Avoiding repeat problems with Wind Turbines
Supporting documents for Edgar County, Illinois

Prepared for: Edgar County Engineer, submittal date Feb 23, 2020

Summary created by Theodore P. Hartke, PE, PLS,
President, Hartke Engineering and Surveying, Inc.
former resident of Pilot Township, Vermilion County Illinois, and within InvEnergy's Cal-Ridge Wind Energy project situated in Champaign County and Vermilion County, Illinois.

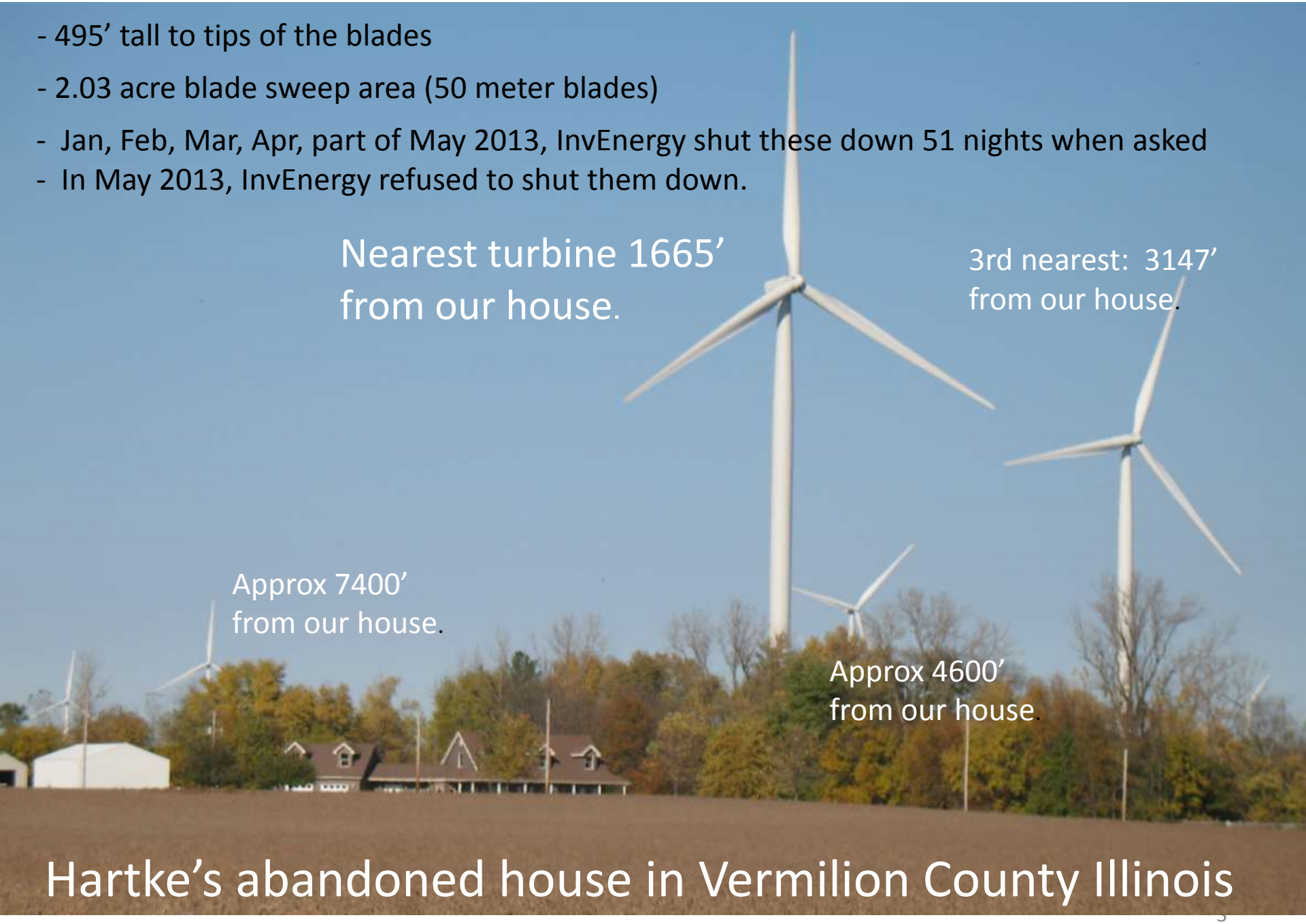
Address of presenter: 2121 E. 2350 N. Rd, Fithian, Illinois 61844 **
InvEnergy turbine electricity production start date: January, 2013 (approximate)
Turbines shut down 51 times at night between Jan through May, 2013
Hartke home abandonment date: Dec 22nd, 2013
Turbine size: GE 1.6 mW – 100 wind turbines, approx 495' to tip of highest blade

** Hartke no longer living in "refugee" doublewide mobile home owned by wife's family located in Collison, Pilot Township, Vermilion County, Illinois…….as of July 4, 2015, Hartke moved to "new" home (northeast of Sidney Illinois) which is 49 years older than "old" home.

RETHINK OUTDATED ASSUMPTIONS:

All wind energy ordinances from before 2012 are outdated and need replaced BECAUSE in the last 7 years:

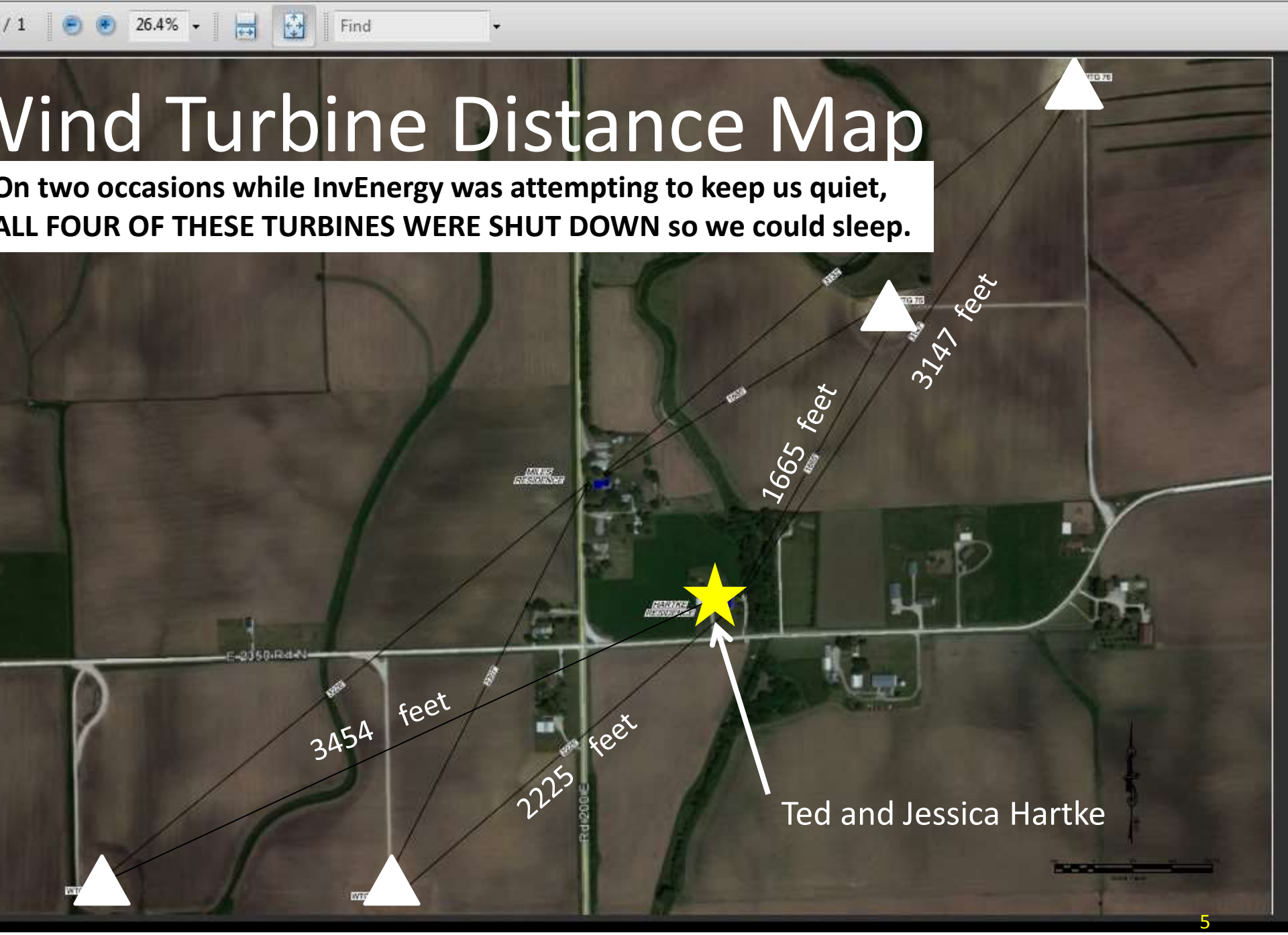
1.) Turbine heights have more than DOUBLED, (or more).
2.) Turbine blade sweep area has more than DOUBLED, (or more).
3.) Repeated experiences with turbines causing HOME ABANDONMENT.


