Vaisala Triton Wind Profiler

/ RELIABLE HUB-HEIGHT WIND MEASUREMENT

VAISALA

“We have used Triton all over the world, including in our most recent successful projects in South Africa. **We can always count on Vaisala’s help** with maintenance and siting considerations.”

Colin Murray
Energy Analysis Group Manager
Mainstream Renewable Power

- Autonomous operation in remote locations
- Stands up to harsh climates
- Easy deployment even in challenging terrain
- Daily monitoring and real-time data access

The Wind Industry's Trusted, Validated Remote Sensing System

Since 2008, Tritons have been deployed more than 2500 times in 40 countries on six continents, performing commercial wind applications in every imaginable climate and terrain.

The world's most successful wind developers and operators trust Triton in wind resource assessment, wind farm design, and condition monitoring. Technology improvements continue to anticipate the growing demands of today's wind industry. Triton's superior operational track record, data recovery and accuracy provide Triton owners worldwide with wind data they trust—over 13 million hours and counting.

Triton's performance, data recovery, and accuracy have been validated in numerous studies by national laboratories, independent engineers, and internationally recognized wind energy experts as well as by commercial wind developers in diverse climates and regions. Hundreds of customer studies have proven Triton's correlation to met towers, data recovery, and operational up-time. Triton is widely accepted for use in energy production estimates and project financing, and have been shown to be a cost-effective way of reducing uncertainty in wind resource assessments.

“Triton data is a valuable and important part of a wind resource campaign, and we have used it in many project financing reports—especially to measure wind at **hub height** and **across the entire rotor disk** of a wind turbine. When integrated into a traditional on-site monitoring study with tower-based measurements, Triton data is **an important part of a bankable wind study.**”

John Bosche
Principal Engineer, Chinook Wind

13M hours of wind data gathered

98%+ up-time, fleet-wide since 2008

4 wind developers have fleets of 15+ Tritons

15 wind developers own between 5 and 15 Tritons

In 2011, the developers of Triton undertook a two-year, $2 million project to modernize SoDAR technology, extend the Triton’s effective data recovery range upward by 30 to 60 meters, and improve Triton’s performance in low temperature and other atmospheric conditions.

The project resulted in the development of a new generation of purpose-built speaker technology. Without any change to the Triton’s power consumption or accuracy, it now provides more high-quality data at higher heights above ground level. Existing Tritons retrofitted with the new array were beta-tested and validated in 2013, and the new array is now part of all Tritons. These Tritons have accumulated nearly 2 million hours of wind data in commercial applications.

Remote Sensing for Today's Wind Industry

..and Tomorrow's

Created by a team of scientists and engineers with over three decades of experience designing advanced wind measurement systems, the Vaisala Triton Wind Profiler revolutionized the wind industry by providing a cost-effective, reliable remote sensing system that meets the rigorous demands of modern commercial wind installations.

Triton was designed with a patented hexagonal speaker array, a purpose-built, tri-lobed acoustic enclosure, and patented acoustic materials. Focused beams of sound provide exceptional accuracy and data recovery at hub height and beyond. State-of-the-art electronics allow ultra-low power operation, and Triton's rugged construction and field-serviceability make it the only practical remote sensing system for far-away locations.

Improvements to Triton's underlying technology, manufacturing process, and installation methods have boosted data recovery, improved data quality and filtering options, and allowed for foolproof installation and operations. Triton owners can take advantage of firmware and hardware improvements to ensure that the Triton they buy today will meet tomorrow's challenges.

