

Economic Impacts of Wind Power in Kittitas County

Final Report

A Report for the

**Phoenix Economic Development
Group**

by

ECONorthwest

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The Economic Impacts of A Proposed Wind Power Plant in Kittitas County, WA

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

I. Introduction and Summary

Two different wind energy companies are currently developing plans for constructing and operating wind power turbines in Kittitas County. The energy company Zilkha Renewable Energy has proposed a project with 110 wind turbines that have the combined potential to generate approximately 165 megawatts of electricity during peak wind periods. A second company enXco is proposing building 150 additional wind turbines with a total of 225 megawatts of generation potential. These two project combined would involve the construction and operation of 260 wind turbines with a potential generating capacity of 390 megawatts of electricity.

As part of the planning process for these projects, the Phoenix Economic Development Group 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 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 of over 250 turbines will create approximately 185 full and part time jobs in Kittitas County and will increase total income to the county by over \$12 million during the construction period.
- *Wind plant operation will provide additional annual economic benefits.* The wind farm operations will require 53 additional jobs and will increase income to the county from salaries and operations expenses by over \$4 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 \$2.8 million dollars annually -- an increase of 11 percent over current property tax revenues. The majority of this increase is due to the property tax paid on the wind turbines.
- *Tax revenues to Kittitas County Government will also increase.* Tax revenues accruing directly to Kittitas County Government will be approximately \$693,000 annually. This increase results from the County's share of new property tax revenue and from increases in other taxes.

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 statistical studies that quantified the impact of wind turbines on property values. For comparison purposes, we also reviewed the literature on the impact that transmission lines have on property values.

A. Tax Assessor Interviews

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

- *Projects constructed within the last 10 years.* 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 Manufact	# of Turbines
WY	Carbon County	Carbon	Foote Creek Rim 4	2000	16.80	NEG Micon	28
CA	San Geronio Pass	Riverside	Cabazon	1999	39.75	Zond Z-750	53
CA	San Geronio 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, Minnesota—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' offices 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.

B. Literature Review

The results of the tax assessor interview show that views of wind turbines do not negatively impact property values. In addition to these 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 academic journals that only publish articles that have been subjected to a peer review process. References for the articles we reviewed are included in Appendix B of this report.

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. The hedonic study showed that house values were 94 Danish kroner (about \$17 per home in 1995 U.S. dollars) 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 was not statistically significant.

One of the likely reasons that wind turbines do not diminish property values is that not all people agree that views of wind turbine are undesirable. As reported by the tax assessors, some residents find views the wind turbines attractive. 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.

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 both Zilkha and enXco 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.

A. Construction

The construction of 260 individual wind turbines will involve a significant amount of employment and spending during the construction period. We have talked to representatives from both Zilkha and enXco 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:

- 85 full and part time local construction jobs
- 10 full and part time jobs for wind company and utility personnel to manage the plant construction phase
- \$6,400,000 in local spending on construction materials (i.e., gravel, concrete)
- \$886,000 in spending on food and lodging for non-local labor brought to Kittitas County for the construction period

Based on these and other input parameters, we estimated the impacts to the local economy for a construction period predicted to last approximately one year.

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

- **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, the impact on *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	Wages	Business Income	Personal Income	Other Income	Jobs
Direct	\$8,420,000	\$1,027,000	\$9,447,000	\$388,000	95.2
Indirect	732,000	139,000	871,000	242,000	30.3
Induced	1,050,000	225,000	1,275,000	234,000	60.0
Total	\$10,202,000	\$1,391,000	\$11,593,000	\$864,000	185.5

As shown in Table 2, the construction phase of the project will result in approximately 95 full and part time jobs. Spending from this project on labor and materials will result in an additional 90 jobs for a total of approximately 185 full and part time jobs during the construction period. Wages during this period will be \$10,202,000 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 \$1,391,000 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 \$11,593,000 in Kittitas County due to spending during the construction phase. When the income of \$864,000 from other sources is considered, the increase in income to the county totals \$12,457,000.

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

Table 3: Construction Phase Economic Impacts by Industry

Industry	Wages	Business Income	Personal Income	Other Income	Jobs
Agriculture, Forestry, and Fisheries	\$37,000	\$7,000	\$44,000	\$15,000	1.7
Construction	7,978,000	\$1,044,000	\$9,022,000	\$389,000	90.4
Manufacturing	42,000	\$4,000	\$46,000	\$16,000	1.4
Trans., Comm., & Utilities	778,000	\$34,000	\$812,000	\$57,000	9.7
Wholesale and Retail Trade	611,000	\$56,000	\$667,000	\$90,000	36.2
Finance, Insurance, & Real Estate	66,000	\$29,000	\$95,000	\$120,000	3.5
Services	618,000	\$218,000	\$836,000	\$146,000	41.2
Government	71,000	\$0	71,000	\$31,000	1.3
Total	\$10,202,000	\$1,391,000	\$11,593,000	\$864,000	185.5

Note: Totals may not match due to rounding

B. 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:

- 22 employees hired to operate and manage the wind power plants
- Spending on equipment, maintenance and materials to operate the wind turbines
- Income to property owners that rent land for the wind turbines (\$4,500 per turbine.)

