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## **Wind Energy Will NOT Reduce US Oil Dependence – July 2007 Update -- 2006 Data**

One of the false claims made by “wind energy” advocates is that greater use of wind energy would reduce US dependence on oil, including oil imports.

In fact, adding more wind turbines will have no significant impact on US oil consumption.

Unfortunately, many well-meaning people (including reporters) and some regulators and political leaders have accepted – and repeated -- the wind advocates’ false claims about reductions in oil use. This brief paper explains why the reduced oil use claim is false.

(The claim about reduced oil dependence is only one of many false and misleading claims made by the wind industry, US Department of Energy (DOE), DOE’s National Renewable Energy “Laboratory” (NREL) and other wind advocates. Other such claims are discussed elsewhere.<sup>1)</sup>)

### **Facts about oil use in electric generation in the US**

1. The only potential use of wind turbines is to produce electricity.
2. Very little oil is used in the US to produce electricity. In 2006, only 1.07% of the electricity generated in the US was produced by using oil.<sup>2</sup> Oil use was down significantly from 2005, undoubtedly due to high oil prices which led to greater use of other energy sources -- principally natural gas, and coal. Shares of electric generation from nuclear energy and hydropower also increased. The share of electricity produced by oil has dropped well below EIA’s projections<sup>3</sup>
3. Most of the use of oil in the US for electricity generation occurs in a few states. As shown in the attached table, in 2006, 3 states (Florida, Hawaii and New York) accounted for more than 70% of all the electricity in the US generated by using oil.
4. Oil accounted for more than 5% of electric generation in only 4 states and the District of Columbia. Those states are Hawaii, Florida, Massachusetts, and Alaska.
5. Oil accounted for less than 1% of electric generation in 39 states. Thirty-six of those were less than ½ of 1%.

### **Reasons why wind energy will have no significant impact on oil use for electric generation**

6. Even in the 11 states (and the District of Columbia) where oil accounts for more than 1% of electricity generation, adding wind turbines would have very little, if any, impact on oil consumption. The facts supporting this conclusion are complex and many of those who have believed the false claims might be forgiven for their errors. However, the complexity does not excuse officials from DOE, NREL or the wind industry who should know better. But, in any case, here is why wind energy is highly unlikely to reduce to reduce oil use in electric generation:

- a. About 7.7% of the oil used in electric generation in 2006 was “distillate” oil<sup>4</sup> used in combustion turbine and internal combustion electric generating units.<sup>5</sup> The cost of this oil is high and such units are used almost exclusively in times when electricity demand is at its highest level (e.g., during hot weekday afternoons in July and August). Little if any wind generated electricity is available during those times.
- b. Most of the remaining 92% of the oil used in electric generation was “residual oil” (#4 & #5) that is used in older, oil-fired steam-electric generating units (oil is burned to heat water and create steam to drive a turbine).
- c. These older oil-fired steam-electric units are quite unlikely to be the units that are backed down or ramped up to adjust for the intermittent, highly volatile (output often varies widely minute to minute) and largely unpredictable output from wind turbines – which produce electricity only when the wind is blowing in the right speed range.<sup>6</sup> Also, some of the old oil-fired steam-electric units are located close to major load centers (e.g., New York City and Long Island) and must be run to maintain proper voltage.
- d. Instead, the generating units that are likely to be used to “back up” the intermittent wind turbines will be units that are either:
  - 1) Designed and designated to serve in an Automatic Generation Control (AGC) mode to keep an electric grid in balance (i.e., frequency and voltage),
  - 2) Producing at less than full capacity and capable of ramping up or down on short notice, or
  - 3) Operating in a “spinning reserve” mode.<sup>7</sup>

Electricity supply and demand must be kept in balance. Electricity production is constantly adjusted to meet electricity demand. The generating units that serve best in backing up intermittent, volatile wind turbines are hydropower units because the output from these units can be increased or decreased almost instantaneously. The next best alternatives are gas-fired turbine-based generating units (e.g., combined-cycle or larger simple cycle). Oil-fired units are less likely to be used in the required balancing role for wind turbines because (a) the oil-fired combustion turbine and internal combustion units are unlikely to be running except in times of peak demand, and (b) the oil-fired steam-electric units are likely to have slower response times than is necessary to back up wind turbines.

