

Press release

Alex Woodward, Head of Marketing
alex.woodward@zephirlidar.com

RES' Project Cyclops revealed at EWEA 2014, defining new measurement methodology for power curve assessments using nacelle mounted ZephIR lidars.

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Renewable Energy Systems Limited (RES) has released details of Project Cyclops today at EWEA 2014 in a first-of-its-kind commercial investigation into lidar-generated turbine performance measurements.

The measurement phase of the project, which concluded late 2013, saw a ZephIR Dual Mode (DM) installed on a Vestas V90 turbine in order to define and test a new measurement methodology for power curve assessments using nacelle mounted lidars. The methodology aims to allow repeatable power curve measurement under a wide range of conditions and to be less sensitive to site complexity than standard mast based measurements. ZephIR DM was chosen for this methodology due to a unique capability of measuring upwind hub and rotor equivalent wind speeds, vertical shear, turbulence and veer. This in turn provided RES with ability to take both absolute and relative power curve assessments with both Hub Height (HH) and Rotor Equivalent Wind Speeds (REWS).

In the presentation at EWEA 2014, RES confirmed the specific methodology and outcome of Project Cyclops:

A ZephIR DM lidar was deployed in horizontal mode on the nacelle of a wind turbine in Southern England, located 2.62 rotor diameter (D) from an IEC compliant met mast, and a second ZephIR DM adjacent to the met mast operating in ground-based vertical mode. Wind speeds were measured at 5 distances in front of the rotor 2.62D, 2D, 1.5D, 1D and 0.5D rotor equivalent wind speed calculations were performed using the ZephIR Turbine Rotor Equivalent Wind Speed (TREWSpeed) post-processing tool at 5 slices over the rotor area.

The ZephIR DM uses inclination and roll sensors along with the known polar beam scan angles to determine the Line of Sight (LOS) wind speeds at a 3 dimensional point in space. LOS pairs on opposite sides of the scan circle are selected at the desired height and translated into horizontal wind speed and wind direction; from this it is easy to identify any yaw misalignment.

The campaign has provided strong evidence of the ability of the ZephIR DM to measure both hub height and rotor equivalent wind speed power curves in excellent agreement with the fixed IEC met mast and ground based ZephIR lidar respectively. At any specific measurement distance, the scatter of the measurements (i.e. category A uncertainties) was independent of the chosen measurement sector, which varied in terrain complexity. RES expect the category B uncertainty to decrease with decreasing measurement range, due to the effects of terrain becoming less significant. An optimum measurement distance of 1.5D is suggested in order to measure 5 rotor equivalent wind speed slices and minimise the distance in front of the turbine. A further test of this methodology is planned in complex terrain.

RES hope this campaign will encourage the manufacturers of wind turbines to offer two power curves to potential customers. The first power curve would be based on conventional measurements for energy yield assessments, and the second, measured using a nacelle lidar, would form the basis of a warranty test. For turbines which are to be sited in complex terrain, manufacturers could consider the possibility of offering the second curve which at a closer distance to the rotor, which RES believe will allow for a more reproducible and consistent test.

Ian Locker, ZephIR Lidar's Managing Director, said: "In this trial, the ZephIR Dual Mode is showing its ability to take measurements that other lidars simply cannot. We are demonstrating that higher repeatability of turbine performance measurements can be made possible through deployment of the ZephIR DM. Additionally, our system has helped RES, one of the most respected technical leaders



Figure 1: ZephIR DM in operation on Vestas V90 turbine.



in the wind industry, determine this new and more reliable power curve measurement technique for turbines. We look forward to continued trials with RES and ZephIR DM in complex terrain this year and more widely providing the tool to improve commercial relationships between developers, operators and turbine suppliers.”

A spokesperson for RES said: “The ZephIR DM was the perfect choice for this trial and the results prove as much. Traditional methodologies for measuring power curves have practical and technical challenges. This trial demonstrates how a new methodology utilising lidar can build on current practices, address existing challenges and improve commercial relationships between developers, operators and turbine suppliers by better understanding the relationship between wind and turbine performance. As well being able to measure upwind at extremely short distances, no other lidar system was able to incorporate shear, turbulence and veer measurements to allow calculation of hub height and rotor equivalent power curves. The ZephIR DM is the only commercially available wind lidar device that satisfied our requirements for this trial and has provided a reliable, accurate and user-friendly solution throughout.”

For a full copy of the presentation please email: alex.woodward@zephirlidar.com

ENDS

Notes for Editors

About Zephir Ltd.

“Celebrating 10 years of wind lidar excellence”

In 2003 we released the first commercial wind lidar, ZephIR®, exploiting decades of research at UK government Research & Development establishment QinetiQ. Designed specifically for the wind industry ZephIR has paved the way for many of the remote sensing devices seen in the market today. Our original lidar technology continues to innovate with world firsts such as taking measurements from a wind turbine spinner and being the first to deploy an offshore wind lidar, both fixed and floating. ZephIR has also now amassed more than 3.5 million hours of operation across 650+ deployments globally spanning a decade of commercial experience. For wind measurements onshore, offshore and in turbine-mounted applications, ZephIR provides accurate, reliable finance-grade wind data.

Zephir Ltd. is a wholly owned subsidiary of Fred. Olsen Ltd. - established in the UK in 1963 with business interests primarily focussed on renewable energy, including ZephIR.

Visit www.zephirlidar.com for more information.

About RES

RES is one of the world’s leading independent renewable energy project developers with operations across Europe, America and Asia-Pacific. At the forefront of wind energy development for over 30 years, RES has developed and/or built more than 8 GW of wind energy capacity worldwide. In the UK alone, RES currently has more than 1GW of onshore wind energy either constructed, under construction or consented.

RES is active in a range of renewable energy technologies including large-scale biomass, solar, wave and tidal and on-site renewable installations. For more information, visit www.res-group.com.