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 22 full and part time jobs, and the spending on these jobs and plant equipment will create approximately 31 additional jobs in businesses that support the wind plants. The combined effect of direct and indirect spending will result in approximately 53 additional new and part time jobs in Kittitas County. Similarly, spending on these jobs will increase annual wages by \$2,728,000 and yearly business income by \$351,000. Income from other sources is estimated at \$1,188,000 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 \$4,267,000 annually.

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

Impact type	Wages	Business Income	Personal Income	Other Income	Jobs
Direct	\$2,165,000	\$216,000	\$2,381,000	\$819,000	22.0
Indirect	77,000	30,000	107,000	22,000	3.1
Induced	486,000	105,000	591,000	347,000	28.2
Total	\$2,728,000	\$351,000	\$3,079,000	\$1,188,000	53.3

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. The Real Estate and Service sectors will also see increased economic activity due to the continued operation of the wind farm.

Table 5: Annual Wind Plant Operation Impacts by Industry

Industry	Wages	Business Income	Personal Income	Other Income	Jobs
Agriculture, Forestry, and Fisheries	\$10,000	\$1,000	\$11,000	\$4,000	0.5
Construction	63,000	29,000	92,000	4,000	2.6
Manufacturing	11,000	1,000	12,000	5,000	0.4
Trans., Comm., & Utilities	2,190,000	226,000	2,416,000	27,000	22.7
Wholesale and Retail Trade	211,000	19,000	230,000	76,000	13.3
Finance, Insurance, & Real Estate	29,000	12,000	41,000	1,012,000	1.5
Services	185,000	64,000	249,000	35,000	11.8
Government	29,000	0	29,000	25,000	0.5
Total	\$2,728,000	\$351,000	\$3,079,000	\$1,188,000	53.3

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 the increases in costs or the provision of county services (i.e., fire, sheriff) that the wind power plant might require.

Based on our review of Kittitas County budgets and spending and our evaluation of the proposed wind power facility, we have estimated the potential revenue impacts for the Kittitas County. Table 6 shows the estimated increases in revenue for the major tax revenue sources.

As shown in Table 6, the primary increase in tax revenues is from property taxes on the wind turbines themselves. For this calculation, we have valued each turbine at approximately \$765,000, which is consistent with our experience in other wind projects and with the information provided to us by the wind companies involved with the Kittitas County project. The property tax rate used for the calculation is 1.35 percent for Kittitas County. Given these parameters,

for the proposed 260 turbines we estimate new property tax revenues of \$2,683,125 annually.

The development of this project will also have an effect of increasing the value of other properties due to the increase in wages and overall economic activity in Kittitas County. This results in an additional \$201,971 in property tax revenues annually due to increases in other property values.

When the property tax revenues from both sources are combined, the additional tax revenue collected within Kittitas County totals \$2,885,096 annually.¹ For comparison, property tax revenues from all sources in Kittitas County totaled \$25,223,948 for the 2001-02 budget year.² The increase in property tax revenues due to the wind farm amounts to an increase of 11 percent over these levels.

Table 6: Increases in Annual Property Tax Revenues in Kittitas County

Revenue Source	Amount
Property taxes on wind farms	\$2,683,125
Taxes from higher values on other properties	201,971
Total	\$2,885,096

A complicating factor in these revenue estimates is the recently passed Initiative 747 (I-747) in Washington State, which limits increases in tax levies to 1 percent a year. From our conversations with the Kittitas County assessor and from information provided by Washington State, it appears that most of the value of a wind turbine (\$500,000) would be considered personal property and as such would be subjected to this limit. For Kittitas County, total personal property is assessed at \$2,355.4 million. The addition of 260 windmills with a personal property value of \$500,000 each would add \$132 million to the total property value of the county - an increase of 5.5 percent. Since this increase is greater than 1 percent, it is possible that taxes in other areas would need to be reduced in order to comply with I-747. This might involve decreases in personal property tax rates and/or bond levies. It should be stressed that ECONorthwest is not an accounting firm, and the implication of I-747 is discussed here only as one possible scenario based on preliminary tax estimates. However, the tax revenue estimates provided here should be viewed with I-747 in mind, as actual

¹ Approximately 30 percent of the turbines are to be built on land managed by the Washington Department of Natural Resources rather than on private land. For these turbines, the rental fee for land will be paid to the State, which then returns these funds to schools throughout the state based on district need. At the annual rental rate of \$4,500 per turbine, this amounts to an additional \$351,000.

² *Kittitas County Assessor's Report 2001 Assessed Valuations Levies and Taxes to be Collected 2002*, page 4.

