

Science for Environment Policy

Are motorways the best spot for wind turbines?

Wind turbine noise can be detected at low levels, even when it is heard alongside motorway traffic noise, a study finds. It is possible for louder motorways to drown out turbine noise, however. The participants in this listening experiment could easily detect wind turbine noise, but only once they knew it was present in recordings of environmental noise.

Public annoyance with wind turbine noise is rising with the increasing number of turbines installed. Previous studies have suggested that people are more annoyed by wind turbines than other sources of environmental noise, such as road traffic, even if they are equally as loud. Research has also indicated that masking turbine noise with other sounds could reduce annoyance.

This Belgian study adds to the body of research into turbine noise. Motorways have been proposed as good locations for turbines, partly because the traffic could help conceal turbine noise. Fifty people participated in a listening test in which they were asked to identify and detect wind turbine noise when heard alongside traffic noise. None of the participants held negative attitudes towards wind energy, and only one was particularly familiar with turbine noise.

The researchers first played recordings of noise at realistic indoor sound levels (40 A-weighted decibels (dBA)) to participants while they read at leisure in an otherwise quiet room. At this stage, the participants did not know the true purpose of the study or that they were going to be played recorded noises.

There were four types of recording: pure wind-turbine noise, pure motorway noise, combined motorway traffic and wind turbine noise, and combined local road traffic and wind turbine noise. Motorway noise was continuous, whereas local road noise was intermittent and individual vehicles could be heard driving past.

The researchers asked participants to rate how annoying they found the noise recordings, without telling them what the recordings actually were. Participants considered local road traffic recordings much more annoying than motorway and turbine recordings. There was little difference in annoyance levels for motorway and turbine recordings, whether in isolation or combined.

When asked to name what they had heard, nearly all participants correctly identified road traffic noise. Just under half said they had heard wind turbines. A number of incorrect answers were given, including air traffic (48% of respondents) and sea waves (28%).

In a second stage of the experiment, the researchers explored how loud traffic noise would have to be in relation to turbines, to mask their noise effectively. The participants were asked to deliberately listen for turbines in recordings, which had an overall volume of around 40 dBA, but with varying ratios of turbine and traffic noise.

At this stage, the listeners easily detected turbine noise in combined recordings, now they knew it was present. Those who detected it most easily tended to be the same people who had rated it as annoying in the first part of the experiment.

Listeners started to detect turbine noise when it was 23 dBA quieter than accompanying motorway noise. The turbine noise's acoustical energy was thus 200 times lower than the motorway's. In contrast, turbines could be detected at all volumes when combined with local road traffic, which suggests that road traffic is not suitable for masking turbines.

The researchers caution that the study was small-scale and short-term; some patterns they observed here might be different if they had conducted a long-term study.



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