Samsung Renewable Energy Inc. and

Pattern Renewable Holdings Canada ULC

13 Consultation Report Addendum

For

Armow Wind Project

December 2012

ARMOW WIND - ARMOW WIND PROJECT APPLICATION FOR RENEWABLE ENERGY APPROVAL

Consultation Report Addendum

Submitted to:
Director, Ministry of Environment
2 St. Clair West, Floor 12A
Toronto, Ontario M4V 1L5

REPORT ADDENDUM

Report Number: 11-1151-0247 (5000)

Distribution:

2 copies: Ministry of Environment

Golder Associates

Table of Contents

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

The Armow Wind Project (the "Project") is an up to 180 megawatt commercial wind energy generation facility located substantially on leased privately owned lands in the Municipality of Kincardine, Bruce County, Ontario. The Project is being developed by SP Armow Wind Ontario LP (the Proponent) by its general partner SP Armow Wind Ontario GP Inc. On December 3, 2012, the Proponent submitted a Renewable Energy Approval (REA) application for the Project to the Ministry of the Environment (MOE). The REA application included the submission of a Consultation Report.

At one of two final public meetings, held on November 12, 2012, the Proponent was advised, by attendees, of errors present in the Noise Impact Assessment (NIA) report. The errors were minor and did not affect the conclusions made in the NIA report. The NIA report has since been revised. The Proponent values their relationship with the community and strives to address such issues in an open and transparent manner. In view of errors in the NIA report, the Proponent voluntarily held an additional Focused Information Session specific to the NIA report and its revisions to clarify any outstanding issues. This Consultation Report Addendum (the "Addendum") provides details of the Focused Information Session. This Addendum also includes correspondence that has occurred since the submission of the original Consultation Report submitted to the MOE on December 3, 2012 as part of the REA application for the Armow Wind Project.

2.0 ADDITIONAL CONSULTATION

2.1 Project Office Drop-in

In addition to the Focused Information Session, the Proponent made themsevles available on December 10 and 11 during regular Project office hours (9:00 a.m. to 3:00 p.m.) to answer general questions related to changes made to the Noise Impact Assessment.

2.2 Focused Information Session: Noise

A focused information session was held on December 11, 2012 from 6:00 p.m. to 8:00 p.m., at the Tiverton Community Centre, 6 McKay Street, Tiverton. The session was extended to approximately 9:00 pm to continue discussions with attendees. The meeting's open house format included display boards and a number of Proponent staff and noise subject matter experts to explain minor changes made to the NIA. A list of Proponent staff and subject matter experts that were available to address comments and questions from the public at the Focused Information Session is provided below in Table 1. Questions and responses were recorded and are summarized in Section 3.0.

Table 1: Project Team Members in Attendance at the Focused Information Session

Project Team Member	Area of Expertise
Pattern	
Jody Law	Project Manager
Samsung	
Brian Edwards	Project Manager
Armow Wind	
Susan Novak	Community Liaison
GLGH	
Darcy Boudreau	Noise
Andrew Brunskill	Noise
Golder Associates	
Caitlin Burley	Public Consultation
Kalena Metcalfe	Renewable Energy Approval Process

2.2.1 Notification

Notices for the Focused Information Session were mailed and emailed to stakeholders who had previously indicated interest in the project and who had provided their contact information. The list of interested stakeholders is not included in this Consultation Report Addendum to protect personal information of those on the list, but is available to review agencies upon request. In addition to direct mailing and emailing of this notice, it was also posted on the Project website (www.armowwind.com) and published in the Kincardine News and the Kincardine Independent on November 27 and 28, 2012 respectively. The notices as they appeared in the newspapers are provided in Appendix A.1.

A summary of the notifications for this Focused Information Session is provided below in Table 2.

Table 2: Distribution of Notice for the Focused Information Session

Date	Distribution	Recipient
November 27, 2012	Notice Published in Kincardine News	Residents of local municipality
November 28, 2012	Notice Published in Kincardine Independent	Residents of local municipality
November 28, 2012	Emailing of Notice	Interested Stakeholders
	Mailing of Notice	Interested Stakeholders

2.2.2 Focused Information Session Materials

A variety of handout materials were made available at the Focused Information Session. In addition to these handouts, two reference copies of the updated Noise Impact Assessment were available for public review and comment. The handouts that were available at the Focused Information Session included:

- Armow Wind Fact Sheet;
- Consumer Benefits;
- Wildlife;
- Health;
- Visual and Sound;
- Wind power is Reliable;
- Blowing Smoke: Correcting Anti-Wind Myths in Ontario;
- Electricity Pricing;
- MPAC news Summer 2012;
- Property values; and
- Summary of Report Revisions.

Copies of these handouts are provided in Appendix A.2.

Proponent staff and subject matter experts were available to explain the information on the display panels and in the handouts, and respond to questions. The following display boards were made available at the Focused Information Session:

- Welcome;
- The REA Process;
- Project Layout;
- Sound dBA;

- Changes to the Noise Impact Assessment (x3);
- NIA Quality Assurance;
- Additional Review of the NIA;
- Visualizing Sound;
- Thank You & Next Steps.

Copies of the display boards, reduced in size for reporting purposes, are included in Appendix A.3.

2.2.3 Attendance and Feedback

Based on the sign-in sheets, 21 people signed into the Focused Information Session, with 6 people providing completed comment forms. One comment form from the previous Public Meeting on November 12, 2012 was also submitted by a stakeholder. Questions and comments provided in this form are captured in Section 3.0. The comment form included three questions and a space to write additional comments. The responses to the first and third questions are presented graphically in the pie charts below. The questions and comments raised through comment forms and during conversation, as well as how these questions were considered are detailed in Section 3.0. The completed comment forms are provided in Appendix A.4.

As shown in Figure 1, 57% of attendees heard about the Focused Information Session through personal letter or email.

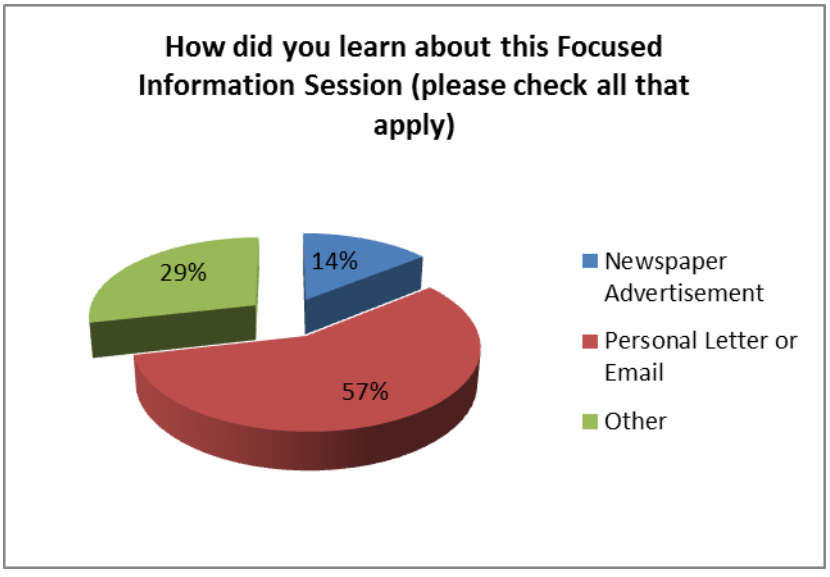


Figure 1: Focused Information Session Notification

As shown in Figure 2, 87% of attendees felt that their information needs were met or somewhat met.

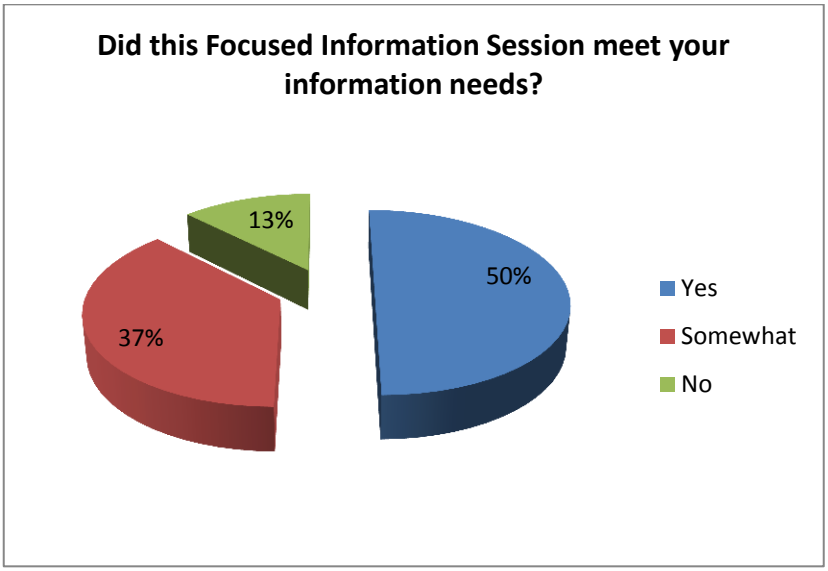


Figure 2: Focused Information Session Information Needs

2.3 Additional Stakeholder Communications

Table 3 provides a summary of one-on-one communications between the Proponent and public and municipal stakeholders that occurred after the Consultation Report was finalized on December 3, 2012. Personal information for public stakeholders has been omitted to protect the privacy of those who have provided comments.

Formal letters received and responses are provided in Appendix A.5. Comments provided at the Focused Information Session (December 11, 2012) are summarized in Section 3.0.

Table 3: Direct Communications with Public Stakeholders

Date	Method of Communication	Stakeholder Participant	Communication Summary
November 25, 2012	Email	Stakeholder #66	Email discussing turbine location in relation to a stakeholder's residence and how the location was chosen. Requested the following information: ■ Distance of turbine from residence; ■ List of other turbines on abutting properties; ■ Who fixes problems as they arise once the Project is in operation? Email also identified that the information at November 12, 2012 Open House was outdated and did not show the Penetangore river. GPS coordinates for many turbines were wrong.

