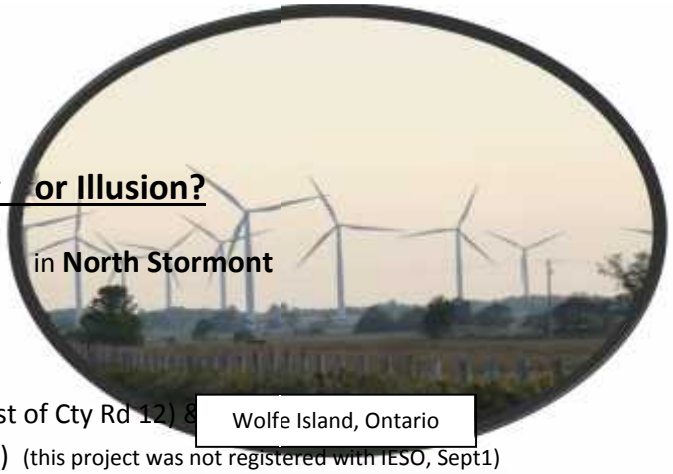
Wolfe Island, Ontario

Wind Turbines in North Stormont–Green Energy or Illusion?

Summary of salient points re: Wind turbine projects proposed in **North Stormont** **(highlights in bold**)

3 wind projects were proposed,
: 25-50 Siemens 3.0-113 (or equivalent low wind) turbines (west of Cty Rd 12) &
: 21 Siemens 3.0-113 or 3.2-113 turbines (east of County Rd 12) (this project was not registered with IESO, Sept1)
: a substation or switching station northwest of Moose Creek

(For a simplified overview of how wind turbines, electricity and the grid work, & point # 6, his personal commentary on wind energy in the USA, also applicable to Canada, see Appendix A, http://www.aweo.org/primer.html *By Eric Rosenbloom)*

1. **North Stormont is a Marginal wind area – what is the cost benefit of putting up Industrial/Utility wind turbines in a marginal wind area?? Is this energy "green" ? Does it "give" more than it "takes"?**

   - Background on wind turbines: "Big turbines often incorporate rechargeable batteries or ultracapacitors to power their own electrical systems. **When those get depleted, the power must come from the grid**. This power goes into running equipment such as yaw mechanisms that keep the blades turned into the wind; blade-pitch controls that meter the spinning rotor, aircraft lights and data-collection electronics; oil heaters, pumps and coolers for the multi-ton gearbox and hydraulic brakes for locking blades down in high winds... and in northern climes for blade heaters to prevent icing (some reports say these heaters can consume up to 20% of a turbine's rated power output); dehumidifiers and heaters in their nacelles…, and large turbines may need to use their generators as motors to help get (and keep) their blades turning to prevent sagging ..and to keep bearings from fretting ». (See "OILPRICE.com", the No. 1 Source for Oil & Energy News, article by Al Fin titled, How Much Power do Wind Turbines Use). **Wind turbine blades need to turn, at all times – wind or no wind, so they are consuming electricity in low wind situations, at the very least.**

   - the cut-in wind speed for the Siemens 3.0-113 is 3-5m/sec (7-11mph or 11-18km/h) - at this point, it joins the grid connection, **producing approximately 1%** of its **rated power** and increasing in power output until the wind reaches steady speeds of between approximately 12.5m/s (27mph-30mph or 43-47km/h)full "rated power" and 25m/s (60mph or 90km/h), when the wind turbine is shut down by feathering of the blades, "in order to protect the turbine and its surroundings". When the average wind speed drops back below the restart average wind speed, the systems reset automatically. The advertised **annual output of 3.0MW** for the Siemens SWT 3.0-113 & the SWT 3.2-113 is **for wind speeds of 8.5m/s (19mph** or **31km/h).** (http://www.ewea.org/fileadmin/files/library/publications/reports/Economics_of_Wind_Energy.pdf) p.52). (Info on the Siemens 3.0-113 is found at http://www.wind-energy-market.com/en/wind-turbines/big-plants/details/details/bp/siemens-swt-30-113-2/, and

http://www.energy.siemens.com/co/pool/hq/power-generation/renewables/wind-power/platform%20brochures/D3%20Onshore%20brochure_ENGLISH_Apr2014_WEB.pdf)

– In North Stormont, the **average annual wind speed was 4.21m/sec** (9mph or 15k/h) according to Environment Canada's Canadian Wind Energy Atlas (www.windatlas.ca/en/nav.php , maps) on and before June 21st, 2015, **although** after meeting with wind energy proponents on June 23rd at an Open House in Crysler, Ontario and providing this information to the representatives, the information on Berwick's wind speeds (by postal code - K0C 1G0), have been **amended upward** by +1.82 m/s to 6.03m/s, (although communities within 5 km on Sept.3rd, still an average annual wind speed of 4.71 m/s. (Paper copies printed on June 21st and Sept. 3rd, reveal the change – does it reflect an actual change in "mean wind speed", or **why would Environment Canada (**or someone with the computer skills capable of making changes**) change the data now?**) The "Important Notices" section on the home page, indicates the last update: Aug 21st, 2008 (Interesting!) The "scattergram" and the "table – Comparison with observation stations, quadrangle no 31", were not changed as of July 8, 2015. **North Stormont amended wind speeds are still within approx. 4-6m/s at 80m elevation** (the approximate height of the nacelle).

- The Legend for the **Canadian Wind Atlas** indicates that **"Utility (Industrial) scale wind power plants require minimum average wind speeds of 6m/s**" (or 13mph 22km/h) . (This info was still found at http://www.evolvegreen.ca/howto.html on July 8, 2015 – a site which provides a link to Environment Canada's Canadian Wind Atlas Website). Berwick (center of 3 villages, Finch, Berwick & Crysler), (on or before June 21st, 2015), has average wind speeds of: winter 4.76m/s or 11mph, spring 4.13m/s or 9mph, summer 3.61m/s or 8mph (when we need the extra energy for air conditioners), and fall 4.40m/s or 10 mph. We infrequently have ideal wind speeds between 12.5m/s (27mph-30mph or 43-47km/h)and 25m/s (60mph or 90km/h), making a good wind energy contribution **unrealistic from this area** (www.windatlas.ca/en/nav.php - go to a specific postal code and check "**Histograms**" for a visual representation of the frequency of wind speeds in m/s)

Will the projects go ahead, regardless of the financial, environmental & community costs, even if there is insufficient wind? Why? Who benefits from the multi-million dollar, 156meter – 174m statues with moving parts scattered across rural Ont. regardless of their efficiency or "net contribution" to the grid?

