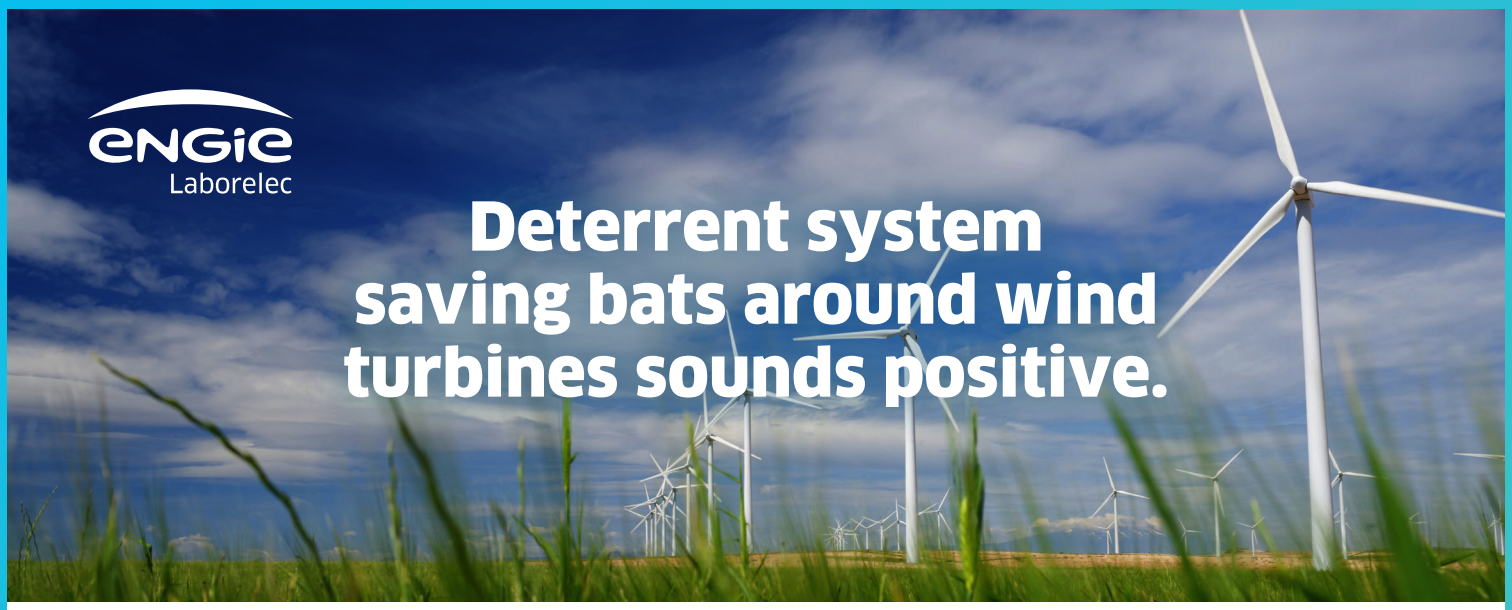


Deterrent system saving bats around wind turbines sounds positive.

Good news for bats and wind park operators. Following a first study, it seems ultrasonic deterrents can reduce bat activity (mitigating bat mortality) around turbines by 85%.

Despite their valuable contribution to the energy transition, wind turbines can spell danger for bats. Not only can bats be hit by a moving blade, they can suffer internal pressure trauma simply by passing too close to one. As bat species and their habitats have become legally protected, wind farm operators are obliged to shut down turbines at certain times to mitigate bat mortality. The downside being a high production loss ranging from 2% up to 15% in specific cases.

Looking to solve this protection vs production loss conundrum, in 2018 a team at ENGIE studied the most mature bat deterrent solutions commercially available.

Most promising was the NRG ultrasonic device, designed and already trialled in the U.S. where significant reductions in bat mortality were found (up to 78%) for some bat species (Sara P. Weaver, 2020). As the technology had not been tested in Europe, in 2019 a pilot project was set up on an ENGIE Electrabel wind turbine in Modave, Belgium, to assess the effectiveness of the system on home ground.