- e. The generating units used to “back up” intermittent and volatile wind generation will depend on the generating mix and other conditions in the grid *control area* that is receiving the electricity from wind turbines. In the Pacific-Northwest, for example, hydro power would likely serve in the balancing role – with no savings in oil. In New England, with its heavy dependence on natural gas and a significant amount of newer gas-fired generating capacity, a gas-fired unit would likely serve in the balancing role, again with little or no savings in oil use.
7. In summary, there is very little likelihood that any oil use in electric generation would be reduced by adding wind turbines. This would certainly be true in the states with only small shares of their electric generation from oil.

The electric industry officials who will have the exact data on the generating units that are run to balance the intermittent and volatile output from wind turbines are those who handle the day to day management and control of electric grids and transmission systems; i.e., depending on the region of the US, electric utility, the power pool, the independent system operator (ISO), or the regional transmission organization (RTO).

### **Where is most oil used in the US?**

During 2006, US oil use<sup>8</sup> averaged 20,588,000 barrels per day.<sup>9</sup> The shares of 2006 US oil consumption by sector were as follows:<sup>10</sup>

• Transportation.	-	68.9%
• Industrial	-	24.1%
• Residential	-	3.6%
• Commercial	-	1.8%
• Electric generation	-	<u>1.6%</u>
Total	-	100%

As the above table suggests, those seeking a reduction in US oil consumption will need to focus primarily on oil use in transportation.

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Attachment: 2006 Electric Generation by State & US Total – All energy sources & petroleum

### Endnotes:

<sup>1</sup> For facts about other false and misleading claims, see my paper entitled: “Facing up to the true costs and benefits of wind energy,” June 24, 2004, and others that can be found at <http://www.windaction.org/>, or <http://www.wind-watch.org/> or [www.tsaugust.org](http://www.tsaugust.org).

<sup>2</sup> US Energy Information Administration, Electric Power Monthly, March 2006, Tables 1.6b and 1.8b

<sup>3</sup> US Energy Information Administration, Annual Energy Outlook 2007, Table A8.

<sup>4</sup> US Energy Information Administration, Monthly Energy Review, Table 7.3b.

<sup>5</sup> A small amount of distillate oil may be used as a start up fuel in oil or coal-fired steam electric generating units or occasionally to assist in flame stabilization.

<sup>6</sup> Larger wind turbines now being installed begin producing electricity when wind is around 6 miles per hour, reach rated capacity at around 33 MPH and are shut down to avoid equipment damage around 56 MPH.

<sup>7</sup> That is, running and synchronized with the grid but not inputting electricity.

<sup>8</sup> Technically, “products delivered.”

<sup>9</sup> US Energy Information Administration, Monthly Energy Review, Table 3.1b.

<sup>10</sup> US Energy Information Administration, Monthly Energy Review, Tables 2.2 – 2.6.

\* GLENN R. SCHLEEDE is semi-retired after working on energy and related matters in government and the private sector for over 30 years. He now devotes a significant portion of his time to self-financed analysis of and writing about (a) government policies, programs and regulations that are detrimental to the interests of consumers and taxpayers, and (b) government or private sector programs and projects that are presented to the media, public and government officials in a false or misleading way. “Wind energy” is a frequent topic.

