

Canada shines spotlight on wind turbine noise at world conference

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## Acoustical Society of America

The purpose of the Society is to generate, disseminate, and promote the knowledge and practical applications of acoustics.

Several speakers from Canada were invited to make presentations at the recent **Acoustical Society of America (ASA)** Spring Meeting. Speakers from around the world were present at the event, held in Salt Lake City, Utah, in the last week of May.

Health researcher and retired pharmacist **Carmen Krogh** delivered a paper co-authored with Ontario epidemiologist **Jeff Aramini**, titled "A case study in Canada: exploring research challenges of industrial wind turbines and health."

The Krogh-Aramini paper stated that the topic of adverse health effects associated with industrial wind turbines (IWT) is controversial and debated worldwide. Some residents living in proximity to wind energy facilities report symptoms of sleep disturbance, annoyance, headaches, ear pain/discomfort, mood disorders, stress, cardiac and blood pressure effects, reduced quality of life and other adverse effects. In some cases, research initiatives have been the result of individuals' complaints. The research is challenged in part by the complexities and numerous variables associated with this subject. A range of IWT research approaches, sometimes in combination with each other, has been used including self-reporting surveys, investigations and acoustical measurements.

### Health Canada study not designed to find cause and effect

There are gaps in the research today, Krogh said. The \$2-million study done by Health Canada was a large-scale, cross-sectional, randomized, epidemiological wind turbine noise and health study which the government department stated at the outset had limitations, would not be definitive, and would not permit any conclusions to be made with respect to causality. Krogh reviewed some of the inherent challenges of studying health effects associated with wind energy facilities and will consider the role of those individuals reporting adverse health effects. She identified several gaps in the Health Canada research.

**Dr. Michael Nissenbaum**, now a professor in radiology at McGill University, presented a paper, "Industrial wind turbines and adverse health effects: Where we are, where we need to go, and the need for regulations and predictive models to recognize human physiology". Research over the past few years in several areas of human physiology has progressed, Dr. Nissenbaum said. We have begun to reveal "the mechanisms by which sleep disturbances result in adverse health effects, over both short and longer durations," Dr. Nissenbaum said. However, he added, current government regulations have not kept up with the new learnings.

### Regulations not current with research

"Local regulations regarding noise (Soundscape) limits and methods of measurement were designed prior to current understandings of human sensory and reactive physiology," Dr. Nissenbaum said. "Instrumentation and modelling geared towards satisfying those regulations are by implication lacking because they do not capture or predict physiological responses to IWT noise. According to the principles of Soundscape, and given the subtleties of human physiology, humans remain the best instruments available for detecting objectionable noise and identifying adverse health effects. Regulations, measurement methods, and predictive models must adapt to current understandings of human physiology to best protect human populations."

Research must begin with people, said **Dr. Robert McMurtry**, professor of medicine at Western University. His presentation, "Patient-Centred Medicine and Soundscape" focused on the need for care and research to start with people and their experiences with wind turbine noise. "According to Bray (2012)," Dr. McMurtry said, "exposed people are 'objective measuring instruments whose reports and experiences must be taken seriously and quantified by technical measurements'." Health care providers need to consider applying patient-centred medicine in evaluating the impact on those exposed to wind turbine acoustical energy.

**Dr. David Michaud** of Health Canada also presented a paper, "An evaluation of how nightly variations in wind turbine noise levels influence wrist actigraphy measured sleep patterns" based on a study of sleep experience among over 250 people living between .25 and 1 km from a wind turbine. Michaud advised the audience that Health Canada is conducting a more refined analysis to assess wrist actigraphy measured sleep patterns regarding nightly variations in wind turbine operations. He also commented that some of the feedback relating to research gaps was valid.

A case study in wind turbine noise emission evaluation was presented by **Andy Metelka** of Acton, Ontario, principal in Sound and Vibration Solutions Canada Inc., in a paper "Measurements of infrasound blade pass frequencies inside multiple homes using narrowband analysis". Previous measurements in homes near wind turbines indicate higher pressure levels below 10Hz than audible pressure levels measured at the same time and location (ASA Vol 20, 2013 Dooley & Metelka), Metelka said. Long-term measurements of Infrasound pressures appear inside multiple homes as wind speed and wind direction vary. Metelka took data from four Ontario homes and compared broadband infrasound levels from wind to tonal infrasound Blade Pass Frequencies. In both cases broadband infrasound and blade-to-tower pressures increase with wind. Other speakers at the international conference included Steven Cooper of Australia, who conducted the Cape Bridgewater study, and Paul Schomer.

Wind Concerns Ontario will provide links to the papers when they are available publicly.