Wind Powering America

Clean Energy for the 21st Century

What is wind energy?

Can wind power my home?

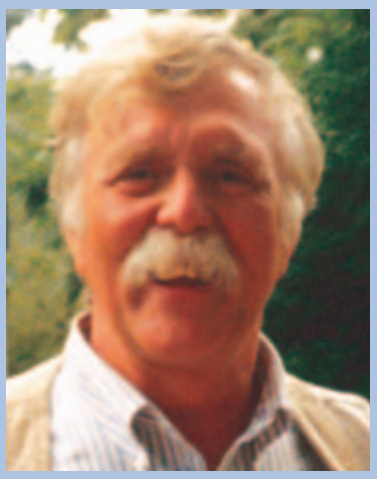
Is there enough wind where I live to produce electricity?

Can I sell electricity to the utility?

U.S. Department of Energy

Energy Efficiency and Renewable Energy

Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable



Wind is homegrown energy that we can harvest right alongside our corn or soybeans or other crops. We can use the energy in our local communities or we can export it to other markets. We need to look carefully at wind energy as a source of economic growth for our region.

David Benson, Farmer & County Commissioner,
Nobles County Minnesota

It seems only natural for rural utilities to do everything they can to advance both farm-based renewable energy development and rural economic development in a cost-effective way. In my opinion, wind energy is the next great chapter in the rural electrification story.

Aaron C. Jones, Washington Rural Electric Cooperative Association
Olympia, Washington

John Stulp/PIX13298

Converting the wind into a much-needed commodity while providing good jobs, the Colorado Green Wind Farm is a boost to our local economy and tax base.

John Stulp, Commissioner for Prowers County
Lamar, Colorado

Wind projects add clean, renewable energy to our electricity supply while supporting the Northwest's rural economy. That's a pretty good combination.

Rachel Shimshak, Director of Renewable Northwest Project, and her son Max
Portland, Oregon

Penn State is proud to be part of bringing new wind generation to the east. Wind energy is great for Pennsylvania's environment and economy. It creates jobs, boosts income for farmers, returns former strip mine land to productive use, and contributes to our nation's energy independence. We hope Penn State's commitment will inspire others to buy wind energy.

Ford Stryker, Manager of Environmental Strategy, Pennsylvania State University, University Park, Pennsylvania

What is wind energy?

Wind is created by the unequal heating of the Earth's surface by the sun. Wind turbines convert the kinetic energy in the wind into mechanical power that turns a generator that produces electricity to power homes, schools, businesses, and communities.

Warren Gretz, NREL/PIX06330

Wind facts:

- A typical wind turbine generates electricity 65% to 90% of the time, depending on the pattern of wind speeds at its location.
- American wind farms generated 13 billion kWh in 2003 (about 0.3% of U.S. electricity generation), enough to fully serve more than 1.3 million households.
- A single, 1-MW wind turbine displaces 2,000 tons of carbon dioxide each year (equivalent to planting 1 square mile of forest), based on the current average U.S. utility fuel mix.
- U.S. wind energy potential is estimated at over 10,000 billion kWh annually—more than twice the total electricity generated from all sources in America today.
- Wind energy has been the world's fastest-growing energy source on a percentage basis for the past 5 years, expanding at an annual rate of 32%.
- A modern, utility-scale wind turbine is a big machine (about the size of a Boeing 747) that generates a lot of electricity—enough to power more than 300 average American homes, year after year. Forty thousand tons of coal or 131,000 barrels of oil would be needed to generate the same amount of electricity as a single 1.5-MW wind turbine generates over 20 years.
- U.S. wind resources are comparable in size to Saudi Arabia's oil resources, and they will never run out. Wind energy could easily generate 6% of the nation's electricity by 2020—as much as hydropower does today.
- The U.S. is facing a serious shortage of natural gas, the most popular fuel for new power plants. Wind energy often displaces natural gas on a utility system, and increasing its use could dramatically reduce the shortage.
- Only 3% to 5% of the land within the boundaries of a wind farm is needed for the generators and their service roads. The rest remains available for farming or ranching. Wind provides an attractive extra income to a land owner.
- Utilities rely on a mix of different types of generating plants to ensure a reliable supply of electricity. Wind can easily be added to that mix without requiring storage or back-up facilities.
- A modern wind turbine 300 meters (about 300 yards) away is no noisier than the reading room of a library and quieter than the sound of the blowing wind.
- Wind power generates no emissions and causes no pollution. Of all types of electricity generation, wind is one of the least harmful to birds and other wildlife.
- Even if wind were to generate 100% of U.S. electricity today, wind would account for only one of every 250 human-related bird deaths. Leading direct threats to birds include buildings, vehicles, and cats.

