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Environmental Health Program (EHP)
Regulatory Operations and Enforcement Branch (ROEB), Health Canada
1505 Barrington Street, Suite 1625
Halifax, Nova Scotia B3J 3Y6

July 30, 2024

Andrew Walter
Impact Assessment Agency of Canada
200-1801 Hollis Street,
Halifax, NS B3J 3N4

Sent by e-mail to: andrew.walter@iaac-aeic.gc.ca and OffshoreWindNS-EolienneExtracotiereNE@iaac-aeic.gc.ca

Subject: Health Canada's reply to the Request for Information from the Committee for the Regional Assessment of Offshore Wind Development in Nova Scotia

Dear Andrew Walter:

Thank you for your email dated June 16, 2024, requesting Health Canada's expert advice on the Regional Assessment of Offshore Wind Development in Nova Scotia. Health Canada is participating in the regional assessment process as a Federal Authority under the *Impact Assessment Act*.

Health Canada has undertaken a review of the Regional Assessment of Offshore Wind Development in Nova Scotia – Interim Report (March 2024), to respond to the Committee's questions regarding potential human health impacts of Offshore Wind (OSW) Farms. Health Canada's areas of expertise that relate to the Committee's questions include the following:

- Methodological expertise in human health risk assessment;
- Human health impacts from noise;
- Contamination of country foods;
- Electromagnetic fields; and,
- Air quality health effects.

Should you have any questions regarding Health Canada's comments, please contact Jérémie Allain at (jeremie.allain@hc-sc.gc.ca) and ia-atl-ei-atl@hc-sc.gc.ca).



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Sincerely,

Jérémie Allain
A/Manager, EHP-Atlantic, ROEB
Health Canada
jeremie.allain@hc-sc.gc.ca

cc:

Heather Jones-Otazo, A/Manager, Environmental Assessment and Contaminated Sites
(EACS) Division, HECSB, Health Canada
Wendy Wilson, Senior Environmental Health Advisor, EACS, HECSB, Health Canada
Beverly Ramos-Casey, Manager, EHP-Atlantic, ROEB, Health Canada

Attachment:

Attachment 1 - Health Canada's response to the Committee questions regarding human health and Offshore Wind Development



Attachment 1 - Health Canada's response to the Committee questions regarding human health and Offshore Wind Development

1. **Potential positive and adverse effects (including cumulative effects) of OSW energy development during all phases on human health including the health of Indigenous peoples. Please include in your response specific reference to the following:**
 - a. **electromagnetic fields (EMF) generated from in-field transmission lines connecting to an offshore sub-station, and/or transmission from the offshore sub-station to the onshore;**
 - b. **shadow flicker from rotating turbine blades; and**
 - c. **audible and sub-audible sound pressures associated with the various OSW activities.**

For a project to present a risk to human health from exposure to chemical substances, three criteria must be present: the potential for releases of contaminants of potential concern (COPCs), the presence of human receptors, and route(s) of exposure. Human health may also be affected by noise emissions reaching human receptors in the vicinity of a project-related activity (e.g., construction activities, increase marine traffic, etc.). Well-being may also be impacted by changes to social and economic conditions.

A project's location, particularly in relation to human receptors, is a necessary component to any review of potential adverse (or positive) effects on human health. Considering the 25 km coastal buffer zone proposed in the draft regional assessment (RA) report and the locations of the study area in Figure 3 of the Interim Report, Health Canada is of the opinion that there is negligible potential for adverse health effects from the wind turbines during the operational phase. There is potential for adverse human health effects from activities closer to the shoreline, during both the construction phase (e.g., horizontal directional drilling for the installation of the transmission cable, onshore construction and assembly of wind turbines areas, etc.) and the operational phase (e.g., marine and helicopter traffic, onshore substation activities, etc.).

- a. **electromagnetic fields (EMF) generated from in-field transmission lines connecting to an offshore sub-station, and/or transmission from the offshore sub-station to the onshore**

Health Canada acknowledges that some people are concerned that daily exposure to electric and magnetic fields (EMFs) may cause health problems. EMFs are invisible forces that surround electrical equipment, power cords, and wires that carry electricity, including outdoor power lines. EMFs are strongest when close to their source. As a person moves away from the source, the strength of the fields fades rapidly. Electric fields can often be shielded by metal, and things



such as buildings and trees. Even the ground, when power lines are buried, can block electric fields.

There have been many studies on the possible health effects from exposure to EMFs at extremely low frequencies (ELF). While it is known that EMFs can cause weak electric currents to flow through the human body, the intensity of these currents is too low to cause any known health effects. At present, the evidence of a possible link between ELF magnetic field exposure and cancer risk is far from conclusive and more research is needed to clarify this possible link. Health Canada is in agreement with both the World Health Organization and IARC that additional research in this area is warranted.

