

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY CROCKER WIND FARM, LLC FOR A
PERMIT FOR A WIND ENERGY FACILITY AND A 345 KV TRANSMISSION LINE IN
CLARK COUNTY, SOUTH DAKOTA, FOR CROCKER WIND FARM

SD PUC DOCKET EL-17-____

PREFILED TESTIMONY OF MARK THAYER
ON BEHALF OF CROCKER WIND FARM, LLC

December 15, 2017

1 **I. INTRODUCTION AND QUALIFICATIONS**

2
3 **Q. Please state your name, employer, and business address.**

4 A. My name is Mark Thayer. I am an Emeritus Professor in the Department of
5 Economics at San Diego State University, San Diego, California 92182.

6
7 **Q. On whose behalf are you offering testimony?**

8 A. I am testifying on behalf of Crocker Wind Farm LLC (“Crocker”), the Applicant in this
9 proceeding.

10
11 **Q. Briefly describe your educational and professional background.**

12 A. I received my Ph.D. in Economics from the University of New Mexico in 1979. My
13 field of expertise is environmental, natural resource, and energy economics. I am
14 currently an emeritus professor in the Department of Economics at San Diego State
15 University. I have thirty-five years of experience in both university and government
16 service, and extensive experience integrating environmental- and energy-related
17 matters into decision making at the state and federal level. I have published
18 numerous research articles in professional journals such as the *American Economic*
19 *Review*, *Journal of Political Economy*, *Journal of Environmental Economics and*
20 *Management*, *Land Economics*, *Natural Resources Journal*, *Journal of Urban*
21 *Economics*, *Economic Inquiry*, *Journal of Sports Economics*, and *Journal of Human*
22 *Resources*. I co-authored the Lawrence Berkeley National Laboratory (“LBNL”)
23 studies relating wind developments to residential property values. I have been a
24 principal investigator on projects funded by entities such as the California Air
25 Resources Board, California Energy Commission, U.S. Environmental Protection
26 Agency, U.S. Geological Survey, the South Coast Air Quality Management District,
27 the National Science Foundation, and numerous private entities. My recent research
28 has focused on projects related to energy efficiency (both program development and
29 evaluation) and the assessment of the impact of wind farms and solar photovoltaic
30 energy on residential property values.

31

1 A copy of my curriculum vitae is provided as Exhibit 1.

2
3 **II. PURPOSE OF TESTIMONY**
4

5 **Q. Describe your familiarity with the Crocker Wind Farm (the “Project”).**

6 A. I conducted a review of academic literature pertaining to wind project development
7 and its impact on property values for the Project. This review, titled “The Impact of
8 Wind Power Projects on Residential Property Values in the United States: An
9 Overview of Research Findings” (“Report”) is included as Appendix I of the Project’s
10 Energy Facility Permit Application (“Application”).
11

12 **Q. What is the purpose of your testimony?**

13 A. The purpose of my testimony and my Report is to provide: (1) a summary of the two
14 LBNL national hedonic studies that investigate the impact of wind facilities on nearby
15 property values, including a summary of and response to criticisms of the these
16 studies; (2) a summary of additional academic literature pertaining to the wind
17 development/property value relationship in the United States; and (3) a summary
18 and analysis of certain "alternative literature," asserting wind farms negatively impact
19 property values.
20

21 **Q. What exhibits are attached to your Direct Testimony?**

22 A. The following exhibits are attached to my Direct Testimony:

- 23
- 24 • Exhibit 1: Curriculum Vitae
 - 25 • Exhibit 2: (LBNL 2009) Hoen, B., Wiser, R., Cappers, P., Thayer, M. and
26 Sethi, G. (2009) “The Impact of Wind Power Projects on Residential
27 Property Values in the United States: A Multi-Site Hedonic Analysis.”
28 Lawrence Berkeley National Laboratory, Berkeley, CA. December, 2009.
146 pages. LBNL-2829E.
 - 29 • Exhibit 3: (LBNL 2013) Hoen, B., J.P. Brown, T. Jackson, R. Wiser, M.
30 Thayer, and P. Cappers (2013). "A Spatial Hedonic Analysis of the Effects

1 of Wind Energy Facilities on Surrounding Property Values in the United
2 States." Lawrence Berkeley National Laboratory, Berkeley, CA, August.

