

BIRD MONITORING IN WIND FARMS



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MEETING TODAY'S CHALLENGES

More wind farms are being built than ever before. And the turbines themselves are getting taller, bigger and more powerful.

Wind farms impact birds by:

- **Direct habitat loss** through wind farm construction;
- **Indirect loss of habitat (displacement)** when birds avoid new wind farm areas;
- **Death by collision** with the turbine blades.

To mitigate the impact of wind farms on birds there's an urgent need for both **comprehensive monitoring** and **intervention solutions**.

In fact, in addition to environmental impact assessments (EIAs), many government bodies are increasingly making it compulsory to perform both pre-construction and post-construction monitoring, as well as to provide active mitigation, such as turbine shutdowns.

Are you faced with the challenge of monitoring and mitigating the impact of wind farms on birds?

We're here to help.

NEXT LEVEL OF ENVIRONMENTAL IMPACT ASSESSMENT

Bird radars are increasingly being used at wind farms during both pre-construction and operational stages.



During pre-construction, our radars are used as a reliable and long-term measurement tool, gathering scientific data on bird movements in the planned wind farm area, as well as migration activity.

They automatically detect and log hundreds of birds simultaneously, including their size, speed, direction and flight path. Historically, this type of information would be gathered by human observers over one or more limited observation periods.

Long-term radar data generated by having avian radar operating 24/7 on-site is far more accurate and useful when it comes to your Environmental Impact Assessments (EIAs). The information on bird activity, based on radar data, is compared both pre- and –post construction to measure the true impact on the local and migratory bird population.

And of course, unlike human observers, our radars don't need to rest, and they can see in all weather, day or night.

Environmental consultants value our avian radars for their unprecedented detection and tracking capabilities, user friendly interface and high flexibility of the PostgreSQL database. The latter also facilitates direct integration with GIS applications.



“ROBIN’S CURRENT STATE OF THE ART BIRD RADAR WITH 24/7 HIGH RESOLUTION BIRD DETECTION, IS A MUST FOR ACCESSING AND MITIGATING THE RISK IN ANY LARGE SCALE WINDFARM DEVELOPMENT...”

Mati Kose, Ornithologist, conservation and EIA expert University of Tartu, Estonia

REDUCE BIRD MORTALITY WITH AUTOMATIC TURBINE SHUTDOWN

For operational wind farms, our radars can automatically switch turbines off and on again. And depending on the situation, we can do this for both single turbines and groups.

We fully understand your need to balance economy with ecology. And we can help you make sure that the one limits the impact on the other.

Our avian radars continuously measure the number of birds that enter a pre-set range from the wind turbines. When this number crosses a specific threshold - and depending on other factors such as wind direction and strength, bird behaviour, time of the day and even the season - our system generates a shutdown command to either a group of turbines or individual turbines, depending on the local situation and user requirements.

Our bird radars are capable of detecting the start of overnight migration, also during adverse weather conditions. Based on the measured radar data, we generate a density grid and distinguish between single birds, local bird movements, and overnight mass migration.

After detecting an overnight mass migration event, our radar system can even shut the whole wind farm down automatically (in a controlled manner), if required.

And don't worry. All commands can, of course, be overridden by an operator.

“IN SEARCH OF THE VERY UNIQUE TECHNOLOGY WE WERE LOOKING FOR; LUCKILY WE FOUND ROBIN RADAR FROM THE NETHERLANDS”

Georg Waldner, Managing Director at EVN Naturkraft



INTRODUCING MAX®

It took more than four years, millions of euros, and thousands of coffees. The result is mind-blowing. We simply had no other choice - than to call it Max®.

Thousands Of 3D Bird Tracks - One Single Radar



UNPRECEDENTED TRACKING

Max® has the fastest rotation speed in the market, resulting in track updates every second. This allows unprecedented 3D visualisation of flight paths with the ability to export tracks into Google Earth.

SIMPLE INFRASTRUCTURE

Max® minimises your infrastructure requirements. Its computer servers can be placed in already existing server rooms. So, at the location of the radar, no shelter or housing is required. All Max® needs is power and a fibre connection.

UNIQUE TECHNOLOGY

Max® is entirely purpose built to monitor birds. The radar antennas are specifically designed for this purpose. It brings Phased Array radar technology into the hands of environmental consultants and ornithologists.

