BEFORE THE STATE OF WASHINGTON

ENERGY FACILITY SITE EVAUATION COUNCIL

In the Matter of Application No. 2003-01: SAGEBRUSH POWER PARTNERS, LLC; KITTITAS VALLEY WIND POWER PROJECT	EXHIBIT 80 SUP (SG-T SUP)

ECONOMIC DEVELOPMENT GROUP OF KITTITAS COUNTY
PREFILED SUPPLEMENTAL TESTIMONY
WITNESS #1: STEPHEN GROVER

Q Please state your name and business address.

A My name is Stephen Grover and my business address is 888 SW 5th Avenue, Suite 1460, Portland, OR 97204.

Q Have you previously filed prepared testimony in this matter?

A Yes.

Q Is this testimony given to supplement your prior testimony?

A Yes.

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Q. What is the specific purpose of this supplement to your prior testimony?

A My previous testimony addressed an economic impacts report that I developed in 2002 for two wind power projects – Kittitas Valley and another proposed by enXco – that were then pending in Kittitas County. At that time, my 2002 report assumed that the Kittitas Valley project was proposed as a 110 turbine, 165 MW project. Since that time, the Kittitas Valley Wind Power Project has been downsized by Horizon Wind Energy (formerly Zilkha Renewable Energy) in 2005 to propose installation of 65 turbines of 2 MW each. This supplemental testimony addresses the economic impacts associated with the downsized Kittitas Valley project.

Q Would you please identify what has been marked for identification as Exhibit 80-4 (SG-4)?

A Exhibit 80-4 (SG-4) is an up-to-date resume of my educational background, expertise and project experience.

Q Would you please identify what has been marked for identification as Exhibit 80-5 (SG-5).

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A Exhibit 80-5 (SG-5) is a new, August, 2006, study of the economic impacts of the downsized Kittitas Valley Wind Power Project entitled "Economic Impacts of the Kittitas Valley Wind Project:" which I authored.

Q Did you prepare this exhibit and is the information contained therein within your area of authority and /or expertise?

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A Yes.

Q Is the information contained in this exhibit based on your own first-hand knowledge or upon knowledge and information that would be relied upon by a reasonably prudent person in your field of expertise?

A Yes.

Q Is the content of this exhibit accurate?

A Yes.

Q Do you incorporate the facts and content of this exhibit as a part of your testimony?

A Yes.

Q Are you sponsoring the admission of this exhibit into evidence in this matter?

A Yes.

Q Please summarize the conclusions of your of your analysis of the downsized Kittitas Valley Wind Power Project.

A While the project has been reduced in scope, the same three key impact areas, i.e., (1) property values; (2) economic impacts; and (3) tax revenues, were analyzed. The same models,

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analytical techniques and processes used in the original analysis were applied to the downsized Kittitas Valley Project to update the report. The literature review was updated to reflect new materials published since the original report was prepared. The 2005-2006 Kittitas County Assessor's Report was utilized to estimate new property tax revenues that will be generated by the project. The value of the complete Kittitas Valley project was valued at $190,000,000 based on estimates provided by Horizon.

The regional 'input-output' model with Kittitas County-specific data was used to estimate the economic impacts of the project on the local economy. The economic impact results included in the report for the construction and operations phases of the Kittitas Valley project rely on IMPLAN model data for Kittitas County from 2003, which is the most recent year available, with numbers adjusted for inflation to reflect 2006 dollars. There is one significant element that is now present in the current analysis that was not present at the time of the prior report, however, that being the considerable economic growth in Kittitas County since 2003. Unemployment is down significantly, and employment growth is coming from sectors that traditionally pay above average wages. A consequence of this is that while the results of the input-output analysis are adjusted for inflation, they likely understate the true economic impact of this project on the county as a whole.

- The construction phase alone for the 65-turbine project will result in an increase in the economic output of the county of $10,150,100, and the operations of the project will result in an increase in the economic output of the county of $4,040,100 annually.

The approach to analyzing potential impact to property values as a result of views of wind turbines in both reports was the same, with additional review of literature on the subject that has been published since the original report was prepared. Tax assessors we interviewed indicated

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that wind turbines do not negatively impact property values. The literature on the subject continues to demonstrate an absence of any statistically significant and measurable effects of wind farm visibility on property values.

- Information from tax assessors and related literature indicate that views of wind turbines do not negatively affect property values.

The revised report also estimates the impact on tax revenues for the major sources of tax income for Kittitas County. To do so, the value of the completed project - $190,000,000 - was obtained from Horizon. Levy rates were obtained from the 2005-2006 Kittitas County Assessor's report and used to estimate annual tax revenues. No attempt was made to estimate increases in cost or changes to the provision of county services, although information from the fire and sheriff's departments servicing the project suggest that no net increase in costs are expected.

- The tax benefits to Kittitas County total $1,508,325 annually based on estimates for the first year of operations, an increase of 5 percent over the current level of tax revenues in the Kittitas County 2005-2006 budget.

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STEPHEN GROVER

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Stephen Grover is a Ph.D. economist who joined ECONorthwest in 2000 as a senior economist and project manager. He currently leads ECONorthwest's energy practice area. In addition to work at ECONorthwest, Dr. Grover is also an adjunct professor at Portland State University where he teaches a course in econometric simulation and forecasting and in energy modeling and economics. Dr. Grover's expertise is in discrete choice modeling and estimating models of consumer behavior using revealed and stated preference techniques. He has utilized these skills in a wide range of applications, including energy, litigation support, transportation, and environmental projects. Most recently, Grover has applied these techniques to research environmental and non-market valuation issues and to estimate consumer willingness to pay for energy efficiency. He has managed and worked on projects for the U.S. Department of Energy, U.S. Environmental Protection Agency, National Renewable Energy Lab, as well as for some of the largest electric utilities in the country.

Litigation Experience

- Testified as expert on lost income due to a contract dispute in the ground shipping industry. *Michael Wieber vs. Fedex Ground* Multnomah County Circuit Court (OR) (Plaintiff, April 2006).
- Wrote expert report regarding the role of financial intermediaries in the credit market in a case involving a furniture rental business.
- Testified as expert on lost compensation in a promotion discrimination case involving a police officer. *Michael Hudgins vs. City of Albany et al (Case # CV02-6040-TC)* Lane County Circuit Court (OR) (Plaintiff, May 2005).
- Testified as expert on the economic impacts of the proposed Wild Horse wind power project in Washington State (Washington EFSEC, March 2005)
- Testified as expert on economic damages in wrongful termination case involving funeral home employees. *Mary Lee Husted, Dennis Loveless, William Summers, and Dennis Loveless vs. SCI Oregon Funeral Services, Inc.*, Lane County Circuit Court (OR) (Defendant, March 2005).
- Testified as expert on lost compensation in a wrongful termination case involving a delivery truck driver. *Jason Posivio vs. Liberty Trucking*, Multnomah County Circuit Court (OR) (Defendant, January 2005).
- As an expert witness, estimated damages and wrote expert report for a personal injury (Plaintiff, January 2005).
- Submitted written testimony on the potential economic impacts of the Kittitas Valley wind project (Washington EFSEC, July 2004).

