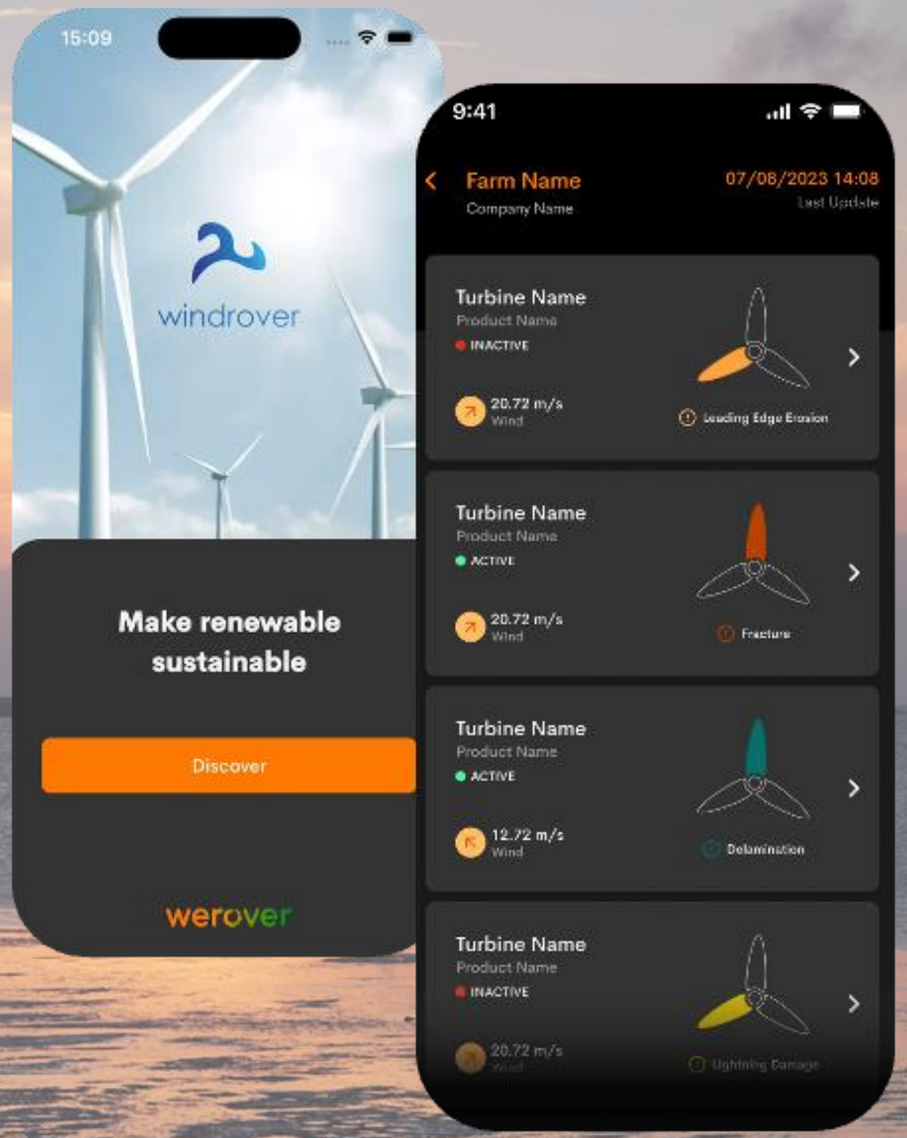
werover

The role of real-time acoustic data in wind turbines blade health monitoring



About Werover

Driven by the mission to make renewable energy more sustainable, **Werover** offers early damage detection through two patented products:

- **Searover**: A specialized ROV for hydropower tunnel inspections
- **Windrover**: AI-powered blade health monitoring for wind turbines

