



# WINDCUBE WATCH



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## Customer Experience : ECOFYS

Ecofys recently deployed a WINDCUBE v2 to measure the influence of land-sea changes and heavily developed terrain on the wind profile. Lidar measurements from multiple locations and rapid deployment were keys to the success of the project.

The WINDCUBE v2 complemented a wind measurement campaign for a proposed wind farm site along a dike in an industrial area of a city in the Netherlands. The measurement plan also included a 60 meter met mast, erected near one end of the dike. It was possible to deploy the Lidar quickly at the future site of the met mast, allowing an extension of the measurement period while the mast was contracted and erected. WINDCUBE v2 was left in place for one month after the mast installation in

order to establish good correlation between WINDCUBE v2 and cup anemometer measurements.

In the next phase of the measurement campaign, the WINDCUBE v2 was moved to the other end of the dike, at a site where it would not have been possible to erect a mast. These measurements allowed for the validation of the flow modeling across the site, which is based on the primary measurement campaign. Specifically, the effects of the dike and surrounding industrial buildings could now be quantified through the use of Lidar.

WINDCUBE v2 can add invaluable insights into wind resource assessment, and not just as a complement to met masts. Ecofys currently has a series of stand-alone Lidar

measurement campaigns at forested sites in Germany and at a rural location in eastern Virginia, USA. For sites without a reference mast, Ecofys performs verifications of the WINDCUBE v2 against a fully IEC-compliant, hub height met mast at their Test Site Lelystad in the Netherlands. These verifications can be carried out before and after the campaign to give further confidence in the quality of the Lidar measurements. This test platform is also available for commercial use by other interested parties. See [www.ecofyswts.com](http://www.ecofyswts.com) for more information.

## FCR™ solution: First complex terrain campaign with Barlovento RN and Acciona Energia

Remote sensing devices offer clear advantages compared to conventional met towers when deployed in the field, such as lack of permitting, quick installation, and a small, low-impact footprint. The advantages of remote sensing devices are particularly evident in complex terrain, where difficulties in access and for siting the mast and anchorpoints are frequent.

Leosphere and NRG Systems partnered with Acciona Energia and Barlovento Recursos Naturales to explore the performance of WINDCUBE v2 in complex terrain. A measurement campaign was developed in eastern Spain's Valencia Region, which is considered a complex site. Measurements are currently being gathered in parallel to an 80 meter meteorological mast, according to the IEC standards.

WINDCUBE and the 80m met mast are collocated on the eastern slope of a 300 meter hill that is between two valleys in the northerly direction. Additional valleys run downhill, and the surrounding vegetation is characterized by forests of 15 meter pine trees. The altitude atop the hill is approximately 840 meters above sea level.

The specific objectives of the Project were as follows:

- Investigate the behaviour of a commercially available Lidar (WINDCUBE v2) with FCR™ in complex terrain;
- Develop standard methods using WINDCUBE v2 for wind resource assessment in complex terrain;
- Reduce financial risk of alternative WINDCUBE v2 in wind resource assessment;
- Enhance scientific and practical knowledge on the performance of the WINDCUBE v2 in complex terrain, leading toward more widespread use in wind resource assessment.

The knowledge obtained from this campaign has enabled the reduction of uncertainty of resource assessment of wind farm projects, and has improved the bankability of WINDCUBE v2 in all site conditions.



WINDCUBE v2 Lidars on ECOFYS IELYSTAD testsite, Netherlands

## FCR™: Lidar Measurement Solution For Complex Terrain

Leosphere and NRG Systems are pleased to introduce FCR™ (Flow Complexity Recognition) for the WINDCUBE® v2 Lidar remote sensor. Supported by WINDCUBE v2's vertical fifth beam, FCR provides precise, bankable data in all terrain, including complex terrain, with no post-processing or post-correction involved.

Assessing the wind resource for any wind farm project is key, and the better the analysis, the more attractive the financial terms. Remote sensors have shown their potential by reducing vertical uncertainty through measurement of the wind up to and above hub height, and by reducing horizontal uncertainty through measurement of the wind at multiple locations across the wind farm.

Up to now, in either a complex terrain or complex flow situation, all remote sensors on the market had a bias due to lack of flow homogeneity across the measured volume. After years of development,

we have developed a solution based on hardware and software to eliminate this bias from WINDCUBE v2. WINDCUBE v2 is the first remote sensor on the market that provides direct true measurement for complex terrain. The performance of FCR has been proven through theoretical analyses and real case studies with CRES (Greece), GL Garrad Hassan (Canada) and a joint study with Acciona Energia and Barlovento (Spain). For the first time, wind energy developers can use the same remote sensor with ease and confidence at all sites, whether in simple or complex terrain, onshore or offshore. FCR is now available on any new WINDCUBE v2 and will be available as an option for existing WINDCUBE v2s by June 2012. For more information, visit [www.lidarwindtechnologies.com/fcr](http://www.lidarwindtechnologies.com/fcr).



