Wind Energy Economics in West Virginia

A description of the environmental, scenic and property value implications and an analysis of the economic benefits and costs associated with existing and proposed "wind farms" in West Virginia

Prepared for the citizens and officials of West Virginia

by

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– Executive Summary –

West Virginia already has one "wind farm" in operation, another has been approved and a third is awaiting approval. Such "wind farms" have far-reaching implications for the people of West Virginia – and other states where they are being considered.

The description of key environmental, scenic and property value implications and the analysis of economic benefits and costs associated with existing and proposed "wind farms" in West Virginia in the body of this report are provided to help increase public, media and official understanding of key issues.

Important conclusions include the following:

- The huge machines produce very little electricity and that electricity is of less value than electricity produced by reliable generating plants.
- "Wind farms" must be backed up by dispatchable generating units and impose extra costs and burden on transmission and electric system management, adding to their true costs.
- "Wind farm" advocates generally understate the true costs of the electricity they produce and overstate both their environmental benefits and economic benefits to states and localities.
- In early years, the value of federal and state subsidies for "wind farms" substantially exceed the income that "wind farm" owners will receive for the electricity they produce.

Special attention should be given to the summary of economic benefits and costs on page 16 of the analysis. Not all factors can be priced precisely but the bottom lines are clear:

- Anyone who believes that "wind farms" produce significant economic benefits for *West Virginia* simply has not considered all the factors that must be taken into account.
- The truly significant economic benefits flow to organizations elsewhere; i.e., to the "wind farm" owner and to the suppliers of the wind turbines and other components – all of whom are located in other states or other countries.

The analysis demonstrates that the real motivation for construction of "wind farms" in the US is the value derived from generous federal, state and local tax benefits and other subsidies – not environmental benefits. "Wind farms" are not environmentally benign.

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Wind Energy Economics in West Virginia

One "wind farm" is already operating in West Virginia, the Public Service Commission has approved another, and a third is awaiting PSC approval. Wind farm advocates claim that wind energy is good for the environment and can provide significant economic benefits to the people of West Virginia.

Meanwhile, opposition to "wind farms" has grown in many areas of the US and Europe, as more people are learning that environmental and economic benefits of wind energy are often overstated, and costs to consumers and taxpayers, and adverse impacts on environmental, ecological, scenic and property values are often understated.

To help shed light on key issues, this paper focuses on recent and pending "wind farm" developments in West Virginia. Among seldom recognized facts that are explained are the following:

- The huge machines produce very little electricity.
- Electricity from wind turbines is unreliable, must be backed up by reliable generating units, and imposes extra costs on transmission and grid management.
- Wind energy advocates understate the true costs of electricity from wind energy.
- Claims of environmental benefits are often exaggerated.
- Adverse impacts on environmental, scenic and property values are often overlooked.
- "Wind farm" owners receive large profits due to federal and state subsidies that shift costs from "wind farm" owners to taxpayers and consumers.
- The potential economic benefits to West Virginia are very limited.
- Actions are needed to protect the interests of citizens, consumers and taxpayers when "wind farms" are considered.

Existing and Proposed "Wind Farms" in West Virginia

One "wind farm" is operating in West Virginia. A Certificate has already been issued for a second "wind farm" and an application is pending before the state Public Service Commission for a third project. The application for a fourth project, Dominion Mt. Storm, apparently has been withdrawn.

The three projects are summarized[1] in the following table, along with estimates of the annual electricity production (in kilowatt-hours – kWh), assuming that they operate at a 30% capacity factor.[2] All projects are to be in the Tucker-Grant-Preston County area on high mountain ridges (3,000 ft. or higher).

Existing and Planned "Wind Farms" in West Virginia

Owner or Developer	Status	Site area[3]	No. of turbines	Rated capacity of each turbine (kW)	Total Capacity in kilowatts (kW)	Est. Annual Product. at 30% capacity factor – in kWh
FPLEnergy's Mountain-eer Energy Center	Operating	4,400 acres[4]	44	1,500	66,000	173,448,000[5]
Mt. Storm Wind Force	PSC cert. 8/29/02	20 sq. miles[6]	166	1,500	249,000	654,372,000
NedPower	Awaiting PSC cert.	8,000 acres[7]	200	1,500	300,000	788,400,000
Total			410		615,000	1,616,220,000

Benefits Claimed by "Wind Farm" Developers

The owners and/or developers of the projects claim that the "wind farms" will produce clean electricity, offset emissions associated with electricity produced by generating plants using fossil-fuels, and provide economic benefits to West Virginia and the areas where the projects are located. The claimed economic benefits are jobs, tax revenue, and rental payments to owners of the land where the windmills and associated cabling and facilities are located. Each of these claims is evaluated in the pages that follow.

Electricity from the WV "Wind Farms" would be Exported and Sold at Negotiated Rates.

The "wind farm" owners or developers have indicated that their projects will be "Exempt Wholesale Generators" (EWGs) and they expect the Federal Energy Regulatory Commission (FERC) to approve negotiated rates for the sale of their electricity output. They have indicated that electricity would be sold in surrounding states[8] and, apparently, not in West Virginia.[9]

Since the true costs of electricity from wind are higher than the cost of electricity from other sources, exporting the wind-generated electricity will mean that electric customers in other states – not the customers in West Virginia – will bear the higher costs.

Exporting electricity is not unusual for West Virginia. During 2000, West Virginians used only about 30% of the electricity produced in the state.[10]

The huge machines produce very little electricity

The 410 existing and proposed turbines are huge machines, ranging in height from about 300 feet to a potential 465 feet. For comparison, the State Capitol in Charleston is 292 feet, the US Capitol in Washington is 300 feet, and the Statue of Liberty is 157 feet.

1. **FPLEnergy's Mountaineer Energy Center (Backbone Mountain).**

   If FPLEnergy's recently completed 66-megawatt (MW) "wind farm," with its 44 wind turbines spread over 4,400 acres, achieves an annual 30% capacity factor,[11] it will produce 173,448,000 kWh of electricity each year (i.e., 66,000 kW x 8760 hours x .30). That sounds like a lot of electricity but, in fact, it is equal to:

   - 19/100 of 1% of the 92,783,000,000 kWh of electricity produced in West Virginia during 2000.
   - 1.5% of the 11,595,559,000 kWh of electricity produced during 2000 by Dominion Virginia Power's nearby Mt. Storm coal-fired generating plant.
   - 5.66% of the 3,066,000,000 kWh that would be produced annually by a new 500 MW (500,000 kW) gas-fired combined-cycle generating unit in base-load service and operating at a relatively modest 70% capacity factor. Many such generating units – which occupy only a few acres – are being built around the US.[12] The total capital cost of such a plant would be about $268 million, assuming a cost of about $536,000 per MW.[13]

2. **Potential output of all three "wind farms."**

   If all three "wind farms," including all the 410 wind turbines (that would be spread over 30 to 40 square miles) that are summarized in the above table achieve a 30% capacity factor,

they would produce 1,616,220,000 kWh of electricity per year. Again, this may sound like a lot of electricity but, in fact, it would be equal to:

- 1.7% of the electricity produced in West Virginia during 2000.
- 39/100 of 1% of the electricity consumed in the 5 nearby states (MD, VA, DE, NJ, OH) and District of Columbia that import electricity, in part from West Virginia. Electric utility sales during 2000 in those states totaled 414,455,004,000 kWh, with about 20% imported.[14]
- 13.9% of the 11,595,999,000 kWh of electricity produced during 2000 by Dominion Virginia Power's nearby Mt. Storm coal-fired generating unit.[15]

One new 265 MW (265,000 kW) gas-fired combined-cycle generating plant occupying only a few acres and operating at a 70% capacity factor would produce slightly more electricity – 1,624,980,000 kWh – than the output calculated above for all three "wind farms" (i.e., 1,615,220,000 kWh). Such a plant would have very low emissions.

