

# EVALUATION OF ROBERT KENNEDY JR'S STATEMENTS IN WEST VIRGINIA ABOUT WIND ENERGY: DELUDED, DELUSIONAL OR DISHONEST?

*by Glenn R. Schleede*



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Attachment A lists quotes from Robert Kennedy, Jr. concerning wind energy, as those quotes appear in the transcript of a Forum on the Future of Energy on January 21, 2010, at the University of Charleston, West Virginia.

During the Forum, Mr. Kennedy made many statements about wind energy that are false or misleading and should not be allowed to stand without challenge.

It's unclear from the transcript whether Mr. Kennedy has been misled by the wind industry, whether he really believes all that he said about wind energy, or whether he was merely hoping that no one listening to the forum or reading the transcript would challenge his false and misleading claims.

A quote about the economy of West Virginia from the early stages of the Forum seems to be the predicate for the claims that he makes about wind (and solar) energy. It begins on page 13, line 22, of the transcript: "...we can bring a responsible growth to the state, and the state needs to start diversifying and it needs to start bringing in new kinds of industry and transitioning to a new energy economy..."

His other statements during the forum that refer to wind energy are listed below. Facts countering the assertions follow the list of quotes.

1. **EMPLOYMENT IN THE WIND INDUSTRY COMPARED TO EMPLOYMENT IN COAL MINING.** Mr. Kennedy stated that "There's 85,000 people in 2008 employed in the wind industry, there's 81,000 the same year employed as coal miners." He claimed that the data came from the US Bureau of Labor Statistics. His statement is false or misleading in several respects:
  - a. **Data apparently not from BLS.** There is no evidence to indicate that BLS has produced the 85,000 estimate. In fact, BLS indicates that it does not collect information on employment in the wind industry.<sup>1</sup>
  - b. **Doubtful validity of data on "the wind industry."** The wind industry's Washington lobbyist organization, American Wind Energy Association (AWEA), issued a report, "Annual Wind Industry Report: End of 2008,"<sup>2</sup> in January 2009 that include on page 17 a graph and narrative claiming that 85,000 people were employed in "the wind industry" in 2008. The report provides no information on how the numbers were

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<sup>1</sup> BLS, "On the Grid: Careers in Energy," Fall 2008. <http://www.bls.gov/oog/2008/fall/art02.pdf>, page 38.

<sup>2</sup> <http://www.awea.org/publications/reports/AWEA-Annual-Wind-Report-2009.pdf>.

compiled and no detailed numbers on the occupations. The 2008 bar's on AWEA's graph suggests that about:

- 1) 20,000 were employed in manufacturing,
- 2) 2,500 were employed in "operations and management,"
- 3) 7,500 were employed in construction, and
- 4) 55,000 were employed in "other jobs," which AWEA says includes "some manufacturing (small components, electrical parts, raw component suppliers), developers and development services (land acquirement, permitting, wind resource assessors), financial and consultant services (financiers, accountants, consultants), contracting and engineering services (contractors, electrical engineers, mechanical engineers, civil engineers), parts related services (repair shops, equipment manufacturers and suppliers), transportation and logistics."

c. **Comparison between "wind industry" and "coal mining" invalid.** Of course, comparing **total** employment in the "wind industry," as AWEA has defined it, (assuming the 85,000) is correct with 81,000 AWEA says were employed in coal mining is a totally dishonest comparison. To provide a more comparable comparison, AWEA and others comparing the two numbers should have included coal mining, coal cleaning, coal transportation, coal handling, operation of coal fired power plants, and many more functions similar to those included in AWEA's "other" category for wind energy.

d. **Comparison should include the amount of electricity produced.** While trying to make some kind of point with his invalid employment comparisons, Mr. Kennedy failed to point out the amounts of electricity produced during 2008 by wind and coal. According to EIA:

- 1) 1,985,801,000 megawatt-hours (MWh) of electricity was produced from coal – 48.21% of total US electric generation.<sup>3</sup>
- 2) 55,363,000 MWh of electricity was produced from wind – 1.34% of total US electric generation.<sup>4</sup>

2. **MR. KENNEDY'S FALSE COMPARISON OF WIND TURBINES WITH RELIABLE ELECTRIC GENERATING UNITS.** New electric generating capacity was added in the US during 2008. Mr. Kennedy asserted that, "Last year, we built more wind energy installations than we did all of coal and all of gas combined." Presumably, by the term "installations," he was referring to "wind farms" and coal and gas-fired generating units.

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<sup>3</sup> [http://www.eia.doe.gov/cneaf/electricity/epa/epaxlfile2\\_1.pdf](http://www.eia.doe.gov/cneaf/electricity/epa/epaxlfile2_1.pdf).

<sup>4</sup> [http://www.eia.doe.gov/cneaf/electricity/epa/epaxlfile2\\_1.pdf](http://www.eia.doe.gov/cneaf/electricity/epa/epaxlfile2_1.pdf).

As explained below, such comparisons have little meaning but a look at the facts is worthwhile. According to EIA,<sup>5</sup> the number “generators”<sup>6</sup> and their nameplate capacity added during 2008 are shown in the table below.

