# Comments submitted to: Utility regulators public workshop on implementation of Washington's 100% clean electricity law < E2SSB 5116, the Washington Clean Energy Transformation Act (CETA)>

July 30, 2019 David Boleneus[1]

- **CONCLUSION: 100 % RENEWABLE ENERGY IS UNREALISTIC GOAL AND WASTE OF RESOURCES DUE TO ITS MANY UNRESOLVABLE CHARACTERISTICS. These characteristics are not problems, but fatal flaws.**
- **ALL FORMS OF RENEWABLE ENERGY SHOULD BE REJECTED AS A METHOD TO PROVIDE ELECTRICITY.**
- **RENEWABLES CANNOT PROVIDE ELECTRICITY TO A MODERN SOCIETY AND HAVE NEVER BEEN REMOTELY SUCCESSFUL, EVEN THOUGH ATTEMPTED IN VARIOUS COUNTRIES (CANADA, AUSTRALIA, EUROPE) FOR MORE THAN 10 YEARS.**
- **FOR WASHINGTON TO BELIEVE IT CAN HAPPEN IN THIS STATE IS FUTILE AND REASONING TO ACHIEVE RENEWABLE ENERGY IN ABSENCE OF REAL ENERGY IS FLAWED.**
- **WASHINGTON SHOULD END ITS ATTEMPT AT "RENEWABLES" BEFORE RENEWABLES ENDS WASHINGTON.**

➢ **TOPICS TO ADDRESS IF TIME PERMITS→WASHINGTON STATE MUST ADDRESS THE FOLLOWING:**

- PRIOR TO ADDRESSING PLANNING, PURCHASING AND COMMISSION RATEMAKING POLICY, THE COMMISSION MUST ADDRESS ISSUES OF A GREATER IMPORTANCE*:*
  (1)WHAT STATE AGENCY, THE WUTC OR OTHERWISE WILL BE HELD RESPONSIBLE FOR UTILITY CUSTOMER SUFFERING AND DEATH DUE TO LACK OF ELECTRIC OR HEATING SUPPLY AND PUBLIC SERVICES DURING PERIODS OF PROLONGED BLACKOUT CONDITIONS THAT COINCIDE WITH WINTERTIME OR OTHER ADVERSE WEATHER CONDITIONS KNOWN TO THREATEN HUMAN LIFE?
  (2)WHAT NUMBER OF CUSTOMERS MUST RECEIVE STATE SUPPORT TO AVOID EXPERIENCE OF LIFE-THREATENING CONDITIONS WHEN ELECTRIC POWER IS UNAVAILABLE?
  (3)WHAT WILL BE THE COST IN DOLLAR TERMS AND HUMAN LIFE TO ATTEMPT 100% GREENHOUSE GAS-FREE (0% NATURAL GAS CAPACITY) SCENARIO?
  (4)DURING PERIODS OF BLACKOUT CONDITIONS HOW WILL MEDICAL FACILTIES, POLICE, FIRE, AND PUBLIC WATER, AND SEWERAGE SYSTEMS OPERATE?
  (5)HOW WILL FOOD SUPPLY, HEATING, REFRIGERATION OPERATE DURING PROLONGED PERIODS OF BLACKOUT CONDITIONS?
- THE TWO OBJECTIVES OF (1) 100 PERCENT RENEWABLE ENERGY AND (2) FULL-TIME ELECTRIC SUPPLY ARE IN CONFLICT BECAUSE BOTH CANNOT BE OBTAINED SIMULTANEOUSLY OR CONTINUOUSLY. THE WUTC IS RESPONSIBLE

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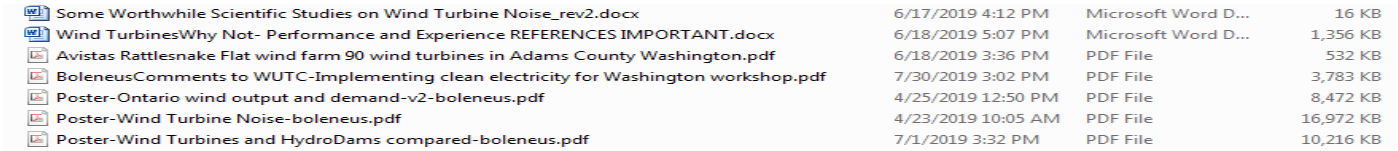
TO GUARANTEE THAT 100 PERCENT RENEWABLE CAN BE ACHIEVED AT AFFORDABLE COST AND WITHOUT LOSS OF POWER BEFORE APPROVING A PLAN, OTHERWISE THE PLAN MUST BE REJECTED.

- A 100 PERCENT RENEWABLE GOAL IS A FANTASY OBJECTIVE WHICH LACKS REASONABLENESS AND PROMOTED WITHOUT EVIDENCE OF OR COST OR PROOF IT IS ATTAINABLE, AS IT IS AN IMAGINED OBJECTIVE THAT HAS NEVER BEEN ACHIEVED AT ANY LOCATION OR PROVEN POSSIBLE EXCEPT IN GOV. INSLEE'S BOOK "APOLLO'S FIRE" WHICH RELIES ON 29 LIES OR MISTRUTHS TO FALSELY PROMOTE SUCH.
- THE LEGISLATURE HAS SHOWN ITS CONTEMPT AND DISREGARD FOR THE PUBLIC WHILE SIMULTANEOUSLY DISPLAYING IN CLEAR VIEW ITS LACK OF INTELLIGENCE AND FULL ABSENCE OF CRITICAL THINKING BY EMBARKING ON A PLAN WHICH IS UNACHIEVABLE AND PROVEN AS UNACHIEVABLE WHERE ATTEMPTED ELSEWHERE IN GERMANY, ONTARIO AND AUSTRALIA

➢ Topics addressed below (in red font)

- AVISTA DOCUMENTS SAY THAT A 100 PERCENT RENEWABLE CLEAN ENERGY OBJECTIVE CANNOT BE MET WITHOUT ELECTRICITY BLACKOUT (CURTAILMENT). OBTAINING A SUPPLY OF ELECTRICITY FROM 100 PERCENT RENEWABLE FORMS OF ELECTRICITY PRODUCTION IS AN UNTENABLE OBJECTIVE, AN IMPOSSIBLE GOAL WITHOUT SUBJECTING ELECTRIC CUSTOMERS TO LONG-PERIOD BLACKOUTS OF ELECTRIC POWER.
- CUSTOMER UTILITY BILLS WILL BE UNAFFORDABLE AND BEYOND CAPACITYOF CUSTOMERS TO PAY IF THE STATE REQUIRES POWER BE SUPPLIED MOSTLY BY RENEWABLE FORMS OF ENERGY. AS A RESULT MANY CUSTOMERS WILL BE DISCONNECTED FROM POWER FORCING FORMER CUSTOMERS INTO PRECARIOUS LIFE OR DEATH SITUATIONS WITHOUT ELECTRICITY NORMALLY SUPPLIED BY UTILITY COMPANIES. ATTEMPTING TO REACH 100 PERCENT RENEWABLE SOURCES WILL SUBJECT ELECTRIC CUSTOMERS TO EXTREMELY HIGH COST, ECONOMIC HARDSHIP AND POSSIBLE DEATH TO LOW-WAGE INCOME EARNERS AS SHOWN ELSEWHERE.
- OUTLAY OF WIND TURBINES ON A WIDE SCALE POSES A HEALTH DANGER TO THE PUBLIC, IN PARTICULAR TO PEOPLE RESIDING WITHIN 10 MILES OF A WIND TURBINE DUE TO INFRASOUND AND LOW FREQUENCY NOISE GENERATED BY TURBINES.
- THE PROJECTED COST TO BUILD A SYSTEM OF WIND TURBINES TO GENERATE ELECTRICITY FOR WASHINGTON IS ESTIMATED AT $4 TRILLION BUT SUCH A SYSTEM CANNOT PRODUCE A FULL-TIME SUPPLY.
- A SYSTEM OF NUCLEAR PLANTS SUFFICIENT TO POWER THE ELECTRIC NEEDS OF THE ENTIRE UNITED STATES FOR LESS COST THAN THE ESTIMATED COST OF A WIND TURBINE SYSTEM FOR THE STATE OF WASHINGTON
- MINERAL SUPPLIES TO BUILD A RENEWABLE SYSTEM ARE NOT AVAILABLE FOR WASHINGTON WITHOUT RELAXING ENVIRONMENTAL STANDARDS TO ENABLE OPENING OF NEW MINES IN THIS STATE.
- A POWER SYSTEM THAT MIMICS THE "GREEN NEW DEAL" EXHIBITS IS SO FLAWED AS TO BE USELESS AS A POWER SYSTEM AND UNABLE TO PROVIDE SERVICE TO THE PUBLIC
- PROJECTION OF LEVELIZED COST OF WIND TURBINE ELECTRICITY IGNORES MANY REALITIES THAT RENDER IT AS AN UNRELIABLE SOURCE
- THE HUMAN FACE OF ENERGY POVERTY
- LESSON FOR WASHINGTON: ALL THE WORLD (where attempted) REJECTS WIND ENERGY.

Attachments or documents (perhaps sent via separate email due to size or other limits):



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| Wind TurbinesWhy Not- Performance and Experience REFERENCES IMPORTANT.docx | 6/18/2019 5:07 PM | Microsoft Word D... | 1,356 KB |
| Avistas Rattlesnake Flat wind farm 90 wind turbines in Adams County Washington.pdf | 6/18/2019 3:36 PM | PDF File | 532 KB |
| BoleneusComments to WUTC-Implementing clean electricity for Washington workshop.pdf | 7/30/2019 3:02 PM | PDF File | 3,783 KB |
| Poster-Ontario wind output and demand-v2-boleneus.pdf | 4/25/2019 12:50 PM | PDF File | 8,472 KB |
| Poster-Wind Turbine Noise-boleneus.pdf | 4/23/2019 10:05 AM | PDF File | 16,972 KB |
| Poster-Wind Turbines and HydroDams compared-boleneus.pdf | 7/1/2019 3:32 PM | PDF File | 10,216 KB |

- **PROJECTION OF LEVELIZED COST OF WIND TURBINE ELECTRICITY IGNORES MANY REALITIES THAT RENDER IT AS AN UNRELIABLE SOURCE.**

**Electric production from wind turbines is promoted as affordable on basis of levelized cost, but this cost estimate ignores and does not address many shortcomings learned by experience from use of wind turbines at other locations. Issues. Issues include: 80% backup source; excess unusable electricity is costly; costs not anticipated require super-surcharges to customers; mismatch of demand to electric production from wind adds cost; renewable advocates hope to remove hydroelectric dams; use of hydroelectric supply by wind may threaten recovery of salmon fishery**

Belief that we approach an accurate reporting of cost of wind turbine electricity through levelized cost, although important, still misleads and misses many unaddressed problems and such issues remain unaddressed by levelized cost. Several serious performance problems remain as experience reveals from Ontario's, Germany's and other experiences. First, wind turbines always require a backup source of power when they are not operating ("vacationing") or produce at a low level. This backup source (coal, nuclear, natural gas or hydro) by those knowledgeable say it must be 80% of the wind turbines' (the wind farms) capacity. This adds a large cost. The need is because of the intermittency problem cannot be overcome. An obvious question: Why two power systems when one full-time system will do?

Second, when the turbines are producing too much electricity, as Ontario experiences, the excess electricity cannot be sold, because production exceeds demand making the electric unusable even through interties to US and Canada, a second additional cost. A report by Brouilette (Ontario's high cost wind millstone) says the additional cost of unsalable electricity is $1.4 billion because 65% of the wind electricity must be wasted. Adding wind turbines only worsens the problem by increasing the proportion of excess power, and with it exacerbates the problem and adds cost of unused, unsalable electricity. ParkerGallantEnergyPerspectives (Ontario) reports that the real cost of wind electricity in 2018 is $0.44 per kwh with this cost confirmed by electric power cost index data from Ontario (STATCAN). The former liberal Ontario gov't. who closed all of the coal plants to rely on wind rationalized this high cost of unsalable electricity by charging customers a Global Adjustment Fee, a super-surcharge, on their monthly electric bills with this fee sometimes exceeding 80% of the invoiced amount which caused Ontario's per kwhr-equivalent cost to rise to $0.36 in 2016 (EP_EnergyProbe).

The cause that no Ontario government official predicted (although known by power experts that gov't ignored) is that that demand and wind generation are a mismatch. In Ontario, the wind electricity far exceeds demand in the spring and late fall. In Washington-Oregon wind turbine system the turbines are "still" for several 7 to 15 day periods at a time during the 5 month-long winter high-demand heating periods because the entire region is subjected to repeat high pressure systems when none of the 3700 turbines operate, but "vacationing". In Germany the wind generation exceeds demand during the wintertime but are still during the air-conditioning season. Denmark also must export part , but not all of its excess wind electricity.

A third problem here in Washington state is that the environmental advocates hope to remove hydroelectric dams in belief that the wind turbine electricity can easily replace the power from the dams, especially the 4 dams on the Snake River. Washington's governor Inslee, a battler of climate change, and pres. candidate (who wrote a climate book choked with errors and mis-statements) is promoting removing dams, but dams are a lifeblood of commerce as each important for both up- and down-river transport of goods, fuel and agric. products (as for grain transport for my farm) for several states and 7 dams on the Columbia-Snake R. system were purpose-built for flood control to avoid the loss of life when the rivers flood. A quick examination of the wind turbines output of the entire Washington-Oregon system on a month-

by-month basis averaged for 2014 through 2018 found the entire wind system underperformed the output of the 4 Snake River dams for 26 to 30 days per month or 167 days of the 182 day January-June period examined even though the wind turbines capacity (4,782 MW) is 37% larger than the capacity of the 4 hydroelectric dams (3,489 MW). (Illustration 1)

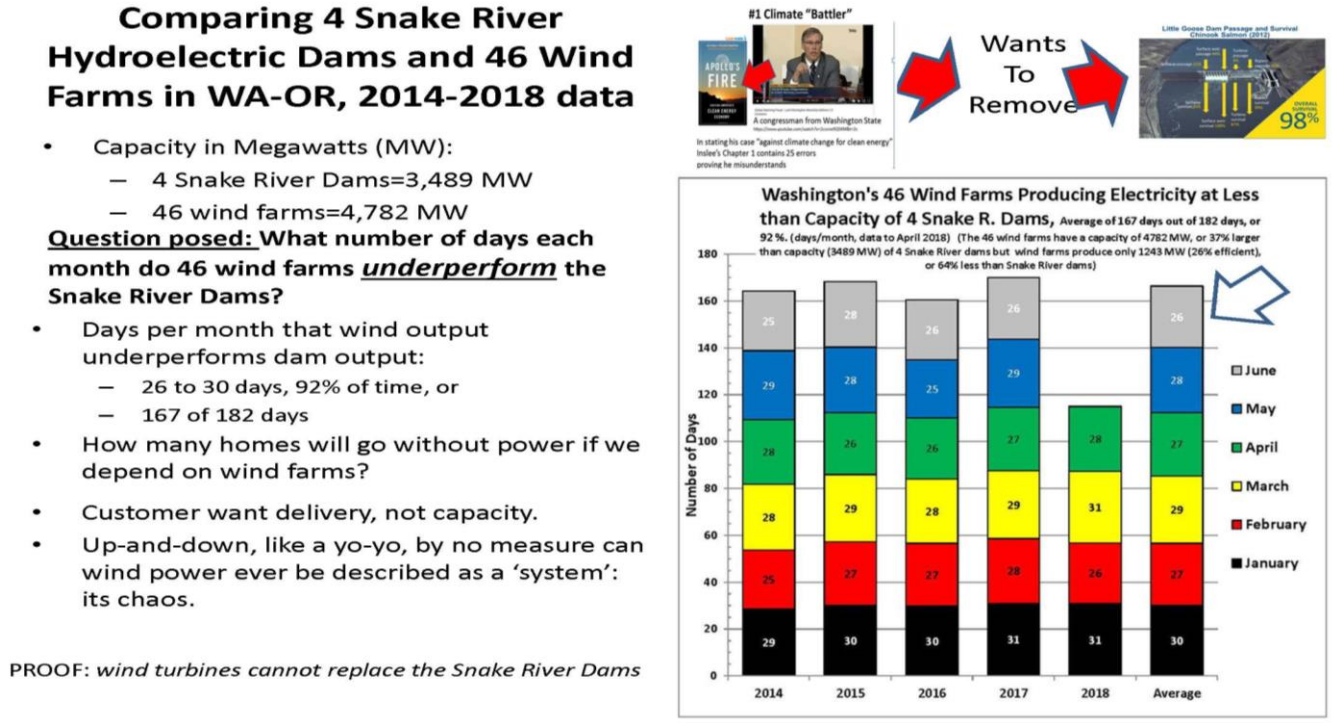


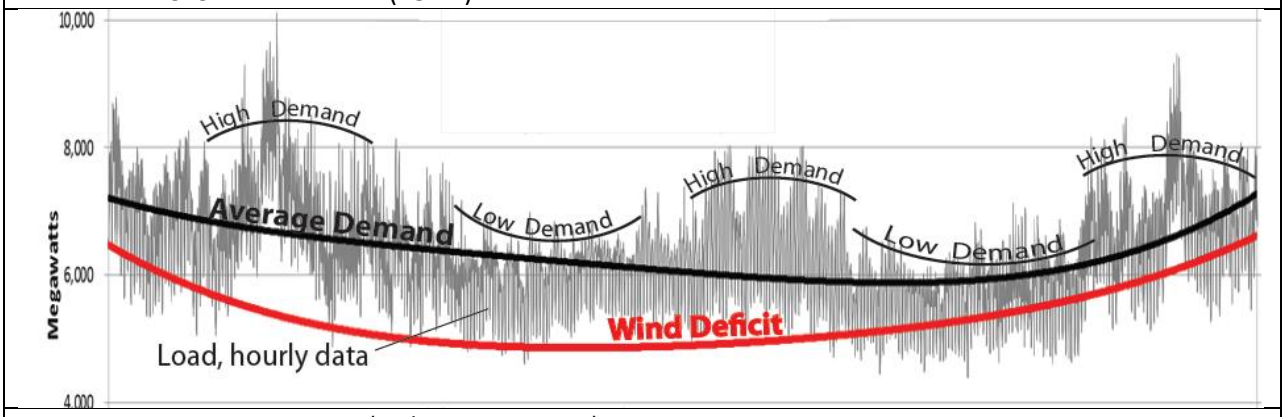

**Illustration 1** shows the "underperformance" of the wind turbines in the Washington-Oregon region of the U.S. by comparing output of wind turbines to the output of four hydroelectric dams on the Snake River. A question is posed on the left: What number of days per month do 46 wind farms underperform the Snake River dams? Answer: The answer is the wind turbines underperform 26 to 30 days per year. **Chart** (right) shows that on average for 26 to 30 days per month during the January-June periods for 2014-2018 that wind turbine system of 46 wind farms in Washington and Oregon underperform the output of the four hydroelectric dams along the Snake River.

Further, on examining the wind turbine output for all of 2018 I found the entire system produced at less than 5% of capacity for 3,092 hours (129 days) of 8,759 hours in 2018. (Illustration 2) The wind turbine system production was less than 1.25% of its capacity for 67 days during 2018 and the entire wind system exceeded 80% of its capacity only 4% of the time. I have produced a poster to explain some of this which I will freely share. Wind generation in the northwest region during the August through January (or September through February) period is highly unproductive. A similar comparison shows that wind turbines produced at less than 10% of capacity from 9 to 21 days per month during the January to June period when averaged over the 2014 to 2018 period.

