# Tragic hero predicts bright future for O&M costs

Amid all the talk of larger turbines, it's easy to forget that optimising the operation of windfarms can bring about a significant reduction in the cost of energy from offshore wind.

I was reminded of that when reading about Romeo, a European project funded by the Horizon 2020 programme that shares the same name as the tragic hero of one of Shakespeare's best known plays.

The project, Reliable O&M decision tools and strategies for high LCoE reduction on offshore wind, seeks to reduce O&M costs through the development of advanced monitoring systems and strategies.

The main objective of the Romeo project is to reduce O&M costs by developing and demonstrating an O&M information management system and an analytics platform, capable of improving decision-making processes while allowing a transition from corrective and calendar-based maintenance to condition-based maintenance strategies.

A flexible and interoperable cloud-based and internet of things platform will provide an advanced analytics ecosystem for failure diagnosis and prognosis models to better understand the real-time behaviour of the main components of turbines under operational conditions, maximising their life span and minimising O&M costs. The project will also develop third-generation condition monitoring systems for some components and low-cost structural condition monitoring systems.

The innovations developed in the project will be tested on three windfarms: Teeside and East Anglia 1 in the UK and Wikinger in Germany. A number of leading companies and academic institutions are involved.

Elsewhere, IBM Research is developing predictive machine learning technologies for a wide range of projects. Speaking about the Romeo project, IBM's Dr Dorothea Wiesmann, who works at IBM's Zurich lab, explained that the company is developing advanced machine learning models for predictive maintenance of wind turbine components.

In a second work package, IBM is collaborating with project partner Indra to develop a data acquisition and analysis system that connects the sensors and analytics at the edge with the analytics and cognitive capabilities in IBM's cloud with O&M information management systems in order to leverage the modelling insights in the form of business decisions.

She explained that most sensor data collected today is outdated seconds after it's collected. Transmitting data from a sensor on an offshore turbine takes time, and the process is bandwidth limited. "If we can analyse some of the data in real-time," she explained, "where it is collected, we can make decisions faster and in some cases automate them, such as shutting down a turbine to avoid cascading damage."

To predict failure in components in cloud data centres, IBM is looking at usage data and degradation indicators, such as correctable errors, and for turbines it will look at system sensor data (such as vibration and temperature), usage and maintenance history, as well as environmental data. Once it has done that, it will leverage machine learning to understand the drivers and indicators of imminent failures.

She noted that the O&M element of offshore wind is estimated to account for a quarter to a third of the lifetime cost of energy, so making turbines as reliable as possible using condition-based maintenance will have a significant effect on the cost of energy from offshore wind.