

Wind Energy Economics in the State of Washington

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Recently, the Kittitas County Planning Commission in Washington advised County Commissioners to impose at least a six-month moratorium on wind projects in the Kittitas Valley.¹ The concerns that led to the Commission's action are not unique to Washington. They are illustrative of growing concerns about "wind farms" in various parts of the US.²

Growing concerns about "wind farms" underscore the need for government officials at all levels to address a range of issues that are important to electric customers, taxpayers, and citizens concerned about adverse economic impact and impairment of property, scenic and other environmental values.

This analysis identifies the wind projects that have sparked concerns in the Kittitas Valley and provides information on other existing and proposed "wind farms." It then reviews several topics that are important when considering the potential role of "wind farms," including:

- Huge machines; little electricity
- High costs for electric customers
- Windfall profits for "wind farms"
- Losses rather than gains for the local and state economies
- Environmental benefits overstated
- Adverse property, scenic impacts
- Economic, environmental impacts
- Conflicting environmental objectives
- Uphill fight for "wind farm" opponents
- Cautions for landowners
- Help for local governments
- Bonneville Power's role in wind energy
- Costly "green power" programs

Huge Machines; Little Electricity

Windmills making up today's "wind farms" are often huge (Some 300+ ft. The Legislative Building in Olympia is 287 feet). However, they produce very little electricity. For example:

1. Kittitas Valley Wind Project. Zilkha Renewable Energy of Houston, TX plans to build a large "wind farm" near Ellensburg, WA.³ Key facts about the project include the following:

- Zilkha would "...install 100 to 150 wind turbines over 10,000 acres..." with total rated capacity up to 250 megawatts (MW) or 250,000 kilowatts (kW)⁴.
- If the rated capacity of the proposed "wind farm" reached 250,000 kW and produces electricity at its full "rated" capacity for 24 hours per day all year long, it would produce 2,190,000,000 kilowatt-hours (kWh) of electricity annually (i.e., 250,000 kW x 8760 hours).
- However, wind turbines produce electricity only when the wind is blowing within a certain speed range. If the turbines produced electricity at a 34% capacity factor,⁵ the total annual output of the "wind farm" would be 744,600,000 kWh (i.e., 2,190,000,000 x .34).

That may sound like a lot of electricity. However, it's equivalent to only 64/100 of 1% of the 117,135,248,000 kWh of electricity generated in Washington during 1999.⁶

Furthermore, the 744,600,000 kWh of potential annual output from the proposed 100 to 150 turbines on the "wind farm" (assuming a 34% capacity factor) would equal only:

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- 19% of the electricity produced during 2001 by the 474 MW Hermiston gas-fired combined cycle cogenerating plant (Hermiston, OR) that began service in 1996. That plant produced 3,926,730,000 kWh of electricity during 2001,⁷ operating at a 90+% capacity factor.
- 36.5% of the electricity produced during 2001 by the 262 MW Tenaska plant (Ferndale, WA) gas-fired combined cycle cogenerating plant⁸ that began service in 1994. That plant produced 2,039,071,000 kWh of electricity during 2001,⁹ also operating at a capacity factor of about 90%.
- 15% of the electricity that will be produced each year by Calpine's 630 MW gas-fired combined cycle plant at Hermiston, OR, that began commercial operations in August 2002, if that plant operates at a 90% capacity factor.

Generally, gas-fired combined-cycle generating units are "dispatchable," which means that they produce electricity when needed by electric customers, not just when the wind is blowing within the right speed range. Such plants occupy relatively few acres while Zilkha indicates that its proposed "wind farm" would stretch over some 10,000 acres.

The area identified for the "wind farm" on Zilkha's web site appears significantly larger than 10,000 acres which suggests that many landowners might be affected by the presence of the windmills but only a few of them would receive rental income.

2. Possible EnXco project. Apparently, a second wind energy developer, EnXco, is also exploring the possibilities for a "wind farm" in the Kittitas Valley but has not yet detailed its intentions. EnXco, a firm headquartered in Sickeborg, Denmark, serves in a variety of capacities in the wind industry and could be planning its own "wind farm" in the area or may be doing development work for another company.