Maximizing energy efficiency and minimizing downtime in renewable energy systems

windrover

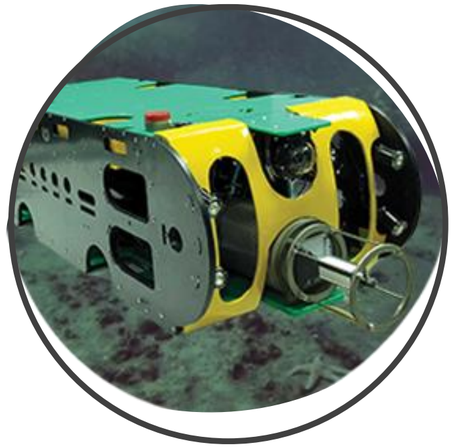
searover
UNDERWATER ROBOTICS

Journey of Werover

2018-2021

Company Establishment

500K USD fund by Türkiye Government



2021
Hydrov

1.7M USD revenue

2022-2023
Werover GmbH

100K Euro Fund by ESA and GreenOffshore Tech

255K USD fund by Türkiye Government

Development of second product line, **Windrover**

2024-2025

Windrover Market Launch in Jan. 2024
16 Paying Windrover Customer

Completed +500 installations

Acquiring **TotalEnergies** and **Fred Olsen Renewables** as a paying customer

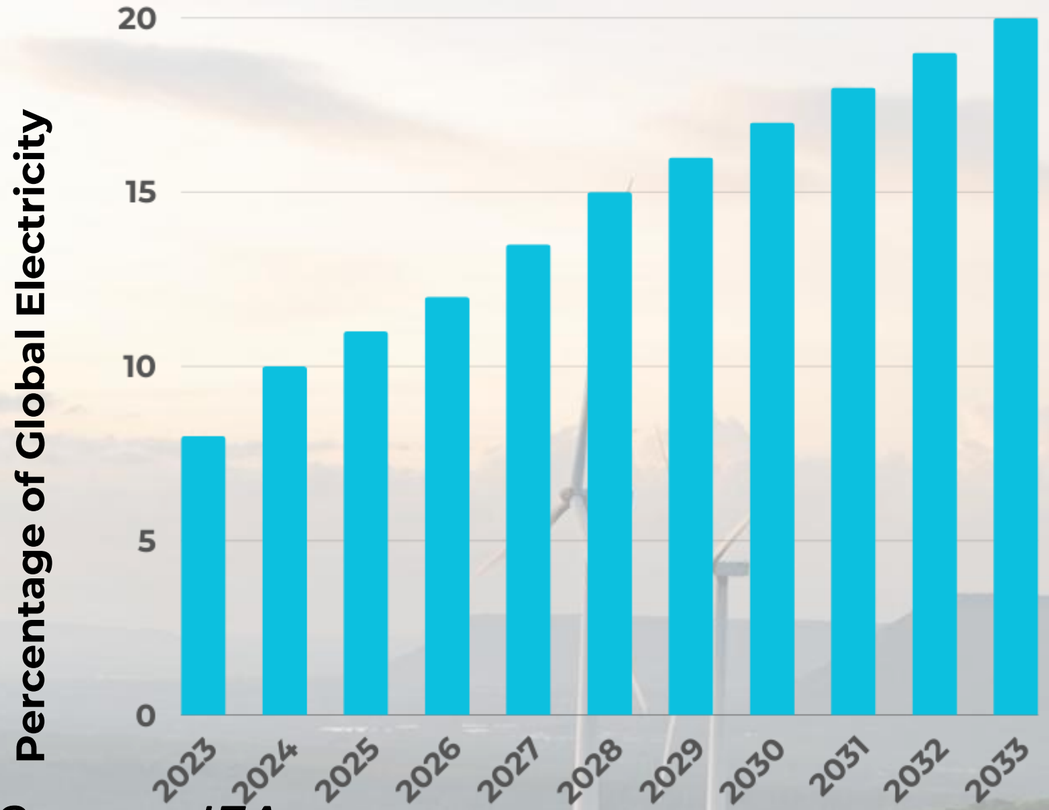
Relocated our HQ to **UK**

Collaborations with **HEC Paris** under **TotalEnergies On Accelerator Program**

We Power The Future

It’s The Right Time !

Projected share of wind energy in global electricity generation (2023-2033)



Source: IEA

Future forecast of global wind energy market (2023-2033)

Source: GWEC

Pain Points

The late detection of turbine defects costs wind farms billions of dollars annually.