- 495’ tall to tips of the blades
- 2.03 acre blade sweep area (50 meter blades)
- Jan, Feb, Mar, Apr, part of May 2013, InvEnergy shut these down 51 nights when asked
- In May 2013, InvEnergy refused to shut them down.
Nearest turbine 1665’ from our house.
3rd nearest: 3147’ from our house.
Approx 7400’ from our house.
Approx 4600’ from our house.
Hartke’s abandoned house in Vermilion County Illinois

View looking Southwest across front yard of Hartke residence

HARTKE'S FIRST COMPLAINT ABOUT NOISE: 01/22/13 1:22 AM
Marlin.....turbines are unbearable tonight. We need to talk. I have been awake for 45 minutes praying for a wind direction change or speed change to quiet the machine noise.

There were several nights when this turbine was the nearest operating turbine and we were NOT able to sleep. InvEnergy 's noise study report also confirms this fact. If we were given the choice for ONE turbine to be removed, we would choose this one @ 2225' away.


Vind Turbine Distance Map
On two occasions while InvEnergy was attempting to keep us quiet,
ALL FOUR OF THESE TURBINES WERE SHUT DOWN so we could sleep.
3147 feet
1665 feet
3454 feet
2225 feet
Ted and Jessica Hartke

For us, it was all about the noise.

Noise is THREE DIMENSIONAL:

1.) Noise Frequency:
(Wavelength of noise, pitch, rumbling, thumping, humming)

2.) Noise Magnitude:
(Decibels, Loudness, Amplitude, Strength)

3.) Noise DURATION:
(Intermittent, Short bursts, or **Constant Noise**)

Never allow an acoustician or anyone else convince you that allowing the maximum Illinois noise limits to be continuous at the window pane 24/7/365 will allow occupants to be able to sleep in their homes.

Dear Ted,

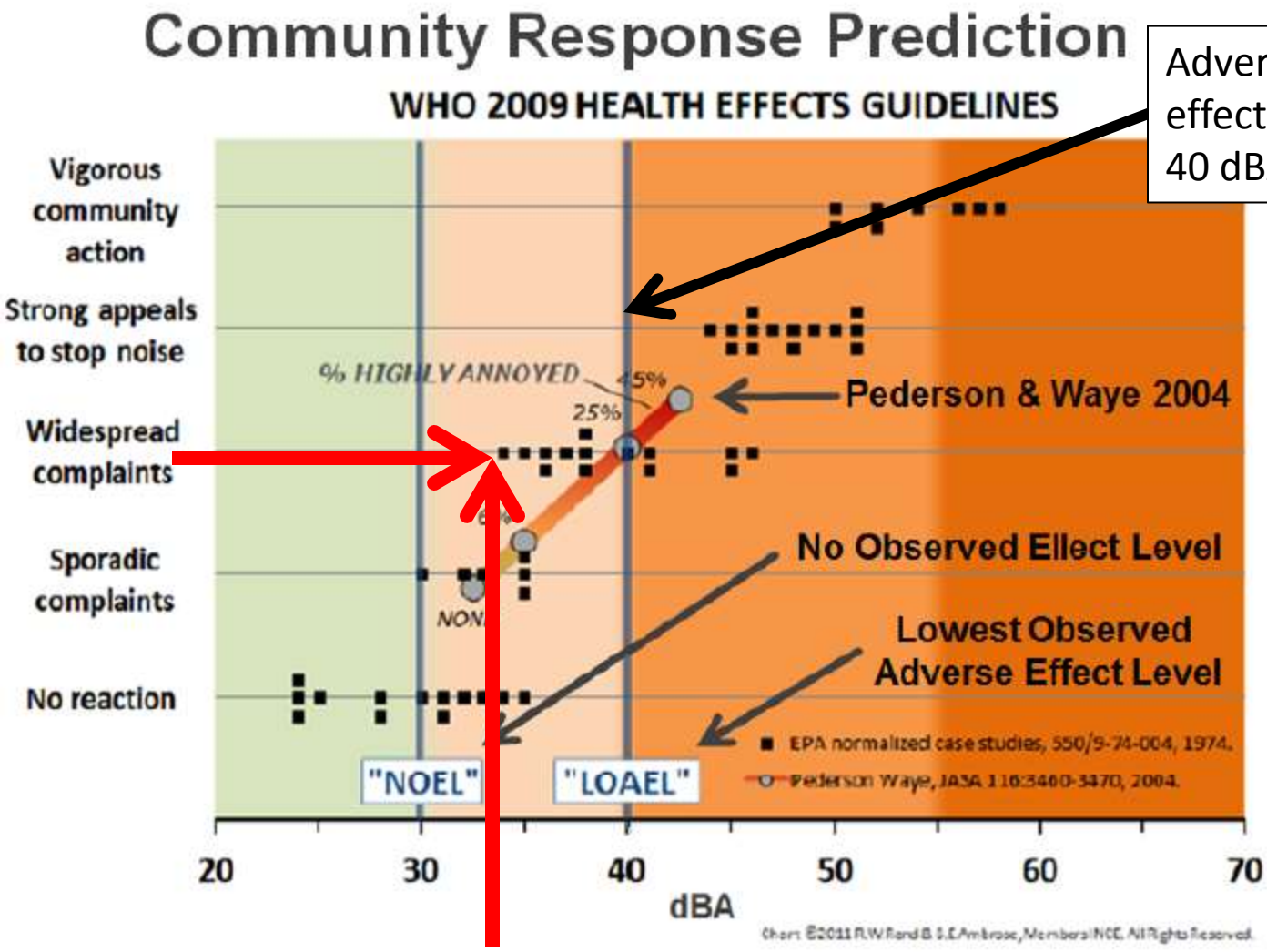
My name is Stephen Ambrose and I have over 35 years' experience performing environmental noise assessments for industrial and commercial facilities. My clients need to operate as a good acoustical neighbor to all nearby residential properties. I am a Board Certified Member of the Institute of Noise Control Engineering (INCE) and Member of the Acoustical Society of America (ASA).