Electricity from wind has less real value than electricity from reliable ("dispatchable") generating units.

Electricity cannot be stored in any appreciable amounts. Instead, it must be produced as it is demanded (e.g., when someone turns on a light, television or air conditioner in a home). The real "value" of a kWh of electricity varies widely, depending on when it is generated, where it is generated, and its reliability.

1. **Low wind energy value and reliability.** Electricity from wind turbines is low in value compared to electricity from traditional energy sources because electricity from wind is:
   - **Intermittent** – i.e., available only when the wind is blowing within the right speed range. No electricity is produced when the speed is below the minimum of the range or above the maximum. For example, the NEG Micon 1.5 MW turbines used in FPLEnergy's 66 MW Mountaineer Energy Center apparently begin producing electricity when the wind reaches about 3 meters per sec or 8.9 miles per hour, achieve rated capacity at about 15 m/s or 33.6 mph, and cut out at 25 m/s or 55.9 mph.[16]
   - **Highly variable or volatile** – Electricity output varies widely as wind speed changes. For a 300 MW (300,000 kW) "wind farm," the amount of electricity would vary from 0 to 300,000 kWh and would fluctuate from minute to minute within that range.
   - **Unpredictable** – The availability of the electricity at any moment cannot be predicted accurately. It could be predicted accurately only to the extent that momentary wind speeds at turbine locations could be predicted accurately.
   - **Largely uncontrollable** – The electricity output from wind turbines is largely subject to wind conditions, rather than being "controllable" by electric system dispatchers.
   - **Counter-cyclical with electricity demand**. Wind tends to be strongest during winter months and at night – which are periods when the demand for electricity in the region tends to be lowest.
2. **Contrast with "dispatchable" generating units.** Because electricity must be produced as it is demanded by users of electricity, most generating units must be immediately available

and controllable so that they can be turned on, increased ("ramped up") in output, decreased in output, and turned off. Such generating units are called "dispatchable." Their output is more valuable than electricity from wind turbines because the output can be counted on when needed and maintained at relatively steady levels. While the times required to start up, ramp up and shut down differ, generating units powered by traditional energy sources – coal, oil, natural gas, nuclear energy and hydropower – are largely dispatchable.[17]

"Wind farms" must be backed up by dispatchable generating units, which adds to the full, true cost of wind energy.

Electric systems ("grids" or "bulk power" systems) must be kept in balance on a real time basis to maintain system reliability – e.g., in terms of frequency, balance between demand and generation (supply), and load on particular transmission lines.

Because the output from wind turbines is intermittent, highly variable, largely uncontrollable and unpredictable, other generating units (i.e., "dispatchable" units) must be kept immediately available to "back-up" the wind turbines by increasing or decreasing their production of electricity. Units serving this backup role must be on line (connected to the grid and producing electricity) and running below their peak capacity and efficiency, or in a "spinning reserve" mode (i.e., connected to the grid and synchronized but not putting electricity into the grid).

The generating units serving this role incur costs that they would not normally incur if they were not serving the backup role, including fuel and operating costs and extra wear and tear on the units as they are ramped up and down. These "backup power" costs are a part of the full, true costs of electricity from wind. If the "wind farm" owner does not pay for those extra costs, they would have to be absorbed by the purchaser of the electricity and passed on to electric customers. The true costs would constitute a subsidy to the "wind farm" owner.

Electricity from "wind farms" makes inefficient use of transmission capacity and adds to the burden of keeping electric systems ("grid") in balance.

Electricity from "wind farms" makes relatively inefficient use of transmission capacity and adds to transmission costs. Transmission capacity must be available that is equal to the maximum capacity of the "wind farm" for those times when the "wind farm" is producing at full capacity. Mountain top "wind farms" in West Virginia probably will have average annual capacity factors in the range of 25% to 35% which means that any lines serving those "wind farms" exclusively would be utilized only 25% to 35% of the time. Of course, the transmission lines will be used at higher capacity factors if the generating units serving in the backup role are close by and served by the same transmission lines. The added cost of inefficient use of transmission capacity is also a part of the full, true cost of electricity from wind.

In addition, the unfavorable characteristics of electricity from wind – intermittence, high variability, very limited predictability and limited controllability -- add to the burden of grid management. Actions must be taken by system managers – some with automatic controls and some manual – to keep the system (or "control area") in balance and keep transmission lines from becoming overloaded. The added grid management burden is also a part of the full, true costs of electricity from wind.

If the added costs and burden imposed on transmission capacity and grid management are not paid for by the "wind farm" owner, they would have to be absorbed by the electricity purchaser

or the electric system serving the "wind farm," and passed on to electric customers. These costs would become an additional subsidy to the "wind farm" owner.

Wind energy advocates generally understate the true costs of electricity from wind energy.

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 probably would not continue to lobby for the generous federal and state subsidies that are discussed below.)

However, the wind energy industry, the US Department of Energy (DOE), the National Renewable Energy Laboratory (NREL), and other advocates of wind energy seldom admit the full, 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:

1. The price paid by the electric utility to the "wind farm" owner for the electricity.
2. The cost of providing "backup" services for the intermittent electricity from the wind turbines discussed above.
3. 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. As explained above, transmission and associated grid management costs are higher for electricity from intermittent, volatile sources such as wind than for electricity from stable, dispatchable generating units.
4. 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).

The extra costs associated with electricity from "wind farms" (i.e., those costs identified in paragraphs 2 and 3, above) vary widely depending on:

- Wind conditions and characteristics of the electricity output from the "wind farms" (e.g., intermittence, variability).
- The electric systems ("control areas") into which the electricity is sent (e.g., the type of generating units serving the backup role and their energy sources).

These are real costs. There should be a clear understanding how they are to be determined and who will bear those costs. As indicated above, if these costs are *not* borne by the "wind farm" owners, they will have to be absorbed by the purchaser of the electricity or the electric system serving the "wind farm." In one way or another, these costs will be passed on to electric customers served by the electric system. The added cost borne by any one customer may be small, but the total costs can be significant and should not be ignored.

Federal and State Subsidies are now contributing to "Windfall" Profits for "Wind Farm" Owners.

The costs enumerated above are NOT the full costs of electricity from "wind energy." The federal government and some state and local governments – including West Virginia -- now provide very generous tax shelters and other subsidies for "wind farm" owners.

Due to generous subsidies – in addition to the income received from the sale of electricity – "wind farms" have become highly profitable ventures for organizations with income to shelter from federal and state corporate income taxes.