Traditional methods: drone inspections or rope access.

Turbines must be stopped: energy loss.

Inspections are only once a year!

Turbines Worldwide

500 K

Blade Maintenance Cost/Turbine

$60 K/ year

Replacement Cost/Turbine

$1 M

At least 3 months downtime

Solution

This advanced AI-powered wind blade monitoring platform delivers timely alerts to operators, allowing them to prioritize inspections and take proactive measures to maximize energy production and minimize downtime.

Reduce Maintenance & Replacement Costs By 50% with Windrover

Product Overview

We already have +500.000 hours audio file pool from Europe, UK, Turkiye. It's growing every minute!

Data Collection

GSM Connectivity to allow direct communication to the cloud

High Precision sound recording

Harsh Weather Resilience

Data Analysis

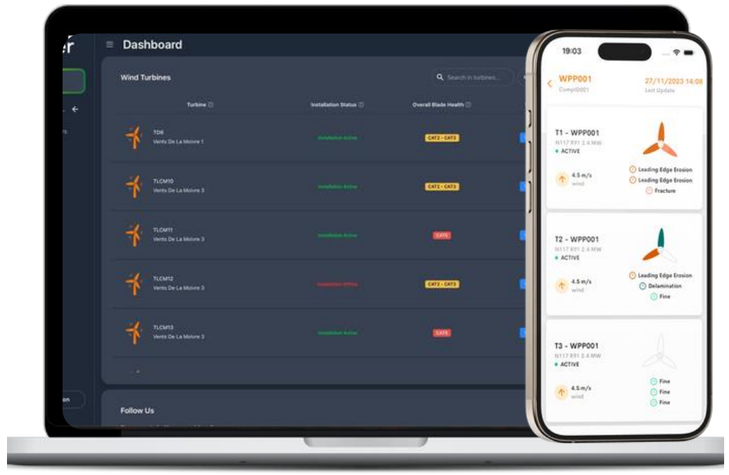
Ensuring the early identification of potential issues.

