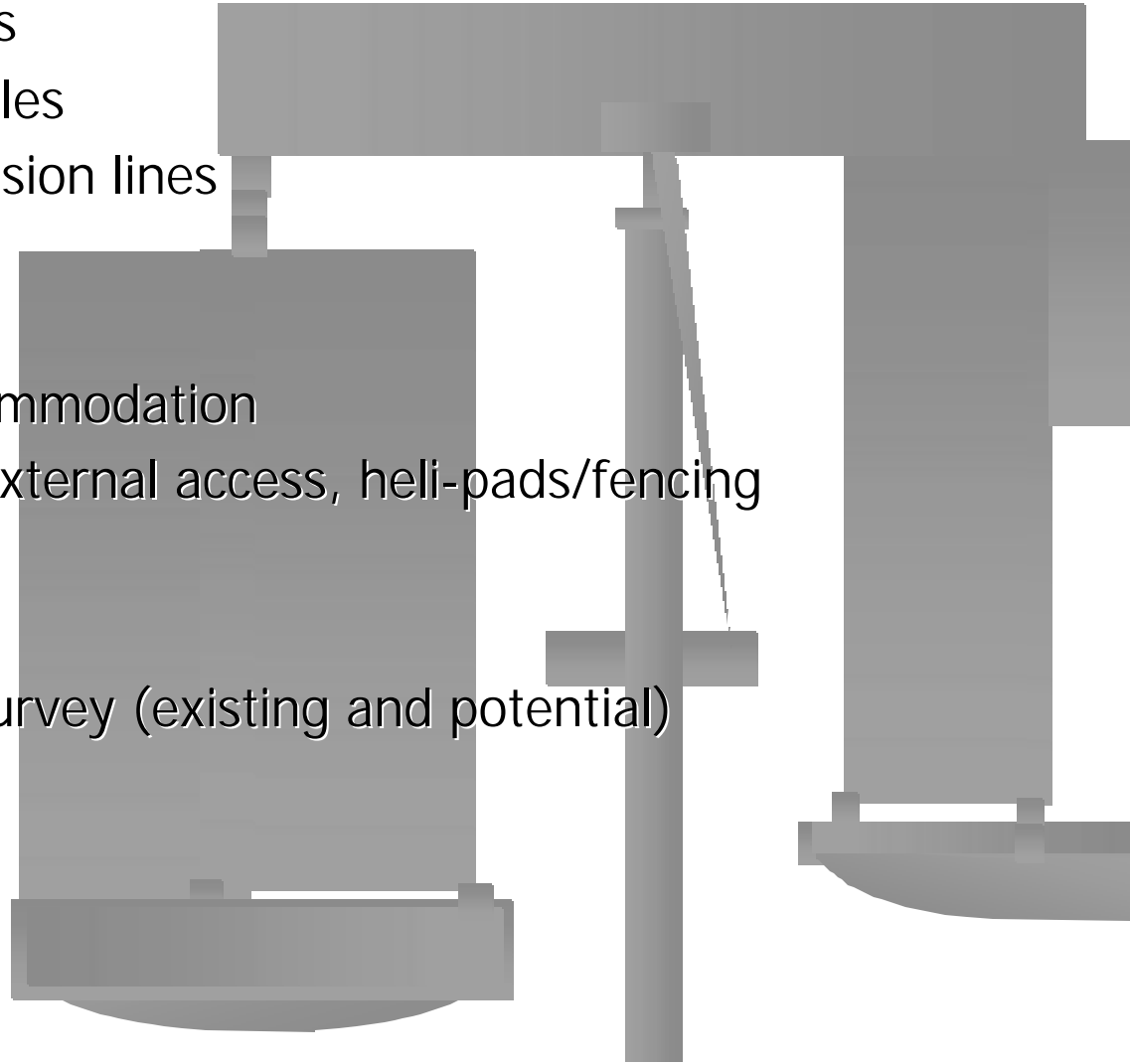
Lidstone Young Anderson

Barristers and Solicitors

Vancouver, British Columbia

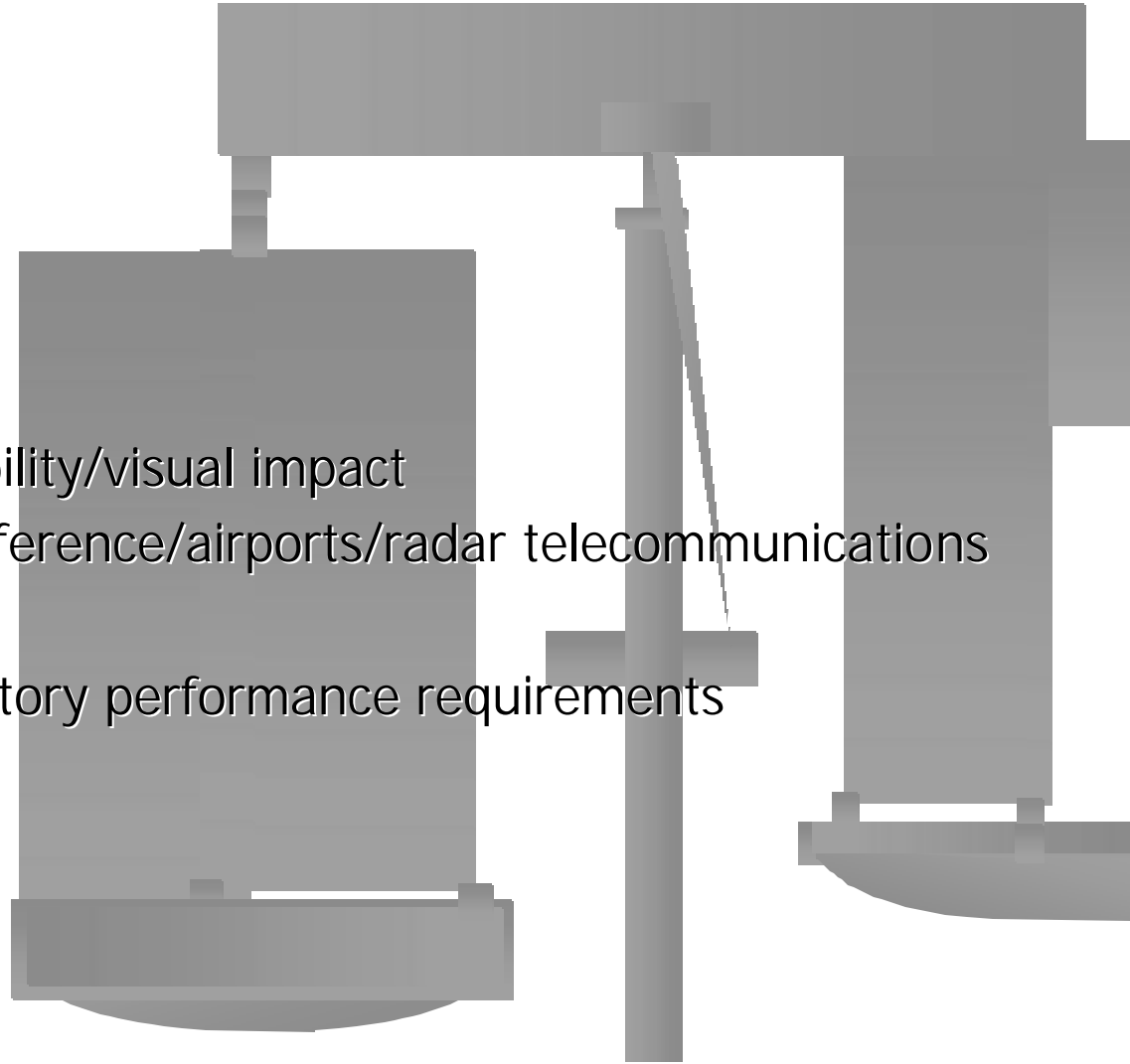
DEVELOPMENT INFORMATION

- 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

CANADIAN WIND FARMS EXAMPLES