Health Canada, along with the World Health Organization, monitors scientific research on EMFs and human health as part of its mission to help Canadians maintain and improve their health. International exposure guidelines for exposure to EMFs at ELFs have been established by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). These guidelines are not based on a consideration of risks related to cancer. Rather, the point of the guidelines is to make sure that exposures to EMFs do not cause electric currents or fields in the body that are stronger than the ones produced naturally by the brain, nerves and heart.

b. shadow flicker from rotating turbine blades

Based on expert consultations, shadow flicker is not expected to be a significant concern at the planned distances (i.e., beyond 25 km of the shoreline). However, if windfarms are situated within the 25 km coastal buffer, the potential for shadow flicker to impact human health becomes more relevant.

While Health Canada does not have expertise in shadow flicker effects on humans from offshore windfarm operations, it has evaluated the impacts of shadow flicker on annoyance for onshore windfarms¹, which can provide valuable insights into the health impacts of shadow flicker. The study found a significant increase in high annoyance to wind turbine shadow flicker with increased shadow flicker exposure. Moreover, high annoyance to shadow flicker was strongly associated with other variables, such as noise sensitivity, concern for physical safety, and annoyance to other wind turbine-related features.

¹ *Voicescu, S. et al. (2016). Estimating annoyance to calculated wind turbine shadow flicker is improved when variables associated with wind turbine noise exposure are considered. J. Acoust. Soc. Am. 139(3): 1480-1492. Available online at: [https://osdp-psdo.canada.ca/dp/en/search/metadata/Health Canada-CURATED-1-0A6D56D6-BA37-47D3-AC4A-9C5F164EC2F0](https://osdp-psdo.canada.ca/dp/en/search/metadata/Health%20Canada-CURATED-1-0A6D56D6-BA37-47D3-AC4A-9C5F164EC2F0)*



c. audible and sub-audible sound pressures associated with the various OSW activities

In order to assess the potential impacts of audible and sub-audible sound pressures on human health, Health Canada published a Noise Impact Guidance document (see reference below). It contains the methodology and parameters (e.g., % of highly annoyed individuals (%HA)) to assess noise (including low frequency noise (LFN)) from the American National Standards Institute (ANSI)², ISO standards^{3,4} and WHO guidelines^{5,6} that Health Canada relies on for its noise assessment of a project. Examples of potential adverse health impacts from noise exposure that Health Canada assesses during the review of a project include:

- Speech comprehension;
- Sleep disturbance; and
- Community annoyance.

A 25 km coastal buffer zone, established in the interim report, should be sufficient to eliminate most of the potential adverse noise impacts on human health. As sound propagates from its source, the intensity of the noise generated will decrease with the distance travelled. However, water surfaces do not absorb noise as efficiently as land surfaces (e.g., trees, shrubs, etc.) and sound can propagate further over water than over land. The Swedish Environmental Protection Agency demonstrated the possibility of projected noise of 40 dBA onshore from wind turbines even with a 25 km buffer. As such, Health Canada recommends including an assessment of sound propagation from wind turbines, with the use of an appropriate noise model, during a project review.

Health Canada recommends that OSW projects continue to be assessed on a project-by-project basis, considering that the type of sound (e.g., impulsive, tonal, etc.) and human receptor locations will vary depending on project specific activities, and that OSW activities occurring closer to shore (e.g., nearshore or onshore) during the construction, operation and decommissioning phases are also assessed for project related effects.

² American National Standards Institute (ANSI). 2005. Quantities and Procedures for Description and Measurement of Environmental Sound Part 4: Noise Assessment and Prediction of Long-Term Community Response (ANSI S12.9-2005/Part 4). Standards Secretariat Acoustical Society of America.

³ International Organization for Standardization (ISO). 2003. ISO 1996-1:2003 Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures. www.iso.org/iso/catalogue_detail?csnumber=28633

⁴ International Organization for Standardization (ISO). 2007. ISO 1996-2:2007 Acoustics – Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels. Available online at: www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=41860

⁵ World Health Organization (WHO). 1999. Guidelines for Community Noise. Berglund, B., Lindvall, T. and Schwela, D.H (Eds.). Available online at: www.who.int/docstore/peh/noise/guidelines2.html

⁶ World Health Organization (WHO). 2009. Night Noise Guidelines for Europe. Hurtley, C. (Ed). Available online at: www.euro.who.int/en/healthtopics/environment-and-health/noise/publications/2009/night-noise-guidelines-for-europe



2. Country foods accessibility and contamination

In addition to the targeted questions posed by the Committee, many concerns were raised in the *2023-2024 Engagement Program – What We Heard Summary* document regarding the potential for impacts on access to fishing areas located within the RA study area. If Indigenous communities cannot reliably harvest from areas impacted by an offshore windfarm, it may result in food insecurity for some members, impact cultural practices and knowledge sharing, and ultimately impact human health. Depending on Indigenous and commercial use of the area, it may be relevant to evaluate the impacts of an OSW project on traditional and commercial fisheries.

There is also potential for human health effects due to contamination of country foods (real or perceived) from offshore windfarm project-related activities, including construction and accidental release of pollutants (e.g., fuel spills, etc.). Indigenous people or local population may be exposed to project-related contaminants because traditional activities, e.g. food harvesting, trapping, fishing, spiritual and cultural activities often take place near coastlines and waterways. Depending on Indigenous and commercial use of the area, it may be relevant to evaluate impacts of a project on contamination of species consumed by Indigenous people or local population due to both onshore and offshore activities.