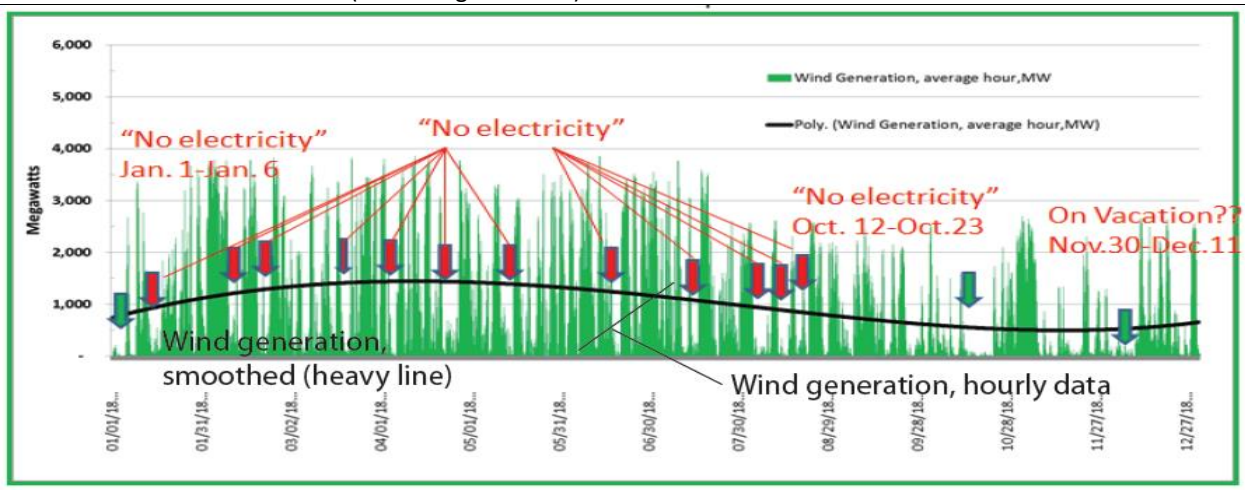
Illustration 3 more clearly displays on a daily/hourly basis of a 7 day record from BPA of load and electric generation from four sources (nuclear, fossil, bio, wind, hydro) for Feb. 6 to Feb 12, 2019 how inadequate is wind generation on the BPA system.. Most notable is the lack of generation from wind on the first three of the seven days, and second that the wind generation never reaches a 50% level of capacity (red line at 2764 MW=100%). For three days the wind farms are on vacation. Even though wind turbines are advertised at power sufficient to serve 3.8 million customers but on these three days approximately 3.7 million customers are not being served the electricity promised. A similar conclusion can

be said for illustration 2 (D): ….For 129 days in 2018 approx. 3.7 million customers (of 3.8 million customers) are not provided the electricity promised; and ….For 265 days during the 1/1/2013 to 2/10/2015 period 3.7 million customers (of 3.8 million customers) are not provided the electricity promised.

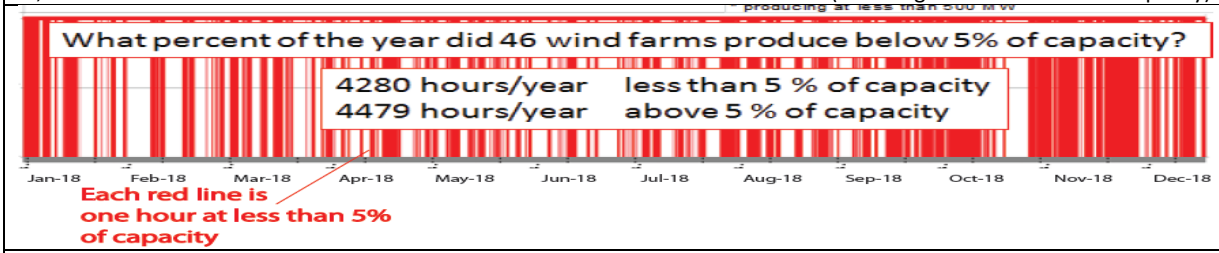
A. BPA SYSTEM DEMAND (LOAD)




B. WIND TURBINE GENERATION (and non-generation) RECORD IN 2018 FROM 46 WIND FARMS ON BPA SYSTEM




C., HOURS DURING 2018 THAT WIND TURBINES ARE NOT PRODUCING ELECTRICITY (electric generation at <5% of capacity)




D. DAYS WIND FARMS PRODUCED AT LESS THAN 5% OF CAPACITY FOR 129 DAYS IN 2018 and 265 DAYS DURING THE 1/1/2013 TO 2/10/2015 PERIOD

| TURBINE FARMS (IN BPA CONTROL AREA) | |
|---|---|
| | Number of days with efficiency less than 5% * |
| January | 11.9 |
| February | 4.3 |
| March | 8.0 |
| April | 7.0 |
| May | 8.4 |
| June | 5.9 |
| July | 7.8 |
| August | 13.5 |
| September | 11.6 |
| October | 18.8 |
| November | 15.7 |
| December | 16.0 |
| **Total, days** | **129** |

* producing at less than 203 MW

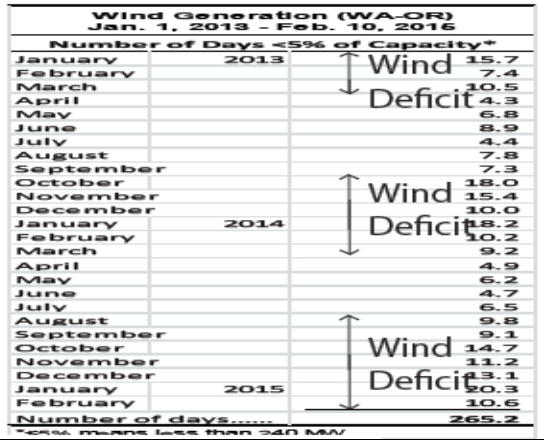



**Illustration 2** compares wind generation, load (customer demand) and wind deficit on hourly basis for 8.759 hours during 2018 on Bonneville Power Administration system (data courtesy of BPA).

A. shows system demand (thin black vertical bars) for high and low demand periods on hourly basis throughout 2018. Thick black line is best fit polyline. Thick red curve is wind deficit, defined as wind generation subtracted from load (demand).

B. shows wind generation record of electricity from 46 wind farms, about 3,700 turbines. Red and green arrows show periods of no electric generation. Thick black line shows polynomial best fit to electric generation. Note several period of non-production. The best-fit polyline represents increase or decrease in hours of wind production (Note: on right, best-fit line is low during winter months indicating low level of production during wintertime) (Note: on left, best fit line shows fewer hours at less than 5% of capacity during late spring to early summer time when production is higher)

C. shows non-productive wind generation hours (vertical thin red bars) on an hourly basis for 8,759 hours during 2018 on the BPA system. Each red line is one hour at less than 5% of capacity. Each thin red bar indicates one hour, 3,092 hours in total, that system-wide wind generation of 46 wind farms on the BPA-wide system (of ~3700 wind turbines) produced at less than 5% of capacity.

**D. Table-RIGHT** (Turbine Farms in BPA control area) shows number of days per month in 2018 that 46 wind farms (all farms combined) produced electricity at less than 5% of capacity (efficiency). Note that period August through January, wind farms are particularly non-productive with non-productive days averaging 14.6 days per month at less than 5% of capacity. Wind turbines did not produce at a level exceeding 5% of capacity for 129 days in 2018. Table-LEFT (Turbine farms in BPA control area) shows wind deficit periods in 2013 to 2015 range from 7 days to 20 days per month that wind generation is less than 5% of capacity

A final problem never admitted by those who favor renewable wind is that the wind turbines take advantage of Washington's ample supply of hydroelectric water supply from hydroelectric reservoirs to fill-in (backup) for wind turbines during their regular times that wind turbines vacation. Many observers of this phenomenon ask if the need for backup from hydro required by wind turbines poses a risk to or diminishes the recovery of salmon fisheries, a huge public issue in the NW being addressed by the US Army Corps of Engineers, and a shallow argument so often used by promoters of renewable energy as reason to remove dams, so the river can "run free". Perhaps this is a bit or irony and lying, rhetorically. It's an unanswered question.

**EX.2. A 7-day Record of Load and Supply (Feb. 6 - Feb. 12, 2019)**

- Question: Why no wind electric generation for first three days of period (Feb. 6-Feb. 8)?

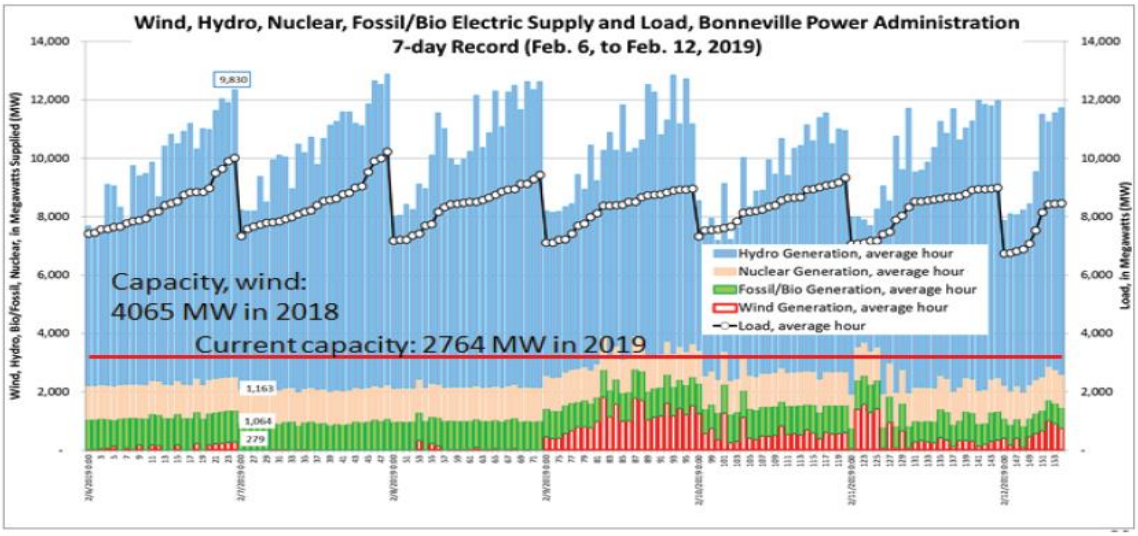



**Illustration 3**. Seven-day record of load and electric generation from all sources, nuclear, fossil-bio, hydro and wind. Note the general lack of wind generation on the first three days of the period (red bars). The horizontal line is 100% capacity of wind generation. Note that all other power sources are operating, except wind.

Comments: Workshop on implementing Washington's 100% clean electricity – Boleneus, D.

- **AVISTA DOCUMENTS SAY THAT AN 80 PERCENT RENEWABLE CLEAN ENERGY OBJECTIVE CANNOT BE MET WITHOUT CUSTOMERS EXPERIENCING ELECTRICITY BLACKOUTS (CURTAILMENT). OBTAINING A SUPPLY OF ELECTRICITY FROM 100 PERCENT RENEWABLE FORMS OF ELECTRICITY PRODUCTION IS AN UNTENABLE OBJECTIVE, AN IMPOSSIBLE GOAL WITHOUT SUBJECTING ELECTRIC CUSTOMERS TO LONG-PERIOD BLACKOUTS OF ELECTRIC POWER.**

Avista Utilities planning documents clearly show that customers should plan on electricity blackout for a substantial period. These blackouts will more pronounced during late summer, fall and winter time months, from August to February when wind production has already been shown to be at a low level of production (Illus. 1, 2, 3). The legislature has provided Avista with a *Mission Impossible* of the utility must (1) reduce greenhouse gases by 80% and (2) be unable to use natural gas (without gas) as a fuel. The diagram illustrates a typical 10 days cold period in January. *Without gas the system is energy deficient during prolonged stretches of low wind and low solar production (Avista, April 16, 2019)* During the period customer loads will lead to electricity shortages, blackouts. (Illustration 4). In rural areas of eastern Washington, low temperatures (at 17 percentile) during the December to mid-February period average below minus 8°C

If utilities are required to provide electricity without use of fossil fuels and without carbon emissions, then curtailments (electricity blackouts) will occur 50% of the time (Illustration 5). Doubtlessly, blackouts are imminent under such greenhouse gas (GHG)-free conditions when use of fossil fuels is banned. Under 80% GHG free conditions the cost of carbon dioxide is $800 per ton while under 100% GHG free conditions, the cost of carbon dioxide is $16,000 per ton (Avista data, April 16, 2019). *Under 100% GHG free conditions Avista projects that 13.7 million acres will be required to build wind turbines and solar facilities to serve electricity sufficient to limit customer blackouts to 50 percent of the time.* This area (13.7 million acres) is *245 times larger than the area of Seattle* (at 56,000 acres).

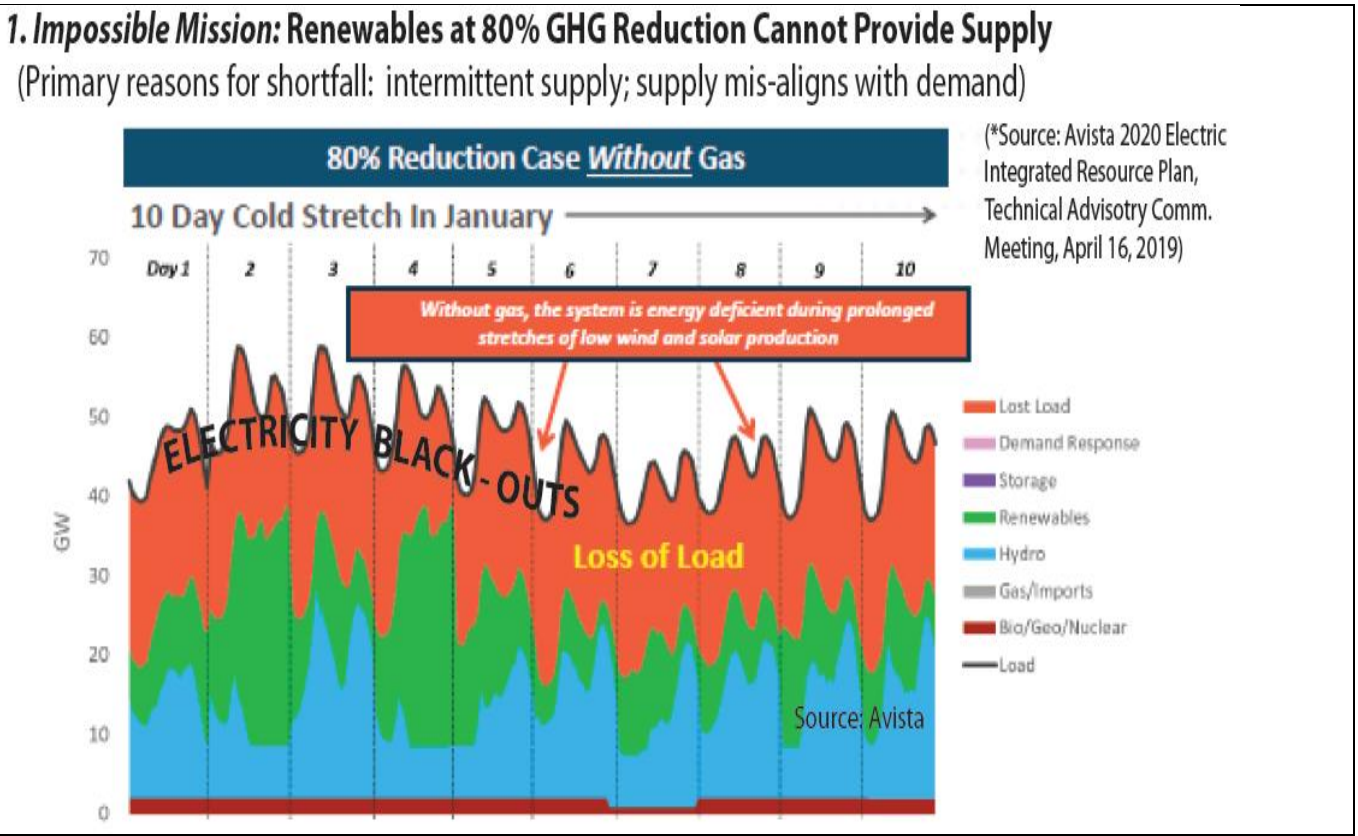



**Illustration 4.** During a typical 10-day cold period in January a significant number of customers will experience electric curtailments (blackout) conditions at a 80% case of greenhouse gas reduction

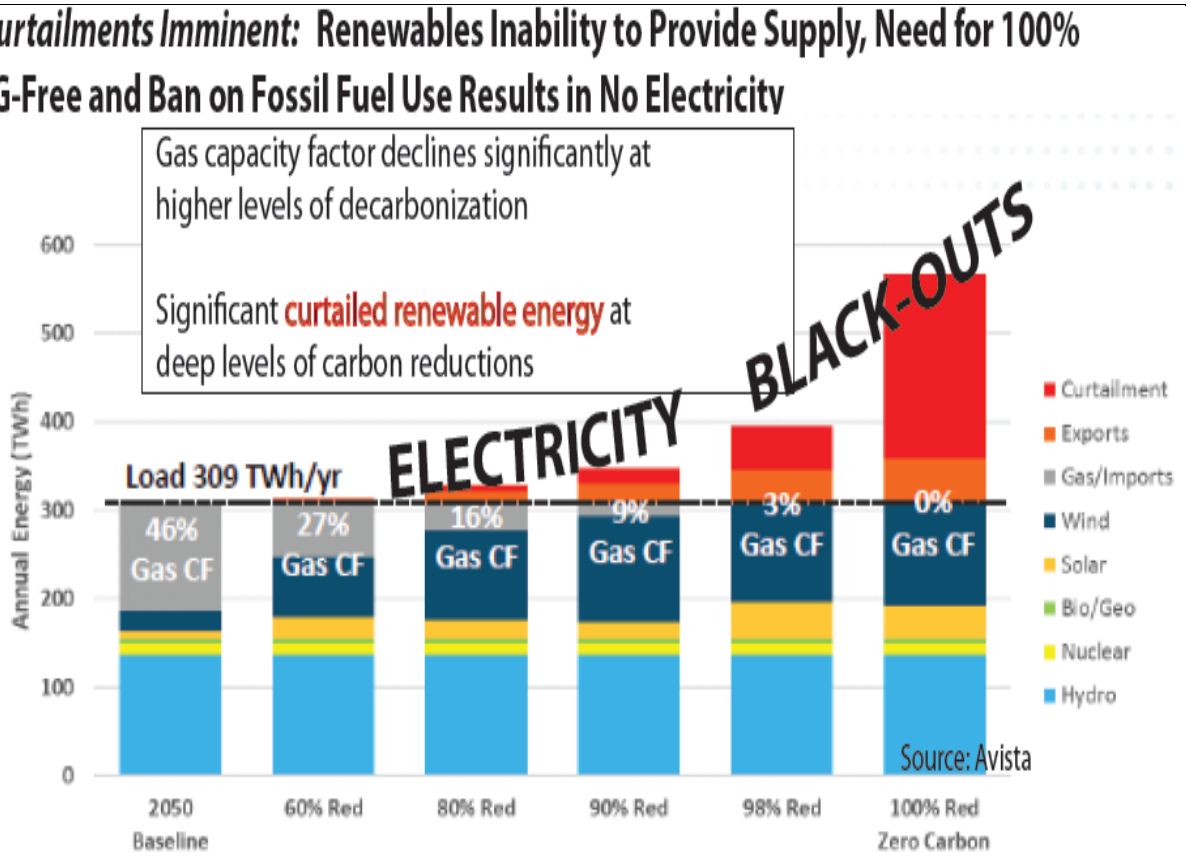



**Illustration 5.** Projected blackout (curtailment) conditions from 46% gas capacity factor (CF) today (at left column), to 0% CF at 100% GHG free condition. Blackouts will occur about 50% of the time at 0% Gas CF (right column) (Source: Avista)

- **A POWER SYSTEM THAT MIMICS THE "GREEN NEW DEAL" EXHIBITS SO MANY SIGNIFICANT FLAWS (FATAL FLAWS AS TO BE USELESS AS A POWER SYSTEM AND UNABLE TO PROVIDE SERVICE TO THE PUBLIC. MINERAL SUPPLIES TO BUILD A RENEWABLE SYSTEM ARE NOT AVAILABLE FOR WASHINGTON WITHOUT RELAXING ENVIRONMENTAL STANDARDS TO ENABLE OPENING OF NEW MINES IN THIS STATE.**

Mark Jacobsen and others (2015) forwarded a plan[2], the "ROADMAP" plan to a renewable energy future consisting of 100% renewable forms of energy from wind, water and solar (Illustration 6). Jacobsens ROADMAP was severely criticized as unworkable on several fronts by Conley and Maloney and Christopher Clack and others [3][4] as a myth for powering a nation on potential and hope to generate energy (wind, water, solar) rather than energy stored in fuels (coal, natural gas, petroleum, nuclear). Conley and Maloney and Clack identified several **serious flaws or fatal flaws** in the ROADMAP. The most severe is a shortfall of hydroelectric power by 90% of need (Illustration 7). The actual hydroelectric supply is shown by the yellow shading rather than the blue hydro + P.H. (pumped hydro) line. The 90% shortfall of needed hydroelectric power leaves the ROADMAP 60% deficient in needed power from hydro supplies, but this deficiency is only the first flaw. Conley and Maloney and Clack also identified 16 fatal flaws in all listed in Illustration 8.

