association to protect
AMHERST ISLAND

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Response to the REA for the Amherst Island Windlectric Wind Energy Development

Shadow-Flicker

Shadow-flicker was not considered in the planning of the Windlectric wind energy development on Amherst Island. As a result, the high density of turbines shoe-horned into the community has resulted in an unprecedented number of homes that will suffer unacceptable shadow flicker. **Clearly, the site plan needs to be thoroughly revised to mitigate this problem.**

Shadow-flicker is an annoyance that can drive people to distraction. As the following table shows, European countries regulate or provide guidance for shadow flicker[1].

Germany*	30 h/year or 8 h/year with appropriate cloud cover
England	Mitigation
Wales	Avoid shadow-flicker where possible
N. Ireland	30 h/year
Belgium*	30 h/year
Ireland	30 h/year + 30 minutes/day or 10 blade diameter setback
Scotland	10 blade diameter setback
Spain	Regulation not necessary
The Netherlands*	5h 40 min./year with no cloud cover
Denmark	10 h/year with appropriate cloud cover
Canada/USA	No regulation!

*Regulation

[1] Parsons Brinkerhoff "Up-Date of UK Shadow Flicker Evidence Base", a recent but undated report to the UK Department of Energy and Climate Change.

The 30 hours/year (h/y) is for the worst case conditions that the sun is always shining, the plane of the blade is facing the home and the turbine is operating. As is well known, the German regulation was based upon research at the University of Kiel[2] and has been tested in Court[3]. The recommendation for Denmark is for the shadow flicker prevailing with the actual meteorological conditions. In Spain, regulation is considered un-necessary because of the practice of separating homes and turbines.[4]

The recommendation for England is that "where it has been predicted that shadow flicker effects may occur in theory, a local planning authority may consider it appropriate to impose a planning condition to provide that wind turbines should operate in accordance with a shadow flicker mitigation scheme which shall be submitted to and approved by the Local Planning Authority prior to the operation of any wind turbine unless a survey carried out on behalf of the developer in accordance with a methodology approved in advance by the local planning authority confirms that shadow flicker effects would not be experienced within habitable rooms within any dwelling." "Sample Condition: The operation of the turbines shall take place in accordance with the approved shadow flicker mitigation protocol unless the Local Planning Authority gives its prior written consent to any variation"."[5]

Although there is no federal or state regulation of shadow flicker in the US, there is frequently regulation at the local level.

Southern Ontario is far sunnier than Northern Europe[6]. Therefore the worst case 30 h/y in Germany would have significantly less shadow flicker than 30 h/y on Amherst Island.

The UK Department of Energy and Climate Change report notes that it is the custom of developers to first put on to a project map an arc of 10 blade diameters around each turbine, extending from 130 degrees west to 130 east of north. If homes lie within these arcs then a full analysis is done. In Scotland, these arcs define the setback.

[2] Pohl et al., 1999, In English: "Harassment by Periodic Shadow of Wind Turbines".

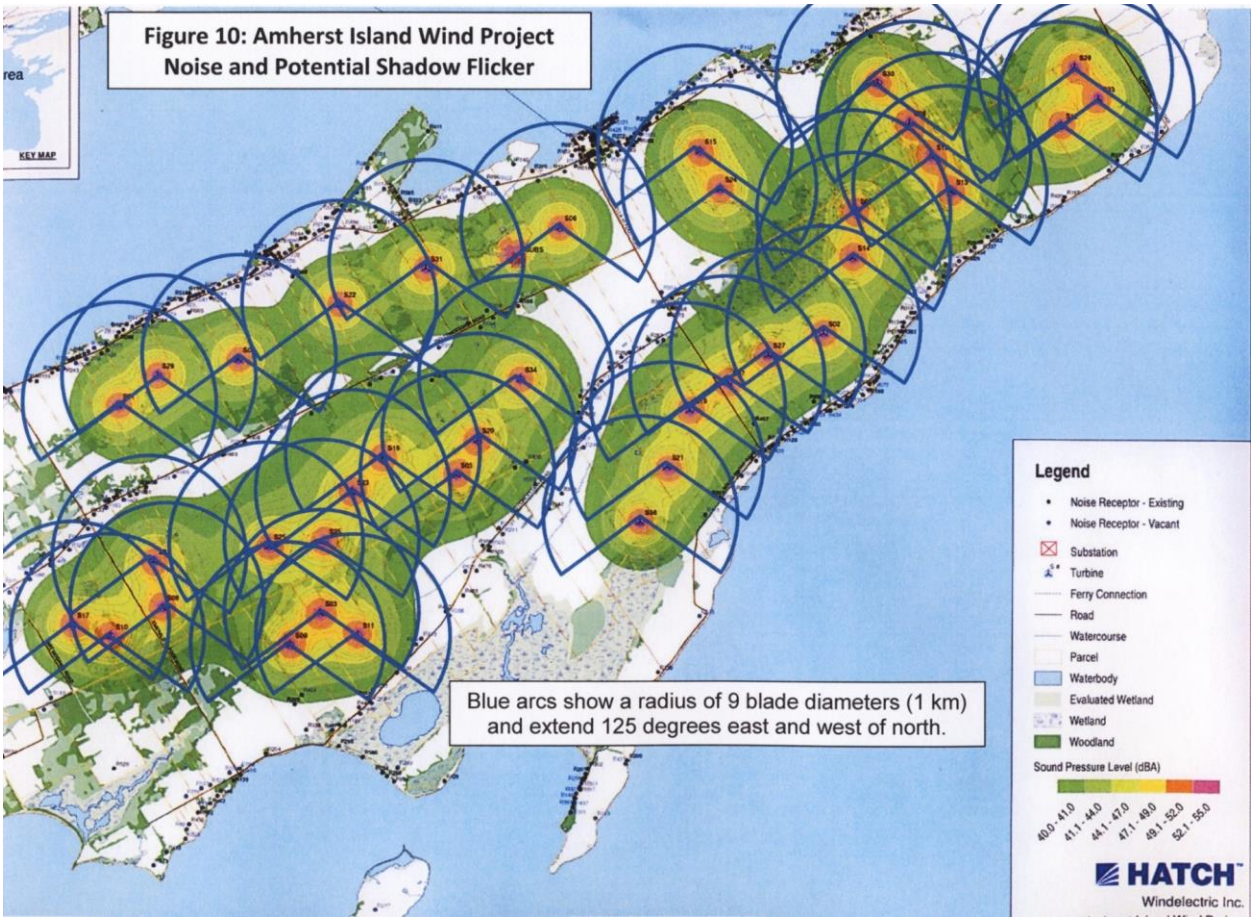
[3] The maximum 30 minutes/day or 30 hours/year for worst case scenario, and the 8 hours/year actual amounts of shadow flicker are a nationwide requirement in Germany as they are now part of the Federal Emission Control Act (BLmSchG), but have been used in case law and state and federal standards as well.