Robert Rand (INCE) and I have worked together since we first met at Stone & Webster Engineering in the 1980's. For the past four years, we have been investigating industrial wind turbine audible and inaudible (infrasound) noise levels. We have identified why there are so many neighbor complaints involving excessive noise levels and adverse health impacts affects; sleep interference, headaches, nausea, vertigo, impaired cognitive ability, and more.

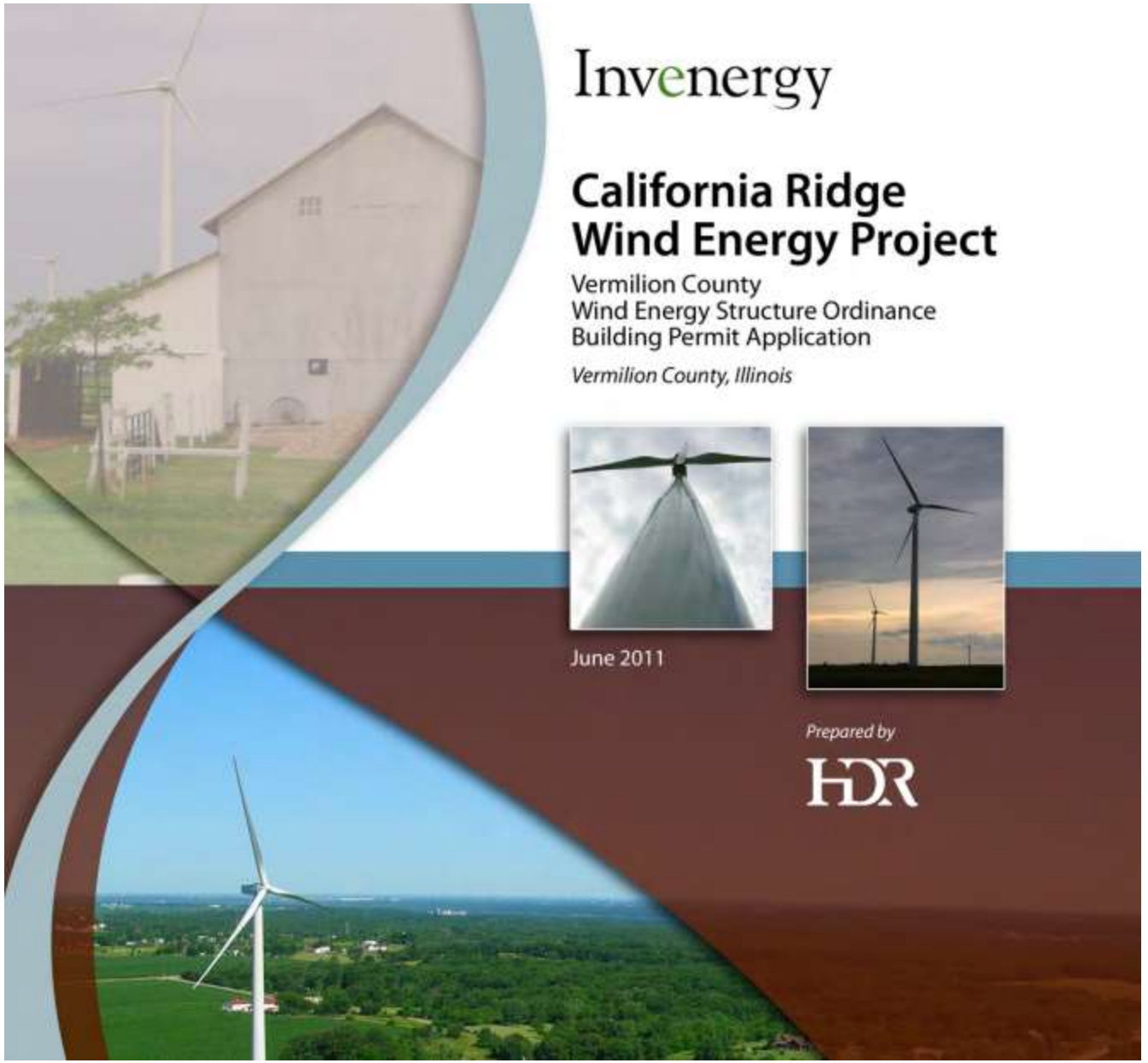
The only noise reduction option for wind turbines is to limit size or impose greater setback distance. This is especially true in quiet rural environments where there are no other man-made noise sources. Quiet areas need setback distances greater than a few thousand feet, but rather a mile or more. This is supported by research gathered from 55 environmental noise studies, which are summarized in the 1974 USEPA "Levels Document" (550/9-74-004). Research in 2004 by Pederson and Waye and the World Health Organization (WHO) 2009 Health Effect Guidelines are consistent with the USEPA recommendation when the noise levels are 'normalized' for quiet environments. This is all shown on Figure 1, which can be used to predict the range of public reactions to new noise source such as wind turbines.

Neighbors respond to the sound level increase and change frequency content. The public or community reaction is easily determined by locating the turbine noise level (dBA predicted or measured) on the 'x-axis' and the response is on the 'y-axis' when the black squares are intersected. Fifty 50 dBA exceeds and meets the black squares representing "*strong appeals to stop noise*" and "*vigorous community action*". Forty-five dBA has "*widespread complaints*" and "*strong appeals to stop noise*", 35 dBA has "*widespread complaints*" and "*sporadic complaints*". The design goal should be no louder than 32 dBA for "*no reaction*" or "*sporadic complaints*" at the worst.

This chart clearly shows that your family is being exposed to excessive noise and adverse health impacts.



Widespread Complaints Start at 33.5 dBA !!


Invenergy
California Ridge
Wind Energy Project
Vermilion County
Wind Energy Structure Ordinance
Building Permit Application
Vermilion County, Illinois
June 2011
Prepared by
HDR

HDR CLAIMS (InvEnergy Vermilion County)

California Ridge Wind Energy Project *Sound Analysis Report*

With the conservative additions, the analysis indicates that the majority of locations would experience turbine sound levels of less than 40 dBA (outdoors). This level is sufficiently low to minimize or eliminate any potential for sleep interference or indoor/outdoor speech interference, as defined by the US Environmental Protection Agency (EPA). Furthermore, these average hourly levels are compatible with parameters for acceptable levels of noise within residential land uses established by the EPA guidelines and the State of Illinois' requirements – per Title 35, Chapter I, Part 901.

InvEnergy Vermilion County Application has PROBLEMS!!!!

