

## Wind Power and Climate Change

### Wind Power: Electricity Without Emissions

There is no need to wait for a new climate solution. Wind power is one of only a few near-term options to reduce emissions. In a May 2008 study, the U.S. Department of Energy concluded that “Wind energy...can be widely deployed across the United States and around the world to begin reducing greenhouse gas emissions *now*.”

Wind energy is already clearing the air and protecting the planet: Projects installed through 2008 will generate approximately 73 million MWh in 2009, displacing over 44 million tons of CO<sub>2</sub>. Wind energy offers time to allow for the development and commercialization of emerging clean technologies, as well as construction of other clean power options with longer lead times.

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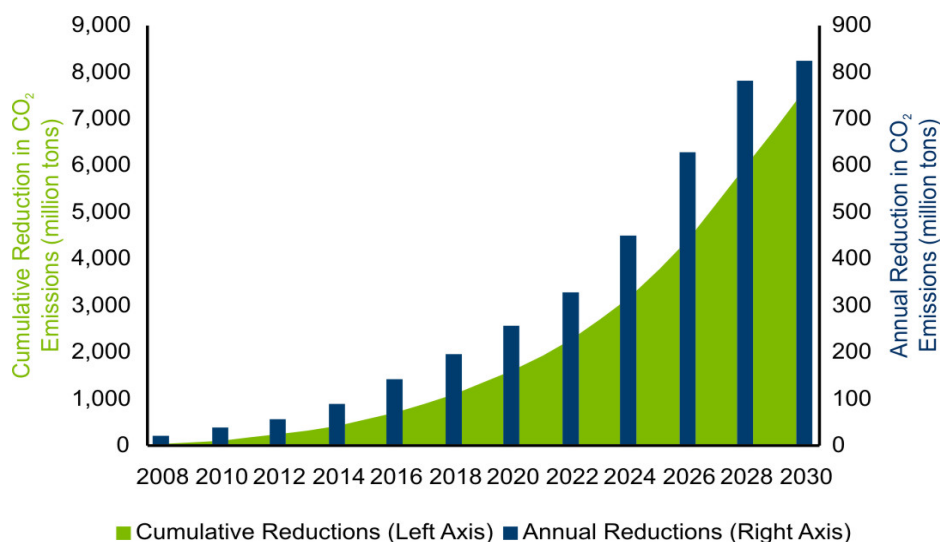
### How Wind Helps Reduce Global Warming

- Electricity generation is the largest industrial source of air pollution in the U.S. and demand for electricity continues to grow.
- The United States produces six billion metric tons of carbon dioxide annually. By 2030, this number could reach 6.75 billion metric tons. 40% of CO<sub>2</sub> emissions are generated by the electric power sector.
- Wind power generates no emissions, and displaces carbon dioxide and other greenhouse gases that would otherwise be emitted by fossil fuel-fired electric generation.
- The clean generation provided by wind capacity installed through 2008 will displace approximately 44 million tons of carbon dioxide annually.
- One megawatt-hour (MWh) of wind energy produced reduces CO<sub>2</sub> emissions by roughly 1,200 pounds. The average turbine installed in 2008 was 1.67 megawatts (MW) in size. A single 1.67-MW turbine would produce over 5,000 MWh of electricity per year and reduce CO<sub>2</sub> emissions by over 3,000 tons.

### How Much Can Wind Help Fight Global Warming?

Looking at a scenario of 20% wind energy by 2030, the Department of Energy recently reported wind energy could avoid 825 million tons of CO<sub>2</sub> annually by 2030, cutting expected electric sector emissions by 20-25%. This is equivalent to taking 140 million vehicles off the road.

**CUMULATIVE & ANNUAL EMISSION REDUCTIONS  
UNDER A 20% WIND SCENARIO BY 2030**





## The Long-Term Climate Benefits of Significant Wind Power

In May 2008, the U.S. Department of Energy released a study<sup>1</sup> of the feasibility of generating 20% of U.S. electricity needs from wind power by 2030. DOE determined that achieving this level of wind generation is feasible without any technological breakthroughs and would have significant environmental benefits:

- The cumulative effect of achieving 20% wind energy by 2030 would be reducing CO<sub>2</sub> emissions by 7,600 million metric tons, and through 2050, reducing emissions by an additional 7,400 million metric tons,
- Using wind to generate 20% of U.S. electricity will almost single-handedly keep electric sector emissions from increasing despite dramatically increased demand.
- The 20% scenario would displace 50% of electricity generated from natural gas and 18% of electricity generated by coal, alleviating pressure on gas markets, eliminating the need to build more than 80 gigawatts of new coal capacity and lowering electricity prices.
- It would also reduce cumulative water consumption in the electric sector by eight percent, or four trillion gallons by 2030, with nearly 30% of the savings occurring in western states where water is particularly scarce.

A related study<sup>2</sup> concluded that the 20% wind scenario would reduce natural gas costs to consumers by approximately \$128 billion and would lower the cost of compliance with climate legislation by around \$98 billion.

## Wind Power Is Already Reducing Greenhouse Gases

- To generate the same amount of electricity as today's U.S. wind turbine fleet (over 25,300 MW) would require burning over 36 million tons of coal or 110 million barrels of oil each year.
- Even emissions from the manufacture and installation of wind turbines are negligible. The "energy payback time" (a measure of how long a power plant must operate to generate – "pay back" – the amount of electricity required for its manufacture and construction) of a wind project is three to eight months, depending on the wind speed at the site – one of the shortest of any generation technology.
- A study by the Midwest Independent System Operator (MISO) showed that 16,000 MW of added wind capacity would avoid 43 million tons of CO<sub>2</sub>, or approximately 1,300 pounds of CO<sub>2</sub> for every megawatt-hour of wind generation.<sup>3</sup>

## Climate Change Legislation Should Take Full Advantage of Wind Energy

Climate change legislation offers a significant opportunity to expand our nation's reliance on wind energy and make a significant down payment on emissions reductions. If properly crafted, such legislation will send price signals to invest in clean, renewable resources like wind power, both in the near and long term. To be most effective in promoting wind power, climate change legislation should financially recognize the emission reduction contribution from renewable energy; create a strong, direct, and stable market price signal; address transmission infrastructure needs; and help expand domestic manufacturing and workforce training for renewable energy industries.

1. *20% Wind Energy by 2030*, U.S. Department of Energy (2008) <http://www.20percentwind.org>

2. *Power System Modeling of 20% Wind-Generated Electricity by 2030*, NREL (2008) <http://www.nrel.gov/docs/fy08osti/42794.pdf>

3. *Transmission Expansion Plan, Vision Exploratory Study*, Midwest ISO (2006) <http://www.midwestiso.org/page/Expansion+Planning>