(cont'd)

Proposed BC Wind Farm

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

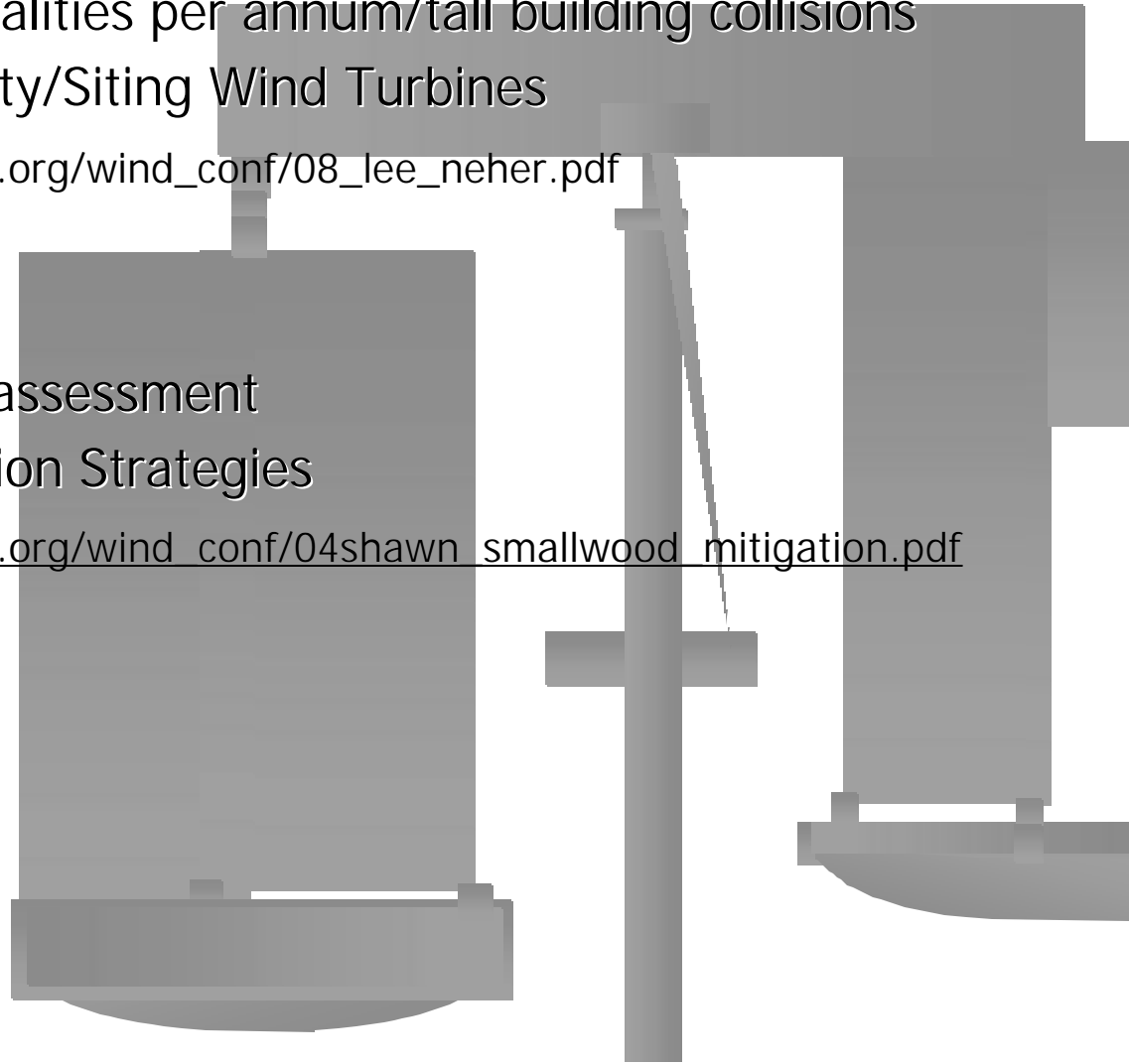
Environmental Assessment (Federal and Provincial) Terms of Reference
www.eao.gov.bc.ca./projects/hackneyhills/index.html