Wind facts provided by the American Wind Energy Association (AWEA).

Can I power my home or business with wind energy?

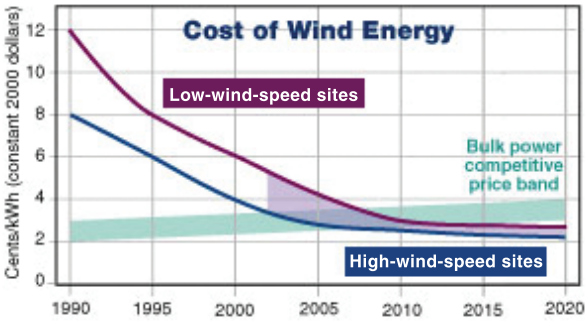
There are two ways you can power your home with wind. You can purchase wind energy in the form of green power from your local utility, or you can provide a part of your electric needs with a small grid-connected wind electric system. A wind turbine rated in the range of 3 to 10 kilowatts could lower your utility bill by 30% to 70%.

Can I sell the extra electricity my system generates to the utility?

Federal regulations require utilities to connect with and purchase power from small wind energy systems. The terms for compensation will depend on whether your state has a net-metering program.

What is net metering?

Utilities with net-metering programs allow their customers to use the electricity their systems generate to offset their consumption over the entire billing period, not just instantaneously. This offset would enable customers with generating facilities to receive retail prices for the excess electricity they generate.



The cost of wind energy has plummeted since 1980. Today, wind power is one of the cheapest sources of new electricity.

In evaluating the potential of wind energy generation, Native Americans realize that wind power is not only consistent with our cultural values and spiritual beliefs, but it can also be a means of achieving native sustainable homeland economies.

Ronald Neiss, Rosebud Utility Commission President
Rosebud Reservation, South Dakota

Keith Roman/PIX09055

From our winter pasture near the Wyoming border, we used to be able to see all the way to Denver. Now all we see is air pollution. We believe it's time to begin using pollution-free energy in the West. That's why our winter range now boasts a wind farm.

Keith and Myrna Roman
Landowners/ranchers in Weld County, Colorado

Before the advent of rural electrification, farmers and ranchers in this part of the country depended on windmills to provide electricity. I like to think we're returning to our roots and the idea of self-sufficiency by installing small wind electric systems.

Gordon G. Brittan, Jr., rancher and Regents Professor of Philosophy
Montana State University, Bozeman, Montana

In my 44 years in the municipal utility business, no utility project has ever generated more customer support and interest than our wind turbine project.

Nick Scholer, former manager of Algona Municipal Utilities
Algona, Iowa

Daniel McGuire/PIX12476

Higher production costs combined with low commodity prices paid to farmers spells economic trouble for rural America. That's why the American Corn Growers Foundation and the American Corn Growers Association promote wind energy. It's why we developed the Wealth from the Wind program. We support wind farming as both an alternative income stream for farmers and landowners and an economic development opportunity for rural communities.

Dan McGuire, Director of the American Corn Growers Foundation and American Corn Growers Association Wealth from the Wind program
Lincoln, Nebraska

Lloyd Herziger, Enron Wind Corp./PIX09641

Helping states harvest a new crop

Farmers and rural landowners nationwide are discovering a new cash crop that can be harvested year-round: wind energy. Rural landowners who lease their land to wind developers typically receive about 2% to 4% of the gross annual turbine revenue. In southern Minnesota and northern Iowa, landowners receive annual payments from $2,000 to more than $4,000 per turbine, which can help compensate for a downturn in commodity prices. The Union of Concerned Scientists estimates that typical farmers or ranchers with good wind resources could increase the economic yield of their land by 30% to 100%. At a time when farm economies are sorely strained, wind power appears to be an ideal supplement.

The U.S. Department of Energy's (DOE's) Wind Energy Program is helping to bring the message of economic opportunity through wind resource development to American farmers, Native Americans, and other rural landowners in states throughout the country. Since 1999, the Program has actively supported 10 state wind workshops to discuss wind technology, resources, development, and benefits to local communities. With interest in wind development growing nationwide, DOE's Wind Program will continue to support local efforts to examine wind development and provide technical assistance to communities that decide to move forward.

Wind Powering America

The U. S. Department of Energy's Wind Powering America efforts strive to help the United States achieve targeted regional economic development, protect the local environment, reduce air pollution, lessen the risks of global climate change, and increase energy security.

The goals of Wind Powering America are:

- Increase the number of states with 100 MW of wind capacity to 30 by 2010
- Support the American Wind Energy Association's goal of 100,000 MW of wind power by 2020.

