VAISALA

Permanent lidar for wind energy farms

Solutions Brochure

Optimize performance at every stage with permanent wind lidar

The wind energy industry is filled with innovators who use the wind like no one before imagined, and the world is better for it. Today, wind lidar can elevate your operations over the entire project lifecycle.

Onshore and offshore, wind lidar is replacing meteorological masts (met masts) for accurate, reliable wind measurements. Not only is it far more cost-efficient in many regions, but the technology is also safe, fast, and perfectly suited for today's growing turbines. These are major advantages for wind farm development, and the benefits easily carry over into every phase of operations.

Applications

After a Wind Resource Assessment has been completed, a permanent lidar can operate standalone or alongside a met mast to provide wind measurements for several applications, helping to optimize performance, minimize safety hazards, lower maintenance costs, and reduce OPEX and CAPEX expenses.

At the turbine and farm level:

- Monitor performance, diagnose under-performance
- Monitor meteorological conditions
- Run real-time diagnostics
- Power performance testing
- Optimize performance
- Detect yaw misalignment
- Implement accurate curtailment
- Plan maintenance
- Validate configuration after maintenance or modification

WindCube® as permanent lidar
Known the world over as the gold standard in wind lidar, WindCube also acts as a virtual met mast with the ability to measure wind parameters remotely, eliminating the need for physical meteorological towers.

How permanent lidar benefits wind farm operations

Permanent lidar enhances the efficiency, safety and profitability of wind farm operations throughout their entire lifecycle, making it a valuable tool for the renewable energy industry.

Operational efficiency

Once the wind farm is operational, lidar continues to provide value by offering ongoing monitoring of wind conditions.

Wind lidars

WindCube vertical profiler
WindCube Scan
WindCube Nacelle
WindCube Offshore

Operations and life management

Permanent wind monitoring
Weather and light obstruction monitoring
Power performance testing
Retrofit and performance increase
Site O&M
Offshore ship operations for maintenance
Minutes/hour/day ahead forecasting
Repowering

Performance analysis and reporting

The detailed and continuous wind data collected by lidar can be used to perform advanced analytics to assess wind farm performance. This analysis can identify underperforming turbines and other issues that might be impacting efficiency. Accurate wind data is also essential for reporting to stakeholders and regulatory bodies.

End of life and repowering

At the end of a wind farm's operational life, wind lidar can assist in the decision-making process for repowering (replacing old turbines with new ones).

Maintenance and safety

Wind lidar helps in predicting and scheduling maintenance by providing data on wind-induced stress on turbine components. This proactive approach to maintenance can prevent failures, reduce downtime, and extend the lifespan of the turbines. Real-time wind data can also ensure the safety of maintenance personnel working on the turbines.

Wind farm research

Permanent lidar transforms wind farm research by providing critical data across three main areas: wake steering and farm control, forecast and grid management, and independent energy yield monitoring and forecasting.

WindCube: Wind intelligence for data-driven success

WindCube is the iconic and trusted gold standard in wind lidar. The turnkey product suite offers innovative, reliable, and highly accurate solutions for thousands of customers across the globe. Borne from a passion to advance the field, WindCube continues to take wind energy ever higher through a commitment to four guiding principles:

- Trustworthy, superior metrology
- Unrivaled thought leadership
- Innovative lidars from a one-stop shop
- Easy, reliable global solution

WindCube vertical profiler

WindCube is the new standard for wind measurement throughout the industry. Validated by hundreds of independent studies and accepted by all international standards and guidelines, it is augmenting and replacing legacy met masts.

WindCube measures the complete wind profile at 20 simultaneous heights, covering the rotor sweep of even the largest turbines. This ensures extremely high data availability and accuracy across heights.

WindCube Offshore

WindCube Offshore equips the WindCube vertical profiler with a robust casing for integration into floating buoys and other harsh offshore locations, such as lighthouses, substations, and vessels.

With offshore wind development accelerating, WindCube Offshore provides the ideal ruggedized option for Floating Lidar Systems (FLS).

WindCube Scan

WindCube Scan reliably and affordably provides full, 3D wind mapping and multi-purpose analyses that are indispensable to onshore and offshore projects. The industry's tool of choice for reducing spatial uncertainty, it is valuable at any stage of a wind farm project, from prospecting to operation.

WindCube Scan is fully configurable for multiple uses, including monitoring, atmospheric cross-sectioning, and wind profiling. It can also measure multiple turbine locations at once, creating huge efficiencies in operational assessment.

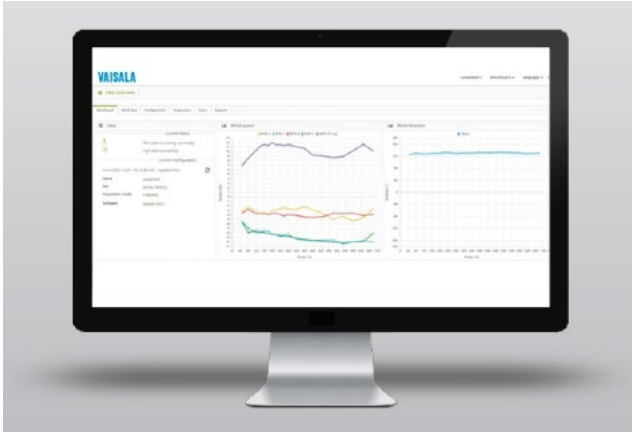
WindCube Nacelle

Suitable for any turbine type and rotor diameter, WindCube Nacelle provides a complete picture of the wind profile at unprecedented ranges from 50 to 700m (long-range version).

By measuring 20 distances simultaneously each second, it provides outstanding data quality and availability — making it the routine choice for contractual PPT and the default system in many turbine supply agreements. It is the first nacelle-mounted lidar classified according to the IEC 61400-50-3 standard and enables PPT on any wind turbine, onshore and offshore.

WindCube Insights

Included with every WindCube lidar, WindCube Insights software provides actionable, at-a-glance data analysis and reporting so users can get the most from WindCube deployments. The modern, cloud-based, easy-to-use solution adds efficiency while unleashing the power of WindCube data for whoever needs it, wherever they need it.



Why Vaisala?

We are innovators, scientists, and discoverers who are helping fundamentally change how the world is powered. Vaisala elevates wind and solar customers around the globe so they can meet the greatest energy challenges of our time. Our pioneering approach reflects our priorities of thoughtful evolution in a time of change and extending our legacy of leadership.

Vaisala is the only company to offer 360° of weather intelligence for smarter renewable energy, nearly anywhere on the planet. Every solution benefits from our 85+ years of experience, deployments in 170+ countries, and unrivaled thought leadership.

Our innovation story, like the renewable energy story, continues.

Ref. B212890EN-A

windcubelidar.com