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Memo

To:	Karl Dahlstrom and Todd Velnosky, Wind Capital Group		
From:	Angela Piner, HDR Engineering, Inc.	Project:	Broad Mountain
cc:			
Date:	10/16/09	Job No:	119860

RE: SUMMARY OF CURRENT STUDIES REGARDING WIND FARMS AND PROPERTY VALUES

INTRODUCTION

Negative effects of wind facilities on property values are a common concern raised by citizens in opposition to wind facilities. At Wind Capital Group's request, HDR Engineering, Inc. reviewed recent, readily available studies regarding United States land-based wind farms and their effects on property values. Recent studies were those completed since 2001, when installed wind capacity jumped from 2,579 MW in 2000 to 4,273 MW in 2001 (AWEA, 2008).

There are several studies that are commonly referenced in relation to wind farms and property values. They can largely be grouped into two categories – survey based studies and transaction based studies (Hoen, 2006). Recent work completed by Hoen (2006) and Hoen & Wiser (2008) use hedonic regression analysis to support a more comprehensive analysis of wind farm effects on property values. A summary of the results of the survey based, transaction based, and hedonic pricing studies are included below. The source papers are included as attachments.

SURVEY BASED STUDY

Survey based studies utilize interviews with "experts" to ascertain effects. According to Mr. Hoen, "The survey studies do not give a clear indication as to whether there is an actual decrease in value . . . The results of these studies reinforce the need for more research . . . " (Hoen, 2006).

One survey based study was identified for this summary. ECONorthwest conducted a study to better understand the potential economic impact of wind power development in Kittitas County, Oregon. One facet of this study used tax assessor interviews and a literature review to determine the potential effects of wind farms on property values (Grover, 2002). Their nation-wide survey of tax assessors in areas with wind power projects (which included 22 wind projects in 13 different counties throughout the country) found no evidence supporting the claim that views of wind farms decrease property values. The study surmised that one of the likely reasons that wind turbines do not diminish property values is that not all people agree that views of wind turbine are undesirable (Grover, 2002). As reported in interviews of tax assessors, some residents find views of wind turbines attractive.

TRANSACTION BASED STUDIES

Transaction based studies gather data on property values and compare sales prices of homes in a given area. These studies typically fall short by identifying whether the wind farms are actually the cause for property value effects (Hoen, 2006). HDR identified two recent studies in the United States.

REPP Study

This 2003 study of post-1998 wind farms in the United States examined data on property sales in the vicinity of wind projects and determined whether the presence of a wind project had an influence on property values for properties that were sold. It also attempted to address the extent to which wind projects have an influence on property values. The results of the study indicated there is no empirical support for the claim that wind development harms property values (Sterzinger, 2003). The study indicated that for the great majority of wind projects, the property values actually rose more quickly in the view shed than they did in the comparable community. Moreover, values increased faster in the view shed after the projects came on-line than they did before. Finally, after projects came on-line, values increased faster in the view shed than they did in the comparable community.

Due to the broad scope of this study, the analysis did not take into account whether the individual properties had a direct view of the wind developments or the distance to the turbines. Subsequent studies have addressed this issue.

Energy Center of Wisconsin

The 2004 collaborative study by the Energy Center of Wisconsin (ECW) examined wind turbine impact on local property values. The study attempted to address the shortcomings of the REPP report. In particular they included viewshed ground truthing of the data and distance effects in their analysis. This study came to no definitive conclusions of the effects of wind energy on property values, largely due to the fact that the sample size was small due to the relative rural nature of the surrounding environment. As a result, there were fewer than one in three transactions in the sample that involved properties within the view shed of the development (ECW 2004). The conclusions of the study outlined key elements to property value studies in relation to wind farms.

Poletti and Associates Study

Poletti and Associates (2005) conducted a study of the Forward Wind Energy Center in Wisconsin using on-site evaluation and property transactions near operating wind farms in Wisconsin and Illinois. According to this study, the selling prices of small residential or agricultural property near the operating wind farms in Wisconsin and Illinois were not significantly different from the selling prices of similar properties located in control areas some distance from these farms. Results were less conclusive at predicting the effects of the wind farm on improved residential property values at the Illinois site. However, the authors still concluded that, based on the sales of agricultural land, small residential tracts as well as anecdotal data, the Illinois wind farm has not affected prices or development in the project area.