“The Triton is an important tool our company uses to execute new area prospecting activities, vertical and horizontal wind modeling validation and **AEP uncertainty reduction**. With **over 40 campaigns** already conducted, our Tritons have proved to be extremely robust and practical, leveraging our **competitive advantage in the Brazilian wind energy market.**”

Lucas Araripe
Business Development Director,
Casa dos Ventos Energias Renováveis

46 patented and patent-pending innovations

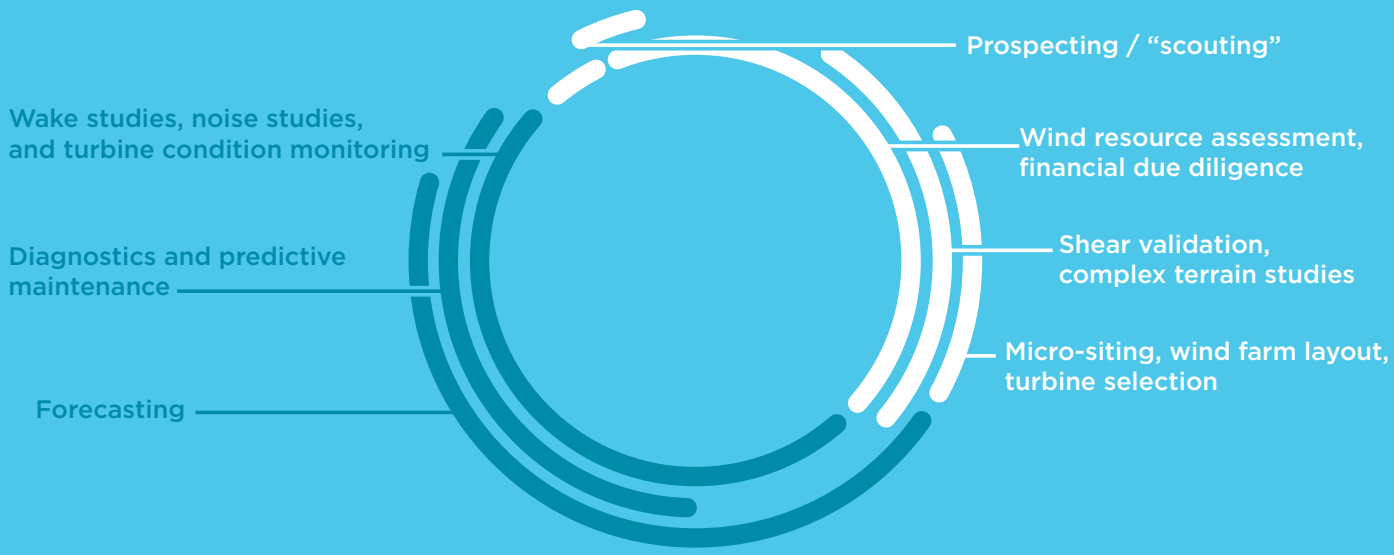
500+ Tritons in use in the wind industry