- there could be little, if any positive energy flow **into** the grid and as **there is no present way of knowing how much energy is "taken" from the grid (to maintain wind turbine movement, equipment, lights, etc); there is no proof that wind turbines produce more energy than they use or that they use more energy than they produce & no wind proponents are willing to provide answers to the questions raised : it's time to use "tower net metering"** to determine how much hydro electricity is used – there needs to be a **smart meter for wind turbines**, too. (http://www.aweo.org/ProblemWithWind.pdf)

- No IESO (Independent Electricity Systems Operator) data is available yet from South Branch Wind Farm in Brinston – where 10 similar turbines have been in operation since Mar of 2014 - for comparison. For IESO info. for some Ont. wind farm output go to: http://www.ieso.ca/map/default.htm - touch a

"balloon" (e.g. Wolfe Island which is the closest to North Stormont, and click "More output data" or go to: http://reports.ieso.ca/public/GenOutputCapability/PUB_GenOutputCapability.xml . A random sampling of data generates interesting questions about the causal relationship between wind speed and energy output, e.g. July 7th and 8th, 2015, Wolfe Island, 86 turbines – 198 MW of available capacity:

July 7th & 8th, 2015	Wolfe Island, ON	198 MW available capacity:
Time of Day	Wind speed (from the Weather Network)	Output (IESO)
3 am	22 km/h (6m/s)	164 MW
1 pm	20 km/h "	67 MW
8 pm	13 km/h (4m/s)	64 MW
9 pm	13 km/h "	108 MW
1 am	24 km/h (7m/s)	84 MW
2 am	26 km/h "	134 MW
3 am	19 km/h (5m/s)	79 MW
7 am	11 km/h (3m/s)	23 MW
10 am	20 km/h (6m/s)	14 MW

(Go to http://www.windfinder.com/wind/windspeed.htm for a wind speed calculator for conversions)

- We have sufficient **hydro electricity available locally - RH Saunders Generating Station** (Cornwall-Seaway – information from the website) – Capacity: 1,045MW – **6 billion kwh of clean, renewable electricity to meet the needs of over 600,000 homes (3% of Ontario power),** updated in 2007 – 97% reliability of units – not at full capacity – are some generators regularly shut down to accept intermittent solar & wind energy, at greater cost e.g. June 17, 2015, at 9:23:27. http://reports.ieso.ca/public/genoutput capability.xml indicates Capability 968 & Output 828 (up from 707 at 1am). **Hydro Electricity is Green Energy!** (See also Tom Adams, expert on independent energy & environment issues, for his perspective at: https://www.youtube.com/watch?v=R6pq80vK6EQ)

2. Impact on Wildlife and Habitat will be significant – Effects of the Environmental Protection Act on birds, bats & species at risk

-In **2013**, Ontario introduced a regulation, The **Environmental Protection Act**, which **exempts major industries from the strict protection standards under the Endangered Species Act 2007, provided they mitigate harm.** There is no plant, animal, or habitat which will stop wind turbines from going up, as long as wind companies and/ hydro rate payers/ taxpayers, create a similar habitat in another area. (Hydro lines are being moved, adapted or set up - and who pays? Hydro's expense/our expense? - to accommodate wind turbines, regardless of the availability of wind). (Check out the Endangered Species Act to learn of endangered, threatened or extirpated species and their habitat; in S.D.& G. County and Ontario.) In Ontario, wind turbines have affected raptors, other migratory birds, bats & insect life – as explained at the Open House in Crysler on June 23rd, **someone is paid to collect the carnage,)(if no other predator already has)**.(See http://savetheeaglesinternational.org/new/us-windfarms-kill-10-20-times-more-than-previously-thought.html , Apr2014 for species at risk of wind turbine kills in the USA)

- *Excerpt from Ministry of Natural Resources v. Janssen, Reasons for Judgment - February 12, 2015.*

"...government would be fully aware that any action taken by a person to challenge an industrial wind turbine project would fail because there are no regulations pertaining or applicable to wind turbines, under the *Environmental Protection Act*, or any other act. With the misleading of all of this legislation and directions, it would seem that this Part V.0.1 of the *Environmental Protection Act*, Schedule "G" of the *Green Energy Act*, etc., is merely an attempt to mislead the people of Ontario into believing they have avenues which, based on Part V.0.1, there are none".

- We should however, **continue to take photographs and document sightings** of "Endangered Species" and "Species at Risk", and their habitats, and **hold all levels of Government accountable** for the protection and preservation of wildlife in Canada.

3. **<u>Elected Municipal Councils stripped of powers by the Green Energy Act, 2009</u> - which provides amendments which exempt renewable energy undertakings from the normal application of the "Planning Act", including policy statements, provincial plans, official plans, demolition control by-laws, zoning by-laws and development permit regulations and by-laws.** (See under Government of Ontario (proposed & defeated) 41:1 Bill 48, Restoring Planning Powers to Municipalities Act, 2014),

- Municipal powers have been reduced – municipal councils **c**an choose to be an "Unwilling Host" or can sign to support a wind company's bid(s) and give them "bonus points" in their application for a LRP 1 RFP contract - that's the real extent of their input/control. Rural communities are polarized with residents not engaged in turbine developments pitted against neighbours (and family), over concerns with health impacts, quality of life issues, and financial implications. Municipal councils have reached out to other municipal councils for support and to try to bring pressure to bear to resolve some of the complaints and problems experienced, as a result of the process Ontario has used to impose wind farms in rural Ontario.
(Napanee Beaver, Oct. 10, 2013, p26), "...numerous resolutions regarding health effects reportedly related to IWT's have been received by Lennox and Addington County council from other municipalities that do have turbines, which led him (mayor) not to support IWT's in Greater Napanee. ..Certainly if there is a chance of those health factors, I do not want that to happen to our residents."

