



Wind speed at light speed

Firnas Shuman Leverages Wind Lidar Technology to Advance Wind Resource Assessments Across Mauritania



Firnas Shuman

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1 Overview

Firnas Shuman is a renewable energy consultancy and technical services company specialising in turnkey wind and solar measurement campaigns across the Middle East and Central Asia.

For more information visit: <https://firnasshuman.com/>

Providing complete solutions for the supply, installation, operation, and maintenance of meteorological masts, Firnas Shuman also leverage advanced wind Lidar technology for precise and reliable wind data collection in support of wind farm development projects.

Firnas Shuman has been a Trusted Service Provider of ZX Lidars since 2018, successfully deploying more than fifty wind Lidars in a total of 13 countries globally. Firnas Shuman owns and provides rental and in-field services with a fleet of ZX 300 Lidars, in addition to selling and deploying Lidars for its clients.

2 Background and Opportunity: Wind Energy Potential in Mauritania

- ▲ In 2020, Mauritania adopted a national energy strategy aimed at transforming its power sector. The strategy targets a significant increase in the share of renewable energy to 60% by 2030, aligning with the country's nationally determined contributions (NDCs) under the Paris Agreement.¹
- ▲ Mauritania possesses substantial wind energy potential, particularly along its Atlantic coastline, where strong and consistent winds average around 9 metres per second throughout the year. This resource base creates favourable conditions for the development of large-scale wind farms, offering opportunities not only to meet domestic electricity demand but also to contribute to regional power integration.²
- ▲ With its abundant solar and wind resources and a 754 km Atlantic coastline, Mauritania is widely recognised as also having strong potential for green hydrogen production. The combination of high renewable energy capacity and access to export routes via the coast positions the country as a future hub for hydrogen and derivative fuels, supporting both domestic energy transition goals and international decarbonization markets.³

At the beginning of 2023, Firnas Shuman was approached by an independent energy developer to assess the development potential of a large-scale, multi-gigawatt renewable energy project in Mauritania. The project, targeting over 10 GW of combined onshore wind and solar capacity, is designed to supply a green hydrogen export facility across two extensive areas totalling approximately 15,000 km².

To initiate the measurement campaign quickly and to ensure comprehensive coverage of the vast project area, Firnas Shuman deployed twelve ZX 300 Lidars, complemented by 6 meteorological masts and 4 solar measurement stations. This integrated approach provided high-resolution wind and solar resource data to support the project's large-scale feasibility assessment.

The ZX 300 wind Lidars were delivered pre-validated against an IEC compliant met mast in the UK. This meant the data could be accepted as part of a bankable energy yield assessment with minimal uncertainty applied to the data.

¹ Extractive Industries Transparency Initiative | EITI, Pathways to Energy Transition Mauritania
https://api.eiti.org/sites/default/files/2022-04/Mauritania_Energy_Transition_Factsheet_EN.pdf

² https://apim.gov.mr/service/renewable-energies-2/?utm_source=chatgpt.com

³ https://apim.gov.mr/service/renewable-energies-2/?utm_source=chatgpt.com

3 Project Implementation – Challenges and Solutions

This large-scale project presented several challenges. Firmas Shuman's extensive expertise and proven track record across diverse renewable energy projects, meant the team was able to address and overcome these challenges efficiently, ensuring the successful execution of the measurement campaign.

3.1 Extreme Hot Climates

Mauritania's climate falls under the BWh (hot desert) category according to [Köppen climate classification](#). The is a desert marked by extreme aridity, minimal rainfall, and high temperatures that can soar up to 47°C in summer. Humidity levels fluctuate sharply between 8% and 85%, adding further complexity to equipment deployment and operation. In addition to these harsh weather conditions, security risks such as theft and vandalism posed further challenges for sensitive measurement equipment.

To address these issues, Firmas Shuman engineered a custom solution by converting transportation containers into secure and ventilated housing units for the Lidars. This design provided both robust protection against external threats, and sufficient natural ventilation to ensure the uninterrupted performance of the systems in Mauritania's demanding environment.