3. Mitigation and/or monitoring is recommended to address potential adverse health effects.

Developing a community consultation plan may be helpful for wind turbine projects by communicating the potential impact of a project and listening to the communities' concerns. For example, community reaction to noise impacts following community consultation is more likely to be understanding and accepting of noise. Having a better understanding of human receptors (e.g., permanent, seasonal and temporary dwellings) and activity types (e.g., traditional, recreational, etc.) may be helpful in identifying alternative locations for project activities that would mitigate potential human health impacts. Meaningful community consultation and engagement, which includes a transparent noise complaint process, throughout the lifespan of the project can be an effective way to identify and mitigate project-related concerns.

The selection of mitigation measures is dependent on the potential adverse effects from a project. When noise impacts are anticipated, best practices (e.g., avoiding loud construction activities at night and early morning) can be applied and/or the use of quieter technologies/equipment. The same approach can also be applied during the development of monitoring programs. Country foods monitoring may be appropriate if there is potential for exposure to contaminants from the project, including chemical spills from accidents and malfunctions events.



4. The impact of climate change on human health, and the potential for the OSW industry to reduce GHG emissions through displacement of carbon-based energy systems.

Climate change poses significant risks to human health both directly and indirectly. As outlined in 'Health of Canadians in a Changing Climate: Advancing our Knowledge for Action,'⁷ human health can be affected through a range of exposure pathways, including rising temperatures, changing precipitation patterns, and increasing frequency and severity of extreme weather events, all contributing to more natural disasters. Populations at higher risk from health impacts of climate change include children; pregnant people; First Nations, Inuit, and Métis peoples; people with chronic illnesses; outdoor workers; low income individuals; and people with disabilities. Furthermore, anthropogenic emissions of GHGs have caused Canada's climate to warm at approximately twice the rate of the global average, with the Northern region experiencing even faster warming. We encourage the committee to refer to this report to understand the potential impacts on human health and on health systems from climate change and to understand how human health can be impacted from specific exposure pathways such as water quality & quantity, air quality, extreme heat, etc.

If the committee has specific questions about the impacts of climate change on human health, Health Canada has subject matter experts and can try to provide a response in a timely manner.

The OSW industry may have the potential to help mitigate these impacts by reducing GHG emissions through the displacement of carbon-based energy systems; however, Health Canada does not possess the expertise to comment on this topic.

Health Canada's guidelines for evaluating human health impacts in impact assessments:

To date, Health Canada has published the following guidance documents for evaluating human health impacts in impact/environmental assessments:

1. *Health Canada. 2023. Guidance for Evaluating Human Health Impacts in Impact Assessment: **Noise**. Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario*
https://publications.gc.ca/collections/collection_2024/sc-hc/H129-54-3-2023-eng.pdf
2. *Health Canada. 2023. Guidance for Evaluating Human Health Effects in Impact Assessment: **Air Quality**. Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.*
https://publications.gc.ca/collections/collection_2024/sc-hc/H129-54-1-2023-eng.pdf
3. *Health Canada. 2023. Guidance for Evaluating Human Health Effects in Impact Assessment: **Drinking and Recreational Water Quality**. Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.*
https://publications.gc.ca/collections/collection_2024/sc-hc/H129-54-2-2023-eng.pdf

⁷ Berry, P., & Schnitter, R. (Eds.). (2022). *Health of Canadians in a Changing Climate: Advancing our Knowledge for Action*. Ottawa, ON: Government of Canada. Available online at:
<https://changingclimate.ca/site/assets/uploads/sites/5/2022/02/CCHA-REPORT-EN.pdf>



4. Health Canada. 2023. *Guidance for Evaluating Human Health Effects in Impact Assessment: **Country Foods***. Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
https://publications.gc.ca/collections/collection_2024/sc-hc/H129-54-5-2023-eng.pdf
5. Health Canada. 2023. *Guidance for Evaluating Human Health Effects in Impact Assessment: **Human Health Risk Assessment***. Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
https://publications.gc.ca/collections/collection_2024/sc-hc/H129-54-6-2023-eng.pdf
6. Health Canada. 2022. *Interim Guidance Document for the **Health Impact Assessment** of Designated Projects under the Impact Assessment Act*. Available upon request to: ia-ei@hc-sc.gc.ca

Health Canada also has published guidance on environmental public health management of crude oil incidents that may provide guidance to addressing potential human health impacts from hazardous waste events :

- Health Canada. 2018. *Guidance for the Environmental Public Health Management of Crude Oil Incidents*. Available online at:
https://publications.gc.ca/collections/collection_2018/sc-hc/H129-82-2018-eng.pdf

The Public Health Agency of Canada (PHAC) has published the following guidance for evaluating other aspects of human health (e.g., mental health):

- [Social Determinants of Health and Health Inequalities](#)
- [Key Health Inequalities in Canada: A National Portrait](#)