-OFA (Ontario Federation of Agriculture) believes the amendments to the Planning Act under authority of the Green Energy Act do not have the desired effect of providing for good planning. **Removal of municipal input has alienated the rural population and ignored competing community needs and policies.** It is not appropriate to take the decision role outside the hands of municipalities. The use of site plan approval and site plan agreements under the Planning Act would enable agreement on final design and setbacks and provide a framework for the municipality to ensure appropriate treatment of matters such as road access, drainage, and proximity to property boundaries and natural heritage features. **A balance between the province's power requirements and local autonomy regarding land use must be struck**. (OFA position statement on Industrial Wind Turbines, 2012 -

http://www.manitoulin.ca/2012/01/25/ontario-federation-of-agriculture-calls-for-halt-of-expansion-of-wind-turbine-plans/#sthash.8VMu1yI7.dpuf)

4. Health issues and associated controversial set-back distances – an issue internationally – beyond 1km, (1 Mile in the States) consistently comes up in the recently released Canadian study as a minimum distance, and 35dBA as an upper limit for noise to meet health needs – however it's not convenient for wind companies

- noise regulations can be a barrier to wind turbine development as they effect wind turbine spacing and consequently the cost of wind-generated electricity. Industrial wind turbines are being placed in close proximity to family homes in order to have access to transmission infrastructure. (Canadian Family Physician, May 2013 – Adverse health effects of industrial wind turbines). Unless siting guidelines are adequate and rules enforced, we can expect family physicians to see patients suffering from related ailments in their offices, resulting in increased stress and expense to the Health Care System, too.

- "**Health Canada" issued guidelines indicating 40dBA is an acceptable noise limit for wind turbines**, in keeping with the World Health Organization **(WHO) 2009 guidelines for night-time noise** .

In Oct. 2008, Ontario established dBA limits for wind turbine projects in Class 3 or rural areas as shown in Table 1, and in 2009 issued Regulation 359/09 which set out the process for Renewable Energy Approvals under the Environmental Protection Act. As seen in the chart below, the Ministry of the Environment actually **allows noise levels up to 51 dBA**, when wind speeds reach **10m/s**. When evaluating other noise sources, the Ontario MOE makes adjustments for special qualities of noise outlined in NPC-104, but ignored this in the Noise Guidelines for Wind Farms. **"If a sound has an audible cyclic variation in sound level such as beating or other amplitude modulation then the observed value shall be increased by 5."** (Ontario MOE, Publication NPC-104 – Sound Level Adjustments). This adjustment was not included in the MOE Noise Guidelines for Wind Farms because the MOE felt: "Any tonal character associated with the wind turbine noise is generally associated with maintenance issues." (Ont. MOE, Noise Guidelines for Wind Farms, Queen's Printer for Ontario, Oct 2008, p.5). **Not so, as the 2015 Federal Gov't initiated Review of Literature revealed!**

Table 1: Summary of Sound Level Limits for Wind Turbines (source: Ont.Min.of the Env't (NPC-232)

Wind Speed (m/s) at 10 meter height	4m/s	5m/s	6m/s	7m/s	**8m/s**	9m/s	**10m/s**
Wind Turbine Sound Level Limits Class 3 Area, **dBA**	40.0	40.0	40.0	43.0	**45.0**	49.0	**51.0**

-Ontario's minimum setback distance of 550meters, as outlined in the Ontario Government's Section 47.3 (1) Environmental Protection Act R.S.O.1990, September 2009, "Development of Noise Setbacks for Wind Farms – Requirements for Compliance with MOE Noise Limits", is one of the shortest on record, internationally. Page 4, 6.0 Results and Conclusions, Table 1 – proposes setbacks for Land-based wind Power Projects in a range, based on: # of wind turbines, Minimum setback to closest wind turbine per

group, & the SPL (sound power level) rating for each turbine. **The RANGE is from a minimum of 550m for 1-5 turbines (within 1km of a receptor), where the SPL for the specific turbine is 102dBA, to 1500m for 11-25 turbines (within 3km of a receptor), when the SPL for the specific turbine is 107dBA**.
Who is ultimately responsible for siting the turbines and enforcing the setback guidelines?? NO ONE?
(see p. 4 & 5, Table #1, Ontario Ministry of the Environment - Requirements for Compliance with MOE Noise Limits – Table 1–Proposed Setbacks for Land-based Wind Power Projects represented below)

# of wind turbines (within a radius of a receptor)	Minimum setback to closest Wind Turbine per Group			
	102dBA	104 dBA	105 dBA	107 dBA
1-5 within 1km	550m	600m	850m	950m
6-10 within 2km	650m	700m	1000m	1200m
11-25 within 3km	750m	850m	1250m	1500m
Value is the Sound Power Level in dBA re 1 pW, corresponding to the wind turbine operating at 95% of rated electrical power capacity.				

https://ia601508.us.archive.org/3/items/stdprod080767.ome/stdprod080767.pdf)

(The wind turbine proposed for use in North Stormont has a SPL (**sound power level) of 105dBA = a minimum setback of 850m for 1-5 turbines** – yet both "Open House" Presentations used the 550m setback – the wind company representative (June 23, 2015), who claimed he has been involved in setting up wind farms for many years, suggested that's the only set-back he'd ever used.) (For info. on the SPL(sound power level)of the Siemens 3.0-113 go to https://www1.maine.gov/dep/ftp/WindPowerProjectFiles/CantonMountainWind/Third%20alternate%20turbine%20submissions/section_5_noise_ADDENDUM%20Siemens%20SWT%203-113%20Modeling%20Results%20Revised%2005222012.pdf)
(For Comparative Examples of Noise Levels, go to http://www.industrialnoisecontrol.com/comparative-noise-examples.htm - they indicate that a quiet rural area is 30dBA).

Health Canada - Environmental & Workplace Health – Wind Turbine Noise and Health Study: Summary of Results

- Most recently, **in 2012**, a **study** of a number of homes within the vicinity of wind turbine installations was conducted by **Health Canada** using homes **in southwestern Ontario and PEI** (both have a minimum 550m setback), in collaboration **with Statistics Canada** to support a broader evidence base on which **to provide federal advice** and **in acknowledgement of the community health concerns expressed in relation to wind turbines.**

Background:

- The study consisted of 3 primary components -
: an in-person questionnaire, (Statistics Canada gave this to 1 randomly selected participant/household between the ages of 18-79 at varying distances from wind turbine installations)
: collection of objectively measured outcomes assessing hair cortisol, blood pressure and sleep quality,&

: more than 4000 hours of Wind Turbine Noise(WTN) measurements.
(Out **of 2004 potential households sampled**, 1570 were valid dwellings – surprisingly,
434/2004 sites (21.7%) were: vacant (138/434), unoccupied seasonal (during June, July, Aug, Sept? – 107/434), not within the specified age range (over 79 yrs of age- vulnerable pop'n) 96/434), demolished (82/434), under construction or not home (11/434).
338/2004 did not want to participate
1232 households with similar demographics **participated** and of these,
- **110 (8.9%) received personal benefit** from the wind project (were under a "nondisclosure contract" - effectively a "gag order"). The Canadian study seemed slanted in favour of wind, from the outset.