- 3 • Exhibit 4: Hinman, J. L. (2010) "Wind Farm Proximity and Property Values:
4 A Pooled Hedonic Regression Analysis of Property Values in Central
5 Illinois." Thesis Prepared for Master's Degree in Applied Economics.
6 Illinois State University, Normal. May, 2010. 143 pages.
- 7 • Exhibit 5: Carter, J. (2011) "The Effect of Wind Farms on Residential
8 Property Values in Lee County, Illinois." Thesis Prepared for Master's
9 Degree. Illinois State University, Normal. Spring 2011. 35 pages.
- 10 • Exhibit 6: Magnusson, M. and J. Gittell (2012) "Impact of the Lempster
11 Wind Power Project on Local Residential Property Values." Working
12 paper, Whittemore School of Business and Economics, University of New
13 Hampshire.
- 14 • Exhibit 7: Atkinson-Palombo, C. and B. Hoen (2014). "Relationship
15 between Wind Turbines and Residential Property Values in
16 Massachusetts." Joint report of the University of Connecticut and the
17 Lawrence Berkeley National Laboratory.
- 18 • Exhibit 8: Lang, C., J.J. Opaluch, and G. Sfinarolakis (2014) "The Windy
19 City: Property Value Impacts of Wind Turbines in an Urban Setting."
20 *Energy Economics* 44, 313-421.
- 21 • Exhibit 9: Heintzelman, M. D. and Tuttle, C. (2012) "Values in the Wind: A
22 Hedonic Analysis of Wind Power Facilities." *Land Economics*. August (88):
23 571-588.
- 24 • Exhibit 10: Heintzelman, M.D., R.J. Vyn, and S. Guth (2017).
25 "Understanding the Amenity Impacts of Wind Development on an
26 International Border." *Ecological Economics*, 137, 195-206.

- 1 • Exhibit 11: Hoen, B., Wiser, R., Cappers, P., Thayer, M. and Sethi, G.
2 (2011). "Wind Energy Facilities: The Effect of Proximity and View on
3 Property Values." *The Journal of Real Estate Research*, 33, Number 3,
4 279 – 316.
- 5 • Exhibit 12: Hoen, B., J.P. Brown, T. Jackson, R. Wiser, M. Thayer, and P.
6 Cappers (2014). "A Spatial Hedonic Analysis of the Effects of Wind
7 Energy Facilities on Surrounding Property Values in the United States."
8 *Journal of Real Estate Finance and Economics*, 51, 22-51.
- 9 • Exhibit 13: Atkinson-Palombo, C. and B. Hoen (2014). "Wind Turbines,
10 Amenities and Disamenities: A Study of Home Value Impacts in Densely
11 Populated Massachusetts." *The Journal of Real Estate Research*, 38,
12 Number 4, 473-504.
- 13 • Exhibit 14: Gardner, D.T. (2009). "Impact of Wind Turbines on Market
14 Value of Texas Rural Land." Prepared for the South Texas Plains
15 Agriculture Wind and Wildlife Conference, Lubbock TX.
- 16 • Exhibit 15: Kielisch, K.C. (2011). "Wind Turbines and Property Value."
17 Presentation, Appraisal Group One.
- 18 • Exhibit 16: Sunak, Y. and Madlener, R. (2012). "The Impact of Wind
19 Farms on Property Values: A Geographically Weighted Hedonic Pricing
20 Model." Prepared for Institute for Future Energy Consumer Needs and
21 Behavior (ACN), RWTH Aachen University. May, 2012 (revised March
22 2013). 27 pages. FCN Working Paper No. 3/2012.
- 23 • Exhibit 17: Gibbons, S. (2015). "Gone with the Wind: Valuing the Visual
24 Impacts of Wind Turbines through House Prices." *Journal of
25 Environmental Economics and Management*, 72, 177–196.