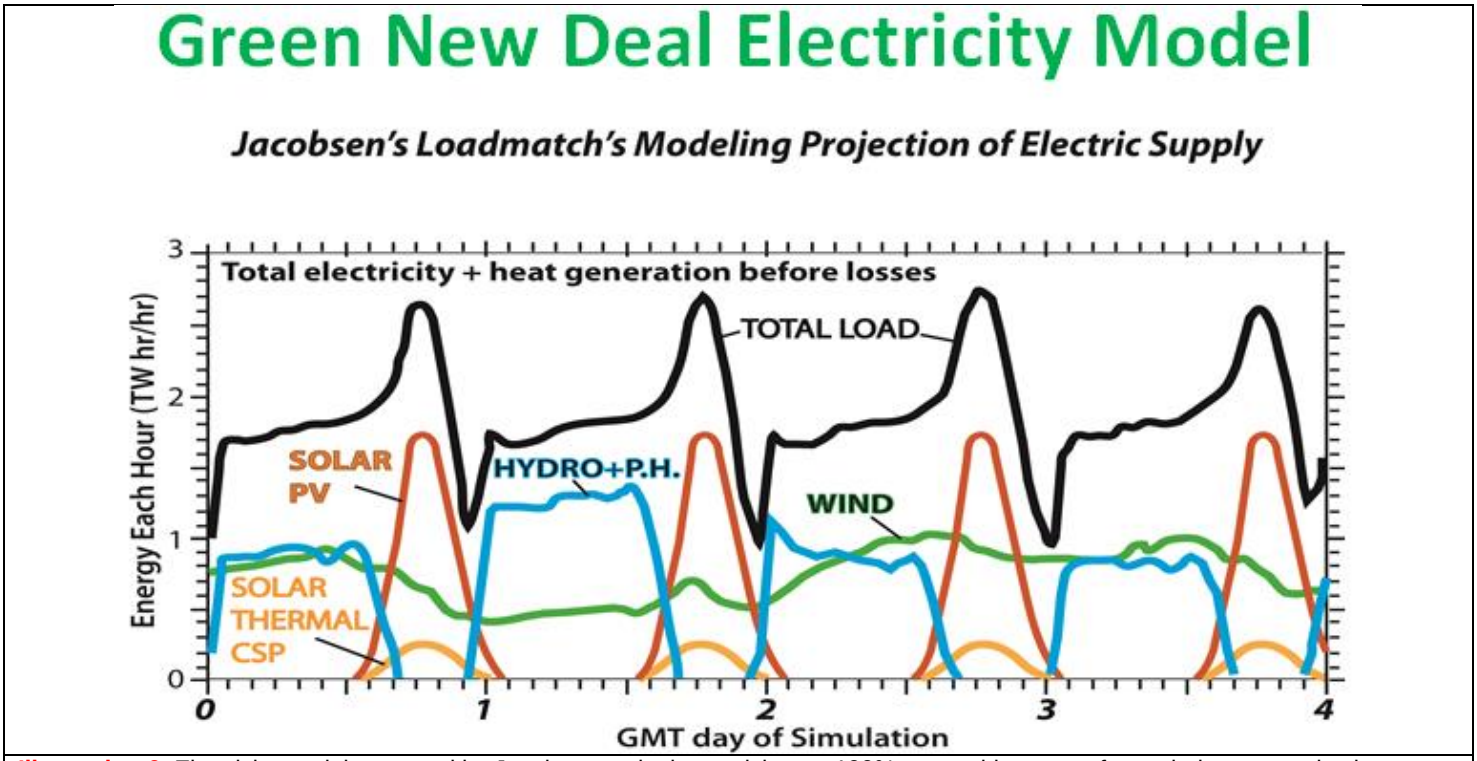



**Illustration 6.** Electricity model proposed by Jacobsen and others relying on 100% renewable energy from wind, water and solar. Model purports to show 4 day loadmatch model projection of load and supply.

[2] Energy and Environmental Science https://www.sciencedirect.com/science/article/pii/S2542435117300120
[3] Roadmap to nowhwere http://www.timothymaloney.net/Critique_of_100_WWS_Plan.html "*Critique*"
[4] Proceedings of National Academy of Sciences https://www.pnas.org/content/114/26/6722.full

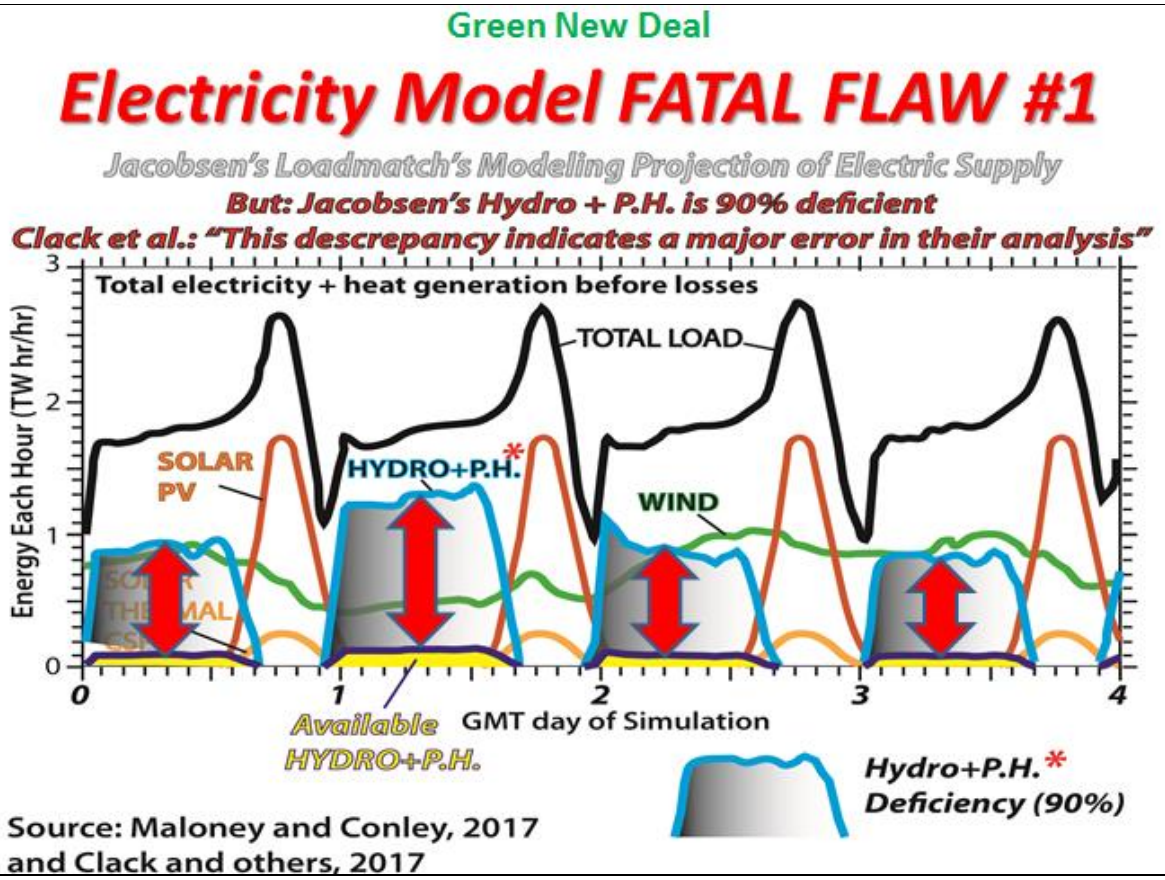



**Illustration 7.** Electricity model showing deficiency in hydro supply. Hydro supply anticipated by ROADMAP is blue line but authors Conley and Maloney and Clack and co-authors shows that the actual hydroelectric supply is 60% deficient as indicated by the yellow shaded area. The hydro deficiency is fatal flaw #1.

**Clack et al PNAS (2015); Conley and Maloney (2017) list criticisms, deficiencies, errors:**

"ROADMAP" involves errors, inappropriate methods & assumptions and it lacks credible evidence to reject other energy options, is impossible (Fatal Flaws.

**Fatal flaws of "ROADMAP":**

1. Hydro supply is 90% deficient;
2. Wind 80% undersize;
3. Solar undersize by 50%;
4. Solar packing too dense;
5. Feasibility not demonstrated;
6. Reserve is "hope" and "pray";
7. Mineral supply to build is unavailable;
8. HVDC AC-to-DC seamless conversion is not available;

**Fatal Flaw of ROADMAP (continued)**

9. 35 years to construct;
10. Useful life of wind and solar facilities is 10-15 years; replacements adds cost;
11. RoadMap is uncompetitive because new technologies available at 2% of RoadMap's cost that emits less CO2;
12. Erecting threatens food supplies, eminent domain threatens private lands;
13. Wind turbine noise is a serious health hazard to humans;
14. Area requirement is unreasonably immense;
15. Wind and solar generation are intermittent, mis-aligned with demand;
16. A battery technology is not available to balance generation with demand.

**Illustration 8.** Fatal flaws identified in Jacobsen's ROADMAP plan to provide 100% renewable energy from wind, water and solar.

- **THE PROJECTED COST TO BUILD A SYSTEM OF WIND TURBINES TO GENERATE ELECTRICITY FOR WASHINGTON IS ESTIMATED AT $4 TRILLION BUT SUCH A SYSTEM CANNOT PRODUCE A FULL-TIME SUPPLY.**
- **MINERAL SUPPLIES TO BUILD A RENEWABLE SYSTEM ARE NOT AVAILABLE FOR WASHINGTON WITHOUT RELAXING ENVIRONMENTAL STANDARDS TO ENABLE OPENING OF NEW MINES IN THIS STATE.**

A plan to provide Washington with 100% renewable electricity from renewable sources will rely heavily on wind generation. Accordingly a projection was made to provide 100% of electric supply, although hypothetical, using wind turbines. The projection was made based on average electric used by a Washington resident, considering the number of residences and the output of a conventional wind turbine generator (details available on request). Solar power is not favored because solar PV or conc. solar consumes the entire area for use for power generation from solar facilities and removes that land from all other uses. Also wind turbines can be dispersed across the land. To obtain a 400% reserve we calculate that 99,950 turbines are needed to produce 13.2 GW to power Washington State. Conventional power stations provide a nominal 250% reserve but because wind is a "potential" to generate power and not a "fuel" that promises generation that the additional reserve can be justified.

Illustration 9a shows the mineral resources required to build the 99,950 wind power stations presented as a percentage of the total amount of each mineral material produced in 2018 in the U.S. Note that a shortage of supply may exist for iron ore to make steel and copper. Supplies of molybdenum and REE (rare earth elements neodymium and dysprosium) are in extremely short supply worldwide or do not exist to build wind turbines for Washington. The Mo: 1331% means that Washington requires a 1331% larger supply of molybdenum than produced in the U.S. in 2018. For REE: The REE needs for Washington are 14,293% larger than REE produced in the U.S. in 2018. Illustration 9b tallies the raw materials and their value at $201 billion. U.S. Geological Survey Mineral Commodity Summaries (2019) shows that the ration of finished value to raw material value is 20 provides an estimate of cost of wind turbines in Washington at $4.03 trillion. This high cost is not the only problem, the final problem is supply. Supplies of copper, molybdenum and rare earth elements are extremely limited in the U.S. and worldwide because current supplies are already committed to known customers. Building wind turbines in Washington would require new supplies of copper, for example, because current supplies at mines in Utah, Arizona and New Mexico are destined elsewhere. Washington's new supplies of copper for Washington wind turbines must come from unmined resources identified by U.S. Geological Survey. Most of the supplies would require opening of new mines in the Cascade Mountains of Washington and Oregon. The reality is a renewables tradeoff: A requirement for renewable energy requires relaxing environmental requirement on national forest and wilderness areas in these states to access these copper resource. See Illustration 10 to locate these copper, molybdenum, gold and silver resources that are as yet unmined. Removing all of the copper from mines shown in Illustration 10 will only supply copper needs for renewable energy for 14 states (on a Washington scale; divide endowment of 14.424 million tonnes by 990,000 tonnes to get 14) while the molybdenum resources from mines in the illustration is only adequate supply for two states (on a Washington scale). It is clear that cost and supply are hurdles that must be crossed before meeting the mandate of 100% renewable energy.

9a.

# Mineral Resource Needed to Build
## Washington's 99,950 Wind Turbines

(13 Gigawatts, Hypothetical)

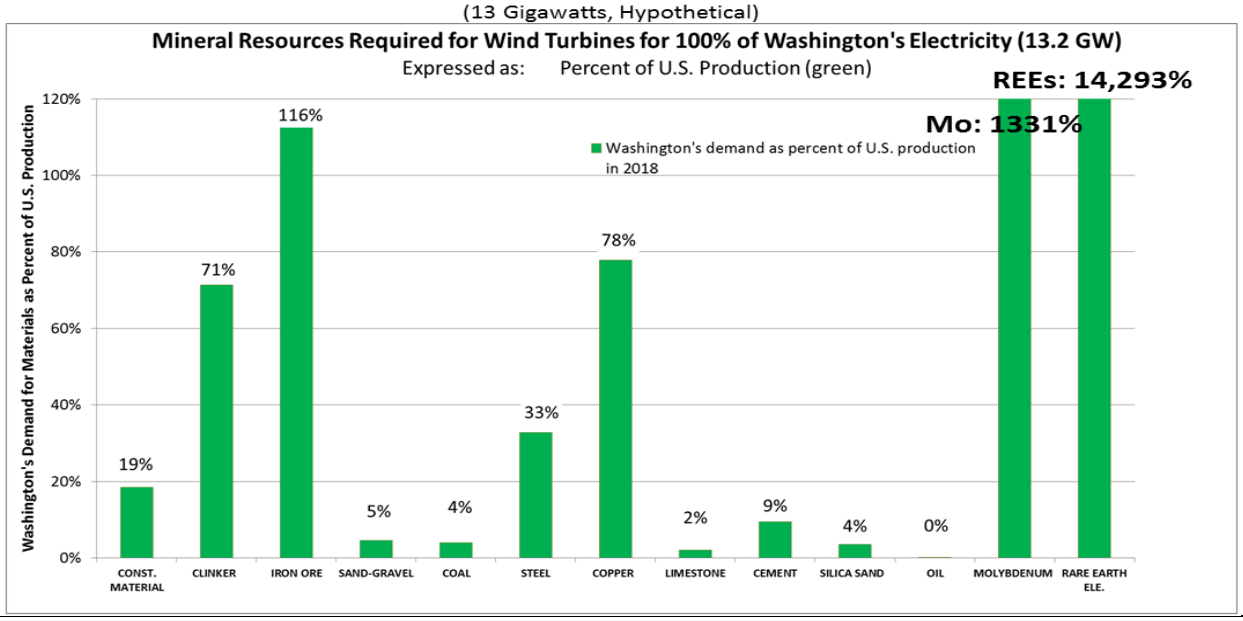



**Illustration 9a**. Raw material and mineral needs to build wind turbines for Washington shown as a percent of 2018 U.S. production for each mineral or material needed.

9b.

| | Raw Material Demands for Washington's Wind Turbines: | | | |
|---|---|---|---|---|
| Material, Metal | Percent of all U.S. mine production in 2018 | | Raw value, $ millions | Tonnes, 000s |
| RARE EARTH ELE. | 14293% | $ | 5,281 | 46 |
| MOLYBDENUM | 1331% | $ | 9,698 | 594 |
| IRON ORE | 116% | $ | 106,391 | 59,370 |
| COPPER | 78% | $ | 5,640 | 990 |
| CLINKER | 71% | $ | 16,374 | 53,773 |
| STEEL | 33% | $ | 53,196 | 29,685 |
| CONST. MATERIAL | 19% | $ | 1,888 | 164,917 |
| CEMENT | 9% | $ | 1,005 | 8,896 |
| SAND-GRAVEL | 5% | $ | 390 | 44,878 |
| COAL, SILICA, LS, OIL | 4%,4%,2%,>0% | $ | 53,579 | 49,167 |
| Total, $ millions | | $ | 201,555 | |
| *Real value (includes manufacture, construction, labor, transportation, taxes, M.E. X 20 ($millions)....* | | **$** | **4,031,102** | |

**Illustration 9b.** Estimate of amount and value of raw materials to build a system of wind turbines for Washington. The raw material value is $201 billion (col. 3) and tonnes needed (col. 4). Based on the ratio of raw material value to finished value of 20, the finished value (cost) of 99,950 wind turbines, the finished value cost is $4.031 trillion for Washington

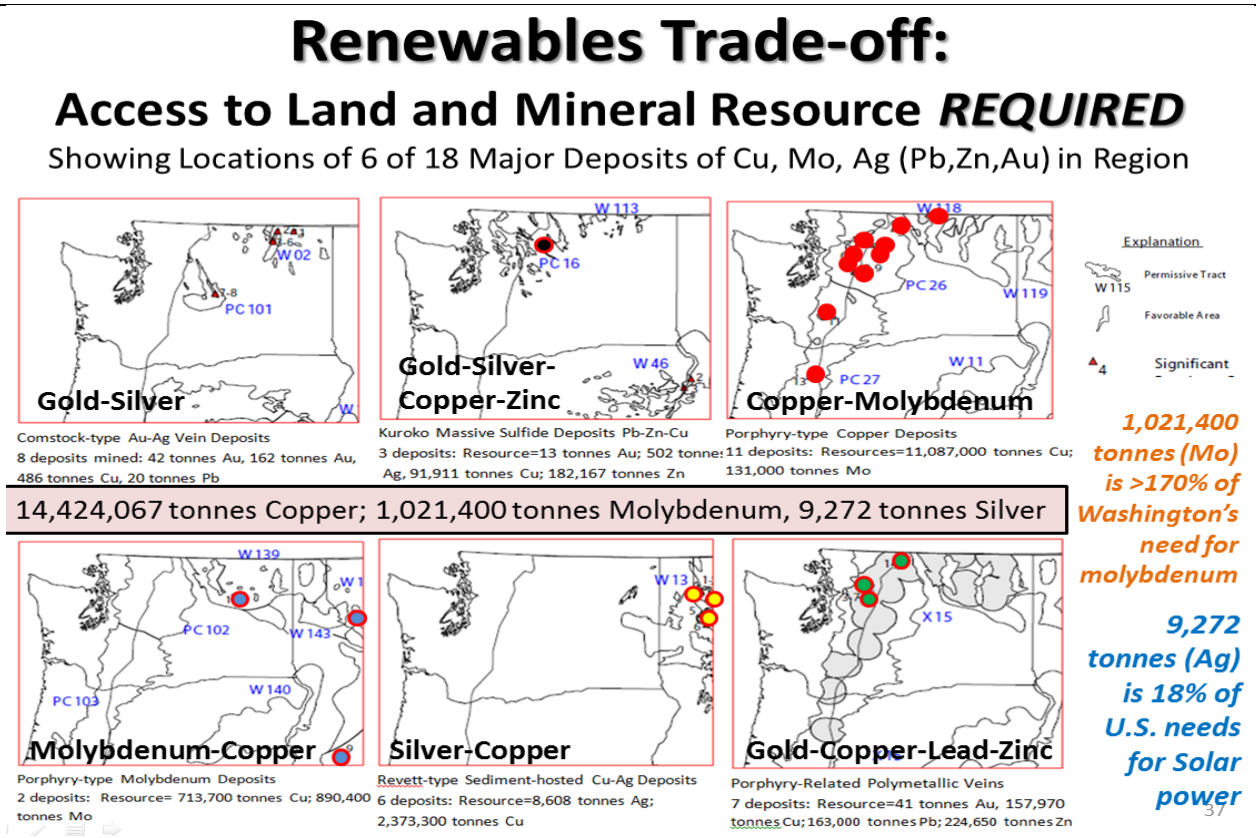



**Illustration 10**. The renewables tradeoff means that new mines must be opening and environmental requirements relaxed if 100% renewable energy from wind turbines is required in Washington because supplies of molybdenum, copper and silver for renewable facilities must come from new copper, silver and molybdenum mines in Washington located in national forest and wilderness areas in Washington's Cascade Mountains in addition to other locations in the northwest. Each color dot is location of future mine or current mineral reserve of these metals. Mines in diagram have copper supplies adequate to supply 14 states. Mines in diagram have molybdenum supplies adequate for 2 states and silver for solar panels is enough for 18% of U.S.