HEDONIC PRICING MODEL

Hoen (2006) proposed the use of hedonic pricing models as a way to isolate the characteristics of properties that are affecting price. Hoen (2006) contends that this approach in assessing the link between property values and wind farms improves on previous studies that generally lack rigor and include insufficient detail to capture the complex relationships between wind farms and home transaction prices.

Madison County, NY Study

Mr. Hoen of the Bard Center for Environmental Policy conducted a study of impacts of wind turbine visibility on property values in Madison County, NY. The study provides an overview of previous studies that had been conducted and uses the Madison County wind farm for an analysis of potential effects.

The study found no statistically significant relationship between the sale price of homes and their proximity or visibility to the wind farm. They caution the use of the results of the study, in particular the transferability of the results would be limited to a community that is similar to the Fenner rural farming community evaluated in the study. However, he argues that the research done in this study does provide evidence that the presence of a wind farm does not devalue property.

LBNL Study Preliminary Results

The Lawrence Berkeley Laboratory is currently evaluating the impact of wind facilities on residential property values. Mr. Hoen and Mr. Wiser gave several presentations on the preliminary results of their research, most notably in June 2008 and November 2008. Their study evaluates data from 11 study areas that are surrounded by more than 25 wind facilities. These study areas are each located in Washington/Oregon, California, Iowa, Oklahoma, Texas, Illinois, Wisconsin, and two each in New York and Pennsylvania. These areas include approximately 8,500 property transactions. The study is reviewing three potential effects to the properties' values: area stigma ("industrialization" of the area), scenic vista stigma (decrease in quality of scenic vista), and nuisance effects (health concerns of residents). While their research results are preliminary the following conclusions have been surmised from their initial analyses:

- In regard to area stigma, there is no statistical evidence that homes near wind facilities are stigmatized by those facilities as compared to other homes in the region.
- In regard to scenic vista stigma, there is no statistical evidence that homes with a view of wind turbines have different values than homes without such views
- In regard to nuisance effects, the is not statistical evidence that homes within ¼, ½, and one mile of turbines sell for different values than those further away.

Hoen and Wiser (2008) concluded that, though one cannot rule out isolated cases where property values are negatively impacted, any such impacts within their sample were not widespread nor statistically identifiable.

REFERENCES

AWEA. 2008. *American Wind Energy Association Annual Wind Industry Report, Year Ending 2008*. http://www.awea.org/publications/reports/AWEA-Annual-Wind-Report-2009.pdf. Retrieved October 12, 2009.

Energy Center of Wisconsin (ECW). 2004. *Examining Wind Turbine Impact on Local Property Values*. A Study of Wind Energy Development in Wisconsin. Part 3: 119-137. July 1, 2004. http://www.ecw.org/prod/231-1.pdf. Retrieved October 12, 2009.

Grover, D. S. 2002. *Economic Impacts of Wind Power in Kittitas County, WA*. ECONorthwest for Phoenix Economic Development Group. 1-18. November 2002.

Hoen, Ben. 2006. Impacts *of Windmill Visibility on Property Values in Madison County, New York*, unpublished thesis (M.S.), Bard College, Bard Center for Environmental Policy.

Hoen, Ben and Ryan Wiser. 2008.*The Impact of Wind Facilities on Residential Property Values.* What We Know and What We Don't Know – 10 Area Preliminary Results. Lawrence Berkeley Laboratory. June 2008.

Hoen, Ben and Ryan Wiser. 2008.*The Impact of Wind Facilities on Residential Property Values.* What We Know and What We Don't Know. Lawrence Berkeley Laboratory. Mid-Atlantic/Southeast RWEI Annual Meeting. Alexandria, VA. November 14, 2008.

Poletti and Associates, Inc. 2005. *A Real Estate Study of the Proposed Forward Wind energy Center Dodge and Fond du Lac Counties, Wisconsin*. Prepared for Invenergy Wind LLC.

Sterzinger, G., F. Beck*, et al.*2003. *The Effect of Wind Development on Local Property Values*. Renewable Energy Policy Project. 1-77. May 2003.