Date	Method of Communication	Stakeholder Participant	Communication Summary
November 26, 2012	Email	Stakeholder #67	Email requesting that the Project be put on hold until further health studies are done. Concerned about impacts to visual landscape, red flashing lights, community impacts, number of turbines in area, breaking up and reducing farmland, property values and future home developments.
December 3, 2012	Email	Stakeholder #2	Request for a detailed outline of the changes made to the NIA and which turbines these changes affect. Commented that the map included in the notice appears to indicate a strong correlation of turbine siting on or close to small creeks and groundwater resources. Request for information about engineering decisions with regards to support pilings that may need to be deeper than indicated in the REA Reports.
December 4, 2012	Email	Response to Stakeholder #66	Proponent responds to Stakeholder #1 indicating that the Draft Site Plan is available on the Project website as well as locations in Kincardine and Tiverton from which the requested distances can be seen and calculated. Explained that setbacks are established by the provincial government and offered assistance in getting additional information regarding 0. Reg. 359/09. With regards to property values it is difficult to isolate the potential impact of any single variable, but multiple studies have consistently found no evidence that wind energy projects around the world negatively impact property values. With regards to potential human health effects the stakeholder was directed towards the growing body of peer reviewed scientific evidence which clearly indicates there is no direct link between wind turbines and health effects in humans.
December 4, 2012	Email	Stakeholder #66	Stakeholder indicated that response given to previous email was inadequate and requested additional information.
December 4, 2012	Email	Response to Stakeholder #67	Proponent responds to Stakeholder #2 indicating that health professionals support energy conservation combined with wind and solar power to help us move away from coal power. A body of work from medical and scientific experts supports the conclusion that the sound from wind turbines does not adversely impact human health. With regards to the Heath Canada study, it is important to note that they have not called for a moratorium on new wind projects while they undertake their research.

Date	Method of Communication	Stakeholder Participant	Communication Summary
			With regards to property values, there are many factors that impact property values and multiple studies have consistently found no evidence that that wind energy projects around the world are negatively impacting property values. Feedback from those with turbines on their property has indicated that having the turbine will increase the value of their property as well as increase their income. With regards to the red flashing lights, Armow Wind is investigating potential mitigation options including shades that reduce the visibility of the lights from ground level as well as radar technology that allows the lights to remain off until a plane is within approximately 20 km of the Project. Ultimately Transport Canada must approve any mitigation measures as it is their regulations that require them for safety of the aviation industry. With regards to the visual impact some find the aesthetics of wind turbines as hopeful and beautiful while others do not.
December 4, 2012	Email	Murray Clarke, CAO Municipality of Kincardine	The Proponent requested a meeting/conference call for December 6, 2012 at 11:00 am to provide updates on Project.
December 5, 2012	Face-to-face	Members of the Amish Community	Met with Amish community members as a follow-up to previous discussions.
December 6, 2012	Phone call	Murray Clarke, CAO Municipality of Kincardine	Discussed status of the Memorandum of Understanding.
December 10, 2012	Face-to-face	Stakeholder #68	Discussed general concerns regarding the Project. Stakeholder #68 requested the distance of a number of turbines from his home.
December 10, 2012	Email	Response to Stakeholder #66	Proponent's response to Stakeholder #1 indicating that Turbine 98 is 599 m from the stakeholder's home. Explained how turbine siting is guided by MOE Guidelines and many other factors including: noise, distance to buildings and environmental considerations. The Proponent provided the distance from the stakeholder's home to the turbines surrounding lot 29, as well as the seven lots that border the stakeholder's property, also indicating which of these have turbines on them. With regards to the stakeholders statements/questions

Date	Method of Communication	Stakeholder Participant	Communication Summary
			regarding property values, the Proponent provided the Ontario Assessment Review Board's ruling that there is no evidence that the presence of a wind farm on the west end of Wolfe Island. The Proponent provided the qualifications of the Project team members who assisted in the development of responses to stakeholder questions. The Proponent also requested additional information from the stakeholder with regards to a statement/question.
December 10, 2012	Face-to-face	Anne Eadie, Deputy Mayor Municipality of Kincardine	General discussion of the Project, the Memorandum of Understanding and the complaint resolution process. Armow Wind indicated that the complaint resolution process is still in the early stages and will be formalized as the Project develops.
December 10-11, 2012	Face-to-face	Various Stakeholders	Various stakeholders dropped into the Project Office to discuss the Project including Stakeholder #53.
December 11, 2012	Letter	Stakeholder #1	Stakeholder has provided information obtained through a freedom of information request from the MOE relating to noise complaints and health problems at the Melancthon Wind Power Project. As the noise calculations for this Project were done using the same standards (ISO 9613) the stakeholder feels this Project may have similar issues. Letter posed a number of questions, which are summarized in Section 3.0. A copy of the letter received is provided in Appendix A.4.
December 12, 2012	Email	Stakeholder #13	Proponent provided direct link and instructions for downloading the Design and Operations Report as was requested by the stakeholder at the Focused Information Session on December 11, 2012.
December 20, 2012	Letter	Response to Stakeholder #1	Proponent's response to Stakeholder #4 indicating that the noise impact assessment was performed in accordance with all MOE Guidelines. As the stakeholder posed a number of questions they were addressed individually. The response letter to this stakeholder is provided in Appendix A.4.

Table 4 provides a summary of one-on-one communications and correspondence between Armow Wind, municipal stakeholders (Table 4), and Aboriginal communities and organizations (Table 5) that were not captured in the Consultation Report.

Table 4: Direct Communications with Aboriginal Communities

Date	Method of Communication	Stakeholder Participant	Communication Summary
December 6, 2012	Email	Alden Barty on Behalf of Métis Nation of Ontario	MNO requesting meeting in the new year. Has asked the Proponent for suggested dates when the Armow team would be available. Once a date is agreed MNO will draft a meeting budget and agenda.

3.0 CONSIDERATION OF COMMENTS

Under O. Reg. 359/09, proponents of renewable energy projects are required to provide in the Consultation report a description of whether and how:

- Comments from members of the public, Aboriginal communities and municipalities were considered by the person engaging in the Project;
- The documents made available in the final Public meeting were amended after the final Public Meeting; and
- The proposal to engage in the Project was altered in response to comments received from members of the public, Aboriginal communities and municipalities.

Table 5 provides representative comments for each topic category and responses to these comments.

Table 5: Consideration of Comments

Topic Category	Comment	Response
Agricultural Land	This Project will convert agricultural lands into an industrial park and goes against agricultural zoning. A survey indicates that 1-3 acres are being taken up by wind farms.	The loss of agricultural land during the lifespan of the project due to turbine footprints and access roads will represent less than 0.5% of all lands within the Project Study Area and associated crops. The temporary loss of agricultural lands associated with the construction and installation activities will represent approximately 2% of the total Project Study Area.
	The windmills are breaking up and reducing the valuable farmland that this province needs to survive.	
Community Impact	These windmill projects are dividing up our community into those that want them and those that don't want them. This doesn't do anything for community and neighbour relations.	The Proponent is aware that some people in the community are not in support of the Project and is making great efforts to address the concerns of the community where ever possible Armow Wind is committed to being a long-term partner of the community and believes the Project will have a net benefit for the Municipality of Kincardine.
	I feel like our community is turning into an industrial wasteland, a [n access] road will run right up the side of our property near our orchard.	
	Farmers are making a lot of money to have turbines on their land.	
Construction and Access roads	The access road is too close to our property and we will be negatively affected by construction dust and noise and potential long term effects from the transmission line.	A description of potential environmental effects and mitigation measures is provided in Section 4.0 of the Construction Plan Report, submitted as part of the REA application for the Armow Wind Project Best Management Practices will be used to minimize air and noise emissions generated during the construction and installation of the Project. These include: ■ Implementing a speed limit to reduce disturbance of dust; ■ Ensure proper operation and maintenance of vehicles and machinery to limit noise; ■ Minimize vehicular traffic on exposed soils and stabilize high traffic areas with clean gravel surface layer or other suitable

Topic Category	Comment	Response
		cover material; ■ Minimize mud tracking by construction vehicles along access routes and areas outside of the immediate work site; ■ Applying dust suppressants; ■ Re-vegetation of cleared areas, as soon as possible, and maintenance of vegetation to ensure growth; ■ Covering loads of friable materials during transport; ■ Scheduling excavations or activities involving movement of soil and/or gravel on days with low wind; and ■ Implementing a complaint response program, whereby complaints received from the public are recorded and investigated.
Complaint Resolution	I am skeptical of the complaint resolution process, due in large part to the lack of response from other local wind turbine operators. I would like to see the complaint resolution process drawn up prior to Project approval. The process would need to be expedient with written or verbal contact availability.	A mailing address will be established for Project operations staff to receive communications from the public, Aboriginal communities, regulatory agencies, Municipality of Kincardine and Bruce County. All complainants will be provided with the actions that will be taken to remediate the cause of the complaint and proposed actions to prevent similar occurrences in the future. A formal protocol will be developed prior to the start of construction as part of the Proponent's Emergency Response and Communications Plan, which can be found in the Design & Operations Report, submitted as part of the REA application for the Armow Wind Project.
Health Concerns	I feel the Project should be put on hold until further health studies are done.	We acknowledge that Health Canada's new proposed study has the potential to contribute to the current base of scientific literature. However, the vast majority of scientific evidence available to date demonstrates clearly that wind turbines do not pose a significant risk to human health. Studies and literature reviews from around the world have confirmed this, including a recent study that stated that, "the scientific evidence available to date does not demonstrate
	The noise and motion make me sick and it just gets worse on still days. I am sensitive because I am an artist.	
	I have spent time within other wind turbine	

Topic Category	Comment	Response
	developments and I feel nauseous when inside a similar distance to what is proposed for the land surrounding my house.	a direct causal link between wind turbine noise and adverse health effects". Health Canada has noted of their study that: *"It is important at the outset to clearly acknowledge that this research is being conducted to provide additional insight into an emerging issue; however, the results will not provide a definitive answer on their own."* The provincial government has established clear siting requirements for wind projects in Ontario; and we are confident that the sound level from wind turbines at common residential setbacks is likely not sufficient to cause hearing impairment or other direct health effects.
	Is the Proponent aware that the MOE has confirmed health problems from wind turbine noise even when the noise emissions comply with the MOE guidelines?	The Proponent cannot comment on complaints made to the MOE regarding other projects which the Proponent is not involved in.
	There has been very little by way of a human health impact assessment.	Although a Human Health Impact Assessment is not a requirement of O. Reg. 359/09 the Proponent takes potential impacts to human health seriously and had human health experts on hand at the first and final Public Meetings to answer questions and address concerns related to human health effects.
Kincardine Airport	Turbines are still proposed in front of the runways.	The Armow Wind Project has submitted its layout to NavCanada through their Land Use Application process. The Project has not sited any turbines within the Municipal Airport buffer outlined in bylaw no. 2003-25 Comprehensive Zoning Bylaw.
Sound	The GPS coordinates for many turbines were wrong.	All errors in the Noise Impact Assessment have been identified and confirmed that they had no impact on the results of any analysis or assessment. All maps presented at the Public Meeting were correct and not affected by the errors. Multiple checks and quality control procedures have been implemented on the report to ensure its accuracy. Additionally, a public information session specifically focused on the errors and corrections was held on Dec 11, 2012.
	Does GL GH hold a Certificate of Authorization?	GL GH has P.Eng's on staff and holds a Certificate of Authorization.

