

The Facts about Wind Energy and Emissions

Recent data and analyses have made it clear that the emissions and fuel use savings from adding wind energy to the grid are even larger than had been commonly thought. In addition to each kilowatt-hour (kWh) of wind energy directly offsetting a kWh that would have been produced by a fossil-fired power plant, new analyses show that wind farms further reduce emissions by forcing the most polluting and inflexible power plants offline and causing them to be replaced by more efficient and flexible types of generation.

At the same time, and in spite of the overwhelming evidence to the contrary, opponents of wind energy have launched an increasingly desperate misinformation campaign to convince the American public that wind energy does not significantly reduce emissions. As a result, we feel compelled to set the record straight on the matter.

At the forefront of this misinformation campaign are two reports written by the natural gas consulting firm Bentek, the first of which was paid for by the fossil fuel lobby group Independent Petroleum Association of Mountain States (IPAMS). The President and CEO of Bentek, the company that wrote the reports, is also the Chairman and Director of IPAMS' Natural Gas Committee and a member of the Colorado Oil and Gas Association.

Attacks Directly Refuted by DOE Data

Both Bentek reports are directly refuted by large bodies of U.S. Department of Energy and grid operator data showing that fossil fuel use and pollution decrease drastically as wind energy is added to the grid. In particular, the first report's claim that wind energy has not reduced emissions in Colorado and Texas is directly contradicted by government data.

For Texas, DOE data show that wind and other renewables' share of Texas's electric mix increased from 1.3% in 2005 to 4.4% in 2008, an increase in share of 3.1 percentage points. During that period, electric sector carbon dioxide emissions declined by 3.3%, even though electricity use actually increased by 2% during that time. The DOE data for Colorado is summarized in the table below. For both states, all other possible explanatory factors for the declines in carbon emissions, such as changes in the output of other resources, changes in electricity use or imports and exports, and others, were examined and ruled out as possible explanatory factors. In many cases these factors, such as increases in electricity use or shifts from natural gas to higher-emitting coal, were working against the emissions benefits that were achieved by wind energy, indicating that the emissions benefits of wind were likely even larger than they appear.

Change in Colorado Power Plant Fossil Fuel Use and Emissions from 2007-2008, as Wind Jumped from Providing 2.5% to 6.1% of Colorado Electricity

CO2 emissions	SO2 emissions	NOx emissions	Coal use	Natural gas use
Down 4.4%	Down 6%	Down 6%	Down 3%	Down 14%

Furthermore, four of the seven major interstate grid operators in the U.S. have studied the emissions impact of adding wind energy to their power grids, and all four have found that adding wind drastically reduces emissions of harmful pollutants. Discussion of those reports, as well as citations to the DOE data above, are available here and here:

http://archive.awea.org/newsroom/pdf/04_05_2010_Colorado_emissions_response.pdf

<http://www.renewableenergyworld.com/rea/news/article/2010/09/the-facts-about-wind-energy-and-emissions>

Fatal Flaws in the Bentek Reports

How could the Bentek reports get the answer so wrong? The Bentek reports are plagued by numerous and fundamental methodological flaws that result in massive errors that render the reports' conclusions meaningless:

- Wrongly assuming that all variability on the power system is caused by wind energy, even though variability in electric demand has a far larger impact.
- Cherry-picking outlier events for wind variability and then extrapolating them as normal behavior.
- Cherry-picking an isolated instance of the pollution control technology at a coal plant failing, blaming wind energy for the emissions increase, and then extrapolating that as the normal impact of adding wind.
- Understating the emissions reduction benefits of wind energy in California by excluding the fact that wind is actually displacing the state's large imports of coal power.
- Greatly understating the emissions benefits of wind in the Pacific Northwest and California by ignoring the fact that displaced hydropower is stored behind the dam and used later to displace fossil fuel use and emissions.
- Only looking at hourly snapshots of the power system and therefore excluding the vast majority of the emissions savings when wind energy causes emitting power plants to turn off for an extended period of time.
- Failing to model the process by which grid operators actually choose which power plants to operate. That type of analysis is the only way to accurately assess the impact of adding wind, or any other resource, to the grid.

The Real Story – Wind’s Emissions Benefits are Even Larger than Expected

Studies that accurately model the power system have confirmed that adding wind to the grid typically results in even larger emissions savings than expected, as wind energy tends to displace dirtier coal-fired generation in favor of more flexible natural gas generation. For example, the government- and grid operator-conducted Eastern Wind Integration and Transmission Study (EWITS) found that obtaining **20%** of our electricity from wind energy would reduce carbon dioxide emissions by **25%** relative to our baseline electricity mix, while obtaining **30%** of our electricity from wind would reduce emissions by **37%**. As shown below, coal generation declined by around 23% from the business-as-usual case to the 20% wind cases (Scenarios 1-3), and by 35% in the 30% wind case (Scenario 4).

Output of other Power Plants as Wind Energy is Added to the Grid