Wind Powering America publications:

State Wind Working Group Handbook
August 2003

Wind Power: Options for Industry
March 2003

Wind Power for Municipal Utilities
October 2002

Small Wind Electric Systems: A U.S. Consumer's Guide
revised May 2004

Wind Power for America: Rural Electric Utilities Harvest New Crop
February 2002

Wind Powering the Government
August 2000

Wind Energy for Rural Economic Development
July 2004

Electronic versions of these publications can be accessed at http://www.eere.energy.gov/windpoweringamerica/wpa_publications.html.

Warren Gretz, NREL/PIX09630

Resources

U.S. Department of Energy
Wind Energy Program
Forrestal Building
1000 Independence Ave., S.W.
Washington, D.C. 20585
(202) 586-5348
www.eere.energy.gov/windandhydro/
www.windpoweringamerica.gov

National Renewable Energy Laboratory
National Wind Technology Center
1617 Cole Boulevard
Golden, Colorado 80401
(303) 384-6979
www.nrel.gov/wind

American Wind Energy Association
122 C Street, N.W., Suite 380
Washington, D.C. 20001
(202) 383-2500
fax (202) 383-2505
www.awea.org

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

For more information contact:
EERE Information Center
1-877-EERE-INF (1-877-337-3463)
www.eere.energy.gov

U.S. Department of Energy

Energy Efficiency and Renewable Energy

Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

Produced for the U.S. Department of Energy (DOE), by the National Renewable Energy Laboratory, a DOE national laboratory

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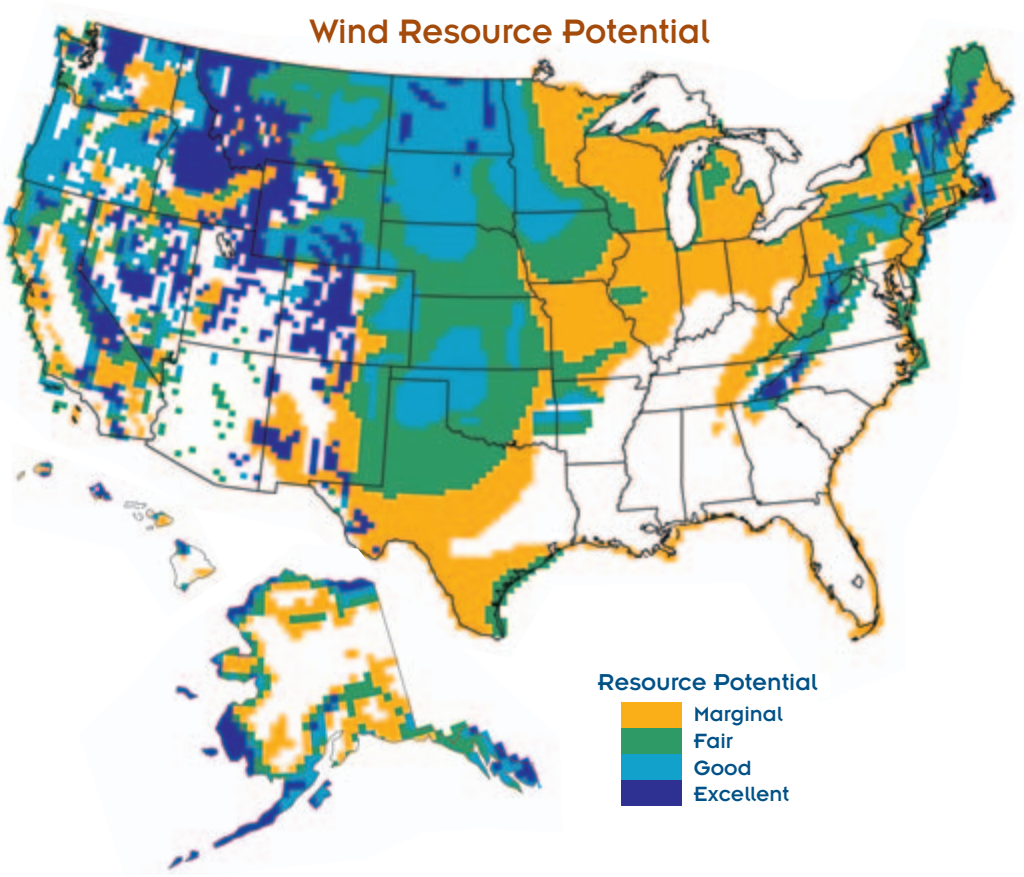
Wind Resource Potential



Is there enough wind where I live to produce electricity?

All 50 states have enough wind to power wind turbines. Thirty-seven states have wind resources that would support utility-scale wind power plants. To find out about the wind resources in your area, visit www.windpoweringamerica.gov or the wind resource database at www.nrel.gov/wind.

Wind Energy Developed by December 2003