

09hr_SC-CUER_CRule_10-057_pt07b



Details:

(FORM UPDATED: 08/11/2010)

WISCONSIN STATE LEGISLATURE ... PUBLIC HEARING - COMMITTEE RECORDS

2009-10

(session year)

Senate

(Assembly, Senate or Joint)

Committee on ... Commerce, Utilities, Energy, & Rail (SC-CUER)

COMMITTEE NOTICES ...

- Committee Reports ... **CR**
- Executive Sessions ... **ES**
- Public Hearings ... **PH**

INFORMATION COLLECTED BY COMMITTEE FOR AND AGAINST PROPOSAL

- Appointments ... **Appt** (w/Record of Comm. Proceedings)
- Clearinghouse Rules ... **CRule** (w/Record of Comm. Proceedings)
- Hearing Records ... bills and resolutions (w/Record of Comm. Proceedings)
 - (**ab** = Assembly Bill) (**ar** = Assembly Resolution) (**ajr** = Assembly Joint Resolution)
 - (**sb** = Senate Bill) (**sr** = Senate Resolution) (**sjr** = Senate Joint Resolution)
- Miscellaneous ... **Misc**

They say a picture is worth a thousand words.

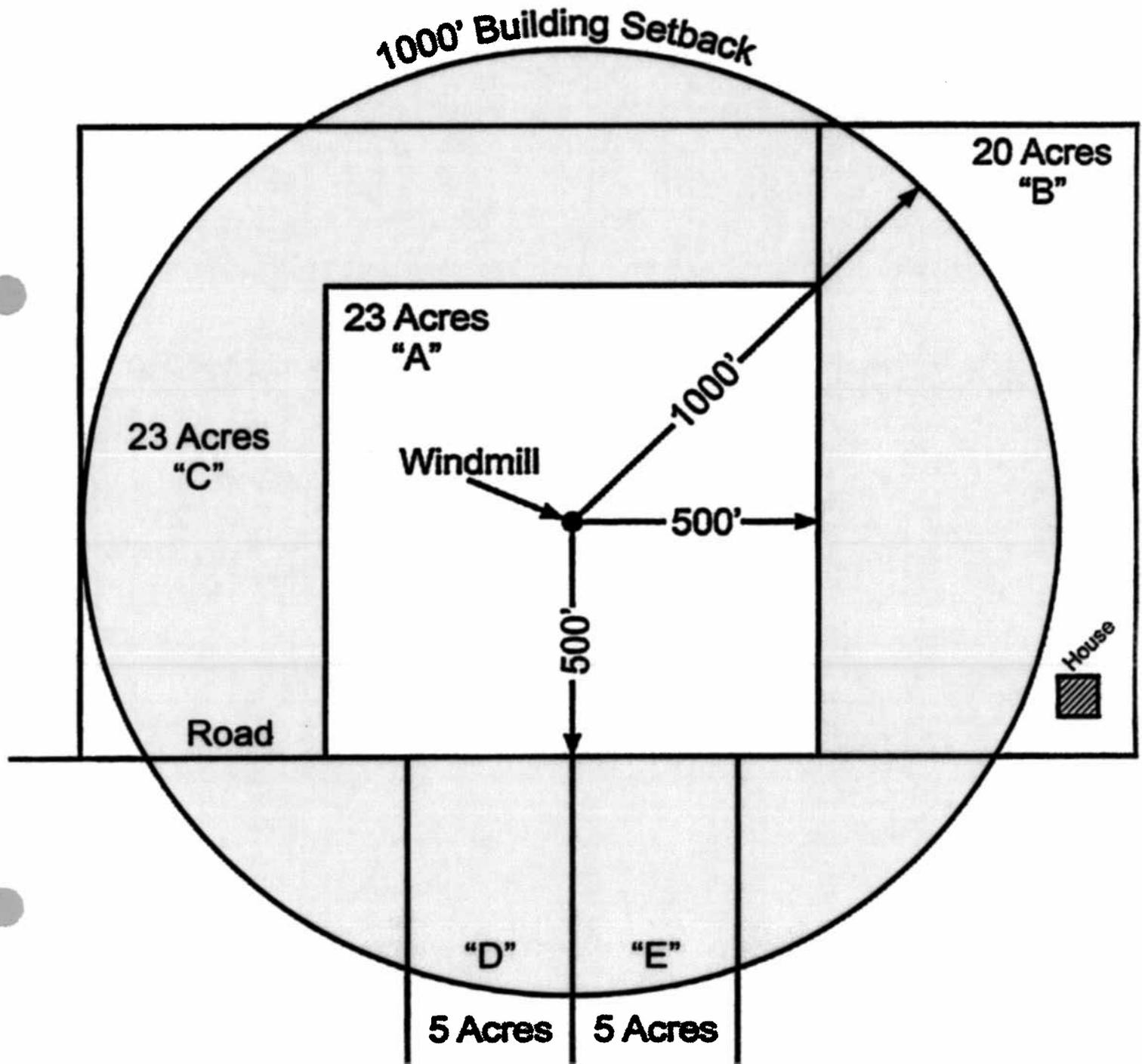
This map illustrates the property rights issue for neighbors of industrial wind turbines.

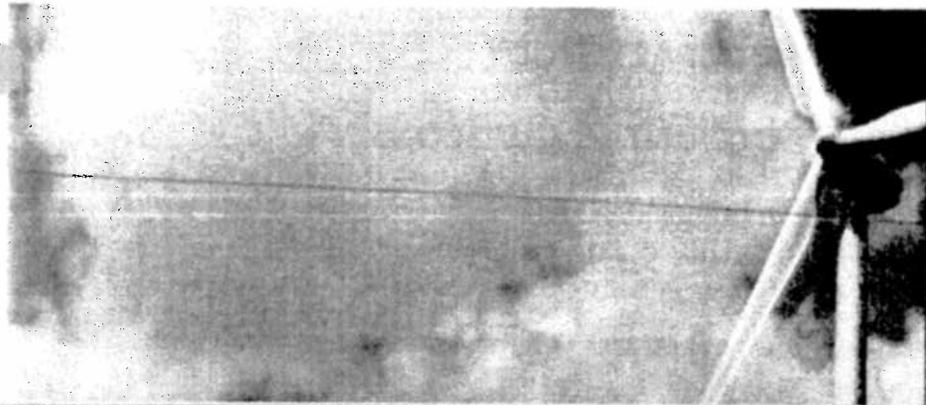
Under proposed PSC siting regulations, turbines can exist 3.1 times the blade top from a non-participating home (approx. 1200 feet)

For example, a person who owns parcel "A" can site a turbine and collect the contracted payments from a wind developer.

The Owners of Parcels "B", "C", "D", and "E" have their right to build a home anywhere in the yellow circle taken from them without any compensation. Even worse, they cannot appeal to any local government or planning committee. They have no say whatsoever in this "taking"! Their only option would be legal challenge.

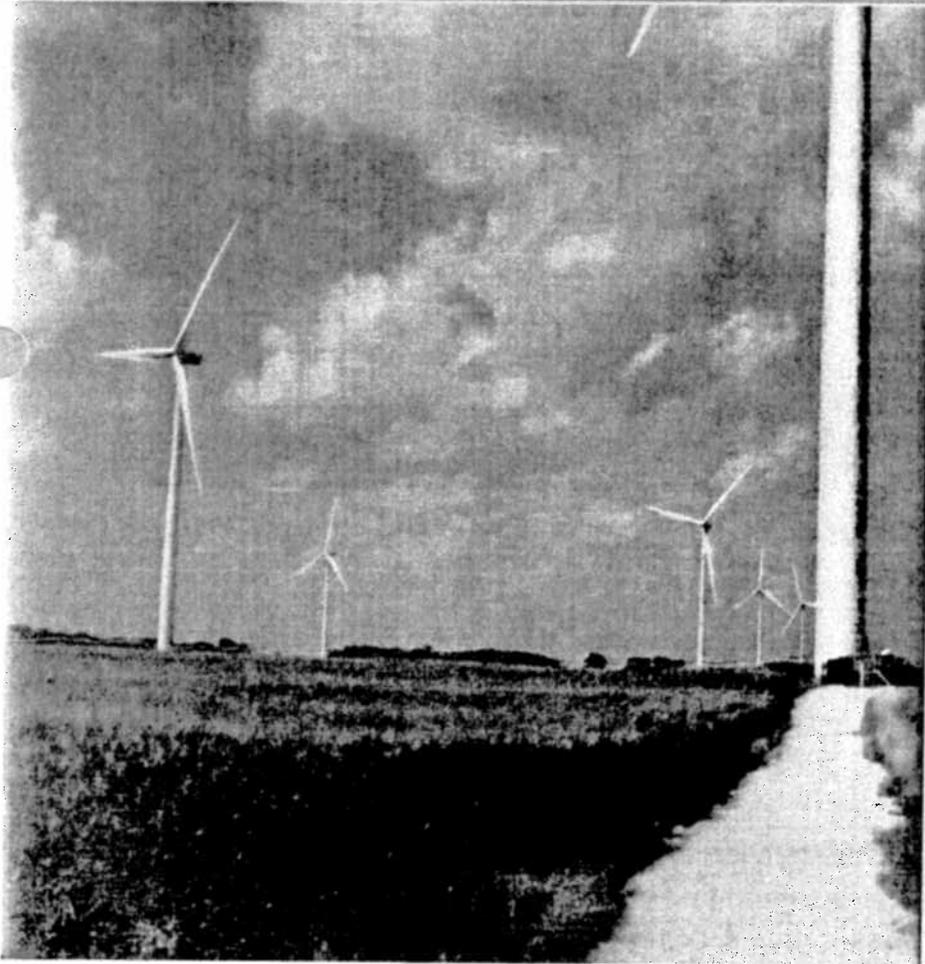
Thus an owner of 23 acres can "take" the right to build a home or office from an additional 50 acres that is owned by his neighbors.





2009

WIND TURBINE IMPACT STUDY



APPRAISAL GROUP ONE

9/9/2009

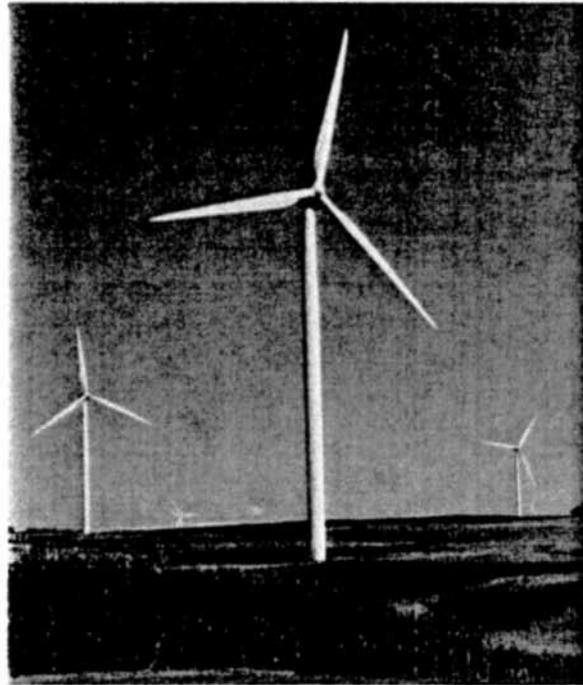
WIND TURBINE IMPACT STUDY

DODGE & FOND DU LAC COUNTIES – WISCONSIN

Preliminary Draft - September 2009

This is a study of the impact that wind turbines have on residential property value. The wind turbines that are the focus of this study are the larger turbines being approximately 389ft tall and producing 1.0+ megawatts each, similar to the one pictured to the right.

The study has been broken into three component parts, each looking at the value impact of the wind turbines from a different perspective. The three parts are: (1) a literature study, which reviews and summarizes what has been published on this matter found in the general media; (2) an opinion survey, which was given to area Realtors to learn their opinions on the impact of wind turbines in their area; and, 3) sales studies, which compared vacant residential lot sales within the wind turbine farm area to comparable sales located outside of the turbine influence.



The sponsor for this study was the Calumet County Citizens for Responsible Energy (CCCRE) (Calumet County, Wisconsin), which contracted our firm, Appraisal Group One, to research the value impact that wind turbines have on property value. Appraisal Group One (AGO) protected against outside influence from CCCRE by having complete independence to the gathering of facts, data and other related material and the interpretation of this data to the purpose of this study. AGO chose the location of the study, the search parameters, the methodology used and the three-step approach to the study. AGO does not enter into any contract that would espouse any preconceived notion or have a bias as to the direction of the study and its findings. The purpose of the study was to investigate the value impacts of large wind turbines, the issues influencing these impacts and to report these findings on an impartial basis.

AGO is an appraisal company specializing in forensic appraisal, eminent domain, stigmatized properties and valuation research. This company is located in Oshkosh, Wisconsin,

and provides appraisal services throughout the State of Wisconsin. In addition, AGO provides forensic appraisal services, valuation consulting and research outside of the state. Recent projects were completed in Ohio, Indiana, Illinois and Michigan.

The geographic area of this study was focused in Dodge and Fond du Lac Counties. These two counties have three large wind farms. They are:

WE Energies - Blue Sky Green Field wind farm which has approximately 88 wind turbines and is located in the northeast section of Fond du Lac County, bordering Calumet County to the north.

Invenergy - Forward wind farm which has approximately 86 wind turbines and is located in southwest Fond du Lac County and northeast Dodge County.

Alliant - Cedar Ridge wind farm which has approximately 41 wind turbines and is located in the southeastern part of Fond du Lac County.

Of these three wind farms, only the WE Energies and Invenergy wind farms were used in the sales study since the Alliant – Cedar Ridge wind farm did not have enough viable sales within the turbine influence area to use as a base of comparison. The Realtor survey was limited to Fond du Lac and Dodge Counties, that being the area which had the three wind farms. The literature study was not limited geographically.

The balance of this report follows this introduction. The conclusions drawn at the end of each section are based on the data we collected and analyzed and are the sole possession of Appraisal Group One.

Submitted on September 9th, 2009, by:

Kurt C. Kielisch, ASA, IFAS, SR/WA, R/W-AC

President/ Senior Appraiser

Appraisal Group One

www.forensic-appraisal.com

WIND TURBINE IMPACT – REALTOR SURVEY

The purpose of the Realtor survey was to learn from the people who are on the first tier of the buying and selling of real estate what they thought of wind turbines and their impact to residential property value. This survey was designed to measure what type of impact (positive, negative or no impact) that wind turbines have on vacant residential land and improved property. The questions were designed to measure three different visual field proximity situations to wind turbines. These three were **bordering** proximity (defined as 600ft from the turbine), **close** proximity (defined as 1,000ft from the turbine) and **near** proximity (defined as ½ mile from the wind turbines). In all situations the wind turbines were visible from the property. Graphics and photographs were utilized to illustrate each question so the survey taker would have the same or similar understanding as others on each question. In addition to asking the Realtor about the type of impact they expected in each situation, the survey then asked them to estimate the percentage of the impact. Though it is understood that Realtors are salespeople and not appraisers, it is also true that they often have to estimate asking prices for their clients or act in the capacity of a buying agent for a client. Both situations demand an estimate of value and recognition of those factors that both benefit and detract from value.

The geographic area for selection of the survey participants was defined by the wind farm projects. These projects were in Fond du Lac and Dodge Counties, Wisconsin.

The Scope of Work (SOW) that was followed in the development, implementation and recording of this survey was as follows:

1. Outline the purpose of the questions and determine what is to be measured and what information is needed to have an informative survey free of any suggested bias.
2. Create a Beta version of the survey and have it tested by ten Realtors outside of the projected survey area.
3. Once the Beta testing and revisions were completed, then print the final version of the survey.
4. Realtor offices were presented with the survey and participants were offered a fee for taking the survey. (interestingly, some declined the fee.)
5. All surveys were given in person. No surveys were given orally nor via the Internet.
6. Once the surveys were completed the survey presenter signed and dated the survey.
7. All surveys were reviewed for errors and those that were found in error, e.g. giving multiple answers to a question when only one was allowed, were then rejected and saved with the reason for its rejection.
8. The survey results were tabulated and presented in a spreadsheet format.

9. From the spreadsheet the results were presented graphically for ease of understanding.
10. A summary of the findings and a conclusion was then completed and included in this report.

