



Background

The introduction of the Feed-in Tariff (FIT) has made small wind turbines an attractive financial proposition. The FIT scheme guarantees a minimum payment for all electricity generated from renewable or low carbon sources as well as a separate payment for the electricity exported to the grid.

In order to claim the FIT all installed small wind devices must be accredited by the Microgeneration Certification Scheme (MCS). MCS ensures that all microrenewable technologies are fairly tested for energy output, safety and noise.

Project Outline

Evoco Energy Ltd, a specialist manufacturer of small scale wind turbines, commissioned Narec to test their Evoco 10 wind turbine in accordance with British Standard BS EN 61400-11 and Microgeneration Certification Scheme (MCS) requirements.

The test took place over a 6 month period at one of Evoco’s development sites in Queensbury, West Yorkshire. The site was chosen due to its close proximity and convenience to Evoco’s manufacturing facility.

Figure 1: Manufacturer Turbine Configuration Data

General Information:	
Turbine Make	Evoco
Turbine Model	Evoco 10
Year of Manufacture	2010
Rotation Axis	Clockwise (viewed from the front of the rotor)
Horizontal/Vertical	Horizontal
Orientation	Downwind
Rotor Diameter (m)	9.7
Hub Height (m)	12.72

Narec conducted the following:

1. Power performance test
2. Acoustic measurement test
3. Structural and durability assessment
4. Power degradation assessment
5. Safety test verification

Power Performance Test

The power performance test measured the standardised Ref Power and Ref Annual Energy allowing the turbine to be measured on a comparable basis against other turbines in its class. Other environmental factors which could impact upon the test such as changes in air density were also checked. This test also helps to identify the optimum turbine for the average wind speed on the site.

A site analysis assessment to measure the topography of the land and check for any significant potential errors between measured and actual wind flows was also conducted. Physical obstacles which could impact upon the actual and measured wind speed were also assessed to check that there was less than 1% potential error, ensuring integrity of the test.

Acoustic Measurement Test

Measurements at various wind speeds were taken whilst the turbine was both operational and static in order to conduct an environmental impact assessment in relation to noise including frequency analysis. Part of the test also included a tonal analysis which involved a frequency spectrum analysis to adequately analyse the impact to humans.

Structural and Durability Assessment

The mechanical equations relating to the design of the turbine were verified to ensure the materials used in the turbine build were capable of withstanding the loads.

Power Degradation Assessment

To ensure a turbine can withstand normal operating conditions and to detect signs of any long term wear in the turbine design, average power performance and wind speed ranges were calculated over a 6 month period to ensure that there was no significant degradation of produced power at comparable wind speeds over time.

Safety Test Verification

All safety aspects including the mechanical and electrical breaking systems were verified as well as how the turbine performs in the event of the loss of grid connection.

Equipment

Validated installation of meteorological mast and data logging equipment was used to conduct the test.

Additional instrumentation equipment included:

- Power meter
- Voltage measurement equipment
- Sound meter (provided by Narec)

On this occasion all data logging and anemometer equipment was provided by Evoco Energy Ltd. The data logging equipment was set up to automatically provide Narec and Evoco Energy Ltd with logged data on a daily basis via GSM link. The data was analysed daily to ensure the test was running satisfactory.

Project Summary

Narec independently tested the turbine in accordance with British Standard BS EN 61400-11 and Microgeneration Certification Scheme (MCS) requirements, BRE Global was the certification partner.

The Evoco 10 is now MCS certified and is fully operational. A full test report was issued to Evoco Energy Ltd.



Figure 2: Evoco 10

Advancing Renewable Energy

Eddie Ferguson House, Ridley Street, Blyth, Northumberland, NE24 3AG
Tel: +44 (0)1670 359 555 | Fax: +44 (0)1670 359 666 | Email: info@narec.co.uk