Asset reporting typically focusses on month-to-month operation, with a general performance overview looking at current revenue compared to the predicted revenue (the PS0), availability indicators, and sometimes power curves. Whilst this kind of analysis highlights underperforming assets, it fails to highlight what can be done to improve performance and the root causes of any underperformance.

Wood has developed a method that specifically focusses on improving the performance of all wind farm assets, known as Optimiser Phase 1. This analysis uses a wide range of data sources and metrics to identify the root causes of underperformance and quantify potential solutions. This then acts as a springboard to target the most cost effective solutions to improve asset performance.

**Wood’s Holistic Optimisation Approach Covers...**

**Forestry Optimisation**
- Topographic maps and knowledge of land management plans allow for analysis of the effects of targeted tree felling and other topographic impacts

**Events Analysis**
- Event logs are used to determine availability and the lost energy due to any faults, curtailments or icing and to highlight potential solutions

**Wind Turbine Control Optimisation**
- SCADA data is used to show power curves, torque, pitch and yaw to identify controller performance issues compared to a state-of-the-art controller

**Wind Farm Control Optimisation**
- Curtailment strategies (if present) are reviewed to see if these can be better managed, through better wake management or Adaptive Noise Control
- Ancillary grid services are also considered as part of the review

**Wind Turbine Enhancements and Upgrades**
- The make, model, age and performance of the assets is reviewed to identify options for uprating, controller tuning and installation of aerodynamic enhancements

**Life Extension**
- Analysis of site conditions, faults, inspection findings, monthly reports and historical fleet performance of wind turbine type is conducted to provide a high level life extension prediction

**A Sensor Sanity Check**
- Sensor measurements are analysed to ensure readings are correct, identifying items such as poorly calibrated anemometry that affect performance monitoring

**Financial Modelling**
- Financial models are used to determine the cost benefit and impact of implementation of the identified performance improvements

...And Can Provide Real Returns

AEP gains of 2-6% are typically achievable on the average wind farm or portfolio, but can be significantly greater. This holds true even where regular reporting is taking place and where wind farm performance appears in line with the budget projection.

This is because optimisation takes many forms, can enhance even well performing assets, and requires specialist input. A holistic approach utilising expert opinion is therefore essential, which is where Wood excels. Representative results from one of the targeted optimisation reports is shown to the right, highlighting some of the many improvement measures considered in a typical analysis.

The commercial gain associated with wind farm optimisation is significant for project owners and can also be used as a tool to support Merger and Acquisition (M&A) activity or refinancing.

**Example site with significant potential improvement measures**

<table>
<thead>
<tr>
<th>Improvement Measure</th>
<th>Potential AEP Gain [%]</th>
<th>Site Potential Revenue Gain</th>
<th>Outline Value Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forestry optimisation</td>
<td>5.0</td>
<td>€300k p.a.</td>
<td>High</td>
</tr>
<tr>
<td>Load mitigation using individual blade control</td>
<td>3.0</td>
<td>€180k p.a.</td>
<td>High</td>
</tr>
<tr>
<td>Active noise management</td>
<td>2.5</td>
<td>€150k p.a.</td>
<td>High</td>
</tr>
<tr>
<td>Improved curtailment strategies</td>
<td>2.0</td>
<td>€120k p.a.</td>
<td>Medium</td>
</tr>
<tr>
<td>Life extension</td>
<td>2.0</td>
<td>€120k p.a.</td>
<td>Medium</td>
</tr>
<tr>
<td>Control system improvements</td>
<td>1.5</td>
<td>€90k p.a.</td>
<td>Medium</td>
</tr>
<tr>
<td>Aerodynamic enhancements (e.g. VGs)</td>
<td>1.0</td>
<td>€60k p.a.</td>
<td>Low</td>
</tr>
<tr>
<td>Ice mitigation</td>
<td>1.0</td>
<td>€60k p.a.</td>
<td>Low</td>
</tr>
<tr>
<td>Static yaw error corrections</td>
<td>0.5</td>
<td>€30k p.a.</td>
<td>Low</td>
</tr>
</tbody>
</table>

Email Charlie.Plumley@Woodplc.com for more information and check out PO.003 for technical details on the SCADA analysis.

windeurope.org/op18  #OpWF18