Following is: (a) a copy of the survey that was hand delivered to each survey participant and (b) graphic presentation of the tabulated results from the survey.

Summary of Findings & Conclusion of Impact

The survey indicated that in all but two scenarios (those being Questions #8 and #9), over 60% the participants thought that the presence of the wind turbines had a negative impact on property value. This was true with vacant land and improved land. Where the group diverted from that opinion is when they were presented with a 10-20 acre hobby farm being in *close* and *near* proximity. In these cases 47% (*close* proximity) and 44% (*near* proximity) of the participants felt that the wind turbines caused a negative impact in property value.

The answers showed that *bordering* proximity showed the greatest loss of value at -43% for 1-5 acre vacant land and -39% for improved properties. Next in line was the *close* proximity showing a -36% value loss for 1-5 acre vacant land and -33% for improved property. Last in line was the *near* proximity, showing a -29% loss of value for a 1-5 acre vacant parcel and -24% loss in value for improved parcels. These losses show a close relationship between vacant land and improved land. This pattern was replicated regarding the *bordering* proximity for a hobby farm, whereas 70% believed it would be negatively impacted. Lastly, the opinions regarding the impact of the wind turbines due to placement, that being in front of the residence or behind the residence, showed that in both situations most participants believed there would a negative impact (74% said negative to the front placement and 71% said negative to the rear placement).

In conclusion, it can be observed that: (a) in all cases with a 1-5 acre residential property, whether vacant or improved, there will be a negative impact in property value; (b) with 1-5 acre properties the negative impact in property value in *bordering* proximity ranged from -39% to -43%; (c) with 1-5 acre properties the negative impact in property value in *close* proximity ranged from -33% to -36%; (d) with 1-5 acre properties the negative impact in property value in *near* proximity ranged from -24% to -29%; (e) in all cases the estimated loss of value between the vacant land and improved property was close, however the vacant land estimates were always higher by a few percentage points; (f) it appears that hobby farm use on larger parcels would have lesser sensitivity to the proximity of wind turbines than single family land use; and (g) placement either in front or at the rear of a residence has similar negative impacts.

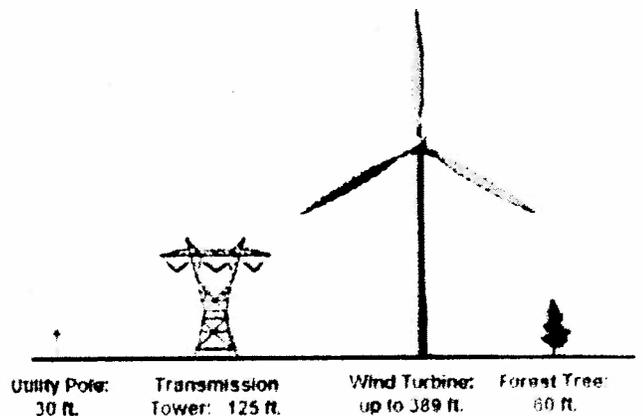
SAMPLE OF THE SURVEY
FOUND ON THE FOLLOWING PAGES

Wind Turbine Realtor Opinion Questionnaire

A. Purpose of the questionnaire

This questionnaire seeks to find the opinion of real estate sales professionals on whether an industrial-scale wind turbine near a residential property has an impact on its property value. The questionnaire specifically defines terms such as "wind turbine," "close proximity," "near proximity" and "outlying proximity."

Wind Turbine – for this questionnaire, a wind turbine is defined as a 1.5 MW industrial-scale wind turbine, approximately 389 feet tall from base to blade tip, at its highest point, with a blade diameter of approximately 252 feet. Such a wind turbine is pictured below, left. A comparison of the maximum height of industrial-scale turbines compared to other utilities and natural features is seen below, right.



Graphic: Impact of Wind Turbines on Market Value of Texas Rural Land. Derry T. Gardner of Gardner Appraisal Group, Inc. February 13, 2009. Original height of turbine altered for specific case

All dimensions to scale: 1 inch = 200 feet

Visual Field Proximity – for this questionnaire, "bordering proximity" is defined as 600 feet from turbine to residence, and easily seen from the subject property. "Close proximity" is defined as 1000 feet from turbine to residence, and readily seen. "Near proximity" is defined as ½ mile from turbine to residence, and seen in the distance. In the questionnaire you will see examples of each.

B. Please tell us about your real estate background: (check all that apply)

- Are you a Wisconsin licensed real estate sales person? yes no If yes, how long? ___ yrs.
- Are you a Wisconsin licensed real estate broker? yes no If yes, how long? ___ yrs.
- Are you a Wisconsin licensed/certified/general appraiser? yes no If yes, how long? ___ yrs.
- Are you a Wisconsin assessor? yes no If yes, how long? ___ yrs.
- Are you a land developer? yes no

C. What type of property have you listed or sold in the past? (check all that apply)

- vacant land for residential use operative farm
 - vacant land for agricultural use hobby farm
 - vacant land for recreational use recreational land
 - vacant land for commercial use large tract rural land for any purpose
 - single-family residential improved commercial
 - vacant land for residential developments
- In the last 5 years, have you listed a property from which one or more wind turbines were visible?
 yes no

If yes, then please check the type of property (check all that apply)

- residential improved vacant
 - farm recreational land
 - residential development hobby farm
 - large tract rural land for any purpose agricultural
- In the last 5 years, have you sold a property from which one or more wind turbines were visible?
 yes no

If yes, then please check the type of property (check all that apply)

- residential improved vacant
 - farm recreational land
 - residential development hobby farm
 - large tract rural land for any purpose agricultural
- Where do you reside?
 City
 Suburb
 Rural

For this next set of questions, we are focusing on vacant residential land.

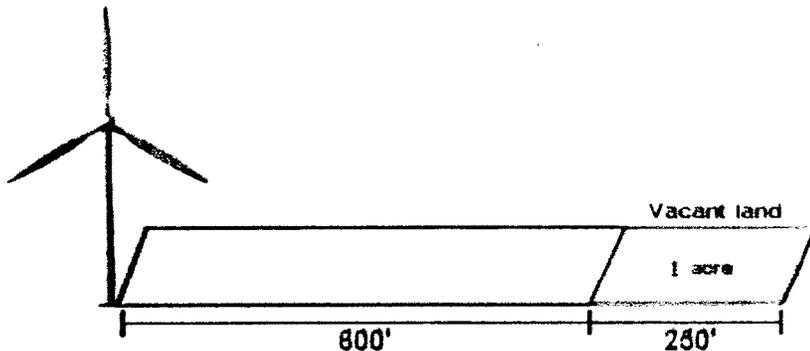
1. What is your opinion of the property value impact of wind turbines in **bordering proximity** to a 1-5 acre vacant residential lot? (see figure)

i. Do you believe the property value of the parcel in this example would be:

- Positively impacted
- Negatively impacted
- No impact

ii. In your opinion, what would be the percentage of impact?

- I would not know.
- I would estimate a negative impact in the range of _____%
- I would estimate a positive impact in the range of _____%



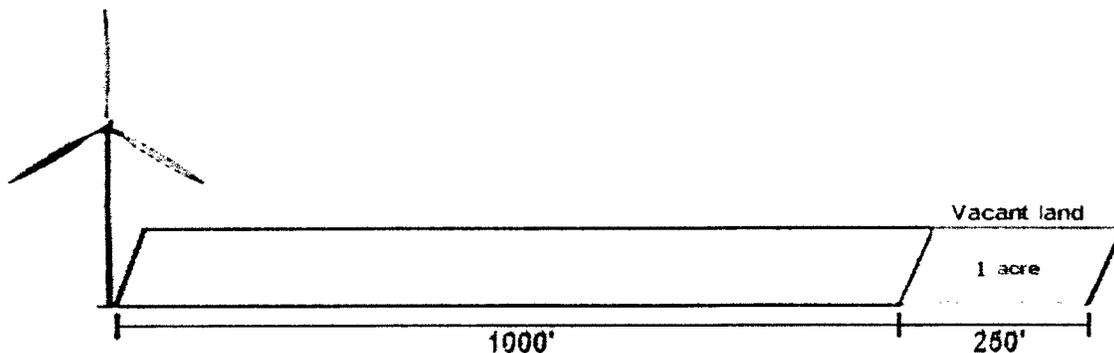
2. What is your opinion of the property value impact of wind turbines in **close proximity** to a 1-5 acre vacant residential lot? (see figure)

i. Do you believe the property value of the parcel in this example would be:

- Positively impacted
- Negatively impacted
- No impact

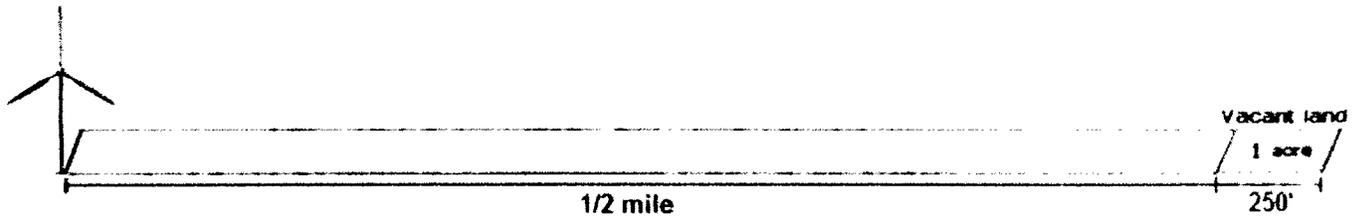
ii. In your opinion, what would be the percentage of impact?

- I would not know.
- I would estimate a negative impact in the range of _____%
- I would estimate a positive impact in the range of _____%



3. What is your opinion of the property value impact of wind turbines in **near proximity** to a 1-5 acre **vacant residential** lot? (see figure)

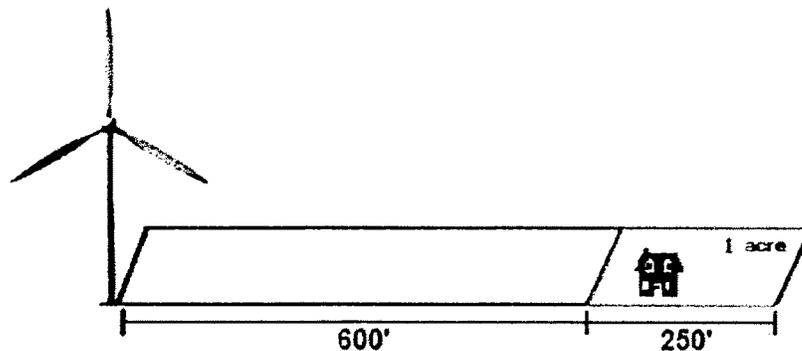
- i. Do you believe the property value of the parcel in this example would be
 - Positively impacted
 - Negatively impacted
 - No impact
- ii. In your opinion, what would be the percentage of impact?
 - I would not know.
 - I would estimate a negative impact in the range of _____ %
 - I would estimate a positive impact in the range of _____ %



For this next set of questions, we are focusing on improved residential land. "Improved" means there is a residence on the property.

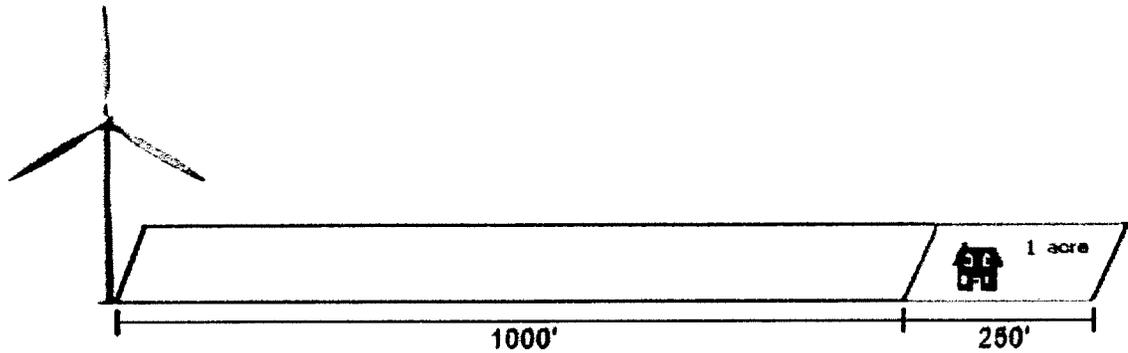
4. What is your opinion of the property value impact of wind turbines in **bordering proximity** to a 1-5 acre **improved residential** property? (see figure)

- i. Do you believe the property value of the parcel in this example would be
 - Positively impacted
 - Negatively impacted
 - No impact
- ii. In your opinion, what would be the percentage of impact?
 - I would not know.
 - I would estimate a negative impact in the range of _____ %
 - I would estimate a positive impact in the range of _____ %



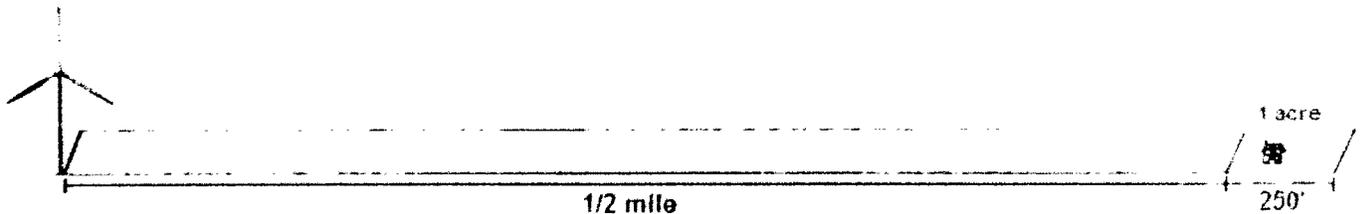
5. What is your opinion of the property value impact of wind turbines in close proximity to a 1-5 acre of improved residential property? (see figure)

- i. Do you believe the property value of the parcel in this example would be
 - Positively impacted
 - Negatively impacted
 - No impact
- ii. In your opinion, what would be the percentage of impact?
 - I would not know.
 - I would estimate a negative impact in the range of _____ %
 - I would estimate a positive impact in the range of _____ %



6. What is your opinion of the property value impact of wind turbines in near proximity to a 1-5 acre improved residential property? (see figure)

- i. Do you believe the property value of the parcel in this example would be
 - Positively impacted
 - Negatively impacted
 - No impact
- ii. In your opinion, what would be the percentage of impact?
 - I would not know.
 - I would estimate a negative impact in the range of _____ %
 - I would estimate a positive impact in the range of _____ %

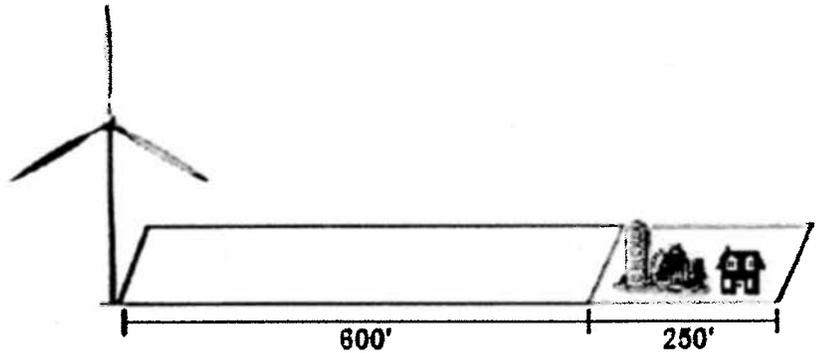


7. Envision a hobby farm improved with a residence. It's 10-20 acres in size and has a wind turbine in **bordering proximity**.

