



DeWind D8.2 60 Hz Demonstrator Sweetwater, TX, USA

Introduction

In mid-2007 DeWind entered into an agreement to provide Texas State Technical College (TSTC) a turnkey solution for the provision of the first DeWind D8.2 60 Hz wind turbine. The turbine was to be both a technology demonstrator for DeWind and to provide the technician training program at TSTC with a hands on training opportunity.

A location for the turbine was secured on land owned by the City of Sweetwater near the Roscoe High School.

The turbine is the third D8.2 2000kW turbine to be placed into service and like the preceding two turbines has been placed into a challenging environment. In this case, not only does the turbine demonstrate 60 Hz operation but also the ability to directly connect to a medium voltage distribution line, without the need for a transformer. This is a unique feature of the D8.2 turbine, which is accomplished through the use of a hydrodynamic torque variable converter that allows speed operation of the wind turbine rotor while supplying constant speed to a medium voltage directly connected synchronous generator.

A video of the erection of the turbine can be seen on the TSTC West Texas Web Site at the following address:
<http://www.windenergyeducation.com/turbine.htm>



Sign showing owners and vision for the future of the site.

Foundation

A Pier type of foundation was designed following geotechnical studies of the site. Following site preparation foundation construction was undertaken during November and December of 2007.



Installation of Outer Can of the foundation

Installation of Turbine

The turbine erection took place in January 2008 and went smoothly despite some days that were lost due to high winds and bad weather.



The installed D8.2 at Sweetwater

Electrical Configuration

The electrical grid at the turbine location is a distribution network that is owned by Oncor, the distribution arm of TXU. The voltage on this distribution network is nominally 12.47kV and thus within the capability of the D8.2, which can generate power at up to 13.8kV without the need for a step up transformer.



Point of Common Coupling

The point of common coupling provides the grid protection and anti-islanding required by Oncor. The grid protection is provided by a recloser equipped with a relay that provides the necessary over/under voltage, over/under current and over/under frequency protection. The recloser is located on the left hand pole shown in the figure below. The cabinet houses the transfer trip equipment that provide the anti islanding protection required by the utility. The pole to the right is owned by Oncor and provides the connection to the existing grid and also has the revenue meter.



Point of Common Coupling Equipment

Pre Commissioning at NREL

Tests were performed on the complete DeWind D8.2 nacelle in late November through early December 2007, at NREL's National Wind Technology Center (NWTC), Dynamometer south of Boulder, CO. The turbine's functionality on a 60Hz grid, ability to achieve 2 MW continuous power output, proof of cooling system up to 35°C ambient, and many other system tasks were successfully completed.

Commissioning

The final mechanical and electrical completion began on February 24th 2008 to prepare the turbine for commissioning. Commissioning started on February 29th and first wind driven 60 Hz power was delivered to the grid March 3rd 2008.

Performance Testing

Reliability test passed 25th April

From that date, there was an extended period resolving problems caused by a weak grid, Oncor re-strung part of line; and DeWind fully explored and proved the synchronous generator capabilities, by running at 2MW in voltage support mode whilst connected to a "Weak" Grid.

TSTC took formal ownership on 24th Sept 2008.

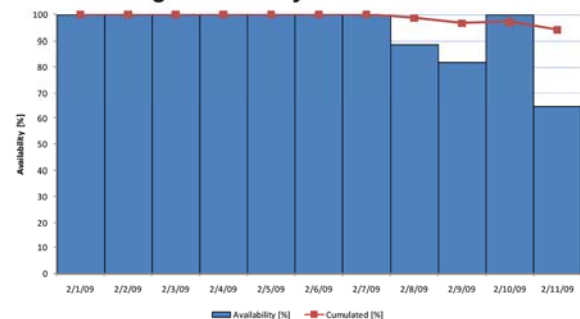
Screenshot of turbine running at 2MW Feb 11th 09

eOS ToolBox

eOS View 2.6.1

| Operation mode | | | Act. pitch controlle | | | |
|------------------------|------------|-------------|----------------------|----------------|----------------|-------------|
| Controlled Operation 2 | | | Speed Control | | | Auto |
| Drivetrain | | | Wind | | | |
| Power | Gear speed | Rotor speed | Speed | Abs. direction | Rel. direction | Pitch Angle |
| 2060.34 | 465.10 | 18.61 | 15.32 | 266.02 | -1.73 | 9.70 |
| 2019.50 | 470.00 | 18.80 | 35.00 | 267.75 | 0.00 | -2.00 |

Average availability 94% at end Jan 09



Proof that with 24/7 and service support, the D8.2 achieves good availability

This is the 3rd D8.2 to be installed and the 1st 60hz unit.

By the end of January 2009 the Turbine has run 2500hrs synchronized with the Oncor Grid and generated 2.7 GWh

For further information on DeWind Turbines please contact us at (949) 428-8500 or (940) 455-7450