

About BP Wind Energy & Dominion

Dominion and BP Wind Energy have entered into an agreement to jointly develop, own and operate wind energy projects in Virginia.

The companies are committed to meeting Virginia's goal of 12 percent of base-year electricity sales from renewable energy sources by 2022.



Dominion

Dominion is one of the nation's largest producers and transporters of energy, with a portfolio of approximately 27,000 megawatts of generation, 1.2 trillion cubic feet equivalent of proved natural gas and oil reserves, 14,000 miles of natural gas transmission, gathering and storage pipeline and 6,000 miles of electric transmission lines. Dominion operates the nation's largest natural gas storage facility with 975 billion cubic feet of storage capacity and serves retail energy customers in 12 states. Its renewable portfolio includes nearly 1,300 megawatts in various stages of development or operation.

BP Wind Energy

BP Wind Energy is a wholly owned subsidiary of BP, one of the world's leading energy companies, providing its customers with fuel for transportation and energy for heat and light. BP believes that investing in diverse supplies of energy is important to meet U.S. energy and economic security needs.

BP is also investing in a portfolio of alternative energies – wind, solar, biofuels and hydrogen energy with carbon capture and storage – because they are good for the environment, energy security and the growth of sustainable, green jobs.

BP Wind Energy is one of the leading wind developers in the U.S. with a wind portfolio that includes the opportunity to develop almost 100 projects across 24 States with a potential total generating capacity of 20,000 megawatts (MW) – enough clean electricity to power approximately six million average American homes. BP Wind Energy has over 1,000 MW in or nearing commercial operation and more than 1,000 MW in an advanced stage of development.

Benefits of a Wind Farm

Local Economic Benefits

Community benefits - Growing the tax base:

Wind farm development will significantly expand the local tax base making more money available for schools, civil works and social services. Over 25 years a 60 MW project will contribute over \$6 million to the county in property taxes, while placing very low demands on local public services.

Construction and operations jobs:

A 60 MW project will generate over 100 construction jobs with over \$2 million in wages and over \$5 million in local contracts for gravel, trucking, concrete, etc., as well as secondary local revenues to support the workers. It will also generate 5-10 long-term jobs for maintenance and administration of the wind farm.

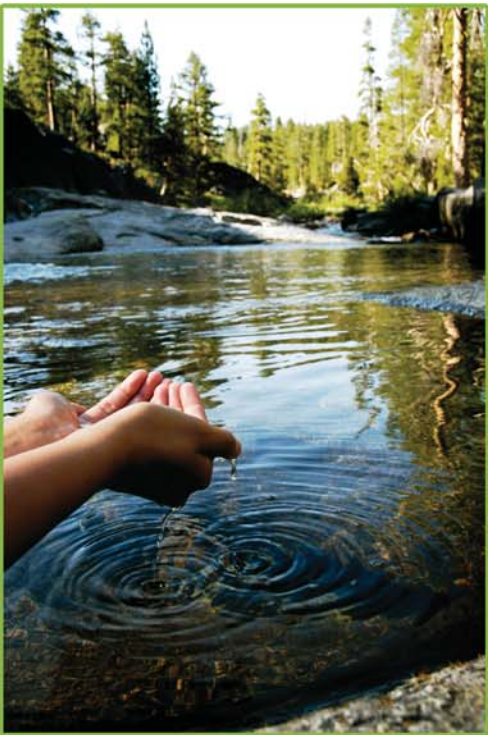


“About 85,000 people are employed in the wind industry today, up from 50,000 a year ago.”

~AWEA news, 1/27/2009



Virginia’s Renewable Portfolio Standard



On April 11, 2007, Gov. Tim Kaine signed legislation which established a voluntary renewable portfolio standard. The RPS sets a renewable energy target of 12% of 2007 "base year" sales to retail customers by 2022. Investor-owned utilities are eligible for increased rates of return if they can demonstrate a reasonable expectation of achieving the 12% target by 2022.

Energy sources that count toward the goal include: solar, wind, geothermal, hydropower, wave, tidal and biomass energy.