Sound Analysis Report (HDR Engineering) Page 9 June 2011

Majority of locations would experience sound levels of less than 40 dBA. This level is sufficiently low to minimize or eliminate any potential for sleep interference? If true, then why Hartke Home Abandonment after **SLEEP DEPRIVATION ISSUES PERSISTED ???**

EFFECTS OF WIND TURBINE ACOUSTIC EMISSIONS

June 23, 2015

Paul D. Schomer, Ph.D., P.E.
Schomer and Associates, Inc.
Champaign IL. 61821

Member, Board Certified,
Institute of Noise Control Engineering

Standards Director, Emeritus
Acoustical Society of America

Wind turbine effects

- Annoyance -- audible sound
- "Health" effects -- infrasound
- Sleep disruption -- both audible and infrasound

Wind turbine effects

- Annoyance -- audible sound
- "Health" effects -- infrasound
- Sleep disruption -- both audible and infrasound
- The Illinois Pollution Control Board (IPCB) is only responsive to the first bullet: annoyance
- So, the Health effects caused by infrasound are not addressed by the IPCB.

Wind turbine effects on sleep

- Effects of outdoor audible sound:
  - Almost no significant effects predicted at 39 dB or lower (WHO)
  - Sharp increase in adverse health effects predicted in the 40-55 dB range (WHO)
- Effects of non-audible low-frequency and infrasound:
  - Reported awakenings in agitated and/or scared states

Some of the reported effects of wind-turbine low-frequency and infrasonic emissions (Effects Reported)

- Pulsations
- Pressure on the ear
- Headache
- Fatigue
- Nausea
- Dizziness

Who will be affected? Where, when, and why?

- We do not know?
- Many windfarms have no observable problems
- However, in the case of wind farms with high numbers of complaints, it appears that something like 1/3 of the residents self-report being significantly affected, with a subset of these reporting to being severely affected
- We do not know the true number because those receiving money from the windfarm typically have in their contract a prohibition on speaking out or taking part in any action in opposition to the windfarm.

The Cooper Study
(Cooper)

- Australia
- Subjects: 3 couples in 3 houses; 0.6 to 1.6 km (2,133 to 5,249 ft.)
- Power company provided operations data and turned turbines on and off; subjects did not know when
- Subject responses in sync with turbine power being generated, and major changes in power
- Subject responses were not in sync with the audible sound or vibration

A brief history of wind industry allegations

- 7 major allegations, and potentially one revised allegation
- There are factual data to evaluate 6 of the 7

1. Alleges, A-weighting is appropriate: Wrong

- According to both ISO (International Organization for Standardization) and ANSI (American National Standards Institute) Standards, A-weighting should not be used for wind-turbine noise, but the industry ***has not complied with these Standards.***

2. Alleges, a wind turbine is quieter than a refrigerator: Wrong

- Follows from incorrect use of A-weighting
- A-weighted level from a wind farm may be lower than the level for a refrigerator but it is ***not quieter***
- This shows ***how wrong A-weighting is*** for assessing wind-turbine noise

3. Alleges, if you can't hear it, it can't hurt you: Wrong

- We don't see x-rays, but they *can hurt us*
- We don't see infra-red, but it *can hurt us*
- We don't hear ultrasound, but it *can hurt us*
- We don't hear infrasound, but it *can hurt us*
- The Cooper study shows that the wind industry's assertion is not correct

4. Alleges, it is 100% the nocebo effect; Australia, USA, Canada, etc.

- Claim non-auditory effects are 100% imagined in perhaps 25 countries around the world
- Claim people hear the sound and make themselves angry
- Due to the internet
- Those who are sensing effects:
  - Include infants, small children who can't read the internet (Shirley Wind study)
  - Include the deaf (Cooper study)

4. Alleges, it is 100% the nocebo effect; Australia, USA, Canada, etc.: Wrong

- Claim people **hear** the sound and make themselves angry
  - About **2/3 of the complainants** we met at Shirley **could not hear the turbines** inside their houses
  - The researchers could not reliably hear the turbines in 2 of the 3 tested homes
  - The **best subject** in the Cooper study is **deaf**
- Blaming the internet is also a fallacy
  - Same public responses to low-frequency industrial noise existed at least **40 years ago**—and there was **no internet** to blame

6. Alleges, no non-audible pathway and corresponding effect(s) exist: Wrong

- Cooper's study shows cause and effect for at least one non-visual, non-audible pathway by which wind turbine emissions affect the body and "signal" the brain.
- What you can't hear, can hurt you.

6. Alleges, no non-audible pathway and corresponding effect(s) exist: Wrong

- ISO 1996 Part 1: "Investigations have shown that the perception and the effects of sounds differ considerably at low frequencies as compared to mid or high frequencies. The main reasons for these differences are as follows:"
- Among other reasons, ISO 1996 Part 1 has:
  - "perception of sounds as ***pulsations*** and fluctuations;"
  - "complaints about ***feelings of ear pressure***"

6. Alleges, no non-audible pathway and corresponding effect(s) exist: Wrong

- 1985 Toronto study exposed people to 8 Hz (Toronto Study)
  - 12 to 23 %, reacted
- 8 Hz that had lower levels and numbers of overtones elicited
  - Nausea, Dizziness
- 8 Hz that was rich in overtones elicited
  - Headache, Fatigue

6. Alleges, no non-audible pathway and corresponding effect(s) exist: Wrong

- The ISO standard shows that this allegation is Wrong.
- The 1985 Toronto study shows that this allegation is Wrong.
- The Cooper study shows that this allegation is Wrong.

7. "Expert" studies *find no references* to non-audible pathways: Wrong

- Several "expert" studies all find nothing
  - The "expert" studies do not find ISO 1996-1
  - The "expert" studies do not find the 1985 Toronto study

7 major allegations; all are shown to be wrong

- A-weighting is not OK to assess turbine noise
- Wind turbines are not quieter than a refrigerator
- What you can't hear, can hurt you
- It is not 100% nocebo
- Wind turbines emit infrasound
- A non-audible pathway by which wind turbine emissions affect the body does exist
- Research exists

What will industry say?

- They will bring in dozens of experts to say how wrong every fact is. They will find a reason why every Standard, every fact, and every study I quoted is flawed.
- They will tell you the levels used in the Toronto study were too high. This is true for wind turbines, but this was 1985 and the purpose was for higher level sources, not wind turbines.
  - But the "expert" studies should have found this study and reported on it. They did not.

Evaluating industry and supportive "expert" studies

- Studies by industry and /or government
- A Massachusetts study said every study in the world on human response to wind turbine noise that might help a community in any way was inadequate for one reason or another. One of their most cited reasons for deprecating a study was that the study was cross-sectional rather than longitudinal. It is not important, for now, what these terms mean.

(Massachusetts Study)

Evaluating industry and supportive expert studies

- Massachusetts EPA and Dept. of Public Health
- Panel of “Independent Experts”
- "The limited description of the selection process in this study is a limitation as well, as is the cross sectional nature of the study. Cross-sectional studies lack the ability to determine the temporality of cause and effect; in the case of these kinds of studies, we cannot know whether the annoyance level was present before the wind turbines were operational from a cross sectional study design. Furthermore, despite efforts to blind the respondent to the emphasis on wind turbines, it is not clear to what degree this was successful."