Topic Category	Comment	Response
		All legislated requirements regarding the qualifications of the individuals involved in developing the noise report have been adhered to.
	The Project will permanently destroy the features that brought us here such as a quiet living space.	The Ministry of Environment has established guidelines to protect public health and safety which prescribe setback distances and permissible sound levels at dwellings. The Project has been designed to be in compliance with noise requirements of O. Reg. 359/09 which requires a minimum setback distance of 550 metres between a turbine and a non-participating landowners' residence with background sound levels not exceeding 40 decibels at the residence. This is the sound level one would experience in a quiet office and is only slightly louder than in a library.
	The noise is significant, particularly during low winds when the turbines spin and the wind is quiet.	
	The MOE guidelines state that 5 dBA are to be added to the noise calculations for tonality. Why is the Proponent not adding anything at all to the calculations for tonality?	Siemens has provided a noise measurement report which describes the measurement and analysis of the sound power level and tonality of the SWT-2.3-101. Siemens has stated that the level of tonality in the near field is acceptable; thus, no tonality penalty was applied. The substation Broadband Sound Power Level value includes a 5 dB(A) tonal penalty.
	Health problems being claimed in other wind farms may not be related exclusively to the audible spectrum of sound, rather related to infrasound, which is what the noise calculations are currently based on.	Infrasound refers to the sound waves with a frequency below 20 Hz. Low frequency sound refers to frequency between 20 and 200 Hz. Natural sources of infrasound and low frequency sound include severe weather, waves on seashore, and wind in the trees. Like other devices such as cars and refrigerators, wind turbines also produce low frequency noise and infrasound. The level at which wind turbines produce low frequency noise and infrasound is well below the threshold and sensitivity of hearing for these frequencies. Many studies have been conducted world-wide to examine the relationship between wind turbines and possible human health effects. Overall, health and medical agencies agree that when sited properly, wind turbines are not causally related to adverse effects. We refer you to these sources as examples: Chatham-Kent Public Health Unit, 2008; Australian Government, National Health and Medical Research Council, 2010; Australian Government, 2011; Massachusetts Department of Environmental Protection (MassDEP) and Massachusetts Department of Public Health (MDPH), 2012.

Topic Category	Comment	Response
		The Noise Impact Assessment was performed in accordance with the MOE Guidelines which are written in terms of A weighted decibels and 1/1 octave band centre frequencies.
	Sound from turbines 94 and 59 can skip off of the pond. How do you calculate skip off of the pond? A 0.7 Sound Attenuation Factor does not seem conservative enough.	Ground attenuation is mainly the result of sound reflected by the ground surface interfering with the sound propagating directly from source to receiver. The ground factor is not a direct result of vegetation in the area; rather, it is a result of the porosity of the ground. (In ISO 9613, the sound attenuation as a result of vegetation is taken into account through a separate factor, “Afol”, which has been assumed to be zero here as per the Noise Guidelines for Windfarms (MOE, 2008).) The acoustical properties of the ground are taken into account through the ground factor G. Three categories of reflecting surface are specified in ISO 9613, as follows: a) Hard ground, which includes paving, water, ice, concrete and all other ground surfaces having a low porosity. Tamped ground, for example, as often occurs around industrial sites, b) Porous ground, which includes ground covered by grass, trees or other vegetation, and all other ground surfaces suitable for the growth of vegetation, such as farming land. For porous ground G= 1. c) Mixed ground: if the surface consists of both hard and porous ground, then G takes on values ranging from 0 to 1, the value being the fraction of the region that is porous. The guidelines specify that a global value ground factor of 0.7 is appropriate. GL GH has followed the noise modeling methodology described in the MOE Guidelines.

Topic Category	Comment	Response
	The ISO standard says that the calculations are accurate to approximately +/- 3 dBA and the MOE Guidelines say that the noise assessment must represent the “predictable worst case”. Why are you not adding 3 dBA to the noise calculations to take into account this margin of error since your calculations could be low by at least 3 dBA?	“Predictable Worst Case” is defined in NPC-232 as follows: “The assessment of noise impact requires the determination of the "predictable worst case" impact. The "predictable worst case" impact assessment should establish the largest noise excess produced by the source over the applicable limit. The assessment should reflect a planned and predictable mode of operation of the stationary source. It is important to emphasize that the "predictable worst case" impact does not necessarily mean that the sound level of the source is highest; it means that the excess over the limit is largest. For example, the excess over the applicable limit at night may be larger, even if the day-time sound level produced by the source is higher.” According to the definition, “predictable worst case” is not referring to the inclusion of an uncertainty level in the calculation. GL GH calculates sound pressure levels using CadnaA software which is an implementation of ISO 9613-1 and ISO 9613-2. The accuracy of the ISO 9613-2 method is estimated to be ±3 dB(A). However, given the conservative nature of the additional assumptions incorporated here, the probability of the overall noise simulation being underestimated is reduced. The conservative assumptions made as part of the Ontario guidelines [1], in addition to those inherent in ISO 9613-2, include: • Receptors are always downwind (as described in ISO 9613-2); • No attenuation due to foliage, trees or obstacles (referred to as Afol in ISO 9613-2) • Temperature and humidity settings are always favourable to propagation • Summer night-time shear conditions are always assumed when determining turbine sound emission levels • When windy, the ambient noise may be louder than the
	Is the Proponent aware that the noise calculations based on ISO 9613 may be low compared to actual noise levels in the field and therefore the actual noise may exceed the noise guidelines?	

Topic Category	Comment	Response
		sound generated by the wind turbine • A 5dBA tonal penalty was applied to the transformer. • All vacant lot receptors are assumed to have a height of 4.5 m. There is uncertainty associated with the predictions, as is the case with any engineering model. The conservative assumptions used influence the uncertainty of the approach. Considering the conservative nature of the aforementioned assumptions, it is considered to be less likely that a value is significantly underestimated.
	Is the Proponent able to measure noise emissions from the wind turbines and prove that they meet the noise guidelines, especially taking into account infrasound?	Internationally recognized protocols exist for the measurement of noise in the environment, and specifically from wind turbines, including ISO 1996 , IEC 61672], and IEC 61400-11]. These protocols are widely accepted in the industry. IEC 61400-11 states that optional measurements may include directivity, infrasound, low-frequency noise and impulsivity, as described in Annex A of IEC 61400-11. It is noted that the turbine noise emission levels themselves do not need to directly meet any guidelines; it is rather the aggregate audible noise level produced by the turbines at reception points that must respect the 40 dB(A) limit required by the MOE guidelines.
	Does the Proponent know the Wind Shear coefficient for the Armow Project and have the noise calculations taken into account the actual wind Shear coefficient rather than just the “moderate ground-based temperature inversion” that’s assumed in the ISO standard?	GL GH has modeled the sound emitted by the turbines based on specifications supplied by Siemens, available in Appendix E in the NIA. Siemens has provided Warranted Acoustic Emissions, which specify the broadband sound power level (PWL) of the turbine as a function of the wind speed at a height of 10 m above ground level. This inherently includes an assumption regarding wind shear (and associated surface roughness), which relates the wind speed at a height of 10 m to the wind speed at the turbine’s hub height. The MOE Guidelines specify the sound level limit at a receptor as a

Topic Category	Comment	Response
		function of wind speed at a height of 10 m above ground level, and this methodology complies with the Guidelines. During the summer at night-time, shear is assumed to be high, i.e. "worst case". In this case, the wind speed at 10 m will be significantly lower than the wind speed at the turbine's hub height. The standard assumption about shear made by Siemens does not apply; therefore, an adjustment is required. GL GH has assumed that for wind speeds of 6 m/s and greater at a height of 10 m, the shear may be high, resulting in a much greater wind speed at the turbine's hub height than at a height of 10 m. As a result, for sound modeling at 10 m wind speeds of 6 to 10 m/s, GL GH has assumed that each turbine is producing its peak PWL. For example, if the 10 m wind speed is 6 m/s, then the sound level limit at a class 3 receptor is 40.0 dB(A). Using standard shear assumptions, if the 10 m wind speed is 6 m/s, then from the specifications for the SWT-2.3-101, the PWL is 105.4 dB(A). However, if summer night-time shear is assumed, as was done for all calculations in the NIA, then the shear is greater than that assumed by Siemens. Under summer night-time conditions, at a 10 m wind speed of 6 m/s, the turbine's PWL is conservatively assumed to correspond to the maximum value for the turbine, rather than the PWL corresponding to a wind speed of 6 m/s at 10 m in the noise specifications. From the specifications for the SWT-2.3-101, the resulting PWL is then 106.0 dB(A). The maximum PWL of the turbine, 106.0 dB(A), was used for all 10 m wind speed scenarios considered.
Project Description	We already have enough power in this province so why do we need more of these [wind projects]?	Wind power can complement the provincial base load generation and create a more stable and reliable electrical grid. Wind power is intended to be part of the long-term energy supply plan for the Province of Ontario, which accounts for forecasted supply and demand in the years to come.
	Is the Proponent looking at pile driving due to the geology of the area?	Foundation types will be decided after the completion of a geotechnical investigation. There may be a mix of piled and gravity