- 1 • Exhibit 18: Jensen, C.U., Panduro, T.E., Lundhede, T.H. (2014). “The
2 Vindication of Don Quixote: The Impact of Noise and Visual Pollution from
3 Wind Turbines.” *Land Economics*, 90 (4), 668–682.
- 4 • Exhibit 19: Thomas O. Jackson, and Jennifer Pitts. (2010). “The Effects of
5 Electric Transmission Lines on Property Values.” *The Journal of Real
6 Estate Research*, 18 (2), 239-259.

7

8 **Q. What sections of the Application for the Project are you sponsoring?**

9 A. I am sponsoring the following portions of the Application:

- 10 • Section 9.7.1.2: Impacts to Communities (Property Values – Wind Farms;
11 Property Values – Transmission Lines)
- 12 • Appendix I: The Impact of Wind Power Projects on Residential Property
13 Values in the United States: An Overview of Research Findings.

14

15 **III. LBNL STUDIES**

16

17 **Q. What are the LBNL Studies?**

18 A. The Lawrence Berkeley National Laboratory (“LBNL”) conducted two large-scale
19 regression studies in 2009 and 2013 (collectively, the “LBNL Studies”) examining the
20 impacts of wind farms on nearby property values. The LBNL Studies are the
21 following:

- 22 • "The Impact of Wind Power Projects on Residential Property Values in the
23 United States: A Multi-Site Hedonic Analysis" (B. Hoen, R. Wiser, P.
24 Cappers, M. Thayer, and G. Sethi), December 2009 – analysis of 7,459
25 home sales (Exhibit 2). The final published version of this work appeared
26 in the peer-reviewed *The Journal of Real Estate Research*. (Exhibit 11).
- 27 • "A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on
28 Surrounding Property Values in the United States" (B. Hoen, J.P. Brown,

1 T. Jackson, R. Wiser, M. Thayer, and P. Cappers), August 2013 –
2 analysis of 51,262 home sales, with 1,198 within one mile of a turbine
3 (Exhibit 3). The final published version of this work appeared in the peer-
4 reviewed *Journal of Real Estate Finance and Economics*. (Exhibit 12).

5 The 2009 LBNL study focused on property value concerns for wind energy that fall
6 into three categories. Each of these effects could impact property values and the
7 effects are not mutually exclusive.

- 8 • Area Stigma – concern that surrounding areas will appear more
9 developed.
- 10 • Scenic Vista Stigma – concern over decrease in quality of scenic vistas
11 from homes.
- 12 • Nuisance Stigma – concern that factors that occur in close proximity will
13 have unique impacts.

14 The 2013 LBNL study focused only on area stigma and nuisance stigma.

15
16 **Q. Please provide a brief explanation of the empirical methodology used to
17 examine the impact of wind farms on nearby property values.**

18 A. The wind turbine/property value relationship was primarily studied using a statistical
19 method called the Hedonic Price Model. The hedonic price model has been used by
20 economists and real estate practitioners for over 40 years and has the following
21 attributes:

- 22 • Uses actual market data to infer value – there is no attempt to appraise
23 values.
- 24 • Designed to place an economic value on specific characteristics of a
25 home (e.g., value of an additional bathroom, a pool, or view of wind
26 turbines).
- 27 • Uses a large number of home sales (many thousands).
- 28 • Controls (holds constant) a large number of possibly confounding
29 variables (everything under the sun).
- 30 • Uses data from a large area to obtain enough variation in all
31 characteristics.

- 1 • Can use data from a restricted period of time (cross-sectional analysis) or
2 an extended period of time (time-series analysis) – note that this latter
3 case requires adjustment to constant dollars.
- 4 • Can be used effectively to appraise homes due to extensive data set –
5 however, constantly updating the data set is expensive and time
6 consuming.
- 7 • Hedonic pricing is essentially a very large "Paired Sales" analysis with
8 sufficient home sales and controls.

9
10 The hedonic pricing model requires information on a large number of sales and
11 corresponding sales prices and home characteristics, which include

- 12 • Quantity Measures (e.g., square feet of living area, lot size, number of
13 bathrooms, bedrooms, etc.).
- 14 • Quality Measures (e.g., number of fireplaces, condition of home, presence
15 of pool, air conditioning, scenic vista, etc.).
- 16 • Location Specific Variables (e.g., local school quality, demographics,
17 socioeconomic status, distance to important activities, environmental
18 quality measures, etc.).
- 19 • Variables of Interest (e.g., view of wind turbines, distance to wind
20 turbines).