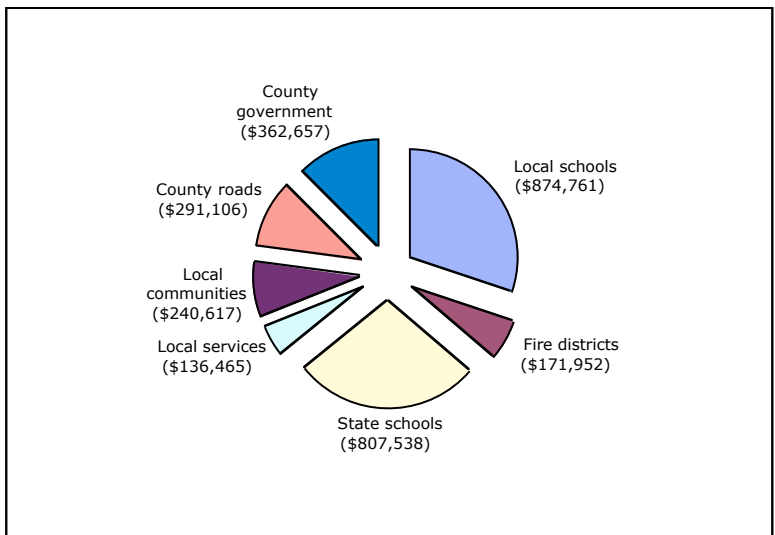
revenues may ultimately be reduced in the County in order to comply with the initiative.

Table 7 shows the likely distribution of the new tax revenues based on the spending allocations reported in the 2002 Kittitas County Budget. This information is also presented graphically in Figure 1.

Table 7: Allocation of Property Tax Revenues

Spending Category	Amount
Local schools	\$874,761
State schools	\$807,538
Fire districts	\$171,952
Local communities	\$240,617
County roads	\$291,106
County government	\$362,657
Hospitals and other local services	\$136,465
Total	\$2,885,096

Figure 1: Allocation of Property Tax Revenues



Based on current spending patterns, local schools receive the largest share of the tax revenue increase at \$874,761 annually. Following the local schools, state schools would receive the next largest share of revenues at \$807,538 annually. The local county government budget would receive \$362,657 annually, local county roads revenues would increase by

\$291,106 annually, and annual funds going to local communities from the county would increase by \$240,617. Finally, annual spending for local fire districts would increase by \$171,952 and funds allocated to hospitals and other services in the county would increase by \$136,465.

The property tax revenue estimates reflect funds that are spent in a variety of sectors, both inside and outside Kittitas County. In addition to these property

taxes, we estimated the tax revenue that will accrue to the Kittitas County Government. This was done by comparing the current tax revenues as a fraction of total economic output for Kittitas County with and without the wind farm. Using the results from our input-output model, we estimated the total increase in economic output from the proposed wind plant. Given the increase of output with the project, we estimated the increase in tax revenues assuming that tax rates remained constant. For each individual tax, the increases were generally on the order of 0.2 percent annually.

The estimated increase in annual revenue for the Kittitas County Government from these taxes is shown in Table 8. The majority of these additional tax revenues are the property taxes collected for county government and roads. Other sources include smaller taxes such as those collected for fees and services as well as revenue returned to the county by the State. Together, these tax revenues total \$693,777. Given the Kittitas County Government expenditures of \$44,312,102 planned for 2002, the additional revenue generated by the wind farm represents an increase of almost 2 percent over the budgeted amount.³

Table 8: Additional Kittitas County Government Tax Revenues

Spending Category	Amount
Property taxes - County government and roads	\$653,763
Sales and use taxes	\$7,103
All other taxes	\$2,927
Licenses and permits	\$2,094
Charges for services	\$8,509
Fines and forfeits	\$2,138
State collected taxes distributed to County	\$17,244
Total	\$693,777

³ *Kittitas County 2002 Annual Budget*, page 15.

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 will 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.⁴

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

⁴ 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.

example, would include income received by private business owners, doctors, accountants, lawyers, etc.

- 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.

VI. Appendix B: References

Colwell, Peter F. 1990. "Power Lines and Land Value." *Journal of Real Estate Research*. Volume 5(1): 117-127.

Delaney, Charles J. and Douglas Timmons. 1992. "High Voltage Power Lines: Do They Affect Residential Property Value?" *Journal of Real Estate Research*. Volume 7(2): 315-329.

Des Rosiers, Francois. 2002. "Power Lines, Visual Encumbrance and House Values: A Microspatial Approach to Impact Measurement." *Journal of Real Estate Research*. Volume 23(3): 275-301.

Hamilton, Stanley W. 1995. "Do High Voltage Electric Transmission Lines Affect Property Value?" *Land Economics*. Volume 71(4): 436-444.

Jordal-Jorgensen, J. 1995. "Social Costs of Wind Power: Partial Report of Visual Impacts and Noise from Windturbines." Institute of Local Government Studies, Copenhagen, Denmark.

Kung, Hsiang-te and Charles F. Seagle. 1992. "Impact of Power Transmission Lines on Property Values: A Case Study." *The Appraisal Journal*. Volume 64(3): 413-418. July.

Rikon, Michael. 1996. "Electromagnetic Radiation Field Property Devaluation." *The Appraisal Journal*. Volume 64(1): 87-90. January.