One could argue that Mr. Kennedy was correct because there were only 5 coal-fired generating units and 94 natural gas fired units (thus  $5 + 94 = 99$ ) added during 2008 while there were 101 “wind farms” added. However, his statement ignores the important facts about the generators:

- a. Capacity per “generator” clearly varies widely among various energy sources.
- b. Wind turbines produce electricity only when the wind is blowing in the right speed range,<sup>7</sup> so their output is intermittent, volatile and unreliable. Solar photovoltaic units produce only when the sun is shining.
- c. Generating units powered by coal, petroleum, natural gas, nuclear energy, hydropower, wood, geothermal (usually), and biomass-fired units are considered “reliable” and “dispatchable”; that is they can produce electricity whenever they are called upon to do so.
- d. Wind turbines, since they produce electricity only when winds are strong enough, have low “capacity factors”<sup>8</sup> compared to coal, natural gas, and nuclear powered units. The average capacity factor of wind turbines in the US in 2007 was about 30%. Nuclear plants have capacity factors in the high 80s and low 90% range. Coal plants typically have capacity factors in the 70s and low 80% range. Again, the output from coal, nuclear, natural gas and other traditional energy sources is reliable, not intermittent and unreliable like wind turbines.

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<sup>5</sup> [http://www.eia.doe.gov/cneaf/electricity/epa/epaxfile1\\_5.pdf](http://www.eia.doe.gov/cneaf/electricity/epa/epaxfile1_5.pdf).

<sup>6</sup> In the case of wind, the number of “generators” probably refers to the number of “wind farms.”

<sup>7</sup> Starting to produce around 6 mph, reach rated capacity around 32 mph and cut out (to avoid equipment damage) around 56 mph.

<sup>8</sup> “Capacity factor” is calculated by dividing the amount of electricity produced over a certain period by the nameplate capacity of the generating unit x the hours in the period. For example, a 1.5 megawatt (= 1,500 kilowatt) wind turbine that produced 3,942,000 kWh of electricity in a year would have a “capacity factor” of 30%; i.e., 3,942,000 kWh divided by 8760 hrs in year x 1500 kW nameplate capacity.

Energy Source	Number of “Generators”	Nameplate Capacity (Megawatts)
Coal	5	1,651
Petroleum	40	95
Natural gas	94	8,700
Hydro	7	17
Wind	101	8,304
Phovoltaic	47	32
Wood & wood derived	3	52
Geothermal	4	56
Other Biomass	131	132
Other	1	22
<b>Total:</b>	433	19,602

- e. Wind turbines, because they depend on wind conditions, tend to produce their electricity at night and in colder months – not at the time of high electricity demand in most parts of the US. Peak demands tend to occur during late afternoons on weekdays in July and August. Thus the electricity from wind turbines has lower value because of when it is produced.
- f. Because wind turbines produce intermittently and are unreliable, they do not replace the need for reliable, dispatchable generating units that are needed to assure the reliability of electricity during periods of peak demand. Thus, areas experiencing increasing peak electricity demand or needing to replace old generating units will have to add reliable generating capacity whether or not they build unreliable “wind farms.”

The net effect of these important considerations is that the electricity from “wind farms” is low in value as well as unreliable and thus aren’t really comparable to the other traditional electric generating units that are being built in the US.

### 3. **MR. KENNEDY’S FALSE CLAIMS ABOUT CHINA’S PLANS FOR BUILDING “WIND FARMS.”**

Mr. Kennedy stated that “China has committed this year to spend \$7 trillion over the next five years developing its wind and solar energy, more than it’s spending on its military.”

- a. Amount of intended investment. Mr. Kennedy’s statement appears to be substantially in error. There are reports that China plans to have 100 gigawatts - GW (100,000 MW) of wind generating capacity by 2020<sup>9</sup> (10 years from now). As of the end of 2008, China apparently had installed a total of 12,210 MW of wind generating capacity. Another source indicates China plans 150,000 GW of capacity by 2020.<sup>10</sup> This source (Greenpeace) estimated cost per MW of less than \$1,000,000 per MW.

<sup>9</sup> <http://www.gwec.net/index.php?id=125>.

<sup>10</sup> <http://www.greenpeace.org/china/en/campaigns/countdown-to-copenhagen/beijing-wind-farm>.

Determining the amount of China's intended investment in wind turbine capacity would depend on knowing both the intended total generating capacity and the cost per MW. While the facts about commitment and cost are unclear, the approximate size of the total capital investment commitment can be estimated roughly. Specifically, four examples using two different 10 year commitments and two different costs per MW provide a range of estimates:

Determining Possible 2020 Commitment (in MW)	Capital Cost per MW	Total Cost
100,000	\$1,000,000	\$100 billion
150,000	\$1,000,000	\$150 billion
100,000	\$2,000,000	\$200 billion
150,000	\$2,000,000	\$300 billion

All these numbers – even assuming 10 years rather than the 5 years claimed by Mr. Kennedy, are substantially less than the \$7 trillion claimed by Mr. Kennedy. He did say “wind and solar,” but his number is so wildly high that calculating potential solar investments would not be productive use of time.

