

Primer on Wind Power

What is wind energy, how does it work, and how is Unitil involved?



What is Wind Energy?

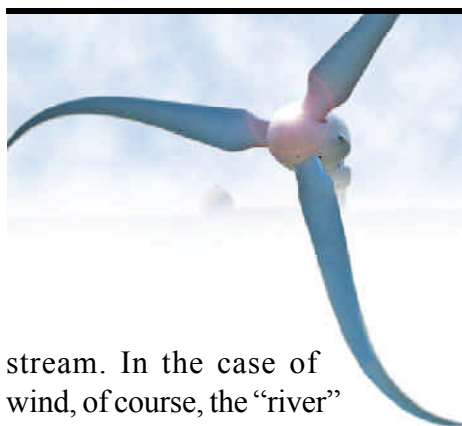
Wind energy is a form of solar energy, created by the circulation patterns in the Earth's atmosphere that are driven from the sun.

People have made use of wind energy for thousands of years, fashioning sails and attaching them to boats for transportation or wind mills to grind grain. The energy that the wind contains can either be used directly, as in these examples, or it can be converted into that high-value, highly flexible and useful form of energy we call electricity

How does it work?

Perhaps the simplest way to describe a wind-electric turbine generator (or wind turbine) is to say that it works just like a hydroelectric generator. At hydropower stations throughout the US and the world, the energy that is contained in falling or flowing water is used to spin the rotor of a turbine (a rotor that looks quite like an everyday electric fan), and the turbine rotor drives the shaft of a generator to produce electricity.

Wind energy works in a very similar fashion, especially similar to “run-of-the-river” hydro stations that make use of flowing water in a river or



stream. In the case of wind, of course, the “river” is an invisible one made of air, but the principle is the same. As the air flows past the rotor of a wind turbine (a rotor that looks a lot like an airplane propeller), the rotor spins and drives the shaft of an electric generator.

What is Unitil's Involvement with Wind Power?

Unitil Energy Systems (Unitil) is beginning a new program to displace its distribution system energy requirements through installation of small scale wind turbines. The first installation is a pole-top application in Hampton, New Hampshire, and utilizes the SkyStream^{3.7™} residential scale wind turbine manufactured by Southwest Windpower, Inc.

The unit has a rated output of 1.8 kilowatts at 20 MPH and begins producing power at wind speeds above 8 MPH. The energy will feed directly into the Unitil distribution system and will offset energy demands which are part of the normal distribution system operations. Over time and depending on actual wind speeds, the unit will produce about as much electricity as consumed in a single household.



Why is Unitil Doing this?

Unitil believes strongly in the development of renewable energy, such as wind power. Alternative technologies are improving rapidly as significant investments are made in solar, wind, and conservation. The relative cost of these technologies to conventional fuels is still high but the gap is narrowing. Renewable resources will allow us to diversify our energy mix over time, with the hope of leading to lower prices and providing an extra measure of energy security.

Unitil's service area along the NH Seacoast benefits from strong coastal winds which makes it a potential candidate for economic wind energy deployment. In addition, Unitil already has existing poles in the area, providing a unique opportunity for a low cost wind energy installation. The energy generated can be interconnected directly into the distribution system and used to offset the Company's normal utility electricity usage – usage which otherwise is met with external electricity supply.

What are the Details on the Installed Unit?

Unitil installed the unit on the top of a transmission pole located just off

Wind Energy, *continued*

Route 101 in Hampton. The machine is light colored to blend in with the sky and weighs 170 pounds, with three fiberglass blades six feet in length. The speed of the blades will vary with wind speed—as wind speed increases, rotation and power output will increase up to a peak output of 2.4 kilowatts. The unit will not produce power at wind speeds below 6.7 MPH or winds speeds above 56 MPH, but is rated to survive winds up to 140 MPH.

Unitil installed metering equipment to assess the unit operations and economics to determine whether expanding the program is appropriate. Southwest Windpower had conducted extensive testing and research on the SkyStream wind turbine and its safety and reliability in residential applications, and has deployed 100,000 units in 120 countries around the world. This will be the first application installed on a utility distribution system. Unitil is carefully assessing the operation of the unit in this application, and will be seeking comment and input from local officials and the public.

For more information:

Here are some web links with more information on wind power:

- Wikipedia entry on wind power: http://en.wikipedia.org/wiki/Wind_power
- American Wind Energy Association: <http://www.awea.org/>
- Southwest Windpower: http://www.windenergy.com/index_wind.htm