3. Other State Wind Farms. Washington's other existing and planned "wind farms include:

- The 178.2 MW portion of FPLEnergy's Stateline Wind Energy Center in Walla Walla County. If that portion of the "wind farm" operates at a 33% capacity factor,¹⁰ it would produce 515,140,560 kWh of electricity per year (i.e., 178,200 x 8760 x .33%). That output of electricity would equal 44/100 of 1% of Washington's total 1999 electricity generation.
- The 48.1 MW Nine Canyon Wind Project under construction in Benton County. If that "wind farm" operates at a 34% capacity factor,¹¹ it would produce 143,261,040 kWh of electricity per year (i.e., 48,100 x 8760 x .34), equal to 12/100 of 1% of Washington's 1999 electricity generation.

The status of other potential "wind farms" apparently is uncertain -- as discussed in more detail under the heading of Bonneville Power's role in wind energy.

High Costs for Electric Customers

Wind industry advocates readily admit that electricity from windmills costs more than electricity from traditional energy sources; i.e., natural gas, oil, coal, hydropower, and nuclear energy. (Otherwise they would not need the extremely generous federal subsidies -- discussed below -- that are contributing to windfall profits for "wind farm" developers.)

However, wind energy advocates in the US Department of Energy (DOE) and the wind industry seem eager to avoid admitting the true costs of wind energy. In fact, the true costs for electricity from "wind farms" -- which costs end up in electric customers' monthly bills -- include:

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- a. The price paid by the electric utility to the “wind farm” owner for the electricity.
- b. The cost of providing “firming” or “balancing” services for the intermittent electricity from the wind turbines. Wind turbines produce electricity only when wind speed is within certain limits – and then on a variable (sometimes volatile) basis. Other generating units must be kept immediately available to back up the wind turbines so that customers’ electricity requirements are served and to keep the grid system in balance. This backup role may be served by hydropower, but often by combustion turbines, combined-cycle or steam electric units powered by coal, oil or natural gas that are running at less than peak efficiency or in “spinning reserve.” This backup service costs money and that cost is a real part of the true cost of wind energy.
- c. The capital and operating cost of transmitting the electricity from the point where it is purchased from the “wind farm” owner to the electric distribution system. Such transmission and associated grid management costs may be higher for electricity from intermittent, volatile sources such as wind than for electricity from stable, dispatchable generating units.
- d. The normal capital and operating costs of a utility’s electric distribution system (e.g., substations, wires, transformers, meter reading, billing and other customer service costs).

If the total costs of electricity from wind were only \$0.02 per kWh (a low estimate) more than electricity from other sources, the added annual cost imposed on electric customers in Washington for a 250 MW “wind farm,” such as that being proposed by Zilkha, operating at a 34% capacity factor, would be \$14,892,000 per year (i.e., 744,600,000 x \$.02). Such extra costs for electric customers will increase if still more “wind farms” were added in Washington.

“Windfalls” for “Wind Farm” developers

The above costs are NOT the full costs of electricity from “wind energy.” The federal government now provides two extremely generous tax shelters for “wind farm” developers. These subsidies shift costs from wind energy developers to remaining taxpayers.

- a. One extremely generous subsidy available to corporations with income to shelter is 5-year double declining balance accelerated depreciation available for facilities using wind to produce electricity. “Wind farm” owners can recover their capital investment in 5 to 6 years with over half recovered in the first 2 years or less. Specifically, if the capital cost of the 250 megawatt “wind farm” being considered by Zilkha were \$250,000,000, the recovery through depreciation would be as follows (see IRS Publication 946):

<u>Year</u>	<u>% of investment Recovered</u>	<u>Amount Recovered</u>
First	20%	\$ 50,000,000
Second	32%	\$ 80,000,000
Third	19.2%	\$ 48,000,000
Fourth	11.52%	\$ 28,800,000
Fifth	11.52%	\$ 28,800,000
Sixth	<u>5.76%</u>	<u>\$ 14,400,000</u>
Total	100%	\$ 250,000,000

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- b. The second generous federal subsidy available to “wind farm” owners is the Production Tax Credit of \$0.018 per kWh of electricity generated during the first 10 years of a wind project’s life. Zilkha’s 250 MW “wind farm” planned for Kittitas Valley would receive a tax credit of \$13,402,800 per year if the turbines produce at an average 34% capacity factor (i.e., 250,000 kW x 8760 hrs. x .34 x \$0.018).

