

Using drones differently



Drones have long been used for inspection and maintenance with wind turbines, transforming the ease of access and reducing the cost of operating in this space. Now, drones can support further in improving the efficiencies of turbines through regular cleaning.

Neglecting wind turbine maintenance

Many operators are well versed in managing wind turbine downtime. What is less well managed due to limited access is sorting minor imperfections and ongoing small challenges. Real world studies have shown wind turbines naturally accumulate detritus and salt, decreasing blade performance by up to 3%.

The financial implications of this are significant, as well as the potential for aesthetic and ongoing maintenance issues, given many onshore sites struggle to fulfil their obligation to maintain clean structures. The downtime caused by corrosion and salt buildup is both costly and inefficient. Globally, offshore wind turbines lose a staggering three million production days per year due to these issues. This not only impacts financial outcomes but also the reliability and stability of renewable energy supply, creating a ripple effect of inefficiency.

Neglecting the cleanliness of wind turbines can also lead to long-term damage and increased wear and tear, further escalating maintenance costs and potentially shortening the lifespan of these costly assets. The environmental implications of reduced turbine efficiency are equally significant, leading to higher reliance on backup energy sources and increased carbon footprints.

The bigger picture: supporting global clean energy goals

The UK government has committed to achieving 40 GW of installed offshore wind capacity by 2030, supporting the UN Sustainable Development Goals (SDGs) for clean and affordable energy. Improving the efficiency of existing wind turbines is crucial to meeting these ambitious targets. The importance of this innovation extends beyond mere maintenance; it is a key component in the global drive toward net-zero emissions by 2050.

By ensuring that turbines operate at peak efficiency, the operator maximises their asset and revenue while also contributing directly to the global fight against climate change. Cleaner turbines mean more reliable renewable energy, reducing the need for fossil fuel-based power and helping countries meet their carbon reduction commitments.

Outdated and dangerous cleaning methods

Current cleaning methods, if they happen at all, are not only outdated but also perilous

and expensive. They involve helicopters, rope access, or cherry pickers for low-level maintenance. These methods are slow, risky, and subject to poor accessibility. For example, using helicopters or rope access technicians to clean turbine blades is not just inefficient but also dangerous. The photo shows a worker cleaning a dirty blade in India. Workers are exposed to significant heights and adverse weather conditions, increasing the risk of accidents.

Moreover, these methods are time-consuming and labour-intensive, leading to higher operational costs and prolonged downtime for turbines. To date, existing drone technology has fallen short too, unable to meet the required accuracy for safe operation near structures, and constrained by strict regulations. There is also a significant challenge with getting effective coatings on the blade that are also ecologically sensitive.

Beyond the state-of-the-art: transforming maintenance practices

Innovative drone and coating technology

Aspira, a start up from Manchester, believes it has the answer. Aspira's bespoke anti-collision drones and specialised coating technology facilitates safe flight to a blade, tracking the surface and remove detritus and salt from wind turbines with unprecedented precision. The coating used is effective, non-toxic, and does not require agitation or catalysts to operate. These coatings are already proven in other industries such as nuclear and marine, ensuring reliability and effectiveness.

The application of the coatings via drone technology ensures that every part of the turbine blade is treated evenly, enhancing the aerodynamic efficiency and reducing the rate of wear and tear. The non-toxic nature of the coatings means they are safe



for the environment, aligning with the green principles of the wind energy sector.

Life-saving implications

Aspira was developed out of a desire to mitigate the risk of working at height. In 2019, the Health and Safety Executive (HSE) reported 44,000 non-fatal accidents and 29 deaths from falls across all industries. Aspira's drone technology significantly mitigates the risks associated with high-altitude maintenance, providing a safer alternative to traditional methods. This reduction in risk is not just a safety improvement but also a financial one, as fewer accidents mean lower insurance costs and less downtime due to injury-related absences.

Proven success and freedom to operate

Aspira has obtained all necessary approvals, including from the Civil Aviation Authority (CAA), to operate close to structures. The technology is protected by patents and copyrights, ensuring that future developments remain secure. Its supply chain for coatings is robust, scalable, and supported by comprehensive Safety Data Sheets.

Having the necessary regulatory approvals means Aspira can operate without legal hindrances, ensuring that their technology can be deployed widely and efficiently. The protection of intellectual property through patents and copyrights secures the company's competitive edge in the



market, fostering innovation and continuous improvement.

Unparalleled market potential

Expanding market size and demand

The wind turbine operation and maintenance market was valued at \$28.05 billion in 2020 and is projected to grow to \$52.74 billion by 2028, with a compound annual growth rate (CAGR) of 8.3%. By 2021, approximately 500,000 turbines globally, and 10,000 in the UK, required maintenance, with the market expanding rapidly.

The rapid growth of the wind energy sector underscores the urgent need for efficient and reliable maintenance solutions. As more

countries invest in renewable energy, the demand for technologies that can enhance turbine performance and longevity will continue to rise. Aspira is well-positioned to capitalise on this expanding market, providing a solution that addresses critical pain points in turbine maintenance.

Aspira's competitive edge

Fast and efficient maintenance

Using drone technology can apply coatings to wind turbines 10 times faster than existing methods, significantly reducing maintenance costs and downtime. This efficiency will revolutionise maintenance schedules, increase the lifespan of turbine components, and enhance investment returns.

The speed and precision of Aspira's drones mean that turbines can be maintained more frequently and with minimal disruption to their operation. This proactive approach to maintenance helps prevent major issues before they arise, ensuring consistent performance and reliability. This technology was developed in conjunction with Innovate UK and ORE catapult over the course of 18 months and cumulated in the attached image demonstrating their services to the Rt Hon Graham Stuart, MP and Minister of State for Energy Security and Net Zero.

The future

Innovative drone technology will continue to transform the renewables sector, no longer will drones be used for just surveying. Cleaning offers a clear financial benefit by restoring and maintaining turbine efficiency. The cost savings from reduced downtime and extended turbine life can significantly enhance the profitability of wind farms. Operators can see a rapid return on investment, making

Aspira's solution is not just a technical innovation but a sound financial decision. MD Jonathan Fenning will be at Global Offshore Wind 2024 to answer your questions.

