



press release

## **Improving the energy efficiency of wind turbines: Launch of the ANR SmartEole project on wind turbine control technologies**

Rueil-Malmaison, 21 May 2015. **The SmartEole project has just been launched following the French National Research Agency (ANR) call for projects on the theme "The energy efficiency of processes and systems". This project is aimed at improving the energy production efficiency and lifespan of wind turbines via the development of innovative control solutions.**

One of the major challenges for the development of the wind power sector is reducing the cost of the energy produced. The implementation of advanced wind turbine control systems represents one of the levers to optimize performance and achieve production gains.

Scheduled to last three and a half years, the SmartEole project is being led by [PRISME](#), a laboratory of the University of Orléans, working alongside three research partners, IFP Energies nouvelles ([IFPEN](#)), Le Laboratoire de Mécanique de Lille ([LML-CNRS // University of Lille 1 // Ecole centrale de Lille // Ecole nationale supérieure d'arts et métiers de Lille](#)) and the Laboratoire d'analyse et d'architecture des systèmes ([LAAS-CNRS](#)), along with two industrial partners, [Maia Eolis](#) and [Avent Lidar Technology](#).

SmartEole will lead to the development of control techniques designed to improve the operating conditions of wind turbines. The challenge is to integrate sensor systems (particularly Lidar) capable of accurately detecting incoming wind speed, direction and intensity. By measuring incoming wind, it will be possible to implement real-time control strategies to optimize nacelle and blade orientation. By anticipating the optimum orientation of the wind turbine via the measurement of incoming wind, the mechanical constraints placed on the structure (mast and blades) are significantly reduced, thereby decreasing maintenance costs and increasing the lifespan of the structure. SmartEole also aims to underpin this strategy with innovative concepts, making it possible to reduce mechanical fluctuations for shorter characteristic times via an active flow control system on the blades.

The control technologies developed within the project will thus be deployed on several scales – the blades, the turbines and the wind farm as a whole – and will form the focus of a range of research, from fundamental research conducted at lab scale up to full-scale demonstration in real conditions.

Two types of experimentation are planned:

- full-scale testing on a Maia Eolis wind farm using control strategies developed by IFPEN with Avent Lidar Technology sensors.
- wind tunnel measurements in facilities operated by LML and PRISME laboratories, with validation of control strategies developed by LAAS-CNRS and PRISME.

Developments will draw on the partners' expertise in the fields of wind power and lidar technology, as well as metrology, fluid mechanics and automatic systems.

**Avent Lidar Technology** develops and manufactures wind turbine nacelle mounted lidars Wind Iris. Avent is part of group LEOSPHERE, maker of short and long-range wind lidars WINDCUBE, and global leader in the wind energy industry, airport safety and operational meteorology.

**IFP Energies nouvelles** is a public research and training player. It has an international scope, covering the fields of energy, transport and the environment. From research to industry, technological innovation is central to all its activities.

**The LAAS-CNRS** is a CNRS unit which research activities fall within the domain of Information Sciences and Technology. Labeled Institut Carnot in 2006, the laboratory has a history of strong relationships with industry and works in a large number of collaborative projects with international, national and regional industries of all size.

**The LML** is a french research laboratory (CNRS / Lille University of Science and Technology / Ecole Centrale de Lille and Arts et Métiers ParisTech). This laboratory is composed of 6 research teams. LML focuses on the following research area : Mechanical reliability and Tribology ; Fluid mechanics ; and Civil engineering with a strong involvement at a regional, national and international levels.

**Maia Eolis**, subsidiary of the MAÏA Group with 49 % hold by GDF SUEZ, is a single point of contact in the wind energy sector, from design to operations of wind farms, including construction and maintenance. R&D is a major activity in order to improve its productivity.

**PRISME** is a Pluridisciplinary Research laboratory on System Engineering, Mechanics and Energetics. It belongs to the University of Orléans, France. Innovations in transport, energy conversion and environment are parts of its main objectives.

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