

# Expectation, Exposure and Reality: A Nocebo-Based Perspective on Wind Turbine Syndrome

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## OUTLINE

Both in Slovenia and internationally, we are observing the activities of a small but vocal group that is speaking out against wind energy. These people try to alarm the public with unfounded claims, especially about alleged health risks. Their arguments often centre on the infrasound generated by wind turbines, which they claim causes health problems for local residents. What they may not realise is that by spreading such inaccurate and often misleading information, they are inadvertently contributing to actual discomfort or even health problems in those who believe them. Health complaints voiced by people who strongly oppose wind energy and convinced of its negative effects are often better explained by the nocebo effect. This psychological phenomenon occurs when negative expectations – such as the belief that infrasound is harmful – lead to actual physical symptoms in those who hold such beliefs. In contrast, others who are not influenced by these messages do not experience such effects. Research has shown that people who expect negative effects from environmental factors are more likely to interpret physical sensations as confirmation of their fears. Experimental studies confirm this and show that the mere suggestion of the harmfulness of infrasound can significantly influence a person's subjective well-being – regardless of the actual exposure. As we are concerned about the unnecessary psychological and health burdens caused by the nocebo effect, this contribution aims to highlight its existence and powerful influence. In the wrong hands, the nocebo effect can become a powerful psychological weapon.

## INFRASOUND AND EMF

**Infrasound** is a natural and everyday part of our acoustic environment. It refers to sound waves with frequencies below 20 Hz, which are generally below the human hearing threshold. Almost all sound emissions, whether natural or artificial, contain infrasound components, whereby the intensity of these sounds is decisive. In wind turbines, infrasound is generated by the rotation of the rotor blades. When the rotor blades move, they generate turbulent air currents. When a blade passes in front of the tower, this air flow is briefly interrupted and an infrasound pulse is generated (Kegel et al., 2025). However, wind turbines are not unique in this respect – many other everyday sources such as road traffic, the wind itself, household appliances such as fridges and electric motors emit infrasound at a higher intensity. For example, the level of infrasound measured inside a car with the rear windows open, or even fully open, is much higher than that generated by a wind turbine. In addition, the infrasound emitted by wind turbines is far below the threshold of human perception and is not considered harmful to health (Fachagentur Wind und Solar, ND).

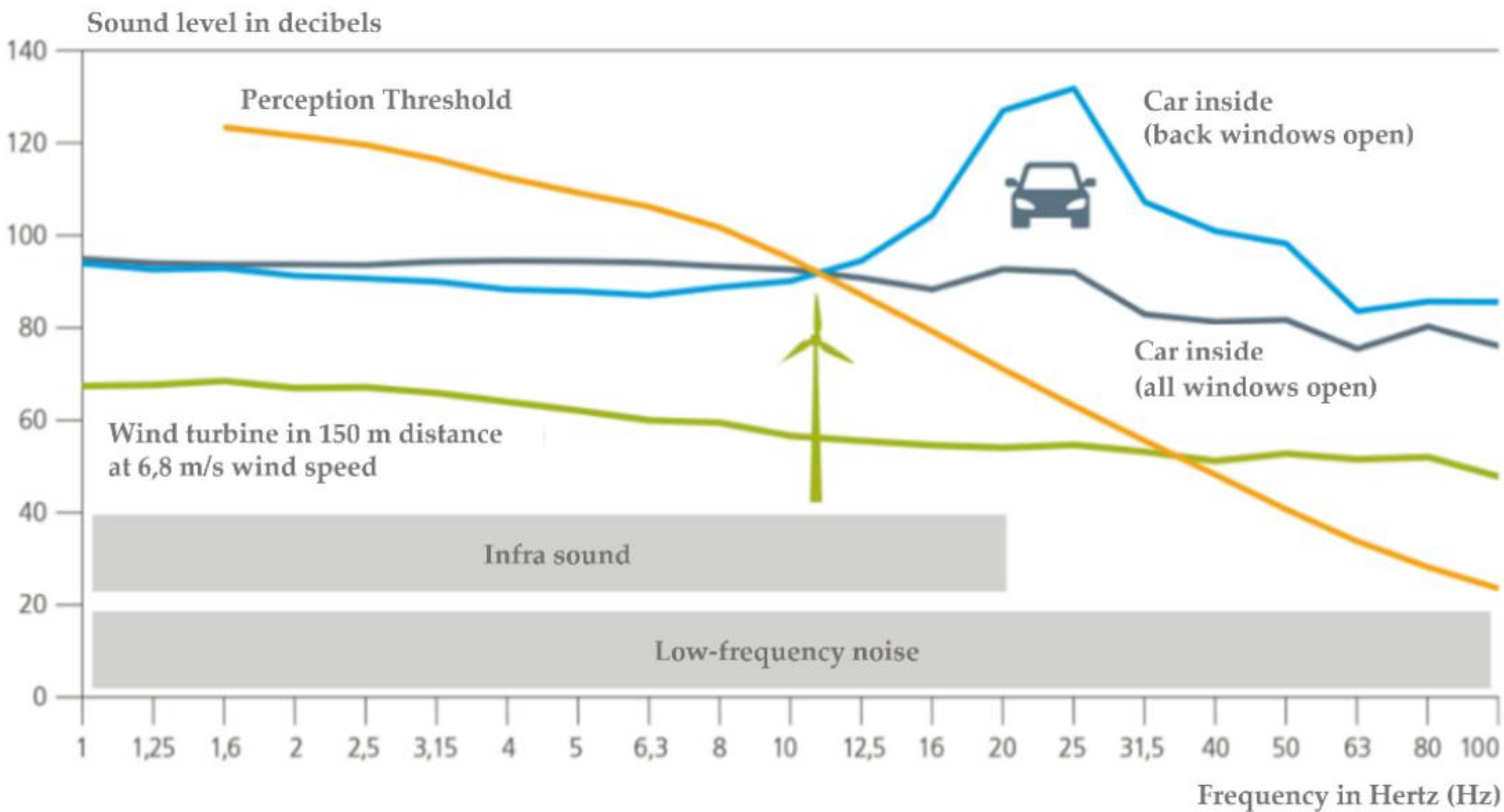


Figure 1: The other sound sources are significantly louder than the wind turbine (Fachagentur wind und solar, n. d).

