

EXPANDING SMALL WIND TURBINE CERTIFICATION TESTING - ESTABLISHMENT OF REGIONAL TEST CENTERS

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Abstract

The rapid growth of the small wind turbine (SWT) market is attracting numerous entrants. Small wind turbine purchasers now have many options but often lack information (such as third-party certification) to select a quality turbine. Most SWTs do not have third-party certification due to the expense and difficulty of the certification process. Until recently, the only SWT certification bodies were in Europe. In North America, testing has been limited to U.S. Department of Energy (DOE) subsidized tests conducted at the National Wind Technology Center (NWTC) under the ongoing Independent Testing Project.

Within the past few years, the DOE, National Renewable Energy Lab (NREL), and some states have worked with the North American SWT industry to create an SWT certification infrastructure. The goal is to increase the number of certified turbines and gain greater consumer confidence in SWT technology. The American Wind Energy Association (AWEA) released AWEA Small Wind Turbine Performance and Safety Standard (AWEA Standard 9.1 – 2009) in December 2009. The Small Wind Certification Council (SWCC), a North American certification body, began accepting applications for certification to the AWEA standard in February 2010.

To reduce certification testing costs, DOE/NREL is assisting in establishing a network of Regional Test Centers (RTCs) to conduct SWT third-party certification testing. To jump-start these RTCs, DOE/NREL is providing financial and technical assistance for an initial round of tests. The goal is to establish a lower-cost U.S. small wind testing capability that will lead to increased SWT certification. This poster describes the project, describes how it fits within broader SWT certification activities, and provides current status.

Regional Test Center Project

Project purpose:

To expand SWT testing capabilities in the United States to allow cost-effective SWT certification testing (SWTs are defined as having a rotor-swept area < 200 m²).

Strategy

- Establish RTCs capable of testing small wind turbines to the IEC's and AWEA's test standards
- Select RTC partners via competitive solicitation
- DOE/NREL contribute funds and provide technical assistance to RTCs
- Leverage existing NREL test expertise by assigning an NREL test engineer to each RTC to provide assistance and mentoring, review test and commissioning plans, and review data and test reports
- Host an annual SWT Certification Testing Workshop
- Support the testing of two turbines per RTC to the standards.

Status

- Four offerors have been selected for negotiations: Intertek (NY), Kansas State University & Colby Community College(KS), West Texas A&M (TX), Windward Engineering (UT). Negotiations are underway.

Kansas State University and Colby Community College (Colby, KS)

Windward Engineering (Spanish Fork, UT)



Whisper H40 at the host site, Spanish Fork, Utah. PIX# 10509.

Regional Test Center Partners



Intertek (Syracuse, NY)

West Texas A&M (Canyon, TX)



West Texas A&M University small wind turbine test field. PIX# 17242.

SWT Certification Overview

Certification Goals:

- Provides consumers with objective information about SWT performance.
- Provides data needed to objectively determine turbine eligibility for state incentive programs.
- Sets a minimum safety level.

Turbine Eligibility Criteria:

- Rotor-swept area less than 200 m²
- Generates electricity for use while grid-interconnected or for battery charging.

Wind Turbine Manufacturer:

Provides a turbine model to be certified.

Testing Entity:

Conducts the testing mandated by the test standard. Depending on the standard, the testing entity may be an accredited lab, an unaccredited lab, or the turbine manufacturer.

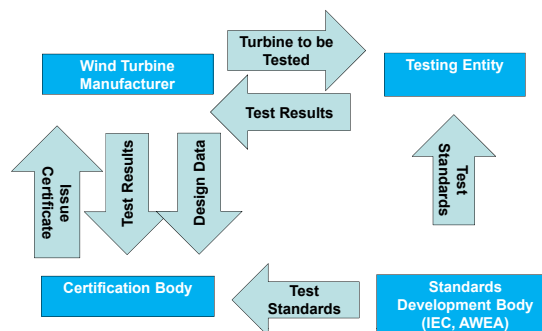
Standards Development Body (IEC, AWEA):

Determines how the turbines will be evaluated. Typically evaluation consists of a combination of design review and field testing. The standards are developed and updated using a consensus process by a group representing various stakeholders. The base SWT test standards consist of IEC 61400-2, IEC 61400-11, and IEC 61400-12-1. Most existing country standards are based on these IEC standards.

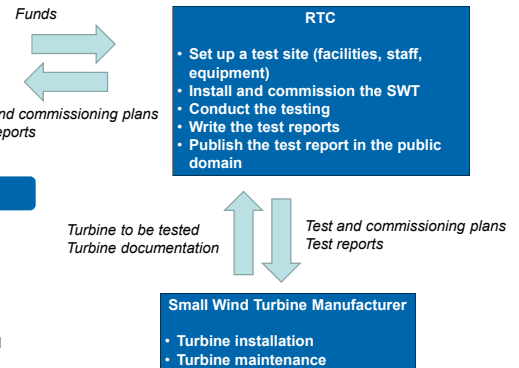
Certification Body (Agency):

- Conducts the design review
- Evaluates the test results and the testing entity
- Grants (or withholds) certification.

SWT Certification Process



Note: While this diagram shows the certification body conducting its work after testing, in practice the certification body will often work in parallel with the testing entity. This ensures issues are resolved in a timely fashion, saving time and money. Also, in addition to evaluating the turbine design and the test results, the certification body will evaluate the testing entity and its procedures. Non-accredited labs and manufacturers testing their own turbines will be subjected to greater scrutiny than accredited labs.



Timeline

- May 2009: RTC Project announced
- October 2009: RFP released
- December 2009: RFP closed
- February 2010: Offerors selected for negotiations
- 2Q 2010: Subcontracts signed
- 3Q-4Q 2010: Turbines commissioned and testing initiated
- 2011-2012: Testing completed; test reports posted



Turbine to be tested
Turbine documentation

Test and commissioning plans
Test reports

Small Wind Turbine Manufacturer

- Turbine installation
- Turbine maintenance

Certification Tests

Duration (IEC 61400-2):

- Investigates structural integrity and material degradation (corrosion, cracks, deformations); quality of environmental protection of the wind turbine; and the dynamic behavior of the turbine
- "Turbines must achieve an operational time fraction of at least 90% over a minimum of 2,500 operating hours (over a range of wind speeds) with no major failures, significant degradation of wind turbine components, or "degradation in power production at comparable wind speeds."

IEC 61400-2 Ed.2 Design requirements for small wind turbines, Section 9.4 (Page 99)

Power Performance (IEC 61400-12-1):

- Measures output of the turbine vs. wind speed
- Estimates the turbine's annual energy production
- Provides an independent check of the manufacturers' claimed performance.

Safety and Function (IEC 61400-2):

Verifies that the wind turbine displays the behavior predicted in the design and that provisions relating to personnel safety are properly implemented.

IEC 61400-2 Ed.2 Design requirements for small wind turbines, Section 9.6 (Page 107)

Acoustic Noise Emissions (IEC 61400-11):

- Determines the turbine's noise-emission characteristics
- Is mandatory under the AWEA standard. If not testing to the AWEA standard, may or may not be required depending on the certification body.