Topic Category	Comment	Response
		foundations. Final foundation design and type will be confirmed after the completion of a full geotechnical investigation. A desktop geotechnical investigation has been completed for the Project area. This report is available in the Design and Operations Report, submitted as part of the REA application for the Armow Wind Project. More details about foundations that are proposed for the Project are available in the Design and Operations and Construction Reports.
	With regards to turbines on side roads and turbine access roads. Will there be anything limiting me from using these roads?	The proponent's current plan is to allow landowners to use the access roads as long as it is safe to do so.
	Not many developments have such a large impact in such a short amount of time with no benefits.	Armow Wind is committed to being a long-term partner of the community and believes the Project will have a net benefit for the Municipality of Kincardine and the Province of Ontario.
	The road along my property has hawthorns. These block the wind and dust and will be removed to develop access roads for the Project.	Section 4.0 of the Construction Plan Report details potential environmental effects of construction activities as well as mitigation measures used to reduce these impacts. This includes re-vegetation of cleared areas, as soon as possible, and maintenance of vegetation to ensure growth. The Proponent is also committed to working with individual landowners to resolve issues such as dust.
	I feel as though there are important questions that need to be answered. I understand that we need to be further along in the process to get these answers.	Armow Wind is committed to being a long-term partner of the community and will provide up to date Project information as it becomes available through the Project website (www.armowwind.com) and through the Project office (322 Lambton Street).
	At the previous Open House it was determined that the closest turbine located to a non-participating household is 561 metres. Will this be defended with the 800 metre setback?	The Project meets all the setbacks requirements outlines in O. Reg. 359/09, as amended, and the Noise Impact Assessment confirms that the Project meets all noise requirements.
	Have any definite engineering decisions been made in regard to the need of support pilings	Final foundation design and type will be confirmed after the completion of a full geotechnical investigation. A desktop

Topic Category	Comment	Response
	deeper than indicated in the last draft?	geotechnical investigation has been completed for the Project area. This report is available in the Design and Operations Report. More details about foundations that are proposed for the Project are available in the Design and Operations and Construction Reports.
	According to the map sent along with the notice for the Focused Information Session appears to indicate a strong correlation of turbine sitings located either directly on or closely adjacent to either small creeks or groundwater resources.	The Water Assessment and Water Body Report and Construction Plan Report examined the potential effects to water resources and have determined that by implementing mitigation measures there will be no significant impacts to the environment during the design, construction, operation or decommissioning phases. A technical desktop assessment and review of groundwater elevation was conducted to determine if foundation construction associated with the wind turbines will intercept groundwater, and if so, what potential dewatering rates will be required in support of the foundation construction. The assessment concluded that there is a relatively low potential that the depth of the proposed excavations will intercept the water table (or saturated ground) under conditions that will require foundation dewatering for construction purposes other than the management of precipitation catchment. If groundwater should be encountered during the excavation of the foundations, mitigation measures detailed in the Construction Plan Report will be implemented. A full site erosion control and drainage plan will be prepared and implemented. In the event of an environmental incident, emergency response and spill and waste control plans would be immediately implemented to protect groundwater and the environment. Further details about emergency communications are in the Design and Operations Report.
Property Values	Are you prepared to make up the difference in the value when property values fall due to this Project?	The Proponent has no intentions to buy properties at this time. Several recent studies have demonstrated that proximity to a wind farm does not have a negative lasting impact on property values. These studies include:
	If the assurance is there that the property values won't decrease why can't the Proponent	

Topic Category	Comment	Response
	buy properties or guarantee a fair value? We would like to move sooner than planned (8 years) but will not be able to sell because our views will be ruined.	■ MPAC News Summer 2012 (http://www.mpac.ca/pdf/MPACNewsSummer2012.pdf) which noted that property values have continued to increase in Ontario in many areas where wind projects either exist or are proposed for development. In the County of Huron, for example, residential property values increased by an average of approximately 14.8% since 2008; farmland has increased by approximately 65.3% since 2008. ■ Canning, G., and L.J. Simmons. (February 2010). Wind Energy Study Effect of Real Estate Values In the municipality of Chatham-Kent. Canning Consultants Inc. & John Simmons Realty Services Ltd. Prepared for the Canadian Wind Energy Association. ■ Hoen,B., Wiser, R., Cappers, P., Thayer,M., and G.Sethi. (December 2009). The impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Hedonic Analysis. Ernest Orlando Lawrence Berkeley National Laboratory. Prepared for the Office of Energy Efficiency and Renewable Energy
	Property values and future farm/home building construction is being altered due to the presence of these windmills and their effect on the building codes.	The Proponent has chosen a layout that meets all regulatory setback requirements.
Public Participation	The information presented at the November 12, 2012 Public Meeting was very out dated. The area maps were wrong as it did not show the Penetangore River which runs across my property. Instead it appeared as two small bodies of water in the south west corner of my land that are non-existent.	The information presented at the November 12, 2012 Public Meeting was the most up to date Project information based on the results of the various studies undertaken in preparation for REA application submission. The Project location map as well as the Natural Heritage Features map present at the Public Meeting clearly showed all water bodies including the Penetangore River. Rivers were included on Project maps but not labelled. Labelling the high number of rivers on the map would have cluttered the map, making it difficult to read. Maps that have the Penetangore River labeled are provided in the Water Body Site Investigation Report

Topic Category	Comment	Response
		(Figures 1-5)
	Please explain your communications with the Amish. They came to this area to get away from development.	On October 23, 2012 the Proponent met with members of the local Amish community where they discussed turbine placement, future school development, setbacks from existing school, process of setting setbacks, construction traffic impacts to horse-drawn vehicle traffic. The meeting minutes are provided in Appendix B.4 of the Consultation Report. The Proponent also met with the Amish on December 5, 2012, as a follow-up to previous discussions.
	I feel like residents have no voice. I feel unheard and uncared for.	O. Reg. 359/09 sets out consultation requirements for REA applications. This includes a commitment to document all concerns so that they are part of the public record. It also includes a commitment to respond to public comments and show how the Project has been altered, where feasible, in response to public comment. The details of how the Project has been altered in response to this feedback are detailed in Section 7.0 of the Consultation Report submitted as part of the REA application for the Armow Wind Project. In June 2012 we also opened a local project office in Kincardine where members of the community are welcome to discuss aspects of the project or ask any questions. We value community engagement and are always open to hearing new ideas on how to best communicate with all stakeholders.
	Green energy is being pushed on us and the process is hurting communities. I wish there was compensation for people that are affected and not just the landowners.	Decisions regarding compensation for neighbours have not yet been made.
	(Comment regarding previous Public Meeting) The amount of material presented is too much to be able to take in during the time I had available. Also the presentation was one sided in favour of the Proponent. I would like to see a study of a representative group of residents who live in close proximity to the turbines, including some who benefit financially and	The Proponent had experts from every related discipline associated with the REA reports that were developed for this Project. The Proponent, at all public meetings, tries to strike a balance between allowing attendees the opportunity to read material at their own pace and to actively engage them. The Focused Information Session was allowed to run past the expected closing time of 8:00 p.m. for the benefit of one

Topic Category	Comment	Response
	others who do not.	Stakeholder.
	The “Blowing Smoke” report should not be on the Project website as it angers people by stating that irritation is not an impact. Irritation is am impact due to the stress it creates.	Armow Wind tries to have a variety of factual literature available on the Project website and at Public Meetings such as the Focused Information Session.
	The MOE does not directly respond to any of our requests/comments/concerns.	Questions and comments directed to the Proponent have been addressed in the Consultation Report and this Consultation Report Addendum. These comments are forward to the MOE for review and consideration. The Proponent cannot comment on the MOE’s engagement with specific stakeholders.
	Request to see the redline version of the Noise Impact Assessment.	The redline versions of Appendix F and Table 7-2 of the NIA report were provided at the Focused Information Session for public review. These are representative of the significant changes that were made to the Noise Impact Assessment.
Setbacks	Why are the turbines so close? A minimum 1 kilometre setback is standard in many parts of the world.	The Ministry of Environment has established guidelines to protect public health and safety which prescribe setback distances and permissible sound levels at dwellings. The Project has been designed to be in compliance with noise requirements of O. Reg. 359/09.
Visual Impact	The windmills are filling our once beautiful landscape.	Although the appearance of wind turbines is subjective, we acknowledge that there are some that feel that they detract for the rural landscape. While it is unfortunate that no energy supply is zero-impact, the Project is committed to providing an overall net benefit to the community and province through community involvement, land taxes and sustainable energy generation.
	Requesting an update to discussions regarding abatement of red lights on the turbines. Also if given the approval from NavCan would the Proponent consider satellite based navigation tools as opposed to light shields?	Discussions are ongoing with NavCanada on this issue. The Proponent will provide information about light abatement as soon as it is available.
	Is landscaping (such as planting adult trees) part of the mitigation measures?	The majority of construction along county roads will occur in the road right-of-way for the construction of electrical distribution lines and will not require tree removal. Where access roads are proposed from county roads, Armow Wind has sought to minimize any disturbance to trees in consultation with landowners. Armow Wind is

Topic Category	Comment	Response
		also considering a tree preservation replacement program and will develop this plan as the Project progresses.
	Concern regarding the red flashing lights at night both for visual impact and impacts on star gazing.	Flashing lights at night on top of the wind turbines is a safety feature required by Transport Canada. The Proponent is working with Transport Canada to explore options to address this concern.

3.1 Changes to REA Documents following the Focused Information Session

Following the submission of the REA application no changes were made to the Noise Impact Assessment based on the feedback from the Focused Information Session on December 11, 2012.

4.0 REFERENCES

Australian Government, National Health and Medical Research Council (NHMRC). 2010. Wind Turbines and Health: A Rapid Review of the Evidence.

Australian Government, National Health and Medical Research Council (NHMRC). 2011. Report on the Scientific Forum: Wind Farms and Human Health.

Chatham-Kent Public Health Unit. 2008. The Health Impact of Wind Turbines: A Review of the Current White, Grey and Published Literature.

Massachusetts Department of Environmental Protection and Massachusetts Department of Public Health. 2012, Wind Turbine Health Impact Study: Report of Independent Expert Panel.

Ministry of the Environment (MOE). 2008. Noise Guidelines for Wind Farms. Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities.

Ministry of the Environment (MOE). 2009. Ontario Regulation 359/09. Renewable Energy Approvals under Part V.0.1 of the Environmental Protection Act.

Report Signature Page

GOLDER ASSOCIATES LTD.