- b. **Coal vs. reliable generating capacity in China.** According to one source, China's objective is to have 3% of its electricity produced from non-hydro renewables by 2020.<sup>11</sup> Therefore, even if China were to achieve this objective, it apparently will have to continue expanding its generating capacity that relies on hydro, coal, and nuclear energy for the overwhelming share of its anticipated electricity requirements.
- c. **Potential constraints on China “wind farm” expansion.** China apparently faces several of the same constraints on the expansion of its wind generating capacity that are faced in the US.<sup>12</sup> Specifically:
  - 1) Integrating intermittent, volatile, and unreliable output from wind turbines into its electric grids and assuring the availability of reliable generating capacity to provide the backup and balancing roles.
  - 2) Building the expensive and inefficiently used transmission capacity to bring the electricity from wind turbines from remote areas to populated areas where electricity is needed.

<sup>11</sup> <http://www.gwec.net/index.php?id=125>.

<sup>12</sup> <http://www.gwec.net/index.php?id=125>.



- 3) Justifying the higher cost when the country's electricity requirements could be satisfied at substantially lower cost by building reliable generating units close to the areas where the electricity is needed.
4. **MR. KENNEDY'S MISLEADING CLAIMS ABOUT THE COST OF BUILDING "WIND FARMS" VS. COST OF BUILDING COAL-FIRED PLANTS.** Mr. Kennedy stated, "You can build a wind plant even cheaper than you can build a coal plant." This statement is grossly misleading.

According to the US EIA AEO 2009,<sup>13</sup> the overnight capital cost for a conventional coal fired generating plant would be \$2,058 per kW of capacity (in 2007\$), and the overnight capital cost for wind generating capacity would be \$1,923 per kW of capacity (in 2007\$). Assuming EIA's assumptions are accurate, Mr. Kennedy would be technically correct.

However, this comparison is quite meaningless because:

- a. The coal-fired plant would be a source of reliable, dispatchable power whenever required to meet electric customers' electricity demands.
  - b. The wind turbines produce electricity only when wind speed is sufficient so the output is substantially less (i.e., lower "capacity factor"); is intermittent, volatile, and unreliable; and has less value because the electricity is unlikely to be available when most needed. (All these factors are explained in paragraph 2, above.)
5. **MR. KENNEDY'S FALSE DEPICTION OF THE US AS "THE SAUDI ARABIA OF WIND."** Mr. Kennedy stated: "And guess what, the Midwest of our country is the Saudi Arabia of wind. We have more wind – North Dakota, the windiest place on the planet. We have enough wind in North Dakota, Montana and Texas we have enough wind to provide 100 percent of the energy needs of this country for the next 50 years..."

For the past 15 years or more, advocates of wind energy have made rash claims about the amount of electricity that could be generated from wind in the U.S., often citing areas in the Midwestern US as the "Saudi Arabia of wind." In fact, DOE's National Renewable Energy "Laboratory" (NREL) recently issued a "new assessment" indicating that the US has the *potential* to generate 36,919,551 gigawatt-hours (GWh) of electricity annually from wind.<sup>14</sup> This estimate is more than three times a Pacific Northwest "Laboratory" 1993 estimate of US wind potential.

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<sup>13</sup> <http://www.eia.doe.gov/oiaf/aeo/assumption/pdf/tbl8.2.pdf> The latest EIA assumptions available at this date.

<sup>14</sup> [http://www.windpoweringamerica.gov/filter\\_detail.asp?itemid=2542](http://www.windpoweringamerica.gov/filter_detail.asp?itemid=2542) "Estimates of Windy Land Area and Wind Energy Potential by State for Areas >=30% Capacity Factor at 80m," February 4, 2010.

For comparison purposes, it's useful to note that total US electric generation in 2008 was 4,119,588 GWh,<sup>15</sup> so it is not surprising that someone might jump to the false conclusion that all US electricity requirements could easily be generated using wind turbines.

Equally erroneous conclusions have often been reached about other *potential* natural resources such as oil from shale or magnesium from the ocean floor. Such conclusions typically ignore practical and economic feasibility and that is certainly the case with Mr. Kennedy's "Saudi Arabia of wind" assertion and similar claims by others such as "wind in Texas, or Montana, or North Dakota could supply X% of all US electricity requirements."

The claims about wind are erroneous because:

- a. The location of the *potential* wind resource is often far from the areas where electricity is needed.
- b. The full, true cost of building the "wind farms" to capture the wind and turn it into electricity greatly exceeds the cost of generating electricity using other energy resources.
- c. Huge expenditures would be required to build transmissions lines from the areas where the *potential* wind resources are located to the place where electricity is needed.
- d. Transmission of electricity over long distances results in "line losses" that further impair the economics of wind energy and, furthermore, wind farms make inefficient use of transmission capacity, further impairing the economics.
- e. Wind farms use large areas of land, making them unacceptable in many areas.
- f. Construction and operation of wind farms and transmission lines have adverse environmental, ecological, economic, electric system reliability, scenic and property value impacts – as demonstrated by the growing opposition to the construction of these facilities.

Clearly, claims such as those made by Mr. Kennedy are false and have contributed to the incorrect popular wisdom about wind energy in the public, media and among government officials.