2500+ commercial deployments

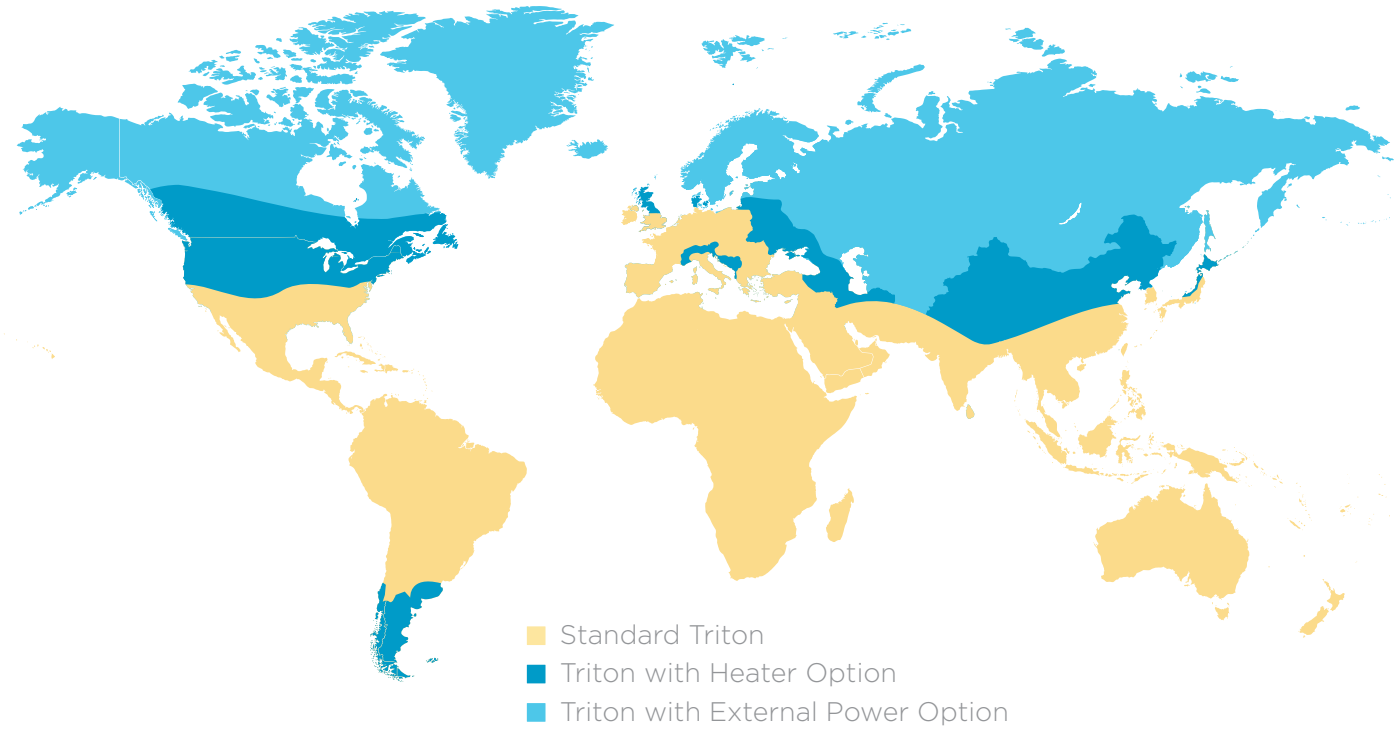
Tritons operate in **40** countries

Reducing Financial Risk at Every Stage

Triton delivers information about wind conditions at a site during the entire life cycle of a wind project, reducing financial risk and enabling more profitable operations from initial site-finding through development and operations. Wind developers, wind farm operators, and utilities use Triton for applications all around the life cycle of a wind farm, from initial site prospecting through operations and re-powering.



Measuring Wind in Any Climate



Triton is specified to work down to –40°C, and configurations are available to handle different climates. Local conditions may vary; please consult with Vaisala for configuration and siting advice.

Photo courtesy of Puhuri Wind

“Triton’s **ruggedness and reliability,** and newly developed satellite communications capabilities, combined with Vaisala’s excellent standard of technical and field support, allow us to easily install and use Triton in **harsh conditions and remote locations** without worrying about data loss.”