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)

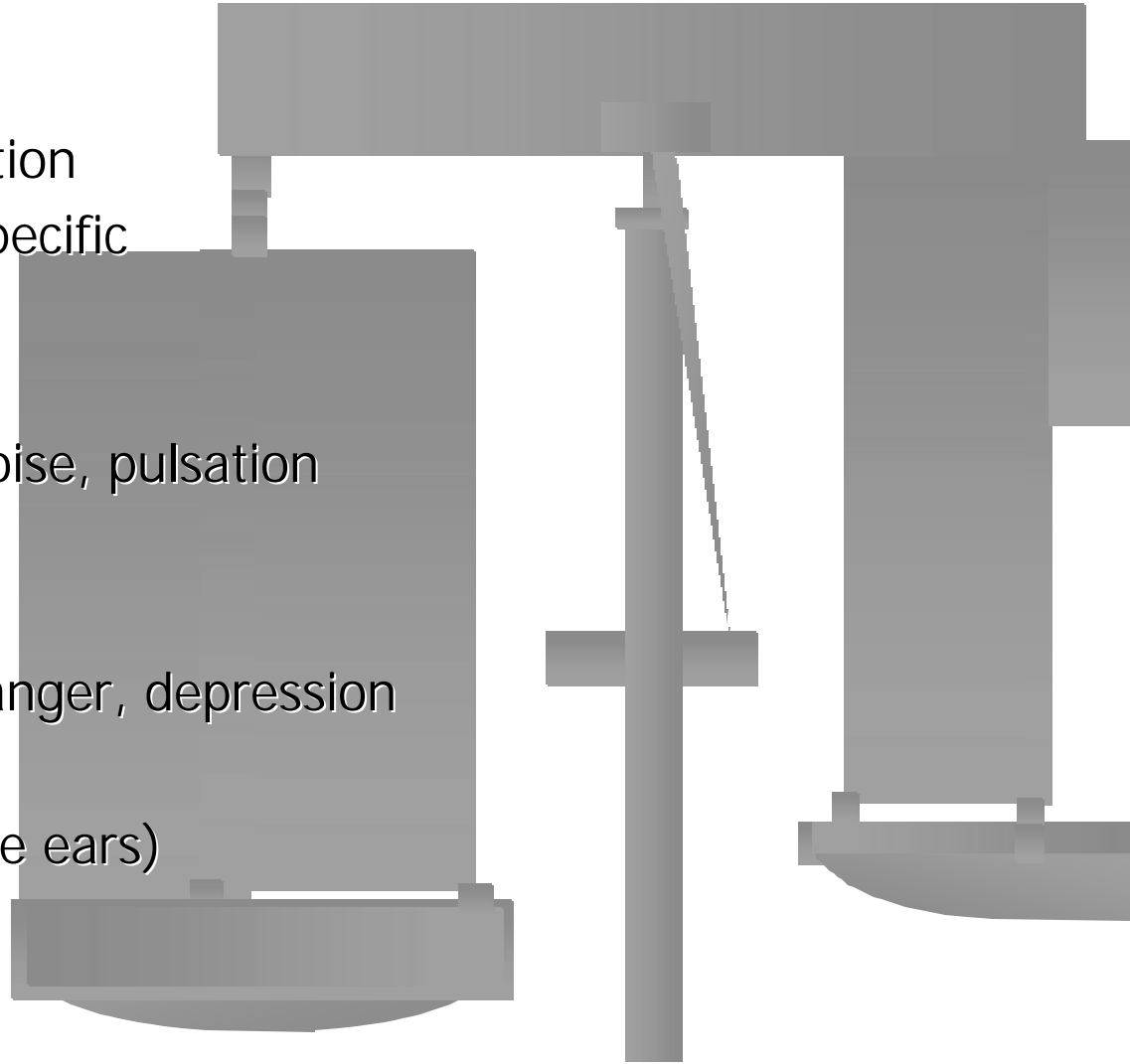
BIRDS AND BATS (cont'd)