It is important to keep in mind that all federal and state tax shelters and other 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.

The subsidies available to "wind farms" in West Virginia include:

- Federal accelerated depreciation
- Federal Production Tax Credits
- Reduction in West Virginia Corporate Net Income Tax (due to federal accelerated depreciation).
- 87.5% to 93.75% reduction in West Virginia's Business and Occupation Tax.
- 91.67% reduction in West Virginia property taxes.

Those generous subsidies provided by the federal and West Virginia governments are described and, to the extent practicable, quantified in the pages that follow.

1. **Two generous federal subsidies.** The federal government now provides two generous tax shelters for "wind farm" owners. These subsidies shift costs (i.e., tax burden) from "wind owners" to remaining taxpayers.

    a. **Accelerated depreciation.** One very generous subsidy available to companies with income to shelter is 5-year double declining balance accelerated depreciation (5-yr.; 200% DB) that can be used be to calculate depreciation for tax purposes. Five-year 200% DB can be used for capital costs of facilities using wind to produce electricity for sale. Nearly all other electric generating facilities[18] must use 20-year depreciation, so "wind farm" owners have a tremendous advantage.

    This shelter has been generous since it was first adopted in 1981. It became even more generous as a result of the Job Creation and Worker Assistance Act of 2002 which provided a special 30% depreciation deduction in the first year before taking advantage of 5-year 200% DB. The special 30% deduction applies to qualifying assets purchased after September 10, 2001 and before September 11, 2004, provided those assets are placed in service by January 1, 2005.

    Five-year double declining balance (5-yr. 200% DB) depreciation as it existed prior to the change enacted in 2002 permitted sheltering the depreciation deductions from otherwise taxable income shown in the first table below. The table below is based on an assumption that the capital costs of a "wind farm" is $300,000,000 -- which is the approximate amount that NedPower has estimated for its proposed "wind farm" in West Virginia. Specifically, the table shows for each year:

    - The percentages and amounts of capital costs that could be deducted from otherwise taxable income, and
    - The reduction in tax liability, assuming a 35% marginal corporate income tax rate.

Year	% of investment Recovered	Income that can be sheltered	Reduction in Tax Liability (assuming 35% rate)
First	20%	$ 60,000,000	$21,000,000
Second	32%	$ 96,000,000	$33,600,000
Third	19.2%	$ 57,600,000	$20,160,000
Fourth	11.52%	$ 34,560,000	$12,096,000
Fifth	11.52%	$ 34,560,000	$12,096,000
Sixth	5.76%	$ 17,280,000	$ 6,048,000
Total	100%	$ 300,000,000	$105,000,000

The next table shows the same factors under the even more generous accelerated depreciation made possible by the 2002 Act.

Year	% of investment Recovered	Income that can be sheltered	Reduction in Tax Liability (assuming 35% rate
First	44%	$ 132,000,000	$46,200,000
Second	22.4%	$ 67,200,000	$23,520,000
Third	13.44%	$ 40,320,000	$14,112,000
Fourth	8.064%	$ 24,192,000	$ 8,467,200
Fifth	8.064%	$ 24,192,000	$ 8,467,200
Sixth	4.032%	$ 12,096,000	$4,233,600
Total	100%	$ 300,000,000	$105,000,000

If the "wind farm" were sold to a new owner, that new owner would be able to utilize the generous accelerated depreciation benefits to "recover" its capital investment.

b. Federal Production Tax Credit. 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.[19] At the current rate of $0.018 per kWh, NedPower's proposed 300 MW "wind farm" would receive a tax credit (i.e., a direct deduction from its federal income tax bill) of $14,191,200 per year if the turbines produce at an average 30% capacity factor (i.e., 300,000 kW x 8760 hrs. x .30 x $0.018). The rate, originally $0.015 per kWh, is adjustable each year for inflation.

Organizations owning "wind farms" must have substantial taxable income to take advantage of these two federal tax shelters.[20] That is one reason why small companies specializing in "wind farm" development sell off their projects to larger companies early in the life of their projects. For example, FPLEnergy purchased the 66 MW "wind farm" (now called the Mountaineer Energy Center) from the initial developer, Atlantic Renewable Energy Corporation. The annual report of the FPL Group, the parent of FPLEnergy and Florida Power & Light Company, makes clear that the FPL Group has substantial income that can be sheltered from federal corporate income taxes through its investments in "wind farms."

2. Subsidies provided by West Virginia. In addition to the generous federal tax shelters, the State of West Virginia also provides subsidies that contribute significantly to the profits of "wind farm" owners. These include:

a. Reductions in "wind farm" owners' West Virginia Corporate Net Income tax liability. West Virginia taxes net corporate income at a rate of 9% but "it is a federal conformity tax in that the starting point in computing West Virginia taxable income is

the federal taxable income of the corporation."[21] Thus the generous federal accelerated depreciation deduction described earlier reduces the taxable income basis used when applying West Virginia's 9% corporate net income tax rate.

The amount of West Virginia corporate net income tax that can be avoided due to the federal accelerated depreciation benefit cannot be estimated accurately without knowing a lot of details about the "wind farm" owner and its parent and affiliate organizations. The impact on the owners' West Virginia Corporate Net Income tax liability could be as much as 9% of the owners' federal accelerated depreciation deduction in the particular tax year due (i.e., the amount shown in the tables presented earlier on page 7).

b. Business & Occupation Tax Break for "wind farms." Most electric generating units (except peakers) are valued at 40% of nameplate capacity for purposes of calculating their West Virginia B&O tax liability. However, due to a special tax break enacted in 2001, wind generators are valued at only 5% of their nameplate capacity.[22] This tax break significantly reduces a "wind farm" owners tax liability. Specifically, at the current tax rate of $22.78 per kW, a 300 MW (300,000 kW) "wind farm" that is:

- Valued at 40% of capacity (300,000 x .4) or 120,000 kW would owe B&O taxes of $2,733,600 (i.e., 120,000 x $22.78).
- Valued at 5% of capacity (300,000 x .05) or 15,000 kW would owe B&O taxes of $341,700 (i.e., 15,000 x $22.78), thus saving the owner $2,391,900.

c. Industrial Expansion and Industrial Revitalization Credit Offset for B&O Tax. The Industrial Expansion and Industrial Revitalization tax credit can be used to offset up to 50% of the Business & Occupational tax liability. It appears that the potential tax of $341,700 identified above for a 300 MW "wind farm" with a capital investment of approximately $300,000,000 would easily qualify to offset 50% of the estimated B&O tax liability, or $170,850, reducing the owner's annual B&O tax liability to $170,850.

d. West Virginia Business Franchise Tax. It appears the potential liability for West Virginia's Business Franchise Tax for a "wind farm" would be zero, assuming that the owner of the facility was 100% engaged in electric generation.[23]

e. Property Tax Break for "wind farms." Normally, in West Virginia, assessed valuations for property tax purposes are set at 60% of fair market value. However, a special tax break enacted in 2001 for "wind farms" provided that assessed valuations would be set at only 5% of fair market value.[24] This, of course, results in a significant reduction in:

- The amount of the tax that would be due on the "wind farm" owner's property.[25]
- The annual revenue that would be received via the property tax by Grant County, the School Board and other organizations that receive portions of the property tax revenue.