(see figure)

i. Do you believe the property value of the parcel in this example would be

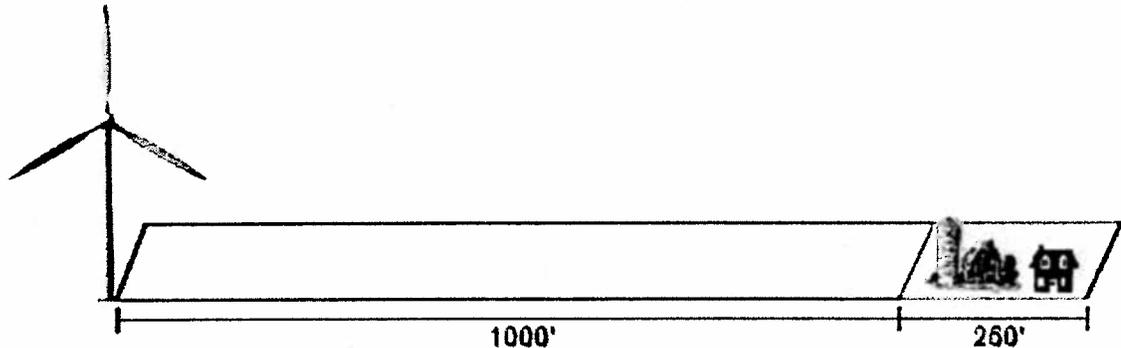
- Positively impacted
- Negatively impacted
- No impact



8. Envision a hobby farm improved with a residence. It's 10-20 acres in size and has a wind turbine in **close proximity**. (see figure)

i. Do you believe the property value of the parcel in this example would be

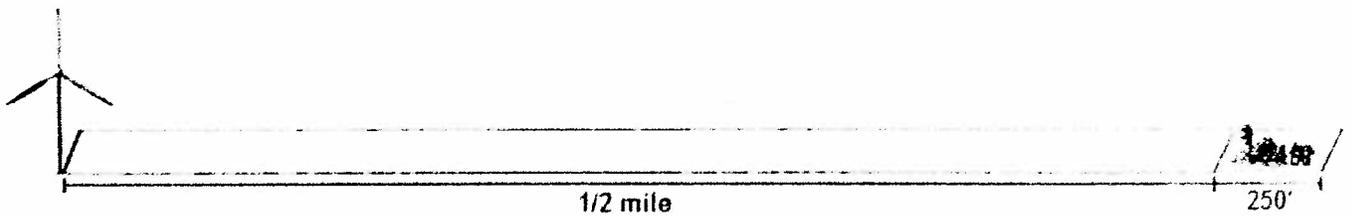
- Positively impacted
- Negatively impacted
- No impact



9. Envision a hobby farm improved with a residence. It's 10-20 acres in size and has a wind turbine in **near proximity**. (see example on next page)

i. Do you believe the property value of the parcel in this example would be

- Positively impacted
- Negatively impacted
- No impact



10. Assume that the wind turbine can be seen from the *front yard* of a 1-to-5 acre improved residential property as pictured below. Based on your professional experience would you say that this turbine would have:

- A positive impact on the property value
- A negative impact on the property value
- No impact on the property value



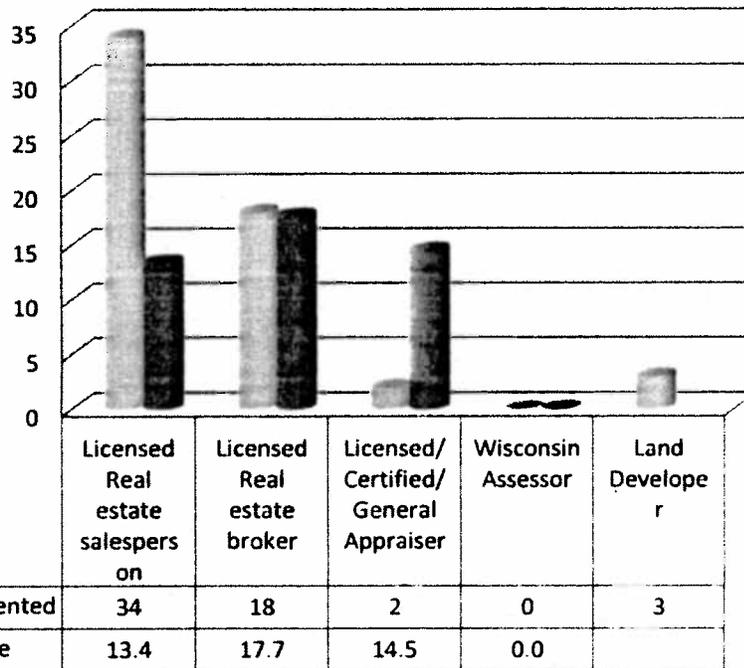
11. Assume that the wind turbine can be seen from the *back yard* of a 1-to-5 acre improved residential property as pictured below. Based on your professional experience would you say that this turbine would have:

- A positive impact on the property value
- A negative impact on the property value
- No impact on the property value.

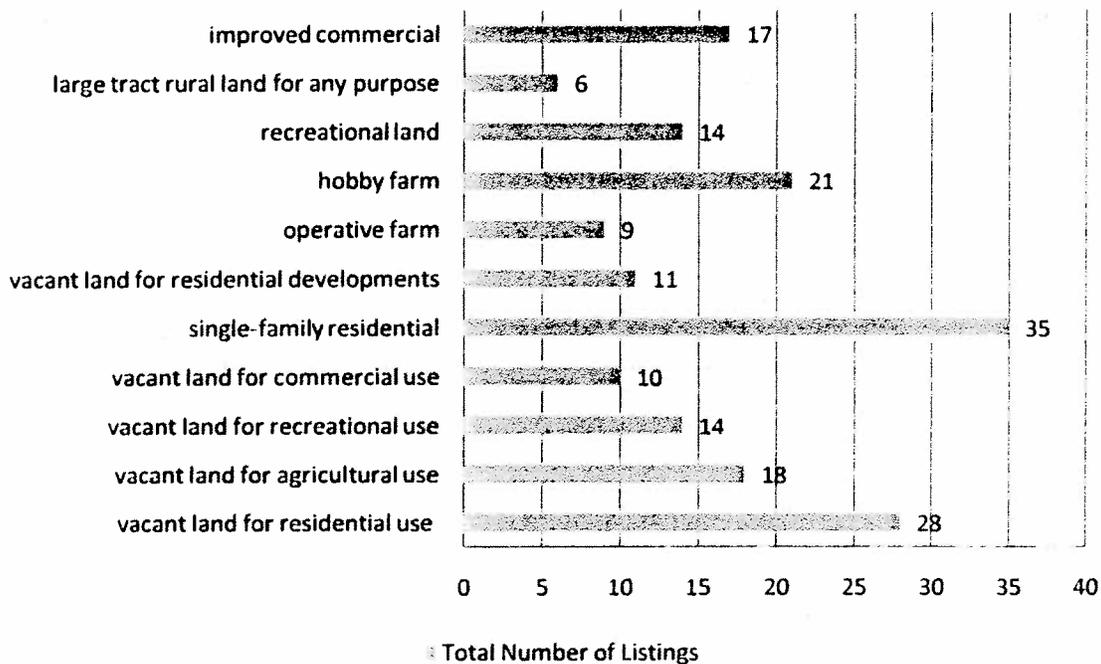


RESULTS FROM THE SURVEY IN GRAPHIC PRESENTATION
FOUND ON THE FOLLOWING PAGES

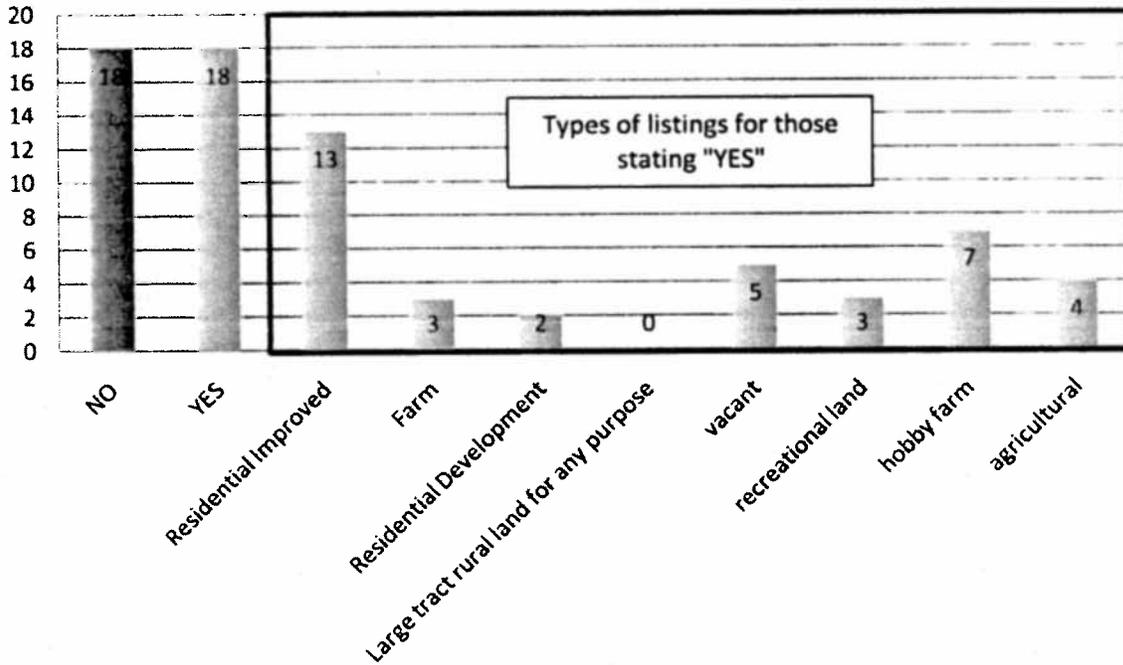
Real Estate Background



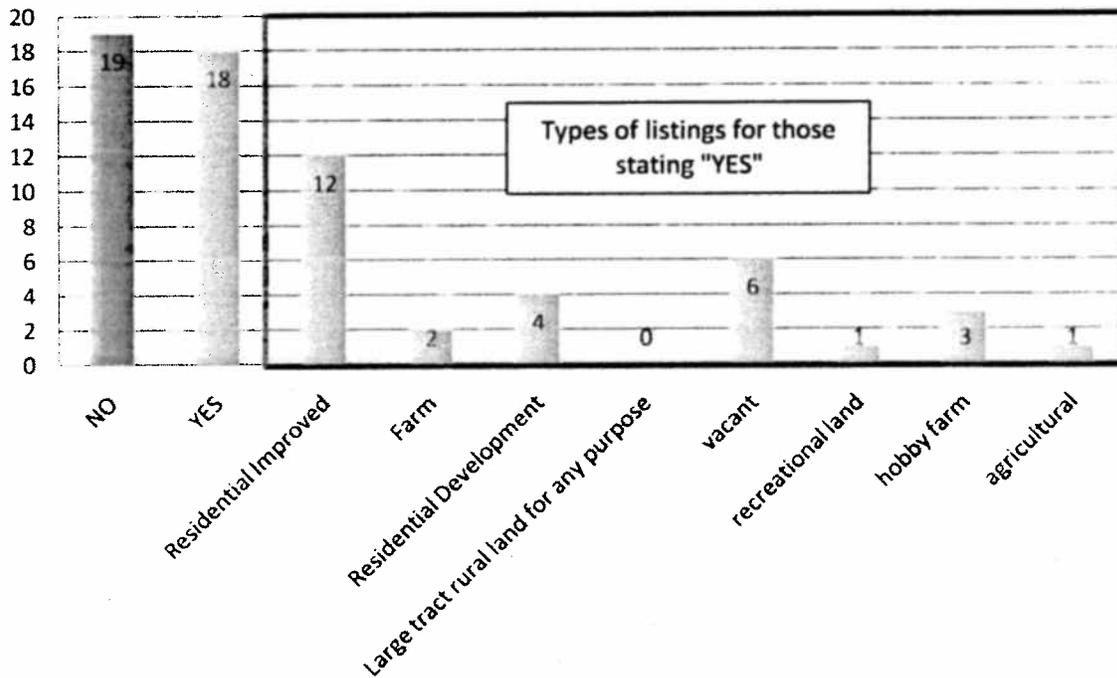
Types of Listings Sold



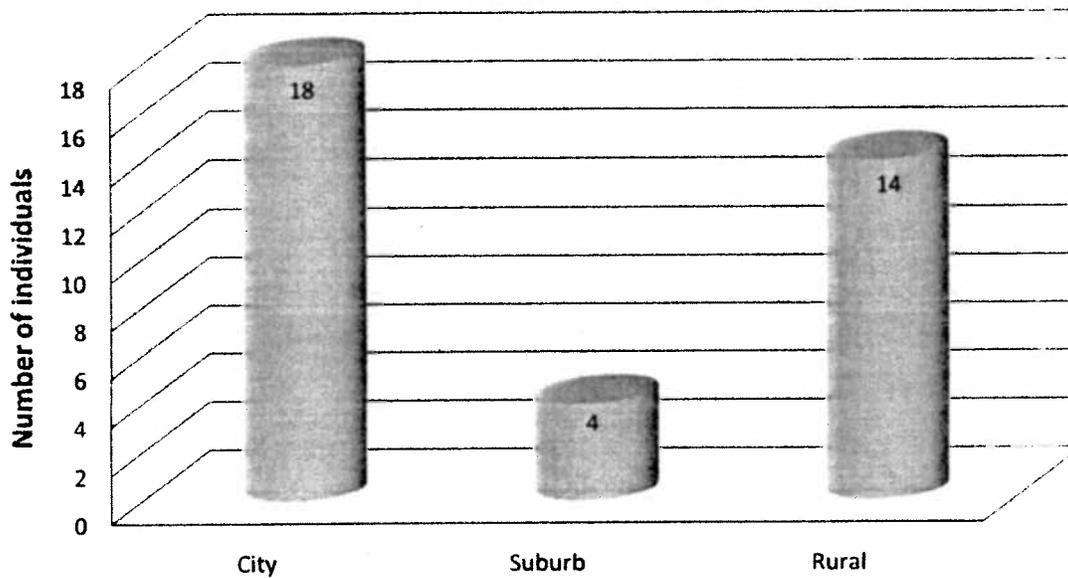
Listed Property with Turbines Visible



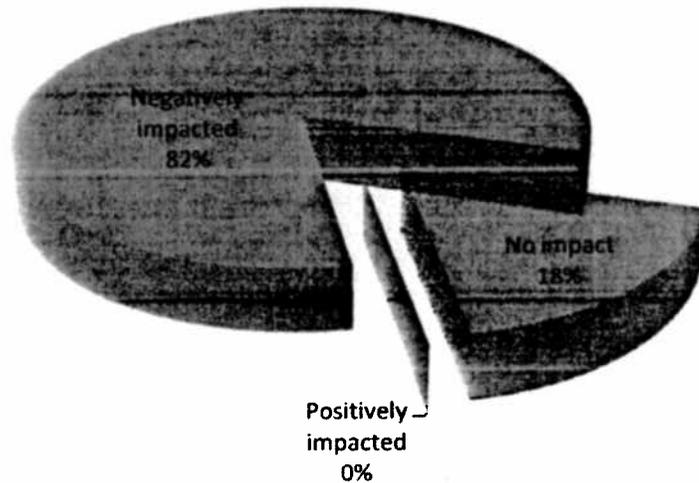
Sold Property with Turbines Visible



Where do you Reside?

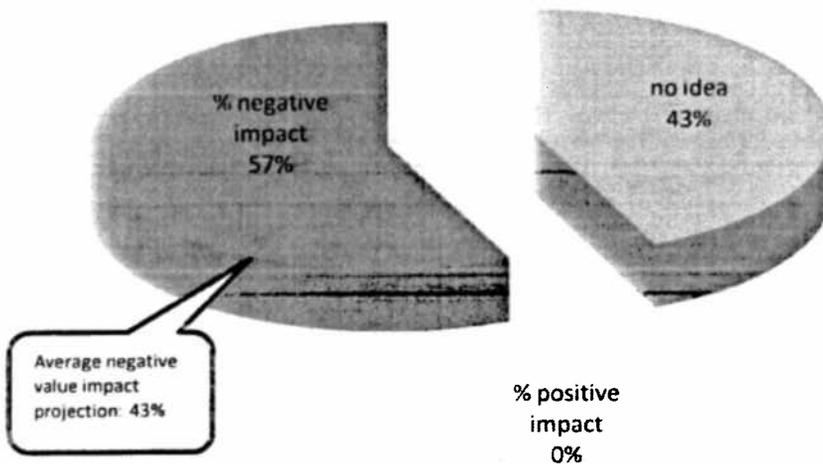


Question 1: What is your opinion of the property value impact of wind turbines in **bordering proximity** to a 1-5 acre vacant residential lot?