The point is people need to evaluate what is being said


Quieter than a refrigerator


A-weighting is fine for assessment

If you can't hear it . . .


No low frequencies


Of the thousands of people around the world having problems with wind turbines, 100 % are imagining it. It is all nocebo.


No known pathways or effects except for hearing


No known research supporting other pathways or effects

THIS IS WHAT WIND COMPANIES WANT YOU TO BELIEVE

Conclusions

- With Cooper, the preponderance of the evidence is that infra-sound causes adverse effects in some people
- Industry provides no proof that the wind turbine acoustic emissions are not causing adverse effects. Their proof is "expert" studies that find that "no literature exists." And all of these expert studies failed to find the pertinent international standard and at least 2 other pertinent documents.

Recommendations

- For audible noise, public officials should require that the the maximum A-weighted sound level at any residence be < 39 dBA
- For very low-frequency sound and infra-sound, public officials should require industry to prove that their new designs will not create adverse effects on people, notably, on sleep or those of the type listed on earlier charts. This proof from industry must be provided before any new windfarms are approved.

DOCTOR QUOTES:

The Irish Doctors' Environmental Association also said the set-back distance of 500m is not enough, that it should be increased to at least 1,500m [1.5km, almost 1mi].

Visiting Research Professor at Queen's University, Alun Evans and lead clinical consultant at Waterford Regional Hospital Prof Graham Roberts have both expressed concerns over the current noise levels and distance of turbines from homes.

Environment Minister Alan Kelly is currently reviewing the wind energy planning guidelines and the group is calling for both issues to be examined closely in the interest of public health.

The association has called for the introduction of a maximum noise level of 30 decibels as recommended by the WHO and for the set-back distance from inhabited houses to at least 1,500m from the current 500m.

Prof Evans said the construction of wind turbines in Ireland "is being sanctioned too close to human habitation".

"Because of its impulsive, intrusive, and sometimes incessant nature, the noise generated by wind turbines is particularly likely to disturb sleep," he said.

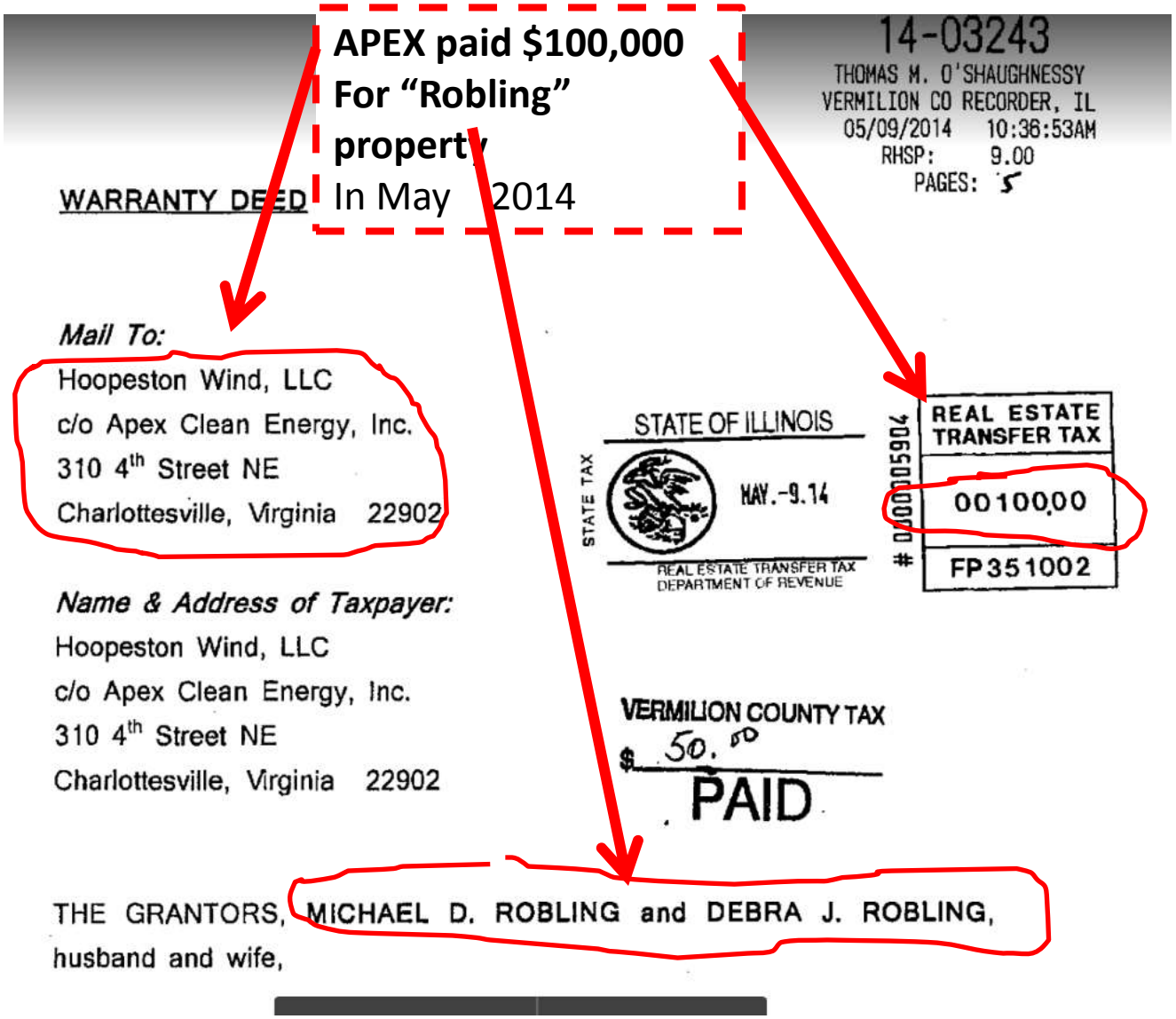
"The young and the elderly are particularly at risk. Children who are sleep-deprived are more likely to become obese, predisposing them to diabetes and heart disease in adulthood. As memory is reinforced during sleep, they also exhibit impaired learning."

Prof Evans said adults who are sleep-deprived are at risk of a ranges of diseases, particularly "heart attacks, heart failure, and stroke, and to cognitive dysfunction and mental problems".