6. **MR. KENNEDY'S FALSE CLAIMS ABOUT THE COST OF ELIMINATING AND REPLACING US ELECTRIC GENERATING UNITS USING CARBON-BASED FUELS.** Specifically, Mr. Kennedy stated, "We use 1,000 gigawatts a year – or a day during peak demand. Five hundred of those are carbon. To eliminate those and replace them with solar and wind would cost \$1.2 trillion."

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<sup>15</sup> <http://www.eia.doe.gov/cneaf/electricity/epa/epaxlfilees1.pdf>, Table ES1, page 11.



- a. **What did he mean?** It's hard to tell what Mr. Kennedy meant by these cryptic comments but, whatever the meaning, the comments appear to be incorrect.

Perhaps he was referring to total US summer electric generating capacity as of the end of 2008 which, according to EIA was 1,010,171 gigawatts (GW), with the amount for each energy source shown in the table below. About 75% of that capacity uses carbon based fuels (coal, petroleum, natural gas, other gas), so that apparently isn't the "Five hundred" that Mr. Kennedy referred to.

It's conceivable that he intended to refer to the amount of electric generation from coal fired generating units which, as shown in the table below is 48%, which is about half of the total US electric generation in 2008.

Energy Source	Generating Capacity – Summer (in Megawatts) <sup>16</sup>	Share of Total	2008 Electric Generation (in 1,000 Megawatt-hours) <sup>17</sup>	Share of Total	Nationwide Capacity Factor <sup>18</sup>
Coal	313,322	31.0%	1,985,801	48.2%	72.4%
Petroleum	57,445	5.7%	46,243	1.1%	9.2%
Natural Gas	397,432	39.3%	882,981	21.4%	25.4%
Other Gases	1,995	0.2%	11,707	0.3%	67.0%
Nuclear	100,755	10.0%	806,208	19.6%	91.3%
Hydroelectric	77,930	7.7%	254,831	6.2%	37.3%
Other Renewables	38,493	3.8%	126,212	3.1%	37.4%
Pumped Storage	21,858	2.2%	- 6,288	- 0.2%	n/a
Other	942	0.1%	11,692	0.3%	n/a
<b>Total:</b>	1,010,171	100%	4,119,388	100%	46.6%

- b. **Assertions about substituting wind and solar are incorrect.** In any case, Mr. Kennedy was incorrect in asserting wind and/or solar generating units could "replace" reliable generating capacity. As explained earlier in Paragraph 2, above, wind turbines and solar photovoltaic units produce electricity only, respectively, when the wind is blowing or the sun is shining. Neither can be counted on to supply electricity when it is required by electric customers. Furthermore, wind turbines tend to produce

<sup>16</sup> US Generating capacity 2008: [http://www.eia.doe.gov/cneaf/electricity/epa/epaxlfile1\\_1.pdf](http://www.eia.doe.gov/cneaf/electricity/epa/epaxlfile1_1.pdf). Table 1.1, p.15.

<sup>17</sup> US electric generation 2008: [http://www.eia.doe.gov/cneaf/electricity/epa/epaxlfile2\\_1.pdf](http://www.eia.doe.gov/cneaf/electricity/epa/epaxlfile2_1.pdf). Table 2.1, p.28.

<sup>18</sup> These numbers are quite theoretical since they assume that the generating capacity shown in the first column of numbers is available 100% of the time (8760 hours per year). The "capacity factor" shown is the result of dividing the actual generation (in 1,000 megawatt-hours – MWh) shown in the 3<sup>rd</sup> column of numbers by the product of 8760 hrs. times the generating capacity shown in the first column of numbers. Capacity factors for various "other renewable" generation vary widely depending on the energy source. For example, wind capacity factor is about 28%. Wood and biomass have higher capacity factors.

electricity at night and in colder months, not on hot weekday afternoons in July and August when electricity demand reaches peak levels in most areas of the US.

- c. **Furthermore, Mr. Kennedy apparently lost three zeroes in his calculation of cost!** Even if the objective was to replace as many kilowatt-hours as were produced by coal in 2008, it would take nearly 810,000 MW (810,000,000 kW) of wind turbine capacity operating at 28% capacity factor (approximate US installed wind turbine capacity factor in 2008) to produce as many kWh of electricity as produced by coal-fired generating plants in the US in 2008.

810,000,000 kW of wind turbine capacity, even if the cost were only \$2,000 per kW, would cost over \$1.6 quadrillion (\$1,620,000,000,000), not the \$1.2 trillion (\$1,200,000,000) claimed by Mr. Kennedy.

- 7. **WIND TURBINES AND “WIND FARMS” ARE NOT AS POPULAR AS MR. KENNEDY IMPLIES.** Specifically, he stated that “As I said, were (sic) building these plants all over. If you leave West Virginia, West Virginia is 99 percent dependent on coal. You go to other areas of this country and you’ll see wind plants.”

