

THE SILENT MENACE

When it comes to wind turbine infrasound, what you can't hear can hurt you

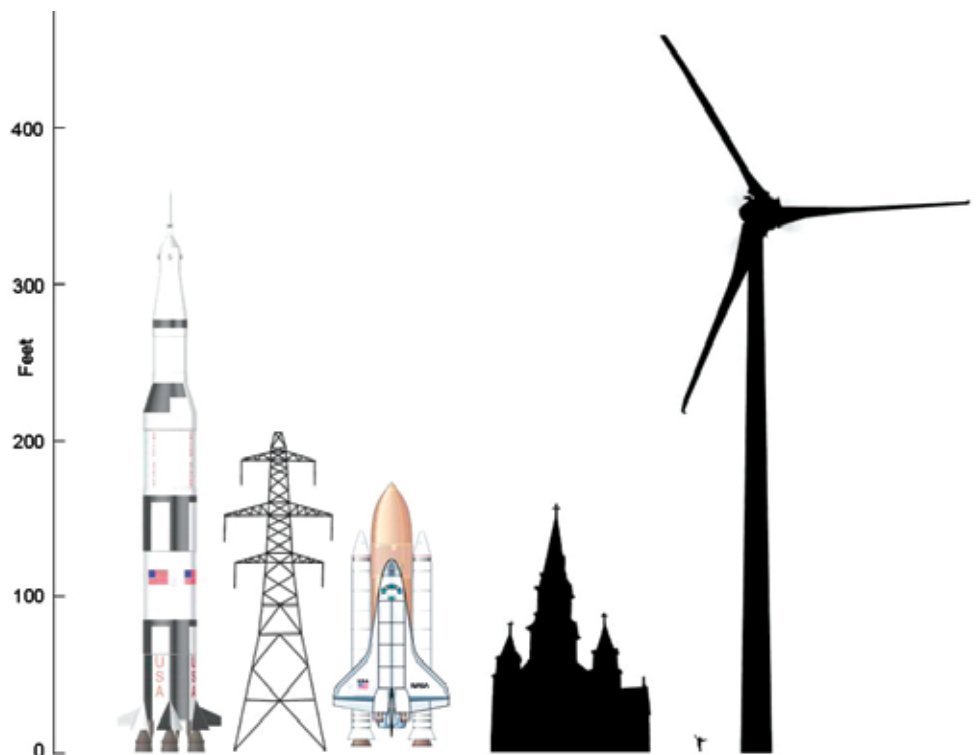
Part 1 of 2

SCI-FI FANS REMEMBER THE TAGLINE from the Alien movie poster, which ominously declared, *"In space, no one can hear you scream."* Likewise, research on the infrasound frequencies produced by industrial wind turbine blades is increasingly providing proof that what you can't hear, can hurt you. Accordingly, it is worth noting that there is a huge difference between the auditory terms "sound" and "noise." According to the Canadian Centre for Occupation Health and Safety, *"Sound is what we hear. Noise is unwanted sound."* When speaking of the sounds generated by industrial wind turbines, the operative term is "noise," and an important difference between sound and noise - including when infrasound noise is not heard by the ears - is that it can be felt by the brain and internal organs. Such an insight makes it all the worse to learn that infrasound noise can travel over much longer distances than previously admitted by the wind energy industry. Moreover, the intensity of potentially harmful levels of infrasound vibrations do not dissipate as quickly as formerly believed.

Along those lines, an important German study calculated the distances over which wind turbines can have unanticipated effects. The 2016 study warned how wind turbine-produced infrasound interferes with Comprehensive Nuclear Test-Ban Treaty monitoring equipment that is operated by Germany in the Bavarian Forest and Antarctica. The purpose of those stations are to verify com-

pliance with the International Monitoring System that exists to detect nuclear explosions occurring in the atmosphere.¹ The conclusion of that study suggested that a distance of 20 kilometers between a single wind turbine and the monitoring stations should be considered a rule of thumb and that a separation of 50 kilometers should be maintained between multi-element wind energy facilities and monitoring stations. The introduction to that article tells of a variety of studies that already took place to identify the

hazards that wind turbine infrasound were already wreaking on similar monitoring stations on Ascension Island, as well as a station in southern California where the monitoring equipment is located 35 kilometers from a so-called "wind farm." Moreover, the historical portion of that study mentioned, *"Wind turbine noise effects on seismometer stations have also been investigated and reported for example at AS104 station in Eskdalemuir, UK. Stammler and Ceranna investigate the increasing influence of*



Comparative sizes. Chart by Développement Durable des Appalaches (Québec)

wind turbines on seismic records, depending on the wind speed and on the number of newly build wind turbines in the vicinity of seismic sensors.” This suggests that wind turbine infrasound could interfere with the monitoring and prediction of earthquakes and associated tsunami warnings.

The great distances that infrasound waves travel from their source was also documented in a study by the Los Alamos and Sandia Laboratories, published in 2014.² In New Mexico, infrasound from sixty wind turbines could be detected 90 kilometers from the source under favorable conditions at night. The present trend of the wind energy industry is to push for more offshore than onshore facilities, yet studies in acoustics show that sound waves travel further over water than land, and that cooler water temperatures create inversions that cause sound waves to bend downward and become amplified which is a thought that leads to a study in Finland.

