

Permanent lidar: ISO ready, no met mast required

Quick Guide



Taking wind energy to new heights



Vaisala WindCube® lidar accelerates modern wind energy with ISO-compliant performance you can rely on for accurate wind data.

WindCube 2.1 XP is the world's most accurate vertical wind lidar, delivering bankable wind resource data for your utility scale wind projects.

Wind lidar is rapidly replacing met masts for wind measurements. It's more cost-effective, safer to maintain, and avoids permitting delays – while still meeting the strict data standards set by Independent System Operators (ISOs).

With 61400-50-2 classification, lidar provides bankable, high-quality data that accelerates approvals, reduces risk, and supports benefits like curtailment compensation, accurate forecasting, and grid compliance.

ISO standards play a critical role in shaping the development, operation, and financing of wind energy farms in the United States. These standards ensure consistency, safety, and quality across all phases of a wind project – from site assessment to long-term performance monitoring.

The value of permanent lidar

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

Benefits of permanent lidar for operations

Operational efficiency

In day-to-day operations, lidar tracks wind conditions across the rotor plane in real time, empowering operators to adjust proactively and maintain peak efficiency.

No surprise repair costs

Exercising WindCube's extendable warranty means a predictable ownership cost throughout its long lifespan

Performance analysis and reporting

Continuous lidar data unlocks powerful performance insights, helping operators pinpoint inefficiencies while ensuring transparent reporting for stakeholders and regulators.

End of life and repowering

As projects near end of life, lidar provides the evidence needed to make smart repowering decisions and maximize future returns.

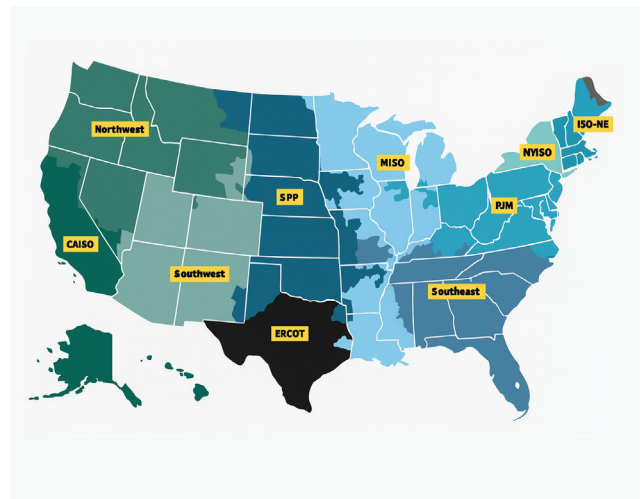
Meeting ISO requirements across the U.S.

Accuracy where it matters most

WindCube is the first lidar classified to accurately measure up to 200 meters — ideal for large wind turbines — with a total range of 400 meters. Its low sensitivity to environmental factors ensures stable accuracy across varied conditions, while high data availability in clean-air areas supports reliable, bankable wind data collection.

ISO compliance can seem overwhelming or too challenging to take on. With various communications channels, WindCube is making the transition simpler and more cost effective than ever.

The technology delivers ISO-compliant wind measurements that replace permanent met masts entirely — while simplifying SCADA integration, reducing risk, and improving overall project economics.



Map of U.S. electric power markets, highlighting regions served by ISOs and Regional Transmission Organizations (RTOs). (Source: Federal Energy Regulatory Commission)

Case study: WindCube replaces permanent met mast at Amadeus Wind Farm

BayWa r.e. is leading the charge to replace met towers with lidar — starting with an upgrade at their Amadeus Wind Farm within ERCOT. Learn more about the benefits the team has gained and future implementation plans:

[BayWa r.e.'s Amadeus Wind Farm](#)

Aligning with ISO standards through lidar accelerates project approvals, minimizes costly setbacks, and unlocks benefits including curtailment compensation, precision forecasting, and seamless grid compliance.

Key ISO requirements & compliance

Listed are the requirements for the main ISOs in the United States. Contact your Vaisala sales representative for more details and how to get started.

ISO	Lidar acceptance	Key technical requirements	Backup / redundancy requirements
CAISO	Accepted with prior agreement	One met station at average hub height on windward side; may require second station ~30 m below hub height; SODAR/LIDAR acceptable substitute for wind speed direction with prior CAIS agreement (via CIDI ticket or email).	Lidar cannot be the only met station; in case of lidar failure, ground cup anemometer acceptable if meeting telemetry requirements.
ERCOT	Accepted	A minimum of one met tower or approved lidar installation must capture representative wind and atmospheric data. Real time wind speed, direction, and temperature must be securely transferred to the market operator's data center.	Verified backup data source recommended in case of outage.
ISO-NE	Accepted	Met tower or equivalent remote sensing device (SODAR or LIDAR) strategically placed to provide 'free stream' data minimally impacted by operations.	Recommend additional backup nacelles to avoid outages; prefer nacelle-level data from all turbines
MISO	Accepted	Provide site-specific meteorological data (temperature, wind speed, wind direction, pressure) for forecasting; SCADA points to Transmission Owner's control center as specified.	None explicitly stated.
NYISO	Accepted	Each turbine within 5 km of a met data collection point; ideally stand-alone met tower augmented with turbine sensors; lidar acceptable.	None explicitly stated.
PJM	Accepted	At least one met tower (or mutually agreed alternative such as lidar) at or near hub height; provide real-time data via ICCP/DNP.	PJM may request additional towers depending on forecast accuracy; annual calibration required.
SPP	Accepted	Meteorological data must be submitted either from a meteorological tower, lidar, or individual measurements taken at each wind turbine's nacelle. In addition, the meteorological data submitted must be within 10 miles of the wind farm's midpoint.	None explicitly stated.

Why Vaisala?

Driven by a passion to advance the field, WindCube propels wind energy forward through our commitment to superior metrology, thought leadership, innovative lidar solutions, and global reliability with a one-stop-shop approach.

WindCube has been third-party validated in hundreds of independent studies and across thousands of customer deployments – backed by 20+ years of wind lidar expertise and unparalleled global service.