**Electromagnetic fields (EMFs)**, on the other hand, are caused by the interaction of electric and magnetic fields that arise when electrical voltages and currents change. These fields occur not only in industrial plants, but also in a variety of everyday electronic devices such as televisions, hair dryers and even wind turbines. EMFs are characterised by their frequency and magnetic flux density and can be measured with special instruments, such as Hall sensors (Kegel et al., 2025). With regard to wind turbines, studies have shown that EMFs are only be detected in the immediate vicinity of the turbines themselves. Measurements in the vicinity of the turbines show that the EMFs quickly drop to background levels within a few metres. The electromagnetic fields in the vicinity of wind turbines – within about 2 to 3 metres – are comparable to the EMFs emitted by normal household appliances, or even weaker. Therefore, exposure to EMF from wind turbines does not pose a significant health risk to residents living near wind farms (Knopper et al., 2014).

## WHAT IS NOCEBO EFFECT?

It is noteworthy that the reports of symptoms attributed to wind turbines gained prominence following the publication of a self-published book by Pierpont (2009). This book theorised that the infrasound generated by wind turbines causes a variety of symptoms in people living near wind farms and proposed a biological mechanism to explain the occurrence of these symptoms. Although such claims are not supported by solid scientific evidence, the idea that infrasound from wind turbines poses a health risk has since gained traction in public discourse and in the media, particularly via the internet (Leventhall, 2013). The dissemination of health warnings suggesting that environmental exposure is dangerous can trigger the onset of symptoms through the so-called nocebo effect alone – even if the exposure is physiologically harmless (Crichton et al., 2014a). A nocebo response to a harmless environmental exposure occurs when people expect symptoms due to the exposure and therefore become more vigilant and more likely to report symptoms related to perceived health risks (Pennebaker, 1994; Petrie et al., 2005). Both epidemiological and experimental evidence suggests that the reporting of symptoms in the vicinity of wind farms is not due to harmful physiological effects of infrasound, but rather to negative expectations and the misattribution of common symptoms (Chapman et al., 2013; Crichton et al., 2014b). As there is growing evidence that fears and negative expectations can contribute to symptoms attributed to infrasound from wind turbines, a simple but potentially effective intervention could be to explain the nocebo effect to those affected. This could help to reduce fears and change expectations.

## NOCEBO EFFECT STUDY RESULTS

In their 2015 study, Crichton and Petrie investigated whether the explanation of the nocebo effect could reduce the symptoms triggered by negative expectations associated with infrasound from wind turbines – expectations that are often shaped by media and information from the internet. The study involved 66 healthy individuals from the local population. Each participant took part in two 14-minute sessions during which they were exposed to sound recordings containing both audible wind turbine noise and infrasound (9 Hz, 50.4 dB). Before the first session, all participants watched a video with negative information about the health effects of infrasound. They were then randomly assigned to one of two groups: The group with the nocebo explanation received a scientifically based explanation after the first session, suggesting that the symptoms could be due to a psychological mechanism – the nocebo effect. The group with the biological explanation received an explanation that suggested a physiological basis for the symptoms (e.g. effects on the inner ear and vestibular system). Both groups reported increased symptoms and worsening mood after the first session. However, in the group with the nocebo explanation, symptoms and mood returned to baseline levels during the second session. The group with the biological explanations, on the other hand, showed persistent or even increased symptoms and negative feelings. The study confirms that negative expectations shaped by media information can trigger real physical symptoms in otherwise healthy individuals – a hallmark of the nocebo effect. At the same time, it shows that a thoughtful and empathetic explanation of this mechanism can help to reduce anxiety and alleviate symptoms. The authors emphasise that it is generally not enough to simply deny physiological effects in order to alleviate anxiety. The key lies in a meaningful, neutral and non-stigmatising explanation that enables sufferers to understand their symptoms without arousing feelings of guilt or ridicule. The results support the use of psychological approaches as a complementary tool in the treatment of symptoms related to environmental factors such as wind turbines (Crichton & Petrie, 2015).

## CONCLUSION

This article, supported by empirical findings, clearly shows how the fear of the alleged health effects of infrasound and noise from wind turbines can arise – not through physiological damage, but through psychological mechanisms such as the nocebo effect. The results of the study by Crichton and Petrie (2015) show that negative expectations, especially those fuelled by reporting from citizens' initiatives and misinformation, can lead to otherwise healthy people experiencing real symptoms. The evidence is clear: addressing symptom reports related to wind turbines requires more than denial – it requires transparent, evidence-based public communication that explains the role of expectations, perceptions and misinformation in creating health concerns. Therefore, those who publicly speak out against wind energy and spread unverified claims must be held more accountable. The dissemination of inaccurate or misleading information about health risks – without a scientific basis – not only undermines public understanding, but can also contribute directly to mental and physical health problems. Raising awareness of factual, peer-reviewed data and educating the public about the nocebo effect are essential steps to reduce unnecessary fears and build an informed, resilient attitude towards renewable energy infrastructure.

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