Organizations owning “wind farms” must have substantial taxable income to take advantage of these two federal tax shelters. That is one reason why “wind farm” developers often sell off their projects to larger companies early in the life of their projects. For example, Entergy Corporation purchased a majority interest in the Top of Iowa “wind farm” that was developed by Zilkha Renewable Energy and another firm¹². However, Zilkha apparently has retained ownership of many of the “wind farms” the company has developed, thus suggesting that the firm and/or its owners have sufficient, otherwise taxable income to profit from the federal income tax shelters.

In addition to the generous federal tax shelters, the State of Washington provides at least two significant subsidies to “wind farm” developers and/or owners:

- An exemption from the state’s sales and use tax for “...machinery and equipment used directly in generating electricity using...[and]...sales of or charges made for labor and services rendered in respect to installing such machinery and equipment...” using wind energy.
- A mandate that all electric utilities (public and investor owned) offer their customers an option to purchase electricity generated from renewable sources. In effect, this requirement forces utilities to arrange for purchases of energy from “renewable” sources even if the electricity costs more than traditional sources and/or the full cost of the purchases cannot be recovered from utilities’ customers who agree to pay a premium price to exercise the option.

In fact, all federal and state subsidies shift costs and/or tax burden from “wind farm” developers and owners to taxpayers who must continue to pay taxes and/or to electric customers. The added burden and costs are then hidden in tax bills or monthly electric bills.

All the federal and state subsidies for “wind farm” developers and owners are *in addition to* the revenue received by the “wind farm” owner for the sale of electricity. For example, if the 250 MW “wind farm” being planned for Kittitas Valley were to produce at a 34% capacity factor (i.e., 744,600,000 kWh) and the electricity were sold to an electric utility for \$0.03 per kWh, the “wind farm” owner would receive \$22,338,000 each year for that electricity (i.e., 744,600,000 x \$0.03).

Losses rather than gains for local and state economies

“Wind farms” are often presented as beneficial to states or regions where they are located because of additional jobs in the area and additional income for the landowners who lease land for the windmills, substations, cables, meteorological facilities, support facilities and transmission lines. However:

- a. The amount paid landowners for land rental or easements may not be significant. Amounts would depend on negotiations among the parties. Research indicates that landowners in Wisconsin were offered as much as \$5,000 to \$10,000 per turbine. Assuming 150 turbines at \$5,000 each, landowners would receive a total of \$750,000 per year.

If landowners accepted lower payments, say \$2,000 per turbine, annual income would total only \$300,000.

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- b. The number of lasting jobs may be quite small. Bonneville Power Administration has indicated that the proposed 150 MW Maiden Wind Project in Benton County would require an average of 150 temporary employees during construction with wages of \$15 - \$25 per hour and, when in operation, “up to 15” full time employees for operations and maintenance with wages of \$10 to \$25 per hour¹³. Assuming construction lasted 6 months and wages averaged \$20 per hour, construction wages would total \$3,120,000. (Some of the employees would come from the local area.) Assuming 15 full-time employees after construction at \$20 per hour, the annual wages would total \$624,000 (i.e., 2080 hrs. x \$20 x 15)¹⁴.
- c. The brochure on the Kittitas Valley Project distributed by Zilkha indicates that only 6 to 8 permanent employees would be required. If so, the annual wages would total about \$332,800 (i.e., 2080 hrs x \$20 x 8).
- c. The rental and easement payments received by landowners and wages earned by permanent workers would be dwarfed by the higher cost for the electricity that would be paid by electricity consumers. Specifically:
 - 1) If the electricity from the proposed Kittitas Valley Wind Project, for example, cost only \$0.02 per kWh more than electricity from traditional sources, the added annual burden on electric customers would be \$14,892,000 per year (i.e., 744,600,000 kWh x \$0.02)
 - 2) Fifteen permanent jobs might produce \$624,000 per year, or 4.2% of the added burden on electric customers. Eight permanent jobs might produce \$332,800 or 2.2% of the added burden on electric customers.
 - 3) Land rental payments for the windmills and associate facilities might provide an additional \$750,000 per year to local landowners if each turbine produced \$5,000 annual payments – which is about 5% of the added burden on electric customers. If landowners agreed to only \$2,000, the annual total of \$300,000 would be about 2% of the added burden on electric customers.
- d. Owners of the “wind farm” apparently would pay significant amounts of property tax but apparently county tax revenues are limited to a 1% increase per year¹⁵. Therefore, other property owners in the county might, temporarily, receive a small tax reduction. The real impacts on landowners would be difficult to predict because of potential adverse impacts on property values discussed later.