Of the 1232 randomly selected individuals, between 18 & 79 years of age who participated:
- 70/1232 – 5.7% lived within 550 meters (landowners under "contract" are the only group who can live that close to a turbine),
-584/1232 – 47.4% lived between 550m and 999m (40 of these/3.2% would be landowners),
(53% in total lived within 1km of a wind turbine – 8.9% under a non-disclosure contract),
-463/1232 – 37.6% lived between 1km and 1.99km,
-115/1232 – 9.3% lived between 2 km and 10km from a wind turbine
(46.9% in total lived 1km or more from a wind turbine – up to 10km). (Source: Derived from noise estimates for each participant in the Health Canada study that was provided to Health Canada by MG Acoustics. Data was obtained from Health Canada through an Access to Information request.)

- Results indicated that the following were **not found to be associated with *WTNoise exposure*: self-reported sleep disturbance/disorders, self-reported illnesses (e.g. dizziness, tinnitus, headaches, high blood pressure or self-reported stress & quality of life)** – these conditions **were reported but** were **not found to change in relation to WTNoise levels.**

- found to be statistically associated with increasing levels of *WTNoise: annoyance* towards several wind turbine features (i.e. noise, shadow flicker, blinking lights, vibrations, and visual impacts) - increase in noise level was associated with an **increase in the percentage of the community** indicating that they are **"highly annoyed";** community annoyance with WTN begins at a lower sound level and increases more rapidly with increasing WTN. Annoyance is defined as a long-term response (approx. 12months) of being "very or extremely annoyed". The **relationship between noise and community annoyance is stronger than any other self-reported measure**, including complaints & reported sleep disturbance and **annoyance increased with increasing exposure to WTN levels**. In addition:

* **at WTN levels >= 40dBA, 16.5%** (1 in 6) Ontario respondents **were highly annoyed**
(The calculated WTN levels are representative of yearly averages with an uncertainty of about +/- 5dB
* a **statistically significant increase in annoyance** was found when WTN **levels exceeded 35dBA**
* reported **WTN annoyance was statistically higher in summer, outdoors, during the evening or night time**
* WTN **annoyance was statistically related to several self-reported health effects, e.g. blood pressure, migraines, tinnitus, sleep quality**
*WTN **annoyance was statistically related to measured hair cortisol (a well-established biomarker of**

stress), systolic and diastolic blood pressure
* **Community annoyance** was observed to **drop at distances between 1-2km** in Ontario
* WTN annoyance dropped in areas where calculated night time background noise exceeded WTN by 10 dBA or more (traffic, water, industries, etc)
* **Annoyance was significantly lower among the 110 participants who received personal benefit**, however there were other factors that were found to be more strongly associated with annoyance, such as the visual appearance of turbines, concern for physical safety and reporting to be sensitive to noise in general

Health Canada's findings support a potential link between long-term high annoyance and health (as does the World Health Organization) – http://www.who.int/docstore/peh/noise/Comnoise6.htm - Guidelines for Community Noise) (http://www.euro.who.int/_data/assets/pdf_file/0008/136466/e94888.pdf - WHO defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Therefore, a high level of annoyance caused by environmental noise should be considered as one of the environmental health burdens).

-*Infrasound* – was measured over a period of 1 year – infrasound from wind turbines could sometimes be measured at distances up to 10km from wind turbines but was often below background infrasound levels – **infrasound levels were found to decrease with increasing distance from the wind turbine at a rate of 3dB per doubling of distance beyond 1km**, downwind from a turbine – levels of infrasound measured near the base of the turbine were audible by only about 1% of people (Analysis will continue with more results by Health Canada in 2015)

(The **summary findings were valuable**, the expert panel credentials were impressive, but the **Canadian Government denied that the study showed any causal relationship between health issues and wind turbine noise, (**http://www.theglobeandmail.com/news/national/study-finds-no-link-between-wind-turbine-noise-perceived-health-effects/article21484223/Published Thursday, Nov. 06, 2014 4:42PM EST). This result is interesting since **the study's original purpose** was to **provide federal advice** and **in acknowledgement of the community health concerns expressed in relation to wind turbines").** Health Canada subsequently asked for a review of the literature. Well-credentialed researchers – the "Council of Canadian Academies, 2015, Understanding the Evidence: Wind Turbine Noise" reviewed 38 relevant studies and found ... **the "prevalence of adverse health outcomes in Canada could not be answered because of lack of data" (– a common theme in Canada)**. They did report that: "**sound from wind turbines** is **broadband**, (p.xiii), "sound **emissions increase with greater wind speed**... up to turbine's rated speed" (speed at which it generates maximum power) (p.xiv) and, "..**can exhibit periodic amplitude modulation, often describes as a 'swishing' or 'thumping' sound", (which should mean :increase the observed value by 5,** or **35dBA + 5 = 40dBA so wind turbine noise levels should be kept below 35dBA)**.

- For a few of the hundreds of additional sources of information, see: Canadian Family Physician (May 2013) "Adverse health effects of industrial wind turbines" (Jeffrey, Krogh & Horner),

British Medical Journal (2012). "Wind turbine noise".
Canadian Journal of Rural Medicine (2014). "Industrial wind turbines and adverse health effects".

Krogh, C. "Letter to Health Canada – Pamphlet & Preliminary Results", Mar 6, 2015

www.dailymail.co.uk – 30 May, 2015 - ...Gov't gave new powers to block developments... amid new health warnings for those living close to turbines... also expected to crack down on subsidies for onshore farms.... report warning that sleep deprivation, migraines and hearing problems could be just some of the **effects of living within a mile (1.6km) of a wind farm**. By Glen Owen & Brendan Carlin for The Mail.

Some **other setbacks**: Quebec -**750m** to a residence & **2km to a town**, Nova Scotia – **1000m**, Australia-veto right within **2km**, France **4,828.03m**, Scotland **10km**.