The following table shows the impact of the special tax break for "wind farms," assuming:

- The fair market value of the wind turbines and other facilities that would be built by NedPower is $300,000,000, and

- The tax rate will remain the same as Grant County rate for the period from July 1, 2001 through June 30, 2002; i.e., $1.56940 per $100 of assessed valuation.[26]

Valuation Percentage	Assessment	Grant County Tax Rate per $100 of assessed value	Estimate of Annual Property tax Liability
60%	$180,000,000	$1.56940	$2,824,920
5%	$ 15,000,000	$1.56940	$ 235,410
Lower Revenue			$2,589,510

The following table shows the revenues that would flow to the various recipients, assuming the same assessed values, tax rate and distribution of tax revenues as that applicable to the July 1, 2001 – June 30, 2002 property tax year:

		Recipients of revenue and percent shares				
		State	County	Schools	Hospital Bond	School Levy*
Valuation %	Total Revenue	.7%	33.3%	52.1%	2.2%	11.7%
60%	$2,824,920	$19,774	$940,698	$1,471,783	$62,148	$330,516
5%	$ 235,410	$ 1,648	$ 78,392	$ 122,649	$ 5,179	$ 27,543
Lower Revenue	$2,589,510	$18,127	$862,307	$1,349,135	$56,969	$302,973
* A special levy that required the approval of the voters in Grant County.						

The above losses in revenues may be offset in part by special contributions in lieu of taxes by the NedPower. Officials of that company have testified that its project "will increase Grant County's annual *ad valorem* tax revenues by at least $500,000 per year."[27] That amount is substantially more than suggested by the above table but substantially less than would be paid if the special tax break had not been enacted.

NedPower officials have also testified that "NedPower has created public-private partnerships with Maysville Elementary School and Union Educational Complex to provide funds annually to support scholastic and extra-curricular activities at those schools."[28] The Grant County News has reported that NedPower has promised the two schools "an annual royalty from wind-generated power sales, up to $350 per turbine." That could come to $35,000 per school [annually] once all turbines are in operation."[29]

Information is not available to show whether the reduced tax revenue that would accrue to the various recipients would be adequate to cover the additional costs that would be incurred due to the construction and operation of the "wind farm" (e.g., county costs for road maintenance, police and fire protection).

Income for "wind farm" owners from the sale of the electricity.

The value of all the federal and state subsidies for "wind farm" developers and owners is *in addition to* the revenue received by the "wind farm" owner for the sale of electricity.

Owners of "wind farms" in West Virginia have indicated that they plan to sell the electricity under negotiated contract rates. Often, such rates are not publicly disclosed. However, if the 300 MW "wind farm" being planned by NedPower were to produce at a 30% capacity factor

(i.e., 788,400,000 kWh) and the electricity were sold to an electric utility or other electricity supplier for $0.03 per kWh, the "wind farm" owner would receive $23,653,000 each year for that electricity (i.e., 788,400,000 x $0.03). If the electricity were sold at $0.04 per kWh, the annual income would be $31,536,000.

Economic Benefits for West Virginia Claimed by "Wind Farm" Developers and Owners.

"Wind farm" developers and owners generally claim that their projects will provide substantial economic benefits in the town, county and state where the projects are located. Generally, the claimed benefits include:

- **Materials, equipment and services purchased in the area**. Any such benefits for West Virginia would appear to quite small since the bulk of the capital investment in "wind farms" consists of turbines, blades, towers, controls, cabling and related electrical equipment that is manufactured elsewhere. (Most wind turbines are manufactured by foreign companies even though the US Department of Energy has spent hundreds of millions in tax dollars on wind energy R&D.) Some transportation services (e.g., for concrete) probably would be provided locally.

- **Rental payments to landowners** that host the windmills (i.e., turbines, towers) and associated facilities (e.g., substation, cables, transmission lines, maintenance and control facilities). NedPower officials have testified that "landowners will receive approximately $600,000 annually from NedPower in lease payments"[30] for its planned 200-turbine 300 MW project. Rental payments would be $100 per year per lease until electricity production begins. When in operation, rental payments would depend on production from wind turbines.[31]

  Information is not readily available to permit determining whether the landowners are West Virginia residents which, if so, might indicate that at least a portion of the money would provide an economic benefit IN West Virginia. Any economic benefit for West Virginia would depend on where the owner(s) live, how and where the income is spent or invested, and whether any or all of it is subject to West Virginia taxes.

- **Construction jobs.** Generally, "wind farms" can be constructed in relative short time periods because the turbines, blades, and much of the other equipment are produced elsewhere and shipped in for assembly. Construction jobs may last for several months or perhaps a year, depending on phasing of the construction.

  NedPower officials have estimated that the project would provide up to 200 jobs during the construction period. Apparently an agreement with the West Virginia Building and Construction Trades Council, AFL-CIO, covering construction labor jobs and the union "…has assured NedPower that all reasonable efforts will be made to utilize local labor in the construction of the facility."[32] However, unless workers with the required skills are available in West Virginia, they would be brought in from other states and the jobs available to local workers probably would be those for laborers.

  Data are not readily available on the potential economic benefit to the region that would result from the construction jobs. (Actual experience with the source of workers for construction of the Mountaineer Energy Center might shed light on the likely sources of workers for the construction phase and on the benefits that might accrue to West Virginia.)

However, if construction required 200 employees who were paid an average $25.00 per hour and construction lasted a full year, the employees wages would total $10,400,000 for that year (i.e., $25 per hour x 2080 hours x 200). If only 40% of the workers came from West Virginia – which seems more likely -- and they held the lower paying jobs, the wages for West Virginians probably would total less than $3,000,000. To get a firm estimate of the potential economic benefit to the area, this crude estimate would have to be adjusted to fit more accurately the likely number of jobs, period of construction, the number of employees that actually resided in the area and their hourly wages.

- **Permanent jobs.** NedPower officials have estimated that, "Once operational, we anticipate the Project will be operated and maintained by a staff of ten to fifteen employees."[33] Apparently much of the operation is autonomous with onsite employment largely for maintenance activities. Assuming all the employees were on site and paid an average of $20.00 per hour, the annual payroll would total $416,000 (i.e., $20 x 2080 hours x 10 employees) to $ 624,000 (i.e., $20 x 2080 hrs x 15 employees). Again, to get an accurate estimate, these crude estimates would have to be adjusted to fit the facts.

- **Personal Income Tax and Sales Tax Revenue.** Most of the potential sources of increased tax revenue were discussed in a previous section of this paper and won't be repeated here. However, there would be potential additional revenue from state income taxes on worker wages during "wind farm" construction and operation and, potentially, on landowners' rental income.[34] In addition, there would be revenue from West Virginia's 6% sales and use taxes on a variety of products and services that are not exempt.

  If a total of $3,000,000 were paid to 80 construction workers from West Virginia during a 1-year construction period, the personal income tax revenue probably wouldn't exceed $150,000. If annual wages for permanent employees totaled $520,000 the annual income revenue probably would not exceed $26,000. If all the estimated $600,000 in land rental payments were taxable in West Virginia at a 6% marginal income tax rate, the annual revenue would be $36,000, but only after the "wind farm" was in operation. If the "wind farm" owners purchased $1,000,000 worth of goods and services subject to the West Virginia 6% sales tax each year, the sales tax revenue would total $60,000.