21
22 Either Qualitative Ratings (e.g. dominance of view of wind turbines) or distance to
23 the nearest turbine at time of home sale is used to measure the possible dis-amenity
24 from wind turbines.

25
26 The 2009 LBNL study used home sales data from ten areas surrounding twenty-four
27 wind facilities in nine states. In total, 7,459 residential sales transactions (1,754 pre-
28 announcement, 768 post-announcement/pre-construction, and 4,937 post-
29 construction) were analyzed. The 2013 study utilized 51,276 home sales from 27
30 U.S. counties related to 67 wind facilities, and 1,198 home sales were within one
31 mile of a wind turbine.

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Q. Please provide a summary of the LBNL research findings.

A. The 2009 LBNL study determined that there was no significant impact to sale values of properties over time due to proximity of wind-energy project development. The 2013 follow-up study found no statistical evidence for differences in home values from pre- to post-construction. The LBNL Studies concluded that risks of property value impacts are often expected, but all research suggests that property value impacts related to view and distance are essentially zero. Specifically,

- Area Stigma – no statistical evidence that sales prices of homes near wind facilities are significantly affected by those facilities as compared to other homes in the region.
- Scenic Vista Stigma – no statistical evidence that sales prices of homes with a view of the turbines are significantly affected (i.e., stigmatized) even if the view is "extreme."
- Nuisance Stigma – no statistical evidence that sales prices of homes within a mile of the nearest wind turbine are significantly affected by those facilities as compared to other homes in the region.
- Timing – no statistical evidence of a trend in sales prices of homes near turbines that is consistent with scenic vista, area, or nuisance stigma.

In addition, the LBNL Studies also provided results from alternative models:

- Repeat Sales Model – appreciation rates for homes near the wind farms are not significantly different than appreciation rates for homes located farther from the wind farms.
- Sales Volume Analysis – no statistical evidence that the sales volume of homes near wind farms is different than the sales volume of homes located farther from the wind farms.

Q. Are there other peer-reviewed studies completed recently that examined the impact of wind farms on nearby property values in the United States?

1 A. Yes. In addition to the two LBNL Studies, there have been six large empirical studies
2 completed since December 2009 that examined the impact of wind farms on nearby
3 property values in the United States. The studies are:

- 4 • "Wind Farm Proximity and Property Values: A Pooled Hedonic Regression
5 Analysis of Property Values in Central Illinois" (J.L. Hinman) May 2010 –
6 analysis of 3,851 home sales. (Exhibit 4).
- 7 • "The Effect of Wind Farms on Residential Property Values in Lee County,
8 Illinois" (J. Carter), 2011 – analysis of 1,298 home sales. (Exhibit 5).
- 9 • "Impact of the Lempster Wind Power Project on Local Residential Property
10 Values" (M. Magnusson and R. Gittell), January 2012 – analysis of 2,593
11 home sales. (Exhibit 6).
- 12 • "Relationship between Wind Turbines and Residential Property Values in
13 Massachusetts" (C. Atkinson-Palombo and B. Hoen), 2014 – analysis of
14 122,198 home sales, with 6,081 within one mile of a turbine (Exhibit 7).
15 Final published version of this work appeared in the peer-reviewed *The*
16 *Journal of Real Estate Research*. (Exhibit 13).
- 17 • "The Windy City: Property Value Impacts of Wind Turbines in an Urban
18 Setting." (Lang, Opaluch, and Sfinarolakis), 2014 – analysis of 48,554
19 home sales, with 3,254 within one mile of a turbine. (Exhibit 8).
- 20 • "Values in the Wind: A Hedonic Analysis of Wind Power Facilities" (M.D.
21 Heintzelman and C.M. Tuttle), July 2012 – analysis of 11,331 home sales.
22 (Exhibit 9).

