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# **Residential Property Values And Wind Turbines: A Summary of Findings**

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# Impacts on Residential Property Values Near Wind Turbines

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- Wind Energy and Property Values
  - Overview of Subject
  - Previous Literature
  - Berkeley Lab Research
  - Other Disamenity Research
  - Conclusions

# Proximity to and Views of Environmental (Dis)Amenities Can Impact Property Values



This linkage is well studied generally,  
but not for wind facilities,  
but that is changing.

# Property Value Concerns for Wind Fall Into Three Potential Categories

1. **Area Stigma:** Concerns that rural areas will appear more developed

No one will move here!

2. **Scenic Vista Stigma:** Concerns over decrease in quality of scenic vistas from homes

It will ruin my view!

3. **Nuisance Stigma:** Potential health/well-being concerns of nearby residents

I won't be able to live in my home!

Each of these effects could impact property values; none are mutually exclusive

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# Relatively Few Robust Wind and Property Studies Exist

- **Variety of methods used**, from surveys to sales analyses, with varying levels of sophistication
- **Some methods are not conventional** based on the previous literature
- **Some analyses use very small samples** on which they base conclusions
- **Results are diverse**, and in many instances unpersuasive due to limitations to the data and methodology.

<u>Document Type</u> Author(s)	Year	Number of Transactions/ Respondents	Before or After Wind Facility Construction	Area Stigma	Scenic Vista Stigma	Nuisance Stigma
<b>Homeowner Survey</b>						
Haughton et al.	2004	501	Before	- *	- *	
Goldman	2006	50	After	none		
Firestone et al.	2007	504	Before	- *	- *	
Bond	2008	~300	After		- ?	- ?
<b>Expert Survey</b>						
Grover	2002	13	After	none		none
Haughton et al.	2004	45	Before	- *	- *	
Khatri	2004	405	Before <sup>‡</sup>	- ?		- ?
Goldman	2006	50	After	none		none
Crowley	2007	42	After	none	none	none
Kielisch	2009	57	Before <sup>‡</sup>			- ?
<b>Transaction Analysis - Simple Statistics</b>						
Jerabek	2001	25	After			none
Jerabek	2002	7	After			none
Sterzinger et al.	2003	24,000	After	none		
Beck	2004	2	After			none
Poletti	2005	187	After	none		none
DeLacy	2005	21	Before <sup>†</sup>	none		
Goldman	2006	4	After	none		
Poletti	2007	256	After	none		none
McCann	2008	2	After			- ?
Kielisch	2009	103	After			- ?
Schneider	2010	2,330	Before	- */none		
<b>Transaction Analysis - Hedonic Model</b>						
Jordal-Jorgensen	1996	?	After			- ?
Hoen	2006	280	After		none	
Sims & Dent	2007	919	After			- *
Sims et al.	2008	199	After		-/+ *	
Hoen, Wiser et al.	2009	7,459	After	none	none	none
Laposa & Mueller	2010	2,910	After		none	
Hinman	2010	3,851	After	none		none
Canning & Simmons	2010	82	After	none	- */none	
<i>"none" indicates the majority of the respondents do not believe properties have been affected (for surveys) or that no effect was detected at 10% significance level (for transaction analysis)</i>						
<i>"- ?" indicates a negative effect without statistical significance provided</i>						
<i>"- *" indicates statistically significant negative effect at 10% significance level</i>						
<i>"-/+ *" indicates positive and negative statistically significant effects at 10% significance level</i>						
<i>† Sales were collected after facility announcement but before construction</i>						
<i>‡ Some respondents had experience with valuations near facilities while others did not</i>						

# What Conclusions Can Be Drawn From The Previous Literature When Looking At It Together?

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- Wind facilities have often been **predicted to negatively impact property values** (e.g., Haughton; Firestone et al.; Kielisch; McCann)
- Some convincing evidence exists of impacts occurring **after announcement but prior to construction** (Hinman)
- In general, **impacts**, to the degree that they exist, **are most likely very near turbines** (e.g., where they can be heard) (McCann)
- **Experts** (e.g., appraisers, assessors, realtors) when surveyed after construction **have mixed opinions as to actual effects** (Grover; Goldman; Crowley; McCann; Kieliesh; Poletti)
- When actual sales are investigated **after construction** using accepted techniques **evidence of impacts has failed to materialize** (Hoen; Sims & Dent; Sims et al., Hinman, Canning & Simmons)

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# Berkeley Lab Project Involves Most Data-Rich and Comprehensive Analysis To Date

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## Research Questions

- 1) Is there evidence that views of turbines measurably affect sales prices?
- 2) Is there evidence that proximity to turbines measurably affect sales prices?
- 3) Do the results change over time, and are there other observable impacts?