## A SYSTEM OF NUCLEAR PLANTS SUFFICIENT TO POWER THE ELECTRIC NEEDS OF THE ENTIRE UNITED STATES FOR LESS COST THAN THE ESTIMATED COST OF A WIND TURBINE SYSTEM FOR THE STATE OF WASHINGTON

Interestingly, a nuclear fuel system could be built to generate electricity for the entire United States at a cost of $3 trillion or $1 trillion less than the cost of a $4 trillion wind turbine system for the State of Washington. The nuclear power plants would consist of Generation IV molten salt reactors (Gen IV MSR), with each reactor of 1 GW size. About 1,000 such reactors would be needed. The US-wide Gen IV MSR system is unusual is that they have 1/3 lower greenhouse gas emissions that renewables, a nuclear meltdown is impossible because the nuclear fuel is no fissionable fuel, that is it cannot be used to make nuclear weapons. MSR's are not light water reactors of the early "bomb" designs. The fuel is uranium 238, the non-weapon part of uranium wasted to create the weapon type fuel for light water reactors and thorium, another non-fissionable fuel. MSRs can also be fueled with U-235 nuclear waste from other power plants, a proposition that would end the nuclear waste repository problem at Hanford Washington. MSRs have a wasted but about 70% of the waste can be reprocessed into new fuel. Microsoft pioneer Bill Gates is promoting MSR reactors of the design shown in Illustration 11 that are built into very large ships and installed permanently in a drydock at a port. The Gen IV MSR uses about 3.1 tonnes fuel for each refueling once each eight years. When refueling is needed a reactor vessel is removed and returned to the manufacturer for processing.

Fuel cost for the MSR is about 0.53 cents per kwhr so the cost of electricity to customers is 3 to 4 cents per kwrh. Reactors of this type have 400 reactor years of experience in other countries. Ironically, a small MSR reactor of this design powered the electric needs for about 15 years of the Oak Ridge TN research station of the Department of Energy during the 1950-1960s period (Thorcon 2015; Power Magazine, 2018, 2019)


**Illustration 11.** Design of a 350 MW Gen IV molten salt reactor (Thorcon, Seattle)

- **OUTLAY OF WIND TURBINES ON A WIDE SCALE POSES A HEALTH DANGER TO THE PUBLIC, IN PARTICULAR TO PEOPLE RESIDING WITHIN 10 MILES OF A WIND TURBINE DUE TO INFRASOUND AND LOW FREQUENCY NOISE GENERATED BY TURBINES. PLACING WIND TURBINES NEAR HOMES ALSO SERIOUSLY DEGRADES THE REAL ESTATE VALUE OF PROPERTIES WITH A MILE TO SEVERAL MILES DISTANCE.**

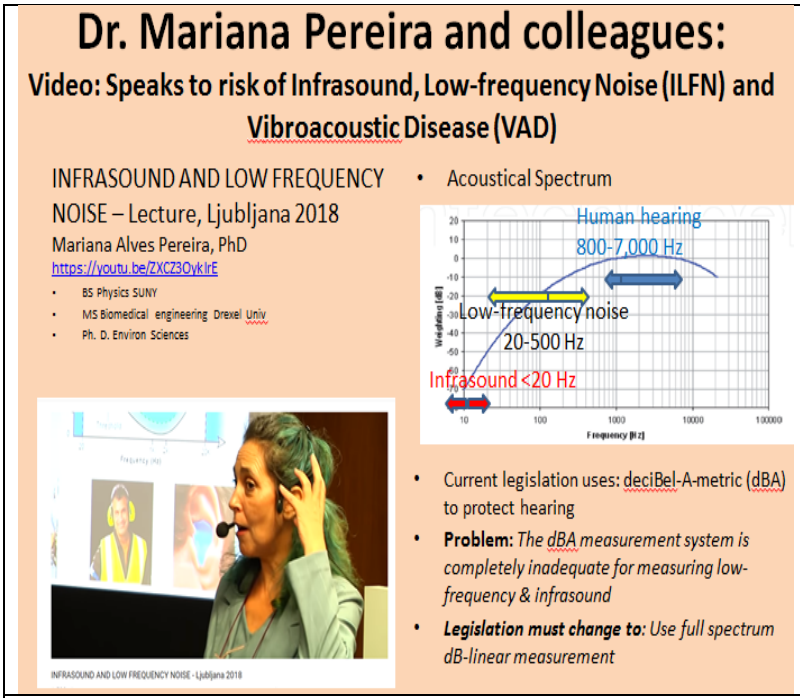
Several scientific articles document the danger of noise from wind turbine upon human health. The noise is infrasound and low frequency noise (ILFN) generated from any industrial process with wind turbines included. Biomedical engineering professor Mr Mariana Pereira presents a lecture on the dangers to human health of long term exposure to ILFN noise from wind turbines. People are not aware of the noise because the noise is below the range of human hearing or below 800 hertz and dBA measurements of noise do not detect ILFN in this range. ILFN cause the human body and internal organs to vibrate so long term exposure over two years can result in damage to the brain, respiratory and cardiac organs, says Dr Pereira (Illustration 12). Dr Pereira says legislation must change to protect human life and property from industrial noise of this type. The problem with ILFN from wind turbines is that people who live near them cannot escape the noise. The noise comes 24 hours a day and 7 days a week. Illustration 12 also provides an audiogram recording of full spectrum sound from a rotating wind turbine. The sound heard by the human ear is represented by the blue bars while the full spectrum of sound is the blue and red bars combined. The highest amplitude (loudest noise, but unheard by human ear is at 2 to 8 hertz frequency.

Other research organizations also document the danger of low frequency noise and infrasound (Illustration 13), including Dr. Riina Bray, Medical Director, Womens Hospital, Toronto, the Max Planck Institute, the World Health Organization. Dr Pereira says that the infrasound and low frequency noise cannot be filtered, blocked or prevented. A barrier large enough to block infrasound at 20 hertz must be 17.1 meters thick. Highest amplitude infrasound occurs below this frequency at 2 hertz, so a barrier to block this sound must be over 52 meters thick.

Illustration 14 shows the extreme measures taken by residents to avoid ILFN exposure from wind turbines. Right-Australian resident stacked concrete block around living area of home. Left-German residents live in a "bunker bedroom" in basement of their house situated 1900 m distance from 19 wind turbines.

Illustration 15 lists the clinical stages of exposure to industrial noise (Mariana Pereira). Illustration 16 lists numerous studies on wind turbine noise. ILFN-VAD causes nerve damage in 12-year old child, heart disease, epilepsy cognitive impairment in adults, lethargy in horses (Illustration 17). Long term exposure to LFN (low frequency noise) causes serious respiratory problem, fibroses, turmors (Illustration 18). Illustration 19 documents wind turbine noise: human tragedy with Shineldecker's (Illustration 19) shown in Illustration 20.

Comments: Workshop on implementing Washington's 100% clean electricity – Boleneus, D.



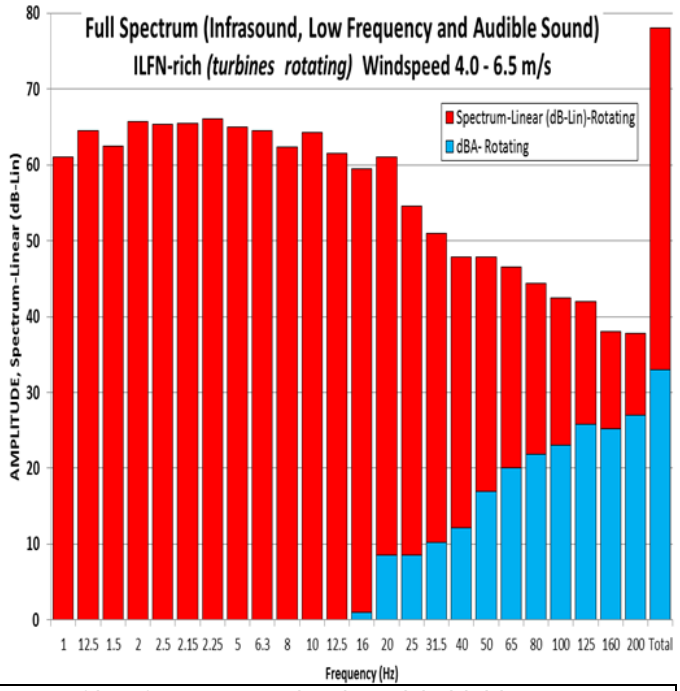




**Illustration 12.** Lecture video by Dr Mariana Pereira on health dangers of low frequency noise (ILFN) is highly recommended (left). Full spectrum audiogram of noise from operation wind turbine. Blue bars=sound heard by human ear. Red bars=infrasound and low frequency sound below range of human hearing.

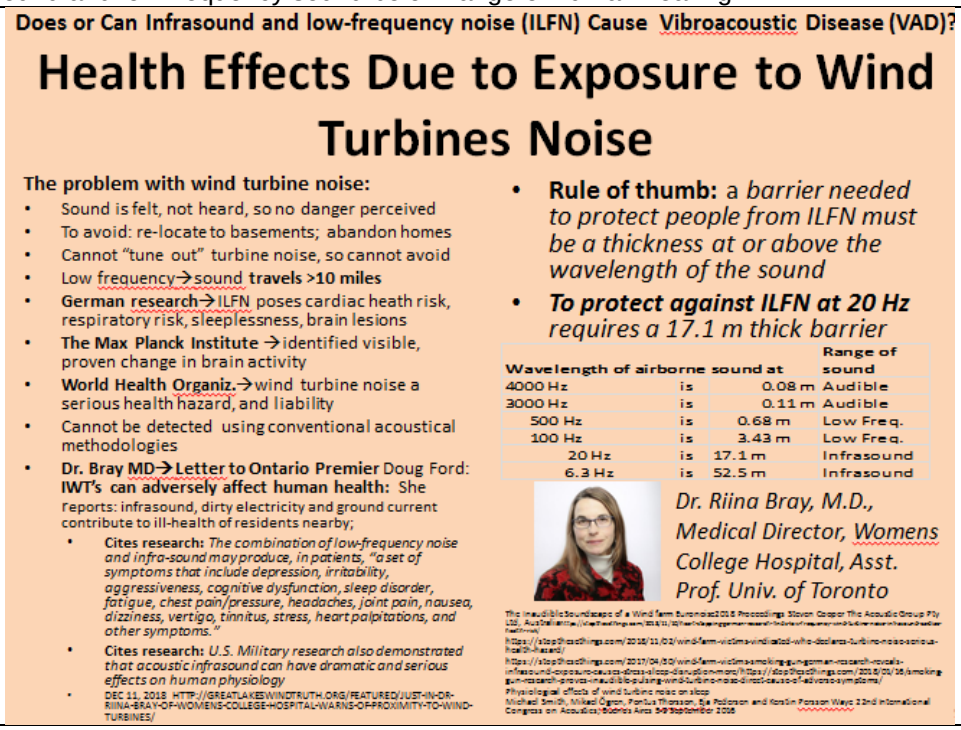



**Illustration 13.** Sources of information about dangers of noise generated by wind turbines

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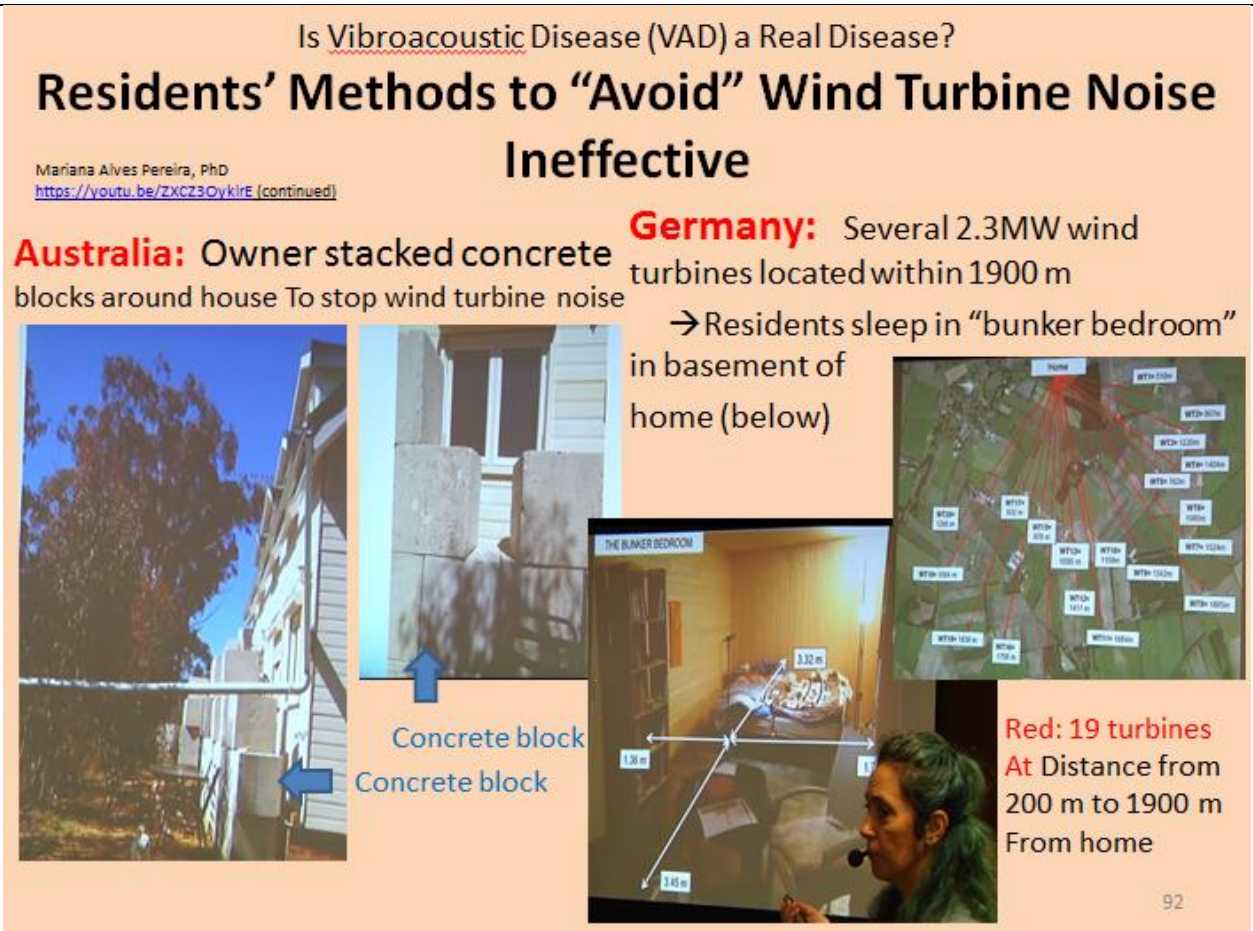


**Illustration 14.** Extreme measures taken by residents to avoid ILFN exposure from wind turbines. **Left-**Australian resident stacked concrete block around living area of home. The blocks are too thin to stop the noise. Noise at 6 hz requires a barrier of thickness of 52.5 m. **RIght-**German residents live in a "bunker bedroom" in basement of their house situated 1900 m distance from 19 wind turbines. (Source Dr. Pereira)

Illustration 15 shows clinical stage of exposure to industrial noise (Source: Dr Pereira)

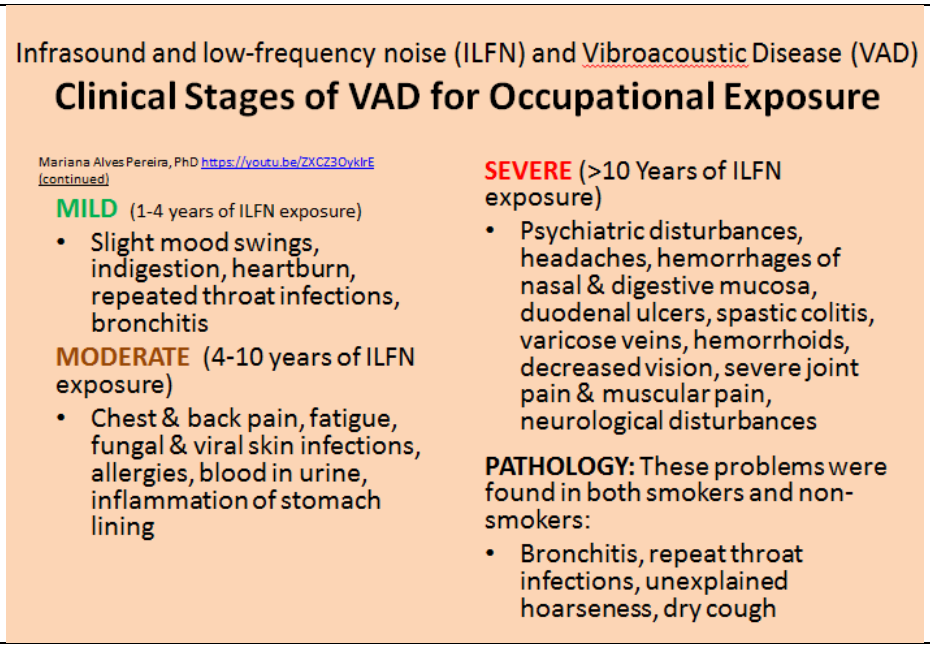


**Illustration 15.** Clinical stages of exposure to industrial noise.

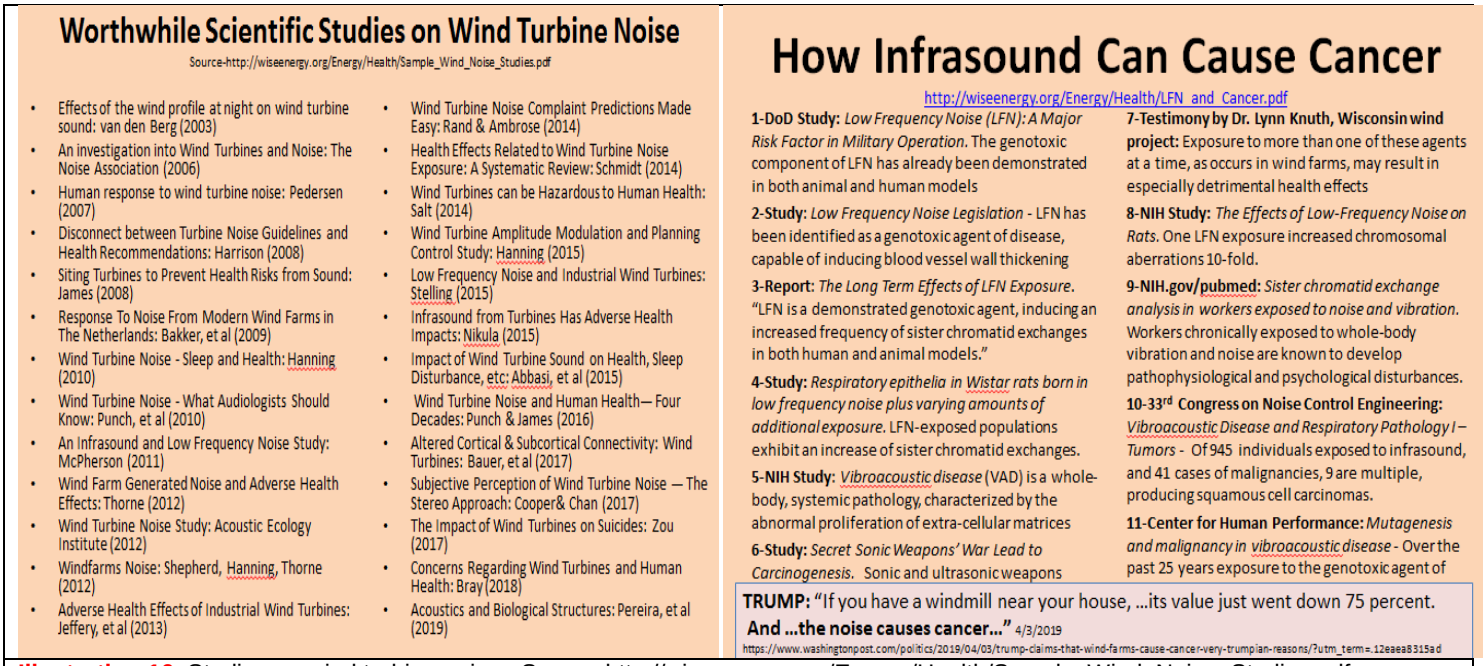


**Illustration 16.** Studies on wind turbine noise. Source-http://wiseenergy.org/Energy/Health/Sample_Wind_Noise_Studies.pdf http://wiseenergy.org/Energy/Health/LFN_and_Cancer.pdf

Comments: Workshop on implementing Washington's 100% clean electricity – Boleneus, D.