[4] A translation of the response from the Spanish Wind Energy Association reads: "As wind farms tend to be located very far away from any populated settlement, no complaints have been registered and no standard practice has been implemented".

[5] Onshore Wind Energy Planning Conditions Guidance Note. Renewables Advisory Board and BERR (2007).

[6] For example, 2015 h/y for Toronto versus 1550 h/y for Hamburg.

Amherst Island has lower latitude that most of Europe and so the 10 blade diameter arc has been reduced to 9 diameters. The resulting planning map for the island then looks as shown below. Almost every home within the study area lies within an arc. Clearly a full analysis was needed; as noted above Algonquin power did not have this done as part of the initial draft site planning document.



APAI realized that there would be a major problem with the project and had its own study done by the Danish consulting company EMD using the acknowledged WindPRO software. The result was 50 non-participating homes or potential homes (collectively to be referred to as homes) with more than 30 hours of shadow-flicker (worst case) per year. Subsequently, and for another reason, one turbine was removed from the draft site plan and the number was reduced to 45 homes. Furthermore, 8 homes were shown to have more than 50 h/y. This un-acceptable result was brought to the attention of Algonquin Power. A study was promised but the company refused to release it until the second public meetings on March 5th and 6th.

We do now have the Hatch report on shadow flicker for the Amherst Island project.[7] Hatch also used EMD with the WindPRO software[8]. **The Hatch report shows 48 homes with more than 30 h/y and 9 homes with more than 50 h/y[9].**

I know of no other project in Ontario with so many homes subject to so much shadow flicker. It would not be permitted in Europe and should not be permitted here. Although the Ministry of the Environment does not have a regulation it has been accepted by other developers that a maximum of 30 h/y is the limit. Other developers have built shadow-flicker analysis into their projects from the start**. MOE must either reject this project, insist on a revised site plan or insist on the harsh mitigation measures that will reduce worst case shadow flicker to below 30 h/y or actual shadow flicker to below 8 h/y at all receptors, existing and vacant.**

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Attachment: Appendix - A Problem with the Hatch Shadow-Flicker Impact Assessment

7 http://www.amherstislandwindproject.com/Shadow%20Flicker%20Report/Amherst%20Island%20Wind%20Energy%20Project%20Draft%20Shadow%20Flicker%20Report%20by%20Hatch.pdf

8 It is now clear that it was important that we did do our own analysis. The numbers in the Hatch report do not make sense. See the Appendix.

9 We had used a semi-graphical approach and we were conservative in counting homes in or out; that perhaps explains the difference.

Appendix: Problems with the Hatch Shadow-Flicker Impact Assessment

The table is an extract from the results presented in the Hatch report. It shows the first 9 rows of the hours per year for the so-called worst case and the number of hours per year for the case where the cloud cover has been allowed for. We would expect that the numbers in the 3rd column would be about half those in the 2nd column. The cloud cover in S. Ontario is about 50% on average. In fact there is no rational correlation between the numbers in columns 2 and 3 at all. One wonders if anyone at Hatch, Stantec or Algonquin has even looked at the numbers.

Receptor ID	Worst Case (h/y)	Real Shadow (h/y)
R002	0.0	21.0
R003	0.0	0.0
R005	46.1	3.6
R007	7.9	1.3
R010	0.0	7.3
R011	0.0	3.4
R012	0.0	0.0
R014	0.0	0.0
R015	22.6	0.0

A check against our analysis shows agreement with the numbers in the worst case number of hours per year, column 2 above. It is column 3 that does not make sense.

Note also that the table in the Hatch report includes only the existing receptors and not the total number, existing plus vacant.