

20% Wind Energy by 2030

Increasing Wind Energy's Contribution to U.S. Electricity Supply

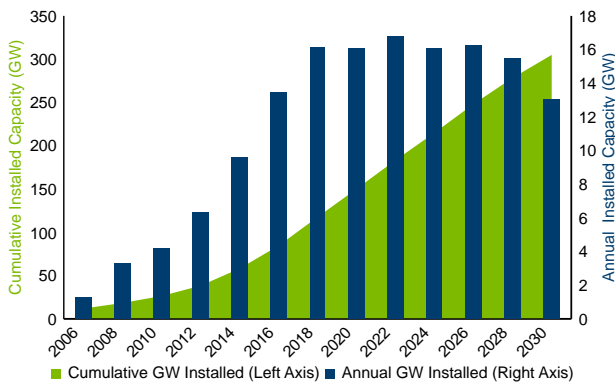
Wind power can play a major role in meeting America's increasing demand for electricity, according to a groundbreaking technical report, *20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply*, prepared by the U.S. Department of Energy with contributions from the National Renewable Energy Laboratory, the American Wind Energy Association, Black & Veatch and others from the energy sector.

The report explores one scenario for reaching 20% wind electricity by 2030 and contrasts it to a scenario in which no new U.S. wind power capacity is installed. It examines costs, major impacts and challenges associated with the 20% Wind Scenario. It investigates requirements and outcomes in the areas of technology, manufacturing, transmission and integration, markets, environment and siting. The report finds that the Nation possesses affordable wind energy resources far in excess of those needed to enable a 20% scenario.

The 20% Wind Scenario

To implement the 20% Wind Scenario, new wind power installations would increase to more than 16,000 MW per year by 2018, and continue at that rate through 2030, as shown in Figure A. Wind plant costs and performance are projected to improve modestly over the next two decades, but no technological breakthroughs are needed. In the 20% wind scenario, 46 states would experience significant wind power development.

Figure A. Annual and cumulative wind installations by 2030



Economic Impacts of Wind Power

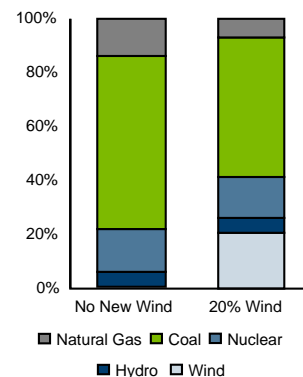
The report finds that, during the decade preceding 2030, the U.S. wind industry could:

- support roughly 500,000 jobs in the U.S., with an annual average of more than 150,000 workers directly employed by the wind industry;
- support more than 100,000 jobs in associated industries (e.g., accountants, lawyers, steel workers, and electrical manufacturing);
- support more than 200,000 jobs through economic expansion based on local spending;
- increase annual property tax revenues to more than \$1.5 billion by 2030; and
- increase annual payments to rural landowners to more than \$600 million in 2030.

Energy Security and Price Stability

Using more domestic wind power will diversify the nation's energy portfolio — adding wind-generated electricity at stable prices not subject to market volatility — and strengthening national energy security through reduced reliance on foreign sources of natural gas. The 20% Wind Scenario would alter U.S. electricity generation as shown in Figure B. In this scenario, wind would supply enough energy to displace about 50% of electric utility natural gas consumption by 2030. This amounts to an 11% reduction in natural gas across all industries. Also, coal consumption would be reduced by 18%. In addition, electric utilities are learning how to accommodate wind's variability while maintaining system reliability.

Figure B. U.S. electrical energy mix



U.S. Department of Energy

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Significant Reductions of Greenhouse-Gas (GHG) Emissions

Carbon dioxide (CO₂) is the principal GHG in the earth's atmosphere. Approximately 40% of total U.S. CO₂ emissions come from power generation facilities. Since substantial amounts of coal and natural gas fuels would be displaced, the 20% Wind Scenario could reduce CO₂ emissions in 2030 by 825 million metric tons – 25% of the CO₂ emissions from the nation's electric sector in the no-new-wind scenario. As shown in Figure C, this reduction could nearly level projected growth in CO₂ emissions from electricity generation.

Siting Strategies and Environmental Effects

The report examines siting issues and effects that an increase in wind power facilities may have on compatible land uses, water use, aesthetics, and wildlife habitats. Wind energy avoids many of the undesirable environmental impacts from other forms of electricity production, such as impacts from fuel mining, transport and waste management.

Unlike fossil-fuel and nuclear generation, which use significant quantities of water for power plant cooling, wind power generation consumes no water during operations. Generating 20% of U.S. electricity from wind would reduce water consumption in the electric sector in 2030 by 17%.

Incremental Cost of the 20% Wind Scenario

Costs incurred by the 20% Wind Scenario exceed those of the no-new-wind scenario by about 2%. Although the 20% wind scenario would incur higher initial capital costs, a large portion of those costs would be offset by \$155 billion in lower fuel expenditures. The estimated incremental investment would be \$43 billion (net-present-value basis; 2006\$). This corresponds to about 0.06¢/kWh of total generation, or about 50¢ per month for the average household. These monetary costs do not reflect other potential offsetting positive impacts.

Challenges

Major challenges along the 20% Wind Scenario path include these:

- Investment in the nation's transmission system is needed so that the electricity generated is delivered to urban centers that need the increased supply;
- Developing larger electric load balancing areas, in tandem with better regional planning, are needed so that regions can depend on a diversity of generation sources, including wind power;
- Significant growth is needed in the manufacturing supply chain, providing jobs and remedy the current shortage in parts for wind turbines;
- Continued reduction in wind capital cost and improvement in turbine performance through technology advancement and improved manufacturing capabilities is needed; and
- Addressing potential concerns about local siting, wildlife, and environmental issues within the context of generating electricity is needed.

The 20% Wind Scenario is not likely to be realized in a business-as-usual future. Achieving this scenario would involve a major national commitment to clean, domestic energy sources with minimal emissions of GHGs and other environmental pollutants.

More Information on the 20% Wind Scenario

The complete report and related information can be downloaded from the following web links:

www.eere.energy.gov/windandhydro

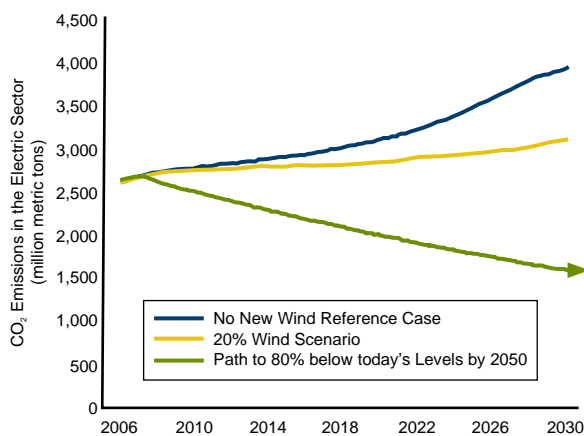
www.nrel.gov/docs/fy08osti/41869.pdf

www.20percentwind.org

More information is available on the web at:

www.eere.energy.gov/windandhydro/
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Figure C. Avoided emissions would nearly level projected growth in CO₂ emissions from the electricity sector



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