

## Scanning lidar for wind energy

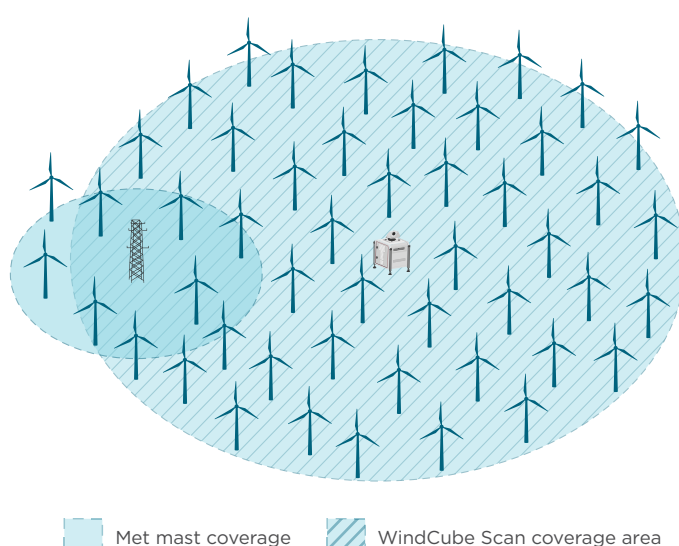
### Key applications and benefits

#### Balancing safety and the bottom line

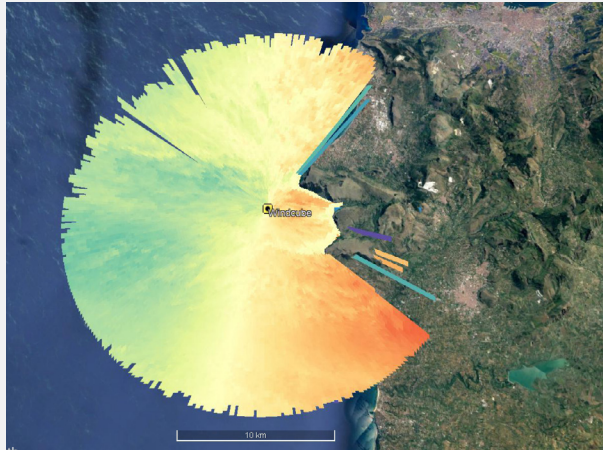
All too often, wind developers and operators have to rely on spotty meteorological records, outputs from met masts that don't cover the whole operating region or rotor sweep, and extrapolations that can introduce error.

Building and running a wind farm is like making a puzzle with half the pieces missing. You might be able to identify the general picture, but you're missing many of the critical details.

**Scanning lidar gives you that detail.**



#### Why scanning lidar?



- Unlike vertical profiling lidar, scanning lidar units measure wind across 360° using several scanning patterns, up to ranges of 18km and beyond. This capability is useful for many onshore and offshore projects.
- Scanning lidar provides full 3D wind awareness, even covering multiple turbines at a time.
- This level of detail greatly improves decision-making, improves bankability, and validates or refines other measurement systems.

#### Reducing spatial uncertainty

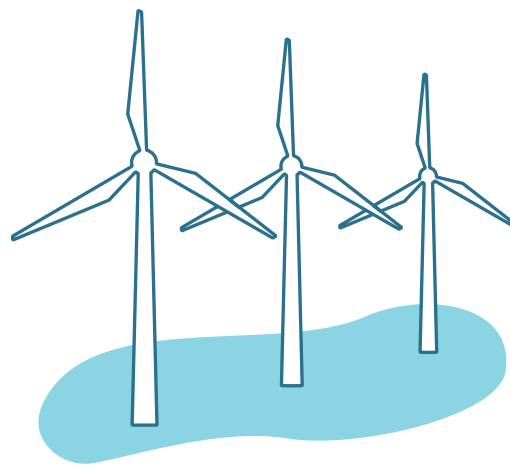
##### Improving decision-making and bankability

- Traditional wind models are based on limiting assumptions and are missing the true complexity of the atmosphere. They require guesswork on the part of the users.
- Scanning lidar dramatically reduces this guesswork, allowing users to check and refine existing wind models, introduce correction factors, and optimize them over time.
- Planners can then make better turbine selections, understand the performance impacts of neighboring wind sites, and improve bankability.
- All of the above are especially valuable for offshore development.

#### Managing turbine and farm interactions

##### Understanding complex influences

- As today's turbines and wind farms increase in size and power, one turbine can have a significant effect on another.
- Users need a reliable understanding of wake effects to avoid performance degradation.
- Scanning lidar provides a real-time check of these effects, which can help users optimize design, turbine choices, yaw settings, and construction.



#### Innovating for higher performance

##### Innovations coming to wind energy

- In R&D studies, properly placed scanning lidar units reliably give operators 5–10 minutes of advanced notice of a storm or other wind disruption. This can benefit operators as well as power grid managers, allowing them to make yaw or other adjustments that reduce wear and tear, and optimize power introduction into the grid.
- Power curve testing can be burdensome, but with scanning lidar, several turbines can be assessed at once. Operators gain a baseline understanding of the entire fleet, can spot-check turbines against estimates, and can more effectively evaluate OEM upgrades.

### WindCube® Scan

Long-range wind awareness for certainty and decision-making



WindCube Scan is the industry-standard scanning lidar.



Built on proven, reliable WindCube technology, the system provides outstanding uptime, reliability, and flexibility.



WindCube Scan can be installed quickly and less expensively than with met masts, with little or no permitting requirements and easy transportation.



Your data — and business outcomes — can be put to work immediately.

### Vaisala is changing 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 renewable energy solutions are guided by several key priorities:



#### Thoughtful evolution

Remain a pioneer in renewable energy, always providing sensible, trusted solutions at the leading edge of R&D.



#### Smarter at every stage

Provide end-to-end weather and environmental solutions and critical insights throughout the renewable energy life cycle.



#### Legacy of leadership

Extend our proven track record and global trust to reach more customers in more ways.