- As an expert witness, estimated damages and wrote expert report for a personal injury (Plaintiff 2004).
- As an expert witness, estimated damages and wrote expert report on the value of lost compensation and medical expenses resulting from a personal injury (Plaintiff 2004).
- As expert, estimated damages and wrote expert report on lost compensation in a wrongful termination case in the insurance industry (Defendant, 2003).
- As an expert witness, estimated damages and wrote expert report on lost compensation in a promotion discrimination case involving a corrections officer (Plaintiff, 2003).
- As an expert witness, estimated damages and wrote expert report on the value of lost household services in a wrongful death case (Plaintiff, 2003).
- As an expert witness, estimated damages and wrote expert report on lost compensation in a wrongful termination case involving a truck driver (Defendant, 2003).
- Testified on damages as expert witness in wrongful termination case in the insurance industry. *Jeff Thomas vs. American Family Insurance*, Multnomah County Circuit Court (OR) (Defendant, 2003).
- As an expert witness, estimated damages and wrote expert report on lost compensation in a wrongful termination case (Defendant, 2002).
- Developed wage prediction model as expert witness in a wage discrimination case (Defendant, 2002).
- Estimated damages due to lost compensation as part of a wrongful termination case (Defendant, 2001).
- Assisted in damages estimation in a wrongful termination case (Defendant, 2001).
- Estimated damages due to lost compensation as part of a wrongful termination case (Defendant, 2000).

Energy Project Experience

- For the Northwest Energy Efficiency Alliance, conducting an evaluation of the ENERGY STAR Homes Northwest program.
- For the Oregon DOE, estimated the economic impacts of its business and residential energy tax credits (BETC/RETC).
- For Pacific Gas and Electric, conducting evaluation of seven local government energy conservation programs operating in partnership with local governments.
- For the Bonneville Power Administration, conducting a process evaluation of their Residential Loan Program offered for energy efficiency equipment investments.
- For Sempra Utilities, conducting impact and process evaluations for two commercial conservation programs.
- For Southern California Edison, performing an impact evaluation to determine energy savings resulting from a non-residential financial incentives program.
- For the State of Washington, developed a guidebook to help rural counties to estimate the potential economic impacts of small wind projects.
- For Vestas Wind, estimated the economic benefits to Oregon of having a wind power manufacturing plant located within the state.

- For the Northwest Energy Efficiency Alliance, developed guidelines and a financing guidebook for hospitals considering outsourcing energy management for their facilities.
- For the National Renewable Energy Laboratory (NREL), conducting a market assessment for commercial solar energy technologies.
- For the New York State Energy Research and Development Authority (NYSERDA), developing logic models and program theory for the 41 energy efficiency and renewable energy programs included in the New York Energy $mart program portfolio.
- For Enbridge Consumer Gas in Toronto, conducting an audit of their 2002 and 2003 DSM program evaluations and providing recommendations on evaluation and reporting procedures.
- For the Energy Trust of Oregon, conducting process evaluations of their residential and commercial new construction programs and assessing market areas that new programs should target.
- For the Energy Trust of Oregon, estimated economic impacts of program spending and energy savings attributed to their energy efficiency and renewable energy programs.
- For a local economic development group, analyzed the potential economic benefits and effects on property values of a large wind energy farm in Kittitas County, WA.
- For NREL and the DOE, wrote report documenting the effects of Federal R&D in energy efficient technologies in the buildings sector over the last 25 years.
- For NREL, assessed status of solar energy research and provided recommendations for future R&D for several solar technologies.
- Measurement and evaluation of the market transformation effects of an Energy Star residential lighting program for the Northwest Energy Efficiency Alliance.
- For a private client, analyzed potential costs associated with public-private ownership of Portland General Electric.
- Verification analysis of DSM program savings estimates for California utilities for the California PUC Office of Ratepayer Advocates.
- Ongoing economic analysis support for researching clean energy issues for the National Renewable Energy Laboratory.

Other Project Experience

- For a private client, developing a plan to analyze the potential impacts of medical malpractice reform initiatives.
- Updated the AASHTO "Redbook" manual for conducting transportation-related benefit-cost analysis for state transportation agencies.
- Fiscal impact analysis of a proposed annexation for the City of Tualatin.
- Developed an environmental cost accounting system framework for the Washington DOT.
- Benefit-cost analysis of proposed Traffic Relief Option highway projects for Portland Metro.
- Developed guidebook for transit agencies to measure the benefits and disbenefits of providing rail and bus transit.
- Analysis of growth in drug and health care spending under the Oregon Health Plan.

Presentations

"Hard to Reach? Hard to Tell Lessons Learned From California", presented at the 2005 International Energy Program Evaluation Conference, New York, NY, August 2005.

"Local Government Partnerships: Working Together for Efficiency A Theoretical Portfolio Analysis Method", presented at the 2005 International Energy Program Evaluation Conference, New York, NY, August 2005.

"Private-Sector Commercial Customers and Market Drivers to Early Solar Adoptions", presented at the World Renewable Energy Congress VIII and Expo, Denver, CO, September 2004.

"Estimating the Local Economic Benefits of Community Wind Projects: A Guidebook for Washington State", presented at the 2005 American Wind Energy Association Conference, May 2005.

"Reaping the Wind: The Economic Impacts of Spending on Renewable Energy and Energy Efficiency Programs", presented at the ACEEE 2004 Summer Study on Energy Efficiency in Buildings Conference, August 2004.

"Consumer Preferences for CFLs Over Time: Where Are We Going?", presented at the ACEEE 2004 Summer Study on Energy Efficiency in Buildings Conference, August 2004.

"Commercial Customers and Market Drivers to Early Solar Adoptions", presented at the American Solar Energy Society Conference, Portland, OR, July 2004.

"Economic Development Benefits of Wind Power: A Guide for Communities for Estimating the Benefits of Wind Projects", presented at the Community Wind Energy Conference, Minneapolis, MN, June 2004.

"Economic Impacts of Wind Power in Kittitas County, WA", presented at the Harvesting Clean Energy Conference, Portland, OR, January 2004.

"A Comparison of Rebates and Non-Rebate Promotions in a Residential Lighting Program", presented at the International Energy Program Evaluation Conference, Seattle, WA, August 2003.

"The Economic Impacts of Wind Energy in Kittitas County, WA" presented at the NREL Energy Analysis seminar, Washington, DC, December 2002.

"Saturation, Penetration, Transformation: How Do You Know When a Market Has Changed?" presented at the ACEEE 2002 Summer Study on Energy Efficiency in Buildings Conference, August 2002.

"Shedding Light on Energy Efficient Lighting Markets in the Pacific Northwest", presented at the 2002 Pacific Northwest Regional Economics Conference, Portland, OR, May 2002.

"Non-Energy Benefits: Lessons from Non-Energy Worlds", presented at the 2001 Association of Energy Service Providers (AESP) Conference, Jacksonville, Florida, December 2002.

"Shedding Light on Energy Star Markets: Evaluation Lessons Learned from a Retail Lighting Market Transformation Program", presented at the 2001 International Energy Program Evaluation Conference, Salt Lake City, Utah, August 2001.

"Pay Now, Save Later: Using Conjoint Analysis to Estimate Consumers' Willingness to Pay for Energy Efficiency," presented at the ACEEE 2000 Summer Study on Energy Efficiency in Buildings, August 2000.

"High Efficiency Clothes Washers: Whiter Whites with Less Energy?", presented at the International Energy Program Evaluation conference, Denver, CO, 1999.

"Market Penetration: How to Predict the Future," presented at the ACEEE 1998 Summer Study on Energy Efficiency in Buildings, August 1998.