The Ontario Government (Environment, Health ministries) is ignoring this evidence. They are still basing the "legal" argument on former Chief Medical Officer of Health, Arlene King's ruling, "there is no direct causal link between wind turbines and adverse health effects." Dr King was subpoenaed to testify in court and the government oversimplified her findings, failing to point out King's own conclusions that there are gaps within the scientific research around how to measure the health impact of turbine noise. Dr. King identified two data gaps in her report," the judge wrote.

One of the data gaps involved "sound measurements at residential areas around wind turbines and comparisons with sound levels around other rural and urban areas, to assess actual ambient noise levels prevalent in Ontario."

The other gap identified by King was making noise level assessments to "mak[e] an informed decision on whether epidemiological studies looking at health outcomes will be useful."
http://www.cbc.ca/news/canada/toronto/top-ontario-official-to-testify-about-wind-power-health-risks-1.1241356 The original 550m setback, established with wind proponent Canadian Wind Energy Association (CanWEA), which represents the wind-power generating industry, still rules in Ontario.

5. Negative Impact on House Prices – not necessarily on farms /farmland

-An Ontario **Case Study** prepared by Ben Lansink of **Lansink Appraisals and Consulting, in 2012** showed a few "dwelling properties" (lot size from ½ to 7 ½ acres – none with a wind turbine erected on it) were **purchased by an energy company** (Canadian Hydro Developments, a wholly owned company by TransAlta) **at competitive rates and resold at diminished values** of: -48.27%, -58.56%, -23.24%,-26.66% and -37.30%. Decreased property value also affects property values in the neighbourhood and municipal taxes generated. (Anyone purchasing the homes had to sign a non-disclosure agreement and promise not to complain about issues in the future (gag order).

-The (current) **Ontario Real Estate Association**'s – Seller Property Information Statement Residential, under Environmental: #3, **asks, "Are there any hydro generating projects planned for the immediate area? eg: Wind Turbines"** - This question would not appear on the form, if it wasn't a consideration.

-(*We are personally aware of a **35 yr old in the Shelbourne area who now owns 2 houses**; **one he can't live/sleep in** (he described the sound as though he was inside a drum) (surrounded by 7 wind turbines within a 1km radius) **and couldn't sell**, and **one further west**, where he now lives with his family. After leaving the Shelbourne house vacant for a number of months, he has been able to rent it to a young family from the neighbourhood.)

-An **August 2013, USA study** "A spatial Hedonic Analysis of the Effects of Wind Energy Facilities on surrounding Property Values in the United States", Ben Hoen, Jason P. Brown,... (downloaded from http://emp.lbl.gov/sites/all/files/lbnl-6362e.pdf), of **50,000 home sales** among 27 counties in 9 states – homes were **within 10 miles (16.1 km)** of 67 wind facilities and **1,198 were within 1mile (1.61km) of a turbine** (not the Ontario 550meter setback). The study **did not include homes within a half mile (800meters) as setback requirements generally result in wind facilities being sited in areas with relatively few houses, limiting available sales transactions for analysis (not so in Ontario).** Based on those set-back distances (beyond 800m up to 16.1km), they found that wind turbines had no appreciable negative effect on property values.

- In December 2014, researchers from the University of Guelph published a study in the *Canadian Journal of Agricultural Economics* that concluded wind turbine developments have no effect on property values of **nearby homes and farms** (Ontario 2015 Renewable Energy Outlook: Regulatory and Policy Developments 04 Feb 2015 By: Graham Erion, Andrew Lord, Sean Tyler). Did the researchers take into account the houses which did not sell? One would not expect the property value of farms to depreciate, especially if they had wind turbines on them.
The 2012-14 Health Canada - Wind Turbine Noise and Health Study revealed that of the 2004 potential households sampled, **434 sites were invalid dwellings** because: **138 were vacant**, **107 were unoccupied**, **82 were demolished**, **11 were not home or under construction (over a 4 month period?**), and 96 were over 79 years old and were not included because of their age: why would people over 79 be discounted and **what would drive a homeowner to abandon their home; their "nest egg" for the future?**

6. Loss of Class 1-3 Prime Agricultural Land in North Stormont Township - see

(www.omafra.gov.on.ca/english/landuse/gis/fitmap/31G3pdf) – only **1 acre of land is "leased**" to the wind company per turbine, but access roads, brace wires, hydro wiring, etc. extend the area affected by wind turbines. Solar has recently made efforts to place "operations" on class 4-7 lands, showing greater recognition for the value of prime agricultural land.
(see IESO response to specific questions from FIT applicants - http://fit.powerauthority.on.ca/program-resources/rules-exhibits-and-forms#priority-points

"In the situation that a Municipality has gone through the Prime Agricultural Area designation process and not designated any areas within the Municipality as Prime Agricultural Areas, the Large Renewable Project is permitted to be proposed in areas covered by the Approved Official Plan (except in Specialty Crop Areas), must not be located on any CLI Class 1 Lands, CLI Class 2 Lands, CLI Class 3 Lands, CLI Organic Lands, or Speciality Crop Areas".

7. **<u>Increase in Hydro Bills</u> - <u>how can we afford winds' supposed "green" energy</u>? The only thing "green" about it is the "Green Energy Credits" (to offset some of our "dirty energy" used? Fracking? Tar Sands?) Who uses/ benefits from the credits??**

- many governments worldwide are promoting vast **wind** farms **to reduce our dependence on fossil fuels** and reduce our output of CO2, encouraging private companies with generous subsidies and regulatory support, requiring utilities to buy from them and **setting up markets for the trade of "green credits" in addition to actual energy**. Energy companies are eagerly investing in wind power, finding the arrangement quite profitable. (A Problem with Wind Power, Eric Rosenbloom – Sept 5, 2006)

– our **hydro rates are going up "40-50%" as a direct result of the (Provincial) Liberal Government's Green Energy Act" quoted from the Frazer Institute** Think Tank in 2012. They estimated green subsidies would add almost $6 billion to household electricity costs and $12 billion to business and industrial costs, transforming Ontario's previous low-cost electricity economic advantage into a crushing competitive millstone. (The Globe and Mail, Aug. 18, 2013)