- a. **Wind turbine capacity in the US as of December 31, 2009, totaled 35,159 MW, according to the American Wind Energy Association (AWEA).**<sup>19</sup> The capital cost of these turbines is probably in the range of \$50 to \$60 billion. Federal, state, and local tax breaks and subsidies have shifted billions of dollars in cost and tax burden from “wind farm” owners to taxpayers and electric customers. The “wind farms” have been built primarily because of two federal tax breaks (Production Tax Credits, and accelerated depreciation) and state “Renewable Portfolio Standards” calling on electric utilities to provide some specified portion of their electricity from “renewable” sources, including wind. Four states – Texas, Iowa, California and Washington account for just over 50% of the total capacity.

Mr. Kennedy is almost correct in his statement about the source of electric generation in West Virginia because, in 2008, according to EIA,<sup>20</sup> West Virginia did get 97.8% of its electricity from coal, 1.4% from hydro, 0.4% from wind, 0.2 from natural gas and 0.1% each from Petroleum and other gases.

- b. **West Virginia, according to AWEA, did have 330 MW of wind turbine capacity as of December 31, 2009,** with an additional 100.5 MW under construction. Among the states, West Virginia ranked 19<sup>th</sup> in wind turbine capacity as of December 31, 2009.
- c. **Proposed “wind farms” are experiencing greater citizen opposition in most states** as their adverse environmental, ecological, scenic and property value impacts become known. There has been a sharp increase during the past year in the number

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<sup>19</sup> <http://www.awea.org/publications/reports/4Q09.pdf>.

<sup>20</sup> [http://www.eia.doe.gov/cneaf/electricity/epa/epa\\_sprdshts\\_monthly.html](http://www.eia.doe.gov/cneaf/electricity/epa/epa_sprdshts_monthly.html).

of media stories reporting on the adverse impacts associated with wind farms as well as the externalities that have not been widely recognized.

**8. THE HIGHLY MISLEADING “STUDY” CITED BY MR. KENNEDY TO BACK UP HIS CLAIM OF JOB BENEFITS FROM EITHER A PROPOSED “WIND FARM” ON COAL RIVER MOUNTAIN OR A WIND TURBINE, TOWER, AND BLADE MANUFACTURING INDUSTRY IN RALEIGH COUNTY, WEST VIRGINIA.**

Mr. Kennedy stated that “... there’s a group here from Coal River Mountain that is trying to build a wind farm and there’s a study by Hendricks that shows – by an MIT professor that shows if they build that wind farm that it’s going to pay the country \$1.7 million a year, that its going to take 1,700 people to build the farm, it will employ 70 to 100 people permanently.”

The “study by Hendricks” that Mr. Kennedy referred to apparently is a report entitled, “The Long-Term economic Benefits of Wind Versus Mountaintop Removal of Coal on Coal River Mountain, West Virginia,” prepared by “Downstream Strategies,” dated December 2008, and submitted to “Coal River Mountain Watch, P.O. Box 651, Whitesville, WV 25209.”<sup>21</sup>

Authors of the report are listed as “Evan Hansen, Alan Collins, Michael Hendryx, Fritz Boettner, and Anne Hereford. None of the authors claims to be an “MIT Professor” in resumes available via the Downstream Strategies web site.”<sup>22</sup>

The employment numbers cited by Mr. Kennedy – 1,700 temporary and 70 to 100 permanently – appear to be based on his or someone’s interpretation of the benefits from a scenario (described below) that is totally unrealistic. (The employment numbers probably came from Table 10, appearing on page 25 of the report).<sup>23</sup>

It’s quite conceivable that the authors started with a preferred conclusion – perhaps dictated by the client – and then searched scenarios and for information, however valid, that might appear to support the preferred conclusion while overlooking or ignoring valid, conflicting information and data.

In any case, the information in the report dealing with *wind energy* is far from objective or accurate. *The misleading nature of the report begins with the front cover* which depicts wind turbines nestled on heavily forested mountain ridges. An accurate presentation of a “wind farm” in a mountainous area would show hundreds of clear cut and scarred acres of land around the wind turbines – areas cleared for construction of the turbines, for roads to bring in construction equipment, turbines, towers, and blades, and to provide an unobstructed path for the wind needed to turn the blades.

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<sup>21</sup> <http://www.coalriverwind.org/wp-content/uploads/2008/12/coalvswindoncoalrivermtn-final.pdf>.

<sup>22</sup> <http://www.downstreamstrategies.com/>.

<sup>23</sup> <http://www.coalriverwind.org/wp-content/uploads/2008/12/coalvswindoncoalrivermtn-final.pdf>.

Examples from the body of the report that show why the report is misleading and should not be taken seriously include those listed below.

a. **Unrealistic wind scenarios.** Among the three scenarios for the use of the Coal River Mountain area selected for analysis are two involving wind turbines:

- 1) A “wind farm” consisting of 164 wind turbines, each with rated capacity of 2 MW, for a total of 328 MW. Turbines are assumed to last 20 years and would be replaced four times to provide a “wind farm” lasting 100 years. This “wind farm” would co-exist with continued underground mining.<sup>24</sup> While the authors calculated income over the full 100 years, they chose not to apply any discount factors to any “projections of jobs, earnings, or output.”<sup>25</sup>
- 2) The above 164 wind turbine scenario PLUS developing a local wind industry what would permit building the wind turbines, towers and blades locally for the proposed Coal Mountain “wind farm” and other “wind farms.”<sup>26</sup>

