

Wind Energy: Good in Europe, Great in the U.S.

The fossil fuel lobby continues its widely discredited¹ misinformation campaign against wind energy, which in its latest form attempts to use false and misleading claims about Denmark's experience with wind energy to derail efforts to move towards clean energy in the U.S.

In its latest salvo on the topic of Denmark, the fossil fuel lobby front group Institute for Energy Research does get one thing right when they note, "As the Danish wind study shows, Denmark's situation is substantially different from the situation in the United States."² **We couldn't agree more.** Integrating wind energy onto the U.S. electric grid will be far easier and offset far more carbon emissions, given the superiority and greater diversity of our wind energy resources, the fact that our electricity mix is much more heavily dominated by fossil fuels, and the additional flexibility that comes with having a power system 100 times larger than Denmark's. Unfortunately, IER's other claims about wind energy in Denmark are still dead wrong, as we illustrate in a point-by-point refutation starting on page 2.

The fact that smaller European countries with relatively isolated power systems and less stellar wind resources have successfully obtained large amounts of their electricity from wind energy is a great indicator that obtaining 20% or more of U.S. electricity from wind energy will be even easier. In addition to Denmark – which IER now apparently admits obtains 20% of its electricity from wind energy – Spain obtains 12% of its electricity from wind, Germany obtains 7%, Portugal 9%, and Ireland 11%.

The example of Ireland is particularly noteworthy, given that recent studies there have concluded that the country can obtain at least 40% of its electricity from wind energy, a remarkable feat for a small island country with only minimal grid ties to surrounding countries.³ The power system of Spain and Portugal is similarly isolated from the main European power grid, yet grid operators there have had no problems obtaining more than 10% of their electricity from wind. Spain and Ireland recently set records by obtaining around 40% of their electricity from wind on particularly windy days.⁴

¹ http://www.awea.org/newsroom/pdf/DanishWindReport_Factsheet.pdf , http://www.awea.org/blog/?mode=viewid&post_id=196 , <http://really-seriously.blogspot.com/2009/09/blowing-away-hot-air.html> , http://switchboard.nrdc.org/blogs/paltman/thinktank_behind_danish_wind_s.html , <http://www.windpower.org/presse/nyheder.html#472>

² <http://www.instituteforenergyresearch.org/2009/09/17/wind-lobby-all-spun-up-about-danish-case-study/>

³ <http://www.dcenr.gov.ie/Energy/North-South+Co-operation+in+the+Energy+Sector/All+Island+Electricity+Grid+Study.htm>

⁴ <http://greeninc.blogs.nytimes.com/2009/08/11/a-record-for-wind-in-ireland/> , <http://greeninc.blogs.nytimes.com/2009/03/06/wind-power-record-for-spain/>

Of course, studies in the U.S. have already verified that high wind penetrations are achievable here. In 2008, the Bush Administration's Department of Energy released a 200-plus page study concluding that there are no technical barriers to obtaining 20% of America's electricity from wind energy.⁵ Other peer-reviewed studies have examined higher potential wind penetrations in different regions of the U.S. and similarly concluded that they are readily achievable.⁶

To continue with a point-by-point refutation of the false and misleading claims made in the fossil fuel lobby's latest attempt to bash clean energy:

How wind is integrated into the electric grid in Denmark

Before explaining why IER's case study of Denmark has no bearing on the U.S., aside from illustrating that wind integration is even easier here, it's important to correct IER's false claims about Denmark.

In its latest rebuttal, IER makes contradictory claims about how wind energy is used on the power grid in Denmark. First, IER claims that the share of Denmark's wind power that is temporarily exported to Scandinavia "directly replaces hydropower in Norway and Sweden, allowing Norwegian and Swedish lakes and reservoirs to retain more water then release the water to produce electricity."⁷ This is correct, and it is good to see IER acknowledge this important fact that AWEA pointed out in our first rebuttal to the IER report.⁸ **Unfortunately, IER then conveniently ignores an equally important fact, which is that when this stored water is later released it is used to produce electricity to offset fossil generation, chiefly in Denmark. Thus, IER's later attempt to claim that electricity exported from Denmark does not reduce carbon emissions is entirely false.**

How wind energy is integrated into the electric grid in the U.S.

Of course, as IER itself notes, "Denmark's situation is substantially different from the situation in the United States," a fact the report's author also admitted in a debate with Rob Gramlich, AWEA's VP for Public Policy, on September 16.⁹ **The reality is that the U.S. power system creates a far more favorable environment for the integration of wind energy.**

For one, wind energy output in the U.S. is much less variable than in Denmark. If the wind slows down in one part of the U.S., it is almost certain to be increasing in another region. The simple fact that the land area of the U.S. is 200 times larger than that of Denmark provides us with a tremendous advantage for the integration of wind energy. In addition, the average wind turbine in the U.S.