- "According to OPG's most recent financial statements, it was paid an average of 5.7 cents per kilowatt hour for its power in the first nine months of 2013. But nearly half of Ontario's electricity comes from private sources, which are paid an average of 10 cents per kilowatt hour, according to OPG. That cost is climbing, as expensive wind and solar power is brought into the system, as demanded by Ontario's Green Energy Plan, and natural gas plants that must be built to account for the fickleness of the wind and sun are also brought online. As an unintended consequence, **the province is now generating much more electricity than it needs, and selling the surplus at a loss to its neighbours**. Two years ago, the Auditor-General noted that Ontario had lost $1.8-billion exporting power between 2005 and 2011. The losses appear to have grown since. The Liberal government of Ontario is wearing this energy fiasco around its neck. It promises to get heavier each year. Residential power prices rising by 50 per cent over the next 10 years – as a best-case scenario?" (from: Ontario is tilting at the wrong windmills, The Globe and Mail, Published Wednesday, Dec. 11, 2013 7:45PM EST)

(Go to the IESO website – Ontario Energy Report Q4 2014 – Electricity, to get an idea of the monthly wholesale Electricity prices in cents/kWh). It describes HOEP **(Hourly Ontario Electricity Price)** as the wholesale price of electricity, determined by bids and offers that are settled in the electricity market operated by the IESO. **Global Adjustment** is calculated based on the difference between the HOEP and regulated rates to nuclear and baseload hydroelectrictric generating stations, contracts with IESO for gas-fired facilities, and nuclear refurbishments, and contracted rates paid to existing generators. It also includes the cost of delivering conservation programs and payments made to participants under contracts with the IESO for demand response programs, (including wind). Ontario is already producing excess power on the grid, before adding wind or solar – their contribution is "surplus power".

Expansion of Ontario's dependence on wind turbines as a source of energy is inefficient as wind power is not "dispatch able" power – it is available only when the wind blows, which does not coincide with peak power usage at any time, and definitely not on a regular basis. The Ontario Auditor General's 2011 Annual Report highlighted this significant weakness in developing a green energy system (based on wind). Data in the report indicates that Industrial Wind Turbines operate at a power capacity factor of

28% but have only 11% availability at peak demand due to lower wind output during the summer months. The seasonal fluctuation ranged from <1% on summer days when power demand is high, to 94% on winter days during low demand periods. An inverse relationship was observed between daily average wind output and daily average power demand – an effect referred to as "surplus base-load generation". The intermittent AC power produced by (industrial) wind farms cannot yet be efficiently stored for later use, and the "rated" generating capacity occurs during 100% ideal conditions, i.e. a sustained wind speed over 30mph (12.5m/s). There are few examples of effective and efficient storage of excess electrical grid power, so why produce extra? (See info on the Sir Adam Beck Generating Complex at Niagara Falls, which includes a large pumped-storage hydroelectricity reservoir - The pumped-storage scheme enables more effective use than could otherwise be made of the water that is available for power production under the Niagara Diversion Treaty of 1950. http://www.opg.com/generating-power/hydro/southwest-ontario/Pages/sir-adam-beck-pgs.aspx) Even pumped-storage power systems are only about 75% efficient and have high installation costs, which would add again to the cost of electricity. Why produce wind energy at low-demand times?

Wind power is a costly means of generation as it has to be backed-up (elsewhere in the province – see IESO data) at all times by another dependable/ conventional source of power (nuclear, hydro, gas/oil), to compensate for when the wind doesn't blow. The resulting excess wind power generated being most often exported/sold to Quebec, Manitoba or the States, at an extremely discounted price or turbines being shut down (which carries a price tag, too – see www.WindOntario.ca, below). Wind power also needs a corresponding expansion of the high-voltage and extra-high-voltage grid infrastructure, and expansion of wind power makes the grid more unstable (and more costly).

Wind farms diversify energy supply – they are not a replacement and **they do not reduce costs of other means of energy production: back-up energy must always be available, in case the wind doesn't blow**. Their manufacture, transport & construction increases the use of "dirty energy", e.g. a turbine site's use of concrete for the base (about 3,500cubic yards/turbine), is a major source of CO2 production. Our rural communities are bribed into becoming Industrial Power plants, our governments boast that they are looking beyond fossil fuels (while little real change is made), our electricity bills go up to support "investment in a greener future' and multinational energy companies reap greater profits and fossil and nuclear fuel use continues to grow. (A Problem with Wind Power, Eric Rosenbloom – September 5, 2006.)

Like all enthusiasts for "free, clean, renewable electricity", wind and solar proponents overlook the fatal implications of the **fact** that **wind speeds and sunlight constantly vary**. They are taken in by the wind industry's trick of vastly exaggerating the usefulness of wind farms by talking in terms of their "capacity", hiding the fact that their **actual output will waver between 100 per cent of capacity and zero**. In Britain it averages around 25 per cent; in Germany it is lower, just 17 per cent. http://www.telegraph.co.uk/comment/9559656/Germanys-wind-power-chaos-should-be-a-warning-to-the-UK.html

See below for relevant points from the www.WindOntario.ca website:

- Ontario is spending $11 billion building transmission lines to feed power from every wind project (and blaming the increase in rates on over-paid hydro workers, they're "collateral damage" - therefore justifying the need to privatize).
  That's an additional $2750 cost to each household
- Ontario has too much power and we either, pay the USA & Quebec to get rid of the excess or charge 2.5 per kwh.
  From 2005 to 2012, the loss was $1.8 billion, which cost each household an extra $450.
  In 2013, the loss was $1 billion which will cost your household an additional $250.
  In October 2014 alone, Ontario paid $1 billion over market price for energy resulting in an immediate increase in hydro rates Quebec turns around and sells our hydro at 5 cents per kwh to bordering States.
- When there is too much power, Ontario pays $1 million dollars a day to take a nuclear plant off-line ($66 million in 2013) and pays wind companies to shut down their turbines.
- $6 billion was spent to increase the power at Niagara Falls; only to divert the water when there is excess power.
- Ontario pays gas plants to run as backup for wind power.
- The first weekend in August, Ontario lost $10 million because of highly windy days resulting in unexpected power to the grid.
  The same occurred on November 9 & 10, where Ontario lost another $20 million.
- September 11, 2013: Ontario agreed to pay Wind Energy companies $200,000 per mw <u>not</u> to supply power,
  The government says it's "cheaper than paying the USA & Quebec to use it".
  Since then, new wind projects continue to be approved.
- The plan to build two new nuclear reactors at Darlington was abruptly cancelled in October 2013 at a cost of $180 million.
- During the 2011 election, the Liberals cancelled the construction of 2 gas plants to win Liberal seats.
  These cancellations totaled $1.1 billion which will cost your household an additional $250. (In order to compensate TransCanada and Eastern for cancelling the plants, the government gave each of them a new contract to build a plant elsewhere. TransCanada is now building a plant near Napanee; Eastern is building one in Lambton County, near Sarnia. The electricity will have to be piped from those locations to the Toronto suburbs, where the power is needed.)
- The Lambton coal plant had just been upgraded at a cost of $1 billion to produce clean coal before it was closed in October 2013.
  That will cost your household another $250.
  Ironically, the Lambton coal plant is 1 km from a coal plant in Michigan that is still active.