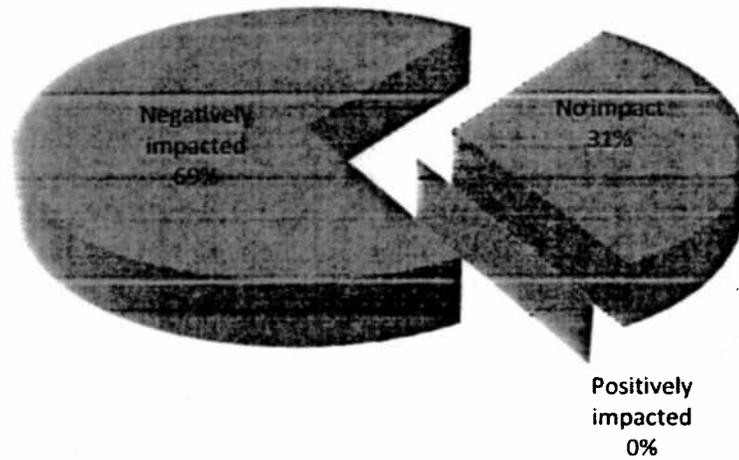


Bordering proximity to a 1-5 acre vacant residential lot:

Opinion of Percentage Impact

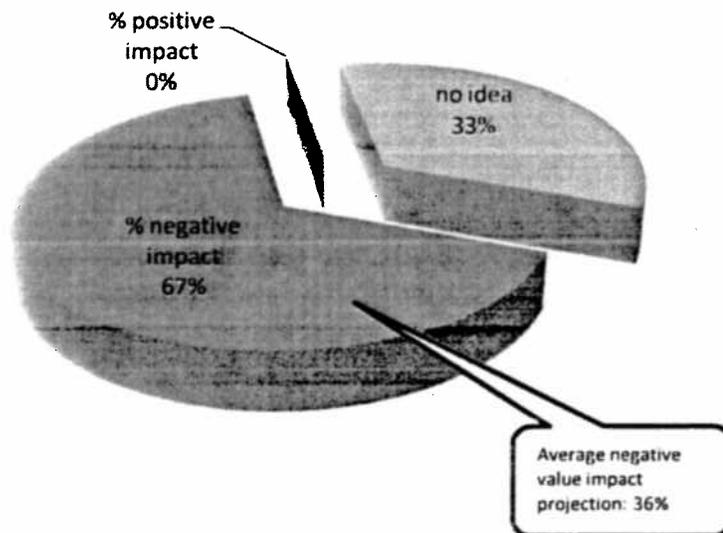


Question 2: What is your opinion of the property value impact of wind turbines in close proximity to a 1-5 acre vacant residential lot?

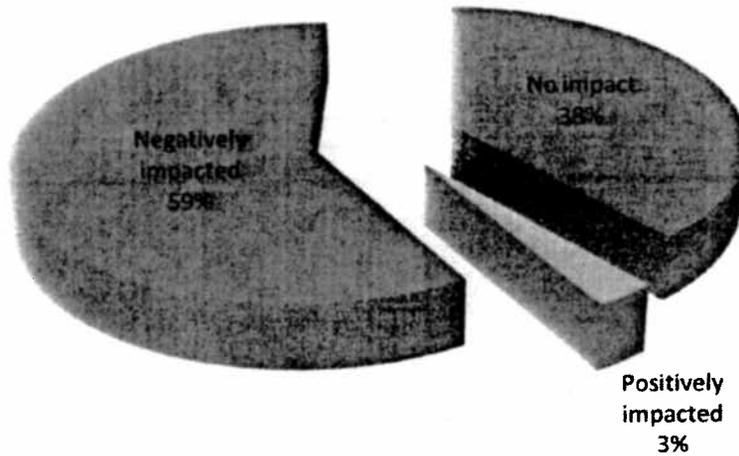


Close proximity to a 1-5 acre vacant residential lot:

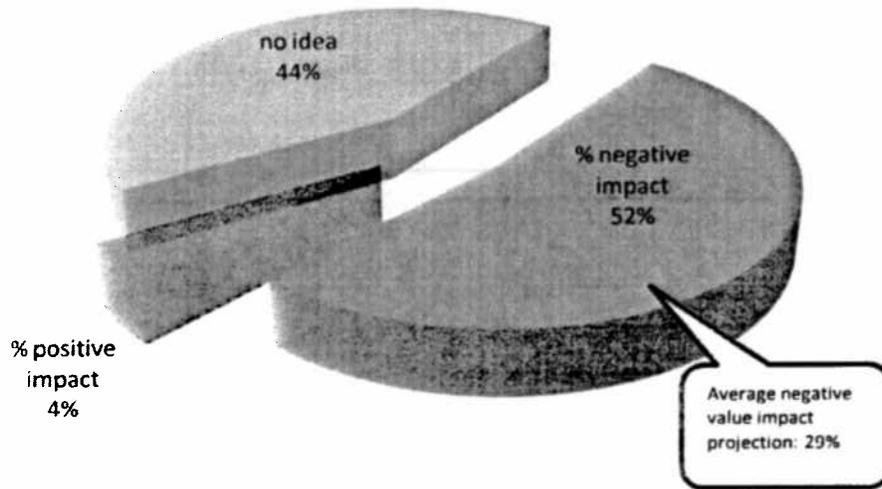
Opinion of Percentage Impact



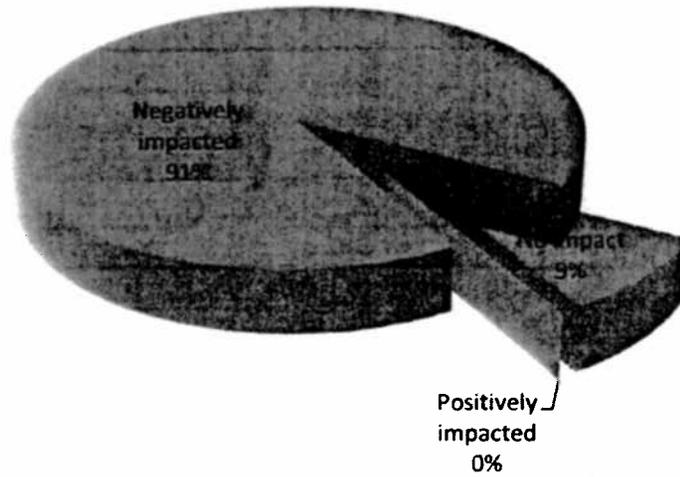
Question 3: What is your opinion of the property value impact of wind turbines in **near proximity** to a 1-5 acre vacant residential lot?



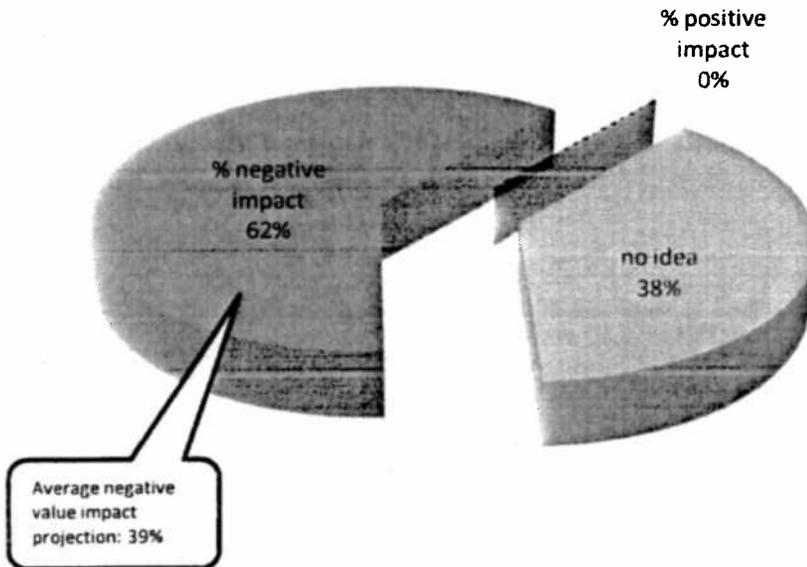
Near proximity to a 1-5 acre vacant residential lot:
Opinion of Percentage Impact



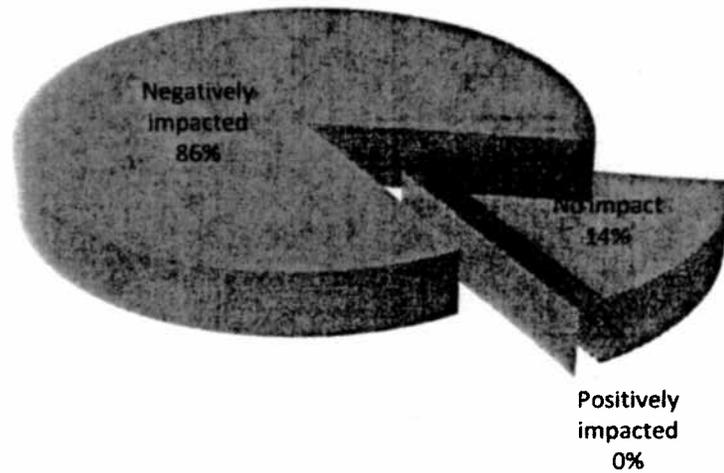
Question 4: What is your opinion of the property value impact of wind turbines in **bordering proximity** to a 1-5 acre improved residential lot?



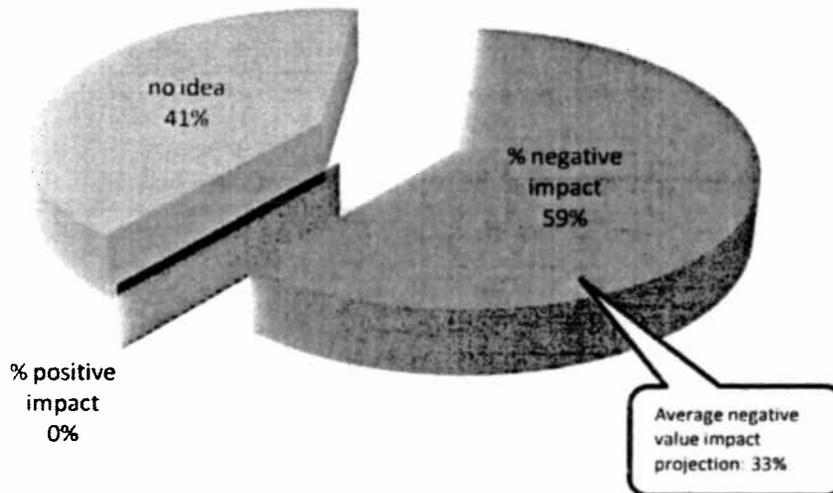
Bordering proximity to a 1-5 acre improved residential lot:
Opinion of Percentage Impact



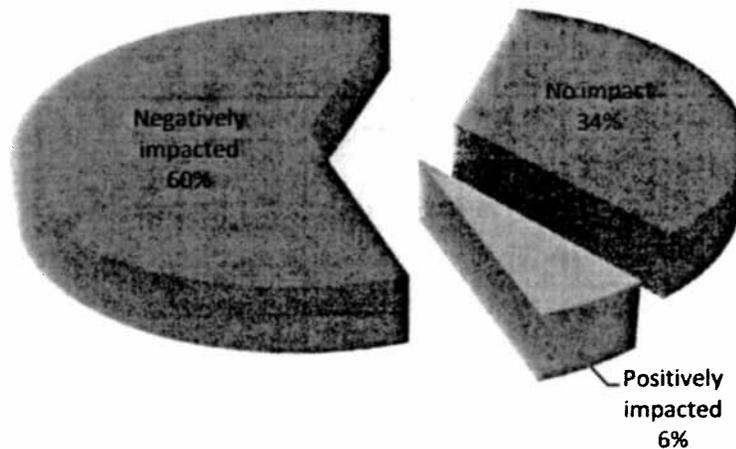
Question 5: What is your opinion of the property value impact of wind turbines in close proximity to a 1-5 acre improved residential lot?



Close proximity to a 1-5 acre improved residential lot:
Opinion of Percentage Impact

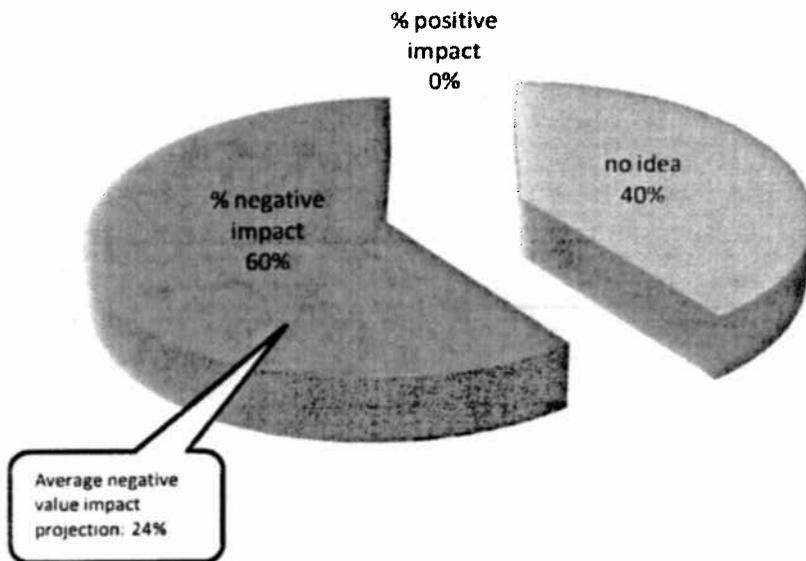


Question 6: What is your opinion of the property value impact of wind turbines in **near proximity** to a 1-5 acre improved residential lot?

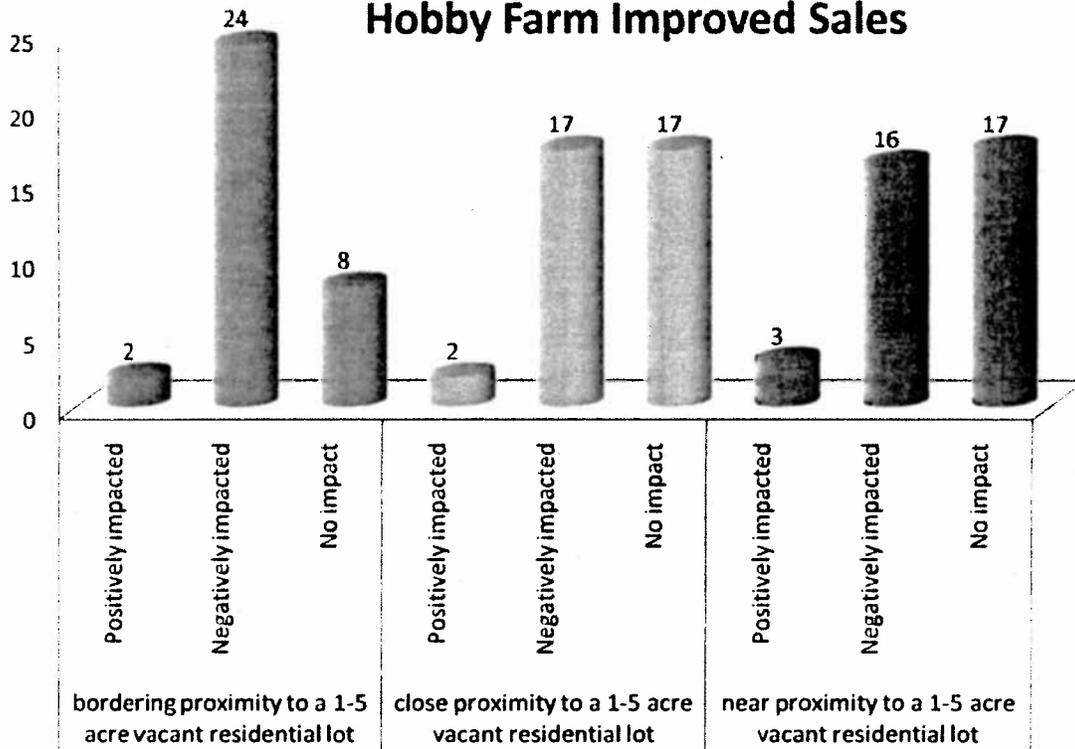


Near proximity to a 1-5 acre improved residential lot:

Opinion of Percentage Impact

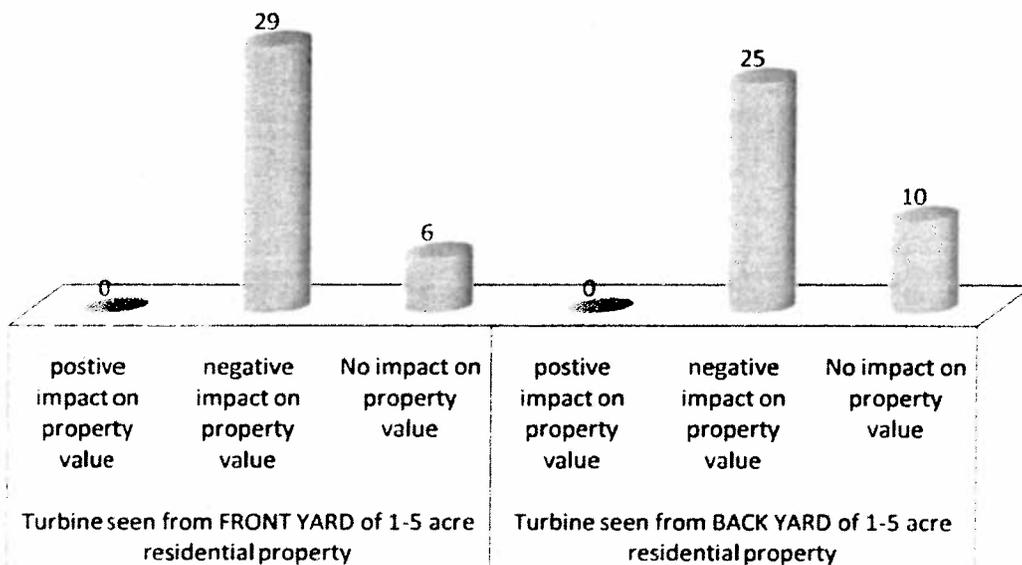


Hobby Farm Improved Sales



Opinion on View Impact

Number of Responses



WIND TURBINE IMPACT - SALES STUDIES

The purpose of the wind turbine impact sales studies was to compare the residential land sales of properties located within the wind turbine farm area to comparable land sales located outside of the influence of the wind turbines. Being located outside of the influence meant that the wind turbines could not be seen from the property.