Shane Quinnell
Project Engineer
Windlab Developments South Africa

Tritons operate in **6** continents

Triton works down to **–40°C**

Triton runs on **7 Watts** average

10 measurement heights up to **200m**

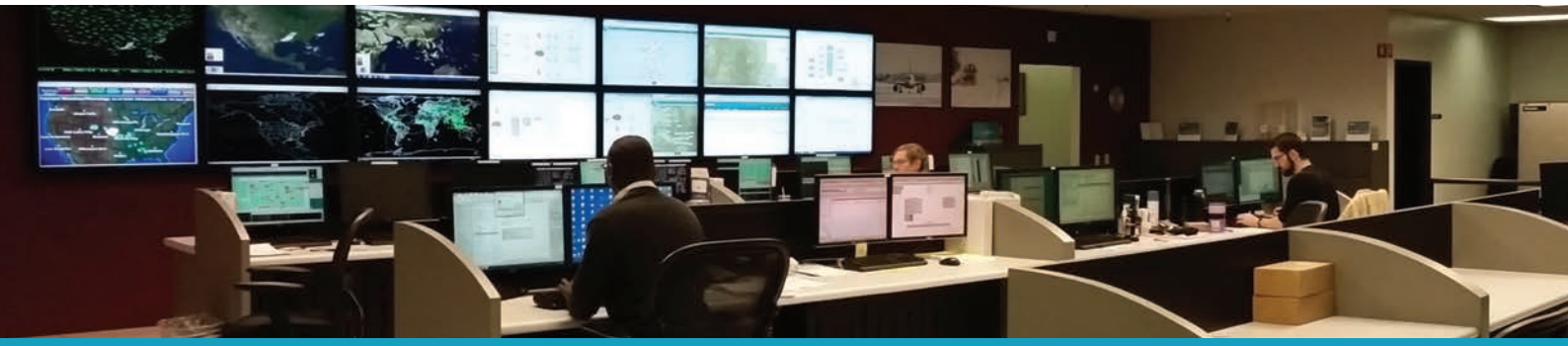
SkyServe Online, On Call, and In the Field

All Tritons include SkyServe—a complete package of communication, data security, and support solutions.

With **SkyServe online**, you see and can analyze your Triton data and performance in real time via a secure, web-based interface. SkyServe archives your data, with time and location stamps, on a secure server.

SkyServe on call includes daily monitoring by the Vaisala wind energy operations center, alerting you to any conditions requiring immediate attention or proactive maintenance. Our technical support engineers are available by phone and online.

SkyServe in the field includes expert siting, installation, and low-cost field service.



Triton Benefits

Low-cost, flexible deployment, commissioning, and operation

- Lower investment costs than LiDARS
- Lower costs of installation, operation, maintenance, and removal than met towers
- Ultra-low power requirements
- Standalone, turnkey system with on-board solar panels, optional configurations for extended power, data communications options, and secure data storage

Reliable, accurate wind data at and above turbine hub height

- Field-proven and validated through over 2500 deployments, over 13 million hours of wind data, and hundreds of correlations to towers
- Used in project financing to reduce uncertainty in energy projections
- Eliminates extrapolation errors, validates shear, and reduces topographical uncertainty
- Fleet-wide average up-time over 98% during seven years of commercial operation

Multiple-use technology

- Use Triton for one campaign and then move it to the next site, preserving capital assets
- Use for specialized forecasting applications, SCADA integration
- Use on very short deployments, such as two weeks for noise studies

Adapts to climate and terrain conditions

- Use in heavy snowfall areas, in areas with low solar insolation, and during dark winter months

Backed by Vaisala and SkyServe

- Nearly 80-year history of meteorological instrument development and manufacturing
- Locations worldwide augmented by global network of service partners