Calculations could be done for other existing and proposed wind farms but would produce a similar result. The net economic impact would almost certainly be an outflow of wealth from Washington for the benefit of out-of-state or foreign wind energy developers and owners.

From the perspective of Washington’s electric customers who would bear the higher costs of electricity produced from wind turbines, it might be far better if a small (though distasteful) tax were added to electric bills and used to pay landowners to AVOID hosting the windmills!

Environmental benefits of “wind farms” often overstated by developers

“Wind farm” developers often claim that the electricity generated by the wind turbines will displace on a kWh for kWh basis electricity that would be generated by fossil-fueled generating units and any associated emissions. Such claims are generally exaggerated. For example, they do not take into account the facts that:

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- In Washington, some of the electricity “displaced” may be produced from hydropower (which supplied 84% of Washington’s electric generation in 1999).
- Any fossil-fueled generating unit that is kept available to back up the intermittent electricity from the wind farm will be giving off emissions while it is running at less than peak efficiency or in “spinning reserve” mode.

Neither do they take into account the fact that other alternatives for reducing emissions may be far more cost-effective.

Adverse Property, Scenic, Economic, Environmental and Related Impacts

Except when placed in remote areas, proposed “wind farms” are facing growing citizen opposition in Europe, Australia and in nearly every state in the US where “wind farms” are being proposed. Opposition seems particularly strong when attempts are made to install the large structures in areas where there are existing or planned homes or in scenic areas and where many property owners are affected but only a few receive payments from “wind farm” owners.

Opposition is due to a variety of concerns including scenic and property value impairment, noise, bird kills, “flicker” effect of spinning blades after sunrise and before sunset, potential safety hazards from blade and ice throws, interference with telecommunications, and higher costs of electricity. Apparently some citizens of the Kittitas Valley are also concerned about potential adverse impact on tourism. The Ellensberg web site¹⁶ makes clear that tourism is important and Zilkha’s web site suggests the area proposed for the Kittitas Valley Project is one of considerable natural beauty.

Preparation of an Environmental Impact Statement (EIS) on the proposed Kittitas Valley project undoubtedly would require consideration of many of these matters. However, citizens and government officials should recognize that the potential impairment of property values, scenery and tourism are inherently difficult to evaluate in advance. Often the impact of a large development such as a “wind farm” on property values does not become clear until after the project is in place and neighbors try to sell their homes and property. Similarly, the lasting impact on tourism or on the willingness of people to live, invest, or work in the area does not become known until after the project is in place, and after the curiosity value or “novelty” of a project wears off.

Assessing adverse scenic impact of “wind farms” is considered difficult because views on the matter are often considered to be “in the eye of the beholder.” However, there is no doubt that some people consider the adverse scenic impact of windmills to be significant. For example, one Oregon resident was recently quoted in the Tri-City Herald, after driving by the Stateline Wind Energy Center, as saying “Could anyone think it’s anything other than Ugly?” and “How is it different than wanting to put up a big ugly billboard?”¹⁷

Difficulty in quantifying adverse impacts; incoherent government efforts

The difficulty in quantifying scenic, property and certain other values is illustrated in other cases. For example, environmental advocates have charged that haze that is believed to be due to emissions from burning of fossil fuels or from dust from roads, mining and other activities is detrimental to scenic and other environmental values and has an adverse economic impact. A variety of approaches, including a technique called “contingent valuation,” have been proposed as ways to quantify the adverse visual and related economic impacts, but none of the approaches have been fully satisfying.