Apparently the authors of the report recognized that the idea of developing a local wind industry to supply wind turbines, towers and blades was unrealistic since *they provided no information or analysis suggesting that such an industry really could be developed in southern West Virginia or that it could compete successfully in the already existing, highly competitive wind turbine, tower, and blade manufacturing market.* Oddly, the authors did calculate various “economic benefits” of such a scenario even though it is totally unrealistic.

b. **Use of Faulty JEDI (Jobs and Economic Development Impact) Model to calculate area job and economic benefits.**<sup>27</sup> While often used by wind energy advocates to estimate local or state jobs and economic benefits of proposed “wind farms,” the model is deficient and generally overestimates potential benefits. The problems with the model have been explained in various papers. The assumptions and operations of the model that result in overestimating benefits include:

- 1) Assuming that a large share of the workers employed during the relatively short “wind farm” construction phase are obtained locally when, in fact, most of such workers – particularly for the higher skilled, higher paying jobs – are brought in temporarily.

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<sup>24</sup> Op. cit., page 15ff.

<sup>25</sup> Op. cit., page 20, first full paragraph.

<sup>26</sup> Op cit., page 17ff.

<sup>27</sup> The JEDI model was developed by a wind industry advocate using tax dollars flowing through the US Department of Energy and the National Renewable Energy “Laboratory” (NREL). Both organizations continue to promote use of the model, even though its faults have been pointed out repeatedly, thus misleading local government officials, landowners considering leases for turbines, and potential investors.

- 2) Assuming that temporary workers spend the entire construction period in the local area when many and probably most travel to their permanent homes for at least some and probably many weekends and holidays.
- 3) Assuming that temporary workers spend their paychecks locally when they are far more likely to spend the bulk of their earnings to maintain their homes and support their families living at their permanent residence, often in another state.
- 4) Assuming that temporary workers pay taxes in the area where they are employed only temporarily.
- 5) Assuming that land lease revenue is spent or invested locally. The authors assume that 25% of the lease revenue is spent in the local economy while pointing out that the “overwhelming” share of land is owned by absentee landowners. Even if 25% was locally owned, there is no assurance that the lease revenues would be spent or invested in the local area.

c. **Overstating the local economic benefits of materials and supplies purchased locally.**

The JEDI model, as well as some other input-output models, and those employing them often make a serious error by assuming that the *full* cost of materials, supplies and services purchased locally (either by the “wind farm” owner-operators and those purchased by temporary or permanent workers – direct and indirect) can legitimately be used as model inputs. In fact, only the *local value added* portion of the costs of locally purchased materials, supplies, and services can have local economic benefit.

A simple example illustrates the error and shows the magnitude of the potential overstatement of local economic benefits. Consider a gallon of gasoline purchased at a local service station for, say \$3, for a vehicle used at the “wind farm.” The only portion of that \$3 that could have a local economic benefit is the portion represented by the service station employee’s wages, the service station owner’s profit margin (if locally owned) and locally spent O&M costs, and the taxes paid locally. The bulk of the economic and job benefit of the \$3 would occur elsewhere because that money goes to the producer of the crude oil, the refiner who produces gasoline from the crud, the bulk fuel terminal operator, and transporters who move the gasoline from the refinery to the bulk terminal to the local service station.

Assuming that the full \$3 purchase price of the gasoline has a favorable local economic impact – direct, indirect, or induced – would overstate that impact by a factor of, probably, 7 to 10.

This issue is a serious problem for the validity of the “Downstream Strategies” report cited by Mr. Kennedy because that report assumes that 50% of the full cost of all materials, supplies and services purchased locally would have a local economic benefit.

The issue would be even more important if the “develop local wind industry” scenario was a realistic scenario. In that scenario, the authors assumed that 100% of the cost of the “wind farm” – including turbines, towers, blades and all other equipment was procured locally. Of course it’s inconceivable that the hundreds of parts going into a wind turbine (many typically manufactured in other countries) would be manufactured locally in southern West Virginia. Furthermore, the steel for towers and foundations (rebar) and the materials used in making blades would almost certainly be produced elsewhere.

- d. **Multiplying erroneous assumptions by other erroneous numbers grossly overstates potential local indirect and induced jobs and economic impact.** The JEDI model calculations of indirect and induced jobs assume that all of the assumptions described above (including the erroneous assumption about the full cost of locally procured materials, supplies and services) are correct. When these assumptions and faulty calculations are multiplied, the inevitable result is that estimates of indirect and induced impacts are grossly overstated.
- e. **Unrealistic transmission line cost assumptions.** The authors assume a cost of \$8 million for a 10 mile 115 kV transmission line to move electricity from the proposed Coal Mountain “wind farm” to a 765 kV line, based on cost information for lines built over completely different (non-mountainous) terrain in South Dakota and Texas.
- f. **Unrealistic estimates of wind turbine O&M costs.** The authors assumed annual O&M cost of \$44,000 per year per turbine with a capacity factor of 30% which works out to \$.00837 per kWh.<sup>28</sup> A recently released report based on a study of over 100 wind turbine operators shows average O&M costs of \$.027 per kWh,<sup>29</sup> roughly 3 times the estimates used by the authors of the Coal Mountain report.
- g. **False claim that “wind farms” do not adversely affect neighbors’ property values.** Specifically, the authors state that “There exists little evidence, however, that wind turbines reduce surrounding property values. Based on property sales data from ten study areas in the vicinity of wind projects, there was no evidence of negative effects on property values within the projects’ viewsheds (Sterzinger et al., 2003).<sup>30</sup> In fact, the Sterzinger report has been discredited because of faulty methodology and a later report based on similar methodology,<sup>31</sup> issued by the Lawrence Berkeley National Laboratory, has also been discredited.<sup>32</sup>