Achieved %92 Accuracy in Anomaly Detection

Proven ability to detect damages from CAT2 to CAT5

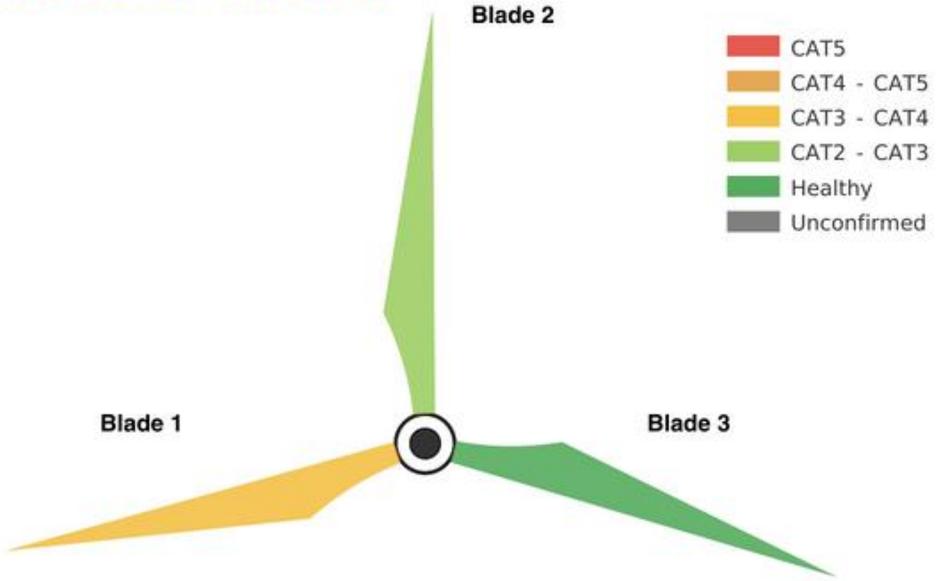
Insight Delivery

Insights Provided Through Weekly Reports and Windrover Dashboard/App



Deep Dive

Turbine Overall Condition



Blade Health Status

Blade 1
- BroadSurface Damage

Blade 2
- BroadSurface Damage

Blade 3
- Healthy

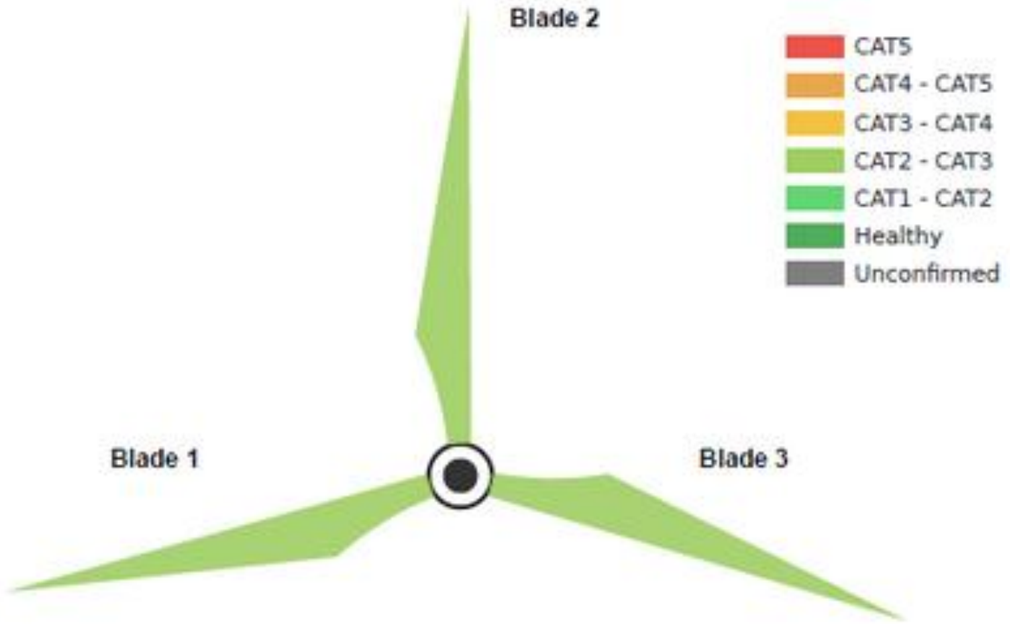
Additional Insights

Blade 1: The blade emits elevated noise across all frequencies, higher than the other blades. This suggestsa broad surface issue such as coat damage. Risk level is estimated at CAT3-CAT4. Blade 2: The blade emits elevated noise across all frequencies, higher than the other blades. This suggests a broad surface issue such as leading edge erosion. Risk level is estimated at CAT2–CAT3. Blade 3: No anomalies were detected on this blade. No risk identified.

New Findings

New Damage on Blade 1
New Damage on Blade 2
Damage Growth on Blade 2

Turbine Overall Condition



Blade Health Status

Blade 1
- Multi-layer Material Damage

Blade 2
- Broad Surface Damage

Blade 3
- Unknown Damage

Additional Insights

Blade 1: Mid-frequency anomalies suggest damage extending into deeper layers, possibly delamination. This type typically carries a CAT2–CAT3 severity risk.

Blade 2: The blade emits elevated noise across all frequencies, higher than the other blades. This suggests a broad surface issue such as leading edge erosion. Risk level is estimated at CAT2–CAT3.

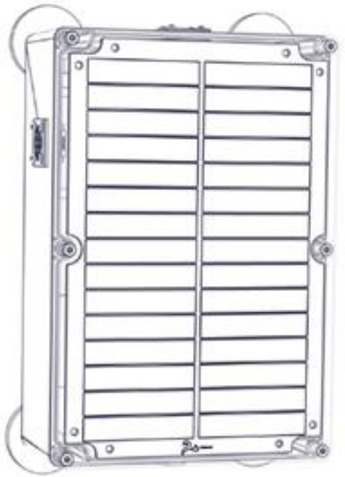
Blade 3: Abnormal patterns were detected but don't match known types. Classified as unknown with a provisional risk of CAT2–CAT3.