"A Nested Logit Model of Congestion and Recreation Demand," presented at the *Western Economics Conference*, San Diego, CA, 1995.

Selected Recent Publications

"Hard to Reach? Hard to Tell Lessons Learned From California", with Peter Graven and Rob Rubin, in *Proceedings of the 2005 International Energy Program Evaluation Conference*, New York, NY, August 2005.

"Local Government Partnerships: Working Together for Efficiency A Theoretical Portfolio Analysis Method", with Chris Ann Dickerson, Valerie Richardson, Betsy Krieg, and Craig Tyler, in *Proceedings of the 2005 International Energy Program Evaluation Conference*, New York, NY, August 2005.

"Private-Sector Commercial Customers and Market Drivers to Early Solar Adoptions", with Robert Margolis, in *Proceedings of the World Renewable Energy Congress VIII* (Denver, CO), September 2004.

"Reaping the Wind: The Economic Impacts of Spending on Renewable Energy and Energy Efficiency Programs", with Alec Josephson, Ben Bronfman, and Fred Gordon, *Proceedings of the ACEEE 2004 Summer Study on Energy Efficiency in Buildings,* Washington DC, ACEEE, 2004.

"Consumer Preferences for CFLs Over Time: Where Are We Going?", with Peter Graven and Emily French, *Proceedings of the ACEEE 2004 Summer Study on Energy Efficiency in Buildings,* Washington DC, ACEEE, 2004.

"Commercial Customers and Market Drivers to Early Solar Adoptions", with Robert Margolis. *Proceedings of 33rd ASES Annual Conference*, Boulder, CO, 2004.

"A Comparison of Rebates and Non-Rebate Promotions in a Residential Lighting Program", with Charisa Flaherty, *Proceedings of the 2003 IEPE Conference*, IEPE, Oregon, WI, 2003.

"The Economic Impacts of a Proposed Wind Power Plant in Kittitas County, Washington State, USA." *Wind Energy Engineering*, Volume 26, No. 5 (2002).

"Saturation, Penetration, Transformation: How Do You Know When a Market Has Changed?", with David Cohan and My Ton, *Proceedings of the ACEEE 2002 Summer Study on Energy Efficiency in Buildings,* Washington DC, ACEEE.

"Shedding Light on Energy Star Markets: Evaluation Lessons Learned from a Retail Lighting Market Transformation Program", with David Cohan, *Proceedings of the 2001 IEPE Conference*, IEPE, Oregon, WI, 2001.

"Pay Now, Save Later: Using Conjoint Analysis to Estimate Consumers' Willingness to Pay for Energy Efficiency", with Bill Babiuch, *Proceedings of the ACEEE 2000 Summer Study on Energy Efficiency in Buildings*, Washington DC, ACEEE, 2000.

"High Efficiency Clothes Washers: Whiter Whites, Less Energy?", with Christie Torok and Bill Babiuch, in *Proceedings of the 1999 International Energy Program Evaluation Conference*, Denver, CO, 1999.

"Market Penetration: How to Predict the Future," with Ibbie Ikenze-Bates, in *Proceedings of the ACEEE 1998 Summer Study on Energy Efficiency in Buildings*, Washington DC, ACEEE, 1998.

Economic Impacts of the Kittitas Valley Wind Project

A Report to the Economic Development Group of Kittitas County, WA

August 14, 2006

(Update to November 2002 Report)

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Exhibit [illegible] (SG-5)

Acknowledgements

This report was prepared by ECONorthwest's Portland office for the Economic Development Group of Kittitas County located in Ellensburg, WA. Dr. Stephen Grover was the ECONorthwest project manager for this analysis and was the primary author of this report. Questions regarding this report should be directed to him at grover@portland.econw.com or by phoning the Portland office at (503) 222-6060. Dr. Grover was assisted in this project by Anne Fifield, Alec Josephson, Bob Whelan, and John Boroski.

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The Economic Impacts of the Proposed Kittitas Valley Wind Power Project in Kittitas County, WA

An Evaluation of Potential Impacts on Property Values, Tax Revenues, and the Local Economy

I. Introduction and Summary

Note: This report is an update to our earlier report on a wind project proposed for Kittitas County.[1] The earlier report was published in 2002 and assumed a project of 260 wind turbines with a potential generating capacity of 390 MW. The current report addresses a portion of the original project involving 65 turbines (2 MW each) and provides updated economic and tax impact estimates.

Horizon Wind is proposing to construct and operate 65 wind turbines in Kittitas County that would have potential generating capacity of 130 MW. As part of the planning process for this project, the Economic Development Group of Kittitas County has hired ECONorthwest to evaluate the potential economic impacts of constructing and operating the wind plants in Kittitas County. Specifically, ECONorthwest was asked to analyze and help quantify impacts in three key areas of interest:

- **Property Values.** Local residents have voiced concern that constructing numerous wind turbines in the valley will detract from views and ultimately reduce property values.
- **Economic Impacts.** The wind plants will create jobs and increase spending in the economy during the construction phase and during plant operations.
- **Tax Revenues.** The increase in jobs and local spending will also increase tax revenues for Kittitas County.

To research these issues, we utilized several different analysis techniques. We surveyed tax assessors in other counties with wind projects to determine the potential effects of wind farms on property values. We also conducted a review of the available academic literature for additional information on property value effects. Local economic impacts were estimated using an input-output model based on construction and operations data obtained from the two companies proposing wind projects in Kittitas County. Tax revenues were estimated from

[1] *Economic Impacts of Wind Power in Kittitas County*, prepared by ECONorthwest for the Phoenix Economic Development Group, November 2002.

the input-output model results based on tax rate and spending information obtained from Kittitas County.

Our analysis in these areas has resulted in the following key findings:

- *Views of wind turbines will not negatively impact property values.* Based on a nation-wide survey conducted of tax assessors in other areas with wind power projects, we found no evidence supporting the claim that views of wind farms decrease property values.

- *Wind plant construction will have significant economic benefits.* The construction spending for 65 turbines will create approximately 126 full and part time local jobs in Kittitas County and will increase total income to the county by almost $5 million during the construction period. Kittitas County will also benefit from the spending of an additional 102 non-local workers employed in the area during construction.

- *Wind plant operation will provide additional annual economic benefits.* The wind farm operations will require 10 additional local jobs and will increase income to the county from salaries and operations expenses by over $1.5 million annually.

- *Property tax revenues will increase.* The construction of the wind farm will increase property tax revenues collected in the Kittitas County by approximately $1.5 million dollars annually -- an increase of 5 percent over current property tax revenues. The majority of this increase is due to the property tax paid on the wind turbines.

Details on the analysis underlying each of these results are presented in the remainder of this report.

II. Property Value Impacts

One of the biggest concerns of the community is that the installation of numerous wind turbines will detract from the current viewscape in the Kittitas Valley and that the destruction of this view will ultimately reduce residential property values.

We conducted two separate analysis tasks to address this issue. First, we conducted a phone survey of tax assessors for counties that recently had wind turbines installed in their areas. In addition to interviewing tax assessors, we also reviewed the current literature for studies that attempted to estimate the impact of wind turbine views on property values. For comparison purposes, we also reviewed the literature on the impact that transmission lines have on property values as these effects may be comparable.