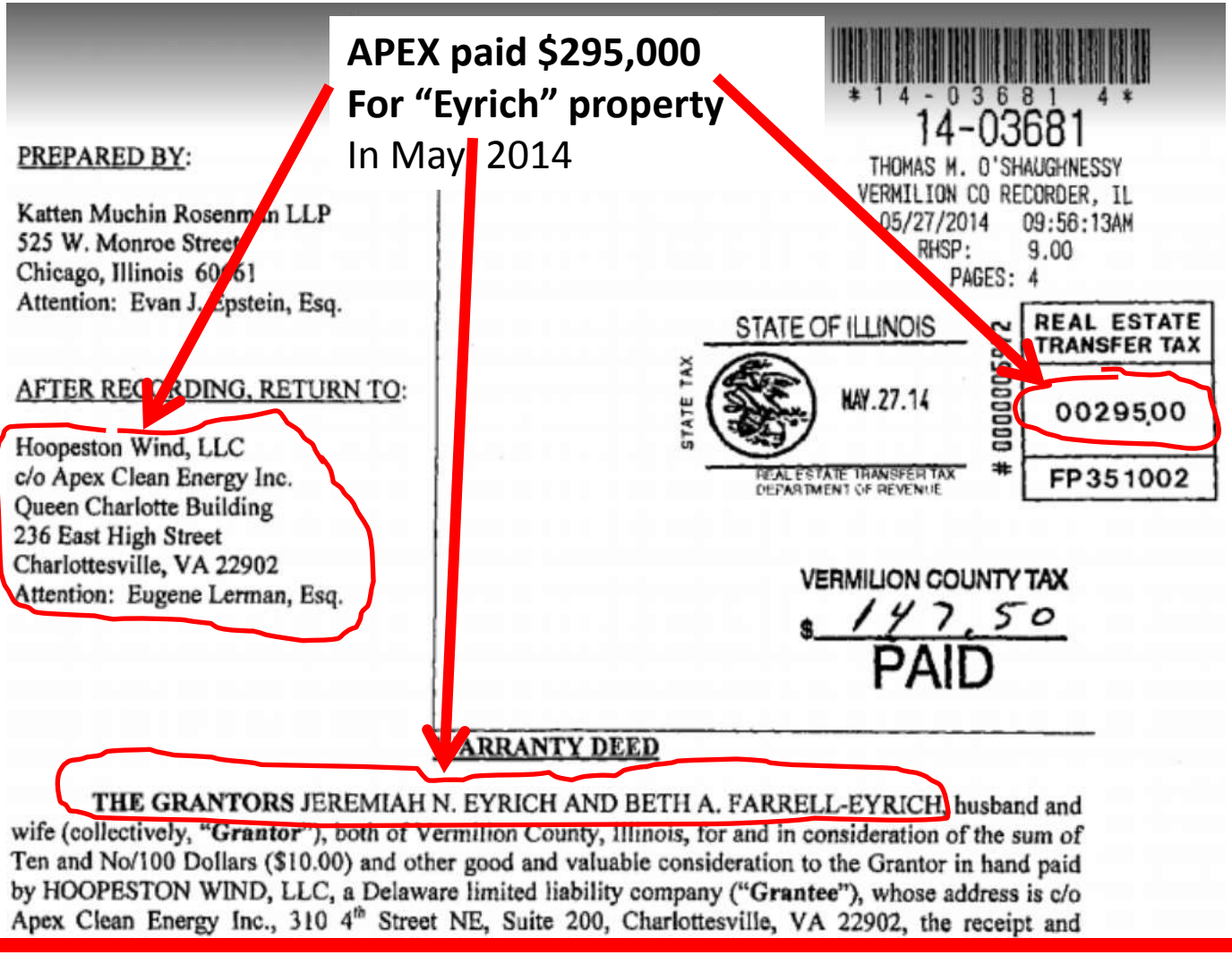
Prof Evans, attached to the Centre for Public Health at Queen's, said the Government should exercise a duty of care towards its citizens and exercise the 'precautionary principle' which is enshrined in the Lisbon Treaty.

"It can achieve this by raising turbine set-back to at least 1500m, in accordance with a growing international consensus," said Prof Evans.

https://www.wind-watch.org/news/2015/03/12/doctors-call-for-reduction-in-turbine-noise/


APEX paid $100,000
For "Robling"
property
In May 2014
14-03243
THOMAS M. O'SHAUGHNESSY
VERMILION CO RECORDER, IL
05/09/2014 10:36:53AM
RHSP: 9.00
PAGES: 5
WARRANTY DEED
Mail To:
Hoopeston Wind, LLC
c/o Apex Clean Energy, Inc.
310 4th Street NE
Charlottesville, Virginia 22902
Name & Address of Taxpayer:
Hoopeston Wind, LLC
c/o Apex Clean Energy, Inc.
310 4th Street NE
Charlottesville, Virginia 22902
STATE OF ILLINOIS
STATE TAX
MAY.-9.14
REAL ESTATE TRANSFER TAX
DEPARTMENT OF REVENUE
REAL ESTATE TRANSFER TAX
00100.00
FP351002
VERMILION COUNTY TAX
$ 50.00
PAID
THE GRANTORS, MICHAEL D. ROBLING and DEBRA J. ROBLING,
husband and wife,

APEX paid $295,000
For "Eyrich" property
In May 2014



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14-03681
THOMAS M. O'SHAUGHNESSY
VERMILION CO RECORDER, IL
05/27/2014 09:56:13AM
RHSP: 9.00
PAGES: 4

PREPARED BY:

Katten Muchin Rosenman LLP
525 W. Monroe Street
Chicago, Illinois 60661
Attention: Evan J. Epstein, Esq.

AFTER RECORDING, RETURN TO:

Hoopeston Wind, LLC
c/o Apex Clean Energy Inc.
Queen Charlotte Building
236 East High Street
Charlottesville, VA 22902
Attention: Eugene Lerman, Esq.

STATE OF ILLINOIS
STATE TAX
MAY.27.14
REAL ESTATE TRANSFER TAX
DEPARTMENT OF REVENUE

REAL ESTATE TRANSFER TAX
0029500
FP351002

VERMILION COUNTY TAX
$ 147.50
PAID

WARRANTY DEED

THE GRANTORS JEREMIAH N. EYRICH AND BETH A. FARRELL-EYRICH, husband and wife (collectively, "**Grantor**"), both of Vermilion County, Illinois, for and in consideration of the sum of Ten and No/100 Dollars ($10.00) and other good and valuable consideration to the Grantor in hand paid by HOOPESTON WIND, LLC, a Delaware limited liability company ("**Grantee**"), whose address is c/o Apex Clean Energy Inc., 310 4th Street NE, Suite 200, Charlottesville, VA 22902, the receipt and

THINK: If there is nothing wrong with APEX wind turbines, then why would APEX purchase these homes?

36178 N 990 East Rd,
Rossville, IL 60963

3 beds · 1 bath · 1,100 sqft Edit

Edit home facts for a more accurate Zestimate.

SOLD: $117,500

Sold on 05/20/15

Zestimate®: $97,142

Price this home

EST. REFI PAYMENT

$434/mo

See current rates

Thinking About Selling?

Find a local agent who can give you a professional estimate of your home value.