The Scope of Work (SOW) for this assignment was as follows:

- 1) Obtain the wind farm maps from the wind farm developer.
- 2) Identify the wind turbine influence area using the wind farm maps, township maps, plat books and county maps.
- 3) Physically inspect the wind farm influence area.
- 4) Search for all residential vacant land sales in the wind farm influence area using the following parameters:
 - a) 1-10 acre land size.
 - b) January 1st, 2005 to May 31st, 2009, to keep the sales in the influence of the wind turbines either present or planned.
 - c) Vacant land sales only.
 - d) Residential land use only.
 - e) Arm's length transactions that meet the legal definition of a Market Value transaction.
 - f) Utilize REDI, MLS, court records, assessor records, county maps, Google maps, FEMA maps, and other sources as needed for property data of each sale.
- 5) Research and confirm all sales within the wind turbine influence and physically inspect all sales and locate the proximity of all nearby wind turbines.
- 6) Complete a sales info sheet on each sale.
- 7) Using the sales in #5, set forth the parameters for the comparable land sales located outside of the sphere of influence and follow steps #4 through #6.
- 8) Once all the sales are confirmed and the sales info sheets completed, complete a spreadsheet listing all land sales data.
- 9) Complete a market appreciation/depreciation time study for time adjustments.
- 10) Complete a "x, y" scatter chart plotting the land sales within the influence of the wind turbines vs. those outside of the influence after time adjustments are applied.
- 11) Plot regression lines of the two values using logarithmic functions.

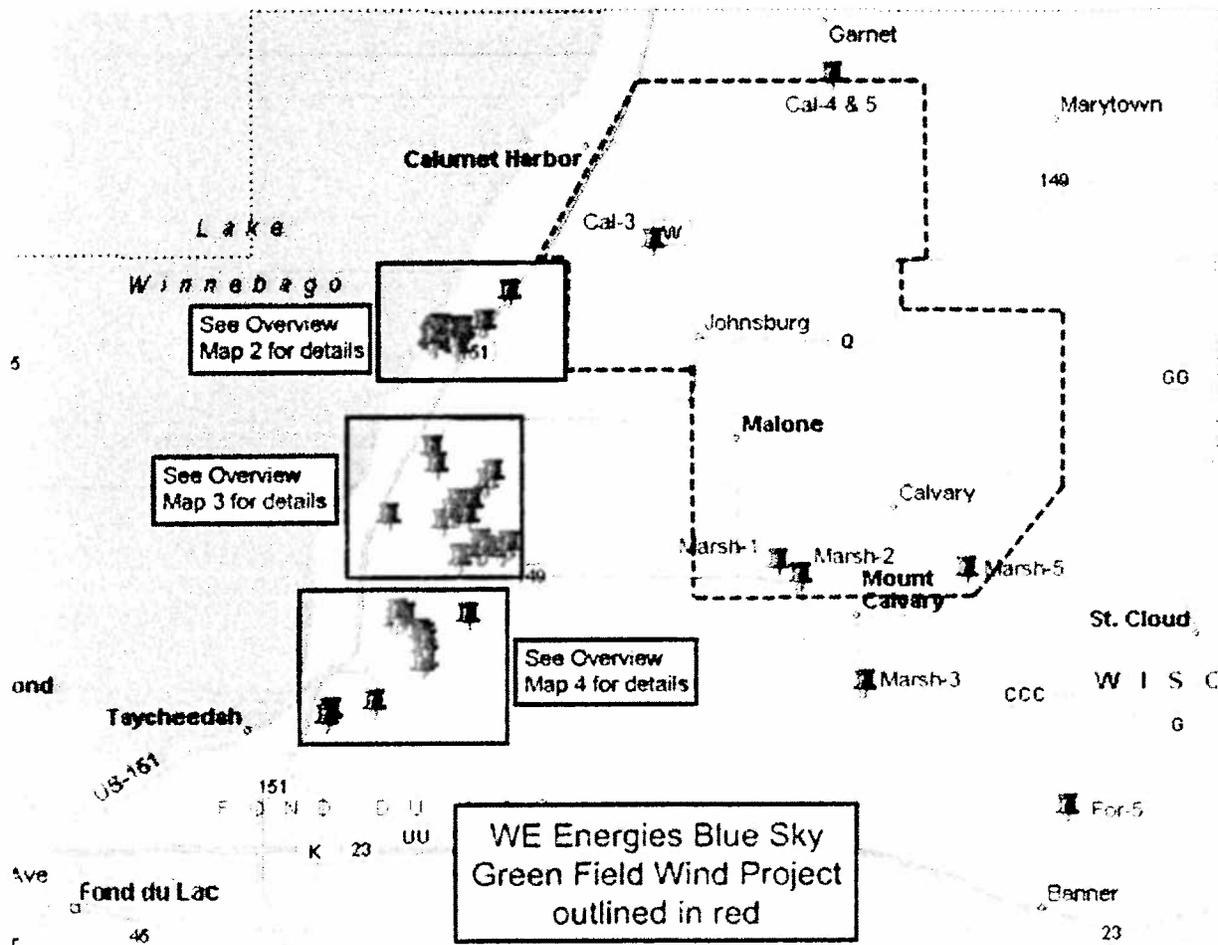
12) Compare the values projected by the charts to identify and define any value difference between the land sales within vs. outside of the influence of the wind turbines.

13) Summarize and conclude the impact of wind turbines to property value.

The areas of study include the WE Energies - Blue Sky Green Field wind farm located in the northeast section of Fond du Lac County and the Invenergy - Forward wind farm located in southwest Fond du Lac County and northeast Dodge County. The sales studies and their conclusions follow.

✓ WE Energies - Blue Sky Green Field Wind Farm Sales Study

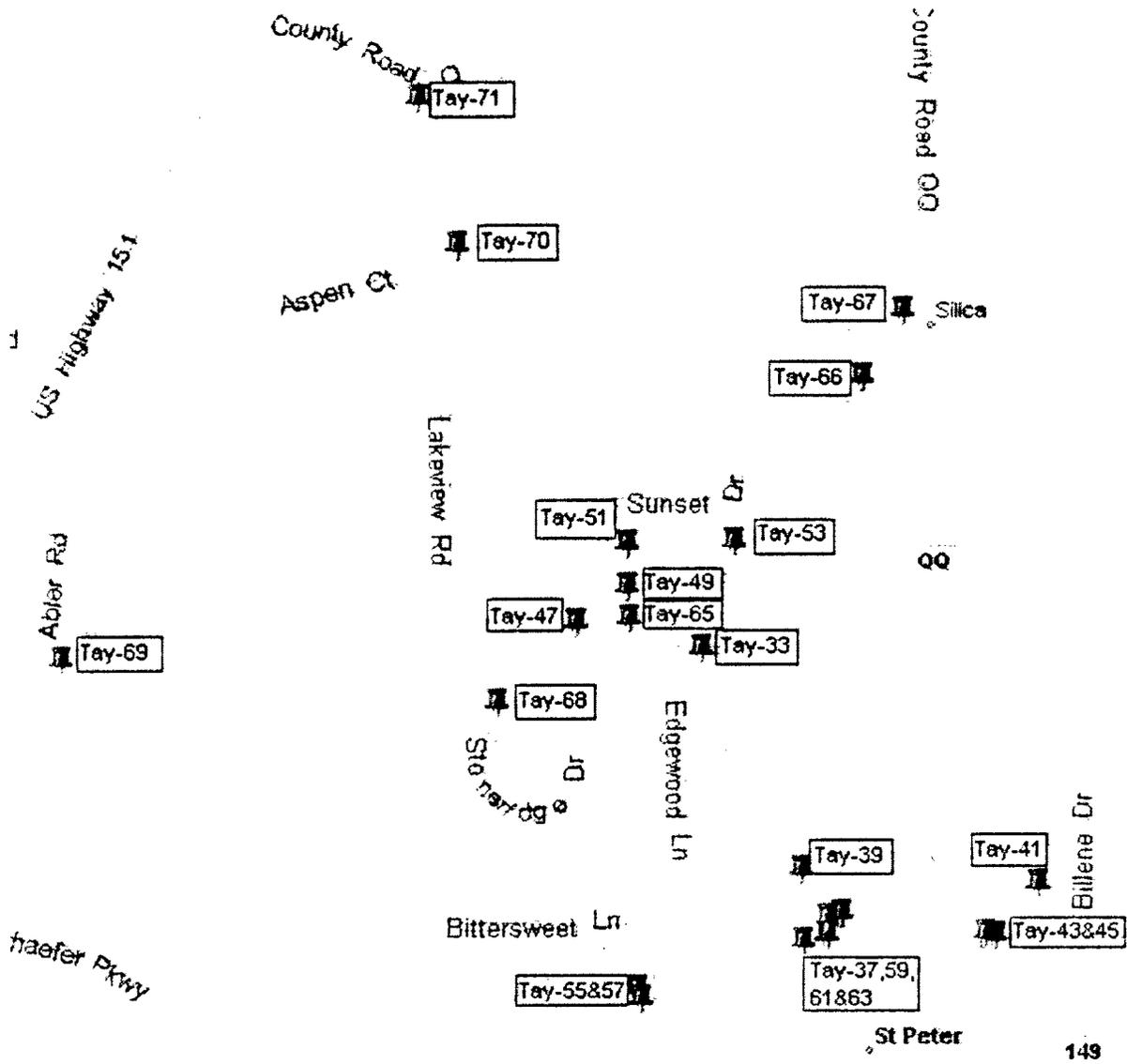
The area of study was the northeast section of Fond du Lac County bordered by Calumet County to the north, Lake Winnebago to the west and Sheboygan County to the east. The study included the townships of Calumet, Taycheedah and Marshfield. A total of 68 vacant residential land sales were utilized for this study. From that total, 6 land sales were in the influence of the wind turbines (within the wind farm parameters), and 62 sales were located outside of that sphere of influence. The sales map for this study is pictured below:



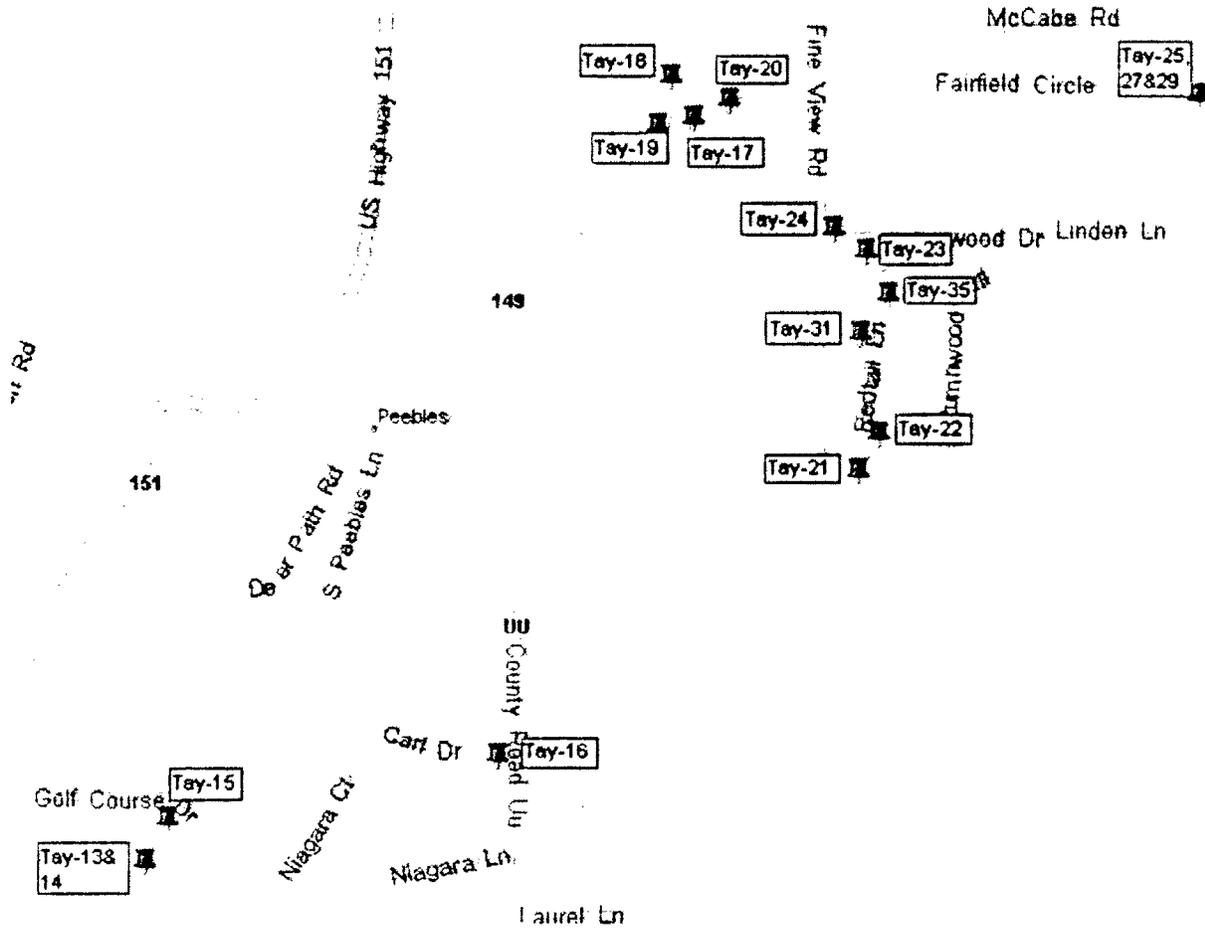
Overview Map #2



Overview Map #3



Overview Map #4



All of these sales were the placed in a spread sheet that appears on the next pages.