Ian Callum, M.Sc., B.Sc.
Project Manager

Anthony D. Ciccone, Ph.D., P.Eng.
Principal

CB/IC/ADC/am

\\golder.gds\gal\mississauga\active\2011\1151\11-1151-0247-sp ontario-armow\5000 consultation\reporting\2 - consultation report addendum\11-1151-0247 doc163_revd_consultation report addendum_20dec12.docx

APPENDIX A

Focused Information Session: Noise (December 11, 2012) – Notices, Handouts, Display Panels, Comment Forms and Formal Letters and Responses with Stakeholders.

1. Notices

NOTICE OF FOCUSED INFORMATION SESSION AND PROJECT OFFICE DROP-IN
by SP Armow Wind Ontario LP

Project Name: Armow Wind Project (the "Project")

Project Location: Municipality of Kincardine, Bruce County, Ontario.

Notice Dated at: Bruce County this, the 27th of November, 2012

SP Armow Wind Ontario LP, a joint venture limited partnership owned by affiliates of Pattern Renewable Holdings Canada ULC and Samsung Renewable Energy Inc., (the "Proponent"), is planning to engage in a renewable energy project for which a renewable energy approval ("REA") is required.

Project Description
If approved, the Project would have a nameplate capacity of up to 180 MW and pursuant to the Act and Regulation, would be considered to be a Class 4 Wind Facility. The Project is shown on the map below and additional Project information is available on the Project website (www.armowwind.com).

Focused Information Session Details
As required by Ontario Regulation 359/09, as amended, draft REA reports (excluding the consultation report), were made available for public and Aboriginal community review at least 60 days in advance of the Project's final open house, which was held on November 12th, 2012. Draft REA reports were also provided to the municipality at least 90 days prior to the November open house. Since that open house, minor changes have been made to the Noise Impact Assessment. Although the conclusions in the report have not changed, the Proponent is holding a focused information session to consult on the minor report revisions. The revised report will also be available on the Project website, at the Municipal and County offices, and at the Kincardine and Tiverton public libraries.

Details of the information session are as follows:

Date: Tuesday, December 11, 2012
Time: 6:00 p.m. to 8 p.m.
Location: Tiverton Community Center, 6 McKay St, Tiverton, Ontario

Project Office Drop-in Details
In addition to the focused information session, Project developers will be available on December 10th and 11th during regular project office hours (9:00 a.m. to 3:00 p.m.) to answer general questions related to the changes made to the Noise Impact Assessment. The office is located at office in Kincardine at 322 Lambton Street.

Project Contacts and Information
For more information or to provide feedback please contact:

Project Email: info@armowwind.com

Jody Law, Project Developer
Pattern Renewable Holdings Canada ULC
100 Simcoe St., Suite 105
Toronto, ON M5H 3G2
Phone: 519-396-9433

Brian Edwards, Manager, Project Development
Samsung Renewable Energy Inc.
55 Standish Court
Mississauga, ON L5R 4B2
Phone: 519-396-9433

FOR RENT

ONE BEDROOM with fireplace. Country living on Shore Road, very close to Bruce Power. $650/month plus utilities. Call 519-368-5441 for details. -- 48TF

ANNOUNCEMENTS

GIFT CERTIFICATES available at **Smeltzer's Garden Centre**. Make a great Christmas gift! Please call 519-395-5206 and leave a message. -- 48-51 4

COMING EVENTS

CHRISTMAS TEA at the **Anglican Church of the Messiah**, Parish Hall, 421 Russell Street, Kincardine on Friday, Dec. 7 at 2 p.m. Admission: $7. Door Prizes. For tickets, please call Gail at 519-396-4281. -- 47-49

COOKIE WALK Saturday, Dec. 1 from 10 a.m. until 12 noon at **Tiverton Knox Presbyterian Church**. Fancy cookies, squares and Christmas cakes. -- 48

IN MEMORIAM

STEEN

In loving memory of **Randi Steen**, Nov. 27, 2008

What would we give to clasp your hand;
Your dear kind face to see;
Your loving smile, your welcome voice,
That meant so much to me.
No one knows the silent heartache,
Only those who have such can tell
Of the grief that is borne in silence
For the one we loved so well.

- Floyd Steen & family

CAMPBELL

In memory of **Art Campbell** Nov. 30, 2010

A beautiful memory, dearer than gold,
Of a father whose worth can never be told,
There's a place in my heart no one can fill,
I miss you, Dad, and always will.

- Love Leigh-Anne

SERVICES

AMBER'S CLEANING CREW Now accepting clients! We clean houses, offices, cottages, windows, etc. Please call for a free estimate. 519-386-2262. --43-48

ALSTAR STARTER & ALTERNATOR Formerly Albrecht Auto Electric. Starters, Alternators, Generators, Voltage Regulators, and Batteries. Testing Service & Sales. Phone or Fax 519-392-8640. --tf

FOGGY WINDOWS? BROKEN WINDOWS? Did you know you could replace the thermal glass pane for a fraction of the cost of replacing the entire encasement? Call Go Glass for a free estimate 519-396-1300. --tf

KINCARDINE DENTAL HYGIENE CLINIC 226 Queen St. S. (Rehab building) ***December Special: 25% off on Tuesdays!*** We accept insurance and offer evening appointments. *kincardinedentalhygieneclinic@live.ca;* 519-396-5550. -- 48tf

Need a Website? A ReMake? MerrimacMarketing.net offers quick, affordable sites with multiple options to customize your site. Call 519-395-0412. -- 48-02

STORAGE

KINCARDINE U STORE IT Units available, different sizes, 5 x 10, up to 10 x 24, and climate controlled. Call 519-396-7248. -- TF

IN MEMORIAM

Matt Johns 1983-2001

www.mattjohns.ca

Always a smile,
instead of a frown,
Always a hand, when one was down.
Always true,
thoughtful and kind,
Wonderful memories he left behind.

Until the end of time,
Ray, Karen & Alex

Terese STANLEY

In loving memory of my wife Terese who passed away November 2010.

They who think that you are gone,
Because no more your face they see,
Are wrong, for in our hearts you live and always will in memory.

Love Kevin

COMMUNITY CALENDAR

It's CHRISTMAS HAMPER time! For those needy families or individuals who would like to receive a Christmas Hamper, please be referred by no later than Nov. 29.

* * *

Teen Coffee House at the Kincardine Library on Thursday, Dec. 5, from 7-10 p.m .

COMMUNITY CALENDAR

SBGHC-KINCARDINE HOSPITAL AUXILIARY will hold its Christmas Luncheon meeting on Nov. 28 at 12 noon at the Best Western Governor's Inn. Call Doris at 519-368-7304 by Nov. 21 to confirm your reservation.

* * *

THE SCRABBLE GROUP meets alternate Wednesdays; next date is Nov. 28 at 7 p.m. at the Centre of Hope Victory Church, 146 Mahood-Johnston Drive.

* * *

JAM SESSION at the Point Clark Community Centre, from 7-9:30 p.m., alternate Thursdays; next date is Nov. 29. Musicians and audience welcome. No electronic instruments please. For more information, call Bob Gallant at 519-395-5058.

* * *

Free childcare for the four Saturdays in December at Kincardine Baptist Church, 569 Queen Street, from 9 a.m. until 2 p.m. Lunch provided. Contact Janice at 519-396-1957 or the church at 519-396-7194 for more information.

KINCARDINE LIBRARY: Decorate a cookie, hear stories, enjoy hot chocolate before the parade from 6-7 p.m. on Dec. 1.

* * *

KINCARDINE HOSPITAL RETIREES will host their Christmas Dinner at the Bruce Steakhouse at noon on Dec. 5. If attending, please call Mary at 519-396-3877, Florence at 519-396-8528 or Marilyn at 519-395-2668 by Dec. 2.

* * *

The KINCARDINE & DISTRICT HORTICULTURAL SOCIETY will hold its Christmas Potluck Supper and Christmas Show at St. Anthony's Church hall on Monday, Dec. 3 at 6 p.m. Everyone is welcome.

* * *

The KDSS Christmas Knights will be holding their annual DOOR TO DOOR FOOD & TOY DRIVE on Saturday, Dec. 8 from 9:30 a.m. to 12:30 p.m.

* * *

The KINCARDINE TRAVEL CLUB meets every third Wednesday of the month at 2:30 p.m. on the third floor at Trillium Court.

The KINCARDINE COMMUNITY CONCERT BAND invites you to its **"A Christmas Celebration!"** concert featuring Scott Jacks and his harmonious keyboards on Sunday, Dec. 9 at 3 p.m. at the Kincardine United Church. Freewill donation at the door.

* * *

Take part in the **Huron-Kinloss Downtown Holiday Shopping Pass** running until Dec. 24 for a chance to win a shopping spree. Passes are available at Ripley and Lucknow businesses or get more information at *www.huronkinloss.com*.

* * *

FREE COMPUTER LESSONS and assistance through Community Access Program at the library for a limited time. All ages welcome. For more information, or to book a lesson contact either the Kincardine Library (519-396-3289) or the Tiverton Library (519-368-5655).

* * *

AL ANON - Is someone's drinking affecting your life? For information about meetings call Al Anon at 519-396-2233.

NOTICES

NOTICE OF FOCUSED INFORMATION SESSION AND PROJECT OFFICE DROP-IN
by SP Armow Wind Ontario LP

Project Name: Armow Wind Project (the "Project")

Project Location: Municipality of Kincardine, Bruce County, Ontario.

Notice Dated at: Bruce County this, the 27th of November, 2012

SP Armow Wind Ontario LP, a joint venture limited partnership owned by affiliates of Pattern Renewable Holdings Canada ULC and Samsung Renewable Energy Inc., (the "Proponent"), is planning to engage in a renewable energy project for which a renewable energy approval ("REA") is required.

Project Description
If approved, the Project would have a nameplate capacity of up to 180 MW and pursuant to the Act and Regulation, would be considered to be a Class 4 Wind Facility. The Project is shown on the map below and additional Project information is available on the Project website (www.armowwind.com).

Focused Information Session Details
As required by Ontario Regulation 359/09, as amended, draft REA reports (excluding the consultation report), were made available for public and Aboriginal community review at least 60 days in advance of the Project's final open house, which was held on November 12th, 2012. Draft REA reports were also provided to the municipality at least 90 days prior to the November open house. Since that open house, minor changes have been made to the Noise Impact Assessment. Although the conclusions in the report have not changed, the Proponent is holding a focused information session to consult on the minor report revisions. The revised report will also be available on the Project website, at the Municipal and County offices, and at the Kincardine and Tiverton public libraries.

