



# AWESOME - ADVANCE WIND ENERGY SYSTEMS OPERATION AND MAINTENANCE EXPERTISE

[www.awesome-h2020.eu](http://www.awesome-h2020.eu)

## CHALLENGES

The growing trend of the wind energy sector (10% of annual increase in the last 10 years), the aging of existing onshore parks (above 10 years), the high operation and maintenance costs (average share of 20%-25% of total levelised cost per kWh produced), as well as the general agreement within the European wind energy industry on the fact that the sector is suffering an increasing shortage of skilled labour, makes the operation and maintenance (O&M) one of the critical tasks for ensuring a cost-effective exploitation of wind farms.

In this scenario, AWESOME network aims to educate eleven young researchers in the wind power O&M field by constructing a sustainable training network gathering the whole innovation value chain. The main EU actors in the field of wind O&M have worked together, under the umbrella of the European Wind Energy Academy (EAWA), in order to design a training program coping with the principal R&D challenges related to wind O&M while tackling the shortage of highly-skilled professionals on this area.

The overall AWESOME research program tackles the main research challenges in the wind O&M field identified by the European wind academic and industrial community:

- Developing better O&M planning methodologies of wind farms for maximizing its revenue.
- Optimising the maintenance of wind turbines by prognosis of component failures.
- Developing new and better cost-effective strategies for Wind Energy O&M.

AWESOME network includes companies, universities, associations and research centres experts in the wind energy sector from Spain, Italy, Germany, UK, Denmark and Norway.

## MAIN FEATURES OF THE PROJECT

The three main AWESOME research goals have been divided into eleven specific objectives, which has been assigned to the fellows, for them to focus their R&D project, PhD Thesis and professional career.

AWESOME fellows have been recruited by project beneficiaries who has designed a training program that answers the challenges identified by the SET Plan Education Roadmap. The program includes local training (PhD enrolment), intra-network activities (secondments and specific AWESOME courses) as well as network-wide actions such as scientific conferences coordinated with EAWA, summer schools and industrial workshops.

Personal Development Career Plans has been also tuned up for every fellow, being their accomplishment controlled by a Personal Supervisory Team formed of senior researchers coming from different research environments. Along the project, each fellow is being exposed to three different research environments from both, academic and industrial spheres through secondments at partner organizations and between beneficiaries.

Apart from the obvious prospects in wind energy, the fellows are receiving complementary training in project management, entrepreneurship, IPR management and R&D results exploitation, opening their careers to other fields.

The international character of the project, even in the same environment, also contributes to the exchange of knowledge providing the fellows with different approaches and ways of facing R&D works.

*AWESOME network at the  
Torque 2016 conference  
(Munich, Germany)*





Wind energy O&M

## RESULTS

According to the eleven research lines developed by the fellows, AWESOME main results and major innovations contributing to wind energy cost reduction are the following:

1. Methodology for very short time wind field forecasting and power output forecast.
2. Simulation game for the operational phase of a wind farm.
3. Tool to operate a whole wind farm as a wind sensor for improving the operation and control of the wind farm.
4. Prognostic methods for particular failure modes in wind turbine components and maintenance strategies for turbine fleets.
5. Tool of the assessment of commercial Condition Monitoring systems by determining whether and when the CM systems detect faults and with what reliability.
6. Methodologies for the prognosis of wind turbine component failures using only SCADA data.
7. High performance Condition Monitoring system.
8. Tool for risk-based decision about post-design life operation.
9. Tool to schedule maintenance on a wind farm to improve availability and decrease the cost of O&M.
10. Reliability based methods for the reduction of the cost of O&M.
11. Optimization methodologies for the cost-effective management of wind farms.

By June 2018, at the end of the training period, AWESOME fellows will complete their PhD degree, providing them with a solid background for the development of their research and technical career, and being positioned as experts on specific fields and on general research on the concepts of wind O&M.



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### EUREC MEMBER



Since January 2015, all AWESOME fellows have completed their secondments and have attended three network specific courses (Spain, Norway and Germany), two summer schools (UK and Germany), two industrial workshops (Norway and Spain) and one PhD Seminar coordinated with the EAWE.

## ACKNOWLEDGMENT



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