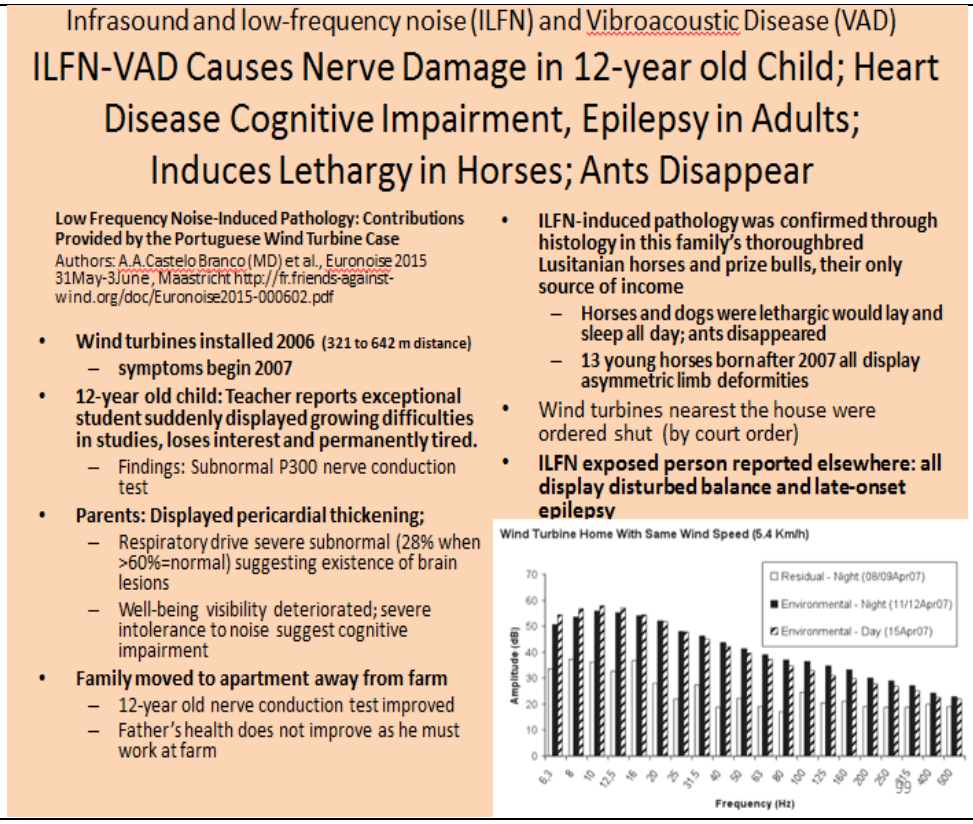


**Illustration 17.** ILFN-VAD causes nerve damage in 12-year old child, heart disease, epilepsy cognitive impairment in adults, lethargy in horses

Comments: Workshop on implementing Washington's 100% clean electricity – Boleneus, D.

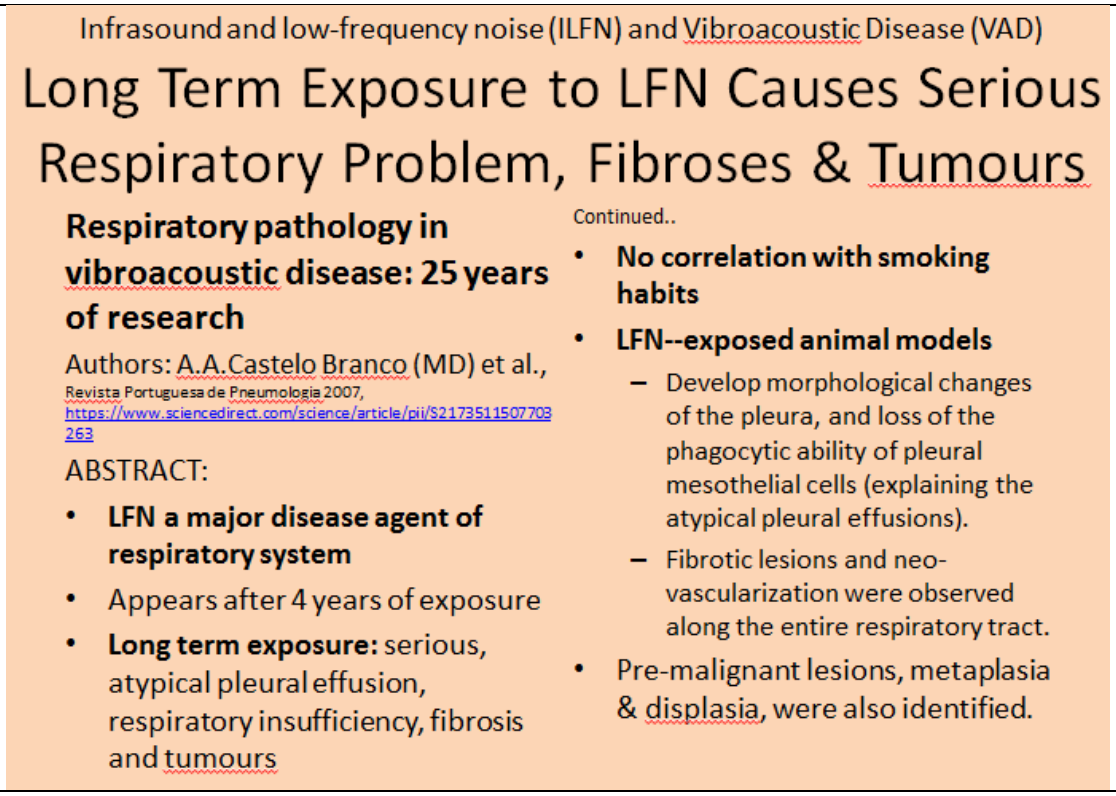


**Illustration 18.** Long term exposure to LFN (low frequency noise) causes serious respiratory problem, fibroses, turmors

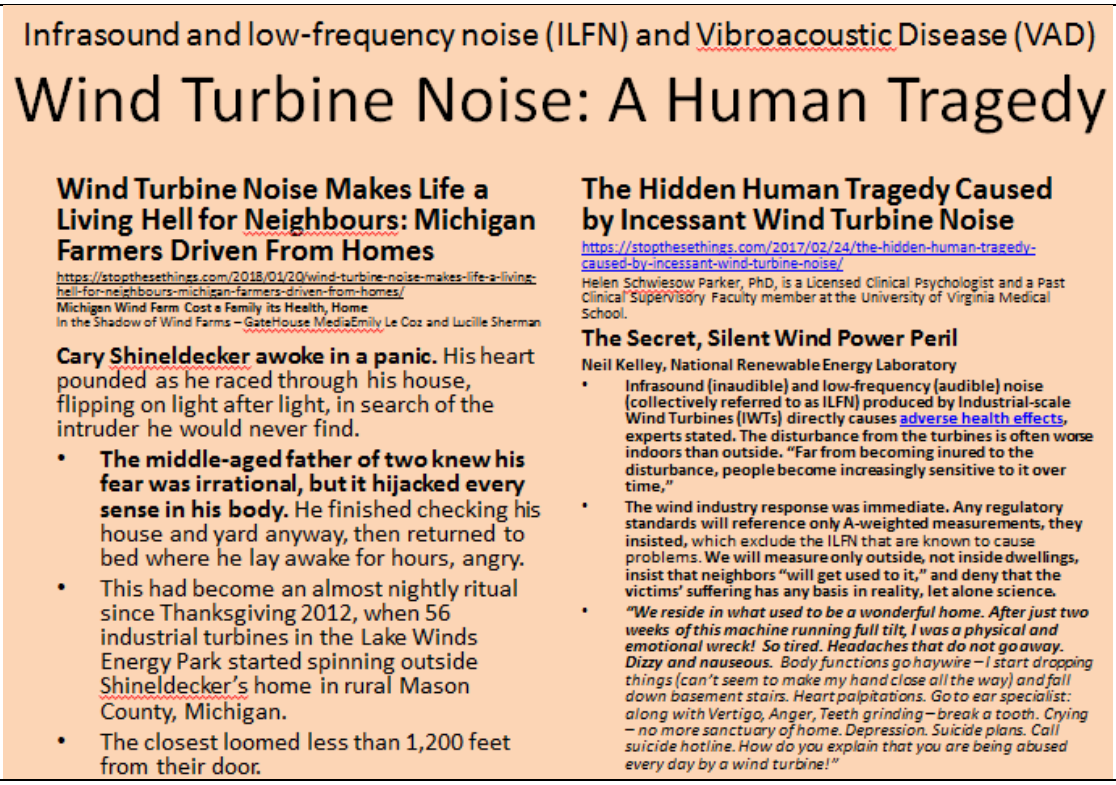


**Illustration 19.** Human tragedy of wind turbine noise

# Shineldecker's Home, Mason Co. Michigan

## *Not told their home would become industrial site*

**Cary and Karen Shineldecker at home with three, 476-ft tall wind turbines nearby, Mason County, Michigan.** A dozen of 56 wind turbines are within one mile of Shineldecker's home. 1995-Year Shineldeckers build house; 2010-Year wind farm announced; 2012-begins operating; Cary's work concentration suffers; he is demoted; 2014-Year forced to sell home at 46% of value lost (-$121,000); neighbors who signed turbine agreements disliked Shineldeckers who did not sign; Shineldecker's dog killed by rat poison; An **InvenergyWind** executive claimed Cary's health problems were due to sleep apnea, alcoholism, irregular heart beat, not wind turbines; Cary said Invenergy's claims are untrue, and has no such problems; the Brittons, neighbors also suffered headaches, sleeplessness; in 2013- neighbors join lawsuit against Consumers Energy.

**Illustration 20.** Shineldecker family were forced to sell rural Michigan home at a loss of $121,000 to escape noise from nearby wind turbines.

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A Finnish health study that surveyed 200 persons in the vicinity of five wind turbine farms on the west coast of Finland found these effects of noise upon residents living at 15 km or nearer to wind turbines: 10% of residents experienced serious health conditions; 11% of residents experienced reduced work ability; 33% of residents experiences effects considered adverse to health; and 20% of residents experienced milder symptoms. Many residents who complained of noise were not aware that wind turbines were located in the area. (Illustration 21). The result shows that living at a distance of 10 miles or nearer to wind turbines poses a health risk.
Finnish Study Finds Wind Turbine Infrasound Unsafe For Residents Living Within 15 Km February 1, 2019
https://stopthesethings.com/2019/02/01/home-wreckers-finnish-study-finds-wind-turbine-infrasound-unsafe-for-residents-living-within-15-km/

- **No human being or residence should be allowed within 10 miles of a wind turbine**

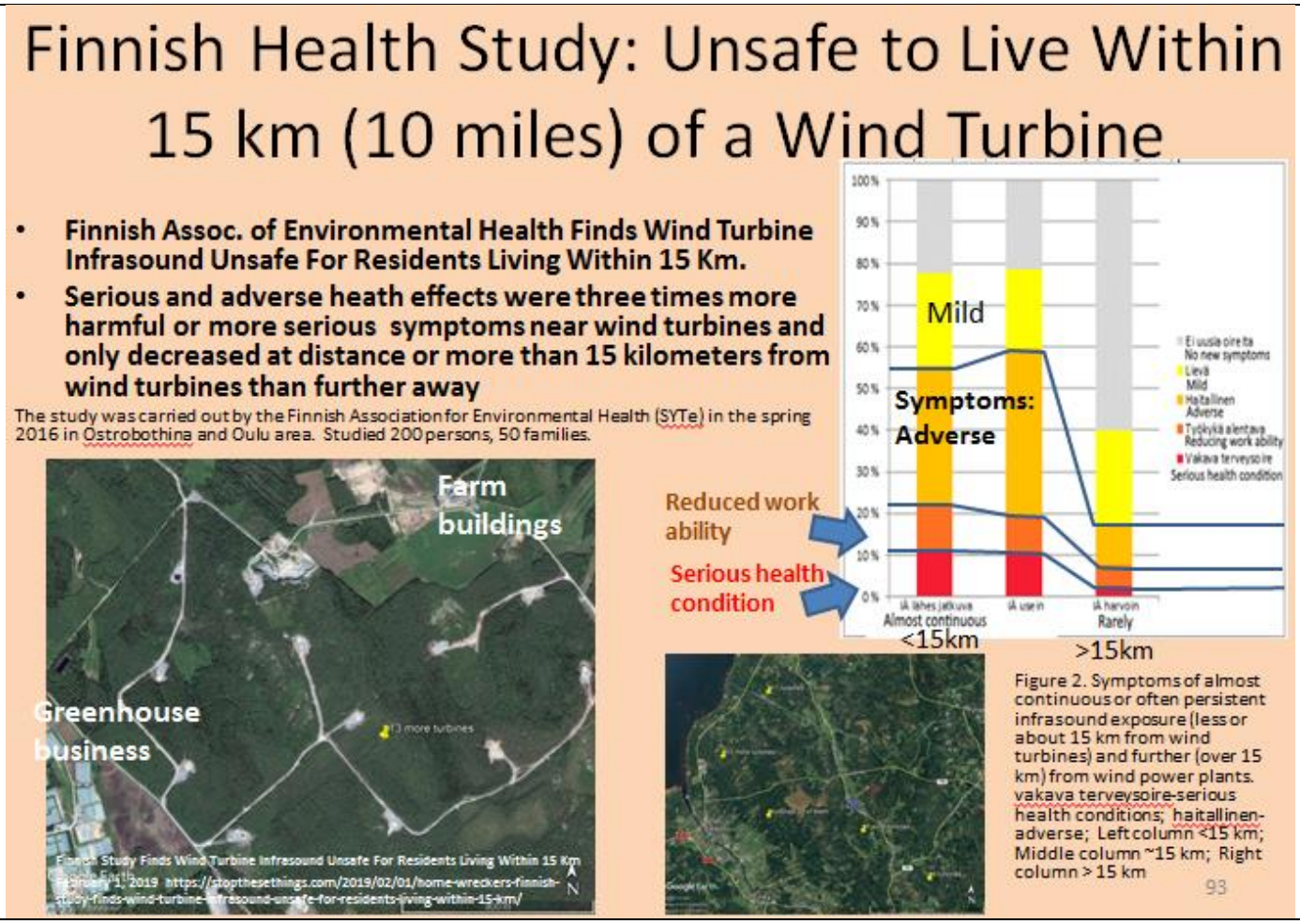


**Illustration 21.** Finnish health study on effect of wind turbine noise on residents

**More detail is available on a poster provided with these comments.**

Comments: Workshop on implementing Washington's 100% clean electricity – Boleneus, D.

- **CUSTOMER UTILITY BILLS WILL BE UNAFFORDABLE, OR BEYOND CAPACITYOF CUSTOMERS TO PAY IF THE STATE REQUIRES POWER BE SUPPLIED MOSTLY BY RENEWABLE FORMS OF ENERGY. AS A RESULT MANY CUSTOMERS WILL BE DISCONNECTED FROM POWER BECAUSE OF NON-PAYMENT FORCING FORMER CUSTOMERS INTO PRECARIOUS LIFE OR DEATH SITUATIONS WITHOUT ELECTRICITY NORMALLY SUPPLIED BY UTILITY COMPANIES. ATTEMPTING TO REACH 100 PERCENT RENEWABLE SOURCES WILL SUBJECT ELECTRIC CUSTOMERS TO EXTREMELY HIGH COST, ECONOMIC HARDSHIP AND POSSIBLE DEATH TO LOW-WAGE INCOME EARNERS AS SHOWN ELSEWHERE.**

## More detail is available on a poster provided with these comments

This is a story about Ontario, a province in Canada. Ontario's liberal government officials, like the State of Washington were convinced that renewable energy was the answer. This is their story. Terence Corcoran reports these events in October 21, 2016 (http://business.financialpost.com/opinion/boondoggle-how-ontarios-pursuit-of-renewable-energy-broke-the-provinces-electricity-system):

At the beginning, coal provided more than 20% of Ontario's electric supplies at a price of 5.5 cents/kwhr. In 2010, deep green environmentalist Rick Smith, PhD in Biology, then head of Environmental Defence Canada, hailed Ontario's Green Energy and the Green Economy Act regime as a cost-free operation that would catapult the province into the big leagues of renewable energy. Smith was absolutely sure that Ontario's campaign to become the North American leader in renewable energy would not be a burden on consumers. He had the facts, the study, and the numbers. Renewable is doable. "We've done some modelling on this and we're talking a penny's increase to your average person's electricity bill," he said. "Ontarians won't even notice any impact on their electricity rates." One of the most influential green studies was a 2005 report commissioned by the Ministry of Energy: "Cost Benefit Analysis: Replacing Ontario's Coal-Fired Electricity Generation." The authors included Bruce Lourie, who later headed the Green Energy Act Alliance among other things, and Peter Victor, a veteran green guru came to Ontario's aid from a post at York University's department of environmental studies.

In 2009, the Green Energy Act, 2009 passed by Parliament.

Post-Green Energy Act 2009. Smitherman and Ontario Premier Dalton McGinty, both liberals sign a $7 billion deal with Samsung and more deals with other vendors pledging future payments for renewables of 400% over the cost of competitive coal power to build wind turbines for a 20 year term and 1,000% above the cost of coal power to build solar. Former premier Dalton McGuinty who originated the Green Energy Act, repeated claims in a recent speech from the throne, that closing coal plants would dramatically reduce smog and save $4.4 billion in health care and other costs are now found to be demonstrably untrue.

Renewable costs out-of-this world

Totalling all the costs of going green — Ontario's auditor general estimated costs to total $170 billion over 30 years— while none of the alleged economic and social benefits have materialized. Ontario's Society of Professional Engineers had issued more than half a dozen reports critical of the Liberals' tendency to let green talk and politics override sound policy. Instead of following the expert advice of engineers and people who understand the intricacies of electricity production and distribution, the government took to issuing directives right out the Premier's office."Because they know how to turn a light bulb on and off, they'll issue policy statements on the most complex engineering system on the planet," said Paul Acchione, a former head of the engineers' society. Toronto consultant Jon Kieran, who has helped

develop Ontario's solar industry, recently wrote that the renewables program based on paying financial and project developers to build large wind and solar plants has morphed into "green corporate welfare." Paul Acchione, an OSPE engineer with long experience in the electricity industry, said the government was "hiring political scientists and environmentalists because they thought they were the experts." As a result, the government has issued more than 100 ministerial directives that ignored the dramatic decline in demand and the realities of managing an electrical grid where new expensive supply was mushrooming all over the province". Quite frankly, the province, and the electricity sector in particular, was taken over by what I would call a radical environmentalist agenda," said Bryne Purchase, adjunct professor at the Queen's Institute for Energy. The 2007 coal exit plan was "physically impossible to do," he added, "but for the longest time you could not say, 'This is impossible,' because if you did, then obviously you were not onside." The provincial auditor general last year delivered a devastating report on the Liberal's green electricity campaign. The Auditor's report estimated that by 2014, electricity consumers had "already paid a total of $37 billion, and they are expected to pay another $133 billion in *Global Adjustment* fees and surcharges from 2015 to 2032." That's $170 billion over 30 years.