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<sup>28</sup> <http://www.coalriverwind.org/wp-content/uploads/2008/12/coalvswindoncoalrivermtn-final.pdf>. Table 9, p. 23.

<sup>29</sup> Asmus, Peter & Matthew Seitzler, “Wind Energy Operations & Maintenance Report, February 2010, page 5.

<sup>30</sup> <http://www.coalriverwind.org/wp-content/uploads/2008/12/coalvswindoncoalrivermtn-final.pdf>, page 32.

<sup>31</sup> Hoen, B., R. Wiser, P. Cappers, M. Thayer, and G. Sethi., The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis, LBNL-2829E. December 2009.

<sup>32</sup> <http://www.arwilson.com/pdf/newpdfs/WindFarmsResidentialPropertyValuesandRubberRulers.pdf>.



Furthermore, any assertion that the value of a residential property located within a few hundred feet of a towering, 400+ foot, 40+ story wind turbine is unaffected by being close to that turbine defies common sense and is contrary to evidence provided by court decisions, tax assessments, and other evidence from around the world.

Denmark, often cited by wind advocates as a model for wind energy development, has an explicit policy that, “An erector of a wind turbine has a duty to pay compensation for loss of value of real property following the erection of the wind turbine. The size of the loss of value is determined by an appraisal authority.”<sup>33</sup>

- h. **Ignoring “wind farm” externalities.** As more “wind farms” have been constructed in the US and other countries, the externalities associated with “wind farms” have become much better known. They include but are not limited to noise, shadow flicker, killing of birds and disruption of migration routes, disruption and destruction of animal habitat, clear cutting of large areas for roads and for construction and operation of wind turbines, destruction of scenic vistas, and reduction of neighbors’ property values.

- 9. **FALSE AND MISLEADING CLAIMS ABOUT RENEWABLE ENERGY INSTALLATIONS IN OTHER STATES.** Mr. Kennedy stated that, “Those communities already – I’m working with those communities right now. And those communities are very, very progressive. Colorado particularly, Governor Ritter, and Utah also in constructing huge wind farms, huge solar thermal plants that are on the books and under construction and already operating.”

Mr. Kennedy is correct in stating that wind farms have been constructed in Colorado and Utah. At the end of 2009, Colorado had 7 “wind farms” with installed wind turbine capacity totaling 1,246 MW and Utah had 3 “wind farms” with capacity totaling 223 MW.

As explained earlier, wind turbine produce electricity only when the wind is blowing in the right speed range<sup>34</sup> so their output is intermittent, volatile, and unreliable. Further, the electricity they do produce usually comes at night in colder months, not on hot weekday late afternoons in July and August when electricity demand tends to be highest.

Because output from wind turbines is unreliable, grid managers must always have reliable generating units immediately available to “back up” unreliable wind generation and keep the grid in balance.

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<sup>33</sup> <http://www.ens.dk/en-us/supply/renewable-energy/windpower/onshore-wind-power/loss-of-value-to-real-property/sider/forside.aspx>.

<sup>34</sup> Depending on the turbine, they begin producing electricity when wind speeds reach about 6 mph, achieve rated capacity around 32 mph, and cut out (to avoid equipment damage) around 56 mph.

Unfortunately, these “wind farms” in Colorado and Utah were very expensive to build and a large share of the cost will be borne by taxpayers because of enormous federal and state tax breaks and subsidies that shift costs from the “wind farm” owners to ordinary taxpayers who do not have access to such special interest tax breaks. The owners of the 10 “wind farms” will be able to avoid over \$75 million per year in corporate income tax just due to one federal tax break; i.e., the Production tax credit. That’s in addition to their ability to recover their capital costs and avoid additional income tax due to their ability to use 5-year double declining balance accelerated depreciation for corporate income tax purposes. Any state tax breaks are additional – as are the inherent subsidies due to state Renewable Portfolio Standards (RPS).

In 2008, Colorado relied on coal for 65% and natural gas for 25% of its electricity. Utah relied on coal for 68% and natural gas for 27% of its electricity.

- 10. MR. KENNEDY’S FALSE CLAIMS ABOUT THE “EFFICIENCY” AND COMPETITIVENESS OF ELECTRICITY FROM WIND.** Mr. Kennedy claimed that, “And the environmental laws are all intended to restore free market capitalism in our country by forcing actors in the market place to pay the true cost of bringing a product to market. And if we did that there is no way that your industry could compete against wind and solar in a true marketplace because we can produce the energy much more efficiently.”