Find an Agent

WOW! 5.19 acres come with this 3 bedroom ranch home. The house has an updated kitchen, wood fireplace, family room and living room, some updated windows and siding. The property offers a HUGE pole barn with tall door. It is also set up for horses, cattle, etc. It offers another metal building for storage. 5 grain bins, 5 acres, above ground pool with deck, and shed. The property also has a heated and cooled building that would be excellent for at home business, beauty shop, daycare, etc. ALSO, this property is a part of the GOOD NEIGHBOR AGREEMENT which the Hoopeston Wind LLC will give the new owner $2,500 per year for taxes. So buy this home and you won't pay taxes! Motivated seller! All room dimensions, sq. footage and year built are

60% loss differential due to APEX turbines

Price / Tax History

Price History | Tax History

DATE	EVENT	PRICE		$/SQFT
05/20/15	Sold	$117,500	-9.5%	$106
01/29/15	Listing removed	$129,900		$118
12/21/14	Listed for sale	$129,900	-56.0%	$118
05/27/14	Sold	$295,000		$268

APEX liens against landowners in Vermilion County Illinois

19-Dec-14			
AMBASSADOR STEEL FABRICATON LLC	IKEA ENERGY US LLC HOOPESTON WIND LLC APEX CLEAN ENERGY MICHELS CORP	MECHANIC LIEN	$1,435,402.43

FAVOR OF	AGAINST/ADDRESS	LIEN TYPE	AMOUNT
7-Jan-15			
AMBASSADOR STEEL FABRICATION LLC	IKEA ENERGY US LLC APEX CLEAN ENERGY HOOPESTON WIND LLC MICHELS CORP	MECHANIC LIEN	$506,781.38

21-Jan-15			
RESITECH INDUSTRIES LLC	CURTIS ORR RANDIE ORR TAMARA ORR HOOPESTON WIND LLC KENTLAND BANK MICHELS CORPORATION	MECHANIC LIEN	$170,581.91

OVER 2.1 MILLION DOLLARS IN LIENS FOR NON-PAYMENT

APEX EXCEEDING 4.5 MILLION DOLLARS IN LIENS IN VERMILION COUNTY !!

ILLINOIS DEPARTMENT OF REVENUE

28-May-15

NCSG CRANE AND HEAVY HAUL SERV INC	HOOPESTON WIND LLC	MECHANIC LIEN	$2,444,703.73
NCSG CRANE AND HEAVY HAUL SERV INC	HOOPESTON WIND LLC	MECHANIC LIEN	$2,444,703.76
NCSG CRANE AND HEAVY HAUL SERV INC	HOOPESTON WIND LLC	MECHANIC LIEN	$2,444,703.76
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NCSG CRANE AND HEAVY HAUL SERV INC	[illegible]	MECHANIC LIEN	$2,444,703.76
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[illegible]	[illegible]	[illegible]	$2,444,703.76
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NCSG CRANE AND HEAVY HAUL SERV INC	HOOPESTON WIND LLC	MECHANIC LIEN	$2,444,703.76

*** MEMORANDUM OF JUDGMENT ***

Wind Farm Non-payment causes liens to be filed against the following local farmers – 1-17-2015
www.Illinoisleaks.com

Olson Acres LLC
Robert Alexander
Brian Alt Trust
James Alt
Kristin Alt
Lawrence Alt
Mark Alt
Harold and Ardith Orr
Lucinda Barnes
Carol Betka
Larry Betka
Melissa Betka
Skip Betka
William Blair
Mann Brothers
Philip Duncan
Sondra Duncan
Carol Edmund
Gernand Family Limited Partnership
Bonita Frank
Bruce Frank
John Green
Lynn Green
Paula Green
Alice Hammerton
Caryn Hatfield
James Hatfield
MWG Holdings
Dewain J Moore Trust
Elizabeth Jane Jacobs
Betty Jo Hartter
Michael John Green
Debra Kinnett
Lois Lee Petersen
Bush LLC
DocsFarms LLC
Kristi Maged
William Marshall

Donna Mason
Jeffry Mason
John Mason
John Mason
Michael Mason
Steven Mason
Charles Maxwell
Debbie Maxwell
Dewain Moore
Marilyn Moore
LaVerne O'Hare
Heirs of Frances Wyers
Heirs of Marcia Hill
Curtis Orr
Randie Orr
Tamara Orr
Joe Peters
Mary Peters
Forest Peters, Jr.
Ann Phillips
Frederic R. von Neuimann
Amy Reetz
Carolyn Robinson
Howard Robinson
Sandra Satterwhite
Debra Short
Blair Siblings Trust
Norma Smith
Cheryl Stewart
Derick Stewart
Jean Stewart
Lorraine Tobeck
Raymond Tobeck
Gerald Toheroh
Lillian Totherhoh
Robert Totherhoh
Timothy Totheroh
Erik von Neumann
Michael vonNeuimann

Melinda Willard
Scott Willard
Joyce Williams
Maxine Williams
Maxine Williams Trust
Russell Williams

How many MORE names
Should we name to
Convince famers that APEX
Is a BAD business partner.

Ramifications include:

1.) Inability to secure operating loan(s)
2.) Issues with mortgaging and estate planning
3.) Issues with interest rates when negotiating new loans/liens for land transactions..lenders moving the farmer into higher risk categories.

Elected officials' ONLY job is to protect health and welfare of citizens.

Is your decision based on facts and science and experience?

A government official does not have the authority to give away private property rights.

Circumventing a negotiation between developer and local citizen opens the door to lawsuits.

The Western Australian Planning Commission Bulletin recommends 1km **(3281 feet)**
The National Wind Collaborating Committee 1/2 mile **(2640 feet)**
The National Research Council 1/2 mile **(2640 feet)**
The French National Academy of Medicine and UK Noise Assoc. 1.5 km **(4921 feet)**
The Wind Energy Handbook recommends a **10 rotor diameters** to avoid shadow flicker

Professor Terry Matilsky from the Dept of Physics and Astronomy at Rutgers University, ice throws from large turbines can reach up to a distance of 1750ft. and blade throws can reach 2500 feet.

Dr. Paul Schomer's criterion

- *The nature of DNL is that if the DNL is based on a sound level that is constant over the entire 24 hour day, that sound level is 6 dB lower than the DNL level that it calculates to.*
- *For example, a constant, 24 hour level of 39 dB calculates to a DNL = 45 dB. (ANSI, ISO)*
- *The results are that* ***the nighttime level and, indeed, the 24 hour level at most should be ≤ 39 dB,*** *and it is not unlikely that the correct limit is lower than 39 dB.*
- *A constant level range from 24-39 dB equates to a DNL range from 30-45 DNL.*
- Hartke note: Dr. Schomer should know…..he authored the Illinois standards. He co-authored the InvEnergy noise study near my abandoned home.

Due to uncertainties, design noise limit should be a minimum of 5 dB less than Maximum allowable 39 dB level 95% of the time. This is Dr. Schomer's recommendations:

