Wind Farm Optimisation
Lessons Learnt
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Optimisation Methods – A comprehensive first phase analysis

Forestry Optimisation
- Review of forestry and impact on performance
- Identification of optimum restructuring plan in relation to AEP

Aerodynamic Enhancements
- Consideration of OEM and 3rd party supplied aerodynamic upgrades
- Quantification of expected AEP gain/s

Yaw Error Correction
- Identify any present yaw error and associated impact on AEP
- Propose corrections and support implementation where required

Life Extension
- Analysis of site conditions, faults, inspection findings, monthly reports and historical fleet performance of WTG type
- Forecast life expectancy and provide high level life extension plan with associated cost benefit analysis

Advanced Controls
- Investigate production losses, blade degradation/improvements, excessive loads, overspeed/over-power
- Propose bespoke solutions and/or support OEM discussions for controller improvements works

Grid Services
- Review of any present grid curtailment including proposed mitigation
- Exploratory analysis of commercial case for grid services (Ancillary services etc)

Hybridisation
- Feasibility assessment for co-location of solar PV and/or battery storage

Typical Results from over 40 Optimisation Projects

- AEP gains of 2-6% are typically achievable on the average wind farm or portfolio
- Noise curtailment measures can be overly conservative
- Load curtailment strategies can severely impact on energy capture
- Wind turbine derating strategies can be damaging to the turbines
- Wind resource and turbulence are negatively affected by forestry
- Actual site conditions can cause wind turbine life to vary substantially from design life
- Significant static yaw errors appear fairly rare
- There is a prevalence of anemometry issues
- Icing can cause significant lost energy at some sites
- Control issues can trigger alarms resulting in decreased availability

Different sites can have markedly different issues affecting performance and how sites that were investigated due to one perceived issue were found to suffer from one or more other issue.

Conclusions

The results point to the importance of conducting a thorough analysis before acting on any perceived underperformance, and that optimisation requires a considered approach, covering a broad range of criteria. This will ensure that the best value for money option is chosen. The results also suggest that all wind farms can benefit from optimisation, even those meeting their PS0. Overall the optimisation studies have shown that there are issues with performance, but there isn’t a one size fits all problem or solution.

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.

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