A. Tax Assessor Interviews (Completed in 2002)

The first step in our survey of tax assessors was to develop an appropriate sample of sites for the analysis. These sites were chosen in 2002 using the following criteria:

- *Recently constructed projects.* Recently completed projects were used to ensure that reliable information was obtained from the assessor. Recent sites are also more likely to have the same turbine technology that is planned for Kittitas County.

- *View locations.* As much as possible, we attempted to find wind farms that could be seen from residences rather than focusing only on sites in remote or very rural locations.

- *Multiple turbines.* We focused on those areas where multiple turbines were installed to be comparable with the projects proposed for Kittitas County.

We applied these criteria to information obtained from the American Wind Energy Association website to locate candidate wind projects in areas throughout the U.S. Table 1 shows descriptive information on 19 projects we located using this method.

Table 1: Location and Size of Wind Farms Used In Analysis

State	Location	County	Project Name	Year	MW	Turbine Manufacti	# of Turbines
WY	Carbon County	Carbon	Foote Creek Rim 4	2000	16.80	NEG Micon	28
CA	San Gorgonio Pass	Riverside	Cabazon	1999	39.75	Zond Z-750	53
CA	San Gorgonio Pass	Riverside	Westwind	1999	46.50	NEG Micon	65*
CA	Tehachapi	Kern	Oak Creek Phase 2	1999	23.10	NEG Micon-700	33
CA	Tehachapi	Kern	Cameron Ridge	1999	56.00	NEG Micon	80
CA	Tehachapi	Kern	Pacific Crest	1999	45.54	Vestas V-47	69
WY	Carbon County	Carbon	Foote Creek Rim 1	1999	41.40	Mitsubishi	69
WY	Carbon County	Carbon	Foote Creek Rim 3	1999	24.75	NEG Micon	33
TX	Culberson County	Culberson	American Nat. Wind Power/ Orion Energy	1999	30.00	Zond	40
TX	Big Spring I	Howard	Howard County	1999	27.72	Vestas V-47	42
TX	Crockett County	Crockett	Southwest Mesa Wind Farm	1999	74.90	NEG Micon (107)	107
MN	Pipestone County	Lincoln	Lake Benton - 2	1999	103.50	Zond	138
IA	Storm Lake	Buena Vista	Storm Lake	1999	112.50	Zond - 50 (150)	150
IA	Storm Lake	Buena Vista	Storm Lake	1999	80.25	Zond - 50 (150)	107*
OR	Helix	Umatilla	1. Vansycle Ridge	1998	25.10	Vestas V-47	38
MN	Pipestone County	Lincoln	Lake Benton - I	1998	107.25	Zond	143
TX	Culberson County	Culberson	Lower Colorado River Authority	1995	35.00	Kenetech	112
MN	Buffalo Ridge	Nobles	Kenetech Windpower	1994	25.00	Kenetech	73
CA	Tehachapi	Kern	Sky River	1993	76.95	Vestas V-27	342

Note: * Number of turbines estimated by ECONorthwest based on reported MW capacity.

In addition to the sites shown in Table 1, we also added projects in Alameda County, California, Walla Walla County, Washington, and the Town of Lincoln, Wisconsin as they all contain wind projects that are similar to that proposed for Kittitas County. The final sample included 22 wind projects located in 13 different counties throughout the country.

Once the sample was determined, the next step was to interview tax assessors within each county to determine the effect these projects had on residential property values. We chose to interview assessors as they are required to

provide objective assessments of property values. If assessments are perceived to be too high by the landowners, the assessed value may be challenged in court. Unlike real estate agents, who have a financial stake in the market values of properties they sell, tax assessors do not have an incentive to inflate property values or to exaggerate the possible effects of wind turbines. For these reasons, we chose to interview tax assessors as they are the best available source for unbiased information on the effects of wind turbines on property values.

From our initial target sample, we were able to interview assessors from all thirteen counties. Based on these interviews, we found no evidence indicating that views of wind turbines decreased property values. Of the counties we interviewed, six contain residential properties with views of the wind turbines, and six counties lack residences with a view of the turbines. One county reported that the wind farm is too new for the assessor's office to know if nearby property values have been affected.

Six counties reported that residential properties have views of the wind turbines, but the turbines have not altered the value of those properties. Responses from assessors in these counties were similar:

- Kern, California—Residents are able to see the turbines from many locations within the town of Tehachapi. The views of the wind turbines have not affected the assessed values of these residences.
- Lincoln, Wisconsin—The turbines are located about two miles outside of town. The turbines do not block the view of any particular feature, but residents can see them if they look for them. The assessor hasn't heard anyone complain about the turbines' appearance. Some residences located in the rural parts of the county have closer views of the turbines, but the turbines have not impacted their land values.
- Buena Vista, Iowa—Many residences in the towns of Alta and Storm Lake have views of the turbines. The turbines are easily seen from town, they are located a couple of miles outside of town, and sit on a high ridge. There has been no impact on land values.
- Howard, Texas—There are no homes within two miles of the wind turbines, but because the terrain is so flat, the turbines are visible from as far as 25 miles away. Appraised land values have not declined because of views of the turbines. The appraiser reported that their office expected property owners to complain about lowered property values caused by a diminished view, but so far they have received no complaints.
- Walla Walla County, WA—The turbines are on a high cliff that has a lot of wind and low land values. The unincorporated town of Touchet lies about 8 miles from the turbines and some residents do not like the views of the turbines as it affects their view of the sunset. This factor has not translated into lower land values according to the assessor. Touchet's tax base rose from just over $100 million to $265 million with the addition of the wind farm and resulted in the addition of 20 to 25 permanent local jobs according to the assessor.

- Town of Lincoln, Wisconsin—The assessor reported that when the turbines were first installed, residents complained about the diminished view. However, in the three years since installation, residents have become used to them, and no one complains now. One homeowner had claimed that the assessed value of his property should be reduced because of the wind turbines. The County asked him to show that the value of sales of properties near the turbines had diminished, and he was unable to do so.

  To investigate further the potential impacts on property values, Lincoln's assessor compared the 2001 assessed value to actual sales (for arms-length transactions of residential properties) and found that the ratio of assessed values to actual sales prices for properties less than one mile from the wind turbines was no greater than for properties more than a mile from the wind turbines. The assessor noted that the wind turbines had negatively impacted television reception for nearby properties, but the utility company provided the impacted homes with better antennas or a satellite dish to bring reception back to previous levels.

The wind farms have had no impact on neighboring property values in five counties as neighboring properties are in agricultural production. Assessors' offices in Alameda, California, Carbon, Wyoming, Crockett and Culberson in Texas, and Umatilla, Oregon reported that no residential properties have views of the wind farms. The neighboring properties are grazing land, and the value of the land is determined by its productivity, not its views. For Riverside County, California, the wind farm was built along the freeway with a buffer zone to separate it from residences. Consequently, very few homes have a view of the turbines in that county and the assessor reports that there has been no impact on property values. Nobles County, Minnesota reported that the wind farm in the county was installed in the past year, and it is too early to determine if they have affected neighboring property values.

One county reported that land parcels with wind turbines located on them have changed in value. Kern County, California reported that property eligible for a wind turbine greatly increases in value. The first step to siting a wind turbine is to change the land from a grazing zone to a "wind-energy" zone. By changing the zone, the land value increases from about $300 to about $1000 per acre. No other county reported such an impact to land values.