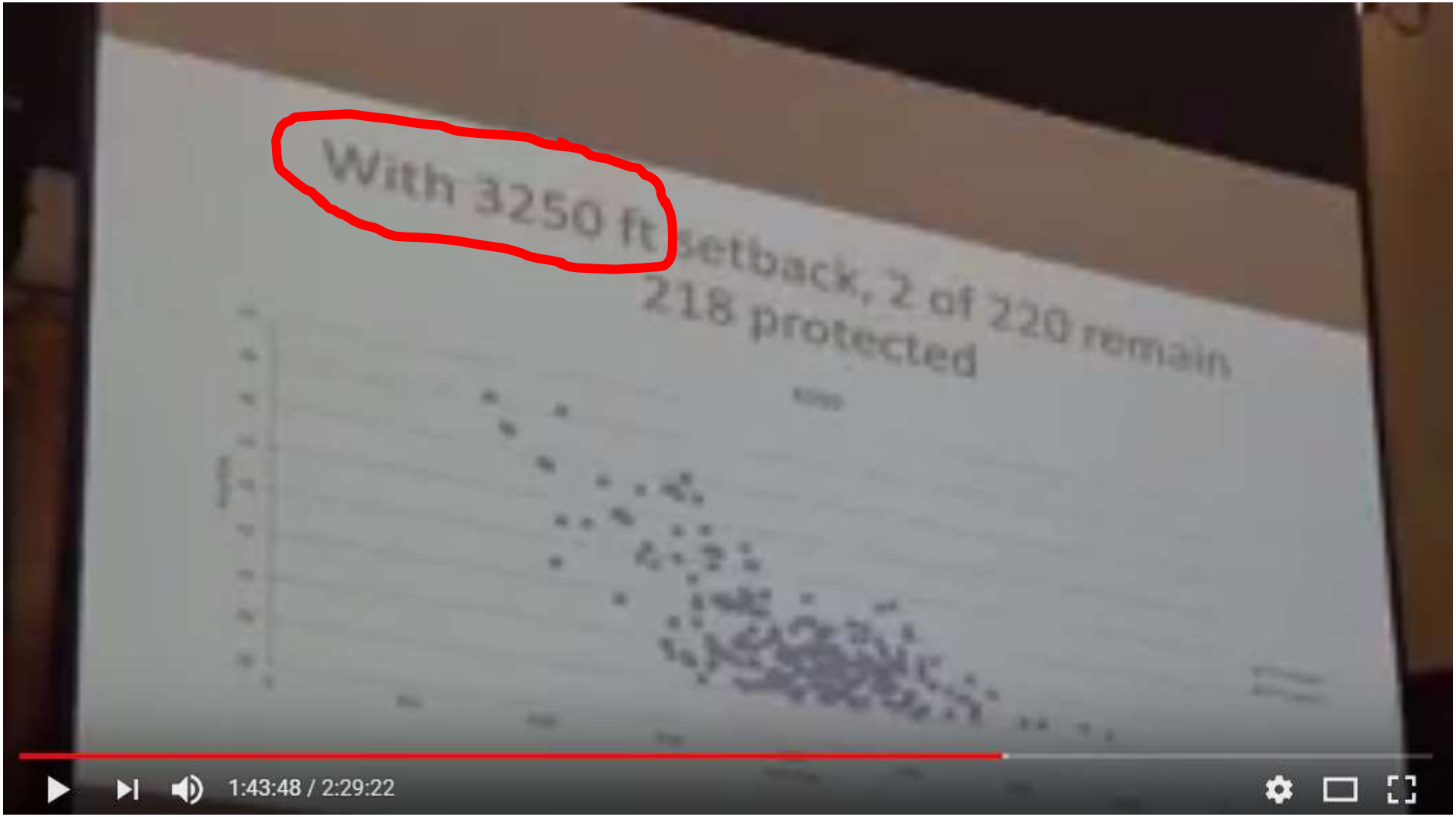
- *Subtracting 5 dB is my recommendation and, I believe, the minimum that can be recommended.*
- *By way of comparison, if one wanted to ensure that less than 1 percent of the data exceed the criterion, (in contrast to 5 percent), one needs to subtract 6-9 dB from the criterion of 39 dB.*
- *The percent of the data exceeding the criterion is directly related to the tolerance chosen. A smaller tolerance (e.g. 5 dB) protects 95 percent of the data. A larger tolerance (e.g. 7.5 dB) protects 99 percent.*
- ***So I recommend designing for 34 dB** and requiring that no more than 5 percent of the data exceed the 39 dB, nearly always by only 0-2 dB.*

Dr. Schomer's noise to distance conversion:

Wind Turbine Sound Propagation at the example of 102 dBA sound power at hub	
Distance (ft)	Noise Reduction (dBA)
1	102
2	96
4	90
8	84
16	78
32	72
64	66
128	60
256	54
512	48
1024	42
2048	36
4096	30

- *The criterion, including tolerance, is 34 dBA.*
- *The table on the left gives dBA versus distance for a large wind turbine with an A-weighted power level of 102 dB.*
- *The distance that corresponds to 34 dBA is 2580ft; nearly half a mile.*
- *NOTE: These calculations are all for a hub power level of 102 dB. If the selected wind turbine had a different power, then all of these numbers go up or down by the difference between the power of the selected wind turbine and 102.*

Livingston County Illinois put in place 3250' setback based upon Dr. Schomer's testimony on July 12, 2016 at the 1:53:35 timestamp in this video (Note that 2 homes remain unprotected)
https://www.youtube.com/watch?v=nByxjMI3AJs&t=7210s



Minimum requirements for a wind turbine ordinance:

1.) Design noise of 34 dBA to ensure 95% of the noise is below 39 dBA for audible sound.
2.) Distance to turbine correlates to the safe noise limit….the only proven effective measure. and the distances vary in relationship to blade tip rotation diameter (say 12x rotor dia)
3.) Low frequency noise measures to include nighttime shutdown and purchase of homes if sleep disturbances/headache/pressure/other stress issues persist.
4.) Eliminate elected officials from handing over property rights “for free”
5.) Allows ALL property owners to negotiate with wind companies.
6.) Property value protections….if no property value losses, then wind companies should have no issues with providing property value guarantee
7.) NO shadow flicker…..very annoying, 100% predicable, software available to eliminate it
8.) ONLY have aircraft safety warning systems using sensors for when aircraft are within 5 mi.
9.) ZERO wind turbines allowed in sensitive areas such as migration paths, scenic or wild rivers, natural “beauty” spots where tourism is impacted.
10.) ENFORCEMENT procedures to include penalties and shutdown until disturbances are solved
11.) DOCUMENTATION procedure in place to collect complaint data
12.) RAW data submittals required for noise recordings/measurements AND associated SCADA data submitted for time periods of complaints.
13.) Either adequate decommissioning bonds/insurance to remove turbines ($500,000/turbine) or ZERO decommissioning…require leaseholders to negotiate their own without govt. assist.
14.) Allow for WAIVERS which are negotiated with individual neighbors to preserve all rights.
15.) Allow a wind company to construct turbines if they sign documents which certify that all children and parents will be able to have healthy sleep inside their homes within 1.5 miles of wind turbines. If they can’t sign this document, then reject turbine projects.

Does the ordinance respect everyone's property rights? Does it protect children in their homes? **Will the wind company sign a contract which states that children will not be awakened in their beds in their bedrooms at night?** If the wind company awakes the children, will they purchase the home of the family so they can escape?

An ordinance needs to err on the side of CAUTION.
Put in scientifically based noise limits using setbacks. THIS CAN be defended in court.

At the same time, allow wind companies and leaseholders the ability to be free to build.

Q: HOW?? A: Use WAIVERS!!!!

Great news: SAFE setbacks with waivers works both ways!
Releases the county board from being sued by wind companies and residents.
The safe scientifically based setback takes care of residents…..3250' recommended by Schomer
The waiver opens an avenue so wind energy companies can negotiate with all residents/neighbors. (For example: good neighbor agreements and homes purchased by APEX)
The waiver allows the neighbors to negotiate their own deal.
The elected officials then do not short-circuit the system…..stay out of the way and avoid lawsuits. This allows safety measures to be in place alongside a "free market" to use land.

Many and most wind turbine adverse effects for noise and flicker allows citizens to enjoy the use of their homes when wind turbines are kept at 12x rotor diameter.