

# Why the wind industry must upgrade its inspection tracking systems immediately

A Papertrail White Paper

**papertrail**   
Record keeping made simple



# Introduction: an industry where time is money



Their remote majesty gives modern wind farms an aura of stability and timelessness. But those acquainted with wind power know that operating turbines is in fact dependent on split-second reactions and rapid responses to changing conditions.

**“Gwynt y Môr is the world’s second-largest wind farm and as such we take compliance and risk extremely seriously. Working with Papertrail we are able to improve our health and safety posture by streamlining processes and information, and in parallel speed up the information flow around wind turbine inspection planning.”**



innogy

JUSTIN GRIMWADE,  
BUSINESS INFORMATION  
MANAGER, INNOGY  
RENEWABLES UK LIMITED

This requirement for operational flexibility has grown as the industry has sought to bring down operations and maintenance (O&M) costs and thereby reduce the levelised cost of wind energy (LCOE).

The move from reactive to preventive or even predictive maintenance regimes, which have been shown to cut costs by 24% and 47% respectively,<sup>1</sup> has forced wind farm operators to embrace new data-driven technologies and processes that improve efficiency.

Mastering the rapid exchange of detailed, accurate turbine operations data is critical for improving power output, reducing downtime and delivering meaningful management reports, all of which can have a very significant impact on wind farm profitability.

It is no wonder, then, that wind farm operators are increasingly implementing sophisticated condition monitoring systems, advanced supervisory control and data acquisition platforms and novel inspection methodologies based on drones or cameras.

There is, however, one area of wind farm operations where asset owners have yet to innovate.

While regular equipment inspections are widely recognised as being a critical component of O&M cost reduction, inspection records are still frequently filed using archaic and administratively unwieldy systems such as spreadsheets.

This paper surveys the current state of inspection record keeping in the wind industry and shows how it can make sense to move to more modern online platforms even just using a highly conservative estimate of administration time reduction.

# The importance of inspections

Given the importance of moving parts in wind turbine design, modern O&M can be viewed as something akin to a cat-and-mouse game where operators seek to spot and repair faults as soon and often as possible, to avoid the likelihood of major failure and loss of output.

Because of this, regular inspections are a cornerstone of wind farm O&M. One study noted regular inspections could lead to a 40-fold reduction in blade repair costs. “Early inspection can help prevent severe structural damage and reduce O&M costs,” it said.<sup>2</sup>

The importance of inspections is every bit as great in offshore wind, which still faces significant pressure to reduce LCOE. Studies show that regular inspections and small parts replacements account for 69% of all maintenance activity in offshore projects.<sup>3</sup>

But for all their importance, wind turbine inspections are fraught with challenges. Inspection engineers have a limited window of opportunity to capture as much information as possible, potentially operating in harsh, risky environments.

It is critical to make sure the information captured during these inspections is made available to stakeholders as quickly and widely as possible. Yet this is rarely possible in the absence of an online data-capture platform.

If inspection records are managed manually, the data may need to be transcribed well after the site visit has taken place, potentially leading to errors and omissions. The process can take time, creating unnecessary overheads.

Perhaps most importantly, however, manual records such as those kept on a spreadsheet may be difficult to share between operational teams and likely offer limited scope for integration into other data sets, for example those coming from drone inspections.

## Counting the cost of inspection record inefficiency

How much does manual record-keeping cost the wind industry? While no studies have looked at this issue specifically, some idea of the problem can be gauged through an analysis of other O&M data.

In Europe, for example, an average onshore wind turbine with a capacity of up to 3MW will produce at least 6 million kWh a year.<sup>4</sup>

With an O&M cost of at least GBP£0.01/USD\$0.013 per kWh,<sup>5</sup> the total cost of maintenance works out at about £62,000/\$78,000 per turbine per year. Of this cost, around 21%, or about £13,000/\$16,000, could be attributed to administration.<sup>6</sup>

With insurance companies recommending that each turbine should have a preventive maintenance inspection every six months<sup>7</sup>, it is fair to assume that a significant portion of this administration cost is related to inspections.

Even working on the highly conservative premise that a move to an efficient inspection tracking platform could cut administration costs by just 2%, the bottom-line impact for the operator would be of the order of £260/\$320 per turbine a year.