- 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)



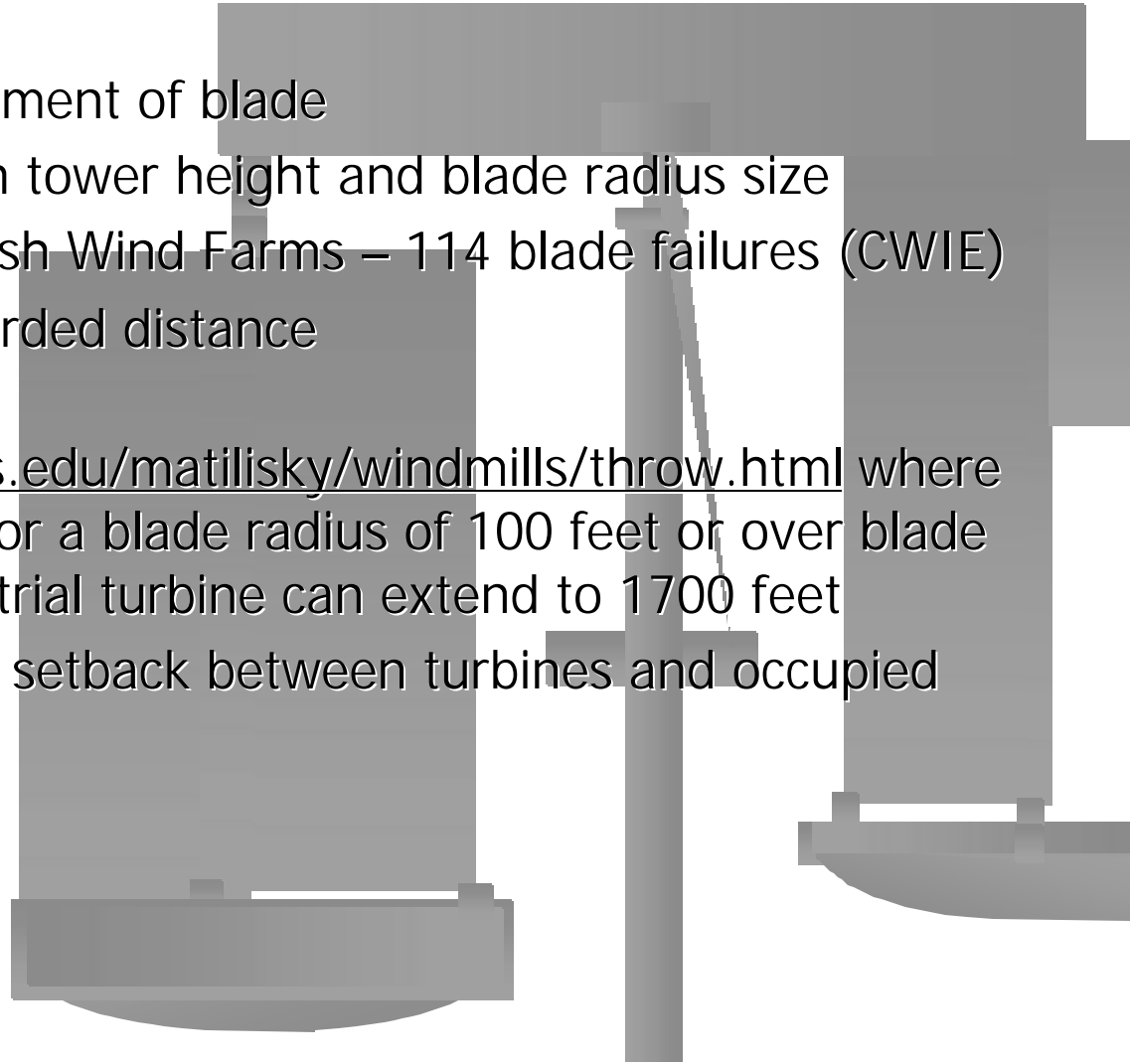
NOISE (cont'd)

- 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 msee Jacque Whitford Final Report – Best Practices for Nova Scotia Municipalities – January 2008
- 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)