## **2006 Electric Generation by State and US Total\***

All Energy Sources & Petroleum in Kilowatt-hours & Percent Petroleum

<u>State</u>	<u>Kilowatt-hours Generated -- All Energy Sources</u>	<u>Kilowatt-hours Generated -- by using Petroleum</u>	<u>% of State's Electric Generation from Petroleum</u>	<u>State Share of US oil-fired Generation</u>
Florida	223,919,000,000	15,882,000,000	7.09%	36.64%
Hawaii	10,873,000,000	8,392,000,000	77.18%	19.36%
New York	140,324,000,000	6,321,000,000	4.50%	14.58%
Massachusetts	45,514,000,000	2,310,000,000	5.08%	5.33%
Pennsylvania	218,259,000,000	1,250,000,000	0.57%	2.88%
Connecticut	34,395,000,000	1,242,000,000	3.61%	2.87%
Virginia	72,539,000,000	812,000,000	1.12%	1.87%
Maryland	48,756,000,000	596,000,000	1.22%	1.38%
Maine	16,974,000,000	592,000,000	3.49%	1.37%
Alaska	6,686,000,000	587,000,000	8.78%	1.35%
North Carolina	125,808,000,000	434,000,000	0.34%	1.00%
Mississippi	46,055,000,000	400,000,000	0.87%	0.92%
New Jersey	61,264,000,000	319,000,000	0.52%	0.74%
Michigan	112,906,000,000	318,000,000	0.28%	0.73%
Ohio	154,393,000,000	311,000,000	0.20%	0.72%
California	217,591,000,000	289,000,000	0.13%	0.67%
South Carolina	99,450,000,000	280,000,000	0.28%	0.65%
New Hampshire	22,558,000,000	255,000,000	1.13%	0.59%
Georgia	138,455,000,000	248,000,000	0.18%	0.57%
Louisiana	90,881,000,000	241,000,000	0.27%	0.56%
West Virginia	93,738,000,000	175,000,000	0.19%	0.40%
Alabama	141,105,000,000	171,000,000	0.12%	0.39%
Indiana	130,464,000,000	169,000,000	0.13%	0.39%
Texas	400,457,000,000	166,000,000	0.04%	0.38%
Tennessee	93,922,000,000	159,000,000	0.17%	0.37%
Delaware	7,236,000,000	149,000,000	2.06%	0.34%
Illinois	193,093,000,000	123,000,000	0.06%	0.28%
Arkansas	51,929,000,000	120,000,000	0.23%	0.28%
Wisconsin	61,487,000,000	106,000,000	0.17%	0.24%
Iowa	45,617,000,000	98,000,000	0.21%	0.23%
Minnesota	50,606,000,000	95,000,000	0.19%	0.22%
Kentucky	98,934,000,000	95,000,000	0.10%	0.22%
District of Columbi	81,000,000	81,000,000	100.00%	0.19%
Arizona	104,437,000,000	73,000,000	0.07%	0.17%
Oklahoma	71,044,000,000	63,000,000	0.09%	0.15%
Missouri	91,689,000,000	62,000,000	0.07%	0.14%
Kansas	45,426,000,000	55,000,000	0.12%	0.13%
Wyoming	45,300,000,000	46,000,000	0.10%	0.11%
North Dakota	31,346,000,000	43,000,000	0.14%	0.10%
New Mexico	36,187,000,000	38,000,000	0.11%	0.09%
Utah	41,264,000,000	34,000,000	0.08%	0.08%
Washington	108,968,000,000	32,000,000	0.03%	0.07%
Nebraska	31,717,000,000	20,000,000	0.06%	0.05%
Montana	27,064,000,000	18,000,000	0.07%	0.04%
Nevada	25,424,000,000	17,000,000	0.07%	0.04%
Colorado	50,698,000,000	16,000,000	0.03%	0.04%
Oregon	53,296,000,000	12,000,000	0.02%	0.03%
South Dakota	7,132,000,000	7,000,000	0.10%	0.02%
Vermont	6,804,000,000	6,000,000	0.09%	0.01%
Rhode Island	5,782,000,000	**	**	**
Idaho	13,119,000,000	**	**	**
U.S. Total	4,052,968,000,000	43,343,000,000	1.07%	100.00%

Data Source: US Energy Information Administration, Electric Power Monthly, March 2006, Tables 1.6b and 1.8b

\*\* Generation from petroleum too small to show up in EIA Data Source