Multiplied across an estate of, say, 100 turbines, this would equate to savings of £26,000/\$32,000 a year, which alone could cover the cost of an online inspection-tracking system.

In practice, the use of inspection-tracking systems has been found to reduce inspection-related costs by up to a factor of 100, thanks to improved notification and tracking of equipment inspections.



## Additional cost reductions and benefits

Quite apart from the above, the move to a more efficient inspection record-keeping system can deliver the following benefits:

- **Simpler handovers** between different O&M crews and providers, since all data is hosted in the cloud and can be accessed by anyone authorised to do so.
- **Improved health and safety compliance** when adopting an inspection platform also used by hospitals and healthcare providers.
- **Reduced downtime** following accidents by providing full, up-to-date inspection reports to aid investigations.
- **Better proactive maintenance** with customisable inspection alerts and a full log of component checks.
- **Defence against reputational damage** from accidents caused by poor maintenance.
- **Increased information visibility** to improve the usage and lifespan of assets.

## Conclusion

If you're still relying on a spreadsheet to track inspection results then you may not be paying much, but it could be costing you millions in unforeseen failures, sub-optimal production and post-accident investigation delays.

Moving to a more agile, online platform is something you can do straight away, with a business case based purely on administration cost reductions.

Longer term, however, such a move would have far-reaching benefits in terms of risk reduction, health and safety improvements and enablement of proactive maintenance regimes.

**+44 1248 719270 or write to us at [renewables@papertrail.io](mailto:renewables@papertrail.io).**

<sup>1</sup> Barber, S, and Golbeck, P, WindRisk Canada: Wind Turbine Maintenance & Condition Monitoring. Available at [http://www.wwindea.org/technology/cho3/en/3\\_4\\_3.html](http://www.wwindea.org/technology/cho3/en/3_4_3.html).

<sup>2</sup> Zhang, H, 2016: Reducing Uncertainty in Wind Turbine Blade Health Inspection with Image Processing Techniques. Iowa State University Ames, Iowa.

<sup>3</sup> Salzmann, DC, 2009: Amplemann – The development of an offshore access system. Cited in Tveiten, CK; Albrechtsen, E; Heggset, J; Hofmann, M; Jersin, E; Leira, B; and Norddal, PK, March 15, 2011: HSE challenges related to offshore renewable energy. Available at <https://www.sintef.no/en/publications/publication/?pubid=SINTEF+A18107>.

<sup>4</sup> European Wind Energy Association (EWEA) website: Wind energy's frequently asked questions (FAQ). Available at <http://www.ewea.org/wind-energy-basics/faq/>.

<sup>5</sup> International Renewable Energy Agency (IRENA), June 2012: RENEWABLE ENERGY TECHNOLOGIES: COST ANALYSIS SERIES Volume 1: Power Sector. Issue 5/5: Wind Power. Available at: [https://www.irena.org/DocumentDownloads/Publications/RE\\_Technologies\\_Cost\\_Analysis-WIND\\_POWER.pdf](https://www.irena.org/DocumentDownloads/Publications/RE_Technologies_Cost_Analysis-WIND_POWER.pdf).

<sup>6</sup> Hilario, C, August 2011: Wind Turbine Inspection, a Strategic Service? DEWI Magazine No 39, p62.

<sup>7</sup> GCube, February 2015: GRINDING GEARBOXES GLOBAL TRENDS IN WIND TURBINE DOWNTIME EVENTS.

Papertrail was created out of the need to find an easier way to keep accurate records and demonstrate compliance for equipment inspections and audits.

Today, industry-leading partners, SMEs to larger enterprise and public sector organisations and their staff and contractors trust Papertrail to drive business efficiencies and optimise compliance by managing equipment inspections, certification and safety records.

Find out more at  
**[www.papertrail.io](http://www.papertrail.io)**

5 Station Road, Llanfairfechan, Conwy  
LL33 0AL, United Kingdom  
**Phone: +44 (0)1248 719270**  
**Email: [renewables@papertrail.io](mailto:renewables@papertrail.io)**

**papertrail**   
Record keeping made simple