

# Advantages and Challenges of Wind Energy

**U.S. Department of Energy - Energy Efficiency and Renewable Energy  
Wind and Water Power Program**

## The Benefits of 20% Wind Energy by 2030

According to the American Wind Energy Association, if we increase our nation's wind energy capacity to 20% by 2030, it would...

### **Reduce Greenhouse Gas Emissions**

A cumulative total of 7,600 million tons of CO<sub>2</sub> would be avoided by 2030, and more than 15,000 million tons of CO<sub>2</sub> would be avoided by 2050.

### **Conserve Water**

Reduce cumulative water consumption in the electric sector by 8% or 4 trillion gallons from 2007 through 2030.

### **Lower Natural Gas Prices**

Significantly reduce natural gas demand and reduce natural gas prices by 12%, saving consumers approximately \$130 billion.

### **Expand Manufacturing**

To produce enough turbines and components for the 20% wind scenario, the industry would require more than 30,000 direct manufacturing jobs across the nation (assuming that 30% – 80% of major turbine components would be manufactured domestically by 2030).

### **Generate Local Revenues**

Lease payments for wind turbines would generate well over \$600 million for landowners in rural areas and generate additional local tax revenues exceeding \$1.5 billion annually by 2030. From 2007 through 2030, cumulative economic activity would exceed \$1 trillion or more than \$440 billion in net present value terms.

Wind energy offers many advantages, which explains why it's the fastest-growing energy source in the world. Research efforts are aimed at addressing the challenges to greater use of wind energy.

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## Advantages

Wind energy is fueled by the wind, so it's a clean fuel source. Wind energy doesn't pollute the air like power plants that rely on combustion of fossil fuels, such as coal or natural gas. Wind turbines don't produce atmospheric emissions that cause acid rain or greenhouse gasses.

Wind energy is a domestic source of energy, produced in the United States. The nation's wind supply is abundant.

Wind energy relies on the renewable power of the wind, which can't be used up. Wind is actually a form of solar energy; winds are caused by the heating of the atmosphere by the sun, the rotation of the earth, and the earth's surface irregularities.

Wind energy is one of the lowest-priced renewable energy technologies available today, costing between 4 and 6 cents per kilowatt-hour, depending upon the wind resource and project financing of the particular project.

Wind turbines can be built on farms or ranches, thus benefiting the economy in rural areas, where most of the best wind sites are found. Farmers and ranchers can continue to work the land because the wind turbines use only a fraction of the land. Wind power plant owners make rent payments to the farmer or rancher for the use of the land.

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## Challenges

Wind power must compete with conventional generation sources on a cost basis. Depending on how energetic a wind site is, the wind farm may or may not be cost competitive. Even though the cost of wind power has decreased dramatically in the past 10 years, the technology requires a higher initial investment than fossil-fueled generators.

Good wind sites are often located in remote locations, far from cities where the electricity is needed. Transmission lines must be built to bring the electricity from the wind farm to the city.

Wind resource development may compete with other uses for the land and those alternative uses may be more highly valued than electricity generation.

Although wind power plants have relatively little impact on the environment compared to other conventional power plants, there is some concern over the noise produced by the rotor blades, aesthetic (visual) impacts, and sometimes birds have been killed by flying into the rotors. Most of these problems have been resolved or greatly reduced through technological development or by properly siting wind plants.