*Global Adjustment* fees, a super-surcharge, are the sum total of all the monies Ontario industries and consumers pay to fund all the back-room policy fiddles, sweetheart cash transfers and subsidies the Liberals brought in to fund renewable power, shut down coal and manipulate the system.

It was now costing $257 per tonne of carbon dioxide to reduce emissions rather than the $17 per tonne charged by the Quebec-California cap-and-trade system. Dr. Rick Smith, Environment Defence Canada, and company claimed hundreds of thousands of jobs would result, but the number now was 42,000.

By 2015, EnergyProbe International of Toronto reported the price of Ontario's electricity had rocketed to 29.9 cents /kwhr and then accelerated to 36 cents /kwhr in 2016 according rising 5 times faster than Canada's Consumer Price index according to Statistics Canada. (http://probeinternational.org/library/wp-content/uploads/2016/02/Getting-Zapped.pdf)

Then in 2017, Ontario Premier Kathleen Wynne doubled down on failure. The Province would issue the "Fair Hydro Plan", a Parliament measure effectively rebating 7 cents/kwhr to customers for 10 years, which will delay the both the real cost of renewable wind and solar outlays in addition to all interest on borrowings, at a cost of another $30 billion presuming the rate on borrowings would not increase by even one percent, when all would come due. The Globe and Mail ("Ontario's new electricity policy: History repeats as farce"[5]) reports this plan merely a ploy by bureaucrats to pay customers using customer's money not to notice the high cost of energy. Ontario businesses complain the high electricity prices threaten their survival[6]. Tom Krueger's bill for one month from HydroOne totals $2,163 (electric and other costs) for 9,000 kwhr, for a total cost of 24 cents per kwhr. Krueger's cost for surcharges only (delivery, regulatory, debt, and sales tax) is $1,088 or 12 cents of the 24 cents per kwhr is 50% of his invoice.

The only way out is for the Province to default on contracts to renewable providers, estimated at $133 billion which would destroy the Province's credit rating; customers of the Province's utilities had already paid $35 billion above the cost of coal provided power since beginning of the Green Energy Act. Ontario's green electricity was a monumental failure. Doug Ford's election to Conservative Premier in 2018 and ousting of liberal Kathleen Wynne is set to re-order Ontario's energy but at a very high cost committed to by the former government officials and along with the end of the Green Energy Act, to end Ontario's adventure with its carbon tax.

[5]https://www.theglobeandmail.com/opinion/editorials/ontarios-new-electricity-policy-history-repeats-as-farce/article31862790/)
[6] http://www.theglobeandmail.com/report-on-business/small-business/sb-managing/small-business-owners-anger-soaring-about-ontario-electricityprices/article33344417/

One example how liberals created waste—"How more produces less"--- *2015--About 2,300 MW of grid-connected generation is expected to be added throughout this Outlook period, which includes* 1,700 MW of wind*, 10 MW of hydroelectric, 300 MW of gas, 240 MW of solar and 40 MW of biofuel resources.* In the first two months of 2015 Ontario exported 17.1% of demand (4.4 TWh-up 71%) so with the additional capacity of 2,300 MW added to the grid in the next 18 months we should expect to see exports soar as will the cost to Ontario Ratepayers. My personal forecast (in the absence of IESO's) is exports will be close to 25 TWh in 2015 and cost ratepayers almost $2 billion or $450 each. https://ep.probeinternational.org/2015/03/26/parker-gallant-iesos-windy-forecasts-more-will-produce-less/

The result is the rapid onset of energy poverty set out by these three articles by Parker Gallant (https://ep.probeinternational.org/?s=Parker+Gallant)

Parker Gallant: Energy poverty in Ontario Chapter 1 https://ep.probeinternational.org/2015/03/01/parker-gallant-energy-poverty-in-ontario-chapter-1/
Parker Gallant: Energy poverty in Ontario Chapter 2 https://ep.probeinternational.org/2015/03/04/parker-gallant-energy-poverty-in-ontario-chapter-2-2/

Parker Gallant: Energy poverty in Ontario Chapter 3
(March 6, 2015) The prior Chapter in this series finished with the disclosure that many affected by "energy poverty" were seniors living on fixed incomes wanting to spend their final years; "aging at home" but rising energy prices were making … https://ep.probeinternational.org/2015/03/06/parker-gallant-energy-poverty-in-ontario-chapter-3/

Parker Gallant: Wind turbines and solar panels bring Ontario energy poverty: Chapter 1
(July 22, 2014) "*Green sustainable energy is working for Ontario making us all more prosperous*." There are a large number of people in Ontario who would disagree with that statement and they are reflected in the increasing number of people living in "energy poverty" https://ep.probeinternational.org/2014/07/23/parker-gallant-wind-turbines-and-solar-panels-bring-ontario-energy-poverty-chapter-1/

Parker Gallant: Wind turbines and solar panels bring Ontario energy poverty: Chapter 2
*(July 23, 2014) The first Chapter on "energy poverty" introduced the reader to LIEN (Low-Income Energy Network) and APCH (A Place Called Home), of the City of Kawartha Lakes & Haliburton County. Hydro One's 1.1 million residential clients would mean that 7,100 of their customers would be affected by "energy poverty" and taking that further would mean that they would be called on to provide $6.2 million in support.* When I examined the LEAP (Low-Income Energy Assistance Program) for 2012, in the report prepared by OEB, it indicated that Hydro One had provided grants of $1,503,062 to 2,628 customers and that amount was $1.3 million less than the salaries of their top five executives. If one extrapolates the foregoing to all LDC supplied residential ratepayer households the number of customers living in "energy poverty," at a minimum, is 28,300 households or 20,000 more than the LEAP program supported and translates into a requirement for $25 million versus the $3.9 million actually disbursed in 2012. https://ep.probeinternational.org/2014/07/23/parker-gallant-wind-turbines-and-solar-panels-bring-ontario-energy-poverty-chapter-2/

Parker Gallant Exposes Energy Poverty, in Ontario
"Real progress" to those who pushed renewable energy has proven to be a fallacy that has done nothing more than create prosperity for foreign companies that rushed to Ontario for the money extracted from Ontario's ratepayers. At the same time the push for wind and solar power has played a major role at creating "energy poverty" that now rivals Germany with over 1% of all households (44,000) in Ontario suffering from that malady! JULY 23, 2014 https://mothersagainstwindturbines.com/2014/07/23/parker-gallant-exposes-energy-poverty-in-ontario/

**The following chart (Illustration 22) shows how electricity prices skyrocketed in Ontario from 2009 to 2016 to the highest electric rates in North America.**
(Sources: StatisticsCanada; GETTING ZAPPED: ONTARIO ELECTRICITY PRICES INCREASING FASTER THAN ANYWHERE ELSE http://probeinternational.org/library/wp-content/uploads/2016/02/Getting-Zapped.pdf)

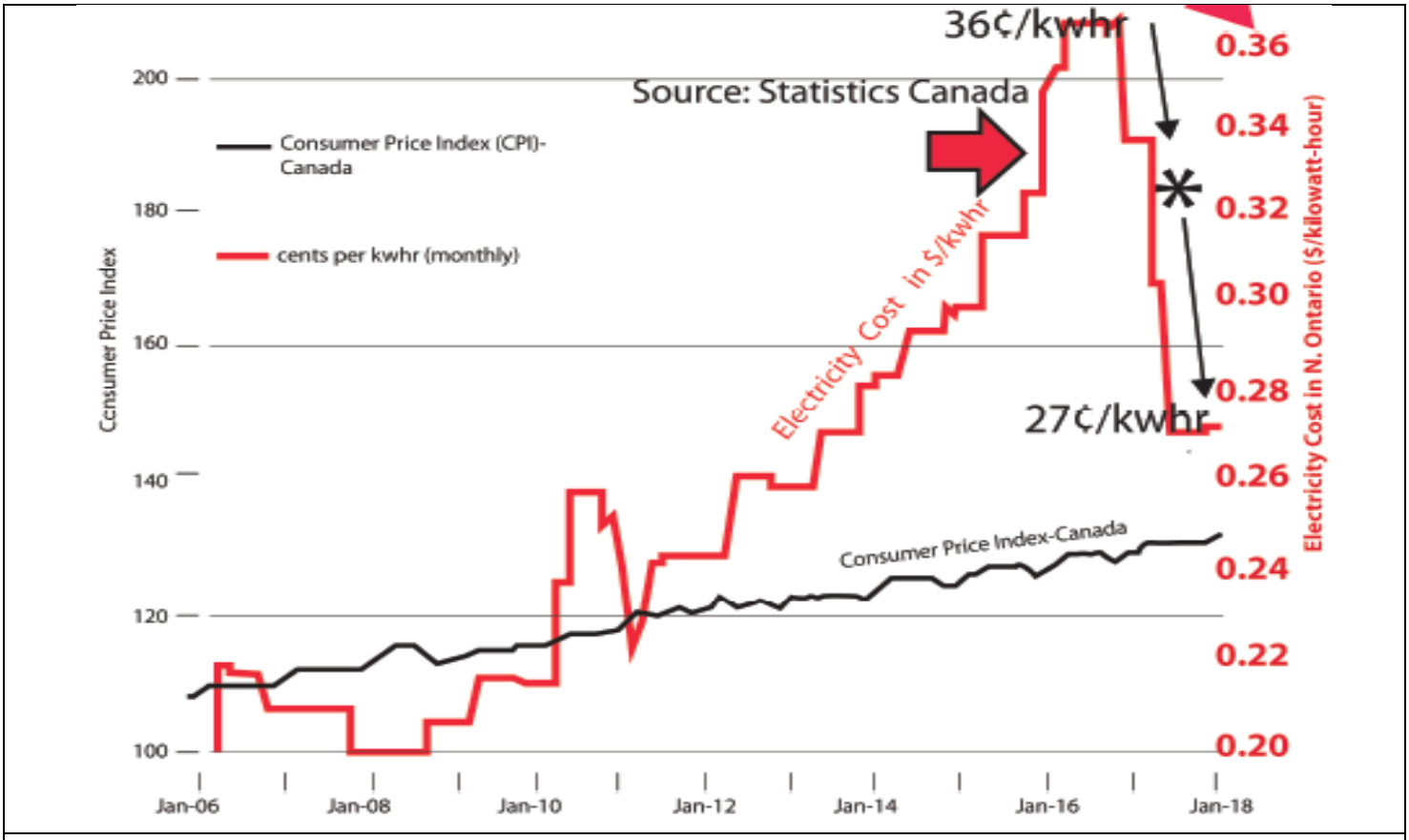


**Illustration 22.** Customer electricity prices in N. Ontario 2006 to 2018 tops 36 cents per kilowatt hour in 2017, following by reduction in rate following "Fair Hydro Plan" (red line). The Fair Hydro Plan only delays the cost, estimated at $30 billion, to customer due in ten years. Consumer price index in Canada (black line) (Source: StatisticsCanada).

The following chart shows the cost of Ontario' Green Energy Act (Illustration 23), essentially state-sponsored energy poverty.. The first part, Round 21, begins with construction of wind turbines and solar facilities, closure of coal plants, contracting with renewable providers for solar at 400% above the cost of coal power and for solar at 1,000% above the cost of coal power. The total Round 1 cost is $172 billion, or $63,000 per household.

Round 2 begins with Ontario's Climate Action Plan , the brings Cap and Trade, additional rises in electric rates, with this part coming at a cost of $3,247 per month per household and a carbon tax rising to $50 per tonne carbon dioxide which would cost a 3-car family another $1,987 per year. Cap and Trade is an escape of responsibility as the practitioner can avoid the emissions by paying a Climate Exchange (Al Gores' Chicago Exchange, Ontario's or California's Exchange) who issue a permit for the practitioner to exceed its emissions cap. The responsibility is avoided but the cost is borne by the utility and eventually the customer while the exchange makes cash on the deal but nothing is accomplished but a

deception of customers. Cap and Trade masks the negative economic consequences behind rhetorical benefits of new government programs that are unrelated to and distort supply and demand yet customers are compelled to restrict their use of fossil fuels to comply according to a number dreamed up by bureaucrats. Cap and Trade relies on a European-style political scheme viewed as a tax on energy, the lilfeblood of the economy, yet the cost is invisible on energy bills, camouflaged as higher costs on goods everywhere that use energy and it masks the causes of higher consumer prices more than a straightforward tax. Cap and Trade contains elements of planned economies as it is a massive energy tax in disguise as it transfer important economic decision-making from private enterprise to government with a new overall loss of GDP, thus it subordinates to central planning as in North Korea, Venezuela, China, Cuba and the FSU. Its main objective is to collapse industrial civilizations. Cap and Trade is a central part of the Western Climate Initiative entered into by States of Washington, California, Oregon and Provinces of Quebec and British Columbia. IT makes carbon pricing a cornerstone of fighting climate and creates an artificial price for carbon pollution.

Citizens must oppose Cap and Trade because creates and illusion of reduced emissions and it is susceptible to fraud and political manipulation, it worsens the already soaring prices of energy as it's a giant shell game entered into by dysfunctional governments[7]. Following are the key disadvantages of cap and trade: It increases prices of energy by 85%, the imagined cost of renewable energy. It does not reduce emissions but causes emissions to increase as Europe now experiences. It disproportionately harms the poor, for example a 15% decrease in CO2 costs the poor 15% of their incomes, so Washington's plan to reduce carbon emissions by 100% will cost low wage Washington residents 100% of their income. It harms energy security because 83% of America's energy is produced domestically and Cap and Trade encourages increasing of imports of energy. Cap and Trade produces no impact on climate because carbon emissions or carbon dioxide are UNRELATED to temperature or climate, and so delegitimizes the purpose of Cap and Trade. Cap and Trade also forces industries to leave for better economic conditions. Cap and Trade raises the cost of natural gas needlessly because companies substitute it for electricity production, which increases energy bills. The major Cap and Trade "Lie" is that can maintain a competitive economy, while the effect is just the opposite. Futhermore, Cap and Trade practices are incompatible with the capital economy of the United States because the energy fuels have facilitated successive industrial revolutions, assisted population growth by 8-fold, increased income 11-fold, enabled the U.S. to reach the highest GDP or any world nation, improved living standards, enabled highest level of medical care and public facilities while increasing life expectancy[8]

See Economic Impact of Waxman-Markey Cap and Trade bill that failed to pass the US Senate in 2009[910].

[7] 5 reasons to oppose Ontarios cap and trade proposal December 11, 2015 by consumerpolicyinstitute
https://ep.probeinternational.org/2015/12/11/5-reasons-to-oppose-ontarios-cap-and-trade-proposal/

[8] 5 reasons to oppose Ontarios cap and trade proposal December 11, 2015 by consumerpolicyinstitute
https://ep.probeinternational.org/2015/12/11/5-reasons-to-oppose-ontarios-cap-and-trade-proposal/

[9] http://scienceandpublicpolicy.org/commentaries-essays/commentaries/cap-and-trade-economic-impact

[10] https://instituteforenergyresearch.org/topics/policy/cap-trade/

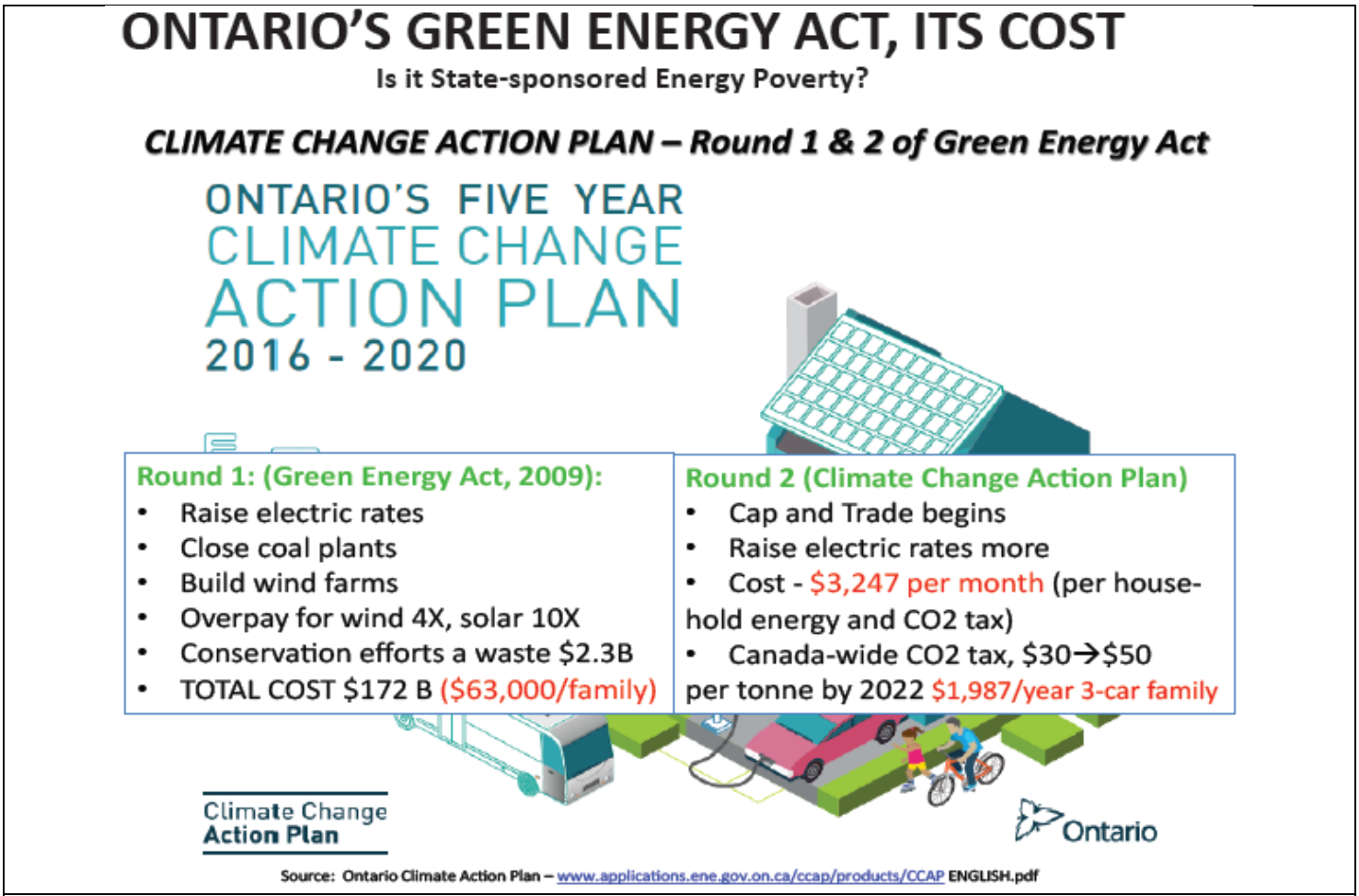


**Illustration 23**. Ontario's Green Energy Act, and its cost, a state-sponsored plan to bring energy poverty to Ontario.

WHY ARE COSTS SO HIGH?

Three of the many reasons explain high costs of renewable energy that governments and lawmakers do not understand and ignore. These are (1) requirement for backup source of power when renewables are not producing, (2) mismatch of output with demand and (3) requirement by renewable providers for subsidy support to afford to build and profit from systems.

*Backup power:* The requirement for backup or second source of power for renewables was discussed above (see Illustrations 1, 2, and 3).