New Findings

No new findings

Product Features

- Protection Against Weather Conditions for Sensitive Acoustic Sensor
- Sensitive Acoustic Sensor Detecting Faulty Noise in Blades
- Durable Body Material for Harsh Environments
- Special Magnet Holder for Wind Turbine Towers



- Battery Operated
- Easy Installation Without Cabling

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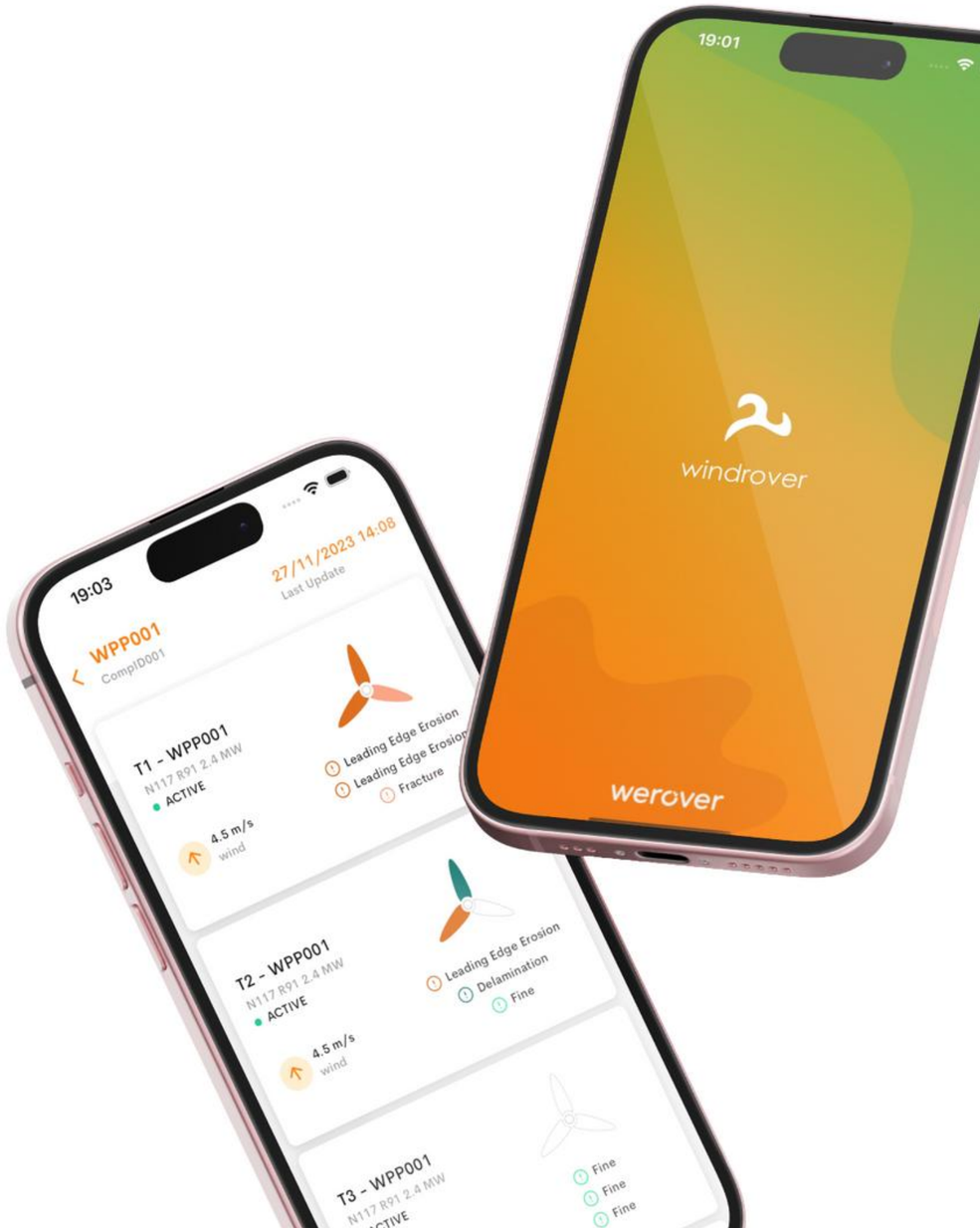
What do our customers gain working with us?