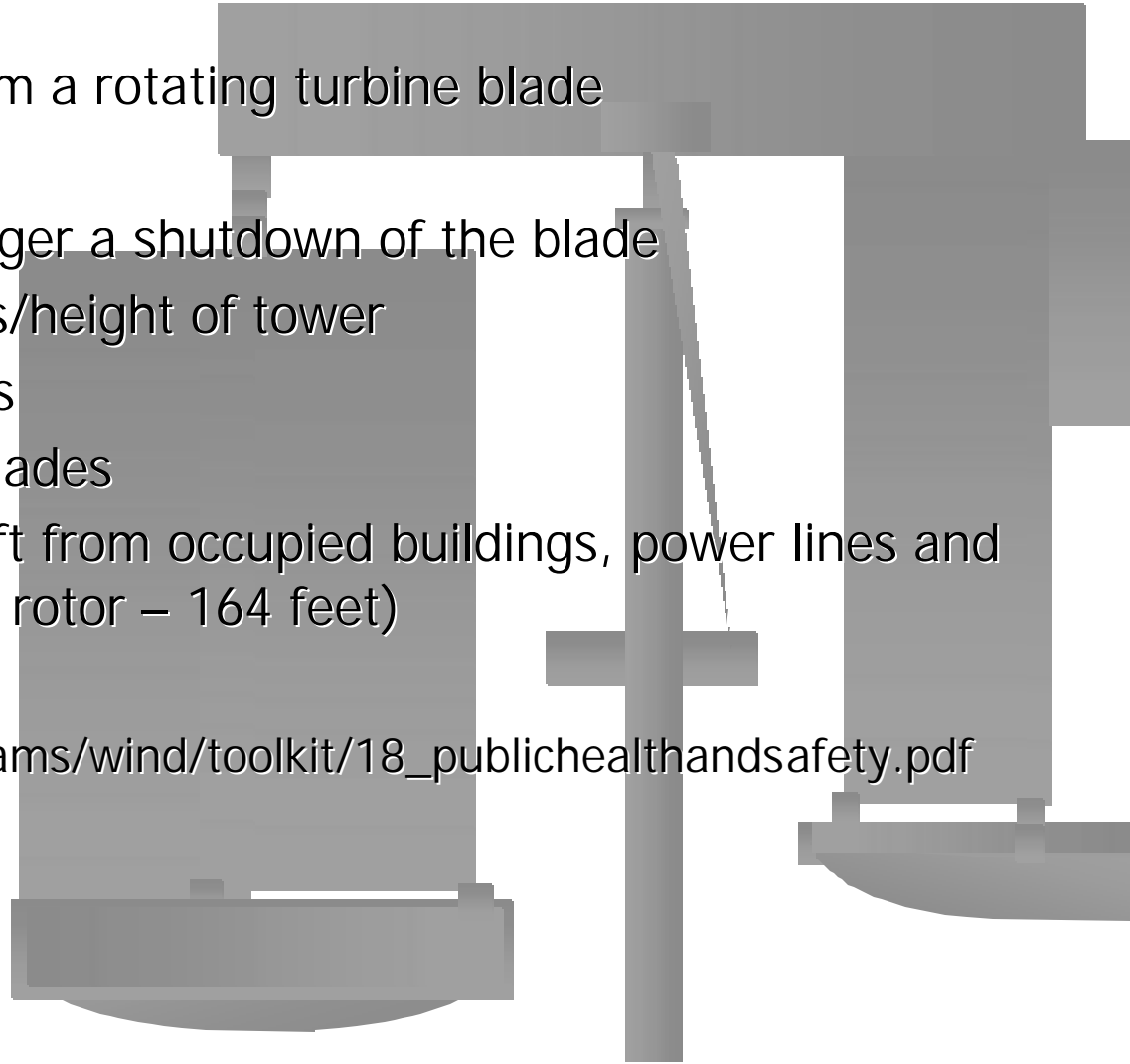
THROW (cont'd)