23
24 **Q. Please provide a summary of these studies.**

25 A. The studies included in my literature review (Appendix I) utilized generally accepted
26 statistical analysis, implying the data base was sizeable (thousands of observations,
27 i.e., utility scale operations), used market data, and used accepted methodologies

1 (e.g., hedonic price method). These studies all come to the same conclusion.
2 Specifically all large-scale, empirical studies of U.S. wind facilities conclude that,
3 post-construction/operation, there is no identifiable effect of wind power projects on
4 nearby residential property values. This conclusion is based on the evaluation of
5 248,560 actual home sales in eight studies.

6
7 While three of the studies included in my review suggest that there is some evidence
8 that the post-announcement/pre-construction phase of wind facility development
9 could have a negative effect on nearby property values, this has been labeled
10 “anticipation stigma” and the effects are small and dissipate completely after the
11 facility is operational. Based on this extensive literature, the planned wind projects
12 in South Dakota will not significantly reduce the sales prices of properties around the
13 wind facilities.

14
15 **Q. Please describe how community characteristics affect real estate price trends**
16 **and hedonic method estimates.**

17 A. Community characteristics could have either positive (e.g., expanding population,
18 expanding economic opportunities, etc.) or negative (de-population, lack of jobs,
19 abandoned homes, etc.) effects upon housing price trends. In either case, these
20 characteristics should not prevent good statisticians from determining the value/cost
21 of proximity to a turbine or having a view of a turbine because the comparison is
22 between homes near to turbines versus homes far from turbines, homes with views
23 versus homes without views, etc.

24
25 **Q. Are you aware of any studies that have found a connection between wind**
26 **turbines and property values?**

27 A. There are no large-scale statistical studies completed using data from areas in the
28 United States and/or Canada that consistently show a significant negative impact
29 from wind facilities on nearby property values after the wind facility is constructed
30 and operable.

31

1 There have been some studies that indicate there could be a potential negative
2 impact to property values within or near a wind farm project area, such “studies” use
3 inappropriate statistical methods such as small sample sizes, non-transparent
4 sample selection process, failure to control for obvious variables, failure to
5 understand statistical significance, or were not subject to peer-review. Examples
6 include a study from Gardner (Gardner, 2009) and Kielisch (Kielisch, 2011).
7 Additionally, there have been European and United Kingdom studies that show
8 possible negative property value impacts from wind facilities, but the estimated
9 impacts are small (3-7%) (Sunak and Madlener, 2012; Jensen et al., 2014; Gibbons,
10 2014). Further, these impacts cannot be explained by data size, quality, or
11 estimation methods and, therefore, have led to speculation that community
12 involvement and compensation levels differ from standard practice in the United
13 States and Canada. As a result, it is questionable that these studies are relevant to
14 an analysis of property values in the United States.

15
16 Finally, there is a recent paper (Heintzelman, Vyn, and Guth, 2017) (Exhibit 10) that
17 examines the impact of wind turbines on nearby property values on both sides of the
18 United States/Canada international border. This paper finds inconsistent results.
19 There are no significant property value impacts on the Canadian side of the border
20 for either turbine view or proximity to turbines. On the US side, there are indications
21 of negative property value effects, primarily for turbine view. The results for the
22 proximity to turbine variables generally do not support the turbine view results as
23 neither the full sample nor the restricted 10 mile sample show negative property
24 value effects. The authors do not provide a definitive rationale for the overall results
25 disparity (Canada v. U.S., turbine view v. proximity) but do offer some speculation
26 about when negative effects might be expected. These include the quality of view
27 prior to turbine construction, the relative quantity of vacation homes and/or
28 waterfront properties, the level on involvement by the local residents, and the level of
29 compensation to the local community. The implication seems to be that if the view
30 prior to construction is not of water, if there are relatively few vacation or waterfront
31 homes, if local residents are active participants in the turbine facility development,

1 and if there is some positive compensation to the local community then there will be
2 no negative impacts on nearby property values from wind developments. There are
3 likely few situations in which this restrictive combination of attributes occurs. This
4 may help explain why all other United States and Canadian studies have failed to
5 find significant property value impacts.