8. Decommissioning Costs – who will pay?

- Wind turbines have a life span of 20 years. Who will pay to decommission them at the end of the 20 year contract? Taxpayers again? The landowner who leased the land? The "Wind Companies", who change on a frequent basis? Decommissioning costs are estimated from between $30,000 and $300,000 each at today's prices – who will pay the liability insurance in case of injury?

Each turbine construction consists of approximately 800 tonnes of cement for support, approximately 250 tonnes of unrecyclable materials, approx. 700 litres of hydraulic fluid and 600 kilograms of rare

earth metals (www.windOntario.ca). Multiply these numbers by the total number of wind turbines and **Ontario is facing a potential ecological conundrum, 20 years down the road to "green energy".**

(see **http://ottawawindconcerns.com/2014/10/14/how-much-does-it-cost-to-demolish-a-wind-turbine/**) The wind power company ProWind, properly "Prowind," which set up the 10 turbine, 30MW Brinston project in South Dundas, does not own the Brinston project, and hasn't for several years. It is now owned by EDP Renewables.
In the original negotiations with Prowind, the developer wanted the landowners and the municipality to be responsible for decommissioning costs. It was the local community group that brought these costs to the attention of the municipality, and played a significant role in the agreement now in place. For the 10 three-megawatt wind turbines at Brinston, the power company ProWind pays $1,000 per megawatt per year over the next 20 years into an escrow account that will rack up $600,000 to pay for decommissioning.
Many landowners were told that it was to their benefit to decommission the turbines themselves as there is so much scrap value in the turbines; this is untrue due to the quality of metal being used, and also the other costs of decommissioning such as crane rental, and disposal of the toxic components.

http://www.protectrichfield.com/documents/Decommissioning%20Estimate%20for%20Ridgeline%20Energy%20Monticello%20Hills%20Project.pdf, gives an example of a complete breakdown of costs at 2011 USA prices and arrived at an estimate of: Total estimate to decommission one turbine $ 170,714. (See the complete article for details.)

See the article below for some items to consider when determining decommissioning costs: it seems a lot more complicated than just selling off the scrap metal for recycling to recoup costs!

(http://www.solventoenergy.com/en/wind-energy/decommissioning-of-wind-farms/)

DECOMMISSIONING OF WIND FARMS

- Prior procedures:
  - Notification to the competent administration
  - Writing a plan for decommissioning and restoration of affected areas
  - Analysis of the current status of the affected area
  - Calculation of the residual value of the elements of the park at an economical level
- The process of dismantling
  - Network disconnection
  - Extraction of the tower wiring, control and power cabinets, transformer, distribution pole, etc.
  - Management of hazardous waste (mineral oils, transformer and batteries fluids…)
  - Contribution of cranes and heavy loads lifts
  - Complete electrical and mechanical dismantling of the wind turbine
  - Foundation dismantling
  - Evacuation elements and aerial and land wiring withdrawal
  - Removal of transformers and control centres
- Management of hazardous waste:
  - Making Inventory of hazardous waste
  - Management through a licensed and registered manager
- Restoration of property:

- Leveling the ground
- Reforestation
- Soil decontamination
- Refurbishing and recycling of decommissioning materials

Appendix A: from an American perspective

http://www.aweo.org/primer.html

Wind Energy Primer (draft)

By Eric Rosenbloom (USA)

1. How a large wind turbine works

Wind turbines catch the movement of the wind with large wing-like blades to turn a rotor shaft which – not getting needlessly technical – spins magnets to generate alternating current (AC) in wire coils.

Usually, three blades (each currently about 50 yards long) are mounted on a hub that connects them to the rotor shaft. The blades work like airplane wings and can be pitched to modulate how much they are moved by the wind. This is done to maintain a steady rate of rotation through the range of wind speeds in which the turbine is active. A steady rotation rate is necessary to generate electricity that matches the wave frequency of the grid.

The hub is attached to one end of the "nacelle" – the housing for the gearbox and generator. When the wind is blowing adequately, the 100-ton blade and nacelle assembly is turned by motors to face it.

The rotation rate of the rotor blades is increased several times by a large gearbox – which requires hundreds of gallons of cooling and lubricating oils – to create a much faster spinning rate in the generator.

The generator requires power from the grid to work (if there's a power outage, the wind turbines are out, too, unless they have on-site backup power). As the wind rises toward the "cut-in" speed at which the turbine begins to operate, the generator works as a motor to start the blades spinning. As the wind speed continues to rise, the torque from the blades allows electricity to be produced (pushed *out* by the generator) rather than consumed (pushed *in* by the grid).

The cut-in wind speed is typically 7-9 mph. The amount of electricity generated increases as the wind rises in a cubic relation to the wind speed (i.e., increasing eight times with every doubling of wind speed): from none at the cut-in speed to full capacity at the "rated" wind speed, which is typically 25-35 mph.

When the wind reaches a speed of, typically, 55 mph, the blades are "feathered" and may also be braked to prevent damage, and the turbine shuts down. This is the "cut-out" wind speed. The blades are not repitched to catch the wind until the wind drops to a speed of, typically, 45 mph, which is called the "cut-back-in" speed.

2. Electricity and the grid

In electricity, **energy is power times time.** Thus, a megawatt (MW) is a measure of power, or the rate of producing or using energy, and a megawatt-hour (MWh) is a measure of energy, representing 1 megawatt of power produced or used for 1 hour. For example, a 100-watt lightbulb burning for 10 hours would use 10 × 100, or 1,000 watt-hours of energy, which is 1 kilowatt-hour. Kilowatt-hours (kWh) are familiar as the unit used in your electric bill. The "kilo" prefix means "thousand"; "mega" (M) means "million"; 1 MWh equals 1,000 kWh equals 1,000,000 watt-hours.