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

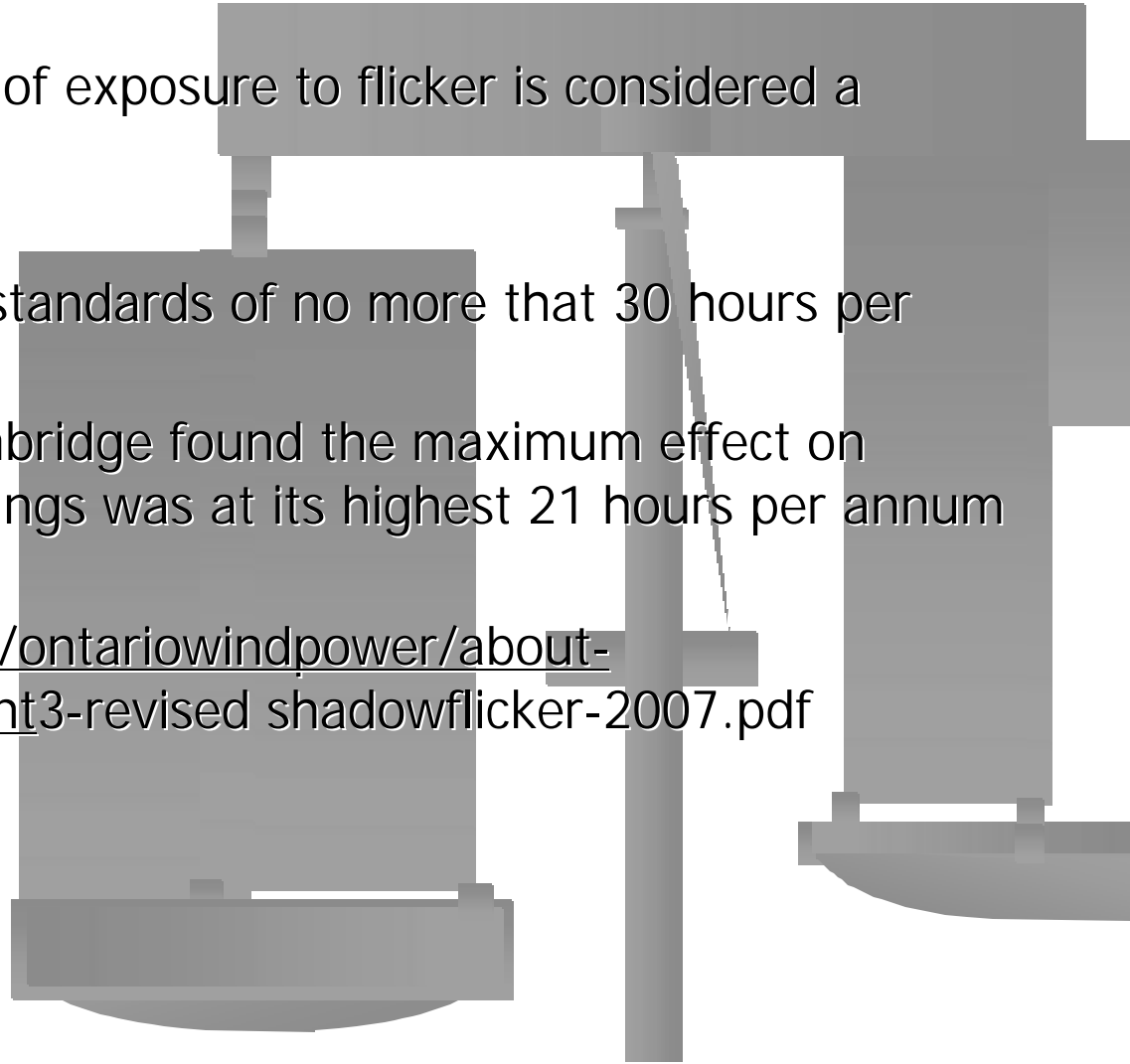
www.powernaturally.org/programs/wind/toolkit/18_publichealthandsafety.pdf



SHADOW FLICKER

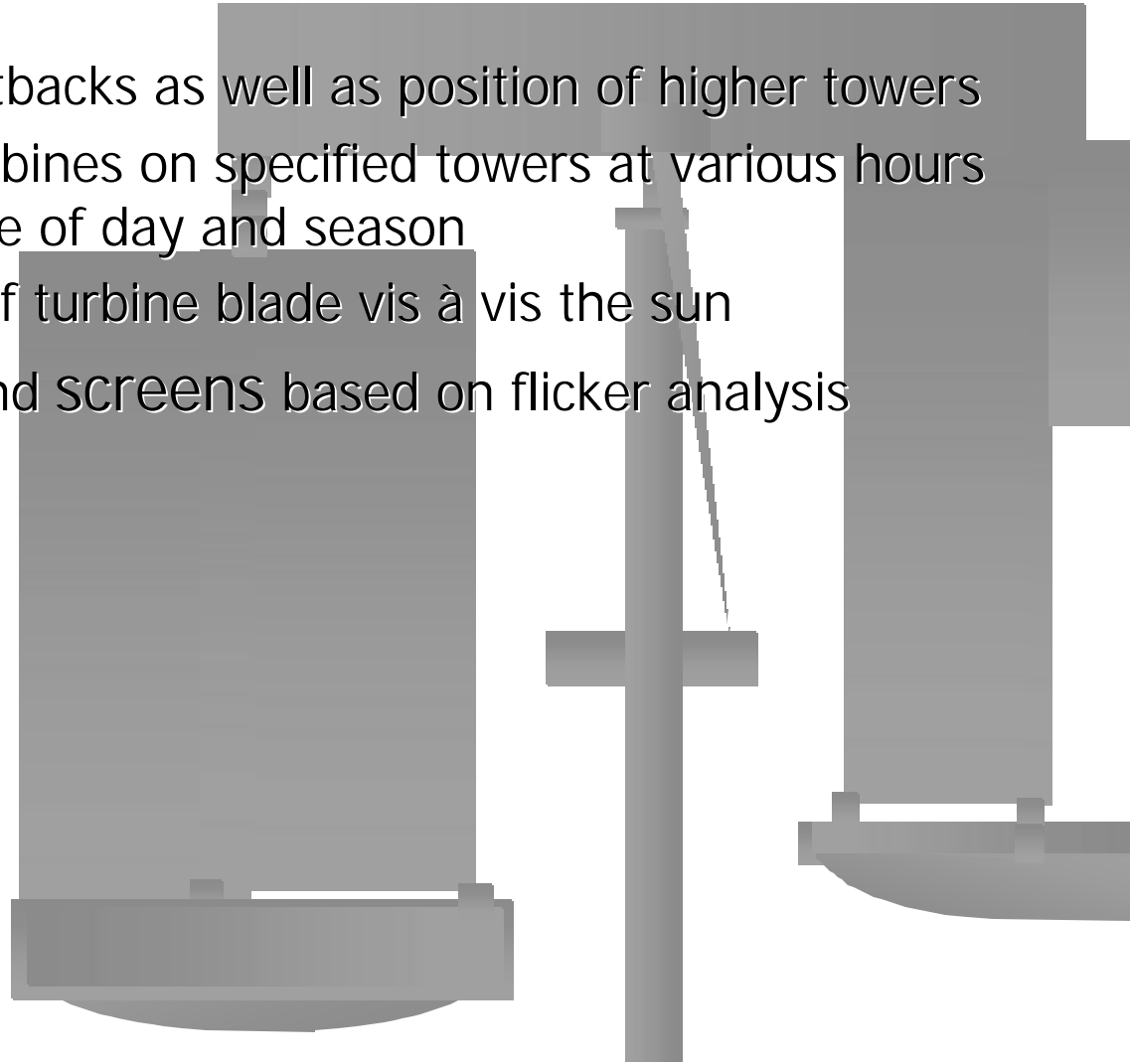
- Visual impact of sun and blade interaction causing flickering as blades rotate.
 - 20/30 hours per year of exposure to flicker is considered a health concern
 - Enbridge, Ontario
 - adopted German standards of no more than 30 hours per year
 - the analysis at Enbridge found the maximum effect on neighboring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