6
7 **Q. What your thoughts regarding the work of Michael McCann with respect to**
8 **analyzing the potential impact of wind facilities on property value?**

9 A. The “alternative literature” discussed in response to the prior question has formed
10 the basis for Michael McCann’s study of wind facilities and property values. Mr.
11 McCann has offered the same testimony in a multitude of settings – specifically, that
12 residential properties located within three miles (or possibly greater distances) of
13 wind turbines will experience a minimum 25-40 percent reduction in home value.
14 Overall, Mr. McCann's studies are cursory investigations using raw averages and
15 paired sales methods. Each of these analyses is beset with the same range of
16 problems, including: small samples; undefined sample selection methods; simple
17 statistical measures; failure to account for obvious confounding factors; and
18 subjective monetary adjustments applied inconsistently. Given these fundamental
19 issues, the conclusions of such work are without foundation and completely lacking
20 in scientific rigor.

21
22 Moreover, Mr. McCann’s results are based on specific locations, specific local
23 influences, and specific adjustment factors. As a result, even if the studies had been
24 done with appropriate scientific rigor, they would not be transferable to any other
25 situation. Further, only one assessment procedure is provided, one that always
26 agrees with his previous work and never explores the impact on his conclusions of
27 different samples, different selection methods, and/or different adjustment factors.

28
29 **Q. Should such studies be given the same weight as the LBNL Studies?**

30 A. No. These studies do not possess the required scientific rigor. These studies use
31 inappropriate statistical methods, such as small sample sizes, non-transparent

1 sample selection process, failure to control for obvious variables, and/or failure to
2 understand statistical significance, and often were not subject to peer-review.

3
4 **Q. Do wind farms have the same impact on property values as transmission line?**

5 A. Crocker also reviewed the impact of transmission lines on property values. Jackson
6 and Pitts (2010) conducted a literature review highlighting several studies. (Exhibit
7 19). Studies reviewed were empirical studies between 1964 and 2009. The studies
8 reviewed, while having some inconsistencies in their detailed results, generally
9 pointed to small or no effects on sales price due to the presence of electric
10 transmission lines. Some studies found an effect, but this effect generally dissipated
11 with time and distance. The effects that were found ranged from approximately 2%
12 to 9% (Exhibit 19) within very close proximity to the transmission line (e.g., 500 feet).
13 While this study indicates a small effect on property values is possible, if the
14 transmission line avoids residences, impacts to property value are not anticipated.

15
16 **Q. Are you aware of any studies that look at the impact of wind turbines on
17 property values in South Dakota specifically?**

18 A. No. None of the previous academic research, nor for that matter, any of the
19 "alternative literature," has included South Dakota wind projects.

20
21 **Q. Please describe the relevance of national studies, such as the LBNL Studies,
22 to the Project?**

23 A. Because none of the previous academic research or alternative literature on the
24 impact of large-scale wind farms on nearby property values has included South
25 Dakota wind projects, to predict what might occur near South Dakota wind facilities
26 requires the transfer of existing research from similar areas. The LBNL studies were
27 not confined to strictly agricultural areas, but did include areas very similar to the
28 South Dakota county in which the Geronimo Project is planned. Specifically, Clark
29 County is quite similar to its Minnesota counterparts, especially Cottonwood County,
30 MN and Jackson County, MN. Franklin County, IA and Sac County, IA are also quite

1 similar to the South Dakota county. So, the range of counties studied in the LBNL
 2 includes counties like those in South Dakota.

3
 4 Table 1 below summarizes information from counties studied in the 2009 LBNL
 5 study (top set of counties) and the 2013 LBNL study (middle set of counties), and
 6 compares the same information for Clark, Codington, and Grant Counties in South
 7 Dakota. The table provides data on the following area attributes: population;
 8 population per square mile; median age (from 2014); median income (2013); and
 9 median home value (2013).

