5 new trends in onshore wind O&M
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This report analyses trends in the way operations and maintenance (O&M) of European onshore wind farms is procured and undertaken. It also explores the growing use of new technology, analytical software and benchmarking tools in wind farm O&M.

The importance of O&M

The cost of operating and maintaining onshore wind farms in Europe is significant. According to the European Wind Energy Association, O&M costs account for around 20% of the levelised cost of energy (LCOE) for onshore wind farms. As such, any measures that can be taken to reduce this cost directly translate into improved returns for investors. This is not to say that asset owners can scrimp on O&M expenses. Inadequate O&M can lead to minor faults or defects not being recognised. This not only impacts yield but can also result in major component failure, potentially leading to costly repairs and lengthy downtime.

One onshore wind independent power producer (IPP) interviewed for this research that asked to remain anonymous stated that condition monitoring recently revealed a minor defect in one of its turbine gearboxes. Preventative maintenance was undertaken at a cost of £65,000. However, had the issue gone unnoticed, repairs would have totalled more than £150,000.

O&M is a growing issue for the onshore wind industry. Due to the increased probability of component failure and that defects will fall outside of the manufacturer’s warranty period, the importance and cost of O&M increases with the length of time from commissioning. Given that approximately 76% of all onshore wind turbines installed in Europe have been operating for less than ten years (i.e. less than half their operating lifespan), this is an issue of growing relevance.

O&M is also rising up the agenda because onshore wind farms are increasingly owned by financial investors that, unlike utilities, do not have in-house O&M capabilities. Indeed, financial investors acquired stakes in 1.8 GW of wind capacity in Europe in 2014 thus far, compared with only 1.2 GW in 2012.

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Trend 1: **OEMs dominate the maintenance market**

The norm across Europe for financial investors, IPPs and utilities is to contract with the turbine OEM to undertake maintenance for the turbines and for third party maintenance contractors to maintain other components such as the substation. This is primarily because OEMs have direct access to spare components, meaning repairs and replacements can be done much more rapidly than an independent maintenance provider. In many cases, banks financing construction of onshore wind farms will require multi-year maintenance contracts with OEMs as they perceive this to be the least risky maintenance strategy.

Furthermore, owners of onshore wind farms have few alternative options to OEMs to partner with for maintenance. Unlike in the US, there are very few non-OEM maintenance contractors that are reputable and have the balance sheet to stand behind warranties in Europe.

“There is a market offering for third party maintenance service providers, but it is not very rich and broad and access to spare parts is quite an issue,” explained Jean Lemaire, former Director of Asset Management, Akuo Energy. “Those things are being structured as we speak but there is certainly not yet an exhaustive third-party full maintenance service offering in the market in Europe.”

The majority of financial investors and IPPs interviewed for this report expect the status quo to remain in the short-term. Aside from access to spare parts, another obstacle to the emergence of third-party maintenance providers is the sheer complexity of new turbines coming to market, meaning a much higher level of technical expertise is required than five years ago to maintain turbines. For this reason, it is likely that any successful independent maintenance providers will have to have expertise in specific turbine models.

“I do not anticipate any major change in the short-term in the way we contract for turbine maintenance,” explained the asset manager of a leading financial investor in onshore wind farms in Europe that asked to remain anonymous. “I am sure this will change in the long-term but the new turbines are a quantum leap from older turbines and the skills required to maintain them are very different. I am not sure that an independent maintenance contractor would be able to maintain a portfolio of different turbine designs. What you may end up having are very bespoke service providers offering maintenance for certain turbines.”

OEMs are also increasing the length of maintenance service agreements in order to lock in long-term service revenue. According to data compiled by MAKE Consulting, the average length of service agreements in publically announced turbine orders in 2012 was around twelve years in Latin America, eleven years in Europe and just over nine years in Africa. This compares to a global average service length of just over two years in 2009.
Trend 2: Separating the O from the M

The capabilities and expertise needed to effectively undertake wind farm operations and maintenance are very different. This is why every asset manager and IPP interviewed for this report engages with separate organisations to undertake each aspect. In addition, separating these responsibilities creates clear incentives to ensure that O&M is done effectively while also creating greater transparency. Nearly all IPPs and asset managers interviewed for this report expressed concern that retaining the OEM for both operations and maintenance might make it harder to understand exactly how their assets were being operated and maintained.

