

Federated Wind Turbine Fact Sheet

Timeline:

- June 27, 2003 — submitted USDA Renewable Energy Grant, which was a new program.
- Awarded \$500,000 USDA grant (September 2003). Grant was for 1.5 MW GE turbine at a cost of \$2.5 million.
- Wind incentives in 2003: State 1.5¢; Federal 1.8¢
- 2004 Federal wind incentives approved, but co-ops couldn't use tax credits. Plus, REPI credits were not part of the bill.
- 2005 Federal tax exempt bonding (Clean Renewable Energy Bonds).
- Project rebid. No turbines available until first quarter of 2007.
- Delayed again from Suzlon until October 2007 and then again until January 2008
- Meanwhile, CREBs (Clean Renewable Energy Bonds) approved, but delayed by government. NRECA lobbying & CFC overcomes this. Before this program existed, only for-profit, investor-owned utilities, through the production tax credits, were eligible to receive a tax incentive for producing electricity through renewable energy sources. CREBs provide a financial incentive for electric cooperatives and municipal utilities. It provides interest-free borrowing for qualified projects. The taxpayer holding the bond received a tax credit on their regular income tax.
- Construction started in 2008 for Suzlon 2.1 MW turbine at Welcome site. A move from from Jackson to Welcome was necessary to avoid expensive and lengthy MISO or transmission line study. 2.1 megawatts is equivalent to how much electricity is used by 210 farms in a month. In June 2008 Federated members used 17,000 MWH and the turbine produced 316 MWH in that same month.
- Cost \$3.3 million (3.3 million dollars divided by 5,000 members would be like a \$660 payment per member in a year to build this or \$44 member over 15 years). Federated pays it off over 15 years.

Turbine and blades:

- 141- foot long blades manufactured by Suzlon in Pipestone Minnesota. Made of layers of fiberglass and epoxy which surround bulkheads of Styro-foam.
- 2 upper tower sections came from Porter, Minnesota and the 2 lower sections came from Texas.
- The nacelle (including gearbox) was assembled in India.
- Hub height is 79 meters or 259 feet tall.
- Diameter of rotor is 88 meters or 289 feet
- The generator is rated for 2100 kilowatts and 600/346 volts at 60 Hz.
- Aerodynamic brake with independent systems for blade pitching and one mechanical brake system

Operation:

- Blades start with wind at 9 miles per hour.
- Prime operation is at 31.5 miles/hour
- Cut-out speed is at 58 miles/hour
- Lightning protection consists of copper wire running continuously through each blade, which is grounded into the hub spark gap arrester, which grounds its way down to the collector system.

Construction:

- 30-foot hole was dug for the foundation in January 2008. It took crews about a week to install metal form (15-foot wide metal tube).
- Crews installed 160 32-foot long anchor bolts that are covered with white PVC sleeves. Secured with 1 3/8" anchor bolts to a metal embedment ring.
- Poured 150 yards of concrete, which if spread horizontally 12" thick would be as big as a football field.
- 450 ton crane used to assemble the tower sections and blades.

Commissioning:

- After assembly and connection of all components, the wind turbine as a complete unit is fully tested to validate that it is fully operational before it is put into service.
 - All mechanical and electrical work is completed.
 - Grid or station power is of proper voltage levels and has the correct phase sequence.
 - All software is uploaded and parameter settings verified as being the newest revision and appropriate for this turbine type.
- All switches and sensors have the correct settings and are calibrated.
All mechanical and electrical systems including safety redundant systems are verified as being functionally operational.
- Lubricants are checked or filled up for operation.
 - Communications systems and SCADA (Supervisory Control And Data Acquisition) are configured and tested.
 - The turbine is put into operation producing power for a test period and then inspected. First started producing power in May 2008.

Monitoring:

- Suzlon has the ability to remotely monitor the turbine 24/7 from a monitoring station.
- Federated can monitor the turbine's output through SCADA (substation monitoring equipment).

Renewables:

- Minnesota legislators mandated that by 2025, 25 percent of utility's electricity must come from renewable resources. In 2013 Federated members used 269,475,703 kWh of electricity. This wind turbine produced 7,105,064 kWh in 2013.