*Mismatch of output and demand:* An excellent example of the mismatch of demand (load) and output is given for Ontario. (See chart, Illustration 24). The chart shows the average 7-day hourly wind output and demand in megawatts for 2013-2015. In the springtime, March-April and autumn, Oct.-Dec., the wind output exceeds what can be sold, even given the large interties between adjacent provinces and New York and Michigan. What power cannot be sold is a cost that must be paid by Ontario's utility customers, yet without receiving a benefit. The problem is too much energy at the wrong time and too little energy at another wrong time. This is the mismatch.

Comments: Workshop on implementing Washington's 100% clean electricity – Boleneus, D.

*Brouilette* reports ("Ontario's high cost wind millstone") on the downside of wind, that: 1. Wind is a high cost option, as it misaligns with demand. At current wind capacity of 6,500 MW, 68% of wind generation is surplus, costing $550 million above its cost. 2. The per kw-hour price falls by 39% during these periods of surplus. 3. This is a cost of $1.1 billion with another $300 million additional cost because the power is unsalable; even considering existing interties with adjacent provinces and U.S. states. In March 2018, wind only provided 3% of all energy supply, so 65% was wasted. 4. Dividing cost by output gives the cost per MWhr of $410/mwhr, or 4 times more than cost of other sources; "Parker Gallant Energy Perspectives" says the actual cost of wind in 2018 is $440/mwhr (44 cents per kwhr).

*THIS RESULT PROVIDES A VALUABLE LESSON IN ENERGY SUPPLY PLANNING. THIS RESULT GIVES REASON TO REJECT SUGGESTIONS MADE BY THOSE WITHOUT KNOWLEDGE OF WIND TURBINES, WHO SAY, "THAT IF A FEW WIND TURBINES CANNOT DO THE JOB THEN JUST ADD MORE". IT'S CLEAR FROM THE ONTARIO EXAMPLE THAT ADDING MORE WIND TURBINES JUST INCREASES COST WITHOUT ADDING PERFORMANCE.*

(Source: Marc Brouillette, June 2017 http://www.thinkingpower.ca/PDFs/Commentary/CCRE%20Commentary%20-%20Ontario's%20High-Cost%20Wind%20Millstone%20-%20Marc%20Brouillette%20-%20June%202017.pdf)

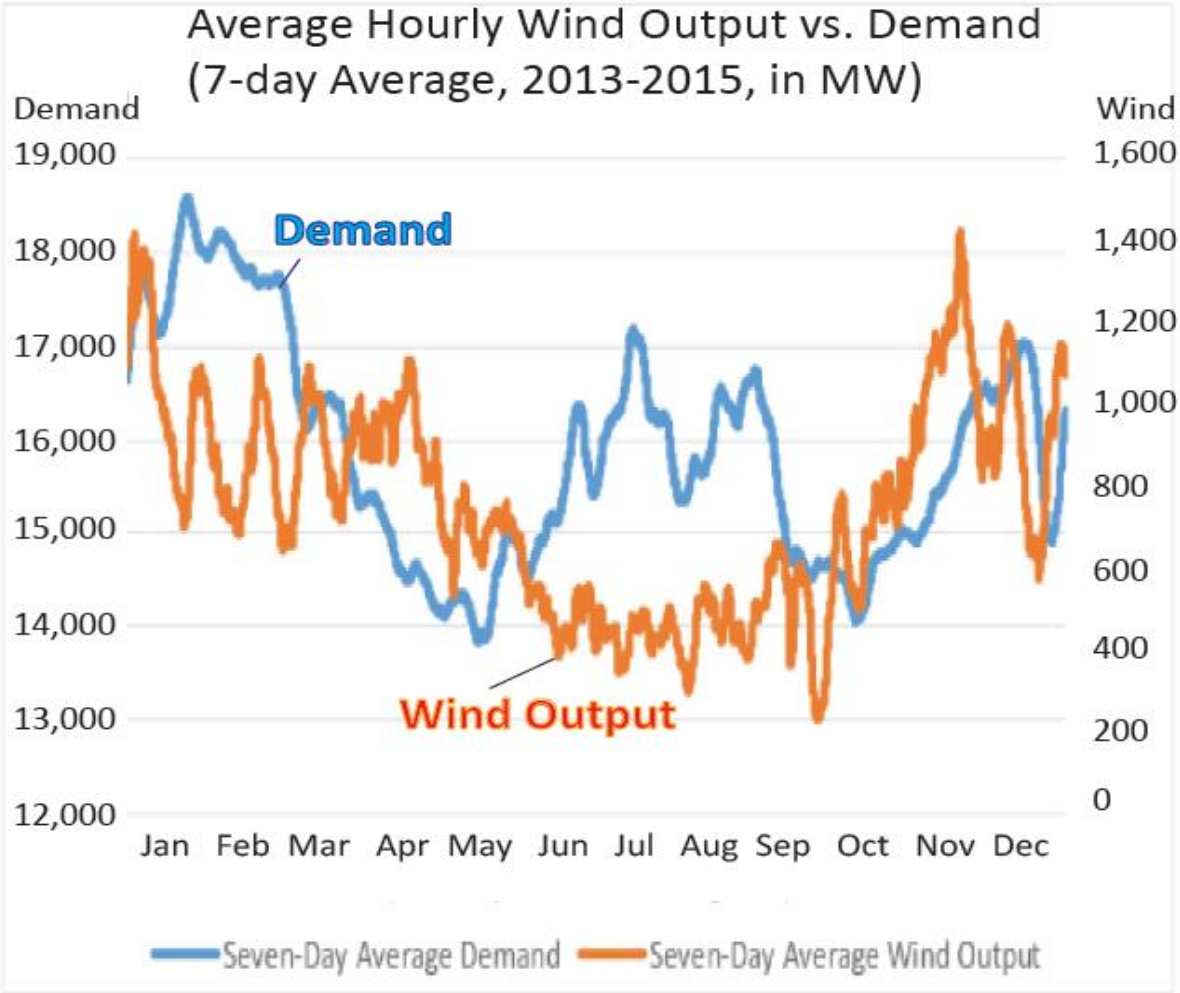


**Illustration 24.** Mismatch of demand (load) (blue) and wind output (orange) monthly averages for 2013-2015 (Data from Ontario's IESO (Independent Electric Supply Operator and CCRE Commentary, Ontario's High Cost Wind Millstone, by Marc Brouillette)

*Subsidy support of renewables:* The subsidies paid renewable providers come from a number of sources, including legislation from cooperating lawmakers. The US energy subsidies for various energy fuels are given below in dollars per MW-hour: Natural gas-$0.64; Coal-$0.64; Hydropower-$0.82; Nuclear-$3.14; Wind-$56.29; Solar-$775.64 (Energy Information Administration). So the combined support for wind and solar is 1,300 times larger than support for coal, yet coal is a fuel, which like natural gas or nuclear and provides energy 24/7 at the ready, while renewables are only a "potential" for power, without promise of when the supply may appear. The subsidy for renewable wind distorts the costs of all other forms of energy. The wind subsidy is $0.035 per kw-hr while the guaranteed price is $0.12 per kwhr which enables wind energy suppliers to undersell all other competitors, thereby eliminating all competition from the marketplace. Warren Buffett is famous for saying because wind energy is a bad investment otherwise, that, "I will do anything that is basically covered bylaw to reduce Berkshire's tax rate. For example on wind energy, we get a tax credit if we build a lot of wind farms. That's the only reason to build them. They don't make sense without the tax credit". (USNews.com/opinion…)

Illustration 25 shows the cost of wind turbine electricity based on explicit costs of 38.8 cents per kwhr based on data that could be assembled from Gilberson at Utah State University and Gilberson and Texas Tech. University. The real or total cost to consumers must also include the implicit costs which are largely unknown, that much resemble Cap and Trade "rules", and the result of government programs to do this or that based on legislation, but legislators are not energy planners.

# Wind Turbine Electricity Costs

## Many Costs are unknown… or company secrets

| EXPLICIT COST | IMPLICIT COST | $/MW-hour* | $/kw-hr |
|---|---|---|---|
| Capital | | $ 126 | 0.126 |
| O & M | | $ 10 | 0.01 |
| Transmission, lines losses | | $ 43 | 0.043 |
| ***Baseload cycling, back-up power*** | | ***$ 23*** | ***0.023*** |
| Environmental | | $ 9 | 0.009 |
| Integration to grid | | $ 12 | 0.012 |
| | Tariff (a "guarantee" more or less) | $ 78 to 130 | 0.13 |
| | Subsidies (federal) $23 ($35 pre-tax) | $ 35 | 0.035 |
| *sub-total (without "unknowns")* | | *$ 388* | *0.388* |
| | *Federal loan guarantee, waivers* | *Unknown* | |
| | *Subsidies (state)* | *Unknown* | |
| | *Renewable Portfolio Standard (State)* | *Unknown* | |
| | *Cap & Trade* | *Unknown* | |
| | *Land, lease, royalty cost* | *Unknown* | |
| | *Carbon tax* | *Unknown* | |
| | *Unmarketable power* | *Unknown* | |
| | *Opportunity cost* | *Unknown* | |
| | *Reduced reliability, short lifetime* | *Unknown* | |
| | *Social, health, environmental cost* | *Unknown* | |
| ***TRUE COST OF WIND ENERGY HERE*** -----> | | ***$388 + UNKNOWN*** | ***Unkn. + 0.388*** |

* 1 MW-hr or 1,000 kw-hours is approximately equal to energy used per household per month

*True cost of energy: Wind: Inst. of Political Economy, R. Simmons et al, Utah St. Univ., www.strata.org
Assessing wind power estimates: Inst. for energy research, M. Gilberson, Texas Tech. Univ.
***An energy density of about 8 watts/acre/year

**Illustration 25.** Chart showing explicit costs of wind turbine electricity while implicit costs remain unknown.

Comments: Workshop on implementing Washington's 100% clean electricity – Boleneus, D.

## ➢ THE HUMAN FACE OF ENERGY POVERTY

Energy poverty is suffering due to high energy costs. It results from inability to pay living costs. It involves decisions as to whether to heat, to feed the kids, to pay the mortgage, to move in with parents, to pay the energy bill or to go off-the-electric grid. In Ontario more than 62,000 electric customers were disconnected due to inability to pay utility bills, including 7% including low-income residents and just before Christmas. More than 421,000 electric customers were held in invoice arrears, unable to pay bills but had not been disconnected, a number amounting to 16% of all regular and low-income residents. Arrears debt reached $148 million in Ontario by 2014. See Illustration 26. The chart shows that 28% of the Ontario population with incomes below $47,700 by 2014 were listed as energy impoverished, an increase of 34% in four years.

Fraser Institute reports: In 2013 7.5% of Ontario households are in energy poverty. Parker Gallant reports: In 2014, 20% of Ontario households are in energy poverty. Fraser Institute, 2016 reports: Province is only able to use 4% of energy supplied by wind and solar while the cost of wind and solar is 20% of the commodity cost and the environmental benefits associated with renewables could have been accomplished with ongoing retrofits of coal plants at 1/10th of the cost. (July 6,2016 https://www.fraserinstitute.org/blogs/high-electricity-prices-putting-ruralontario-in-energy-poverty)

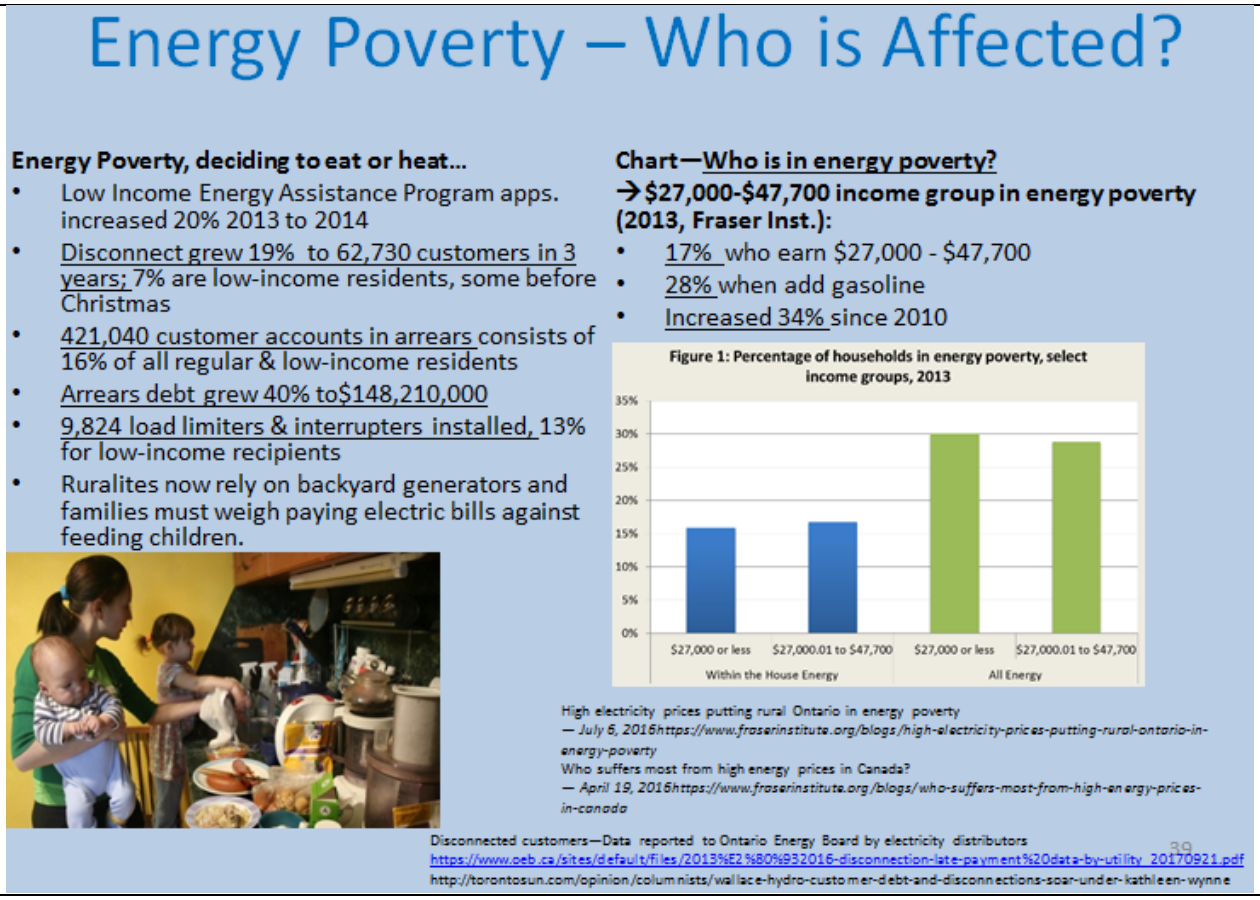


**Illustration 26.** Who is affected by rising energy costs and energy poverty.

Comments: Workshop on implementing Washington's 100% clean electricity – Boleneus, D.

Illustration 27 is a record transcribed from a GlobalNews Toronto newscast. It records challenges met by Bancroft Ontario residents to deal with high energy costs. Electricity prices jumped 16 percent in one year, 2015-2016. Jessup says they must decide to heat or feed the kids. The utility installed a load limited on the Smart meter so Jessup's family could no longer use there microwave oven, as the oven exceeded the load allowed. Counselor Kilpatrick says it's a crisis now that we must decide between basic necessities. Social work Deportier says she had to sell her house because level billing cost more than her mortgage, using over one-half of her paycheck. Ian says his family must move in with parents to survive.

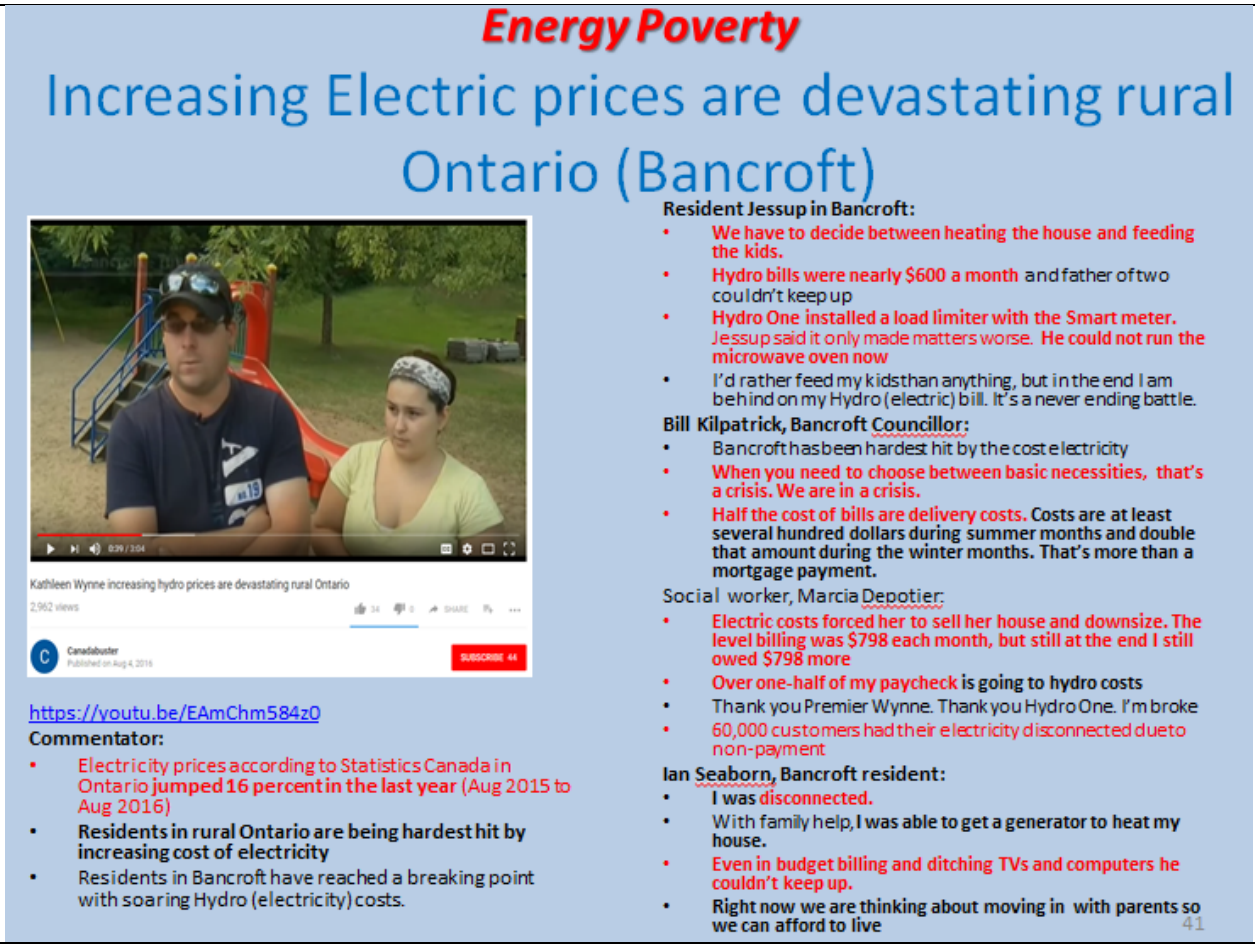


**Illustration 27.** Increasing energy prices are devastating rural Ontario (GlobalNews)

Illustration 28 from GlobalNews Toronto reveals the struggles of a family of six who live for months without electricity. With bills at $800 a month but when the family's electric debt reached $10,000 HydroOne disconnected Carol's family from the grid. Carol was desperate and distrusts their utility, HydroOne. Her family gets water in a garbage can that her husband brings home from work so the kids can bathe. She cooks on the barbeque and uses it to heat water for shower bags so kids can get clean. She says their usage has not changed since moving to rural Ontario 20 years ago but utility bills have increased 20-fold in that time. She cooks outside on the BBQ even in Ontario blizzards.