Why Wind Power

Environmental Benefits

- No pollution or emissions
- Doesn't consume water resources
- Properly sited facilities will not affect wildlife populations

Clean Energy Source

- Wind is renewable and inexhaustible
- Promotes energy independence
- Helps stabilize rising electricity costs



Building a Wind Farm

Turbine Blade Delivery



Constructing Tower Foundation



Turbine Tower Erection



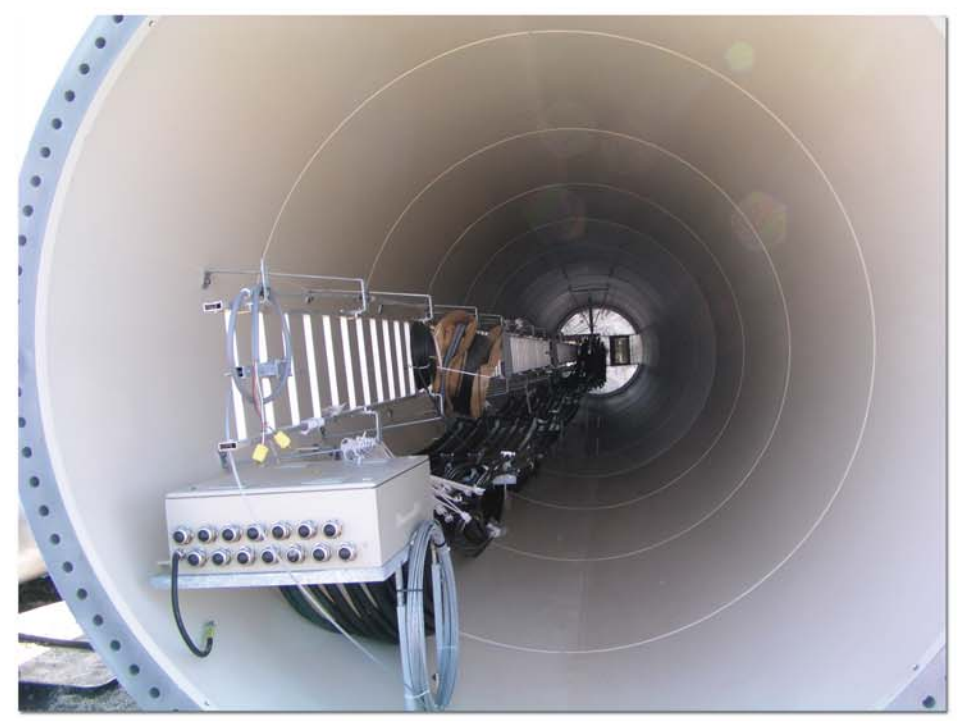
Lifting the Nacelle onto the Tower



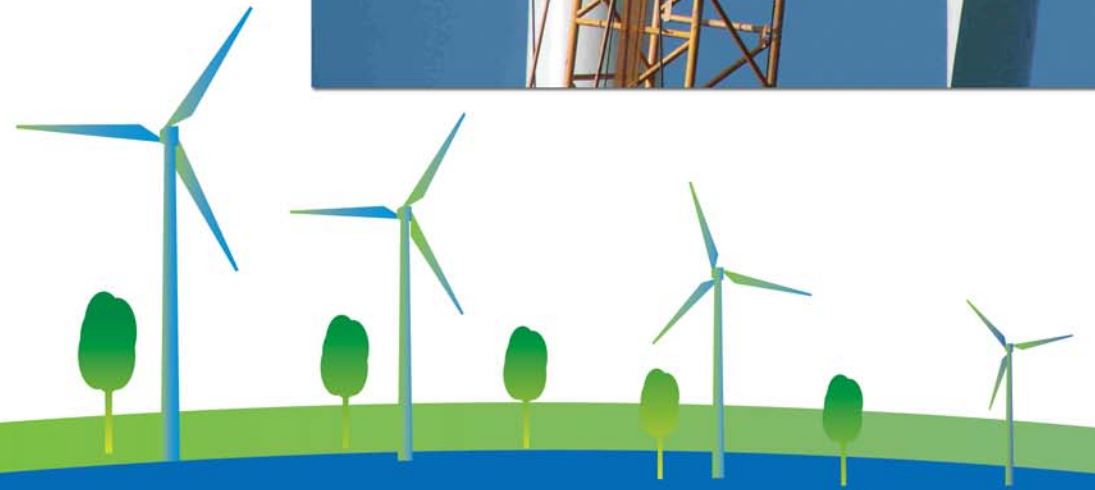
Hoisting Blade Assembly



View inside the Tower



Constructing the Substation



Economic Benefits of Wind Farms

Local Economic Benefits

A 60 Megawatt Wind Farm will provide the following benefits:

- \$2 million in wages plus 100 construction jobs during 8-month construction period
- \$5 million in local products and services (gravel, concrete, etc.)
- 5-10 long-term jobs during operation of the wind farm
- Significant annual local property and real estate tax revenues
 - ✓ Approximately \$600,000 Year 1
 - ✓ Approximately \$450,000 Year 5
 - ✓ Approximately \$280,000 Year 10
 - ✓ Approximately \$180,000 Year 13 - 20



Property Values

On the local level, development decisions that could affect property values are a common concern for many communities around the country. To date, studies that have been done across the U.S., have shown no negative impacts as a result of wind power development.

As new wind farms are built to help meet our growing energy needs, studies continue to reinforce these positive results.

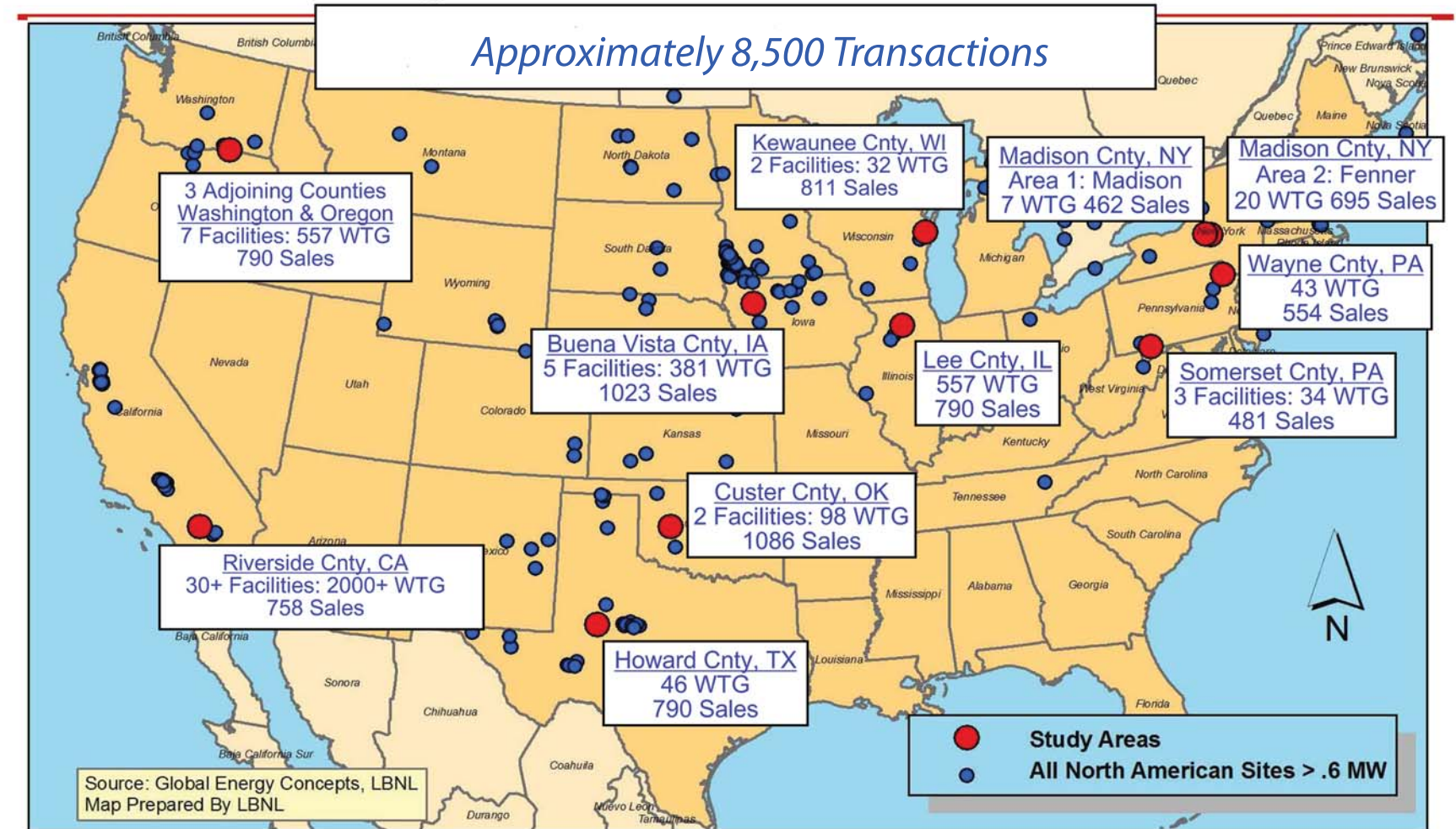
The Latest Research on Property Values and Wind Farms