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While the value of the adverse visual impacts have not been quantified objectively, substantial efforts, backed by federal legislation and EPA regulations, are underway to find measures that can be taken to reduce the unwanted haze. In fact, a massive effort by the “Western Regional Air Partnership” (WRAP)¹⁸, which includes representatives of most western states (including Washington), tribes, and federal agencies is considering measures to force additional use of renewable energy sources, particularly wind energy.

Ironically, the participants appear to be attempting to address one visual issue, haze, while ignoring the visual impact of tens of thousands of windmills and many miles of transmission lines that would be needed to achieve the group’s goals of getting 20% of electricity generation from “renewable” energy sources by 2018.¹⁹

“Wind farm” opponents are at a disadvantage

Electricity customers and taxpayers concerned about extra costs, neighbors of proposed “wind farms” concerned about impairment of property values, or citizens concerned about scenic impairment or other adverse environmental and safety impacts have a significant disadvantage when dealing with proposed “wind farms.”

The U.S. Department of Energy, the National Renewable Energy Laboratory, and the wind energy industry have been highly successful, despite the facts, in presenting wind energy as an environmentally benign energy source that could make a significant contribution in supplying the nation’s electricity. In addition to the generous tax shelters and other subsidies, they have created a popular wisdom in the public, media, US Congress and state governments that wind energy is a “win-win” proposition. Furthermore, local governments that are faced with proposals from aggressive wind energy developers are often not equipped to deal with “wind farm” permit applications.

Therefore, electric customers, taxpayers and other citizens should recognize that they will be facing strong opponents, often financed with tax dollars, when they attempt to oppose “wind farms” affecting their property and scenic values or economic wellbeing. Citizens opposing the planned projects might be forgiven for wondering where their government representatives were when these lucrative arrangements for “wind farm” developers were made!

Cautions for landowners approached by “wind farm” developers

Landowners who lease their land for the windmills would receive added income but they may want to be very cautious about the arrangement they make with developers. For example:

- a. What are reasonable annual payments for use of the land needed for windmills and associated facilities (e.g., substations, cables, meteorological stations, support facilities)? Apparently, developers offer \$2,000 or \$2,500 per MW of turbine capacity. However, research suggests that developers in Wisconsin have offered as much as \$5,000 to \$10,000 annually per MW of capacity.
- b. What other payments are reasonable? For example, should owners of land that must be crossed by transmission lines or cables be compensated on an annual basis for such uses or easements? What is an appropriate one time or annual payment for a noise easement?
- c. Should local governments be paid to cover any extra costs for services (roads, etc.)?
- d. Should landowners receive fixed annual payments or payments based on electricity produced?

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- e. Should payments for the life of a lease or easement be paid “up front,” placed in escrow, or paid annually?
- f. What arrangements should be made for removal of the windmills and restoration of land when they no longer operate?
- g. What are the limits of the liabilities of the organizations that develop and/or own the windmills?
- h. Who really employs the people who approach landowners and local government officials?

The last five questions may be particularly important because:

1. “Wind farm” developers often sell off their projects during the development phase or shortly thereafter. Landowners and local government officials should recognize that they might end up dealing with a “wind farm” owner that is not the initial developer.
2. The developers and/or owners of wind farms may be organized in a way that limits their liability. The Limited Liability Corporation (LLC) seems especially popular with the wind industry.
3. The economics, including longer-term costs, of wind energy are far from certain. For example, calculations of the kWh costs of electricity from wind turbines that are cited by DOE, DOE laboratories, and the wind industry are often based on an assumption of a 30-year lifetime for the wind turbines. However, no one has sufficient experience with large wind turbines to know how long they will last or what their maintenance, repair and replacement costs, or the extent of performance loss will be as turbines age. Economics may dictate abandonment of individual windmills or entire “wind farms” before the end of land rental contracts or current estimates of the useful life of the turbines.
4. “Wind farm” owners may have a strong incentive to sell off or abandon their projects once tax benefits have been captured (5-6 years for accelerated depreciation; 10 years for production tax credits), turbine performance deteriorates, and/or operating and maintenance costs escalate.

Perhaps landowners should insist upon payments in advance, or that the full amounts be placed in escrow or covered by cash bonds.