Wind farms in two counties, Howard in Texas and Umatilla in Oregon, have added to the tax base. The assessors' offices reported that the wind turbines are large capital improvements, and they have contributed to the tax base. This was not a specific question in the interview, and these two counties volunteered the information. The same is likely true in other counties, but the issue was not pursued during the assessor interviews.

Representatives from three assessors' officers reported that community members like the appearance of the wind turbines. The appraiser in Kern County speculated that residents like the appearance of the wind turbines as long as the turbines are functioning. The turbines that were built in the early

1980s had a high failure rate, and many of the turbines just sat on the property in disrepair. That experience led many to feel that wind farms are an eyesore. The newer turbines have a very low failure rate, and residents can see the turbines are operating and creating an economic good, which positively impacts their perceptions of the turbines.

In Kern County, some residents located on rural properties complained about the plan to locate wind turbines near their properties. They argued that they had bought their properties with the expectation of a view of grazing land, not a wind farm. To solve the problem, the wind developer paid them for the property and the people moved. The wind developer then sold the property, although the property values did not decrease.

To conclude, the results of the tax assessor interviews suggest that views of wind turbines do not negatively impact property values. One of the likely reasons that wind turbines may not diminish property values is that not all people agree that views of wind turbines are undesirable. As reported by the tax assessors, some residents find views the wind turbines attractive (just as some people enjoy views of other man-made structures such as silos, water towers, grain elevators, etc.). If a homeowner dislikes having a view of the wind farm, they may move and sell their house to someone who likes the view. In this case, property values would not be diminished.

B. Literature Review

In addition to the assessor interviews, we also conducted a literature review to determine if other studies had found credible evidence of a negative impact on property values. We restricted our literature review to peer-reviewed academic studies, and studies by energy, real estate and economics industry professionals. References for the studies we reviewed are included in Appendix B of this report.

For our initial report published in 2002, we found only one study that specifically addressed the potential impact of wind turbines on property values, and this study was based on residential property in Denmark (Jordal-Jorgensen, 1995). The hedonic study showed that house values were lower close to wind farms than other houses located further away but with otherwise similar characteristics. This result was based on a small sample of homes, however, and the difference in home price was not statistically significant.

Since 2002, additional studies have been published that attempt to estimate the effect (if any) of wind turbines on property values. None of these studies is completely satisfactory, however, and significant research still needs to be conducted on this issue.

The most rigorous of these studies was conducted by Hoen (2006), who analyzed 280 arms-length single-family home sales using a hedonic model. The sales occurred between 1996 and 2005 were within 5 miles of a 20-turbine wind

farm in Madison County, New York. This study is notable because the author personally visited each home in the sample to determine a precise level of turbine visibility. The study also controlled for the exact distance between the homes and the turbines. The study found an absence of statistically significant measurable effects of wind farm visibility on property transaction values, all else being equal.

A similar transaction-based study by Sterzinger *et al.* (2003) for the Renewable Energy Policy Project (REPP) found that "there is no support for the claim that wind development will harm property values". For this study Sterzinger analyzed about 24,000 property transactions near 11 wind farms throughout the U.S. and compared average transaction values for houses outside and inside a 5-mile viewshed. This study, however, is weakened by the following problems: 1) it assumes that all households within the 5-mile viewshed can see the turbines 2) it does not account for actual distance to the turbines (all view impacts are considered equal) 3) it does not provide important statistics that indicate explanatory power, and 4) it includes transactions between family members, estate sales, etc. that may not reflect the true market value.

Poletti (2005) analyzed about 300 sales of residential homes and raw land near two windfarms in Wisconsin and Illinois, and compared the average values (per square foot) of properties judged to be near the windfarm to those thought to be outside the view of the windfarm. While Poletti took care to filter out sales that were not arms-length and also controlled for general housing condition and amenities (e.g., good road access, water views), like Sterzinger he did not control for *actual* windfarm visibility or distance to the windfarm. Poletti finds that there is no statistical evidence to reject the claim that windfarms have an effect on property values, although his results should be considered inconclusive due to the aforementioned visibility and distance issues.

A study by the Energy Center of Wisconsin (2004) tried to improve upon the methods used by REPP to statistically analyze property sales data near two windfarms in Wisconsin. First, the researchers determined whether properties had a probable line of site to the turbines based on estimations of visibility made from public roadways. In addition, the researchers calculated approximate distances between the properties and the turbines. After excluding transactions that were not arms-length sales, however, the researchers were left with too few transactions within the view sheds (i.e., where the turbines are visible) to draw defensible conclusions, and thus no results are given.

Other studies have used different methods than Hoen and Sterzinger and have reached different conclusions. Haughton *et al.* (2004) surveyed 501 residents and 45 real estate agents regarding how a proposed 130-turbine offshore wind farm in Nantucket Sound could affect residential property values. Homeowners believed that average values would decline by 4.0% (waterfront properties would decline by 10.9%) and realtors expected losses to average 4.6%. Haughton does not report confidence bounds for these estimates and they may not be statistically different from zero. It is also questionable how well homeowners can judge potential impacts on property values, especially since there is very little offshore wind development in the United States.

Khatri (2004) sent nearly 2,000 surveys to licensed surveyors in Great Britain to get their perceptions of wind turbine impacts on property values. About 400 surveyors completed the survey, and about 80 of these (mostly in Wales and Scotland) had actual experience with residential property sales near turbines. Sixty percent of the surveyors replied that wind turbines negatively affect home prices and cited a variety of reasons for this including views of wind turbines (among other factors). The study does not claim that wind farms categorically harm property values, however. Most respondents also said that values would dip the most during the planning and permitting stage. The study also found that prices begin to recover after the wind farm has been operational for two years, suggesting that communities grow used to them. The report also does not include the survey instrument used to collect the data so it is not possible to assess the validity of the questions asked.

We also reviewed the academic literature addressing transmission lines and their impact on property values. Unlike wind turbines, transmission lines are almost universally considered unattractive. There is also widespread belief that living near transmission lines is a health hazard. For these reasons, there is a much clearer case that transmission lines will negatively affect property values. Legal cases have agreed that the public perception of danger or health risk can impact property value, regardless of the reasonableness of the public's fear (Rikon 1996).

It is important to emphasize the purpose of reviewing the literature on transmission lines for this analysis. Our review of the literature on transmission lines was done solely to provide an indication of the maximum negative effect views of wind turbines might have on property values *if such a negative impact exists.* As we have indicated from our assessor interviews and literature review, we have not found any evidence that views of wind turbines have any effect on property values. Nevertheless, the information from the literature on power lines is informative.

The evidence from the literature on transmission lines shows that their effect on property values is small and relatively short-lived. The maximum impact on adjacent properties due to transmission lines is about a 10 percent reduction in value. Many studies use hedonic estimation techniques to measure the impact transmission lines have on property values while controlling for other features of the homes. The most recent study (Des Rosiers 2002) found a severe visual encumbrance due to a direct view on a transmission line pylon does exert a negative impact on property prices. Overall, the price reduction stands at roughly 10 percent of average house value. However, being adjacent to the easement will not necessarily cause a house to depreciate. It may even increase its value where proximity advantages (enlarged visual field, increased privacy) exceed drawbacks. Additionally, findings for the non-adjacent properties that have views of the power lines translates in most cases into higher values, due to the improved visual clearance.