10
 11
 12 **Table 1:**
 13 **Comparative Data**

County	State	Population	Population/mi ²	Median Age	Median Income	Median Home Value
Buena Vista	IA	20,578	36	37	46,469	99,744
Lee	IL	34,735	48	42	51,682	140,291
Livingston	IL	37,903	36	40	55,287	102,523
Madison	NY	72,369	110	39	52,300	135,300
Oneida	NY	232,871	192	40	43,702	113,600
Custer	OK	29,500	30	31	45,179	114,228
Umatilla	OR	76,705	24	35	48,514	138,600
Somerset	PA	76,218	71	44	43,429	103,900
Wayne	PA	51,401	70	45	47,932	179,354
Howard	TX	36,651	41	38	47,906	67,485
Benton	WA	184,486	109	35	48,997	176,500
Walla Walla	WA	58,844	47	36	45,875	186,784
Door	WI	27,766	58	49	50,586	187,484
Kewaunee	WI	20,444	60	42	52,929	145,344
Average	LBNL 2009	68,605	66.6	39.5	\$49,342	\$132,510
Carroll	IA	20,562	36	42	50,074	107,911
Floyd	IA	16,077	32	43	44,152	92,087
Franklin	IA	10,436	18	42	48,715	89,330
Sac	IA	10,035	17	46	48,451	81,367
DeKalb	IL	105,462	166	29	52,867	160,600
Livingston	IL	37,903	36	40	55,287	102,523
McLean	IL	174,06	147	32	61,846	160,300
Cottonwood	MN	11,633	18	44	45,949	83,197
Freeborn	MN	30,840	44	44	46,698	99,683
Jackson	MN	10,629	15	44	52,428	93,644
Martin	MN	20,220	29	45	51,865	98,341
Atlantic	NJ	275,209	491	39	52,127	218,600
Clinton	NY	81,632	79	39	43,892	121,200
Franklin	NY	51,262	31	39	45,580	93,529
Herkimer	NY	63,744	45	42	43,754	89,098
Lewis	NY	27,220	21	40	47,990	103,257

County	State	Population	Population/mi ²	Median Age	Median Income	Median Home Value
Madison	NY	72,369	110	39	52,300	135,300
Steuben	NY	98,394	71	41	47,046	90,900
Wyoming	NY	41,188	69	40	50,949	96,515
Paulding	OH	18,989	46	40	44,650	89,619
Wood	01-1	129,590	210	35	51,680	147,300
Custer	OK	29,500	30	31	45,179	114,228
Grady	OK	53,854	49	38	50,677	111,956
Fayette	PA	134,086	170	43	38,903	89,100
Somerset	PA	76,218	71	44	43,429	103,900
Wayne	PA	51,401	70	45	47,932	179,354
Kittitas	WA	42,522	19	31	43,849	234,150
Average	LBNL 2013	62,766	79.3	39.9	\$48,454	\$118,037
Clark	SD	3,645	4	45	48,511	72,127
Codington	SD	27,938	41	37	46,361	140,909
Grant	SD	7,241	11	45	48,354	105,054
Average	SD	12,941	18.7	42.3	\$47,742	\$106,030

1
2 In general, the South Dakota counties seem to have lower average population/mi²,
3 median income, and median home value than the average county in either the 2009
4 or 2013 LBNL studies. However, with respect to other demographics and land use,
5 the South Dakota counties are similar to those included in the 2009 and 2013 LBNL
6 studies evaluated. Of the 36 unique counties examined, 21 are considered more
7 than 50 percent rural, whereas only four counties (Benton, WA; Walla Walla, WA;
8 DeKalb, IL; Atlantic, NJ) are less than 22 percent rural. Sixteen unique counties
9 have a percentage rural greater than or equal to 59 percent, the raw average of the
10 South Dakota counties. Sac County, IA is considered 100 percent rural, which is the
11 same as Clark County, SD. Additionally, Clark County's land cover is 26 percent
12 pasture land and several counties that were examined have land cover dominated
13 by pasture land (over 50 percent) including Grady, OK; Custer, OK; Kittitas, WA; and
14 Howard, TX. Therefore, the range of counties studied in the LBNL includes counties
15 like those in South Dakota.

16
17 Given the information about the types of facilities planned and the previous research
18 on like counties, we would be confident that the LBNL studies would be a
19 reasonable source for a benefit transfer (or damage transfer) effort to South Dakota.
20 This leads to the overall conclusion that the planned wind project in South Dakota

1 will not significantly reduce the sales prices of properties in the neighborhood of the
2 wind facilities.

3

4 **IV. CONCLUSION**

5

6 **Q. Does this conclude your direct testimony?**

7 A. Yes.

8

9 Dated this 15th day of December, 2017.

10

11 **Mark Thayer** Digitally signed by Mark Thayer
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Mark Thayer