

Wind Energy & Reducing Greenhouse Gas Emissions

The Role of Wind Energy in Addressing Greenhouse Gas Emissions

The United States produces 5.4 billion metric tons of carbon dioxide annually. The power sector is the single largest sectorial source of carbon dioxide emissions, contributing 38% of the U.S. CO₂ emissions.

Wind power generates no emissions, and displaces carbon dioxide and other greenhouse gases that would otherwise be emitted by fossil fuel-fired electric generation.

Electricity produced by a wind project results in an equivalent decrease in electricity production at another power plant.

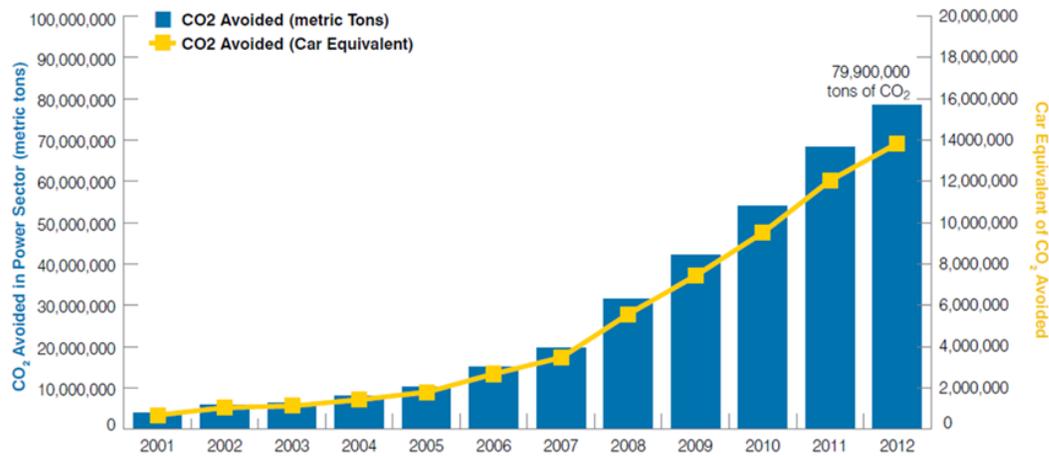
When it is available, system operators use wind energy due to its low operating costs—and ramp down the output of the most expensive marginal power plants. The marginal power plants being ramped down are almost always natural gas, coal- or oil-fired units because of their variable fuel costs.

Wind energy is also occasionally used to reduce the output of hydroelectric dams, which allows such facilities to build up their reservoirs of water so that the resource can be used later to replace more expensive generation.

In 2012, the roughly 140 million megawatt-hours (MWh) generated by wind energy avoided 79.9 million metric tons of carbon dioxide (CO₂) -- the equivalent of reducing power-sector CO₂ emissions by 3.6%, or taking over 14 million cars off the road.

On average across the regions of the U.S., wind generation today will avoid roughly 0.6 metric ton (1,300 pounds) of CO₂ for every megawatt-hour (MWh) of wind generation produced. This means a single typical wind turbine of average size would avoid over 3,000 metric tons of CO₂ annually, the equivalent of taking more than 500 cars off the road.

Wind Energy Impact on Avoiding Carbon Dioxide Emissions during 2012



Source: AWEA U.S. Wind Industry Annual Market Report 2012

In 2013, when new wind projects installed throughout 2012 have a full year of generation, wind generation will avoid nearly 98.9 million metric tons of CO₂ -- the equivalent of reducing power sector emissions by 4.4%, or taking over 17.4 million cars off the road.

To produce the same amount of electricity that today's U.S. wind turbine fleet (over 60,007 MW) will generate during 2013 would require burning over 90 million tons of coal (9,280 miles of railcars) or 329 million barrels of oil each year.

Can Wind Energy Help Address Climate Change in the Long-Term?

The Department of Energy found that scenario of 20% wind energy by 2030 was technically and economically feasible. The U.S. is currently ahead of schedule on this trajectory toward 20% wind energy generation. This scenario would avoid 825 million tons of CO₂ annually by 2030, cutting expected electric sector emissions by 20-25%. This is equivalent to taking 140 million vehicles off the road.

A **study** by the PJM system operator found that 15,000 MW of added wind capacity in the Mid-Atlantic region would avoid 35 million tons of CO₂.

A **study** by the Electric Reliability Council of Texas (ERCOT) found that 9,400 MW of added wind capacity on their system would avoid 17.6 million tons of CO₂.