Details of the information session are as follows:

Date: Tuesday, December 11, 2012
Time: 6:00 p.m. to 8 p.m.
Location: Tiverton Community Center, 6 McKay St, Tiverton, Ontario

Project Office Drop-in Details
In addition to the focused information session, Project developers will be available on December 10th and 11th during regular project office hours (9:00 a.m. to 3:00 p.m.) to answer general questions related to the changes made to the Noise Impact Assessment. The office is located at office in Kincardine at 322 Lambton Street.

Project Contacts and Information
For more information or to provide feedback please contact:

Project Email: info@armowwind.com

Jody Law, Project Developer
Pattern Renewable Holdings Canada ULC
100 Simcoe St., Suite 105
Toronto, ON M5H 3G2
Phone: 519-396-9433

Brian Edwards, Manager, Project Development
Samsung Renewable Energy Inc.
55 Standish Court
Mississauga, ON L5R 4B2
Phone: 519-396-9433

Ian Callum, Project Manager
Golder Associates Ltd
2390 Argentia Road
Mississauga, Ontario, L5N 5Z7
Phone: 905-567-4444

2. Handouts

Armow Wind

Fact Sheet / August 2012

Owner	SP Armow Wind Ontario LP
Location	Municipality of Kincardine, Ontario
Turbine Model	Siemens SWT-2.3-101
Number of Turbines	Approximately 90
Project Capacity	180 MW
Power Equivalent	55,000 homes
Target Construction Start	Third Quarter 2013
Target Operation Start	Fourth Quarter 2014
Construction Jobs	Up to 200
Permanent Jobs	Up to 15
Estimated Tax Revenue	$500,000 annually

SP Armow Wind Ontario LP is a joint venture between Pattern and Samsung, proposing the construction of the Armow Wind project, which will be located within the Municipality of Kincardine. Once complete, the 180 MW Armow Wind project will produce clean and renewable energy equivalent to the needs of approximately 55,000 Ontario homes, while helping the Province meet its renewable energy goals and diversify homegrown energy sources.

SP Armow Wind Ontario LP initiated the Renewable Energy Approval (REA) process for Armow Wind in November 2011 with the issuance of a Notice of Proposal and Project Description Report. Pattern and Samsung will host multiple open house events to provide the community with opportunities to meet the project team, learn about the proposed Armow Wind project and the REA process, and allow the public to ask questions and provide comments about the project.

The Armow Wind project will create many economic development benefits for the Kincardine region, including the creation of development, construction and ongoing permanent employment positions and a direct and significant capital infusion from tax and project royalty revenues to the community at large.

The clean electricity produced by the Armow Wind project will offset more than 655,000 tonnes of carbon dioxide and 1,356,000,000 liters of water each year compared to electricity generated by coal. This is roughly the equivalent of removing 116,000 cars from the roads of Ontario each year and meeting the daily fresh water needs of 11,000 people.

Please visit with us in our local office at 322 Lambton Street in Kincardine, or contact us at (519) 396-9433 or info@armowwind.com. We are interested in receiving your feedback on the Armow Wind project. Your ideas are important in helping us collaborate with the community and make Armow Wind a renewable energy project we can all be proud of.

Pattern

SAMSUNG

SAMSUNG RENEWABLE ENERGY INC.

ABOUT PATTERN

Pattern Energy Group LP is one of North America's leading independent wind and transmission companies. Our mission is to provide our customers with clean, renewable energy, which we seek to achieve by developing, constructing, owning and operating projects that are built for lasting success.

Pattern commenced operations in June of 2009 as one of the most experienced and best-capitalized renewable energy and transmission development companies in the United States when a private equity fund managed by Riverstone Holdings LLC, an energy and power-focused private equity firm with the largest renewable energy fund in the world, and our Executive Management Team purchased our thriving energy business and development pipeline to form Pattern.

The Pattern team employs more than 100 highly-skilled scientists, legal and financial professionals, engineers, and construction and operations experts located in San Francisco, Houston, San Diego, New York and Toronto. We are all devoted to a common purpose: developing high performance renewable energy and transmission projects.

Pattern has 525 MW of wind projects in operation, including our 138 MW St. Joseph Wind Farm in southern Manitoba. We are growing and building on our current development pipeline, which includes over 4,000 MW of wind projects and multiple transmission projects in the United States, Canada and Latin America.

ABOUT SAMSUNG C&T CORPORATION

Founded in 1938, Samsung C&T is the mother company of the Samsung Group, South Korea's largest conglomerate with interests in electronics, chemicals, finance, and numerous other fields. Today, the company's two business groups – Trading & Investment and Engineering & Construction – are involved in a broad and growing portfolio of businesses, delivering creative, integrated business solutions to customers worldwide through a network of over 100 offices in 44 countries. Both business groups have achieve many landmark accomplishments over the years in preparation for such an opportunity - among them, launching one of Korea's first solar energy projects and building the world's tallest skyscraper.

Samsung C & T, Korea Electric Power Corporation (KEPCO) and Pattern Energy plan to build and operate the world's largest renewable energy cluster in Southern Ontario. Samsung is proud to be part of an endeavour that will bring not just clean energy to Ontario households but many new jobs. Samsung was selected by the Ontario Government for its rapidly expanding expertise in the alternative energy field, but also for the proven track record of constructing projects of similar scale from planning and financing through to execution. Samsung and its partners intend to take advantage of Ontario's talented workforce and hire locally.

Samsung C&T is an emerging global leader in new and renewable energy solutions with projects in Canada, the United States, Costa Rica, Korea, France, Italy, Greece, and Turkey.

Wind energy benefits you.

Environmentally and economically sound, free from the increasing cost of fossil fuels, wind has a lot to offer Canadians. Wind farms can be built quickly – faster than many other types of power plants – and can meet our growing need for electricity in cities, towns and rural areas.

With wind energy, the cost of electricity is predictable because there are no escalating fuel costs. Investing in wind also helps us offset our use of other precious resources. That's why wind energy is a great choice for today and tomorrow.

"As fossil fuels become scarce, their price can only increase. Wind energy costs are stable because fuel isn't part of the equation."

Making the connection.

Energy without fuel.

Unlike many forms of conventional energy, which are susceptible to the increasing cost of fuel, wind energy relies on no fuel at all. Think about it. The only thing that fuels a wind farm is the wind – free and limitless.

This means that once a wind farm project is built, the price of electricity is set and it stays at that price for the lifespan of the wind turbines – approximately 20-30 years. Of course the wind is limitless and will outlast the lifespan of the turbines themselves. When they are decommissioned, newer and more efficient models of wind turbines may take their place, ensuring our ability to harvest this clean and fuel-free resource well into the future.

Conserving natural gas.

Our supply of natural gas is increasingly limited and, despite rising prices, drilling for gas is challenged to keep pace with demand and more and more of Canada's natural gas resources are located in environmentally sensitive and protected areas.

The increased use of natural gas for the production of electricity is one of the major reasons supply is tightening. But natural gas is not as efficient in creating electricity[1] as it is in heating homes or providing fuel for stoves and other activities. So why not put this precious resource to better use or save it for generations to come? Wind energy can help. More wind energy coming on line will alleviate some of the pressures on natural gas.

Natural gas – a rapidly depleting, non-renewable resource – is being used more and more to generate electricity, even though it's better suited for other uses such as home heating and cooking. Increasing demand for natural gas has helped drive prices up 400% in the last 5 years.[2]

Studies have consistently shown that increased use of wind energy will actually result in lower prices to consumers for natural gas[3] – and help conserve that resource for future generations in the process.

Birds, bats and wind energy.

Studies show that modern wind farms with sensitive siting have no significant adverse effect on bird populations. The wind energy industry is investing in closely monitoring this important issue and continues to work vigilantly to avoid any significant impact.

Wind energy is emission-free and can help offset the effects of climate change. Wind farms can also be developed with respect for habitats – addressing two significant threats to birds and all other forms of wildlife.

Making way for birds and bats.

How birds and wind turbines interrelate.

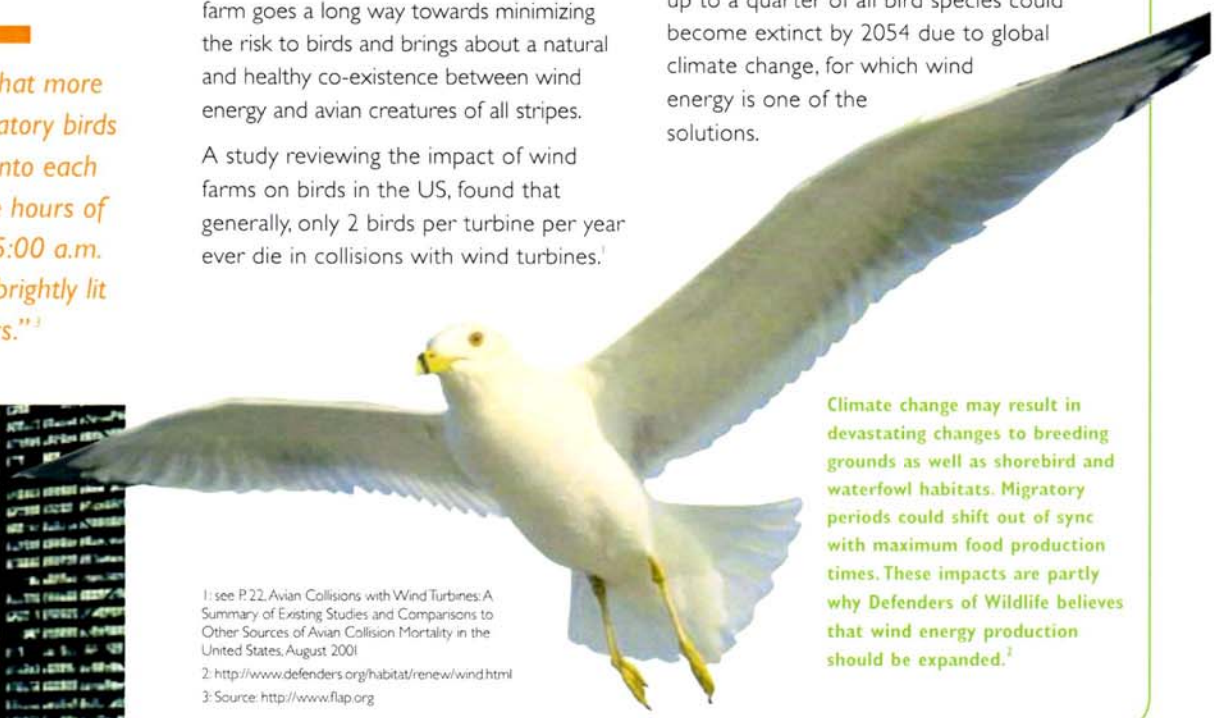
There are a few ways that wind turbines might interfere with birds – one is the potential impact to their natural habitat, another is through possible collisions with the turbines themselves. A well-sited wind farm goes a long way towards minimizing the risk to birds and brings about a natural and healthy co-existence between wind energy and avian creatures of all stripes.