⁵ http://www.20percentwind.org/20percent_wind_energy_report_revOct08.pdf

⁶ http://www.nrel.gov/wind/systemsintegration/pdfs/2008/parsons_wind_impacts_large_amounts.pdf

⁷ <http://www.instituteforenergyresearch.org/2009/09/17/wind-lobby-all-spun-up-about-danish-case-study/>

⁸ http://www.awea.org/blog/?mode=viewid&post_id=196

⁹ <http://cleanskies.com/videos/energy-report-91609-morning-edition-1>

produces 50% more electricity than the average wind turbine in Denmark¹⁰, making it even more certain that if the wind slows in one area another region's wind turbines will be able to make up the difference.

In addition, the U.S. power generation mix is well-suited for wind integration, with a mix of coal (50%), natural gas (20%), and hydroelectric generation (6%). During parts of the year with high wind output, wind energy makes it possible to turn off coal power plants that would have otherwise run, substantially reducing carbon emissions. Our 400,000 MW's of natural gas power plants, a large share of which can flexibly change their level of output, are ideally suited to accommodate changes in wind output that can occur over the course of a day. Our almost 100,000 MW of hydroelectric capacity are also available to store extra wind energy during periods of very high output and provide additional flexibility to the power system.

Moreover, the demand for electricity in the U.S. is around 100 times greater than in Denmark, providing ample demand for much larger amounts of wind energy as well as a massive yet largely untapped source of demand response resources to help accommodate wind's variability.

To sum up, we'd have to agree with IER on one point, "Denmark's situation is substantially different from the situation in the United States." Since that's the case, one might wonder why they even bothered paying for this study and an expensive media campaign to attack U.S. wind energy in the first place?

The quality of the wind resource in the U.S.

IER continues to stick its head in the sand and claim that the wind resource in the U.S. is inferior to that in Denmark. Never mind that the average wind turbine in the U.S. produces around 50% more electricity than the average turbine in Denmark. Never mind that the U.S. land area is 200 times larger. Never mind that AWEA used IER's own map to show that the wind resource in many parts of the U.S. is twice the quality of the best resources in Denmark.¹¹ Never mind that the U.S. Department of Energy has estimated that the U.S. wind potential is around 13,000 GW¹², which is around 1,000 times greater than Denmark's. Never mind that the same DOE study found over 1,000 GW of those wind resources, more than peak electricity demand in the U.S., are located in close proximity to existing transmission lines. As the old saying goes, "Don't confuse me with the facts: my mind is made up."

The truth about energy subsidies

¹⁰ Based on an average capacity factor of 24% in Denmark and 35% in the U.S., per <http://www.bwea.com/ref/capacityfactors.html> , <http://eetd.lbl.gov/ea/EMS/reports/2008-wind-technologies.pdf>

¹¹ http://www.awea.org/blog/?mode=viewid&post_id=196

¹² http://www.20percentwind.org/report/Chapter1_Executive_Summary_and_Overview.pdf

IER would have you believe that the wind industry enjoys tremendous government incentives that put it at a competitive advantage against other energy sources. The reality is that other sources of electricity generation have received and continue to receive government subsidies that are far larger than those provided for wind energy.¹³

According to the U.S. Government Accountability Office (GAO), from 2002 to 2007 in the U.S., fossil fuel energy sources received nearly five times the amount of tax-based subsidies compared to renewable energy sources.¹⁴ Historically, U.S. subsidies for oil, natural gas, coal, nuclear and hydropower totaled approximately \$500 billion from 1950 to 1977, or approximately \$18 billion per year (in 2004 dollars).¹⁵ In the last century, this created an abundance of affordable fossil fueled and nuclear energy, but also built an addiction to fossil fuels and placed the clean energy sources of the future at a major competitive disadvantage, one that is continued by exorbitant fossil fuel subsidies today. Thus, any talk about incentives for wind energy without including the crucial context that there are even larger government subsidies for competing fossil fuels is misleading at best if not outright deceptive.

In addition, IER's claims about the level of incentives for clean energy in Denmark are grossly inflated because they misleadingly exclude the electricity that is re-imported to Denmark after being stored at Scandinavian hydroelectric dams.

The truth about the cost of wind energy

Perhaps growing desperate in sensing that it was losing the other arguments, IER finally tries to fall back on the old saw that wind energy will cost consumers more money. The reality is that dozens of recent studies, including data from IER's own study of Denmark, have confirmed that wind energy actually saves consumers money by reducing the use of expensive fossil fuels, saving them money on their electric and other energy bills.