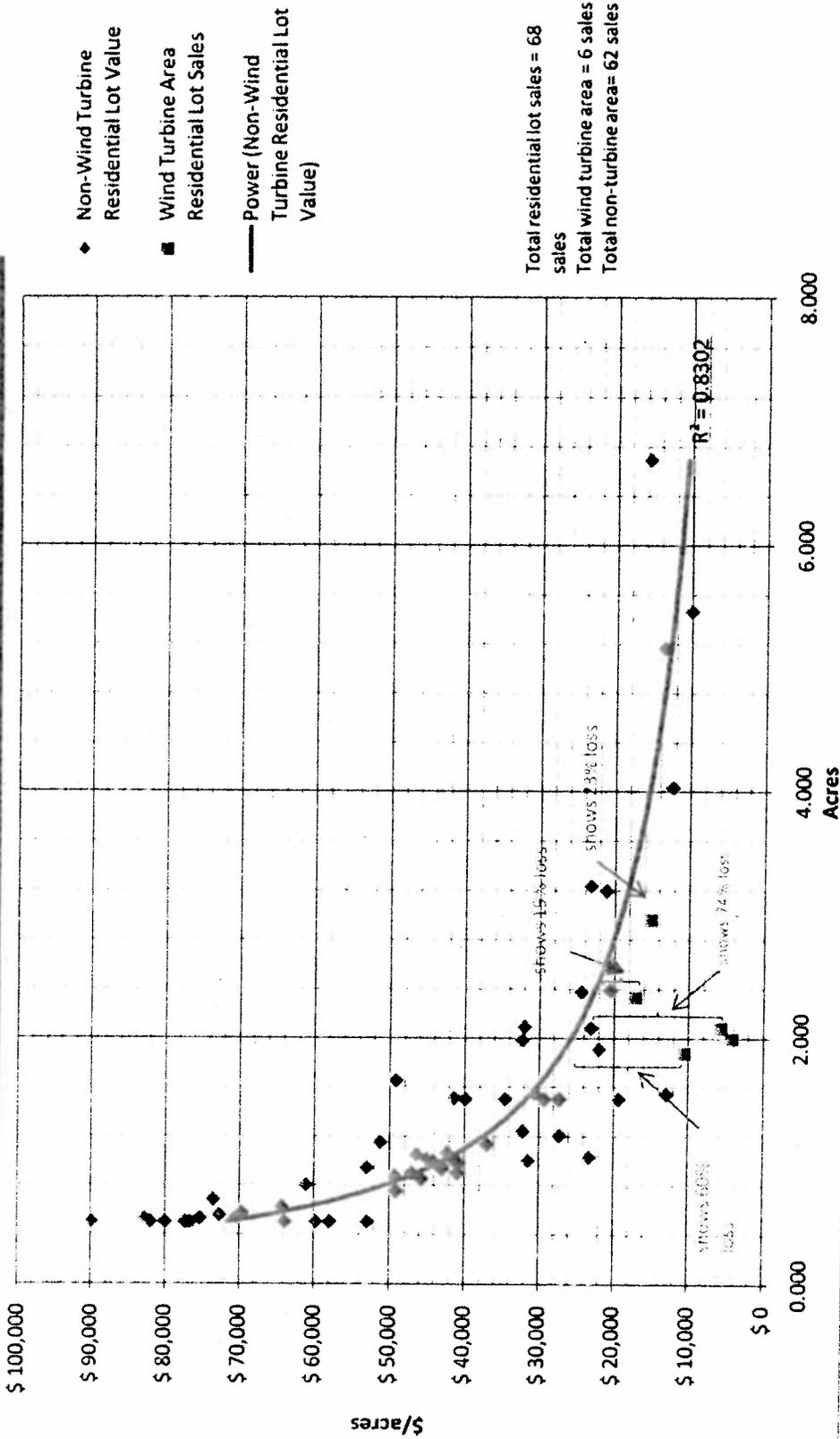
WE-ENERGIES BLUE SKY GREEN FIELD SPREADSHEET

Identifier	Subdy	Lot	Street #	Street name	resale?	Sale Amt	Sale Date	Doc #	lot size acres	adj. Sale after time adj	\$/ac
Cal-5	Rural	turbine	W2073	City Rd HHH	N	\$ 8,500	3/31/2006	868997	2.000	\$ 8,500	\$ 4,250
Cal-4	Rural	turbine	W2079	City Rd HHH	N	\$ 8,500	3/31/2006	868996	2.000	\$ 8,500	\$ 4,250
Cal-3	Rural			Schumacher Rd.	N	\$ 12,000	2/12/2009	931211	2.088	\$ 12,000	\$ 5,747
Marsh-5	Rural	turbine	W1362	Basswood Rd.	N	\$ 45,000	12/27/2007	908549	2.960	\$ 45,000	\$ 15,203
Marsh-2	Rural	turbine	W2209	City Rd W	N	\$ 40,000	5/1/2009	871059	2.330	\$ 40,000	\$ 17,167
Marsh-1	Rural	turbine		City Rd W	N	\$ 20,000	1/16/2008	909043	1.880	\$ 20,000	\$ 10,638
Cal-2	Rural			Johnsburg Rd.	N	\$ 53,500	6/10/2009	940604	2.578	\$ 53,500	\$ 20,753
				State Hwy 151	N	\$ 105,000	10/30/2006	883092	6.689	\$ 105,000	\$ 15,697
For-5	Rural		W879	Pleasant View Ct.	N	\$ 24,000	2/4/2008	910007	1.030	\$ 24,000	\$ 23,301
Marsh-3	Rural			City Rd W	N	\$ 19,900	10/20/2006	882217	1.540	\$ 19,900	\$ 12,922
Tay-13	Winward Estates	Lot 44	W4562	Aeolus Way	Y	\$ 40,000	5/14/2009	938265	0.500	\$ 40,000	\$ 80,000
Tay-14	Winward Estates	Lot 44	W4562	Aeolus Way	N	\$ 45,000	5/31/2007	895585	0.500	\$ 45,000	\$ 90,000
Tay-15	Winward Estates	Lot 68	N7346	Easterlies Dr.	N	\$ 42,900	11/19/2008	926853	0.870	\$ 42,900	\$ 49,310
Tay-16	Niagara Estates	Lot 25		Carl Dr.	N	\$ 70,000	9/15/2008	923533	5.160	\$ 70,000	\$ 13,566
Tay-17	Glacier Ridge	Lot 8		Jennie Lee Ct.	N	\$ 64,000	5/1/2009	937263	1.980	\$ 64,000	\$ 32,323
Tay-18	Glacier Ridge	Lot 10 & 11		Jennie Lee Ct.	N	\$ 75,000	9/6/2006	879445	3.230	\$ 75,000	\$ 23,220
Tay-19	Glacier Ridge	Lot 9	W4209	Jennie Lee Ct.	N	\$ 67,000	6/12/2006	880888	2.090	\$ 67,000	\$ 32,057
Tay-20	Glacier Ridge	Lot 5		Jennie Lee Ct.	N	\$ 81,250	10/4/2006	881308	1.650	\$ 81,250	\$ 49,242
Tay-21	Hawk's Landing	Lot 3	W4084	Redtail Ct.	N	\$ 41,900	9/1/2006	879320	1.132	\$ 41,900	\$ 37,014
Tay-22	Hawk's Landing	Lot 88	N7611	Redtail Ln.	N	\$ 40,400	5/1/2006	871526	0.556	\$ 40,400	\$ 72,662
Tay-23	Hawk's Landing	Lot 24		Thornwood Dr.	N	\$ 39,900	5/9/2006	872462	0.620	\$ 39,900	\$ 64,355
Tay-24	Rural			Linden Dr.	N	\$ 62,500	8/8/2008	920377	1.508	\$ 62,500	\$ 41,446
Tay-25	Rural			Fairlane Circle	Y	\$ 52,000	5/7/2009	937834	1.501	\$ 52,000	\$ 34,644
Tay-26	Fisherman's Estates	Lot 32		Sturgeon St.	N	\$ 40,000	8/30/2006	881378	0.930	\$ 40,000	\$ 43,011
Tay-27	Rural			Fairlane Circle	Y	\$ 41,000	4/12/2007	892630	1.501	\$ 41,000	\$ 27,315

Tay-28	Fisherman's Estates	Lot 26	Sturgeon St.	N	\$ 48,900	5/19/2006	872415	0.800	\$ 48,900	\$ 61,125
Tay-29	Rural		Fairlane Circle	N	\$ 29,000	4/12/2007	892629	1.501	\$ 29,000	\$ 19,320
Tay-30	Fisherman's Estates	Lot 27	Sturgeon St.	N	\$ 45,500	3/27/2006	869335	1.010	\$ 45,500	\$ 45,050
Tay-31	Hawk's Landing	Lot 14	Redtail Ln.	N	\$ 43,900	8/24/2007	901256	0.993	\$ 43,900	\$ 44,209
Tay-32	Fisherman's Estates	Lot 28	Sturgeon St.	N	\$ 50,000	11/26/2007	906314	4.030	\$ 50,000	\$ 12,407
Tay-33	Rural		Sunset Dr.	N	\$ 44,900	4/20/2007	893004	1.060	\$ 44,900	\$ 42,358
Tay-34	Fisherman's Estates	Lot 23	Minnow Ln.	N	\$ 41,272	5/11/2006	871911	0.960	\$ 41,272	\$ 42,992
Tay-35	Hawk's Landing	Lot 99	Redtail Ln.	N	\$ 44,000	5/1/2006	883441	0.531	\$ 44,000	\$ 82,863
Tay-36	Fisherman's Estates	Lot 21	Minnow Ln.	N	\$ 50,000	11/7/2006	884123	0.680	\$ 50,000	\$ 73,529
Tay-37	Sand Hill Ridge	Lot 23	Heron Ct.	N	\$ 39,900	3/16/2006	868646	0.530	\$ 39,900	\$ 75,283
Tay-38	Fisherman's Estates	Lot 17	Perch Ln.	N	\$ 48,800	3/15/2006	868611	1.050	\$ 48,800	\$ 46,476
Tay-39	Sand Hill Ridge	Outlot 2	Sand Hill Dr.	N	\$ 49,900	3/27/2006	869045	0.940	\$ 49,900	\$ 53,085
Tay-40	Fisherman's Estates	Lot 16	Perch Ln.	N	\$ 67,400	6/1/2007	895781	3.190	\$ 67,400	\$ 21,129
Tay-41	Rural		Schuster Ln.	N	\$ 40,000	4/13/2006	869751	0.980	\$ 40,000	\$ 40,816
Tay-42	Fisherman's Estates	Lot 17	Perch Ln.	N	\$ 47,500	4/18/2008	915162	1.550	\$ 47,500	\$ 30,645
Tay-43	Rural		Rosenthal Ct.	N	\$ 32,900	6/28/2007	897596	1.206	\$ 32,900	\$ 27,280
Tay-44	Fisherman's Estates	Lot 10	Perch Ln.	N	\$ 39,710	4/3/2006	869336	0.570	\$ 39,710	\$ 69,667
Tay-45	Rural		Rosenthal Ct.	N	\$ 31,500	4/23/2007	893867	1.000	\$ 31,500	\$ 31,500
Tay-46	Fisherman's Estates	Lot 9	Perch Ln.	N	\$ 41,000	5/15/2006	872274	0.500	\$ 41,000	\$ 82,000
Tay-47	Rural		Sunset Dr.	N	\$ 41,900	4/6/2007	892075	1.010	\$ 41,900	\$ 41,485
Tay-48	Fisherman's Estates	Lot 7	Perch Ln.	N	\$ 38,500	1/13/2006	934159	0.500	\$ 38,500	\$ 77,000
Tay-49	Rural		Sunset Dr.	N	\$ 42,400	3/29/2007	893091	0.900	\$ 42,400	\$ 47,111
Tay-50	Fisherman's Estates	Lot 7	Perch Ln.	Y	\$ 26,500	3/25/2009	934159	0.500	\$ 26,500	\$ 53,000
Tay-51	Rural		Somerset Ct.	N	\$ 36,900	2/15/2007	869033	0.900	\$ 36,900	\$ 41,000
Tay-52	Fisherman's Estates	Lot 5	Perch Ln.	N	\$ 38,700	2/28/2006	867683	0.500	\$ 38,700	\$ 77,400

WE ENERGIES - BLUE SKY GREEN FIELD WIND FARM

1 acre to 8 acre residential land sales -- all sales included

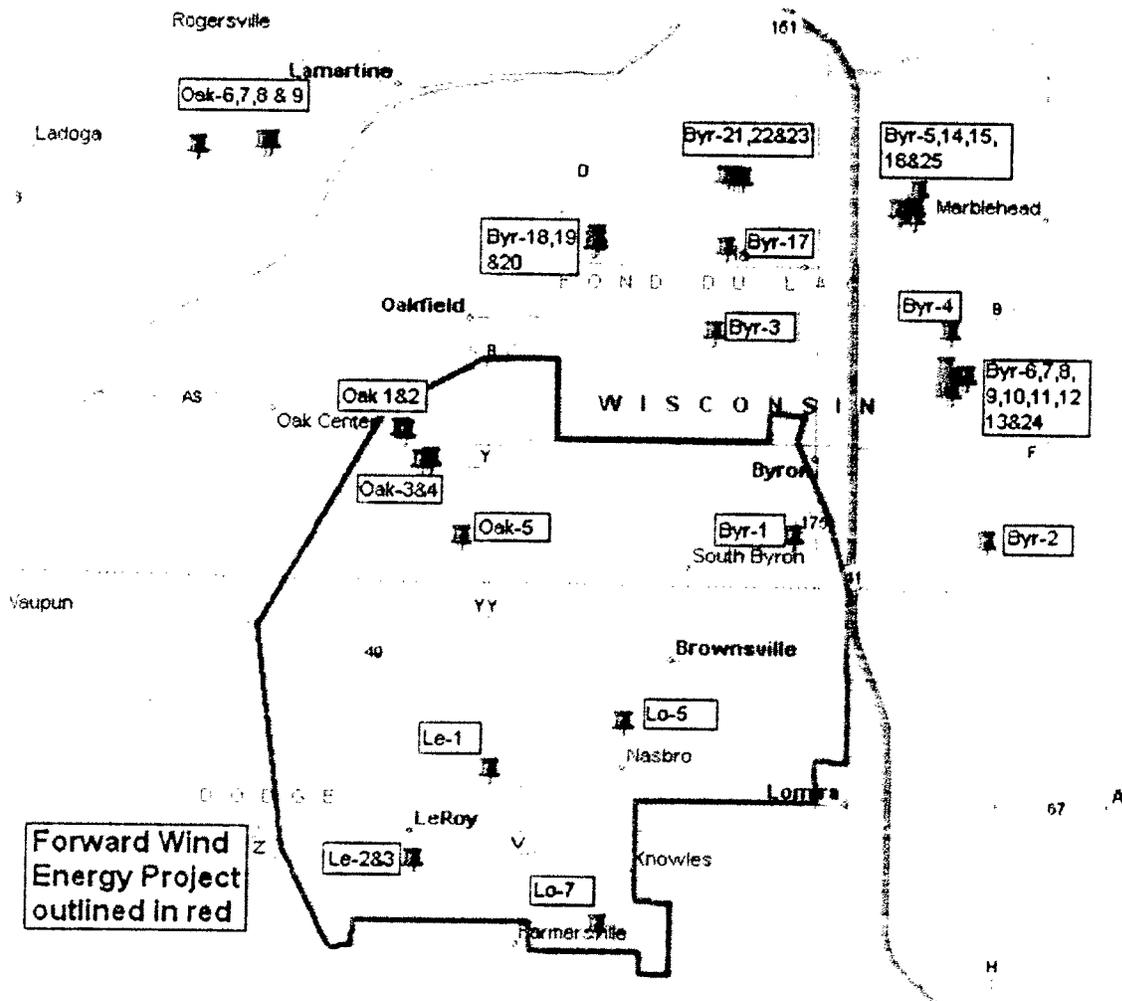


SUMMARY & CONCLUSION

The sales study indicated three factors: (1) sales within the wind turbine influence area sold for less than those outside of this area; (2) there were substantially less sales available within the turbine influence area as compared to those sales outside of the influence area; and, (3) the impact of the wind turbines decreased the land values from -19% to -74%, with an average of -40%. Additionally, it can be said with a high rate of confidence that the impact of wind turbines on residential land sales is negative and creates a loss greater than -19% averaging -40%. It is logical to conclude that the factors that created the negative influence on vacant land are the same factors that will impact the improved property values. Therefore, it is not a leap of logic to conclude that the impact of wind turbines to improved property value would also be negative, most likely following the same pattern as the vacant land sales, that being greater than -19% averaging -40%.