Help for local governments: Model Zoning Ordinance

Unfortunately, it appears that very few local governments have adopted ordinances that prescribe proper conditions for siting of “wind farms.” All too often, local government bodies do not have the expertise or resources to deal with proposed “wind farms” and seem overwhelmed by aggressive, well financed “wind farm” developers. Ideally, ordinances addressing the complex environmental and safety issues and providing specific standards for “wind farms” should be in place before citizens and officials are faced with proposals from wind energy developers.

Local governments that have not yet adopted ordinances may want to consider a model "Commercial Wind Energy & Wind Access Model Ordinance" prepared in January 2002 by Catharine Lawton (CMLawton3@aol.com), a member of the Planning Commission of the Town of Barton, WI. Apparently, the ordinance was developed in connection with her work with a Wisconsin Public Service Commission's Subcommittee known as "Guidelines and Model Ordinance Ad Hoc Subcommittee of the Wisconsin Wind Power Siting Collaborative."

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Bonneville Power's role in wind energy

Actions by the Bonneville Power Authority (BPA) undoubtedly will be important in determining the nature of "wind farm" development in the Pacific Northwest in terms of (a) the commitments to purchase electricity from additional "wind farms," (b) the impacts of intermittent electricity from "wind farms" on electric grids, and (c) the true costs of electricity from wind energy.

1. Potential BPA Purchases from additional "wind farms." BPA has been active in promoting wind energy for several years, including purchases of electricity from "wind farms" in Oregon and Wyoming. BPA mounted a very aggressive effort in February 2001 to sign up 1,000 MW of new wind power²⁰. In March 2001, BPA issued a formal request for proposals along with draft "Predevelopment" and "Power Purchase" agreements. In May 2001, BPA announced that it was working with Washington Winds Inc. to develop a 150 MW "wind farm" in Benton and Yakima Counties²¹.

On June 28, 2001, the Secretary of Energy announced that BPA has selected seven "wind farm" proposals for negotiation of "Predevelopment" agreements, including five additional "wind farms" in Washington²² and two in Oregon. In December 2001, DOE Secretary Abraham announced that it would purchase 34% of the output of FPLEnergy's Stateline "wind farm" located on both sides of the Oregon-Washington border near Walla Walla, an amount roughly equal to BPA's earlier purchases from Oregon and Wyoming "wind farms."

BPA's aggressive actions to sign up "wind farms" appeared to be driven by the 2000-2001 drought conditions in the northwest (sharply reduced hydropower production), high electricity prices and, perhaps, pressure from DOE headquarters in Washington to promote wind energy.

As excitement in the wind industry about potential BPA purchases grew, BPA apparently began to worry about the aggressive actions of "wind farm" developers. On September 20, 2001, BPA issued a press release warning that "Throughout eastern Oregon and Washington, wind power developers, lawyers and speculators are pressing landowners to sign leases for rights to wind generation. Landowners need to learn quickly how to evaluate and secure the value of their wind resource."

Meanwhile, the electricity situation in the Pacific Northwest changed dramatically as drought conditions lessened, significant new gas-fired generating capacity was brought on line, and wholesale electricity prices dropped sharply. A BPA spokesman recently stated that "Wind power hasn't been economical for the past six months, since power prices in the region have fallen after the incredible spikes of 2000-2001." He also stated that "Of the wind power that the agency has bought, reliability has been 'spotty,' with an availability of wind power in the range of 20-25percent, far below the 30-35 percent availability the industry has touted. What's more, wind farms generally need generating support from other – often fossil – sources, and are not useful in supplying peaking power."²³

Earlier this year, BPA began facing severe financial problems and seeking a way to reduce costs. On July 2, 2002, the BPA Administrator announced plans to share information about financial problems and seek input from citizens and officials throughout the areas BPA serves.

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As a part of its campaign, BPA released information on costs of its “renewables” program for a “Financial Choices Workshop” planned for September 17, 2002.²⁴ The document outlines two alternatives but makes clear that neither alternative would produce enough revenue to cover the multi-million dollar program BPA renewables program (including the cost of purchases of electricity from “wind farms”). In fact, four “wind farms” totaling 430 MW on the BPA “short list” announced by the DOE Secretary are omitted in both plans. The 150 MW Maiden Wind Project is included in the “Current Level” alternative but dropped in the “Reduced Level” alternative.

