

RENEWABLE ENERGY SOLUTIONS

Putting the wind to work for you



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The increasing global demand for renewable energy sources has made wind energy a reality today. The potential for owner revenue, revitalizing rural communities and reducing dependence on the power grid without consuming natural resources or emitting pollution or greenhouse gases makes wind energy good for our economy, environment and energy security. As a global leader in energy efficiency and sustainability, Johnson Controls can put the wind to work for you. We'll take responsibility for design, engineering, installation, commissioning, operation and maintenance of a wind energy system suited to your energy needs.

How does wind energy work

Wind power is converted to electricity by a wind turbine. In a typical wind turbine, wind energy is converted to rotational motion by the rotor – usually a three-bladed fan at the front the turbine. The rotor turns a shaft that passes through a gearbox, which increases the rotational speed. This transmission is attached to a high-speed output shaft, which is connected to a generator that converts the rotational motion into electricity at medium voltage. From here the electricity passes through heavy cables in the tower to a transformer, which increases the electric power to distribution voltage.

Depending on the turbine size and your application, this voltage may power a specific facility or be sent to a collection point where it is combined with power from other turbines to power nearby farms, residences and towns. Distribution-voltage power can also be sent to substations where voltage is further increased for transmission to distant cities and factories.

Applications

Wind turbines come in a variety of sizes depending on the planned use for the electricity. Some wind turbines are used to charge batteries for buildings not connected to the utility grid. Some wind turbines can supply all or part of the electricity used by a business, school or farm. Large-scale wind farms with multiple turbines are used to harvest the wind above acres of land, usually to feed power to the electrical grid. Whatever your application, Johnson Controls can provide a complete wind power solution.

Technology with no boundaries

Johnson Controls is a \$32 billion leader in energy and environmental solutions. Our contracts often include a performance guarantee, reducing your risk. Our global experience in energy supply- and demand-side businesses, along with 120 years of building expertise, make us well suited for these applications. With 500 offices around the world, we can deliver solutions anywhere you need them.



WIND POWER FACTS:

- Electricity generated from wind in the U.S is estimated at 31 billion kWh in 2007
- U.S. wind energy potential is estimated at 10,777 billion kWh annually, more than twice the electricity generated in the U.S. today
- Industry growth rate in the U.S. averaged 22% from 2001 – 2006
- Wind has one of the highest energy payback ratios of any power technology

(Source: American Wind Energy Association – 2007 Wind Energy Fast Facts)

WHERE WE'RE WORKING:

Erie Community Unit School District

A 1.2 megawatt wind turbine and tubular wind tower, along with an electrical distribution system, is designed to reduce purchased electrical energy consumption by 87%. The installation is expected to deliver \$9.1 million in total energy savings over 30 years.

Borough of Telford and Wrekin

Johnson Controls installed a wind turbine at Ladygrove Primary School in the United Kingdom, along with innovative monitoring software that allows the community council to obtain real-time data on the wind speed, the energy generated by the wind turbine and the estimated energy savings. A display developed by Johnson Controls allows any school in the Borough to display this information in real time on interactive white boards in the classrooms through a web browser.