A 2016 Finnish pilot study belatedly made international news in 2018, when the Finnish Association for Environmental Health studied 200 persons affected by wind turbine infrasound. The report showed the severity of adverse health symptoms did not decrease for the first 15 kilometers from the source. It also determined that the effects were not correlated with the expectations of the persons being studied. This represented a major finding, since few countries require more than a 2 kilometer setback of wind turbines from homes.³ The results of the Finnish study should not have been a surprise among occupational medical health professionals. In 1999, a report was published by the International Journal of Occupational Medicine and Environmental Health⁴, which stated, “Owing to its long wavelength, infrasonic noise is less attenuated by walls and other structures, it is able to propagate over long distances and may affect the human organism even though the latter is far from its source.”

In light of the proliferation of wind energy, one might ask, “How long have the negative effects of wind turbine-generated infrasound been known?” The first solid evidence for estimating the levels of annoyance from infrasound on humans was found thirty-two years ago. In 1987, Neil Kelley pioneered the field of wind turbine noise annoyance when



he presented a study at the WindPower '87 Conference and Exhibition in San Francisco.⁵ His lecture was titled A Proposed Metric for Assessing the Potential of Community Annoyance from Wind Turbine Low-frequency Noise Emissions. That research was carried out at the Solar Energy Research Institute in Golden, Colorado, and sponsored by the U.S. Department of Energy. Kelly's lab-based report directly linked infrasound to annoyance among human subjects, thereby indirectly linking stress-related disorders from annoyance to wind turbine infrasound.

Since infrasound lies in the inaudible frequency range of less than 20 Hertz, “What you can't hear, can't hurt you” was a mantle of protection the wind industry hid under for decades. Few governments embrace the concept of wind energy as enthusiastically as Germany, yet a highly-publicized 2017 report from their Max Planck Institute found that infrasound, even though it is inaudible, can produce measurable effects in recorded brain function.⁶ According to their report, “this study is the first to demonstrate that infrasound near the hearing threshold may induce changes of neural activity across several brain regions, some of which are known to be involved in auditory processing, while others are regarded as key players in emotional and autonomic control.”

This 2017 study from the Max

Planck Institute, “Altered Cortical and Subcortical Connectivity Due to Infrasound Administered Near the Hearing Threshold – Evidence from fMRI”, also broached the topic of increased cortisol secretions that occur as a result. According to the authors of that report, “since the brain's response to prolonged near-threshold IS [infrasound] involves the activation of brains areas which are known to play a crucial role in emotional and autonomic control, a potential link between IS-induced changes of brain activity and the emergence of various physiological as well as psychological health effects can be established.”

Citing earlier research, the authors stated, “It has been reported in several studies that sustained exposure to noise can lead to an increase of catecholamine and cortisol levels. In addition, changes of bodily functions, such as blood pressure, respiration rate, EEG patterns and heart rate have also been documented in the context of exposure to below- and near-threshold IS (infrasound).” The references to those citations are contained in that study. Equally enlightening is a study that was published fifteen years earlier (2002) in Sweden, “Low Frequency Noise Enhances Cortisol Among Noise Sensitive Subjects During Work Performance.”⁷

Pre-dating the research from the Max Planck Institute, back in 1985, infrasound was similarly found to increase secretions of the hormone cortisol (causing a flight or fight response), which, at sufficiently high levels, can stress the body and mind to trigger annoyance, apathy, confusion, fatigue, an inability to concentrate, and painful pressure in the ears, all of which represents merely short term symptoms. Too much cortisol in the long term eventually weakens immunosuppressive action, weight gain, brain damage, hyperglycemia (elevated blood sugar levels that lead to diabetes), and a shut down of digestive and endocrine functions. In the end, prolonged cortisol production can lead to hypertension.⁸ Fast-forward approximately 25 years to 2011, when Canada's Environmental Review Tribunal made history by officially declaring that the health debate is no longer whether wind turbine noise is harmful to human health but has evolved into one of the degree of harm, *Erickson v. Director, Ministry*

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Next Desert Committee Meetings

SUMMER MEETING

AUGUST 10 & 11, 2019

Nelson Group Camp in the

White Mountains

Meeting Chair:

Terry Frewin

AUTUMN MEETING

Dates, Place, Chair

to be determined

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of the Environment. 2011. Environmental Review Tribunal Nos. 10-121 and 10-122.⁹ A simple experiment to witness the end of the debate over wind turbine noise can be seen by going to Google Scholar and observing the results from searching the terms “wind turbine” AND “health effect” together.¹⁰

On January 26, 2019, congratulations were issued by Cape Cod Wave Magazine to the people of Falmouth, Massachusetts, following their long fight to win a court decision to have a wind energy facility removed from their town. The courts sided with neighbors when it was demonstrated beyond a reasonable doubt that the harmful effects of infrasound emanating from the wind turbines did not justify their existence, and therefore the company was ordered to cease operations and dismantle the towers.¹¹ Such a legal pronouncement indicates that an understanding concerning the adverse effects of industrial wind turbines has advanced beyond the realm of political opinion and moved into the arena of evidence.

Dr. Donald Allen Deever is a former park ranger, science teacher, flight instructor, freelance journalist, and PhD with majors in nursing education, software development, and writing pedagogy. He recently helped defeat the Crescent Peak Wind project in Southern Nevada, one of the most misplaced wind energy developments in history. He and his wife live in Searchlight on their own ten-acre nature preserve.

References for this article can be found in the Notes section of desertreport.org.

NEXT ISSUE

Part 2 of this series will explore research on potentially harmful effects on animals, pets and wildlife, and will look at the facts or fantasy of President Donald J. Trump's recently criticized comment that wind turbine infrasound can cause cancer.