Mr. Kennedy apparently does not understand either the high true cost or the low true value of electricity from wind.<sup>35</sup>

In fact, the principal reason “wind farms” are being built is for owners to take advantage of huge federal, state, and/or local tax breaks and subsidies which (a) make the “wind farms” highly profitable, and (b) which shift costs from “wind farm” owners to ordinary taxpayers and electric customers.

Initially, the rationale for tax breaks and subsidies for electricity for wind was that an emerging technology needed a temporary economic incentive to permit it to gain a foothold in markets in competition with mature technologies for producing electricity. However, The wind industry in its insistence on extending and expanding tax breaks and subsidies that there is no real hope that wind will ever be an economically competitive source of energy for producing electricity.



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<sup>35</sup> See, “The True Cost of Electricity from Wind is always Underestimated and its Value is always Overestimated,” <http://www.windaction.org/documents/25496>; <http://www.wind-watch.org/documents/true-cost-of-electricity-from-wind-is-always-underestimated-and-its-value-is-always-overestimated/>; and [http://scienceandpublicpolicy.org/reprint/electricity\\_wind\\_costs.html](http://scienceandpublicpolicy.org/reprint/electricity_wind_costs.html).

**Glenn R. Schleede** is an independent analyst and writer who focuses primarily on energy matters. He is semi-retired after working on energy and related matters in government and the private sector for more than 30 years. He now devotes a large share of his time to self-initiated and self-financed research, analysis and writing about (a) government policies and programs that are detrimental to consumers and taxpayers, and (b) government or private sector activities that are presented to the media, public and government officials in a false or misleading way.

From 1992 until September 2003, Schleede maintained a consulting practice, Energy Market and Policy Analysis, Inc. (EMPA), providing analysis of energy markets and policies. During that time he worked primarily on natural gas and electricity issues.

Prior to forming EMPA, Schleede was Vice President of New England Electric System (NEES), Westborough, MA, and President of its fuels subsidiary, New England Energy Incorporated. His time with NEES included responsibilities for procurement and transportation of coal, natural gas and oil for NEES facilities, NEES's oil and gas exploration and coal shipping ventures, and NEES economic planning and budgeting functions.

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## ATTACHMENT A

Shown below are quotes from Robert Kennedy, Jr. concerning wind energy, as those quotes appear in the transcript of a January 21, 2010, Forum on the Future of Energy, at the University of Charleston, West Virginia.

Where Quote Begins	Robert Kennedy, Jr's Statements
Page 22, Line 4	"First of all, industrial growth and prosperity is (sic) not dependent on coal in this country. We have a lot of other alternatives. We have the best energy resource of any nation in the world, we have the finest wind resources on earth, we now employ, as of 2008, more people in the wind industry than we do as coal miners in this country."
Page 22, Line 10	"Last year, we built more wind energy installations than we did all of coal and all of gas combined."
Page 34, Line 14	<p>"One is the statistics I got about – talked about (sic) the wind energy comes from the Bureau of Labor Statistics. There's 85,000 people in 2008 employed in the wind industry, there's 81,000 the same year employed as coal miners. The jobs in the wind industry are very high paying, but more money goes to the workers."</p> <p>"In your industry, for example, in your company, you actually take home more money in some years than all your shareholders combined, so what the mining industry does, it makes a few people rich by making everybody else poor, whereas the wind industry distributes wealth and distributes the benefits of that industry more evenly."</p>
Page 35, Line 18	"China has committed this year to spend \$7 trillion over the next five years developing its wind and solar energy, more than it's spending on its military. It sees this as a new arms race. We have been leading the world in wind development for the last 10 years. "
Page 27, Line 20	"You can build a wind plant even cheaper than you can build a coal plant. And guess what, the Midwest of our country is the Saudi Arabia of wind. We have more wind – North Dakota, the windiest place on the planet. We have enough wind in North Dakota, Montana and Texas we have enough wind to provide 100 percent of the energy needs of this country for the next 50 years..."
Page 38, Line 9	"We use 1,000 gigawatts a year – or a day during peak demand. Five hundred of those are carbon. To eliminate those and replace them with solar and wind would cost \$1.2 trillion."
Page 40, Line 22	"As I said, were building these plants all over. If you leave West Virginia, West Virginia is 99 percent dependent on coal. You go to other areas of this country and you'll see wind plants."

Page 41, Line 10	“...there’s a group here from Coal River Mountain that is trying to build a wind farm and there’s a study by Hendricks that shows – by an MIT professor that shows if they build that wind farm that it’s going to pay the country \$1.7 million a year, that its going to take 1,700 people to build the farm, it will employ 70 to 100 people permanently.”
Page 44, Line 11	“Those communities already – I’m working with those communities right now. And those communities are very, very progressive. Colorado particularly, Governor Ritter, and Utah also in constructing huge wind farms, huge solar thermal plants that are on the books and under construction and already operating.”
Page 46, Line 21	“And the environmental laws are all intended to restore free market capitalism in our country by forcing actors in the market place to pay the true cost of bringing a product to market. And if we did that there is no way that your industry could compete against wind and solar in a true marketplace because we can produce the energy much more efficiently.”