Some earlier studies agree that transmission lines have a slight negative impact on property values. Hamilton (1995) found that properties adjacent to a line

lose 6.3 percent of their value due to proximity and the visual impact. Properties more distant from transmission lines are scarcely affected, losing roughly 1 percent of their value. Delaney and Timmons (1992) found that, generally, real estate appraisers believe that transmission lines reduce the value of nearby residential properties by 10 percent. The authors' survey found that 84 percent of the surveyed appraisers believed transmission line have a negative impact, 10 percent believed that there is no impact, and 6 percent believed that there was a positive impact on property values. Colwell (1990) found that properties within 50 feet of an HTVL have a 6 percent to 9 percent lower value than comparable properties, but that drop in value lessens over time and tends to fade away.

As the literature indicates, the negative effect on property values due to transmission lines is 10 percent or less, with this effect diminishing over time. This is reported only for comparison purposes for the case of wind turbines. Again, information from tax assessors and the literature indicate that views of wind turbines do not negatively affect property values.

III. Local Economy

A second component of our analysis addressed the economic impact of the wind turbines on the Kittitas County economy. We interviewed representatives from Horizon Wind to determine the amount of spending and employment for the proposed projects. Using this information, we used a regional 'input-output' model with data specific to Kittitas County to estimate the economic impacts of the project. We used our model to estimate the economic impacts for both the construction phase and the operations phase of this project. Details on both these phases are reported below.

Note that the economic impact results discussed below for the construction and operations phases rely on IMPLAN model data for Kittitas County from 2003, the most recent year available. While the results reported here have been adjusted for inflation to reflect 2006 dollars, the county has enjoyed considerable economic growth since 2003. Consequently, the economic impact results presented here for both the construction and operations phases likely understate the true economic impact of this project.

According to the Washington State's most recent monthly labor report[2], Kittitas County has experienced economic growth. In the three-years from June 2003 to June 2006, the unemployment rate fell from 7.7 percent to 4.7 percent—pushing Kittitas County well ahead of the rest of Washington State. The number of county residents employed rose 9.1 percent from 17,300 to 18,870. Of those, about 1,450 were self-employed. More than 1,250 commuted over Snoqualmie Pass on I-90 to jobs near Seattle.[3]

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[2] Washington State Employment Security Department website http://www.workforceexplorer.com/cgi/dataanalysis/?PAGEID=94&SUBID=149.

[3] Adriana Janovich. "*Commuting over Cascades a piece of cake—many Kittitas County residents make trek to jobs in King County.*" Seattle Post-Intelligencer. October 25, 2004. Page B-2.

While Kittitas County's position as a long-distance commuter bedroom community has been growing, the bulk of the gains in employment seen in the last three years have been homegrown. Payroll employment within the county's border has simply been rising rapidly—up 9.6 percent to just under 15,000. Better still, most of that growth has come from sectors that traditionally pay above average wages. Most notably, double-digit employment increases have been reported in construction, manufacturing, and state and local government. There is no doubt that a construction boom is occurring within the county. Attracted to a low crime, rural lifestyle, and housing prices that are a fraction of those on the west side, many Puget Sound area residents are building second homes in Kittitas County. About 20 to 25 percent of the new homes being constructed are attributed to such buyers. Permits for new homes in Ellensburg jumped from 68 in 2003 to over 200 by October 2005.[4] Elsewhere in Kittitas County permits rose from 235 in 2003 to 332 in 2005.[5]

With this context in mind, the estimated economic impacts of the proposed Kittitas Valley project are discussed below.

A. Construction

The construction of 65 individual wind turbines will involve a significant amount of employment and spending during the construction period. We have talked to representatives from Horizon Wind to determine the likely employment and construction spending. Based on these conversations and our experience analyzing similar projects we developed estimates for use in our model. Our input parameters for the construction phase included:

- $2,712,500 in wages for 52 full and part time local jobs during the 10 month construction period
- $2,862,955 in local spending on construction materials (i.e., gravel, concrete)
- $2,066,000 in spending on food and lodging for non-local labor brought to Kittitas County for the construction period
- $139,000 in spending on a new fire truck for the local fire district (Thorp) by Horizon Wind.

Based on these and other input parameters, we estimated the impacts to the local economy for a 10-month construction period, which is the time period anticipated by Horizon to complete this project.

For the input-output model, economic impacts are grouped into three different categories:

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[4] Mike Johnson. "*Building keeps booming.*" Daily Record. Ellensburg, Washington. October 26, 2005.

[5] Kittitas County website accessed August 8, 2006: http://www.co.kittitas.wa.us/cds/reports.asp

- **Direct economic impacts**. Businesses directly purchase goods and services in their local economies. An increase in spending, therefore, affects the economy directly through increased purchases.

- **Indirect economic impacts**. Businesses also indirectly affect local economies, as those firms that provide direct services to the wind project must also purchase materials and supplies themselves. For instance, a construction contractor working on this project will lease some equipment or purchase supplies locally. Increased purchases of "intermediate" goods and services will also promote additional economic activity.

- **Induced economic impacts**. The direct and indirect effects of employment and income affect overall economy purchasing power, thereby affecting further consumption spending. For instance, wind plant employees who use their income to buy groceries or take their family to the movies generate economic impacts for workers and businesses in those sectors. These individuals will, in turn, spend their income much like the wind plant employees do. This cycle continues until the spending eventually leaks out of the local economy as a result of taxes, savings, or purchases of non-locally produced goods and services or "imports."

In addition to these categories, economic impacts are also divided into different income effects. In the following tables, *Output* is the increase in economic activity (value of goods and services produced) within the county and *Wages* reflects the increase in wage income for all workers as a result of the project. Similarly, *Business Income* is the increase in income to local business as a result of spending associated with the wind plant. *Personal Income* is the sum of wages and business income. The *Other Income* category is used to capture additional income that results from other sources due to the project, such as rents to land owners leasing land for wind turbines. Finally, *Jobs* reflects the number of full and part time jobs that result directly from the project and from the increase in spending in other sectors of the economy.

Additional technical detail on the input-output model is included in Appendix A of this report.

The following tables show the economic impacts for the construction period.

Table 2: Construction Phase Economic Impacts for Kittitas County

Impact Type	Output	Wages	Business Income	Personal Income	Other Income	Jobs
Direct	$5,814,500	$2,712,500	$0	$2,712,500	$0	52.0
Indirect	2,752,800	906,500	154,800	1,061,300	366,100	49.9
Induced	1,582,800	492,100	118,800	610,900	220,900	24.1
Total	$10,150,100	$4,111,100	$273,600	$4,384,700	$587,000	126.0

As shown in Table 2, the construction phase of the project will result in an increase in the economic output of the county of $10,150,100 during the construction phase. During this time approximately 52 local full and part time jobs. This is an addition to the approximately 103 non-local workers that are expected to be hired during the construction phase. Spending from this project on local labor and materials will result in an additional 74 jobs for a total of approximately 126 full and part time jobs during the construction period. Wages during this period will be $4,111,100 due to the hiring of local construction workers and the increases in services needed to support the construction work. Similarly, business incomes will increase by $273,600 due to spending on local materials and other items such as food and lodging for non-local labor hired for the project. Taken together, personal income is estimated to increase by $4,384,700 in Kittitas County due to spending during the construction phase. When the income of $587,000 from other sources is considered, the increase in income to the county totals $4,971,700 during the construction phase.