Utility costs reached a high in 2015 of 29.9 cents per kwhr and then increased again by 25% in 2016 to 36 cents. HydroOne promised to add another $285 to bills by January 2019. HydroOne charges are 12 times larger than rates of Avista Utilities at 7.1 cents per kwrh and 35 times larger than rates of 2.36 cents charged by Chelan and Douglas County

PUDs. One in 20 businesses in Ontario have closed. Rural residents must rely on backyard generators to afford to feed kids by avoiding the utility costs. Disconnects grew 19% in three years. Major Watson in Echo Bay says rates are killing small business[11] and the local grocery must close its refrigeration due to the cost of electricity for cooling[12]. Joanna in Timmins says that it costs $800 a month to keep electricity going in her trailer house as costs have increased 100% in the last decade.[13]

Ms Dobbyn, the United Way executive director in Bruce Grey, Ont., says people are angry, frustrated and told electric bills are their fault. People have had to walk away from mortgages larger than utility bills, with the largest utility bill at $22,000. It's totally a crisis. If we had 30 people in our community with measles it would be a health crisis as we had 3,000 cases of E. coli in Walkerton years ago..that was a crisis, but now we have 60,000 people disconnected from power and the government does not consider it a crisis. Ontarians must choose between heating eating. Dorothy and Ken, elderly couple in Moosonee, Ont. Say they stuggle to pay their utility bill by reducing food and cooking on the BBQ.[14]

[11] http://www.torontosun.com/2015/04/23/hydro-rates-crippling-small-business-owner-says

[12] https://www.youtube.com/watch?v=1w5dRIzyY7g

[13] Ontario's Wind Power Obsession Punishing Thousands-390,000 Families Struggling to Pay Power Bills and 58,000 Disconnected https://stopthesethings.com/2018/01/17/ontarios-wind-power-obsession-punishing-thousands-390000-families-struggling-to-pay-power-bills-58000-disconnected/
WHY HYDRO BILLS ARE SO HIGH IN ONTARIO--CBC News Nov 22, 2016Thttp://www.cbc.ca/news/canada/toronto/ontario-hydro-bills-1.3860314http://www.cbc.ca/radio/thecurrent/the-current-for-september-1-2016-1.3744010/people-have-to-choose-between-heating-and-eating-rising-hydro-costs-hit-ontarians-1.3744013

[14] WHY HYDRO BILLS ARE SO HIGH IN ONTARIO--REVISEDBy Mike Crawley, CBC News Nov 22, 2016 10:22 AM ET http://www.cbc.ca/news/canada/toronto/ontario-hydro-bills-1.3860314http://www.cbc.ca/radio/thecurrent/the-current-for-september-1-2016-1.3744010/people-have-to-choose-between-heating-and-eating-rising-hydro-costs-hit-ontarians-1.3744013

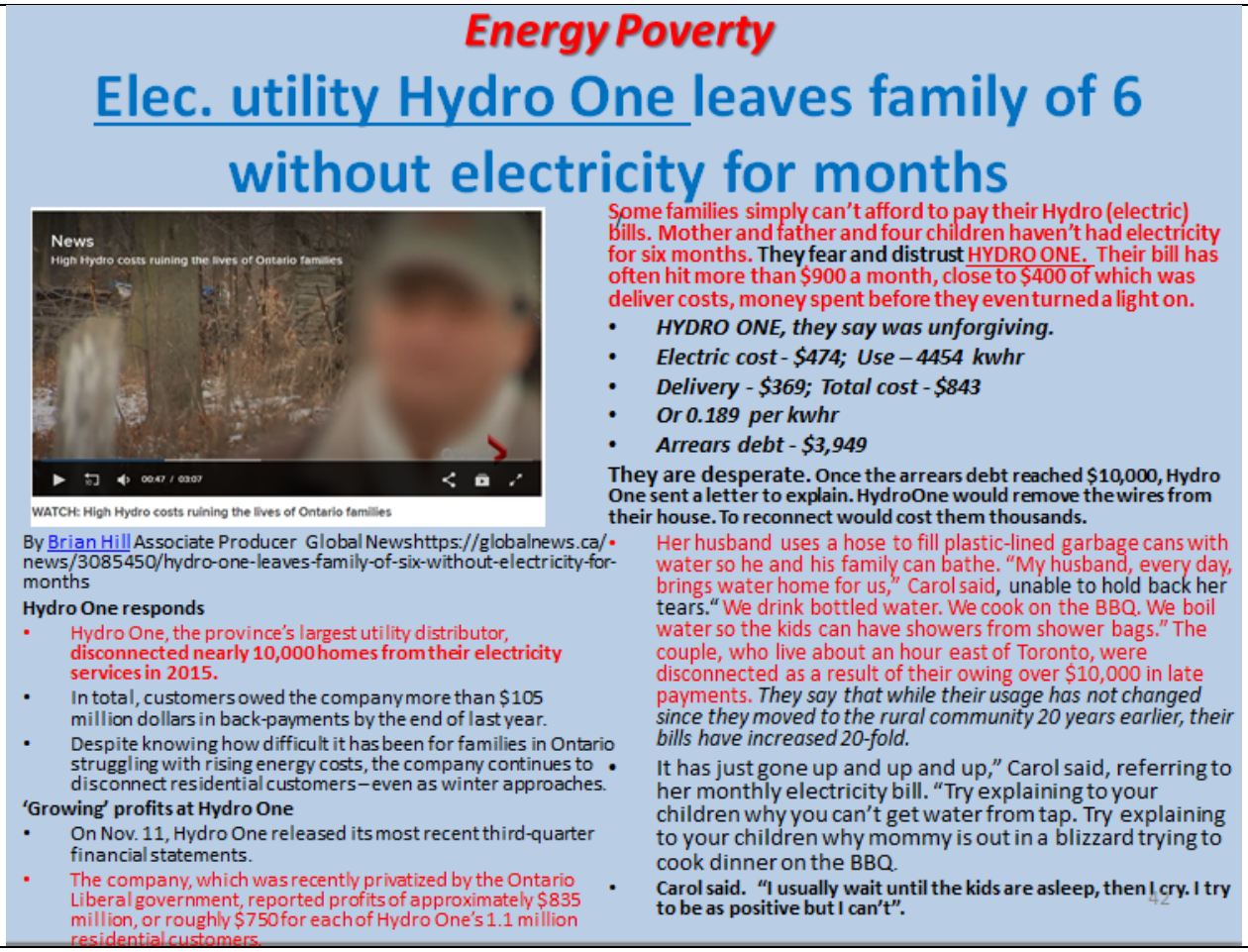


**Illustration 28.** Electric utility leaves family of six without electricity for months (GlobalNews)

The cost of electricity from renewable electricity by countries that both used renewables and do not use renewables is instructive. On Illustration 29 is compiled the cost of electricity in various countries that use varying percentages of renewable electricity so we can compare how much electricity cost increases as the percent of renewable contributions increases. The cost added to utility bills is 20 to 22 cents per kilowatt hour for renewable electricity, which adds $200 to $250 per month. Electricity costs 47.1 cents per kwhr in South Australia, 44.8 cents in Denmark and 43.3 cents in Germany compared to 11.9 cents in Washington and 7.1 to 7.8 cents for Avista. Germany is building 19 new coal fired power plants to supplement the renewable electricity in order to keep the lights on.

More examples showing the excessively high cost of renewables, and the hatred by the public[15]:

- **UK-**Electric prices have risen 133%, yet it committed to spend $40 billion on a nuclear plant to reduce emissions as it has rejected wind power as too expensive and ineffective in reducing emissions (R. Lea, 2012, Electricity costs: The folly of wind power)
- **Denmark-**Pres. Obama cited the Danes as the example to follow, but they pay the highest electricity prices in EU along with Germany; pays subsidies of $376 million per year to wind producers; subsidies paid up to $140,000

[15] Frondel, M., et al (2009), Economic impacts from the promotion of renewable energies: The German experience
G. C.Alvarez, 2009, Study of effects on employment of public aid to renewable energysources: http://juandemariana.org/pdf/090327-employment-public-aid-renewable.pdf
Status of renewable electricity mandates in the states: Institute for energy Research www.instituteforenergyresearch.org/states
Energy and consumer impacts of EPA's Clean Power Plan: NERA Economic Consulting, Insight in Economics (2015)

per year paid to each wind job, which is 250% higher than average Dane worker; wind power exports save neither CO2 nor fossil fuel use, but Danes export 57% of subsidized wind power to neighbors at almost no payment, with hope for return favors;

- **Spain**-2.2 jobs were lost elsewhere for each renewable job created; 9 of 10 jobs ended when renewables construction ended; committed $753,778 per green job; each green megawatt destroyed 5.39 jobs elsewhere;
- **Canada-**British Columbia levies a carbon tax of $30/ton of CO2, which costs one company more than $55 million per year in 2015

And from Germany and Australia:

- **Germany-**Often cited as a model to renewable energy promotion, its subsidies for solar workers are up to $240,000; price markup of 2.2 cents per kwhr for renewables; support for solar and wind is $73.2 billion and $28.1 billion, respectively; each green job disappeared when support ended; Germany's Energy Minister (Aug. 2016) said "our country has reached its limits with renewable subsidies along with its electricity prices or risk de-industrialization although its CO2 emissions have risen and is building 18 new coal plants to provide needed energy;
- **South Australia**-During a winter storm event in South Australia, the SA grid experienced a cascading shutdown of all of its wind and other power stations when 7 transmission towers collapsed blamed on its over-build of wind energy, now at 41% of total grid *The Australian 5/10/2016)*
- **South Australia**-Twice, in December 2016 and February 2017 a heatwave caused a blackout which continued, and again the cause seems to be excessive reliance on wind farms. The up and down ramping of the turbines seems responsible for the unstable conditions. Premier Weatherill blamed Australian Energy Market Operator, AEMO for not ordering the gas power station online.
- **Rolling blackouts ordered in SA in 40°C heat[16].** The AEMO said the blackout caused wholesale electricity prices to spike to $13,440 per MW-hr (equals $13.44 per kwhr)[17]
- **Australia –** Loss of wind power and extreme heat in Adelaide to 118oF. Caused residents to suffer heat exhaustion with out power for four days until the fossil plants were re-started. (Illustration 30). During the period 200,000 households went dark because the coal plant were shuttered two years earlier. The State ordered the Alcoa smelter and the Whyalla steelworks to shut and also ordered all private solar to disconnect due to power surges they were causing. The largest battery system in the world built by Elon Musk's Tesla, a 100 MW, $150 million system with 960 powerpacks at a cost of $197,000 each to support a 100 MW wind farm failed to provide more than a trickle of power until the batteries discharged after two hours, at sunset with the battery contribution so low it did not register on the power charts. The Tesla battery system failed, miserably.

[16] http://joannenova.com.au/2017/02/rolling-blackouts-in-sa-in-40c-heat/
[17] https://wattsupwiththat.com/2017/02/09/south-australia-heatwave-wind-power-collapse-rolling-blackouts/)

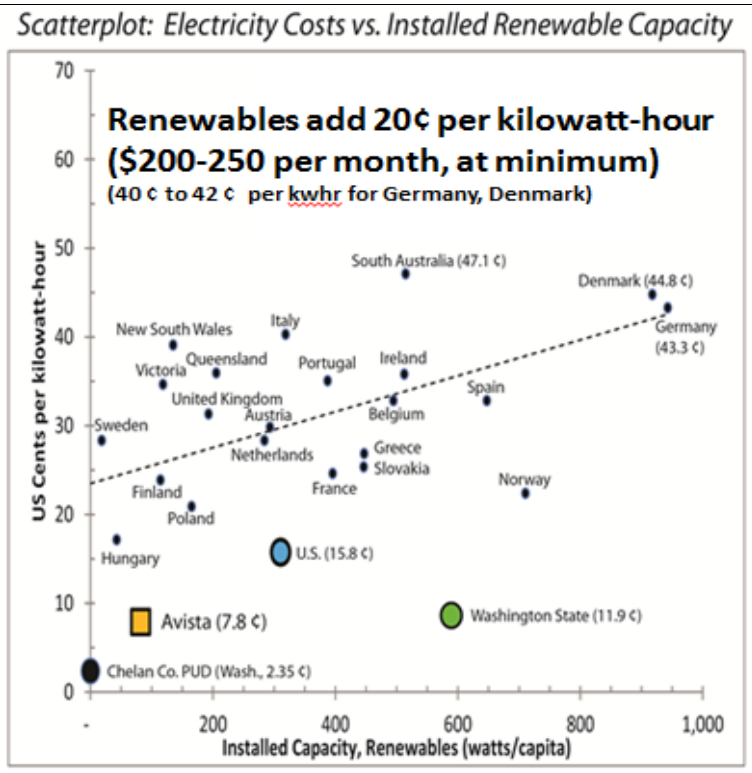


**Illustration 29.** Scatterplot showing increase in cost with increase in percent of renewable energy. All costs in US currency.

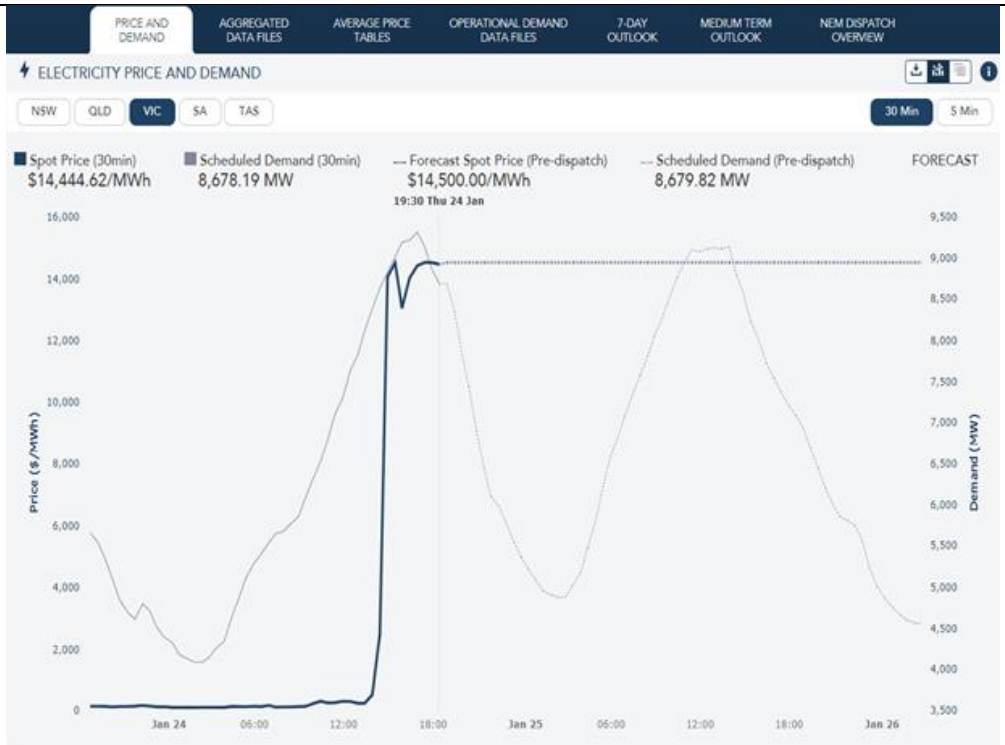


**Illustration 30**. AEMO chart shows "spike" in electric prices to $14,500 per MW hr in South Australia when the wind stopped blowing with heat in Adelaide and Whyalla for four days at 118°F. (46.6 to 48°C.) during Jan. 24 to Jan. 28, 2019

## LESSON FOR WASHINGTON STATE: ALL THE WORLD (where attempted) REJECTS WIND ENERGY.

Illustration 31 shows just one of the demonstrations in Ontario by residents against wind power. Up to 2,271 anti-wind websites worldwide express their displeasure and horror of wind turbines and its unaffordable cost of its energy that wind advocates purport it can provide. Wind turbine farms depress property values, down to 74% in Calumet Co. MI, down 58% in Ontario, and down 35% in Fond du Lack and Dodge Counties WI. Wind power creates tragedy everywhere.

- **2,271: anti-wind websites** www.quixoteslaststand.com
- **More here** www.epaw.org European Platform for Windfarms; www.aweo,org; Ontario Wind Resistance, www.ontario-wind-resistance; wwww.stopthesethings.com (Australia); www.joann3ova.com (Australia); www.masterresource.com; Energy Matters: www.euanmearns.com; www.heartland.org; www.notrickszone.com; Energy Probe International www.ep.probeinternational.org

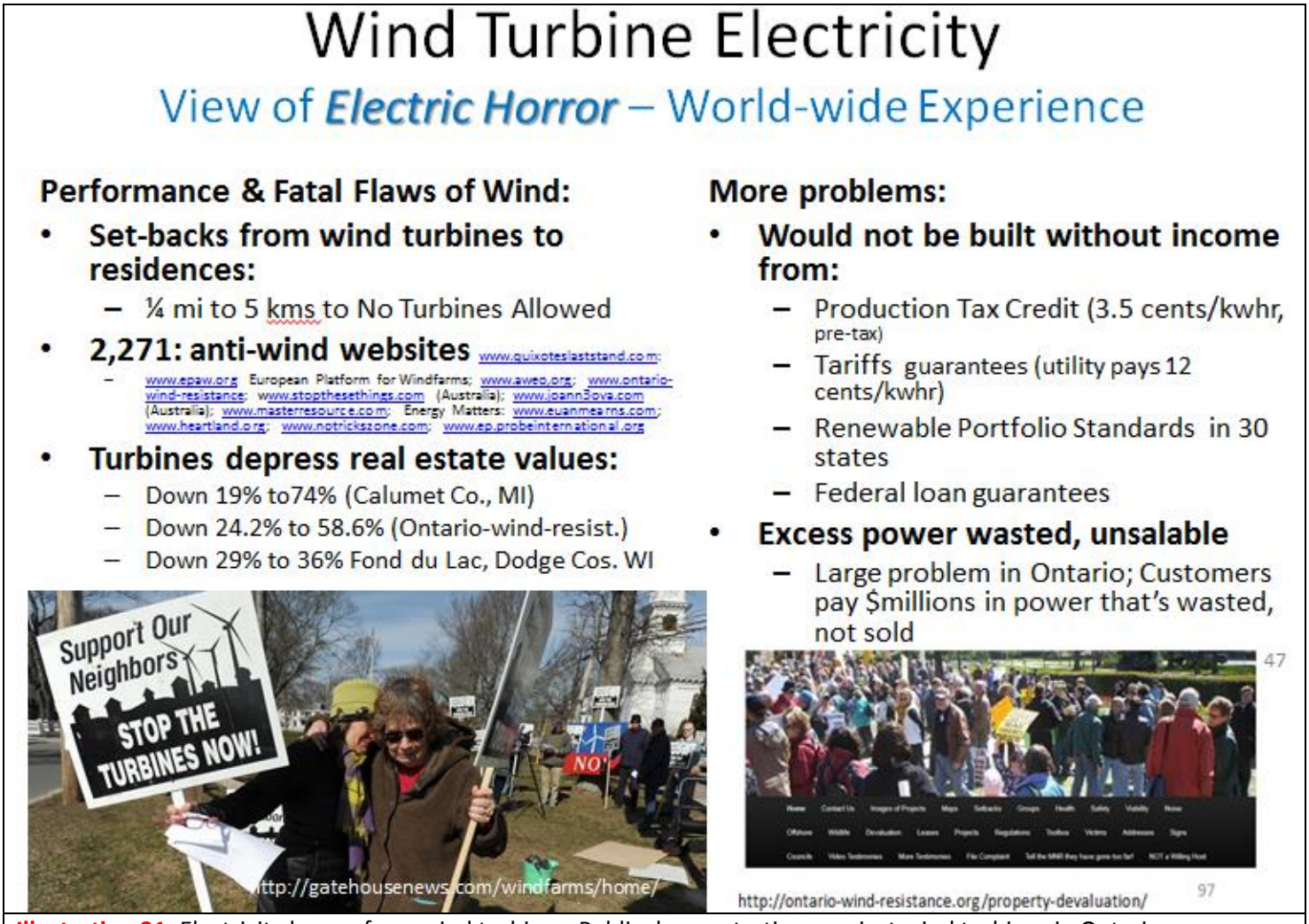


**Illustration 31.** Electricity horror from wind turbines. Public demonstrations against wind turbines in Ontario