- The app offers daily, weekly, and monthly health tracking with intuitive visualizations and performance insights.
- Minimize costly downtime and maximize turbine efficiency
- Prevent major blade damage, reducing the risk of catastrophic failure
- Significantly lower repair and replacement costs

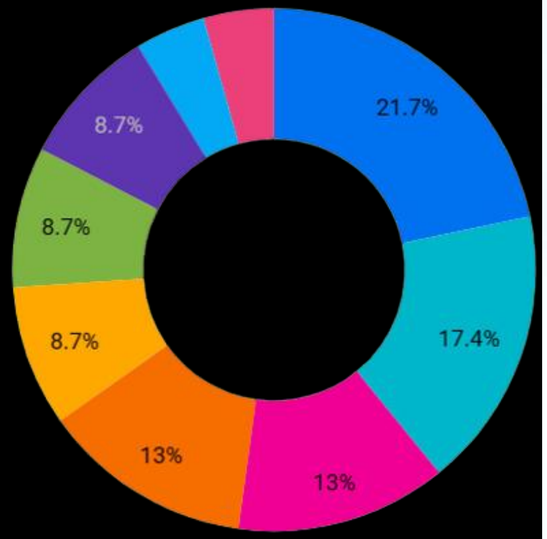


Case Study 1

Windrover Systems were installed on all 4 turbines of the wind farm

Findings: All wind turbines were damaged with severities between CAT-2 and CAT-4

Despite the scheduled inspection being in May or June, we detected significant damage as early as January. A follow-up drone inspection in February confirmed the severity of these damages. Thanks to early detection, the necessary repairs were made during a low-wind period, preventing the issues from escalating.



