



WindCube Scan lidar for offshore wind measurement

Smarter at every stage with advanced weather and environmental solutions

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As the world changes how it is powered, having a better understanding of the weather at any stage of the wind farm lifecycle is more critical than ever before, as a means to reduce costs and enable increased renewable energy integration in our lives. But with weather patterns difficult to predict, particularly long-term, how can a complete set of weather and environmental technologies help?

Renewable energy is on the rise. As the world increases efforts to reduce greenhouse gas emissions and mitigate the dangerous impact of climate change, the rapid growth of solar and wind power provides hope that we can meet the greatest energy challenges of today and the most ambitious climate goals of tomorrow.

With stronger policies, raised climate goals and shrinking costs of advancing technologies, the renewable energy sector is experiencing exponential growth. While the wind and solar energy markets combined made up just 1.7% of global electricity generation in 2010, the share of renewables in

global electricity generation jumped to 29% in 2020. Even better, high-capacity additions are becoming the 'new normal' in 2022, with renewables accounting for 90% of new power capacity expansion around the world.

Driven by advancements in wind energy



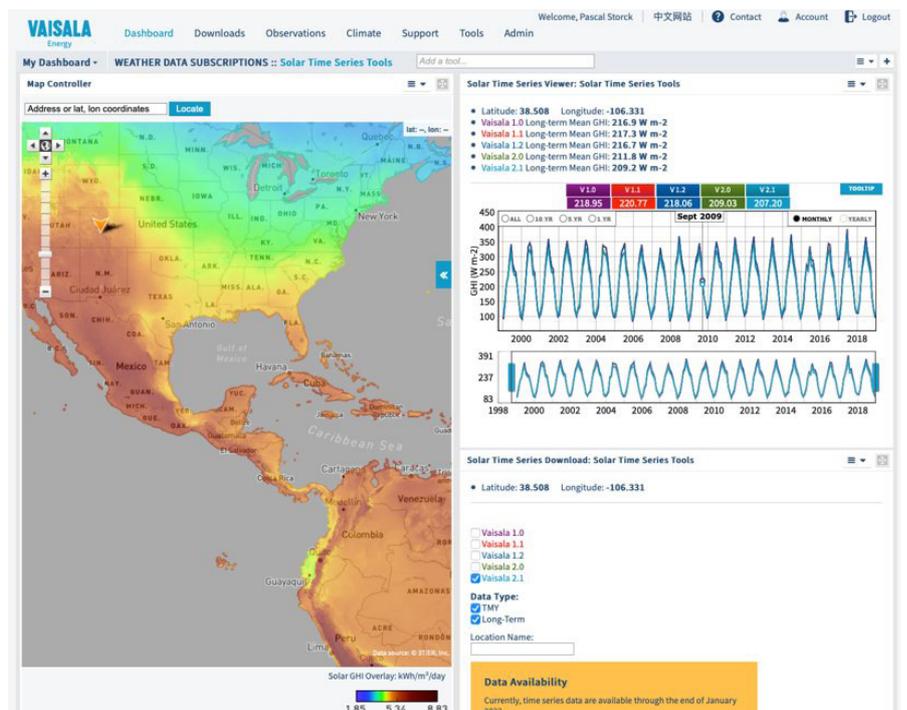
Lightning data provides critical information to protect assets and people

and the influx in the demand for solar, the growing renewable energy industry will need comprehensive solutions that address every stage of the life cycle to expand and open the door to a healthier, greener, more innovative future, and create lasting societal change.

Proven innovation to advance renewable energy

The challenge is the intermittence of these energies. Essentially, due to weather volatility, wind and solar resources vary over days and nights and from site to site. This generates uncertainties in harnessing the resources and integrating them into grids.

With wind and solar energy fundamentally changing how the world is powered, Vaisala and its solutions have been at the forefront of the evolution from day one. From lidars, sensors and systems to digital services and actionable intelligence, the company's enhanced range of comprehensive offerings for wind and solar energy applications provides industry-leading integration, scalability and data quality.



Ex: Solar time series tools

This year, Leosphere, maker of the WindCube® lidar suite, was fully integrated into the Vaisala product portfolio of offerings. The company also delivers its comprehensive suite of solutions, expertise and capabilities to empower customers to do things they never could before. The suite's accurate and reliable intelligence arms decision-makers with the insights needed to innovate, evolve practices, improve accuracy and efficiency, and meet renewable energy challenges with confidence.

Serving wind and solar farm projects at every stage of the life cycle

Uniquely understanding the potential, and the stakes, of the renewable energy evolution, Vaisala has built the most complete set of weather and environmental technologies available for wind and solar projects.

Wind energy is core to this progress. Aided by technologies, including the WindCube suite of wind lidars, recent evolutions in the wind industry have provided developers, operators and turbine manufacturers with more accurate, reliable, bankable data with increased agility and simplicity.

These advances are reducing the risks associated with wind energy output and the global cost of energy for both onshore and offshore wind farms, as well as enabling impressive wind energy innovations, such as Power Performance Testing (PPT) on floating wind turbines.

Advanced and practical in the solar energy space, each of Vaisala's innovative solar solutions combines industry-leading sensors for accurate performance monitoring of solar PV plants. By unlocking new efficiencies and improving decision-making across the project life cycle, it is possible to make solar more competitive and profitable than competing energy sources.