## Relevance

Provide stakeholders in siting/permitting processes greater confidence in the likely effects of proposed wind energy facilities, allowing greater consensus on often-contentious setback requirements, viewshed valuations and non-participating landowner arrangements.

## Team

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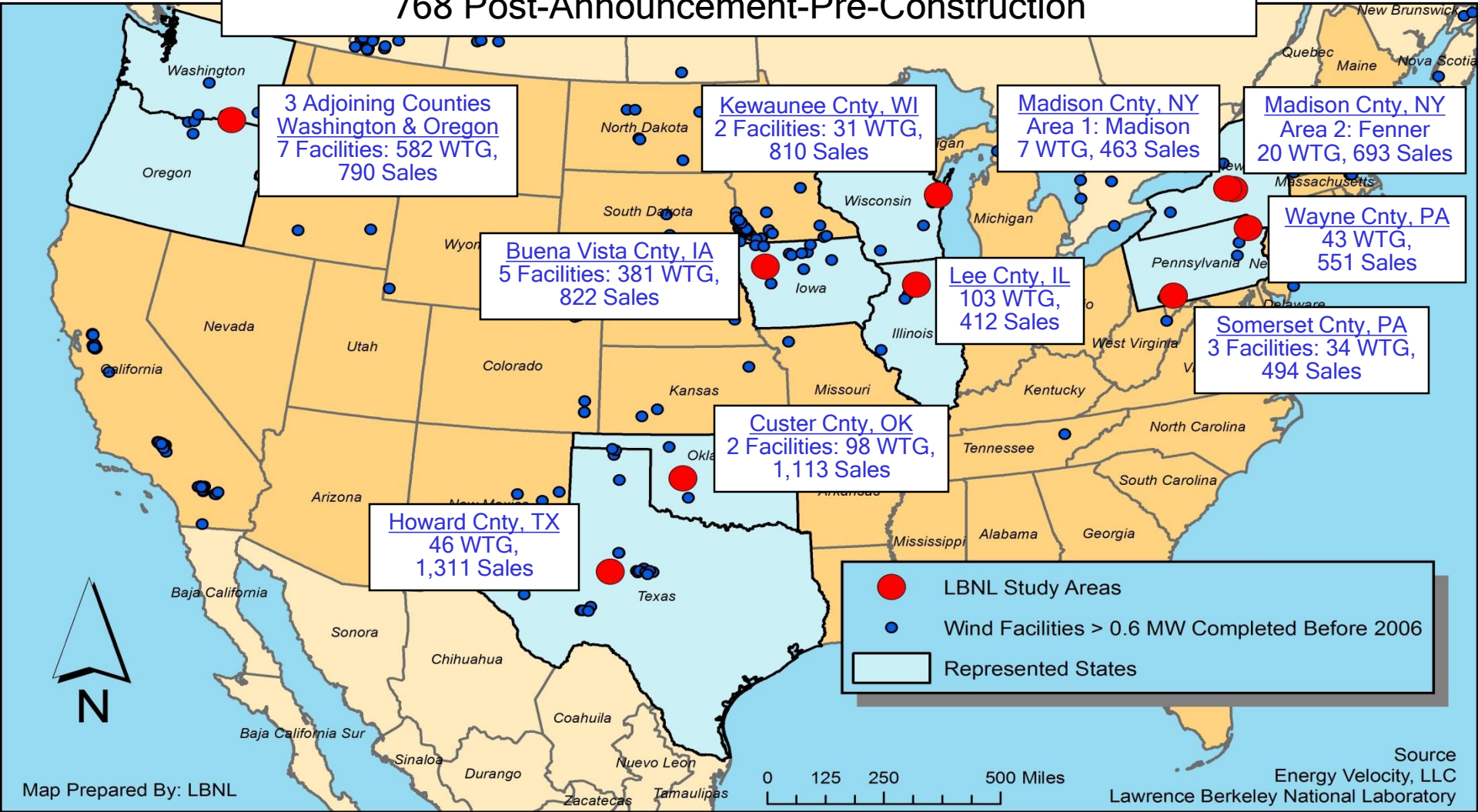
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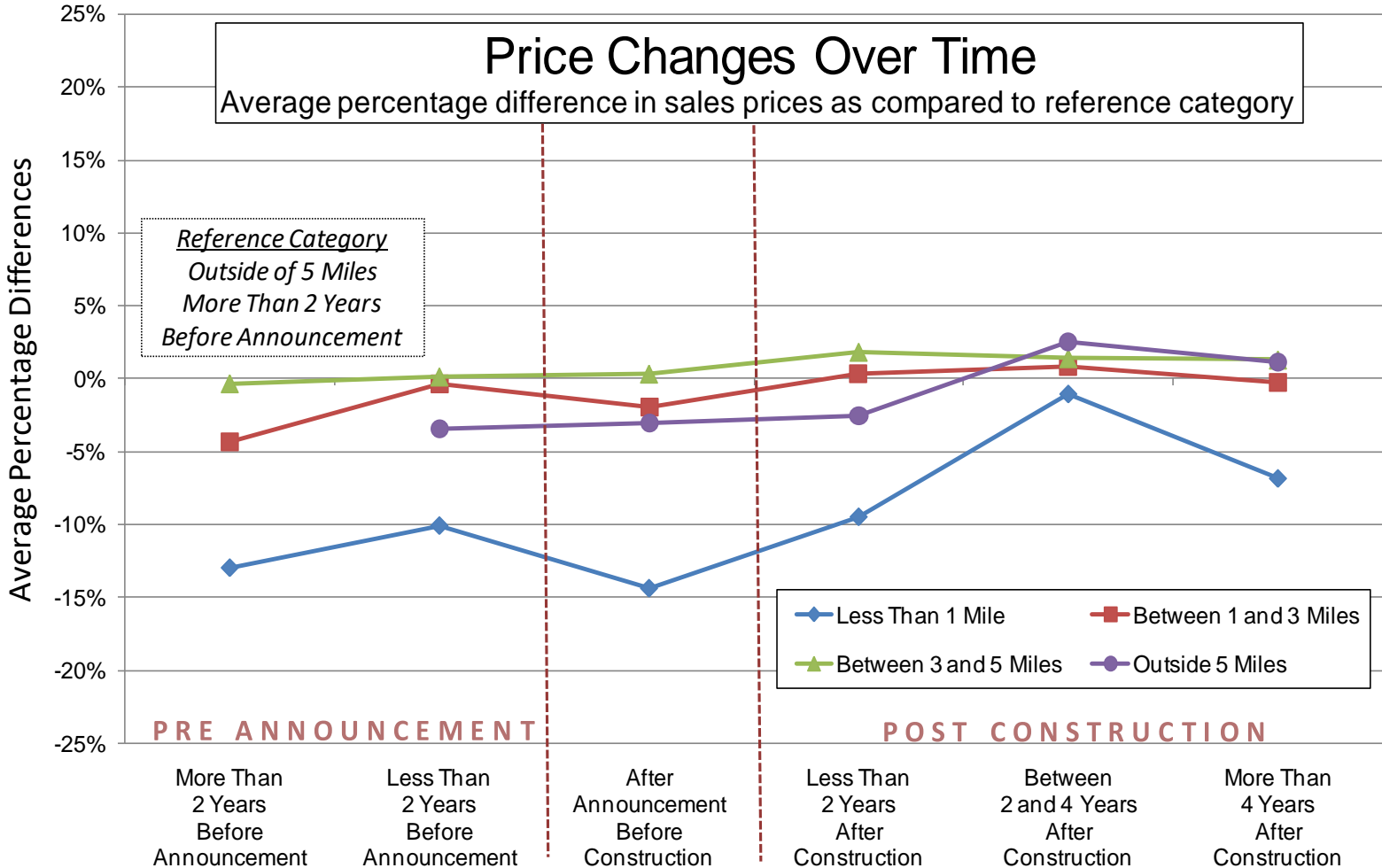
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# Collected Sales Data from 10 Study Areas Surrounding 24 Wind Facilities in 9 States