WINDCUBE v2 WITH FCR™



WINDCUBE v2 on Barlovento Recursos & Acciona Energia site, Valencia Region, Spain



### Employee Introduction

Delphine Gruppi  
Wind Lidar R&D Supervisor

#### Why did you choose to work at Leosphere?

*I was very much attracted by the high level of technology of the products offered by Leosphere. I was myself very familiar with the infrared fiber laser technology. At this moment, Leosphere is growing very fast and I want to take part in this great adventure.*

#### What do you think is the most attractive part of your job?

*I really appreciate working interactively with every department, from production to the scientific department and also with our partner NRG Systems. I also enjoy the challenge of converting a client request into a technical solution as well as to constantly search for the best solution.*

#### During your career at Leosphere, what was your biggest challenge?

*The biggest challenge was to be able to manage the development and launch of a product into production with the constraint of reaching the highest level of quality in terms of meteorological data and operational reliability.*

#### What do you see as the future for Lidar technology?

*Lidar technology can be used in many applications, such as aviation weather, industrial sites survey and offshore wind assessment. We have to work very closely with our customers to develop products that will best fit their needs and withstand extremely harsh environmental conditions. Creating robust innovative solutions based on high technology components will always be our main concern.*

#### Recent WINDCUBE v2 installation highlights:

- Solar complex/GWU, Germany - March 2012
- CWIND, Ireland - February 2012
- Hatch Ltd., Canada - February 2012
- Exxaro, South Africa - February 2012
- NESSCO, UK - January 2012
- Ecofys US Inc., USA - January 2012
- Civi design, Spain - January 2012
- Rotation service, Netherlands - January 2012
- Energy AG/GWU, Austria - January 2012
- JLWI/GWU, Germany - January 2012

# Reach us

## WINDCUBE DISTRIBUTION NETWORK

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# Meet us

EWEA 2012  
Copenhagen, Denmark  
16-19 April 2012

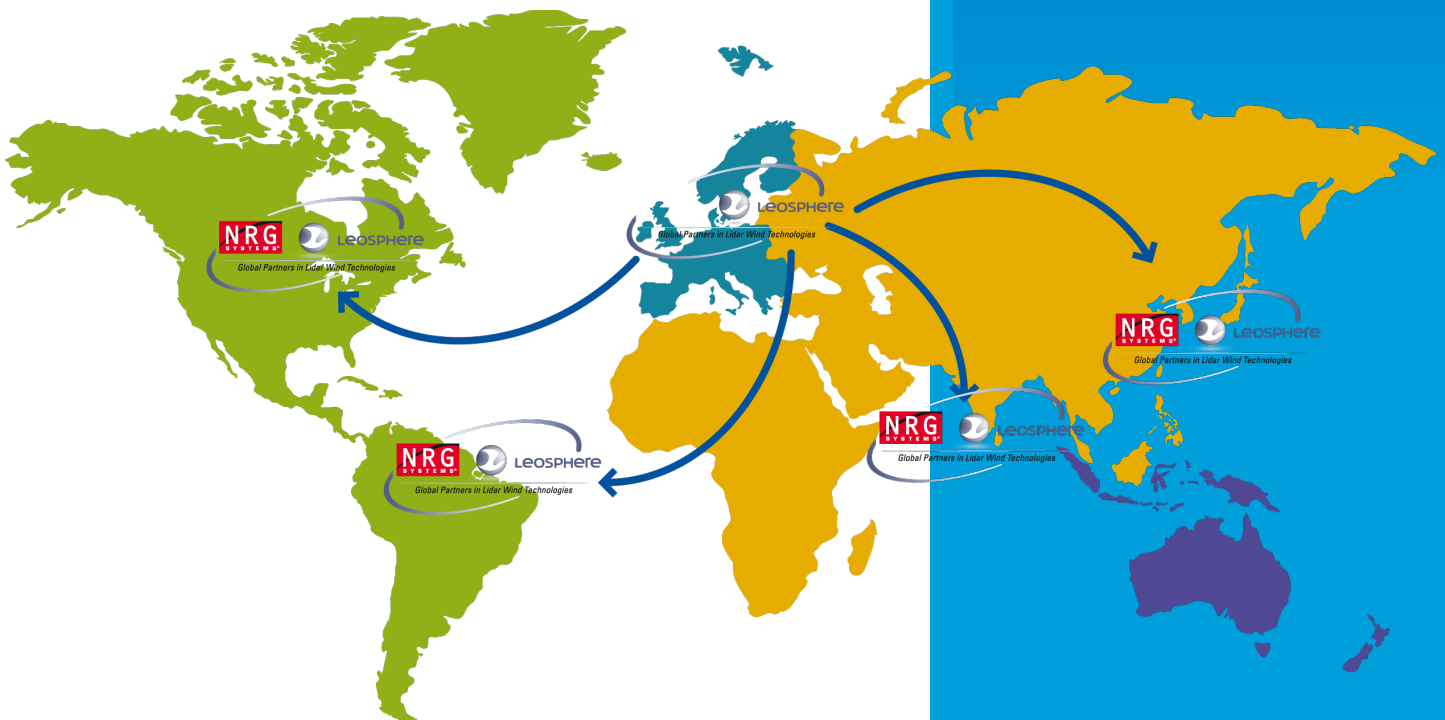
AWEA WINDPOWER 2012  
Atlanta, Georgia USA  
3-6 June 2012

Global Offshore 2012  
London, UK  
13-14 June 2012

AWEA Wind Resource & Project Energy  
Assessment Seminar  
Pittsburgh, Pennsylvania, USA  
13-14 September 2012

HUSUM 2012  
Husum, Germany  
18-22 September 2012

AWEA Offshore WINDPOWER Conference  
Virginia Beach, Virginia  
9-11 October 2012



[www.lidarwindtechnologies.com](http://www.lidarwindtechnologies.com)