- **Corporate net income taxes.** "Wind farm" owners may pay some corporate net income tax though, as pointed out earlier, that amount would be reduced due to generous federal accelerated depreciation benefits. Information simply isn't available to make a good estimate of the potential West Virginia corporate net income tax revenue for a "wind farm" because that amount would depend heavily on the way the owner – or the owner's parent organization(s) handled its accounting for tax purposes. Conceivably there would be little or no taxable net income. (As noted earlier, West Virginia relies on tax reporting to the federal government.)

- **Indirect benefits**. Presumably there would be some indirect economic benefits as the result of the additional money that does come into the region.

Wind Advocates' Claims of Environmental Benefits are Exaggerated.

"Wind farm" developers and owners generally claim that the electricity produced from wind energy is "clean" electricity that offsets emissions (particularly sulfur dioxide, nitrogen oxides, carbon dioxide) that would otherwise be released by generating plants using fossil fuels. In fact,

as discussed later, "wind farms" are NOT environmentally benign. Wind energy advocates typically do not identify the assumptions or explain the calculations leading to their claims about emission reductions. However, those claims are exaggerated in several ways. For example:

- Emissions from many fossil-fueled generating stations have been reduced significantly and additional reductions are required by federal and state air quality laws and more are planned. Also, new lower emission generating units have replaced generation from older, higher emitting units. Advocate claims appear to be based on outdated emissions data.
- Even more important, wind advocates incorrectly assume that kWh of electricity produced from wind turbines offsets electricity from other (usually fossil-fueled) generating units on a kWh for kWh basis. This simply does not occur because, as explained earlier, other generating units must be immediately available to "backup" wind turbines that produce electricity intermittently and with a high degree of volatility and unpredictability. Fossil-fueled generating units serving in that backup role are likely to be running at less than their peak efficiency or in spinning reserve mode. While operating in these modes they are continuing to emit.
- Any emission reduction would depend heavily on the specific unit that would have produced the "displaced" kWh. If the unit were hydro-powered, no emissions would be displaced. If the unit was one of the new gas-fired combined cycle generating unit or an older fossil-fueled unit that has been equipped with new emission control technology, few emissions would have been displaced.

In summary, any blanket statement about emission avoidance due to wind energy generation should be regarded with suspicion.

Potential adverse environmental, scenic and property value, and economic impacts.

The growing opposition to "wind farms" referred to in the introduction has occurred as experience is gained with existing and proposed "wind farms" in the U.S. and Europe. It is increasingly clear that a variety of potentially adverse environmental, ecological, scenic, property value and economic impacts will have to be considered as additional "wind farm" proposals are evaluated by state and local government officials. Unfortunately, these adverse impacts often cannot be quantified accurately in advance. Examples of the potentially adverse impacts include the following:

1. **Scenic impairment: the "ugly as a billboard" issue.** Except when "wind farms" are located in remote, sparsely populated areas with little scenic value, the adverse impact of 300 – 430 foot windmills has emerged as a critical issue. Clearly, scenic impact is a matter that is "in the eye of the beholder."

   The alternative point of view was stated graphically by an Oregon official who was recently quoted in the Tri-city Herald (State of Washington). After driving by FPLEnergy's large "wind farm" that is located along the Washington-Oregon border, he was quoted as stating: "Could anyone think it's anything other than ugly?" and "How is it different than wanting to put up a big ugly billboard?"[35] Scenic impact is likely to be an important issue for West Virginia, recognizing the state's demonstrated interest in marketing its scenic beauty. Official West Virginia web sites make extensive use of unspoiled mountain views.

Some people find recent vintage windmills to be attractive. Some contend that the windmills would attract tourists while others believe that any such novelty value would be short lived.

2. **Property value impairment.** Again, when proposed for a remote, sparsely populated area with low value land, neighbors in the area may not be adversely affected or concerned about potential "wind farms." However, opposition is growing to proposals to place the large machines in areas where there are existing or planned homes and where many property owners are adversely affected and only a few landowners receive land rental payments from "wind farm" owners.

   Citizens and government officials should recognize that the potential impairment of property values is inherently difficult to evaluate in advance. Generally, 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 the market value of property in the area becomes known through actual sales of land and homes.[36]

   One of the very few actual surveys of residents' views taken after a "wind farm" was in place was undertaken after neighbors complained about noise and other adverse effects of a 14-turbine "wind farm" in the Town of Lincoln, Kewaunee County, Wisconsin. Among the findings from the survey were that 52% of the residents would not want to live within 2 miles of the turbines and a majority of those living closest to the turbines reported that they felt that the turbines had adversely impacted their health and safety.

   Even though that "wind farm" apparently met state-prescribed noise standards, the electric utility that owned the project, Wisconsin Public Service, eventually purchased neighboring residential properties to resolve noise and other complaints. Apparently, some of the homes have been torn down.

3. **Adverse impact on tourism, recreation, second home and retirement home opportunities.** Concerns about adverse impacts on tourism have also emerged as an important issue.[37] Data presented by West Virginia resident John Cooper[38] indicates that the greatest contribution to increased economic growth in Grant County's next door neighbor, Tucker County, during the past few years has been due to tourism and more than doubling of condominiums and second homes. The availability of land in the Grant and Tucker County areas and the scenic attractiveness of the area are often advertised in the Washington, DC, market.

   Increased jobs relating to tourism, residential construction, services for visitors and new part and full-time residents – those working and those retiring to West Virginia -- would almost certainly exceed the permanent jobs associated with "wind farms." Data are not readily available to make estimates of increased property tax revenues resulting from added residential and business property to serve tourists and part and full-time residents. However, revenues from those sources may exceed the minimal increases in tax revenues associated with the increased tax revenue associated with the proposed 300 MW "wind farm." Residential property and business property for serving tourists and new residents do not receive the extremely generous property tax breaks provided for wind energy facilities.

   In addition, income taxes paid to West Virginia by workers in tourism, residential and related business construction and service industries, as well as new residents – employed and retired, are likely to exceed those paid by permanent employees of a "wind farm."

4. **Environment, health and safety issues.** The wind industry and other wind energy advocates have long suggested that wind energy provides an environmentally benign source of electricity but those claims are not being borne out in actual experience. Environmental, health and safety concerns that need to be addressed include but are not limited to:

   a. **Noise**, which tends to vary with a variety of conditions and has presented more problems than is commonly admitted by the wind industry. As indicated above, a utility in Wisconsin with a wind farm that appeared to be within noise regulation requirements ended up buying surrounding residential properties because of noise problems.

   b. **Broken blade, ice throws and collapsing towers** have been a significant concern in many areas, often leading to significant set-back requirements from roads and homes.

   c. **Bird deaths and interference with migration,** are issues that, in the case of proposed "wind farms" in West Virginia have received considerable attention from the US Fish and Wildlife Service.[39] The Service's letters and the studies required by them have already been publicized and will not be summarized here.

   d. **"Flicker" or "strobe" effects** of turning blades, particularly during the time when the sun is near the horizon at sunrise and sunset has proven to be an annoying problem for those living near "wind farms."