**7,459 Residential Sales Transactions**  
 1,754 Pre-Announcement, 4,937 Post-Construction, and  
 768 Post-Announcement-Pre-Construction



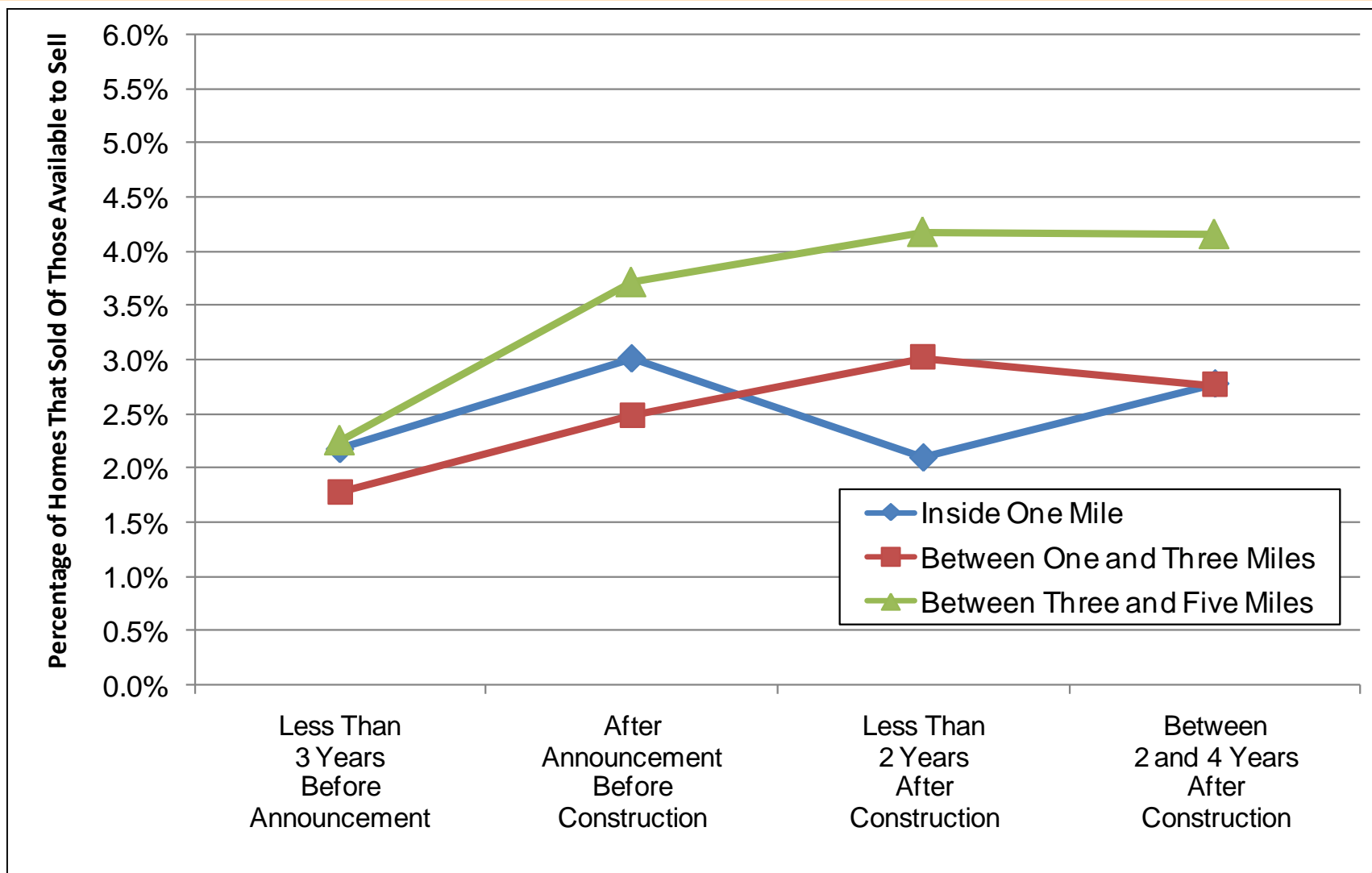
# Homes Nearest the Turbines Were Depressed in Value Before Construction and Appreciated After Construction While Homes Further Away Were Largely Unchanged Over Time



*The reference category consists of transactions of homes situated more than five miles from where the nearest turbine would eventually be located and that occurred more than two years before announcement of the facility*



# Sales Volumes Near Turbines Slowed Slightly After Construction, Then Returned To More Normal Levels



# Conclusions Based On All Of The Analyses In The Report

- **Area Stigma:** There is an **absence of evidence** that sales prices of homes without views of turbines and further than one mile from the nearest turbine are stigmatized by the arrival of facility
- **Scenic Vista Stigma:** There is an **absence of evidence** that sales prices of homes with a view of the turbines are uniquely stigmatized even if that view is “dramatic”
- **Nuisance Stigma:** There is an **absence of evidence** that prices of sales occurring **after construction** of the facility for homes within a mile of the nearest wind turbine in this sample are affected

Therefore, if effects do exist in this sample, they are either too small and/or too infrequent to result in any statistically observable effect