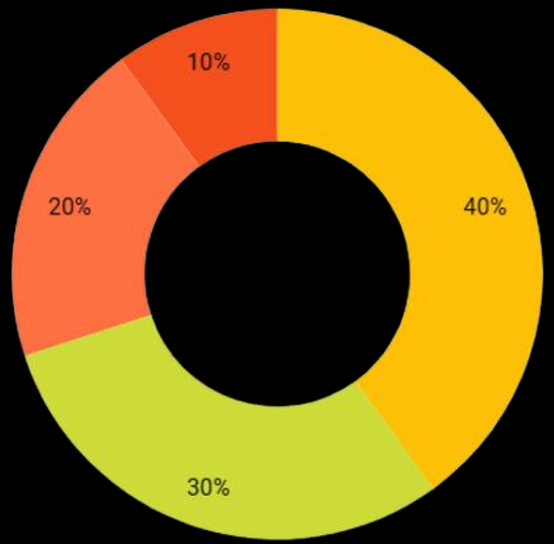
Saving 1m$ and 3 month down time

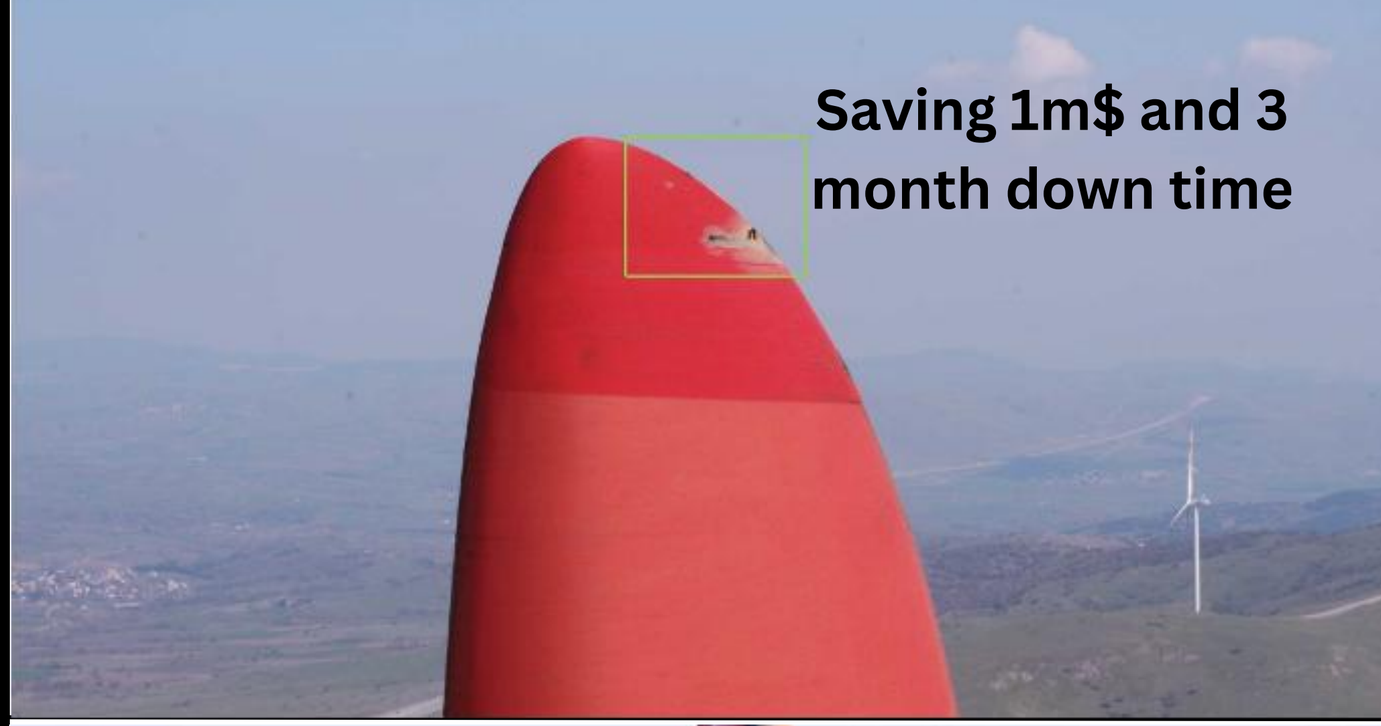
Case Study 2

Windrover Systems were installed on all 16 turbines of the wind farm

Findings: All wind turbines were damaged with severities between CAT-2 and CAT-3

We received a damage alert from a turbine that had just undergone repairs, indicating that the repair had not been done correctly. Without Windrover, the turbine would have continued operating in a damaged state.





PROJECTS

Achieved to be granted with 1.1M USD R&D Project Fund alongside two commercialized products

TÜBİTAK PROJECTS

- Development of a Semi-Autonomous Underwater Robot with Advanced Battery and Cable System, Long-Range Tunnel Inspection, and 3D Mapping Capability **(Ongoing, in 3rd Term)**
- Windrover, Wind Turbine Blade Health Monitoring **(Ongoing, in 4th Term)**
- Remotely Operated Modular Underwater Robot with 360-Degree Imaging Capability **(1512, completed)**
- Development of a Remotely Operated Underwater Robot with Long-Range Tunnel Inspection and 3D Mapping Capability **(1707 Sipariş Ar-Ge, Completed)**

INTERNATIONAL PROJECTS

- ESA BIC- NORTHERN GERMANY, Settallite Integrated Underwater Robotics (**Completed**)
- GREENOFFSHORE TECH- Windrover (**Completed**)
- Innovate UK, RTO PROJECT FUND- Installation of Windrover on ORE CATAPULT Aberdeen Offshore Test Turbine (**Completed**)

EUROGIA CALL30

- AI-Driven IoT and Satellite-Enabled Preventive Maintenance and Health Monitoring for Offshore Wind Turbine Blades to Enhance Operational Efficiency **(Being Invited to Call30 for FPP)**

In Türkiye, Europe and United Kingdom;