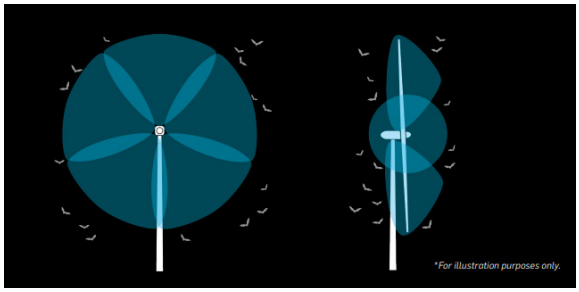
NRG deterrent speakers fixed to nacelle

NRG bat deterrent system

The NRG deterrence system is designed to continuously repel bats. Using ultrasonic speakers fixed to the nacelle, it emits sound frequencies similar to those of bats, ranging from 20 to 50 kHz. These frequencies, inaudible to humans, effectively jam the bats' ability to use echolocation; the resulting sound barrier created around the turbine nacelle making it unattractive for bats to approach.

Testing, testing

The wind turbine at Modave was equipped with 5 NRG ultrasonic deterrent speakers; 3 on top of the nacelle, 2 on the underside.
In addition, 2 detection technologies were added to monitor bat activity: 4 infrared cameras (from BioDiv-Wind) installed on the nacelle as ultrasonic detectors could not be used as they would get saturated by the deterrence speakers. 1 ultrasonic detector (ecoObs GSM Batcorder) was fitted at the base of the turbine to monitor bottom bat activity.



Depiction of sound barrier created around the nacelle by NGR deterrent system

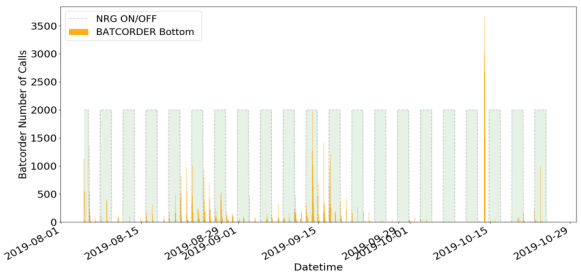
The ultrasonic detector at the turbine base

Over the monitoring period (from 5 August to 25 October) an alternating schedule was programmed into the deterrence system activating the speakers 2 nights out of 4. This allowed for both top and bottom bat activity to be compared when the deterrence was either activated or deactivated. The compared times being both equal in length and weather conditions.

What was learned?

The results were positive in two important ways:

On one hand, with all detections by the nacelle infrared cameras manually checked, out of 53 true bat detections registered, 46 of those were registered on nights when the system was deactivated, only 7 detections registered when the system was activated. With bat activity at nacelle-level reduced from 46 to 7; a **significant reduction of 85% bat activity** around the nacelle could be concluded on nights when the system was activated. In contrast, observing detections registered by the ultrasonic detector at the bottom of the wind turbine, it was found that the deterrence system had little to no influence on bat activity at this level. Peaks of bottom activity (see graph) both occurred during nights when the system was activated as well as when deactivated. The conclusion being, that while the ultrasonic deterrence system is effective in repelling bats around the nacelle, it doesn't disturb the communities at the bottom of the wind turbine, bat or other.



What next?

While the results are very promising, further testing is needed to prove the effectiveness of the system on a larger scale. A second pilot is already underway at this year with assessment including daily mortality checks around the system equipped turbines. The results of this pilot will be released in 2021.

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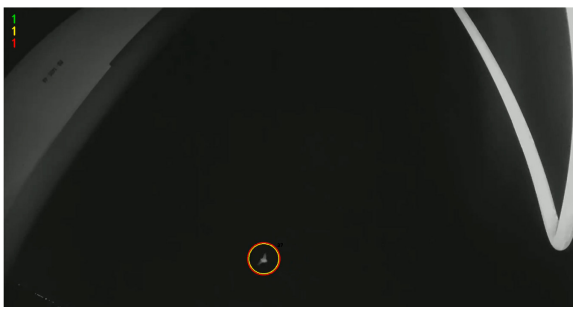
Caroline De Zutter (ENGIE Lab Crigen),
Amélie Clignet (ENGIE Green).

Reference

Sara P. Weaver, C. D.-A. (2020). Ultrasonic acoustic deterrents significantly reduce bat fatalities at wind turbines. Global Ecology and Conservation.



Screenshot of camera-captured bat detection

Like to know more?

Please feel free to contact us via e-mail.

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