Prospecting and development

During the prospecting and development phase of wind and solar projects, decision-makers need to choose their project site wisely. An optimally situated site will provide a faster development cycle, improved rates of return on investment and excellent operational performance, whereas a poorly situated project can result in wasted investment and resources.

A critical factor in the development, siting and operation of a wind farm, the wind resource assessment is often the make-or-break point for any wind farm project. Leveraging vertical profiling and scanning lidars to measure the full wind profile and characteristics of wind flow enables decision-makers to provide the precise measurements and bankable data needed by wind farm developers to secure financing while minimizing risk.

Whether used in onshore complex terrain or remote offshore locations, WindCube



Ex: Solar forecasting

decreases uncertainty by providing both the spatial resolution to analyze bigger areas and direct wind assessment to reduce vertical uncertainty, improving project bankability.

Additionally, digital services, such as WindCube Insights, Historian, Forecaster and Vaisala's historical lightning maps and time series, can help drive more informed decision-making during prospecting and development.

Providing full fleet visibility and management, the cloud-based WindCube Insights software enables users to put wind data to use quickly and efficiently. Based on almost two decades of satellite imagery, multiple decades of global weather data and cutting-edge weather simulation technology, Vaisala Historian offers wind and solar project managers, asset owners and developers access to long-term historical wind and solar data. Offered in a variety of forms, this can drive decisions, create valuable comparisons reports and analyze output year over year.

Forecaster creates exceptionally accurate forecasts for site-specific locations and

entire regions. The company's reference-grade lightning detection data empowers customers to make critical operational and personnel safety decisions based on real-time storm and lightning data.

Construction and commissioning

The construction and commissioning phase of a project invariably involves Power Performance Testing (PPT) to verify the configuration, installation, endurance, output and functionality of solar panels and wind turbines. PPT data empowers decision-makers to ensure the delivery of the expected power output in a variety of climates or conditions.

When used for permanent wind monitoring, WindCube, WindCube Offshore and WindCube Nacelle can deliver weather monitoring during crane or offshore ship operations. WindCube Nacelle lidar measures horizontal wind hundreds of meters in front of turbines to simplify PPT and ensure even the largest offshore turbines are performing at maximum capacity. Plus, by providing reliable data immediately, Vaisala's wind lidars are well



Wind sensors measure a variety of weather conditions

suited for troubleshooting and identifying underperformance.

For solar projects, Vaisala's automatic weather station solutions enable users to easily integrate and manage a variety of sensors to create efficient observation networks that provide high-quality, shareable, actionable weather data. This continuous, traceable weather data enables solar operators to act decisively, protect people and property, maximize construction windows and address severe weather threats before they become more serious issues.

Vaisala also provides several sensors, systems and services aimed at ensuring construction worker safety, including its Helideck Monitoring System, which provides all key weather and environmental parameters to ensure maintain safe, efficient helideck operations; Strike Damage Potential, a solution that provides immediate information for where lightning is most likely to have caused damage; and Global Lightning Detection Network GLD360 and National Lightning Detection Network, which deliver reliable storm and lightning information with unmatched efficiency and location accuracy across the entire continental US or anywhere in the world.

Operations and life management

When it comes to project operations and life management, Vaisala's end-to-end solutions protect the health of assets and maximize long-term performance.

Vaisala's related weather sensors, systems and data services enhance the power of its WindCube lidar suite, enabling operators to manage wind farms decisively, strategically and profitably. Key wind operation benefits

include increased uptime and improved safety and decreased operating costs, optimized performance and lower leveled cost of energy. Usually difficult, time-consuming processes can also be simplified, while excellent forecasting offers big-picture visibility.

By providing quality assessments of the numerous factors affecting solar portfolio performance, it allows operators to monitor threatening weather, anticipate revenue, adjust estimates and make intelligent investment decisions that quantify and reduce uncertainty and protect project profitability. Whether you're leveraging the company's sensors and systems, such as AWS801, AWS310 or Weather Transmitter WXT536, or any of its innovative digital services, Vaisala's solar energy operations and life management solutions enhance your investment.

What is next in renewable energy?

As society continues to rely on harmful fossil fuels and their substitutes to power the majority of our daily lives, renewable energy leaders face significant pressure to harness the potential of renewables in a more competitive, efficient and sustainable manner. Given this pressure and the vital nature of the world's clean energy transition, it is essential that decision-makers are equipped to unlock the benefits renewable energies can have on our health, the environment and the global economy.

Today, Vaisala is the only company offering complete, end-to-end weather solutions for renewable energy, that give users industry-leading integration, scalability and data quality, across the wind and solar energy life cycles.

Backed by its 85+ year proven track record and global leadership, the company is a leading wind and solar technology partner, driving the successful evolution of renewable energy for a healthier, greener and more innovative future. Its renewable energy solutions are expanding the boundaries of knowledge and encouraging new ways of thinking, elevating wind and solar customers around the globe to meet the greatest energy challenges of our time.

🔗 <https://www.vaisala.com/en/industries-applications/weather-and-environmental/renewable-energy>



Matthieu Boquet is head of market and offering, wind and solar energy at Vaisala. In this role, he drives Vaisala's renewable energy offerings to meet the industry's high-level expectations while helping customers continually generate value from their projects.