600

Installation

29

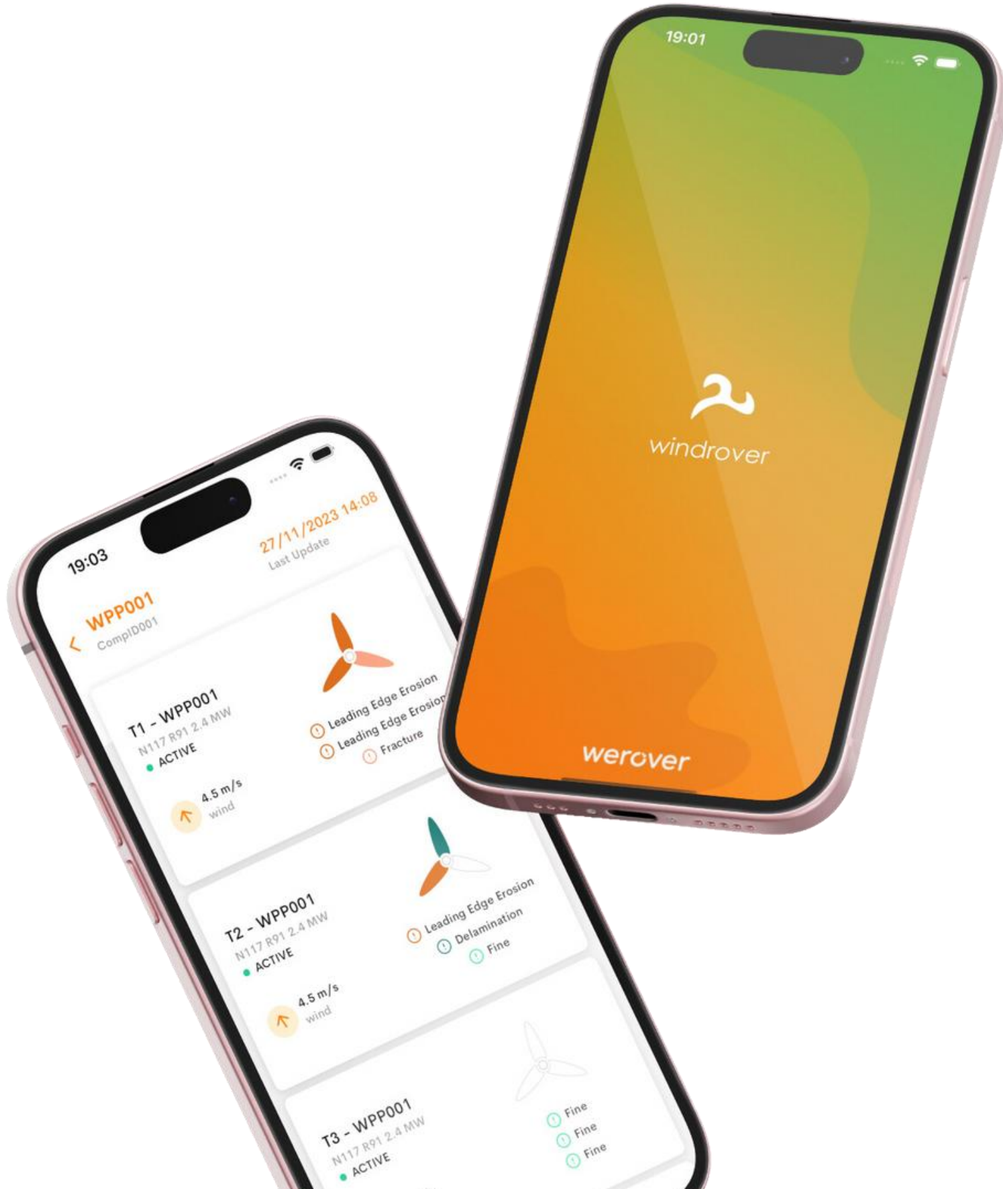
Turbine Model

12

Cities

900.000

Hours of Turbine Audio Raw Data Sample



Our Locations

Thank You

Disrupting a 100+ year-old industry in just 12 months, with unprecedented cost savings!

Lets build a more profitable and sustainable wind energy industry together

Website

www.werover..com

Telephone

+44 7393190175

E-Mail

balca.yilmaz@werover.com

Address

3rd Floor
86-90 Paul Street
London EC2A 4NE