Worry-free wind measurement

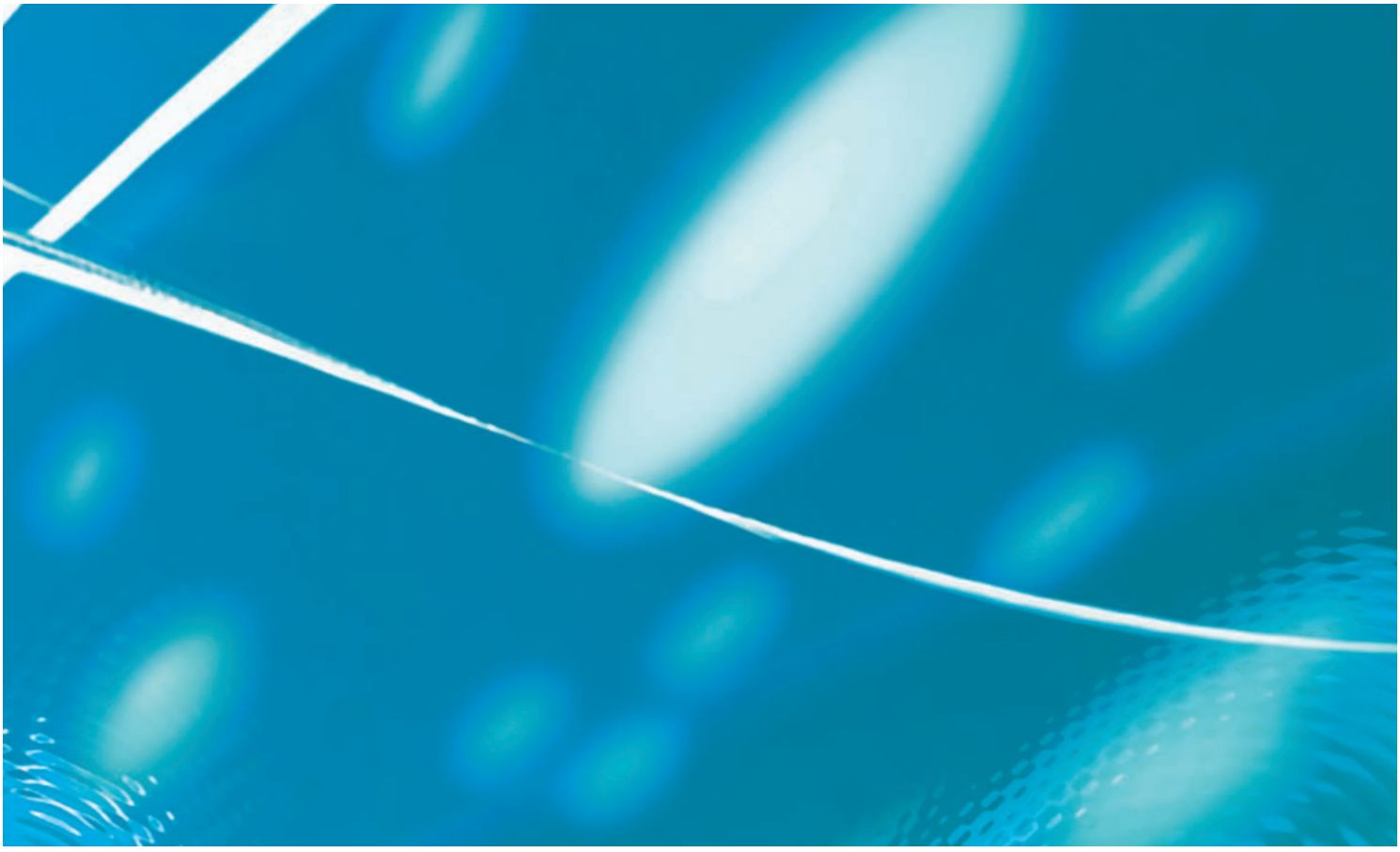
- See what your Triton is doing any hour of the day or night in real time on a secure web interface
- Control maintenance and repair costs with fixed-cost maintenance options
- Daily performance monitoring by Vaisala's US-based Operations Center
- Maintain and service your Triton with our global network of technicians and service partners, or take advantage of training and certification for your staff

“We invested early in remote sensing technology because we need to be **as competitive as possible** in Brazil’s energy auctions. Using the Vaisala Triton allows us to have confidence that we have **the most accurate energy projections.** The Triton is convenient to use, portable, accurate, and reliable. Owning a Triton allows PEC Energia to **reduce our financial risk** in a very competitive development environment.”

Maria Cecilia P. Oliveira
Wind/Solar Project Engineer
PEC Energia

Vaisala in Energy

Weather is the largest variable impacting electricity generation, transmission, and demand. Are you using weather information to your greatest competitive advantage? Vaisala understands the impact weather has on the energy industry. We combine weather expertise with modern science to provide you with equipment and services that improve the performance of your projects, reduce uncertainty, and maximize value. From greenfield prospecting, measurement, and due diligence, to operational forecasting and optimization services—we are your weather expert!



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www.vaisala.com/energy

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