



# Higher Output, Lower Risk

FIELDLAB ZEPHYROS KICKS-OFF AIRTUB PROJECT

THE OFFSHORE WIND INDUSTRY IS A SOURCE OF INNOVATIVE SOLUTIONS. THROUGHOUT EUROPE, MANY INITIATIVES SPRING TO LIFE IN order to make the construction and maintenance of offshore windfarms better, safer, cheaper and more efficient.



Photo courtesy of World Class Maintenance.

Ferry Visser, Program Manager at Fieldlab Zephyros.

Fieldlab Zephyros is an initiative aimed at reducing downtime of offshore wind turbines and decreasing the number of man-hours spent at sea for maintenance. Within the initiative, the AIRTuB project has recently received a Dutch subsidy of EUR 3 million from the Dutch government, showing that the efforts of the collaborating organisations within the Fieldlab Zephyros are considered to be of great value to the further development of this industry.

## Variable Conditions

Fieldlab Zephyros, named after the Greek God of the westerly wind, is an initiative by World Class Maintenance and the Centre of Expertise Water & Energy. World Class Maintenance is a Dutch network organisation that aims at 100% predictive maintenance in the Dutch industry. Through education and research, the Dutch Centre of Expertise Water & Energy contributes to innovations for a sustainable and dynamic energy transition with a focus on water. Ferry Visser is Program Manager at Zephyros, and his enthusiasm about the innovative power of the offshore renewables industry is contagious. "The offshore wind industry is developing at high speed. From the many lessons learned in their relatively young history, almost every new offshore windfarm shows innovative solutions in the field of construction and operation. Meanwhile, at sea, offshore wind turbines are facing harsh circumstances that

can seriously influence the operative life of the machinery. Failing wind turbines undercut the business-case of a windfarm, so downtime has to be avoided. Therefore, innovation should not stop at construction and operation, but should deal with maintenance as well." Mr Visser explains that Fieldlab Zephyros wants to contribute to reducing downtime and limiting the need of on-site maintenance. "The less downtime the better," he states, "and to avoid downtime, effective inspection and maintenance is necessary, but for this, we need to reduce the number of people going offshore, as this leads not only to higher risk but also to higher expenses." He continues, "In fact, our goal with Fieldlab Zephyros is to make maintenance less ruled by variable conditions such as the availability of people, vessels and good weather conditions."

## Smart Industry

Fieldlab Zephyros is running a number of projects in order to reach its ambitious goals, and so far the AIRTuB project is the most developed. Mr Visser explains, "The AIRTuB project deals with the rotor blades of offshore wind turbines. This part of the turbine is the most vulnerable, and the size of the blades continues to increase. Today, the largest rotor blade measures 107m. To put this into perspective, the size of the rotor blades on the first offshore windfarm, the Danish Vindeby, was 17m. Who knows where this will end?" The Centre of

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Expertise Water & Energy decided to focus on the inspection and maintenance of this vulnerable, but large, part of the turbine somewhere in March 2018 – and the AIRTuB project was born. Mr Visser continues, “In June 2018, the first AIRTuB meeting was held, and in June the same year it was decided to write an official project plan, so things went pretty fast. Soon, the first organisations from the research and industry sectors began to show their interest and joined up as partners, and more businesses joined throughout the course of the project. In April this year, the project plan was submitted to the Dutch Enterprise Agency, which is a government agency operating under the auspices of the Ministry of Economic Affairs and Climate Policy, and you can imagine how proud we were when they decided to grant us a subsidy in August worth EUR 3 million.” In September the project officially kicked off and also received the official Smart Industry Fieldlab status, which is proof of the project’s innovative and smart working methods.

### Eight Work Packages

The project plan describes the first phase of the project, which focuses on the development and testing of a drone prototype equipped with a sensor package. “With these sensors,” Mr Visser says, “the drone should be able to inspect the leading edge erosion of offshore wind turbine blades remotely, for example by using 3D mapping of the surface. Also, with the >>

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Photo courtesy of Altitec.



Photo courtesy of Aart Bos.

AIRTuB's first phase focuses on the development and testing of a drone prototype equipped with a sensor package.



Photo courtesy of World Class Maintenance.

In September the project received the official Smart Industry Fieldlab status.

sensors, it should be possible to inspect structural damage of the blades, remotely (using radar and/or thermographics) and in-contact (using ultrasonic sensors).” In a next phase, the results of the prototyping should lead to a commercially applicable, autonomous, flying and crawling inspection and repair robot. Mr Visser: “Now, based on the current types of wind turbines and windfarms, one robot might be able to facilitate a cluster of five wind turbines.”

For this first phase, eight work packages have been developed:

1. Sensor Package Research;
2. Automated Drone Research;
3. Payload automated drone prototyping, integration and testing;
4. Data processing;
5. Automated Coating of Blades;
6. Erosion Modelling and Repair Recipe;
7. Asset Management Strategy;
8. External Knowledge Dissemination.

“Looking at the several work packages, it goes without saying that almost each of them depends on the results of the other; some of them can run next to each other, and others can only run when another work package is finalised”, Mr Visser states. “For every work package, several parties work together.”

### Data Tower

Apart from AIRTuB, within Fieldlab Zephyros four other projects have been initiated, which are currently at various stages of their development. One of these projects is the Data Tower. “With the virtual Data Tower project,” Mr Visser says, “we want to create an umbrella Data Tower functionality for the operation and maintenance of North Sea windfarms. The data will have to be collected from a broad range of indicators, such as sensor and diagnostic data directly from the assets, inspection and maintenance data, operational data from the operator and maintenance contractor, supply chain data, meteorological data, etc. By means of a research project, the Data Tower project aims to investigate the design requirements of such a data tower and the possibilities of obtaining the required data in order to quantify the benefits by means of a business case and to visualise the required investment.

For the success of this project, it is necessary that asset owners participate in this data tower and are prepared to share their data real-time. Anonymously, of course.” At the latest Offshore Energy exhibition, FieldLab Zephyros announced their collaboration with ORE Catapult concerning the data benchmark tool

SPARTA. With SPARTA, FieldLab Zephyros hopes to get entrance to valuable research data for the Data Tower project.

### Short-Sighted Conclusion

Bringing down the cost of maintenance is good news for offshore wind operators, but sounds threatening for maintenance companies. However, according to Mr Visser, this is a short-sighted conclusion: “Every company, also those from the maintenance industry, exists by meeting its customers’ demands and needs. If the amount of maintenance work in the offshore wind industry decreases, there will still be plenty of work for contractors, for example in providing advice on how to prevent downtime. So, for me, it is clear that the future of O&M in offshore wind lies in working towards higher output and lower costs through reduced downtime, and if this can be realised with less deployment at sea, it will also be risk-preventing and I don’t think anyone will argue with this.”

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