A Lawrence Berkeley National Laboratory study is underway with a sample size of roughly 8,500 home sales near 11 operating wind turbine projects. This study will include the following elements that previous research has not.

- Multiple U.S. wind project locations (see map)
- Valid residential sales values (not assessed values)
- Sample sizes of over 450 sales transactions for each area
- Field visits to each home
- Rigorously analyzed data & peer reviewed results
- Testing for all three potential effects
 1. Area Stigma: concerns over "industrialization" of area
 2. Scenic Vista Stigma: concerns over decrease in quality of scenic vistas from homes
 3. Nuisance Effects: potential health and well-being concerns of nearby residents



Data Collected From 11 Study Areas Surrounding More Than 25 Wind Facilities



Conclusions from preliminary analyses - 10 of 11 Study Areas – More than 7,500 Transactions

Area Stigma

No statistical evidence that homes near wind facilities are stigmatized by those facilities as compared to other homes in the region

Scenic Vista Stigma

No statistical evidence that homes with a view of wind turbines have different values from homes without such views

Nuisance

No statistical evidence that homes within 1/4, 1/2 and 1 mile of turbines sell for different values from those farther away

Bottom line

Though one cannot rule out isolated cases where property values are negatively impacted, any such impacts within the sample are not widespread nor statistically identifiable

Hoen, B. & Wiser, R. (2008) "The Impact of Wind Facilities on Residential Property Values: What We Know And What We Don't Know - 10 Area Preliminary Results". Lawrence Berkeley National Laboratory. Presented at WINDPOWER 2008 Conference & Exhibition, June 1 - 4, 2008, Houston, TX.

Misconceptions About Wind Energy

Wind Energy Myths and Facts:

MYTH:

No New Taxes – the county will receive taxes on the turbine equipment, but as their values depreciate (over a few years to \$0) the county will receive \$0 in taxes.

FACT:

For example a 60 MW (30 – 40 turbines) project would generate approximately \$600,000 in business personal property and real estate taxes in year 1 for the locality, depreciating over time for roughly 20 years. Year 5 - \$450,000; Year 10 - \$280,000; Year 13-20 - \$180,000.

MYTH:

My property values will decline if a wind facility is located near my property or home.

FACT:

There have been a number of scientific studies conducted that investigate property values near wind farms. The latest and most comprehensive study, from the Lawrence Berkeley National Lab, covers 11 study areas surrounding more than 25 wind energy facilities nationwide. Preliminary analysis of 7,500+ home sales indicates no negative impact from proximity to wind energy facilities.



MYTH:

Large access roads and turbine platforms on the tops of ridges will cause problems with water; possible flooding – a danger for everyone who lives below the ridges across the county.

FACT:

The project will prepare a site-specific Erosion and Sediment Control Plan and a Storm Water Pollution Prevention Plan in accordance with the Virginia Department of Conservation and Recreation requirements. The preparation of these plans will be used to support obtaining both local and state land disturbance permits. As site access road will be gravel, foundations of the turbines will consist of poured concrete subsurface slabs, and there will be limited other hard surfaces, it is expected that there will be little chance of significant increases in storm water runoff.

MYTH:

Blasting away of mountain tops in order to place wind turbines on the ridge top will destroy the mountains.

FACT:

The site access road will be gravel, foundations of the turbines will consist of poured concrete in small areas on the ridgeline. Trees will be removed only where the turbines and access roads will be placed. Otherwise, the ridgelines are not expected to be significantly altered from existing conditions.