3.2 Import and Logistics

Firnas Shuman delivered the project on a full turn-key basis, managing every step from international importation to customs clearance and local logistics. Strategic collaboration with local partners was key to making this possible. Supported by its in-house logistics team, Firnas Shuman guided the client through the entire importation process, ensuring the Lidars, masts, and meteorological equipment were delivered smoothly, efficiently, on time and without attracting additional costs or downtime within the project.

3.3 Extreme and Remote Locations

The installation sites for the Lidars were remote and difficult to access, requiring careful planning to ensure reliable operations. For remote deployments robust power supplies for the Lidars are critical to ensure maximum system uptime. Firnas Shuman's team ensured precise sizing of the solar power supply systems to guarantee uninterrupted power sources for the Lidars.

Since the sites lacked GSM coverage, satellite modems were installed, with the necessary licenses secured from the relevant authorities. Throughout the measurement campaign, a dedicated team performed pre-scheduled preventive maintenance visits, conducting visual inspections, documenting key components with photographs, and carrying out system checks. These measures ensured the continuous and reliable operation of all deployed equipment, whilst balancing this with maximising system autonomy and minimising site visit costs



3.4 Firnas Shuman as turn-key supplier

Firnas Shuman's responsibility in the project extended well beyond supplying the systems. The company was accountable for meeting minimum contractual data availability guarantees at the measurement stations, even in the face of potential challenges such as vandalism or lightning strikes. These contractual commitments made it especially important to design a setup that enabled continuous monitoring of the stations.

3.5 Health and Safety

Given the remoteness of the project sites, the considerable distance to accommodation and medical facilities, and the client's rigorous safety requirements, Firnas Shuman implemented comprehensive health and safety measures during the installation period. A fully equipped camp was established, featuring:

- ▲ Kitchen and dining facilities
- ▲ Bathrooms and sanitation units
- ▲ Ventilated tents for comfortable accommodation
- ▲ 24/7 on-site ambulance and medical support
- ▲ Continuous security presence

These provisions ensured the well-being, safety, and productivity of all personnel throughout the project.

During the measurement phase, weekly visits were done under high HSE standards, including cars with satellite connection and in vehicle monitoring systems.

3.6 Data Availability

Data availability (along with accuracy) is a critical factor in wind resource assessment projects, Firnas Shuman provided a data availability package, which included continuous data monitoring, regular reporting, and both preventive and corrective maintenance of the Lidars with a guarantee of achieving 95%+ data availability during the measurement campaign.

Thanks to the high reliability of ZX Lidar units and the professional services provided by the Firnas Shuman team, the project achieved exceptional results:

- ▲ **98.5% average data availability at 100 m**
- ▲ **97.75% average data availability at 220 m.**

4 Results and Benefits

The deployment of pre-validated ZX 300 Lidars enabled Firnas Shuman and its client to rapidly launch the resource assessment campaign, achieve comprehensive coverage of the vast project area, and generate highly accurate wind data as validated in-situ against on-site met masts to support the future development of green hydrogen plants in Mauritania.

Firnas Shuman's end-to-end professional services covering logistics, installation, data monitoring, operation, and maintenance combined with the accuracy and reliability of ZX Lidar technology, ensured the project's challenges were successfully overcome and delivered exceptionally high levels of data availability.

The ability to capture reliable data over such large and often inaccessible sites has provided a strong foundation for the ongoing renewable resource assessment in support of a future green hydrogen export facility. In particular, the flexibility of the technology allowed Firnas Shuman to adapt its measurement campaign to the site's diverse conditions, ensuring comprehensive coverage and improved understanding of the wind resource.

More broadly, the use of portable Lidar systems such as the ZX 300 has proven essential for the practical execution of this large-scale campaign. In a country where traditional measurement approaches face both environmental and logistical constraints, Firnas Shuman's adoption of advanced Lidar technology has enabled efficient, reliable, and resilient data collection, directly contributing to the progress of Mauritania's renewable energy ambitions.