5. **Potential loss of coal mining and related jobs.** As pointed out earlier, electricity from "wind farms" does *not* actually offset electricity from other generating sources on a kWh per kWh basis as wind energy advocates contend. If it did, the 1,616,220,000 kWh that would be produced by the 3 existing and proposed "wind farms" operating at a 30% capacity factor would displace that many kWh produced by other West Virginia generating units, probably coal-fired units. That would reduce the amount of coal required.

   The amount of coal that would no longer be required and job impacts can only be estimated roughly. During 2000, Mt. Storm used 4,801,000 tons of coal and produced 11,595,999,000 kWh of electricity. If its generation had been reduced by 1,616,220,000 kWh or 13.9%, the amount of coal required might have been reduced by roughly 670,000 tons. The actual reduction would be less than this because, despite claims by wind advocates, wind-generated electricity does *not* offset electricity from other sources on a kWh per kWh basis.

   During the first 8 months of 2002, about 16.5% of Mt. Storm's coal came from West Virginia, 63.5% from Maryland, and 20% from Pennsylvania. Assuming the reduced coal requirement was proportional, and given the average productivity per employee at mines in those states, it's possible to make rough estimates of potential job losses at mines. Undoubtedly jobs would be lost, but these numbers should be viewed with great caution because of the many assumptions required.

   The rough calculations, shown in the following table, suggest that a total of 69.3 jobs at coal mines would be lost if the three existing and proposed "wind farms" generated 1,616,220,000 kWh of electricity and displaced an equal number of kWh from Dominion Virginia Power's Mt. Storm generating plant. Roughly 34.6 jobs would be lost if the electricity from wind displaced half as many coal-fired kWh.

   As emphasized earlier, the actual kWh displacement resulting from wind generation is speculative but certainly does not occur on a kWh per kWh basis. Also, any kWh displacement would not necessarily be from Dominion's Mt. Storm generating plant.

Rough calculations of coal mining jobs lost by displacement of coal-fired electricity with electricity from West Virginia's Three Existing and Proposed "Wind Farms"					
State	Proportional share if 670,000 tons lost	Avg. tons per employee per hr.[40]	Avg. tons per year per employee assuming 2080 hrs	Jobs lost if all 670,000 tons were no longer needed.	Jobs lost if half the kWh were displaced and half the tons were no longer needed
WV	110,550	4,77	9,922	11.1	5.5
MD	425,450	4.69	9,755	43.6	21.8
PA	134,000	4.41	9,203	14.6	7.3
Total	670,000			69.3	34.6

These job loss calculations cover only job loss at coal mines. They do not cover related job losses elsewhere in the coal industry, in coal transportation, coal handling at the generating plant(s) or any related direct and indirect job losses.

If the coal mine job loses were as estimated in the table and wages averaged only $35,000 a year, the wage losses would be:

	All 670,000 Tons Lost	Half the tons Lost
WV	$ 388,000	$193,000
MD	$1,526,000	$763,000
PA	$ 511,000	$256,000

Related job losses not covered in these numbers could double these lost wages.

Summary Comparison of Economic Benefits and Costs for "Wind Farm" Owners and for West Virginia.

As indicated in preceding sections of this paper:

- Some of the economic, environmental, scenic and property values cannot be estimated with the information now available, and
- Assumptions must be made in order to develop estimates for other impacts.

Those cost and benefit factors identified in previous sections of this paper, along with dollar amounts where practicable are shown on the summary table on the next page of this paper.

Note especially that:

- Identifiable federal and state tax shelters and other subsidies provided to the "wind farm" owner are particularly high in the initial years of "wind farm" operation; specifically, $69,701,460 in the first year.
- Tax breaks granted by West Virginia would be roughly 10 times the identifiable tax revenue that would be received by the state and Grant County. In addition, the "wind farm" would receive a substantial reduction in West Virginia corporate net income tax due to generous federal accelerated depreciation, including $4,158,000 in the first year of operation.
- The total of $69.7 million in tax liability that could be avoided by the "wind farm" in the first year, as well as the liability avoided in subsequent years represents tax burden that would be shifted to remaining taxpayers.

Summary of Estimated Economic Implications of the proposed 300 MW "wind farm" in Grant County, WV

Notes: Data are not available to permit filling in all the cells. Also, all numbers are estimates and based on assumptions. See the appropriate sections of the text for details on the assumptions and derivation of estimates
Some items (NedPower purchases in WV minus cost of same; Sales tax on purchases) are mere guesses. Also, no attempt has been made to adjust for changes in tax rates or inflation

	Text Page	Construc-ion Year	"Wind Farm" in Operation Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	10-yr. Total
"Wind farm" income from sale of electricity:													
If sold at $0.03 per kWh	10		**23,653,000**	**23,653,000**	**23,653,000**	**23,653,000**	**23,653,000**	**23,653,000**	**23,653,000**	**23,653,000**	**23,653,000**	**23,653,000**	**236,530,000**
Estimated Value of Subsidies to "wind farm" owner													
Federal: Reduction in income tax liability:													
Due to deduction for accelerated depreciation	6-7		46,200,000	23,520,000	14,112,000	8,467,200	8,467,200	4,233,600	-	-	-	-	105,000,000
Federal Production Tax Credit*	7		14,191,200	14,191,200	14,191,200	14,191,200	14,191,200	14,191,200	14,191,200	14,191,200	14,191,200	14,191,200	141,912,000
Subtotal - Federal subsidies for owner			**60,391,200**	**37,711,200**	**28,303,200**	**22,658,400**	**22,658,400**	**18,424,800**	**14,191,200**	**14,191,200**	**14,191,200**	**14,191,200**	**246,912,000**
West Virginia:													
Reduction in WV Income tax liability due to federal accelerated depreciation deduction	7-8		4,158,000	2,116,800	1,270,080	762,048	762,048	381,024	-	-	-	-	9,450,000
Reduction in B&O Tax due to special tax break and Ind. Exp & Revit. Tax credit	8		2,562,750	2,562,750	2,562,750	2,562,750	2,562,750	2,562,750	2,562,750	2,562,750	2,562,750	2,562,750	25,627,500
Reduction in Property Taxes due to special tax break for wind	8-9		2,589,510	2,589,510	2,589,510	2,589,510	2,589,510	2,589,510	2,589,510	2,589,510	2,589,510	2,589,510	25,895,100
Subtotal - WV Subsidies for owner			**9,310,260**	**7,269,060**	**6,422,340**	**5,914,308**	**5,914,308**	**5,533,284**	**5,152,260**	**5,152,260**	**5,152,260**	**5,152,260**	**60,972,600**
Potential subsidies - Data not available to estimate: ###													
Cost of backup generation for "wind farm" output	4												
Impact of intermittent, variable output on transmission	4												
Increased burden of electric system (grid) management	4-5												
Subtotal for subsidies that are estimted			**69,701,460**	**44,980,260**	**34,725,540**	**28,572,708**	**28,572,708**	**23,958,084**	**19,343,460**	**19,343,460**	**19,343,460**	**19,343,460**	**307,884,600**
Potential for Increased tax receipts:													
NedPower corp. Income tax revenue: Data not avalable#													
Personal inc.tax due to wages, lease payments	11	150,250	62,000	62,000	62,000	62,000	62,000	62,000	62,000	62,000	62,000	62,000	620,000
Less pers. income tax: coal mine job loss (WV only)	14-15		(9,650)	(9,650)	(9,650)	(9,650)	(9,650)	(9,650)	(9,650)	(9,650)	(9,650)	(9,650)	(96,500)
Sales tax due to "wind farm" purchases	11	120,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	600,000
Increase in WV B&O tax receipts	8		170,850	170,850	170,850	170,850	170,850	170,850	170,850	170,850	170,850	170,850	1,708,500
Increase in Property Taxes ##	8-9		235,410	235,410	235,410	235,410	235,410	235,410	235,410	235,410	235,410	235,410	2,354,100
Subtotal - for tax receipts estimated		**270,250**	**518,610**	**518,610**	**518,610**	**518,610**	**518,610**	**518,610**	**518,610**	**518,610**	**518,610**	**518,610**	**5,186,100**
Potential economic benefits for West Virginia													
Wages for West Virginians in construction	10-11	3,000,000	0	0	0	0	0	0	0	0	0	0	0
Wages for permanent employees	11		520,000	520,000	520,000	520,000	520,000	520,000	520,000	520,000	520,000	520,000	5,200,000
NedPower Purchases in WV (minus non-WV cost of same)	11	1,000,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	5,000,000
Rental payments for landowners ** ***	10	5,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	6,000,000
Promised payments to two Grant County Schools	9		35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	350,000
Indirect benefits of above listed economic activity###	11												
Subtotal - for items with estimates		**3,005,000**	**1,655,000**	**1,655,000**	**1,655,000**	**1,655,000**	**1,655,000**	**1,655,000**	**1,655,000**	**1,655,000**	**1,655,000**	**1,655,000**	**16,550,000**
Potential economic costs in West Virginia													
Potential loss of jobs at coal mines - WV only	14-15		(193,000)	(193,000)	(193,000)	(193,000)	(193,000)	(193,000)	(193,000)	(193,000)	(193,000)	(193,000)	(1,930,000)
Costs that cannot be estimated with available data ###													
Impact on Tourism	12-13												
Impact on property values and related property taxes	13												
Lost attractiveness for recreation, primary or 2nd homes.	13												
Subtotal - for items with estimates			**(193,000)**	**(193,000)**	**(193,000)**	**(193,000)**	**(193,000)**	**(193,000)**	**(193,000)**	**(193,000)**	**(193,000)**	**(193,000)**	**(1,930,000)**