These savings occur because wind resources displace the highest cost power plants on the power system. The supply curve for electricity is typically quite steep, so even modest additions of renewable generation to the power system can drastically reduce wholesale power prices by forcing expensive generators offline and lowering the market clearing price.

In fact, IER's own report has charts illustrating this phenomenon in Denmark. On page 23 of its report, it presents a chart showing that there is a correlation between times of high wind output and low electricity market prices in West

¹³ http://www.awea.org/pubs/factsheets/Subsidies_Factsheet.pdf

¹⁴ <http://www.gao.gov/new.items/d08102.pdf>

¹⁵ Battelle Memorial Institute. Pacific Northwest Laboratory. An Analysis of Federal Incentives Used to Stimulate Energy Production. PNL-2410 REV. 1978.

Denmark, thus validating the fact that consumers benefit from greater wind output.¹⁶

IER attempts to use this chart to claim that Denmark is exporting power that is cheaper than what it receives back from Scandinavia, although this chart is entirely useless for that purpose, since the market price for that power is set on the receiving end in Scandinavia, not in West Denmark. In fact, the market price in Scandinavia would be almost entirely set by market dynamics in that country, given the immense size of the energy market there and the small size of any Danish imports or exports in comparison. Whether it was done intentionally or not, it is telling that the report neglected to include data for that market.

Recent studies in the U.S. have also verified that wind energy reduces consumers' electricity prices here. A 2006 analysis in Colorado found that the wind energy already acquired by the Public Service Company of Colorado at that point would save consumers on net more than \$250 million over the lifetimes of the wind plants.¹⁷ A 2009 analysis for the New York State Energy Research and Development Authority (NYSERDA) found that each MWh of renewable energy produced resulted in \$100 worth of consumer savings on electric bills alone, far more than the \$15/MWh average value of a renewable energy credit.¹⁸

The Joint Coordinated System Plan, a study conducted by many of the grid operators in the Eastern U.S., similarly found that obtaining 20% of the region's electricity from wind and building the transmission infrastructure necessary to do so would save consumers over \$40 billion per year, or \$30 billion once the cost of the transmission was factored in.¹⁹ Another study by Bernstein Research, a Wall Street analysis firm, has found that regions of the country that have experienced significant growth in wind energy over the last several years have also seen significant declines in wholesale power prices.²⁰

Other U.S. studies have found similar results. The consulting firm CRA, International examined the costs and benefits for consumers of building major wind developments and associated transmission infrastructure in two analyses in 2009. In a study looking at 14 GW of wind development in the Lower Plains, CRA concluded the investment would provide economic benefits of around \$2 billion per year.²¹ \$900 million of these benefits would be in the form of direct consumer savings on electric bills.

¹⁶ http://www.cepos.dk/fileadmin/user_upload/Arkiv/PDF/Wind_energy_-_the_case_of_Denmark.pdf

¹⁷ <http://www.interwest.org/documents/documents/2006-08-21.htm>

¹⁸ [http://www.nysERDA.org/Energy_Information/NY%20Renewable%20Portfolio%20Standard%20Program%20Evaluation%20Report%20\(2009%20Review\)-FINAL.pdf](http://www.nysERDA.org/Energy_Information/NY%20Renewable%20Portfolio%20Standard%20Program%20Evaluation%20Report%20(2009%20Review)-FINAL.pdf)

¹⁹ www.jcspstudy.org

²⁰ Bernstein Research, "Power Prices Below Zero," webcast on May 21, 2009

²¹ http://www.crai.com/uploadedFiles/RELATING_MATERIALS/Publications/BC/Energy_and_Environment/files/Southwest%20Power%20Pool%20Extra-High-Voltage%20Transmission%20Study.pdf

Wind energy makes consumers better off through less direct means as well. The Department of Energy's 2008 report, "20% Wind Energy by 2030," found that producing 20% of the nation's electricity from wind energy by 2030 would reduce consumers' natural gas costs by a cumulative \$150 billion by reducing electric sector demand for natural gas and thus reducing the price for all natural gas consumers.²² By offsetting fossil fuel generation, wind energy also reduces the cost passed on to consumers for compliance with other environmental regulations, like sulfur dioxide (SO₂) and nitrogen oxides (NO_x) emissions regulations. Many of the job creation, tax revenue growth, and other economic development benefits of wind deployment also accrue to consumers through direct and indirect ways.

Conclusion

To sum up, wind power makes sense in Europe and makes even more sense in the U.S. We'd like to thank IER for providing the opportunity to highlight European wind success stories like Denmark, Spain, Germany, Portugal, and Ireland, and for explaining how the U.S. has an even more favorable environment for deploying wind energy.

²² http://www.20percentwind.org/20percent_wind_energy_report_revOct08.pdf