Invenergy – Forward Wind Farm Sales Study

The area of study was the southwest section of Fond du Lac County and the northeast section of Dodge County being bordered by US Highway 41 to the east and Horicon Marsh to the west. The study included the townships of Oakfield and Byron in Fond du Lac County and Leroy and Lomira in Dodge County. A total of 34 vacant residential land sales were utilized for this study. From that total, 6 land sales were in the influence of the wind turbines (within the wind farm parameters) and 28 sales were located outside of that sphere of influence. The sales map for this study is pictured below:



All of these sales were the placed in a spread sheet that appears on the next pages.

INVENERGY – FORWARD WIND FARM SPREADSHEET

Salmon colored sales are within the wind turbine influence

Yellow colored sales are low sales both in and out of the turbine influence area removed from the chart analysis.

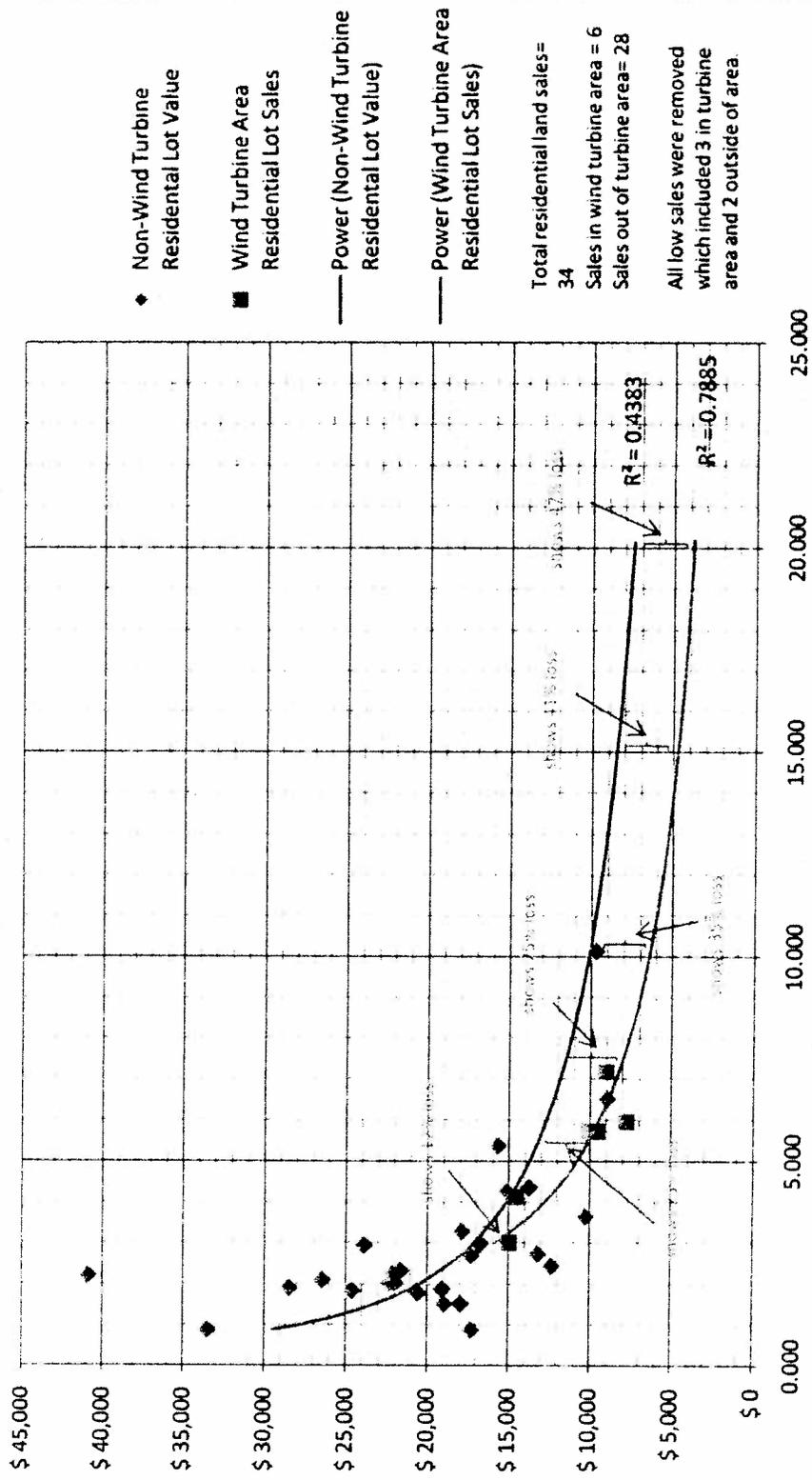
Identifier	Subdiv	Lot	Street #	Street name	resale?	Sale Amt	Sale Date	Doc #	lot size in acres	adj Sale	\$/ac
Byr-1	Rural			Cty Hwy Y	N	\$ 46,500	5/29/2009	939508	5.947	\$ 46,500	\$ 7,819
Oak-2	Rural		W8162	Schoepke Rd.	N	\$ 57,900	5/27/2005	848184	5.725	\$ 57,900	\$ 10,114
Lo-7	Rural		W2388	Farmersville Rd.	N	\$ 60,000	8/5/2005	1051944	4.113	\$ 60,000	\$ 14,588
Oak-1	Rural		W8186	Schoepke Rd.	N	\$ 55,000	6/15/2005	849179	5.724	\$ 55,000	\$ 9,609
Oak-5	Rural		W7810	Kinwood Rd.	N	\$ 45,000	11/7/2005	860118	3.000	\$ 45,000	\$ 15,000
Lo-5	Rural			Rustic Rd.	N	\$ 65,000	10/2/2007	1098197	7.188	\$ 65,000	\$ 9,043
Le-1	Rural		N11014	Dairy Rd.	N	\$ 16,000	3/1/2005	1041761	4.000	\$ 16,000	\$ 4,000
Oak-3	Rural			Highland Rd.	N	\$ 40,000	4/18/2006	870251	20.000	\$ 40,000	\$ 2,000
Oak-4	Rural			Highland Rd.	N	\$ 30,000	4/18/2006	870206	15.000	\$ 30,000	\$ 2,000
Oak-6	Rural			Dehring Rd.	N	\$ 30,000	8/14/2007	900404	5.000	\$ 30,000	\$ 6,000
Byr-17	Rural			Cty Hwy B	N	\$ 38,700	1/18/2006	934701	5.719	\$ 38,700	\$ 6,767
Byr-10	Yellowstone Glen	Lot 10		Maple Ridge Dr	N	\$ 49,900	1/11/2008	909184	2.970	\$ 49,900	\$ 16,801
Byr-11	Yellowstone Glen	Lot 12		Maple Ridge Dr	N	\$ 49,900	9/7/2007	901728	2.250	\$ 49,900	\$ 22,178
Byr-12	Yellowstone Glen	Lot 9		Church Rd.	N	\$ 64,900	#####	885873	4.270	\$ 64,900	\$ 15,199
Byr-13	Rural			Maple Lane	N	\$ 35,500	12/3/2007	906831	1.855	\$ 35,500	\$ 19,137
Byr-14	Whispering Wind Estates	Lot 3	W5363	Abel Dr.	N	\$ 36,500	#####	944576	1.770	\$ 36,500	\$ 20,621
Byr-15	Whispering Wind Estates	Lot 13		Abel Dr.	N	\$ 89,900	4/20/2007	894055	2.197	\$ 89,900	\$ 40,919

Byr-16	Whispering Wind Estates	Lot 14		Bowe Ln.	N	\$ 84,500	4/13/2007	892992	5.369	\$ 84,500	\$ 15,738
Byr-18	Rural		W7113	Briar Ct.	N	\$ 50,000	1/3/2006	863679	2.306	\$ 50,000	\$ 21,683
Byr-19	Rural	Lot 4		Briar Ct.	N	\$ 55,000	1/24/2007	887690	2.077	\$ 55,000	\$ 26,481
Byr-2	Rural		W5135	Cty Rd. Y	N	\$ 27,000	5/4/2006	871853	1.500	\$ 27,000	\$ 18,000
Byr-20	Rural	Lot 3		Briar Ct.	N	\$ 58,500	6/28/2006	875130	3.260	\$ 58,500	\$ 17,945
Byr-21	Boda	Outlot 1		Lost Arrow Rd.	N	\$ 58,500	#####	905816	6.492	\$ 58,500	\$ 9,011
Byr-22	Boda	Lot 3		Boda Lane	N	\$ 30,000	8/31/2006	879134	2.420	\$ 30,000	\$ 12,397
Byr-23	Boda	Lot 6		Boda Lane	N	\$ 28,500	3/14/2008	913416	1.500	\$ 28,500	\$ 19,000
Byr-24	Yellowstone Glen	Lot 18	W5143	Maple Ridge Dr	N	\$ 46,500	2/28/2006	867569	2.680	\$ 46,500	\$ 17,351
Byr-25	Whispering Wind Estates	Lot 19	W5384	Bowe Ln.	N	\$ 70,000	#####	908457	2.927	\$ 70,000	\$ 23,915
Byr-3	Rural		N3866	Hickory Rd.	N	\$ 36,000	7/11/2007	897417	2.717	\$ 36,000	\$ 13,250
Byr-4	Lonesome Oak		N3787	Shamrock Ct.	N	\$ 37,500	6/28/2007	897801	3.636	\$ 37,500	\$ 10,314
Byr-5	Rural		W5326	Lost Arrow Rd.	N	\$ 98,500	8/12/2008	920831	10.130	\$ 98,500	\$ 9,724
Byr-6	Yellowstone Glen	Lot 2	W5110	Maple Ridge Dr	N	\$ 44,900	3/29/2006	868808	1.820	\$ 44,900	\$ 24,670
Byr-7	Yellowstone Glen	Lot 17	W5133	Maple Ridge Dr.	N	\$ 44,900	6/7/2006	873673	2.010	\$ 44,900	\$ 22,338
Byr-8	Yellowstone Glen	Lot 3		Maple Ridge Dr.	N	\$ 53,900	#####	905595	1.890	\$ 53,900	\$ 28,519
Byr-9	Yellowstone Glen	Lot 8		Maple Ridge Dr.	N	\$ 59,900	#####	907222	4.350	\$ 59,900	\$ 13,770
Le-2	Town		N10456	Cty. Rd. Y	N	\$ 15,000	1/10/2005	1038920	0.865	\$ 15,000	\$ 17,341
Le-3	Town		N10456	Cty. Rd. Y	Y	\$ 29,000	2/25/2005	1041336	0.865	\$ 29,000	\$ 33,526
Oak-7	Rural		W8870	Cty Hwy TC	N	\$ 44,000	#####	908830	2.000	\$ 44,000	\$ 22,000
Oak-8	Rural			Cty Hwy TC	Y	\$ 44,000	5/30/2008	917939	2.000	\$ 44,000	\$ 22,000
Oak-9	Rural			Cty Hwy TC	N	\$ 44,000	5/29/2007	895852	2.000	\$ 44,000	\$ 22,000

The spreadsheet from above has been translated into a chart on the next page. This chart plots the land sales within the influence of the wind turbines in red and those sales outside of this influence in blue. The blue regression line plots the best fit of predicted values of the land value outside of the influenced area. The red regression line plots the best fit of predicted values of the land inside of the wind turbine influence. The difference in value between the two is plotted and referenced in the graph.

INVENEGY - FORWARD WIND FARM

1 acre to 20 acre residential lot sales -- low sales removed



SUMMARY & CONCLUSION

The sales study indicated three factors: (1) sales within the wind turbine influence area sold for less than those outside of this area; (2) there were substantially fewer sales available within the turbine influence area as compared to those sales outside of the influence area; and, (3) the impact of the wind turbines decreased the land values from -12% to -47% with the average being -30%. Additionally, it can be said with a high rate of confidence that the impact of wind turbines on residential land sales is negative and creates a loss greater than -12%, averaging -30%. It is logical to conclude that the factors that created the negative influence on vacant land are the same factors that will impact the improved property values. Therefore, it is not a leap of logic to conclude that the impact of wind turbines on improved property value would also be negative, most likely following the same pattern as the vacant land sales, that being greater than -12% averaging -30%.

WIND TURBINE IMPACT – LITERATURE REVIEW

By Erik Kielisch

Introduction

The push for renewable energy is a global phenomenon. "Green" energy has swept the public consciousness, and wind farms are being promoted as a clean-air alternative to traditional energy sources.¹ The prevalent opinion is, "Wind is free. Why not harness it?" The wind industry claims wind turbines emit no greenhouse gases and produce electricity without using fossil fuels.² They also claim that the free nature of wind eliminates fuel cost uncertainty and stabilizes the overall price of electricity as compared to fossil-fueled power plants,³ and thusly national security can be enhanced by diversifying and distributing such electricity generation resources.⁴ Industry advocates claim wind energy development can create jobs, income and tax revenues – especially in rural communities where farmers can benefit from income opportunities through leasing.⁵

On the surface, it's an attractive option, but the reality is far less encouraging. Each industry claim has been widely contested by many, including several European countries the wind energy industry holds in high regard.

The focus on the ideals personified by wind power and the willful ignorance of its true costs and inefficiency has fast become a case of "symbolism over substance."⁶ Though wind is free, harnessing it is not. Nor are wind farms benign, and the converting of blowing wind into electricity is anything but "green." As the following literature review summary will show, wind energy has many unresolved issues that warrant further investigation before committing the country's resources to its further development.

The Setting

When most Americans hear of wind farms, they think of the rustic water-pumping windmills found on turn-of-the-century farms or reruns of "Little House on the Prairie." These windmills are dwarfed by the turbines proposed and built worldwide. The most common height of a modern industrial-grade wind turbine used in wind farms is nearly 400 feet from base to blade tip. That's taller than the Statue of Liberty.⁷ And the spinning diameter of the blades is wide enough to comfortably fit a Boeing 747.⁸

Though fossil fuels are a limited resource, the benefits of wind energy are equally limited. In their haste to promote renewable energy, many counties and states are approving wind farms with little research into how industrial-grade wind turbines impact the health of nearby residents, property values and the local economy.⁹

Health Issues

Many people living near operating wind turbines are reporting neurological and physiological disorders that are only resolved when the turbines are off or when the people leave the area. Common symptoms include sleeplessness, headaches, dizziness, unsteadiness and nausea, exhaustion, anxiety, anger, irritability and depression, problems concentrating and learning, and Tinnitus (ringing in the ears).¹⁰ Symptoms can be experienced up to 1.2 miles away in rolling terrain; 1.5 miles away in valleys; and 1.9 miles away in mountainous regions.¹¹ These symptoms are being referred to as “Wind Tower Syndrome”¹² in the U.S., but they are the same symptoms of a proven ailment, Vibroacoustic Disease (VAD).¹³

In 2007, two Portuguese scientists found that the amount of infrasound and low frequency noise (LFN) generated by wind turbines is conducive to VAD.¹⁴ Symptoms include: slight mood swings, indigestion, heartburn, mouth/throat infections, bronchitis, chest pain, definite mood swings, back pain, fatigue, skin infections (fungal, viral, and parasitic), inflammation of stomach lining, pain and blood in urine, conjunctivitis, allergies, psychiatric disturbances, hemorrhages (nasal, digestive, conjunctive mucosa) varicose veins, hemorrhoids, duodenal ulcers, spastic colitis, decrease in visual acuity, headaches, severe joint pain, intense muscular pain, and neurological disturbances.¹⁵

Though some may claim high frequency noise has no health effects, a study of before-and-after sound waveforms shows how overexposure to high frequencies can cause similar symptoms including: Tinnitus, headaches, sleeplessness, dangerously high blood pressure, heart palpitations, itching in the ears, eye watering, earaches and chest pressure.¹⁶

These symptoms can become so overwhelming that landowners have to leave their home to recover. In a case in Canada, four families had to abandon their homes near the wind farms – prompting the wind company to bury the turbines’ collector line near the worst-hit homes. A collector line transports wind-generated electricity below ground within the turbine rows and above ground from the rows to the main substation.¹⁷ The operator also installed an insulator between the neutral line and the grounding grid. It reduced the high frequencies, but didn’t completely cure the situation.¹⁸