5 Key Advantages of ZX 300 Lidar

- ▲ **Rapid Deployment** – Quick installation and setup, allowing measurement campaigns to start without delays.
- ▲ **High Accuracy & Reliability** – Delivers precise wind measurements, reducing uncertainty in resource assessments and energy yield predictions.
- ▲ **Coverage of Large & Remote Areas** – Portable and flexible, ideal for expansive or hard-to-access sites where traditional met masts are impractical.
- ▲ **Detailed Wind Profiles** – Provides data at multiple heights, supporting optimised decisions on project design.
- ▲ **Adaptability to Complex Conditions** – Performs well in challenging climates, variable wind conditions, and complex terrains.
- ▲ **Cost-Effective** – Reduces the need for multiple tall masts, minimising logistics and infrastructure costs.
- ▲ **Operational Resilience** – Can be housed in secure, ventilated containers or protective setups to withstand harsh environments and security risks.
- ▲ **Trusted Technology** – Proven track record worldwide, enabling confidence for developers, investors, and stakeholders.

“The first time I heard we would be deploying 12 Lidars in the middle of the desert—and that Firnas Shuman would be responsible for every eventuality—I wondered how I’d manage to sleep over the next 12 months. The local communities showed great respect for the measurement campaign, and the ZX Lidars performed flawlessly in such extreme conditions. Within just a few weeks, I was finally able to sleep soundly again.”

- Vicente Gutiérrez, Project Manager of Firnas Shuman

About Us

In 2003 we released the first commercial wind lidar, pooling decades of fibre laser research from the science, security and energy industries. Designed specifically for the wind industry our Lidar has paved the way for many of the remote sensing devices seen in the market today. Our original lidar technology continues to innovate with world firsts such as taking measurements from a wind turbine spinner and being the first to deploy an offshore wind lidar, both fixed and floating. Our Lidars have also now amassed millions of hours of operation across 15,000+ deployments globally spanning two decades of commercial experience. Some of our proudest achievements are listed below; these are the earliest reported examples that we are aware of from open publications.

- 2003** - The first wind lidar to make upwind measurements from a turbine nacelle
- 2004** - The first and original commercially available lidar for the wind industry
- 2004** - The first wind lidar to investigate the behaviour of turbine wakes
- 2005** - The first wind lidar to be deployed offshore on a fixed platform
- 2007** - The first wind lidar to take measurements from a turbine spinner
- 2008** - The first wind lidar to be signed off against an industry-accepted validation process
- 2009** - The first wind lidar to be deployed offshore on a floating platform
- 2010** - The first wind lidar to re-finance and re-power a wind farm
- 2011** - The first wind lidar to be proven in a wind tunnel
- 2012** - The first wind lidar to be used with very short masts and secure project financing
- 2012** - The first wind lidar to be accredited for use with no or limited on-site anemometry for project financing by DNV GL
- 2014** - The largest batch of single-type lidar verifications against an IEC met mast
- 2015** - The first lidar designed specifically for offshore use, with the longest warranty available - 3 years as standard
- 2016** - The first wind lidar to support safe lifting on a jack-up vessel
- 2016** - The first wind lidar SCADA integrated on operational wind farms in replacement of site met masts
- 2017** - The first wind Lidar to be installed across a wind farm on a Lidar-per-turbine basis, uniquely mapping wakes across a wind farm
- 2018** - The first wind Lidar to satisfy all criteria for IEC Classification
- 2019** - The first wind Lidar to take wind measurements from a drone
- 2020** - The first wind Lidar to be accepted for bankable energy assessments in complex terrain standalone (without a met mast)
- 2021** - The first wind Lidar to attract more than £150bn+ of investment into wind energy projects
- 2022** - The first wind Lidar to be fully integrated into a retrofit wind turbine controller for Lidar Assisted Control
- 2023** - ZX Lidars moves to Willow End!
- 2024** - The first wind Lidar with a 5 year warranty and 5 year planned service interval as standard
- 2025** - The first wind Lidar to achieve 21 - 200m IEC Classification and 300m Performance Verifications

Our Products & Services