“It is very unlikely that we would ever use one organisation to do both,” explained the Head of Asset Management at a leading renewable energy investment fund. “OEMs are more than capable of doing both, but there is a question whether you can trust them to give you the full picture of issues that have arisen and how they have been dealt with. There can sometimes be incentives for turbine manufacturers to not fully disclose if there is an issue with one of their turbines, so you really need two parties, with the operator keeping a close eye on the maintenance provider.”
Trend 3:
Internalising or externalising operations?

There is a wide divergence of strategies for operating onshore wind farms in Europe. Utilities and large IPPs have big teams a deep experience of operating power plants, so will typically supervise and manage the technical, commercial and financial operations internally while overseeing the work of maintenance contractors. At the other end of the spectrum are financial investors and smaller IPPs that typically lack the skills and capabilities to operate wind farms. These investors will therefore usually outsource operations to an external service provider.

The investment strategy of investors and developers also influences the decision to externalise operations. Investors intending to sell assets once operating or only hold assets for a few years are less likely to make the significant investment required to establish sufficient internal operations expertise if the benefits are only going to be reaped for a few years. For investors with a buy and hold strategy, internalising operations is a much more compelling proposition.

As Jean Lemaire explains, the primary advantage of internalising wind farm operations is that it enables asset owners to obtain a much deeper understanding of the performance of their assets.

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“We operate our wind farms internally because it enables us to optimise the plant in a way that we would not be able to if it was done by an external provider,” he said. “It enables us to really get to know our equipment. Service providers will tell you if there has been a failure, what caused that failure and explain how it has been resolved, but there is so much going on that inevitably things will be missed. To really understand the asset and optimise the asset you need to operate it yourself or work very closely with your service provider.”
Trend 4: The emergence of new O&M technology

A plethora of new O&M technologies and software have come to market in the last five years in the fields of predictive maintenance, data analysis, lifetime extension and asset optimisation. While asset managers interviewed for this report have mixed views on the effectiveness and reliability of a lot of new technology, a few new solutions were consistently supported.

One of these is the use of lidar technology to assess the performance of wind turbines. “New lidar techniques are coming to market and I think they are very worthwhile,” explained an undisclosed asset manager. “From an owner-operator perspective, I am focused on looking at lidar as a way of assessing turbines’ performance and whether what the manufacturers say is actually valid. They give you a power curve but it is back to this trust thing. You might find some differences from analysis when you apply it to a specific site.”

Trend 5: Benchmarking – a vital tool for O&M

Although a variety of new technology and software has come to market in the last five years, one solution that is currently missing from asset owners’ toolkit is the ability to benchmark the performance of turbines. Our series of interviews for this report revealed broad support for a benchmarking tool that enables asset owners to compare the performance of turbine components and the level of service and cost of maintenance providers with others.

“A benchmarking tool based on information shared by asset owners would be very beneficial,” explained Jean Lemaire. “It would be useful to compare some of the basic parameters, such as the P50 and availability. It is very difficult to challenge an OEM service provider if you cannot come up with a comparison or a ranking of how they are performing on your wind farm. This is where benchmarking has value.”

Interviewees identified two major hurdles that benchmarking tools need to overcome to offer real value to wind farm owners. Firstly, the benchmarking tool needs to be based on a significantly large volume of wind farms so that representative comparisons can be made. Wind farm owners will need to compare the turbines deployed at their wind farms with identical models, so it is essential that a wide variety of models are included in the benchmark. Secondly, benchmarking tools must not be prohibitively expensive.
A solution:

Greensolver Index

One of the most advanced benchmarking tools on the market is the Greensolver Index. The solution enables wind farm owners to track and compare their assets with others, enabling identification of underperformance. Every month, users are required to update key information relating to their wind farms on the benchmarking platform. Users are then immediately provided with access to the index interface.

The Index enables asset owners to compare a variety of factors, including P50 deviation, capacity factor, availability, wind speed, failures rates, mean repair time and down time. Each indicator can be analysed with reference to specific criteria, including time horizons, geographical zones, turbine manufacturer, turbine model, hub height and commissioning date amongst others. At a cost of only a few Euros per wind turbine per year, the Greensolver Index is designed to be a low cost solution so that it is attractive to as many asset owners as possible.

“The index is fully launched and we currently have 1700 MW signed up,” explained Guy Auger, CEO of Greensolver. “We expect a further 500 MW to be signed up in the first few weeks of January. So by the end of next month we will have more than 2 GW of wind capacity regularly feeding into the index. We started in France so most of the capacity we have signed is in France. But we will also have projects in Italy, Ireland, the UK, Germany and Holland. It includes a wide variety of turbine design and models.”