If it were to operate at full capacity for all 8,760 hours of a calendar year, a 1-MW generator would produce 8,760 MWh of energy over the year. The actual amount it produces is called its *load capacity*, or *capacity factor*, which is expressed as a percentage of its rated capacity.

Thus if a generator were shut down for maintenance 10% of the time, its load capacity would be 90% and it would produce 7,884 MWh of energy annually per MW of rated, or installed, capacity. If it is a generator that is used only when very high levels of electricity are needed, it may be operated only 30% of the time. In which case it would produce 2,628 MWh annually per MW installed capacity.

Wind turbines are unable to respond to customer demand, their output depending on and varying in response to the wind. As a result, their average output over a year, their load capacity, may be anywhere between 10% and 40%, depending on the site. In North America, it ranges from 20-25% in the northeast to 30-40% in the great plains.

Because not all generators will be available all of the time, because generators or substations may be subject to catastrophic outages, and because of the high variability

of demand, the grid includes a substantial amount of “excess” capacity to guarantee reliability, some of it operating in “spinning standby” mode. In the U.S. the total installed capacity is about two times the average electricity demand (or *load*). On most systems, the excess capacity is 20-30% higher than *peak* demand.

In 2002, the U.S. used a total of 3.66 billion MWh of electricity. That represented an *average* load, or rate of production and consumption of almost 418,000 MW and an annual per-capita use of 12,600 KWh. The load varies from a low base in the wee hours of the morning to very high peaks during weekdays, especially in the summer. Managers of the electric grid dispatch different power plants to provide base, intermediate, and peak loads as customer demand varies through the day.

3. How wind energy works on the electric grid

Because the electricity generated by wind turbines varies with the wind speed and cannot be called up when needed, it is not like other sources of energy on the grid. It cannot provide peak energy unless by chance the wind is up at the same time demand rises, and it cannot provide base load because it is not steady.

For this reason, wind energy does not reduce the need for other sources to supply reliable energy as needed.

Wind is more like a large customer, varying its burden on the grid in a significantly unpredictable way.

When the wind rises and the turbines turn, the grid is usually required to accept that incoming energy. To maintain the balance between supply and demand, the grid must therefore reduce the energy production from another source. In theory, this is how wind energy would reduce greenhouse gas emissions and pollution: by allowing fossil fuel–fired generators to be used less. In practice, however, it isn’t so simple.

If the amount of wind energy entering the system is within certain tolerances, the grid manager may simply allow the voltage on the system to rise slightly. Or if the grid has hydro power, that is the likely source to be cut off by wind. Obviously, neither of these options would reduce fossil fuel use.

Only with much more wind on the system might it become necessary to reduce production from fossil fuel–fired plants. But that comes at a cost, because running such plants at lower capacity reduces their efficiency, requiring more fuel per

megawatt-hour and burning it with more emissions. More frequent “ramping” or switching off and on also requires more fuel. It is like your car’s gas mileage in stop-and-go city traffic versus on the highway.

In addition, thermal plants that use steam to turn turbines can take hours to warm up. They can’t be switched off if they might be needed again soon, which is always the case with wind, since it fluctuates minute to minute. So they are simply taken off line in terms of energy generation but continue to burn fuel to remain on standby.

In other words, the effect that wind energy on the grid has on fossil fuel emissions is not at all straightforward. It may not affect fossil fuel–fired plants at all, plants may continue to burn fuel while on standby, and added inefficiencies may cancel much of the potential savings.

A further aspect of wind energy on the grid is the burden on transmission. As an intermittent source whose output varies with the wind speed, a wind facility’s average annual output will be only 20-40% of its nameplate capacity. And even though three-fifths of the time the output will be less than its average, occasionally the output will be near capacity. Besides new transmission lines to connect the facility, the existing grid often has to be upgraded to handle those occasional surges of wind-generated power. Alternatively, many utilities around the world limit the amount of wind capacity they will allow, or they reserve the ability to turn the wind turbines off when the lines are too full.

4. Adverse impacts of industrial wind energy

These include noise and vibration disturbance of wildlife; fragmentation and degradation of habitat; danger to birds, bats, and insects from the blades and their pressure vortices; water table and runoff problems from the foundations, clearance, and roads; noise and visual disturbance of human neighbors (from loss of enjoyment of one’s property to loss of sleep and in many cases serious health effects); shadow flicker; strobe lights; devalued property; destruction of rural and wild vistas; loss of recreational areas and wild refuge; interference with wireless communications; danger to small planes and helicopters; fire hazard; and so on.

5. Drivers of wind energy development

First, wind energy provides tax avoidance in the United States through the 10-year federal production tax credit (which was 2.2 cents per kWh for facilities connected in 2012) and 5-year double-declining accelerated depreciation. These provide two-thirds of the capital value of an industrial wind turbine. State subsidies may provide another 10% of the cost with grants and tax breaks.

This taxpayer support allows the wind company to sell the energy to utilities at a competitive price.

In addition to selling the actual energy, the company may then sell an "equivalent" amount of renewable energy credits (RECs, or green tags) with which people can claim the alleged environmental benefit of or satisfy the obligation to buy wind energy even though everyone on the grid – or even on another grid – in fact used it equally.

The obligation to buy wind energy is enacted by legislators with renewable portfolio standards (RPSs), renewable energy standards (RESs), renewables obligations, and the like. Most of such requirements that a certain amount or percentage of electricity be obtained from renewable sources actually favor wind. For example, they usually don't count large or pre-existing hydro, and some of them even specify a certain amount of new wind. Thus, utilities are forced to buy into big wind whether or not it is practical or affordable for them, whether or not it means building new conventional plants to back it up or new remote high-capacity transmission lines.

All of these schemes guarantee markets and large profits for developers.

6. Social aspects of wind energy development

When people are talking about changing the way we harness and use energy, industrial wind instead entrenches a centralized and inefficient system. When people are talking about reducing the burning of fossil fuels, industrial wind entrenches the grid's dependence on them. When people are talking about moderating the corporate control of society, industrial wind entrenches the worst of predatory and crony capitalism that works to move more public money into private hands, transferring the common wealth of the many into the pockets of a few without regard for human, societal, or environmental cost. Big wind operates much like — and is often firmly embedded in — the military-industrial-banking complex subverting democracy and fairness by making politics a stepping stone to private riches, with the frisson of riding

a wave of green-technology utopianism. Only those who have sworn allegiance to their program are citizens of their country. The rest of us are only resources to exploit and barriers to overcome.