MYTH:

Wind turbines provide no real benefit in our dependency on foreign oil and easing global warming.

FACT:

Since wind energy requires no fuel, deploying wind energy can assist in reducing the effects of rising fuel costs, both foreign and domestic. Wind energy produces no emissions, and electricity produced by wind farms offsets electricity produced by other power plants.

MYTH:

No new jobs will be created.

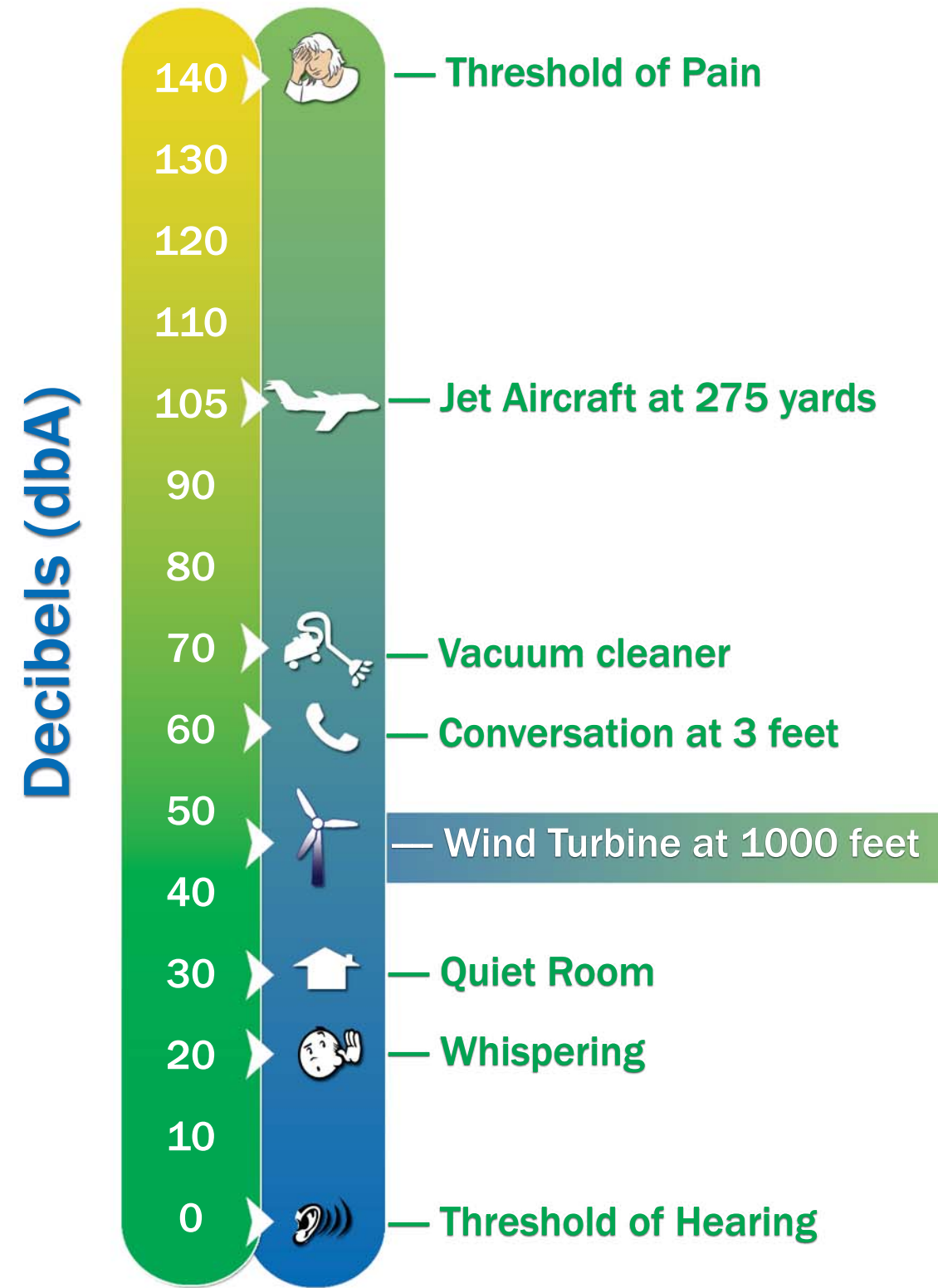
FACT:

A 60 MW Wind Farm will create 100 construction jobs during the 8-month construction period, \$5 million in local products and services (gravel, concrete, etc.) and 5-10 long-term jobs during the operation of the wind farm.