“TO BE SUCCESSFUL TWO THINGS WERE CRUCIAL: 1) LONG RANGE; AND 2) A PERFECT HEMISPHERICAL COVERAGE. THAT’S WHY WE CHOSE MAX®”

Augustin Köllner - Project Developer at OSTWIND Renewable Energy

FULL 3D COVERAGE

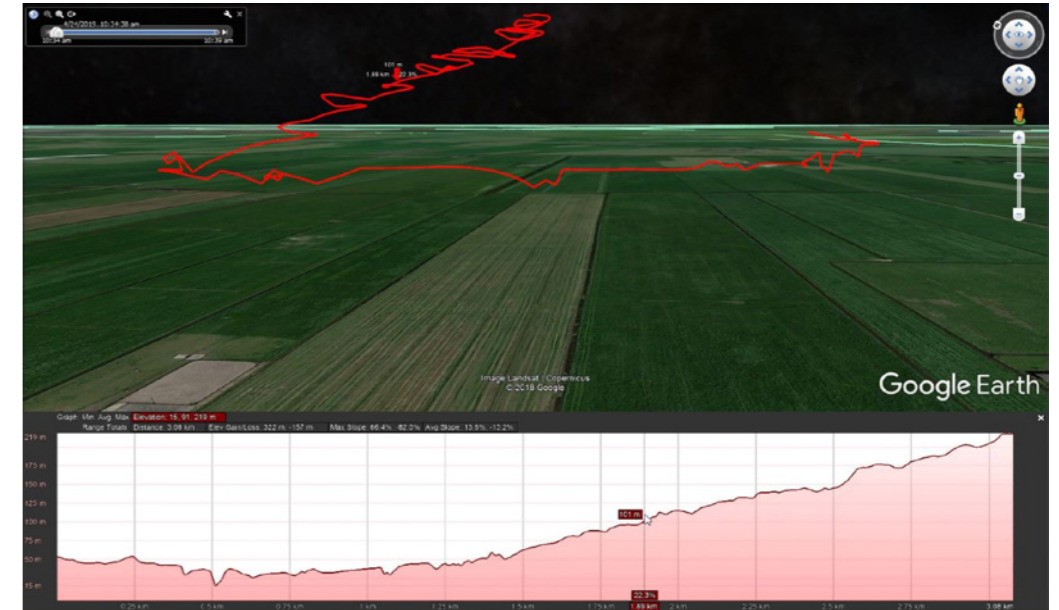
Max® is a single sensor system, providing full 3D information of all avian targets, and all around. All birds have height information and there is virtually no ‘cone of silence’ above the radar. The system provides 360-degree coverage from the horizon to at least 1 kilometer AGL (above ground level).

VISUALISATION ON THE SPOT

Bird movements are displayed in real time on your PC or mobile device. We even designed Max® to work on iOS and Android tablets.

GRAPHICS IN A CLICK

Of course, developing new hardware isn't the only thing we did. Because we know you often need to convert bird data into reports, we've developed an entirely new tool to make appealing graphics in a user-friendly way. Just select the variables and time period you want, and you'll immediately be presented with a graphical representation of your data.



3D track visualised in Google Earth



SYSTEM SPECIFICATIONS

TECHNOLOGY	FMCW
FREQUENCY	X-Band
POWER OUTPUT	20W
ROTATION / SCAN SPEED	60rpm / 1s
INSTRUMENTED RANGE	15km
AZIMUTH COVERAGE	360-degrees
ELEVATION COVERAGE	60-degrees
DIMENSIONS (WXDXH)	1237 x 654 x 1660 mm
WEIGHT	325kg

A RADAR FOR EVERY PROJECT

Max[®] is quite simply the best avian radar we've ever produced. In fact we're willing to bet it's the best avian radar anyone's ever produced. But if you think our flagship radar might be overkill for your particular project, we have other radars for you to choose from too.



GOING OFFSHORE?

For offshore wind farms, we've developed specific configurations that can cope with the additional challenges of being offshore.

First of all, our offshore bird radars have been designed with the harsh offshore situation in mind. So you can rest assured that they can cope with the salty wind farm environment. They can be deployed on the coast, on the distribution platform, and sometimes even on the turbines themselves.

Now sea clutter is, of course, a well-known concern when it comes to radar. Which is why we've made advanced modifications in both hardware and software to help overcome that specific challenge.

Our aim is to give you the same outstanding bird monitoring offshore that you've come to expect from us at your onshore wind farms.



ABOUT ROBIN RADAR SYSTEMS

Our mission is to provide actionable information that increases safety and security for both humans and birds. We do that by combining purpose-built radars with unique software algorithms.

Our bird radars are installed at numerous civil and military airports around Europe, including Amsterdam, Frankfurt, Berlin and Copenhagen. There we monitor birds all around the airport to prevent bird strikes on approaching and departing aircraft.

We also protect the birds themselves and help to reduce the environmental impact of wind turbines with our avian radars at wind farms.

Our counter-drone radars have regularly been used to protect infrastructure, events and VIPs from rogue drones, since 2016.

ROBIN originally started in the eighties as a project within the well-respected Dutch Research Institute for Applied Science (TNO). The project name was an acronym for Radar Observation of Bird INTensity.

In 2010 high-tech entrepreneur Siete Hamminga spun out the technology from TNO to make it commercially available.

Listed in the top three most innovative Dutch companies, we've received FD Gazelle, and Deloitte Fast 50, fast growing business awards, and we've been listed as an official Great Place To Work. All the while we continue to research, develop, manufacture, and above all, innovate.



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Siete Hamminga - CEO at Robin Radar Systems