Table 3 provides the same information broken out by industry sector. Most of the spending during this phase occurs in the Transportation, Communications, and Utility and the Service sectors. Sectors that will support this sector such as the Wholesale and Retail Trade will also see a significant increase in spending.

Table 3: Construction Phase Economic Impacts by Industry

Industry	Output	Wages	Business Income	Personal Income	Other Income	Jobs
Natural Resources	$44,200	$9,400	$1,300	$10,700	$5,700	0.8
Construction	140,000	42,600	12,400	55,000	6,100	1.3
Manufacturing	190,200	34,100	200	34,300	14,400	0.8
Transportation, Communication and Utilities	5,997,600	2,753,100	22,900	2,776,000	32,500	53.1
Wholesale and Retail Trade	847,700	338,100	46,500	384,600	122,700	14.8
Finance, Insurance, and Real Estate (FIRE)	210,700	38,200	11,300	49,500	71,200	1.5
Services	2,454,500	737,500	179,000	916,500	314,800	50.2
Government	265,200	158,300	0	158,300	19,600	3.5
Total	**$10,150,100**	**$4,111,100**	**$273,600**	**$4,384,700**	**$587,000**	**126.0**

Note: Totals may not match due to rounding

Operations

Spending will continue in the local economy during the operation of the wind turbines once the construction phase has ended. During the operations phase, spending will consist of primarily:

- 10 employees hired to operate and manage the wind power plant

- Spending on equipment, maintenance and materials to operate the wind turbines
- Income to property owners that rent land for the wind turbines (an estimated $10,371 annually per turbine for the first year.[6])

The impact to the local economy due to the wind plant operations was modeled based on these factors. As during the construction phase, there is a direct effect from these factors as well as an indirect effect that results from the spending due to the increases in income from the new jobs and from the rental income. These impacts are summarized in Table 4 and Table 5.

Table 4 shows the effect on incomes due to continued operations of the wind turbines. The operations will require 10 full and part time jobs, and the spending on these jobs and plant equipment will create approximately 8 additional jobs in businesses that support the wind plants. The combined effect of direct and indirect spending will result in approximately 18 additional new and part time jobs in Kittitas County. The combined effect on the economic output for Kittitas County is $4,040,100 annually. Similarly, spending on these jobs will increase annual wages by $1,109,100 and yearly business income by $41,300. Income from other sources is estimated at $585,500 annually and will consist primarily of rental fees paid to land owners where the wind turbines are situated. Taken together, the wind turbines operations will increase income to the county by $1,735,900 annually.

Table 4: Wind Plant Operations Annual Economic Impacts for Kittitas County

Impact Type	Output	Wages	Business Income	Total Personal Income	Other Income	Jobs
Direct	$3,491,800	$939,500	$0	$939,500	$508,200	10.0
Indirect	22,000	6,700	1,800	8,500	3,300	0.2
Induced	526,300	162,900	39,500	202,400	74,000	7.9
Total	**$4,040,100**	**$1,109,100**	**$41,300**	**$1,150,400**	**$585,500**	**18.1**

Table 5 shows the economic impacts resulting from wind turbine operations broken out by industry sector. Most of the impacts will be in the Transportation, Communications, and Utilities sector while the Wholesale and Retail Trade and Service sectors will also see some increase in economic activity due to project operations.

[6] The rental payments are a percentage of gross revenues from the sale of energy produced by the Kittitas Valley Project as currently designed. Horizon Wind Energy has estimated these payments based on expected energy generation and anticipated power sales prices. The anticipated royalty payments increase over time to an estimated $16,682 after 25 years. We are using the first year rental payment in our calculations in order to keep our impact estimates conservative. However, the increase in rental payments over time will also increase the overall economic benefit to Kittitas County in future years.

Table 5: Annual Wind Plant Operation Impacts by Industry

Industry	Output	Wages	Business Income	Personal Income	Other Income	Jobs
Natural Resources	$8,800	$2,100	$200	$2,300	$1,200	0.2
Construction	7,500	2,600	800	3,400	500	0.1
Manufacturing	17,400	2,700	0	2,700	1,200	0.1
Transportation, Communication and Utilities	3,534,400	948,900	4,900	953,800	516,500	10.2
Wholesale and Retail Trade	167,200	65,800	10,800	76,600	24,800	3.0
Finance, Insurance, and Real Estate (FIRE)	60,500	11,100	3,400	14,500	20,100	0.4
Services	214,900	67,800	21,200	89,000	20,200	4.1
Government	29,400	8,000	0	8,000	1,100	0.1
Total	**$4,040,100**	**$1,109,100**	**$41,300**	**$1,150,400**	**$585,500**	**18.2**

Note: Totals may not match due to rounding

IV. Tax Revenues

The overall increase in economic activity from the wind power plant will increase tax revenues for Kittitas County. ECONorthwest was asked to estimate the impact on tax revenues for the major sources of tax income for the county. Note that we did not attempt to estimate increases in costs or changes to the provision of county services (i.e., fire, sheriff) that the wind power plant might require.[7]

Based on our evaluation of the proposed wind power facility and a review of the levy rates in the 2005-2006 Kittitas County Assessor's Report, we have estimated that new property tax revenues will equal $1,508,325 in the first year of operation (this amount will gradually decrease as the turbines depreciate over time).[8] For this calculation, we valued the complete wind farm project at

[7] Horizon Wind has entered into an agreement with the local fire district to purchase a new fire truck and make annual payments for fire protection service. Because of these actions, no net increase in costs to the local fire district is expected from the project. The Kittitas County sheriff reported in the DEIS for this project that he did not anticipate any budgetary impacts from additional law enforcement costs related to the wind farm.

[8] In addition, 16 turbines are expected to be built on land managed by the Washington Department of Natural Resources (DNR) rather than on private land. For these turbines, a rental fee for land will be paid to the State, which then returns these funds to schools throughout the state based on district need. For the first 10 years of the project, the annual rental rate is estimated to be $9,429 per turbine, amounting to an additional $150,864 annually for the DNR. These payments then increase and eventually reach an estimated $20,744 per turbine after 25 years, resulting in $331,904 in revenue to the DNR. Like the rents to private landowners, these payments are based on gross revenues from the sale of energy produced by the Project and the estimates provided by Horizon Wind Energy are based on expected energy generation and anticipated power sales prices.

$190,000,000 based on the estimates provided to us by Horizon Wind. For comparison, property tax revenues from all sources in Kittitas County totaled $33,198,898 for the 2005-2006 budget year.[9] The increase in property tax revenues due to the wind farm amounts to an increase of 5 percent over these levels.