A study reviewing the impact of wind farms on birds in the US, found that generally, only 2 birds per turbine per year ever die in collisions with wind turbines.[1]

Bear in mind that this is far less than the millions of deaths per year associated with birds crashing into buildings and windows, and the many millions of deaths associated with birds colliding with vehicles.

A real concern for birds is noted in the 2004 study in *Nature* that estimated that up to a quarter of all bird species could become extinct by 2054 due to global climate change, for which wind energy is one of the solutions.

"It is estimated that more than 10,000 migratory birds are killed in Toronto each year between the hours of 11:00 p.m. and 5:00 a.m. in collisions with brightly lit office towers."[3]

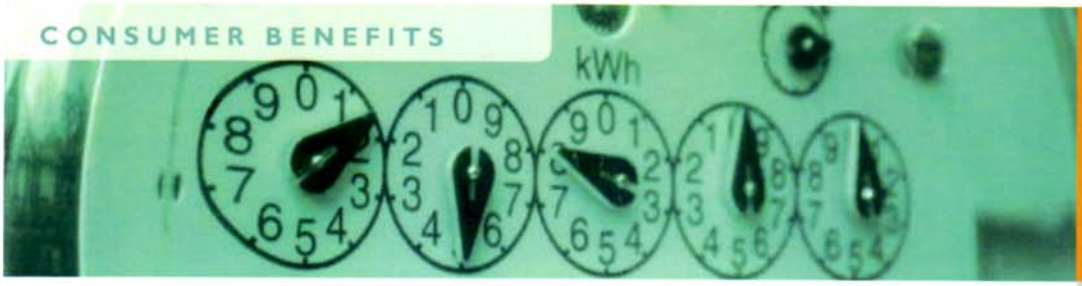


Climate change may result in devastating changes to breeding grounds as well as shorebird and waterfowl habitats. Migratory periods could shift out of sync with maximum food production times. These impacts are partly why Defenders of Wildlife believes that wind energy production should be expanded.[2]

1: see P. 22, Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States, August 2001

2: http://www.defenders.org/habitat/renew/wind.html

3: Source: http://www.flap.org



Wind fits with today's use of energy.

Wind farms can be built to a variety of scales. Smaller scale projects provide Canadians with the opportunity to have a diverse and well-distributed power supply. Compare that to other forms of electricity that are generated in large scale power plants. The chance of brown or black outs increases when we depend on a single large power plant. Having many smaller power producers on line is an ideal way to reduce this risk.

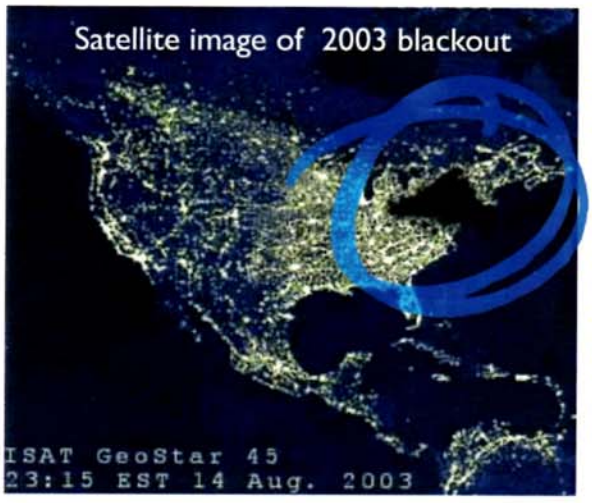
Another benefit of distributed energy is the ability to locate a wind farm close to transmission lines that aren't being used to full capacity. Transmission lines represent a major investment in infrastructure, so it's wise to use them as efficiently as possible. Electricity also loses power when it travels long distances, so the ability to locate wind farms closer to areas of demand is an additional benefit. Energy is precious; we don't want to waste it.

Energy when we need it.

In Canada, we are most dependent on energy in the winter months, when it's cold. Luckily for us, the wind also blows hardest in these cold winter months meaning that wind energy production hits its peak just as our critical demand for energy does. Just another way wind energy can be there for us when we need it most.

Cold winter winds are also denser than winds in warmer seasons. Denser winds contain more energy, so provide even more power potential when we need it most.

Think of throwing a hardball or a whiffle ball as hard as you can. The dense hardball travels much farther because it has more kinetic energy.



The "cascading failures" of the August 14, 2003 blackout affected a 9,300 square mile area and 50 million people. It took just 3 minutes to shut down 21 power plants.

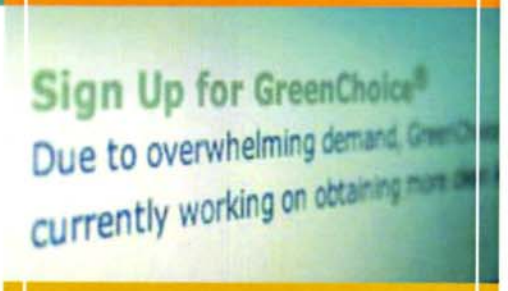
Several nuclear plants were not restarted for days, due to the extensive and time-consuming restart procedures they must go through to ensure safe operation.

In contrast, wind plants were able to start up nearly immediately after the safety of the grid was assured.[5]

CASE STUDY

Austin Energy

GreenChoice® program is a huge success with consumers[4]



When Austin Energy, the publicly owned utility in Austin Texas, launched their GreenChoice® program in 2000, customers had the option of purchasing green power at a premium price – but a price that is now guaranteed to remain stable through June 30, 2015. Their decision to opt for long-term stability paid off in the fall of 2005, when escalating natural gas prices pushed Austin Energy's conventional electricity costs higher than their GreenChoice® power pricing.

Long-term, fixed price contracts for green energy were negotiated with power producers that include the wind farms in McCamey and Sweetwater Texas. Austin Energy purchases 100% of the electricity produced by these 120 turbines – enough to power 35,000 Austin homes. Austin Energy, in turn, provides power at a fixed price to more than 7,000 retail customers and over 400 corporate customers – saving them about US $670,000 annually.

Due to an overwhelming demand, Austin Energy's GreenChoice® program is now fully subscribed leaving the utility searching for more clean energy for waiting customers.

Canadian utilities are following Austin's example. For a list of companies across Canada that sell green power we invite you to visit: **www.canwea.ca/en/GreenPower.html**

Canadian Wind Energy Association
Powering Canada's future naturally
Toll Free: 1.800.922.6932
T: 613.234.8716 / F: 613.234.5642
www.canwea.ca

Natural Resources Canada | Ressources naturelles Canada

CanWEA acknowledges the contribution of Natural Resources Canada.

1: Source: http://www.naturalgas.org/overview/uses_eletrical.asp
2: Source: Canadian Association of Petroleum Producers
3: Easing the Natural Gas Crisis: Reducing Natural Gas Prices through Increased Deployment of Renewable Energy and Energy Efficiency, Wiser & Bolinger
4: Source: Austin Energy (http://www.austinenergy.com)
5: Source: National Association of State PIRGs

Lessons learned.

Lessons were learned from one of the first major wind farm projects in North America. Established in the 1970s, Altamont Pass was problematic for birds. As turbines at Altamont are replaced, newer, fewer and bigger models take their place, making air space around the wind turbines safer for birds.

Today, the wind energy industry has put procedures in place to enhance our understanding of birds and how they interrelate with wind turbines. The modern wind farm undergoes a series of environmental assessments before being approved. In this process, the proposed site will be monitored and bird populations evaluated. What kinds of birds are on site? What are their habits, flight patterns? Do they nest in the area or simply fly through? Questions like these are answered in an effort to better understand on-site bird populations and to mitigate their potential interactions with wind turbines. Once built, further monitoring takes place to better understand the ongoing relationship between birds and the wind farm.

Watching out for wildlife.

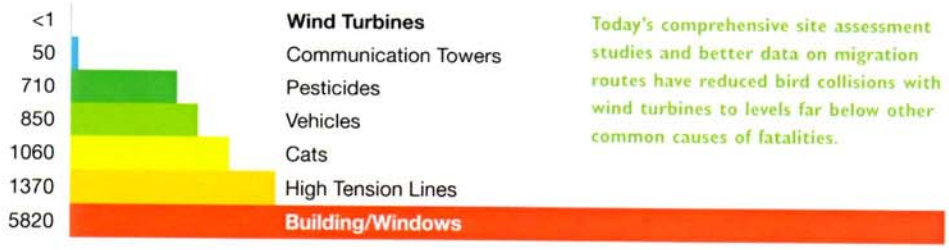
There is an emerging concern about the impact certain wind farms might have on bat populations. As of today, bats and their interactions with wind turbines are far less understood than those of birds.

The wind energy industry has taken a proactive approach to working on this important issue. In the US, conservationists, industry officials and federal agencies are joining forces to address this, as yet, little understood relationship between bats and wind energy. In Canada, we are starting to do the same.

The wind energy industry is very interested in learning more about bats to address any potential problems.[4]

Causes of Bird Fatalities[5]

Number per 10,000 Fatalities



Today's comprehensive site assessment studies and better data on migration routes have reduced bird collisions with wind turbines to levels far below other common causes of fatalities.

PROFILE

Bats and Wind Energy Cooperative (BWEC)

Bat research is underway

Bat behaviour in general, and collisions with wind turbines specifically, is largely understudied. To improve our understanding of this interaction, the Bats and Wind Energy Cooperative (BWEC) was formed in 2003.