* These amounts will be increased as the rate is adjusted for inflation. ** Lessor receives only $100 per year during construction (assumes 50 leases) ***$600K is "estimate." Also, some landowners may be absentee.
# Will depend on how owner & parent report & shelter income for tax purposes. ## Assuming steady rate of $1.56940 per $100 and no change in assessed valuation. ###Data not available to make estimates.

- While sufficient data are not now available to estimate all the potential adverse economic impacts on and costs to West Virginia, it appears that those costs could be as great as any economic benefit that would accrue to West Virginia.[41]

The largest economic benefits for "wind farm" owners occur in the earliest years of a project's life. This fact is important because this "front end loading" creates an incentive for "wind farm" owners to sell or abandon their projects once a large share of the subsidy proceeds have been received. That would be after 6 years in the case of federal accelerated depreciation, and after 10 years in the case of federal Production Tax Credits or when O&M, repair and replacement costs mount as wind turbines age. No one has long-term experience with the O&M, repair and replacement costs associated with the large turbines now being installed.

The Value of Subsidies for "Wind Farm" Owners Exceeds Income from the Sale of Electricity.

Among the more dramatic facts demonstrated by the previous summary table is that federal and state tax burden that a "wind farm" owner could avoid would substantially exceed the income that the owner would receive from the sale of electricity during the early years of a project. In the example shown the taxes that could avoided in the first year of the project's life would be roughly three times the income from electricity sales if the electricity was sold at $0.03 per kWh. Only after the first 5 years would income exceed the tax burden that could be avoided.

The value of the potential tax breaks of $69.7 million in the first year of the project's operation would be equivalent to $0.088 per kWh of electricity produced if the "wind farm" operated at a 30% capacity factor. The value would decline to $0.0245 per kWh by the 7th year of operation. Again, those values do NOT include the income the "wind farm" owner would receive for the sale of electricity.

As stated previously, it must be kept in mind that tax shelters and other subsidies shift costs from "wind farm" owners to consumers and remaining taxpayers.

The REAL markets for Electricity generated from "renewable" energy are very small.

There are few "natural" markets for electricity produced from "renewable" energy sources such as wind – particularly because of its high real cost and its low quality compared to electricity from dispatchable generating units power by the "traditional" energy sources. With few exceptions, the "markets" that do exist for "renewable" energy are artificially created and forced on electricity suppliers and/or electric customers.

There are five types of artificially created "markets" for electricity from "renewable" energy[42] and all five result in shifting costs from owners of "renewable" energy generating facilities to electric customers and/or taxpayers.

1. "Green Energy" offered voluntarily by electric suppliers.

2. Mandated "Green Energy" programs created by electric suppliers.

3. Voluntary decisions by certain customers to buy "green energy" even when more expensive than alternatives, perhaps due to a strong personal commitment to environmental objectives, desire to convey a favorable environmental image, or political pressure.

4. Forced decisions by some federal, state and local government agencies and state educational institutions to buy "green energy," usually at taxpayer expense.

5. State or local government "Renewable Portfolio Standards" (RPS). Fifteen state governments and a few local governments have adopted such standards. They typically require that electricity suppliers obtain some specified portion (usually stated as a percentage) of their electricity from "renewable" sources. The percentages vary widely among states. They usually start low but grow, with some states such as California calling for 20% by 2017.

Particularly from an electric customer point of view, the RPS approach is the most insidious of the alternatives for a number of reasons, including the fact that it protects high cost renewable electricity producers from competition and forces electric customers to pay higher costs. Higher electricity costs are a special problem for low-income people who must pay a larger share of their income for electricity.

Evidence available thus far suggests that very few (probably less than 1% of "eligible" customers) participate in voluntary programs, probably because of their added costs and tiny, if any, real contribution to environmental objectives. Also, the extra money collected by electricity suppliers almost certainly does not cover both the higher cost of the electricity and the cost of administering the "green energy" programs.

Principal Conclusions from the Analysis Described in this Paper.

Many conclusions are indicated by the analysis in this paper, but the following deserve particular attention:

- The huge machines produce very little electricity and that electricity is of less value than electricity produced by reliable generating plants.
- "Wind farms" must be backed up by dispatchable generating units and impose extra costs and burden on transmission and electric system management, adding to their true costs.
- "Wind farm" advocates generally understate the true costs of the electricity they produce and overstate both their environmental benefits and economic benefits to states and localities.
- The value of federal and state subsidies for "wind farms" substantially exceed the income that "wind farm" owners receive for the electricity they produce.
- Actions are needed at all levels of government to protect the interests of citizens, consumers and taxpayers when "wind farms" are proposed.