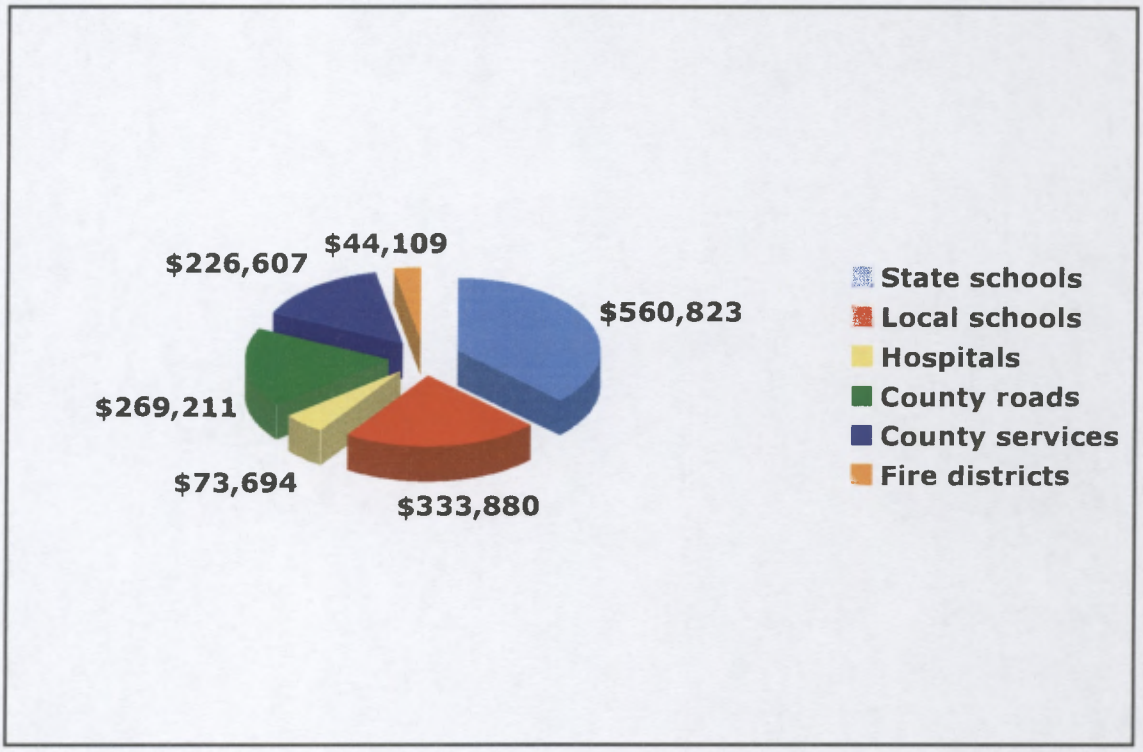
Table 6 shows how the new tax revenues would be allocated based on the taxing districts that the turbines would be located in. This information is also presented graphically in Figure 1.

Table 6: Allocation of Property Tax Revenues

Spending Category	Amount
State schools	$560,823
Local schools	$333,880
County roads	$269,211
County services	$226,607
Hospitals	$73,694
Fire districts	$44,109
Total	**$1,508,325**

[9] *Kittitas County Assessor's Report 2005 Assessed Valuations Levies and Taxes to be Collected 2006, page 4.*

Figure 1: Allocation of Annual Tax Revenues from Kittitas Valley Project



Based on the locations of the turbines and county levy rates, state schools receive the largest share of the tax revenue increase at $560,823 annually. Following state schools, local schools would receive the next largest share of revenues at $333,880 annually. Local county roads revenues would increase by $269,211 annually and the local county government budget would receive $226,607 annually. Finally, annual spending for local hospitals would increase by $73,694 and funds allocated to fire districts would increase by $44,109.

V. Alternative Uses

A final analysis issue was to assess the types of additional costs Kittitas County would likely occur with a new residential development. Our understanding is that a residential development as has been suggested as an alternative to building the wind farm, although it is unlikely that such a development would utilize all the land that is currently being considered for the wind project.

For this task, we did not attempt to estimate these costs or the amount of tax revenue that might be generated from such a development. Rather, we are listing areas of increased costs to the County based on our experiences conducting fiscal impact analyses for other jurisdictions.

With a new residential development, additional costs would be incurred for extending utilities and roads to the development, with road construction likely comprising the highest share of costs. Utility-related costs include extending

water lines, sewer, phone lines, and power lines to the new development. The utility-related costs are usually paid for by system development charges and if the charges are properly constructed, these services will be cost neutral to the County as they will be paid for entirely by the fees collected. Maintenance of items such as roads, however, will likely increase costs for the County.

Additional cost considerations for Kittitas County will be the extension of all county services to a new development. Affected service areas include fire, sheriff, hospital, libraries, and other community services funded by the County. In order to maintain current levels of service to the new county residences in these areas, additional staff may need to be hired.

If the new residential development is large enough, it may also require that additional Kittitas County government officials be hired to handle the increased workloads in all government areas. For example, the addition of a large residential development may require hiring more staff in the assessor's office or possibly additional teachers for that particular school district.

Appendix A: Modeling Process

Expenditure in the utility sectors and construction sectors affect the Washington economy *directly*, through the purchases of goods and services in this state, and *indirectly*, as those purchases, in turn, generate purchases of intermediate goods and services from other, related sectors of the economy. In addition, the direct and indirect increases in employment and income enhance overall economy purchasing power, thereby *inducing* further consumption- and investment- driven stimulus.

The economic modeling framework that best captures these direct, indirect, and induced effects is called input-output modeling. Input-output models provide an empirical representation of the economy and its inter-sectoral relationships, enabling the user to trace out the effects (economic impacts) of a change in the demand for commodities (goods and services).

Because input-output models generally are not available for state and regional economies, special data techniques have been developed to estimate the necessary empirical relationships from a combination of national technological relationships and county-level measures of economic activity. This modeling framework, called IMPLAN (for IMpact Analysis for PLANning), is the technique that ECONorthwest has applied to the estimation of impacts.[10]

The IMPLAN model reports the following economic impacts:

- Total Industrial Output (output) is the value of production by industries for a specified period of time. Output can be also thought of as the value of sales including reductions or increases in business inventories.

- Personal income consists of the wages and salaries received by households (employee compensation) and the payments received by small-business owners or self-employed individuals (proprietary income). Employee compensation includes workers' wages and salaries, as well as other benefits such as health and life insurance, and retirement payments. Proprietary income, for example, would include income received by private business owners, doctors, accountants, lawyers, etc.

[10] IMPLAN was developed by the Forest Service of the US Department of Agriculture in cooperation with the Federal Emergency Management Agency and the Bureau of Land Management of the US Department of the Interior to assist federal agencies in their land and resource management planning. Applications of IMPLAN by the US Government, public agencies and private firms span a wide range of projects, from broad, resource management strategies to individual projects, such as proposals for developing ski areas, coal mines, and transportation facilities, and harvesting timber or other resources. ECONorthwest has applied the model to a variety of public and private sector energy projects including a major US/Canada gas pipeline project and the proposed purchase of Portland General Electric by local counties.

- Other property type income (other income) in the IMPLAN model includes payments to individuals in the form of rents received on properties, royalties from contracts, dividends paid by corporations, and corporate profits earned by corporations.
- Job impacts include both full and part time employment.
- Tax revenues for various federal, state and local taxing jurisdictions.

Ideally, expenditures for the proposed wind farm would be available and specific enough to allocate to each of the 528 industry sectors contained in the IMPLAN model. In addition, the expenditures should be delineated between local and non-local providers, as purchases of goods and services from out-of-state vendors will have no economic impact on Washington employees and businesses.

In absence of this detailed information, ECONorthwest opted to use the production function data for the utility and government sectors contained in the IMPLAN modeling software. From an input-output modeling perspective, this is a standard modeling approach in the absence of detailed primary source data. Indeed, IMPLAN's production function data contains information, called regional purchase coefficients that describe the proportion of a given commodity that will be provided by Washington producers. Our previous modeling experience has shown that the data contained in the IMPLAN modeling system for the various sectors is sufficient to permit an accurate rendering of impacts.

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