see www.enbridge.com/ontariowindpower/about-project/pdf/attachment3-revised_shadowflicker-2007.pdf



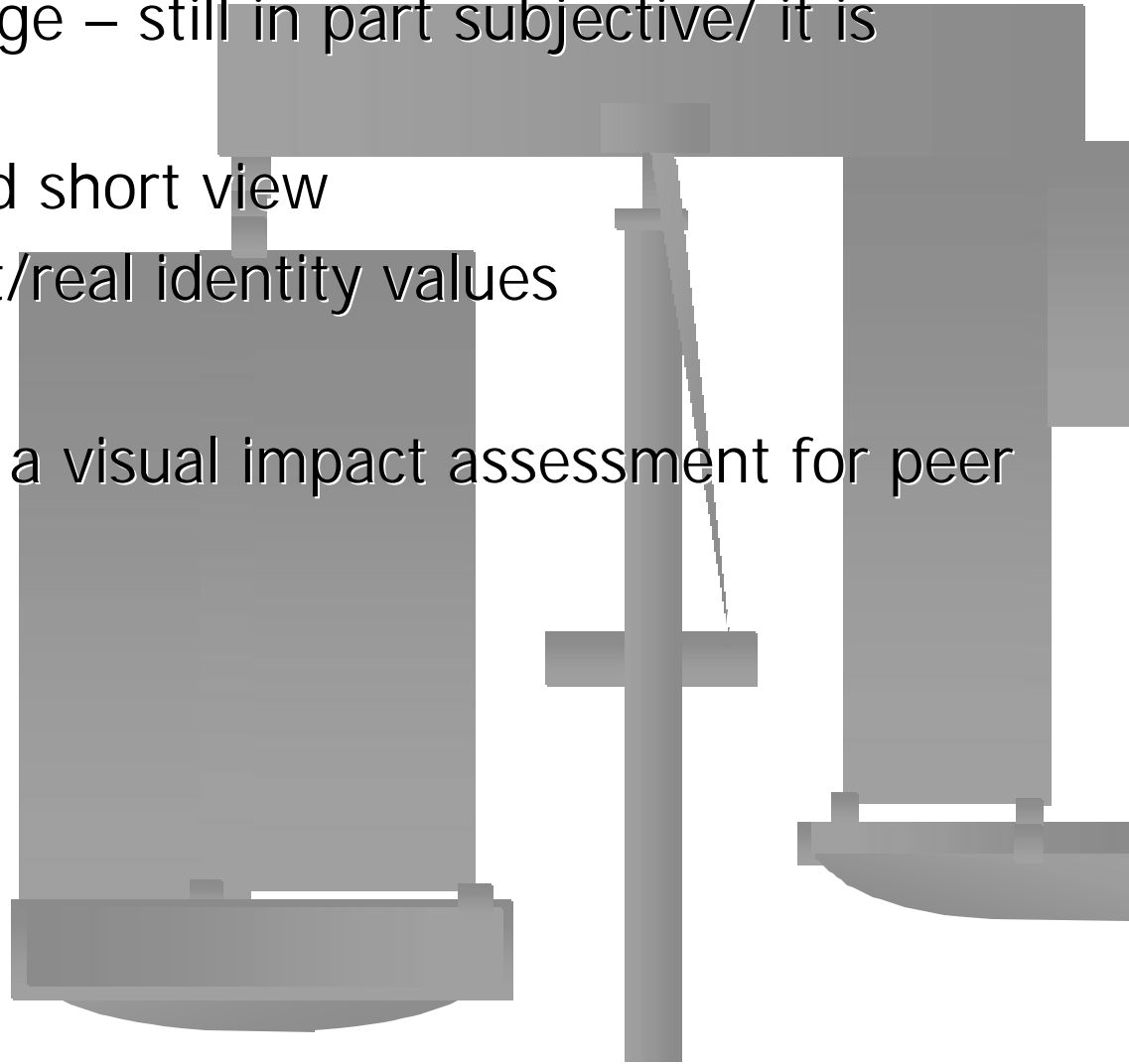
SHADOW FLICKER (cont'd)