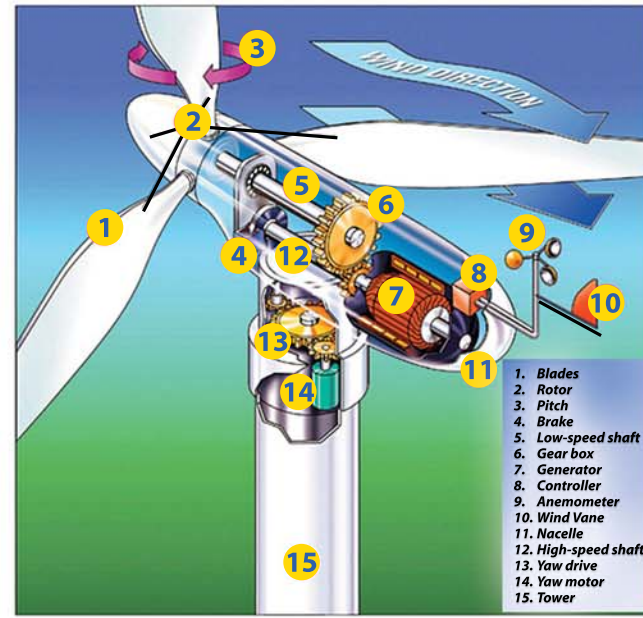


Sound / Wind Turbine Technology

A modern operating wind farm is no noisier than a quiet room or a kitchen refrigerator.



Source: British Wind Energy Association



1. Blades
2. Rotor
3. Pitch
4. Brake
5. Low-speed shaft
6. Gear box
7. Generator
8. Controller
9. Anemometer
10. Wind Vane
11. Nacelle
12. High-speed shaft
13. Yaw drive
14. Yaw motor
15. Tower

- 1. Blades:**
Most turbines have three blades. Wind blowing over the blades causes the blades to "lift" and rotate.
- 2. Rotor:**
The blades and the hub together are called the rotor.
- 3. Pitch:**
Blades are turned, or pitched, out of the wind to control the rotor speed and keep the rotor from turning in winds that are too high or too low to produce electricity.
- 4. Brake:**
A disc brake which can be applied mechanically, electrically, or hydraulically to stop the rotor in emergencies.
- 5. Low-speed shaft:**
The rotor turns the low-speed shaft at about 15 to 20 rotations per minute.
- 6. Gear box:**
Gears connect the low-speed shaft to the high-speed shaft and increase the rotational speeds from about 15 to 20 rotations per minute (rpm) to about 1000 to 1800 rpm, the rotational speed required by most generators to produce electricity. The gear box is a costly (and heavy) part of the wind turbine and engineers are exploring "direct-drive" generators that operate at lower rotational speeds and do not need gear boxes.
- 7. Generator:**
Usually an off-the-shelf induction generator that produces 60-cycle AC electricity.
- 8. Controller:**
The controller starts up the machine at wind speeds of about 8 to 16 miles per hour (mph) and shuts off the machine at about 55 mph. Turbines do not operate at wind speeds above about 55 mph because they might be damaged by the high winds.
- 9. Anemometer:**
Measures the wind speed and transmits wind speed data to the controller.
- 10. Wind vane:**
Measures wind direction and communicates with the yaw drive to orient the turbine properly with respect to the wind.
- 11. Nacelle:**
The nacelle sits atop the tower and contains the gear box, low- and high-speed shafts, generator, controller, and brake. Some nacelles are large enough for a helicopter to land on.
- 12. High-speed shaft:**
Drives the generator.
- 13. Yaw drive:**
Upwind turbines face into the wind; the yaw drive is used to keep the rotor facing into the wind as the wind direction changes.
- 14. Yaw motor:**
Powers the yaw drive.
- 15. Tower:**
Towers are made from tubular steel. Because wind speed increases with height, taller towers enable turbines to capture more energy and generate more electricity.

Source: U.S. Department of Energy