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# Property Value Effects Found Near Other, Potentially More Risky, Disamenities Are In-Scale With Those For Wind Energy

Disamenity	Study	Location	Percentage Change	Difference	Effect Limit
Crematory	Agee and Crocker (2008)	Rawlings, WY	-2% to -16%*	within a mile	
Superfund	Gayer et al. (2000)	Grand Rapids, MI	-4% to -6%*	within a mile	
Superfund	Kiel & Zabel (2001)	Woburn, MA	-15%	within a mile	
Groundwater Contamination Pre Remediation	Case et al. (2006)	Scottsdale & Tempe, AZ	-7%	in currently contaminated area	
Groundwater Contamination Post Remediation	Case et al. (2006)	Scottsdale & Tempe, AZ	no difference	in previously contaminated area	
Waste Transfer Station	Eshet et al. (2007)	Israel	-12%	within a mile	
Industrial - Superfund	Carroll et al. (1996)	Henderson, NV	-7%	within a mile	2.5 miles
Lead Smelter	Dale et al. (1999)	Dallas, TX	-0.8% to -4%	within a mile	2 miles
Power Plant	Davis (2008)	assorted	-3% to -5%	within 2 miles	
Landfill - High Volume	Ready (2005)	assorted	-13%	adjacent to landfill	2 miles
Landfill - Low Volume	Ready (2005)	assorted	0% to -3%	adjacent to landfill	2 miles
Landfill	Reichert et al. (1992)	Cleveland, OH	-5% to -7%	within a few blocks	
Landfill	Thayer et al. (1992)	?	-2% to -5%	within a mile	4 miles
Transmission Line	Hamilton & Schwann (1995)	Vancouver, Canada	-6%	adjacent to tower	330 feet
Transmission Line	Des Rosiers (2002)	Montreal, Canada	-10%	adjacent to tower	150 feet
Road Noise	Batemen et al. (2001)	Glasgow, Scotland	-0.4% to -4%	increase of 10 dBA**	
Road Noise - 29 Study Review	Batemen et al. (2001)	assorted	4% median of all studies	increase of 10 dBA**	

\* based on 2008 median house price (source: city-data.com)

\*\* 10 dBA roughly represents the difference in noise between a busy road and a quiet street



# Effects Found Near Other, Potentially More Risky, Disamenities Are Relatively Small And Fade Quickly

- Homes **within 1 mile** of superfund sites, waste transfer stations, power plants, crematoriums, lead smelters have been found to decrease in value by **no more than roughly 16%** with **most decreasing only roughly 8%**
- Homes **adjacent** to landfills have been shown to decrease in value by **0% to 13%**, depending on landfill volume, **with all effects fading outside of 2 miles**
- Homes **located in areas** with groundwater contamination have been shown to decrease in value by **7%**, with no effects found after remediation
- Homes **adjacent** to high voltage transmission lines have been shown to decrease in value by **roughly 8%**, with **all effects fading outside of roughly 350 feet**
- Homes **adjacent** to noisy roads have been shown to decrease in value by **roughly 4%**, as compared to homes on quiet roads, with 10 dB (A) lower sound levels





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# Conclusions From All Research Regarding Property Value Impacts From Wind Energy

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- Risks of property value impacts are highest when they cannot be accurately quantified, such as in the period after announcement yet prior to construction. Some evidence exists to support this.
- Property value impacts after construction are most likely to exist near turbines (e.g., within earshot), and fade with distance and potentially time
- Given current research, economically significant impacts are not likely to exist outside of 1 mile even if turbines are visible
- Effects inside of one mile are not likely to be larger than other more risky disamenities (e.g., superfund sites)
- And more to the point, conclusive evidence of effects from wind facilities have not been discovered inside of one mile despite a number of studies using a variety of sophisticated statistical techniques



# Thank You!

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For a copy of the full LBNL report: *“The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis”*, go to:

<http://eetd.lbl.gov/ea/ems/re-pubs.html>

For a copy of the journal paper: Hoen, B., Wiser, R., Cappers, P., Thayer, M. and Sethi, G. (Forthcoming) *“Wind Energy Facilities and Residential Properties: The Effect of Proximity and View on Sales Prices”*. Journal of Real Estate Research. Go to:

[http://aux.zicklin.baruch.cuny.edu/jrer/papers/abstract/forth/accepted/jrer\\_156%28F100413R2%29.htm](http://aux.zicklin.baruch.cuny.edu/jrer/papers/abstract/forth/accepted/jrer_156%28F100413R2%29.htm)

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