- 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

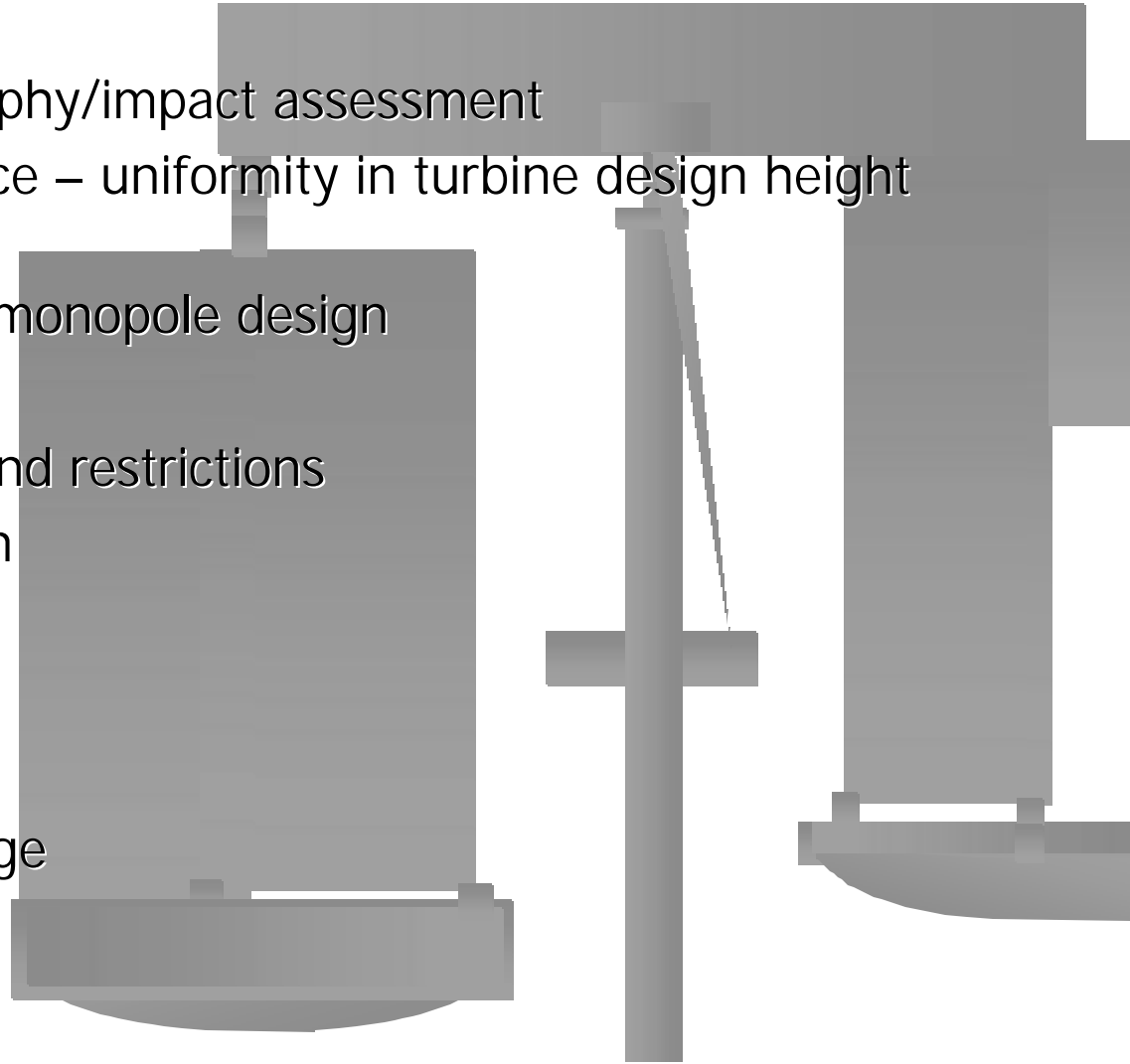
- Whatever the language – still in part subjective/ it is what it is
- View impact/long and short view
- Rural amenity impact/real identity values
- Tourism impact
- Applicant to provide a visual impact assessment for peer review



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