Special attention should be given to the summary of economic benefits and costs on page 16 of the analysis. Not all factors can be priced precisely but the bottom lines are clear:

- Anyone who believes that "wind farms" produce significant economic benefits for *West Virginia* simply has not considered all the factors that must be taken into account.
- The truly significant economic benefits flow to organizations elsewhere; i.e., to the "wind farm" owner and to the suppliers of the wind turbines and other components – all of whom are located in other states or other countries.

This analysis demonstrates that the real motivation for construction of "wind farms" in the US is the value derived from generous federal, state and local tax benefits and other subsidies – not environmental benefits. "Wind farms" are not environmentally benign.

* * *

Author: This analysis was self-financed and 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 citizens, 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.

Endnotes:

[1] Primary data sources: WV Public Service Commission case files: 00-1209-E-CN, 01-1664-C-CN, 02-1189-E-CN, and 02-1295-E-CN.
[2] "Capacity factor" for an electric generating unit is the amount of electricity produced over a certain period, say 1 year, in kilowatt-hours (kWh) divided by the generating unit's rated (or nameplate) capacity times the hours in the period; e.g., 8760 for a year.
[3] These are the areas over which the turbines would be sited, as claimed by developers. Actual "footprints" for individual windmills take up much less acreage.
[4] FPL press release, June 26, 2002.
[5] The calculation of estimated annual output is simply the rated capacity of the turbines (66,000 kW for the FPLEnergy project) times 8760 hours per year times 30% (i.e., 66,000 x 8760 x .30 = 173,448,000 kWh).
[6] US WindForce web site: http://www.uswindforce.com/default.asp?pg=projects&pg2=1, Jan. 9, 2003.
[7] Site acreage to be leased, according to Niessen, Hieronymus, Direct Testimony to West Virginia Public Service Commission, Case No. 02-1189-E-CN, Oct. 17, 2002, p. 7. Mr. Niessen described the site as "approximately 14 miles long by ½ mile wide in some places," p. 9.
[8] Owners and developers have stated electricity would be sold in the PJM (Pennsylvania-Jersey-Maryland) region which includes part of all of VA, MD, PA, NJ, DE and DC and the ECAR region which includes part or all of OH, MI, IN, PA, VA, and KY.
[9] Since electricity from wind energy is substantially more expensive than electricity from other WV generating facilities, the fact that the electricity will not be sold in WV helps reduce adverse economic impacts on WV.
[10] U.S. Energy Information Administration (EIA) web site.
[11] "Capacity factors" (defined in footnote 2, above) vary widely among wind turbines and "wind farms" for a variety of reasons, including wind conditions, the characteristics of the wind turbine, their location, and whether the blades are fouled (e.g., with bugs).
[12] For another comparison, 2,365,200,000 kWh of electricity will be produced annually by Dominion Virginia Power's new 540 MW gas-fired combined-cycle Possum Point generating plant that is expected to begin operation in late spring of 2003, if that plant operates only on an intermediate load basis and only achieves a 50% capacity factor. (According to Dominion, two oil-fired generating units at the Possum Point station will be retired and coal will no longer be used in two coal-fired units now operating at the station.) This highly efficient, low-emitting plant will occupy only a few acres.
[13] Based on EIA "Assumptions to the Annual Energy Outlook 2003," January 2003, Table 40, Page 73.
[14] Data Source: US Energy Information Administration (EIA).
[15] EIA, Electric Power Monthly, April 2001, Table 56A, page 147.
[16] NEGMicon web site; technical data for Model NM72C/1500 wind turbine.

[17] Within the electric industry, such units are said to have both an energy value (kWh of electricity) and a "capacity" value (ability to produce kW when needed). Wind turbines have virtually no predictable capacity value.
[18] Simple cycle combustion turbines use 15-year, 150% declining balance depreciation for tax purposes.
[19] The federal Production Tax Credit for commercial wind energy facilities is currently scheduled to expire on December 31, 2003. However, bills were introduced in the last (107th) Congress to extend the credit either indefinitely or for five years and an extension now seems likely to pass during the current Congress (108th).
[20] Often the desired result is achieved when doing accounting for tax purposes by consolidating the financials of parent organization, subsidiaries (including limited liability companies) and/or affiliates (e.g., shares of partnerships or joint ventures).
[21] West Virginia 2002 Corporate Net Income Tax/Business Franchise Tax (Booklet), Page 7.
[22] West Virginia Code 11-13-2o.
[23] West Virginia Code 11-23-17(b).
[24] West Virginia Code 11-6A-5a.
[25] Under the terms of paragraph 8 of the Lease Agreement proposed by NedPower, the Lessee (NedPower) "…shall be responsible for payment of all taxes assessed against its equipment, machinery, or other property on the Leased Premises." A provision with unknown impact in paragraph 8 of the Lease Agreement provides that the "Lessor will cooperate in the designation of the leased areas as separate tax parcels if helpful to reduce the tax burden."
[26] Information obtained by telephone from Mr. Mitch Earl, Grant County Assessor's office.
[27] Niessen, Hieronoymus, Direct Testimony to the Public Service Comm. of West Virginia, Oct. 17, 2002, Page 15.
[28] Op. Cit. Page 16.
[29] Grant County News, "Wind power proponents stage open house event."
[30] Op. Cit. Page l5.
[31] Lease Agreement, paragraph 3.
[32] Alexander, James, Direct Testimony to the Public Service Commission of West Virginia, Oct. 17, 2002, page 7.
[33] Ibid.
[34] West Virginia's marginal tax rates on taxable income for single taxpayers and married taxpayers filing jointly are: 3% on less than $10,000; 4% for at least $10,00 but less than $25,000; 4.5% for at least $25,000 but less than $40,000; 6% for at least $40,000 but less than $60,000 and 6.5% over $60,000.
[35] FPLEnergy, Op. Cit.
[36] A wind advocacy group in the State of Washington has tried to claim that "wind farms" do not adversely impact property values. However, its "study" was badly flawed, including its reliance on phone conversations with tax assessors for views on property values. Tax assessor's views are not a valid proxy for market values of property.
[37] Tourism has been an important issue in the case of a proposal by Zilkha Renewable Energy to build a "wind farm" in the Kittitas Valley in the State of Washington. According to a story in the January 16, 2003, Ellensburg, WA, Daily Record, the Kittitas County government had adopted detailed procedures for review of an expected application for a conditional use permit. However, the developer instead applied to the State of Washington's Energy Facilities Site Evaluation Council (EFSEC) which some believe is an attempt to bypass the review process in the area where the controversial project would be built.
[38] Cooper, John, Statement for the West Virginia Public Service Commission, Nov. 19, 2002, pages 4 – 6.
[39] See US Fish & Wildlife letters dated August 30, 2002, to Ms. Jessica L. Yeager, Potesta & Associates, Inc, and Dec. 3, 2002, to Mount Storm LLC.
[40] EIA, Coal Industry Annual 2000, Table 48, Page 74.
[41] Perhaps West Virginia tax authorities can supply additional estimates where information is not now readily available.
[42] The definitions of "renewable" differ somewhat among states and among programs but generally include wind, solar, geothermal, certain kinds of biomass, and some energy-from-trash (principally methane form landfills).

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