Most studies on the health impacts of wind turbines have been conducted in Canada and Europe – where turbines have long been operating. But in 2009, Minnesota’s Department of Health released a study on the public health impact of wind turbines. They also found that wind turbines generate a broad spectrum of low-intensity (frequency) noise,¹⁹ and houses do little to weaken LFNs.²⁰ Sleeplessness and headaches are the most common health and annoyance complaints associated with proximity to turbines.²¹ LFN is typically a non-issue at more than a half mile, but differences in terrain or different wind conditions could cause the sound to reach further. Unlike LFN, shadow flicker can affect people outdoors and indoors. Minnesota’s Department of Health recommended further testing to determine the LFN impact; evaluate potential impacts from shadow flicker and visibility; and estimate the cumulative noise impacts of all wind turbines.²²

The noise produced from wind turbines is extremely complex, and it is the complexity of the noise and vibration which causes the disturbance.²³ A 2007 British study surveyed 39 residents already known to be suffering from problems they felt were due to their close

proximity to the turbines. On average, 75% of them reported fatigue, lack of sleep and headaches. Half reported stress and anxiety. And a quarter reported migraines, depression and Tinnitus.²⁴

To counter health claims, the wind industry has quoted the World Health Organization's Community Noise Paper of 1995 which says, "There is no reliable evidence that infrasound below the hearing threshold produce physiological or psychological effects." However, the final WHO document of 1999 reversed that statement: "The evidence on low frequency noise is sufficiently strong to warrant immediate concern."²⁵

According to Dr. Amanda Harry's 2007 study, "Wind Turbines, Noise and Health," people are affected by LFN because the human body is "in an extremely delicate state of equilibrium with the sonic environment and any profound disturbance of this system will have profound ramification to the individual."²⁶

LFNs are mainly the result of the displacement of air by a blade and of turbulence at the blade surface.²⁷ LFN intensity changes with the wind and it can amplify audible, higher frequency sounds to create periodic sound. The effect is stronger at night – sometimes up to 15-18dBs higher – because of atmospheric differences. Multiple turbines can interact with each other to multiply the effect which will be greater for larger, more modern turbines.²⁸ LFNs contribute to the overall audible noise but they're mainly seismic – which is why people say they can "feel" the noise.²⁹

Body vibration exposure at seemingly low frequencies from 1-20 Hz can have the following effects:³⁰

- | | |
|---------------------------------|----------|
| - General feeling of discomfort | 4-9 Hz |
| - Head symptoms | 13-20 Hz |
| - Influence on speech | 13-20 Hz |
| - Lump in throat | 12-16 Hz |
| - Chest pains | 5-7 Hz |
| - Abdominal pains | 4-10 Hz |
| - Urge to urinate | 10-18 Hz |
| - Influence on breathing | 4-8 Hz |

Over time, symptoms from LFN can have serious adverse physiological effects.³¹

- After 1-4 years: slight mood swings, indigestion, heartburn, mouth/throat infections, bronchitis.
- After 4-10 years: chest pain, definite mood swings, back pain, fatigue, skin infections, inflammation of stomach lining, pain and blood in urine, conjunctivitis, allergies.
- After 10 years: psychiatric disturbances, hemorrhages, varicose veins, hemorrhoids, duodenal ulcers, spastic colitis, blindness, headaches, severe joint pain, intense muscular pain, neurological disturbances.

One particular case in Nova Scotia, Canada has generated substantial press. The d'Entermont family home sits in the midst of a 17-turbine wind farm. Soon after the turbines began operating, the parents saw a noticeable shift in their six children's behavior. They started becoming more irritable, hearing ringing in the ears, lost concentration and developed high blood pressure. They had to move 30 miles away to resolve the health issues, and no one will buy their home.³²

However, these symptoms don't affect everyone. Because wind is inconsistent, so too will be the noise (and thus health effects) caused by wind turbines.³³ As a result, the wind industry counters such health claims by relying on engineers and acoustics consultants who base their conclusions on engineering principles instead of on physiology like opposing audiologists and physicians who study the effect of sound and vibration on people.^{34,35} Likewise, many environmentalists dismiss any health effects – claiming they're fictions fueled by not-in-my-backyard-ism.³⁶ However, experts in biomedical research have drawn different conclusions.³⁷

The French National Academy of Medicine has warned that the harmful effects of sound related to wind turbines are insufficiently assessed. They consider wind turbines to be industrial installations and expect turbine operators to comply with specific regulations that address the harmful effects of sound particularly produced by these structures.³⁸

This year, two families in Ontario, Canada had to move due to adverse health effects from nearby wind turbines. One of the displaced landowners said he started suffering from very high blood pressure, sore feet and irritability once the wind farm was online. Once he leaves the area, he quickly recovers. The wind company is paying for one of them to stay in a hotel while tests are being done on their property.³⁹

In July of 2009, Sean Whittaker, vice president of policy for the Canadian Wind Energy Association said such health complaints are few. "There's no cause and effect relationship between audible sound produced by turbines and adverse health effects," Whittaker said. "...all research to date indicates that turbines do not produce infrasound at levels near enough to have impacts on humans."⁴⁰

Elizabeth May, the former Executive Director of Sierra Club of Canada, vehemently defends wind energy but admits that literature studies show wind towers negatively affect human health. She makes a concession for better project siting – away from impacted citizens.⁴¹

But why do some suffer and others do not? Everyone's body is different. Some can be exposed to the flu and never catch it, while others succumb. Of three siblings with identical parentage, two may always be healthy and the third may suffer from extreme arthritis. The human body is complex and some are more resilient than others to outside influences.

Health Solutions

The international community recommends generous setbacks from wind farms in order to mitigate any potential health effects and loss to property values. The setbacks range from a minimal 1,500 foot setback⁴² to 1½ miles away from any home, school or business.⁴³ Because

symptoms can be suffered up to a mile from a wind farm, one study suggests that turbines should be no closer than 1½ miles from a residence.⁴⁴ Others recommend an immediate and mandatory minimum buffer of 1¼ miles between a dwelling and an industrial wind turbine, and even more of a buffer between a dwelling and a wind turbine with greater than 2MW installed capacity.⁴⁵

Other solutions include: filtering inverters at each turbine, burying all collector lines, filtering the power at the substation before going to the grid, and installing a proper neutral system to handle the high frequency return current.⁴⁶

Wind Turbine Hazards

Wind turbines, like all machines, have weaknesses and are subject to accidents and failure. Inclement weather and strong gusts can snap off wind tower blades;⁴⁷ ice can build up on the blades, break and throw large ice chunks⁴⁸ and fling ice shards onto nearby homes^{49,50} - potentially harming nearby residents;⁵¹ turbulent wind can accelerate a blade's deterioration, weakening it to the point of breaking off and crashing into nearby homes;⁵² high winds can also overpower its automatic braking system and result in structural failure;⁵³ automatic shut-down systems can malfunction, damaging the turbine to the point of collapse;⁵⁴ and gale force winds can shut down turbines and make them a safety concern. In one such case, British police cordoned off a 1,500 foot area around the wind farm for "safety precautions."⁵⁵ Other common problems include fires and blade disintegration caused by mechanical failures and lightning.⁵⁶

In Europe, which has long had wind farms, they have seen an increase in turbine accidents, defects and needed repairs. A turbine's gearbox is expected to last 5 years and often quits before then. Due to the huge demand for turbines, manufacturers have no time to test their product before sending it into the field. And the demand has so strained manufacturing capabilities that the waiting list for replacement parts can sometimes top 18 months – leaving the turbine motionless in the meantime.⁵⁷

Wind farms interfere with weather radar by sending false storm signals,⁵⁸ thus limiting the ability of people in surrounding areas to know if they should seek shelter or not. They also interfere with military radar, affecting military readiness.⁵⁹ And they may interfere with civilian radar,⁶⁰ making it dangerous to site turbines near airports or military installations.⁶¹

Despite the constant warning lights on top of each turbine, wind farms are dangerous to planes. A distance of 1,200 feet is still too close to an airport or landing strip because aircraft cannot turn fast enough to avoid the turbines. Also, turbines create a down draft – additional turbulence that pilots have to overcome in take offs and landing.⁶²

In the 2007 *Burch v. Nedpower Mount Storm, LLC* decision, a West Virginia court found that wind farms can constitute a nuisance to nearby landowners. Even though the state's Public Service Commission approved the facility, the court ruled that such approval does not overrule the common law of nuisance.⁶³ Accepted causes of nuisance included noise, eyesore, flicker and strobe effect of light reflecting from blades, potential danger from broken blades, ice throws, and reduced property values.⁶⁴

Conservation Concerns

Wind turbines have been found to adversely affect a wide variety of environmental, ecological, and scenic values.⁶⁵ Poor turbine sitings have led to bird and bat fatalities.⁶⁶ According to the American Bird Conservancy, wind towers kill 10,000 to 40,000 birds every year. However, this is still much lower than the 100 million window-related bird deaths each year.⁶⁷ Bat deaths, however, are killed three times as much as birds by wind turbines.⁶⁸ And many bats killed by turbines are most likely migrating for mating rituals. If such bats are killed then certain bat species are in danger of failing to repopulate.⁶⁹

Aside from wildlife concerns, conservation groups are divided on wind energy. In North Carolina, environmentalists are fighting over siting issues. Some side with the wind companies and want to place wind turbines on mountain ridges for optimal winds. But other environmentalists want to keep them off the ridges in order to protect the mountains' natural beauty.⁷⁰

According to the wind industry, the most damage to wildlife and plant-life happens during construction. After that, they say collision deaths are insignificant compared to the effects of other man-made structures, vehicles and pollution.⁷¹ Turbine installation can also significantly affect natural drainage and ground water.⁷²

The wind industry acknowledges is toxic or hazardous materials in the form of relatively small amounts of leaking lubricating oils, hydraulic and insulating fluids.⁷³ However, even small leakages of such materials can negatively impact ground water if left unchecked over time.⁷⁴ Fluid leaks not only drip directly downward, but they also fly off the tips of the spinning blades, thus spreading the contamination over a wider area.⁷⁵ On-site storage of new and used lubricants and cleaning fluids also constitutes a hazard.⁷⁶ To protect the public, the National Wind Coordinating Committee recommends setback requirements to provide "an adequate buffer" between wind generators and consistent public exposure and access.⁷⁷

Property Values and Land Use

Wind industry advocates say little about a turbine's impact on property values. When they do address the issue, they deny that wind farms negatively impact property values. If they do admit impact, they say the only effect would be more time on the market.⁷⁸

Mike Sagrillo, president of Sagrillo Power & Light Co. said that those who claim property value diminutions "pull myths out of thin air and persist in wild accusations despite being debunked."⁷⁹ To prove this point, wind industry advocates frequently refer to a 2004 study performed by the Renewable Energy Policy Project (REPP) – an organization dedicated to accelerating the use of renewable energy.

The REPP study, paid for by wind energy proponents, reviewed 25,000 assessment records of property sales within 5 miles of wind projects from 1998-2001 to determine if there was a negative effect on property values within the view shed of the wind farm projects. In 9

out of their 10 case studies, they found either no change in value or even an increase of value for those properties within the turbines' view shed.⁸⁰

However, the conclusion that property values increased isn't verified.⁸¹ They did not follow up with the property purchasers.⁸² The REPP findings omit many necessary variables for analysis such as adjustments for a rising or falling market, number of days from listing to sale, residential property vs. rural property, effect of noise, flickering and shadows, distances of the homes from the turbines, and possible change in highest and best use due to the presence of the turbines.⁸³ By using assessment data, they measured mass property values, not individual property values, and assessments do not accurately reflect market value. The purpose of an assessment is to treat all property owners equally so the general tax burden is shared by all.

The REPP study also does not analyze whether or not the properties had a direct line of sight to the turbines, and the number of property transactions decreases the closer one approaches the wind farm. By only examining change in comparable property values over a three year period, the study weakens itself because, in most cases, the projects had been announced and debated long before the three-year window opened. As a result, any depressive effect on property values would have occurred prior to the start of the study.⁸⁴

In contrast, others say close proximity to wind turbines can devalue a property 20-30%.⁸⁵ In analyzing potential impact to their township from a wind farm, the township of Centerville, Michigan disregarded the REPP study because of its flaws and bias in favor of wind energy.⁸⁶

Industry advocates often liken wind turbines to other man-made structures like water towers.⁸⁷ But water towers don't move.⁸⁸ If they had no effect, then people would want to live near them. However, developers are balking at even building near wind turbines lest potential buyers of high-end homes be "spooked by the noise and visual distraction of the huge whirling fan blades."⁸⁹ In many cases there is a complete lack of interest in any homes near existing or planned wind farms. And when they do sell, they usually sell at less than current market value.⁹⁰

At best, a wind turbine near a residential property can have no effect on the value and salability of the property. As one realtor explained, "Logically, as wind turbines produce constant audible noise over a large area, and as they intrude on the view shed, the only valid conclusion is that nearby residences are less valuable than they would be if there was no turbine nearby. Why would a buyer choose a house within sight and sound of a turbine, if a comparable house at the same price were available elsewhere, beyond the sight and sound of the turbine? It is totally counter-intuitive to suggest anything else."⁹¹

In the last couple years, Canadian assessors have begun to devalue homes that are at least 1,500 feet away from the nearest turbine. In Prince Edward Island, several residents near an industrial wind farm received up to a 10% lower property value due their proximity. The assessors considered the turbines as an industrial area and devalued nearby properties accordingly.⁹²

As with other easements, some claim that the impact from windmills will diminish over time. However, studies from Europe show otherwise. In Germany, which has long had windmills, real estate agents report property value losses between 20-30% for properties in sight of wind farms.⁹³ And even though a minority may find windmills to be a nuisance,

property values can still drop \$2,900 per turbine up to \$16,000 for a property abutting 12 turbines.⁹⁴ Likewise, Scottish real estate agents found that a 41-turbine wind farm would result in \$1 million in property value losses.⁹⁵

Properties within wind farm areas may experience longer days on market. In his study, "Living with the Impact of Windmills," Real Estate broker Chris Luxemburger studied 600 sales over 3 years within proximity of a wind mill (interchangeable with "turbine") found that the days on market were more than double for properties within the windmill zone. Selling price was an average of \$48,000 lower inside the zone than outside. And 11% of homes within the zone did not sell vs. 3% of homes outside the zone.⁹⁶

Wind farms are normally built in rural locations. Therefore, apart from size, the main influences on value will often be the view, peace and serenity, and a rural environment. In many rural locations a wind farm will reduce the value of properties located nearby.⁹⁷ However, it has been observed in some rural farming areas that prices remained steady or even increased for those properties benefitting from the associated income stream from the turbine leases.⁹⁸ Many factors contribute to a loss in value, including: loss of a quality view, environmental noise pollution and the consequent health impact, shadow flicker and strobing light (which can have health repercussions). The further a dwelling is from wind turbines, the less impact they will have on property values and health.

In 2004, the township of Lincoln in Kewaunee, Wisconsin performed its own study and found that sales within one mile of the wind farm prior to installation were 104% of the assessed values. Properties selling after the wind farm installation in the same area were at 78% of the assessed value.⁹⁹ The UK has reported similar impacts up to a 20% loss in value from the presence of four 360-foot tall turbines 550 yards from a new home.¹⁰⁰

In most cases, environmental noise pollution will influence the bulk of the property damages. In a well-populated rural area, the total financial damage on the community will substantially exceed the public interest that will be served from the wind farm.¹⁰¹

To counter claims of property value loss, the wind industry cites a 2006 study which shows no impact on property values from visibility of a constructed 20-turbine wind farm. The author, an environmental scientist graduate student, analyzed 280 arms-length residential home sales within 5 miles of the wind farm occurring between 1996 and 2005. He concludes that the lack of impact was due to wind farms "fitting the community's 'sense of place;'" payments "balanced" any adverse impacts; a well-respected landowner / proponent swayed others; and "possibly residents swapped local impacts for global benefits." However, the study does not include sales less than 4,000 feet from the windmills. It does not include any data on whether there were homes closer that did not sell. And of his 280 sales, only 43 had sold after the project started.¹⁰²

The wind industry has referenced a 2007 British study of 919 home sales within 5 miles of a wind farm that found no impact from wind turbines on property value.¹⁰³ However, the turbines' maximum height was just over a third (124ft) of turbines being currently built. Additionally, the study omitted whether any of the sales could see the turbines. All distance zones and rural and town properties were combined together without differentiation. There was no before-and-after analysis of sale prices.¹⁰⁴ When interviewing general land agents, the study found 60% said that nearby wind farms would decrease property values in the view shed.