Both program alternatives result in significant losses (expected revenues do not cover costs), but losses are somewhat less in the “Reduced Level” program.

Recent news stories indicate that some utilities in the Northwest, as well as BPA itself, are concerned about the high cost of BPA’s renewables program.²⁵ Furthermore, as it prepares to develop its Fifth Power Plan to be published in early 2003, the Northwest Power Planning Council has identified a number of issues for comment. One issue concerns the role of BPA in future “resource development” (i.e., procurement of electricity for BPA’s wholesale customers.²⁶

2. Integration of Electricity from Wind Energy in Electric Grid and Associated Costs. As indicated earlier, part of the true costs of wind energy are costs (a) associated with providing backup generation because the electricity output from wind energy and (b) imposed on transmission systems and grid management – with both types of costs due to the intermittent and volatile nature of the electrical output from “wind farms.”

Until July 2002, BPA has imposed an extra charge of \$100 per MWh (or \$0.10 per kWh) on operators of electric generators – including wind generators – that failed to deliver electricity at the time it was scheduled. Under strong pressure from the wind industry and DOE, BPA has eliminated that charge for wind generators. However, wind generators will still be required to pay the cost of the power provided by BPA to make up the difference between the schedule and actual generation²⁷.

It is important to recognize that none of the extra costs associated with wind energy, including the cost of backup generation, transmission and grid management “go away.” Any of those costs not borne by “wind farm” owners are shifted to electric consumers.

To its credit, BPA is devoting resources to efforts to address the problems, burdens and costs associated with integrating volatile and intermittent “wind farm” electricity into the electric grid. Specifically, BPA is providing a significant share (\$227,000) of the funds to support a Utility Wind Interest Group (UWIG) effort to determine the impacts of electricity from “wind farms” on electric grids²⁸. This study, a related study by Electrotek for the Electric Reliability Council of Texas (ERCOT), and a BPA funded wind integration study by Eric Hirst should be helpful in both understanding the impacts and the additional costs due to electricity produced by wind energy.

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Costly “Green Power” Programs

All electric utilities in Washington with 25,000 or more metered customers are now required to provide customers at least one option to purchase power generated from renewable sources. If “green power” programs worked according to theory, a significant portion of the higher costs of electricity from wind and other renewable sources might be borne voluntarily by electric customers who choose to pay extra for so-called “green energy” programs. However, the theory seems not to be working. A recent study by a non-profit group, Renewable Northwest Project²⁹, demonstrated that:

- Less than 2% of electric customers in the whole Northwest signed up to pay the extra cost.
- The electricity for which the customers signed up is only a tiny share of the total electricity sold in the region covered by the report.

Unfortunately for taxpayers and for electric customers who ultimately bear all the cost incurred by their electric utilities:

- “Green power” programs are expensive to administer and the revenue collected seldom if ever pays the full costs (i.e., the higher cost of the “green” electricity and costs of administering the program), so costs not recovered are passed on to other electric customers.
- Emissions that are avoided are truly insignificant and less than often claimed because of the overstatement of environmental benefits from wind energy described earlier in this analysis.
- The cost of premium prices paid by government entities for “green power” is passed on to taxpayers.

Low participation rates are probably due to (a) reluctance of most customers to pay more than necessary for electricity, (b) customer realization that any beneficial environmental impact would be tiny, at best, and (c) citizen realization that utilities have undertaken the programs as a way to appear environmentally friendly and/or because they have been forced to do so.

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* This analysis is provided as a public service and without charge by Glenn R. Schleede, Energy Market & Policy Analysis, Inc. PO Box 3875, Reston, VA 20195-1875; Phone: 703 709-2213; Email: EMPAInc@aol.com. Schleede is semi-retired after spending more than 30 years on energy matters in the federal government and private sector. He now spends part of his time on self-financed analysis and writing about:

- a. Government policies, programs and regulations that are detrimental to the interests of consumers or taxpayers.
- b. Government or private programs and projects that are presented to the public, media, Congress and other government officials in a false or misleading way.

The views presented in this analysis are provided in Schleede’s role as a citizen, consumer and taxpayer and are not on behalf of any client or other interest.

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Notes:

- 1) *Electricity Daily*, “Wash. County Spins Around on Wind,” September 5, 2002, p.1
- 2) States where strong citizen opposition to proposed “wind farms” has emerged include Maine, Massachusetts, New York, Pennsylvania, Michigan, Illinois, Wisconsin, Nevada and California.
- 3) Zilkha Renewable Energy web site, “What We’re Doing,” September 17, 2002: <http://www.zilkha.com/whatweredoing.asp>.
- 4) Ibid.
- 5) The Northwest Power Planning Council assumes that most wind turbines in Washington and Oregon will have capacity factors of 33% or 34%. A generating unit’s capacity factor is the actual kWh of electricity produced during a year divided by the total rated capacity in kW times 8760 hours per year.
- 6) Data Source: US Energy Information Administration (EIA), State Electricity Profiles: Washington, Table 1. Data for 1999 were used instead of 2000 because 2000 was so abnormal due to drought and low hydro availability. *Final* 2001 statewide data are not yet available for 2001 from EIA.
- 7) US EIA, Form 906B Data Base, 2001.
- 8) <http://www.tenaska.com/Projects/Ferndale/ferndale.htm>.
- 9) US EIA, Form 906B Data Base, 2001.
- 10) percentage assumed by the Northwest Power Planning Council.
- 11) Ibid
- 12) American Wind Energy Association, *Wind Energy Weekly*, January 18, 2002.
- 13) Bonneville Power Administration, draft Environmental Impact Statement for proposed Maiden Wind Project, paragraph 3.11.4.2 and 3.11.4.3. http://www.efw.bpa.gov/portal/Organizations/Government/Federal/Dept_of_Energy/BPA/Environment/NEPA/MaidenWindFarm/MWF_TOC.htm.
- 14) FPLEnergy estimated a similar number of employees for the much larger (450 MW) project originally planned for the Stalene Wind Energy Center. <http://www.fplenergy.com/news/2001/contents/00154.shtml>.
- 15) Zilkha web site, “What We’re Doing,” September 17, 2002: <http://www.zilkha.com/whatweredoing.asp>.
- 16) <http://www.ellensburg.ws/>
- 17) FPLEnergy, Op. Cit.
- 18) Information can be found at www.wrapair.com.
- 19) WRAP documents do not appear to justify the heroic assumption that the cost of electricity from “renewable” sources will be reduced by some 30% during the next 15 years. While unclear, WARP analyses do not appear to take into account the costs of either added transmission lines that would be needed or the higher costs of transmission and grid management associated with large amounts of electricity from intermittent wind sources.
- 20) Bonneville Power Administration (BPA) press release, “BPA solicits new wind power projects,” February 22, 2001.
- 21) BPA, “Wind Farm Blows into Mid-Columbia,” May 4, 2001.
- 22) Two 150 MW “wind farms” in Klickitat county and one 100 MW “wind farm” in Columbia County proposed by SeaWest Windpower, an 80 MW project in Klickitat County proposed by Cielo Wind Power, a 150 MW project in Benton County proposed by Pacific Winds (Washington Winds), and two projects in Oregon.
- 23) *The Electricity Daily*, September 17, 2002, p. 1.
- 24) http://www.bpa.gov/Power/PL/FinancialChoices/09-17-2002_Workshop_Handout2.pdf.
- 25) An article by Chris Mulick in the Tri-City Herald on May 28, 2002, indicates that some utility managers want BPA to scale back on its high-cost investments in renewables and quotes the manager of the Franklin County Public Utility District as stating that “Given the rates, our stomachs are kind of full of expensive renewable resources.” Also, a BPA spokesman has expressed concerns about the high cost of wind energy in *The Electricity Daily*.
- 26) Northwest Power Planning Council, Issues for the Fifth Power Plan, February 6, 2002, pp. 20-22. <http://www.nwppc.org/library/2002/2002-1.pdf>
- 27) BPA Press Release, “Wind farms get a boost from BPA,” July 25, 2002.
- 28) Electrotek Concepts, “A proposal for characterizing the Impacts of Significant Wind Generation Facilities on Bulk Power System Operations Planning,” January 2000.
- 29) http://www.rnp.org/htmls/Powerful%20Choices%203_web.pdf.