BWEC is an alliance of Bat Conservation International, the US Fish and Wildlife Service, the American Wind Energy Association and the National Renewable Energy Laboratory of the US Department of Energy.

During the fall of 2004, BWEC researchers conducted the most detailed studies ever performed on bat fatalities at wind sites. The primary goal of this research was to improve fatality search methods and observe bat/turbine interactions. Research techniques included video and thermal imaging which provided new insights on flight, predation and roosting behaviours. This was the first time these observations were made in the rotor-swept zone of operating turbines.

This and on-going research by BWEC is rapidly advancing our understanding of bat fatalities at wind farms and is only possible with the continued support of the wind energy industry.

To review this, and other research, including the study mentioned above, please visit: http://www.batcon.org/home/index.asp?idPage=55 &idSubPage=30

Canadian Wind Energy Association
Powering Canada's future naturally
Toll Free: 1.800.922.6932
T: 613.234.8716 / F: 613.234.5642
www.canwea.ca

Natural Resources Canada Ressources naturelles Canada

CanWEA acknowledges the contribution of Natural Resources Canada.

4: http://www.nationalwind.org/workgroups/wildlife/publications_catalog.pdf

5: Source: A Summary and Comparison of Bird Mortality from Anthropogenic Causes with an Emphasis on Collisions, Erickson, et. al

WIND FACTS

HEALTH

Wind energy is generating clean electricity, new jobs and economic development opportunities in communities across the country. While wind energy has enjoyed growing success in many countries for several decades, it is a relatively new contributor to the power system here in Canada. As such, it is natural for people to ask questions. As a responsible industry, we are committed to ensuring Canadians have the most up-to-date factual information on wind energy.

Wind Energy: Providing Clean and Safe Power

A growing body of peer-reviewed scientific evidence clearly indicates there is no direct link between wind turbines and health effects in humans.

One of the most thorough examinations of the issue to date is a report released in December 2009 by an expert panel of medical doctors, audiologists, and acoustical professionals. The panel, established by CanWEA and the American Wind Energy Association, reviewed existing scientific literature on the perceived health effects of wind turbines and concluded there is "nothing unique" about the sounds they emit and no evidence they could plausibly have direct adverse physiological effects.

(continued on next page)

"According to the scientific evidence, there isn't any direct causal link between wind turbine noise and adverse health effects."[1]

-Dr. Arlene King, Ontario's Chief Medical Officer of Health

WINDVISION 2025
POWERING CANADA'S FUTURE

www.canwea.ca

canwea
CANADIAN WIND ENERGY ASSOCIATION | ASSOCIATION CANADIENNE DE L'ÉNERGIE ÉOLIENNE

Ontario's Chief Medical Officer of Health and the National Public Health Institute in Quebec reached the same conclusion in their own independent reviews of available evidence.

Responsible siting of projects and meaningful community engagement will address any sound impacts for neighbouring homes and communities. Ontario, for example, has the most stringent regulations in Canada with its requirement that turbines be at least 550 metres from dwellings.

Wind power for clean air.

While operating, wind turbines are powered by wind, producing no greenhouse gasses or pollution.

WHAT DO THE EXPERTS SAY?

"The body of accumulated knowledge provides no evidence that the audible or sub audible sounds emitted by wind turbines have any direct adverse physiological or health effects."

Dr. Robert McCunney, Pulmonary Division Specialist in Occupational and Environmental Medicine, Massachusetts General Hospital, Wind Turbine Sound and Health Effects: An Expert Panel Review

"The infrasound generated by wind turbines is not of sufficient intensity to cause health problems, or even a nuisance."

National Public Health Institute of Québec study, 2009

"Ontario doctors, nurses and other health professionals support energy conservation combined with wind and solar power, to help us move away from coal."

2011 advertising campaign sponsored by the Ontario College of Family Physicians, Registered Nurses Association of Ontario, the Asthma Society of Canada and the Ontario Lung Association

Interested in learning more? These links will take you to PDFs:

Wind Turbine Sound and Health Effects: An Expert Panel Review
(www.canwea.ca/pdf/talkwind/Wind_Turbine_Sound_and_Health_Effects.pdf)

Executive Summary, Conclusions and Panel Member Biographies
(www.canwea.ca/pdf/talkwind/Wind_Turbine_Sound_and_Health_Effects-Executive_Summary.pdf)

The Potential Health Impacts of Wind Turbines (report by Ontario Chief Medical Officer of Health)
(www.health.gov.on.ca/en/public/publications/ministry_reports/wind_turbine/wind_turbine.pdf)

Wind Turbines and Public Health (study by National Public Health Institute of Québec)
(www.inspq.qc.ca/pdf/publications/1015_EoliennesSantePublique.pdf)

[1] The Potential Health Impacts of Wind Turbines. (Ontario Chief Medical Officer of Health, May 2010)

WINDVISION 2025
POWERING CANADA'S FUTURE

www.canwea.ca

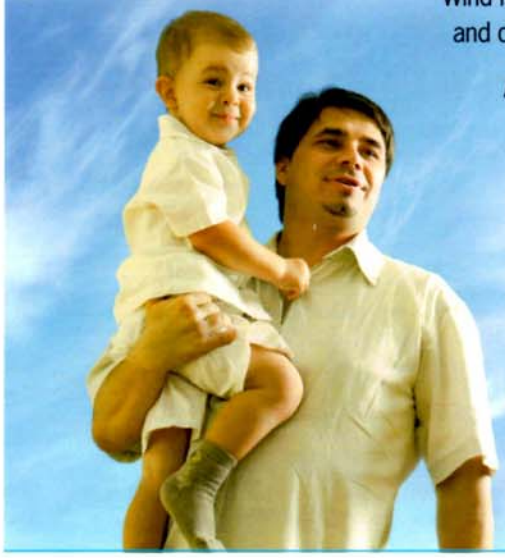
canwea
CANADIAN WIND ENERGY ASSOCIATION | ASSOCIATION CANADIENNE DE L'ÉNERGIE ÉOLIENNE

WIND FACTS

PRICING

Wind energy is generating clean electricity, new jobs and economic development opportunities in communities across the country. While wind energy has enjoyed growing success in many countries for several decades, it is a relatively new contributor to the power system here in Canada. As such, it is natural for people to ask questions. As a responsible industry, we are committed to ensuring Canadians have the most up-to-date factual information on wind energy.

Wind Energy: A Reliable and Affordable Source of Power



Wind is an affordable source of new energy supply that protects against unpredictable fuel and carbon costs.

Any new source of electricity generation is going to cost more than the current generating plants, built and paid for decades ago, that now supply most of Canada's electricity. Among today's options, wind energy stacks up well. Wind is extremely competitive with new installations of coal, hydro, and nuclear power, when the cost of health and environmental impacts are considered.[1, 2]

The price we pay for wind today, though, is only one part of its value proposition.

Wind turbines do not use fossil fuels for producing electricity; this means that once a wind farm is built, the price of the electricity it produces is set and remains at that level for the entire life of the wind farm. In a time of increasing price volatility of traditional sources of energy, the price stability from wind farms

(continued on next page)

provides important protection for consumers. There is no guarantee, for example, that natural gas will remain at today's low prices over the long term. Natural gas prices vary over time with changes in supply and demand – just a few years ago electricity from natural gas-fired projects was more expensive than electricity from wind.

Because wind requires no fuel, produces very little waste and consumes barely any water during operation, it also provides a hedge against the risk and uncertain costs of complying with future greenhouse gas emission restrictions and other environmental regulations.

Jurisdictions in Canada and around the world have developed strategies for capturing the value that wind energy brings to a power system. Feed-in tariffs (FIT), used successfully in countries like Germany, Spain, and France, are a well-established way of creating a stable market for renewable energy investment by providing predictable revenue to wind producers and increasing their access to financing. Ontario's FIT program is the first of its kind in North America, and is helping attract billions of dollars in new investment to the province.

WHAT DO THE EXPERTS SAY?

In 2010, the Ontario Power Authority paid electricity resource costs of $317 million for conservation programs, and $269 million for renewables. That is a lot of money – but you must realize that it is recovered over a total Ontario consumption in 2010 of 142 terawatt hours (that's 142,000,000,000 kWh), which amounts to 0.4 cents per kWh (split roughly equally between conservation and renewable subsidies). So the cost of conservation and all the renewable subsidies in 2010 amounted to 0.4 cents of the 13 cents we paid for a kWh in our homes.[3]

"Once the investment is made, you have a secure price for that power over many, many years. So we're looking for certainty in the electricity supply. This is one way to take out some of the volatility in the marketplace."

Nova Scotia Premier Darrell Dexter, March 2010

The California Energy Commission calculates that a new gas-fired combined cycle power plant has a levelized cost of operation of $115 per MWh.[4] Add $20/MWh to cover the estimated cost of environmental and health damages[5] and the total is $135/MWh – exactly the same as Ontario's feed-in tariff rate for onshore, non-community based wind energy.

Interested in learning more?

The Oil Drum, an energy information website, analyzes the cost of wind, the price of wind, the value of wind (**www.theoildrum.com/node/5354**). Lazard's Levelized Cost of Energy Analysis (**www.blog.cleanenergy.org/files/2009/04/lazard2009_levelizedcostofenergy.pdf**) and the World Economic Forum's report on Green Investing 2011 (**www.weforum.org/reports/green-investing-2011**) compare the cost of some generating technologies.

Sources:

1. Mining coal, mounting costs: The life cycle consequences of coal. Centre for Health and The Global Environment, Harvard Medical School, January 2011
2. Behind the switch: pricing Ontario electricity options, The Pembina Institute, July 2011
3. The True Cost of Renewable Energy and Conservation, Environmental Commissioner of Ontario, March 2011. http://www.eco.on.ca/blog/2011/03/22/the-true-cost-of-renewable-energy-and-conservation/
4. Comparative Costs of California Central Station Electricity Generation. (California Energy Commission, January 2010). Table 4, page 3
5. Cost Benefit Analysis: Replacing Ontario's Coal-Fired Electricity Generation. (DSS Management Consultants, RWDI Air Inc; April 2005), page ii.

WINDVISION 2025
POWERING CANADA'S FUTURE

www.canwea.ca

canwea
CANADIAN WIND ENERGY ASSOCIATION | ASSOCIATION CANADIENNE DE L'ÉNERGIE ÉOLIENNE

WIND FACTS

PROPERTY VALUES

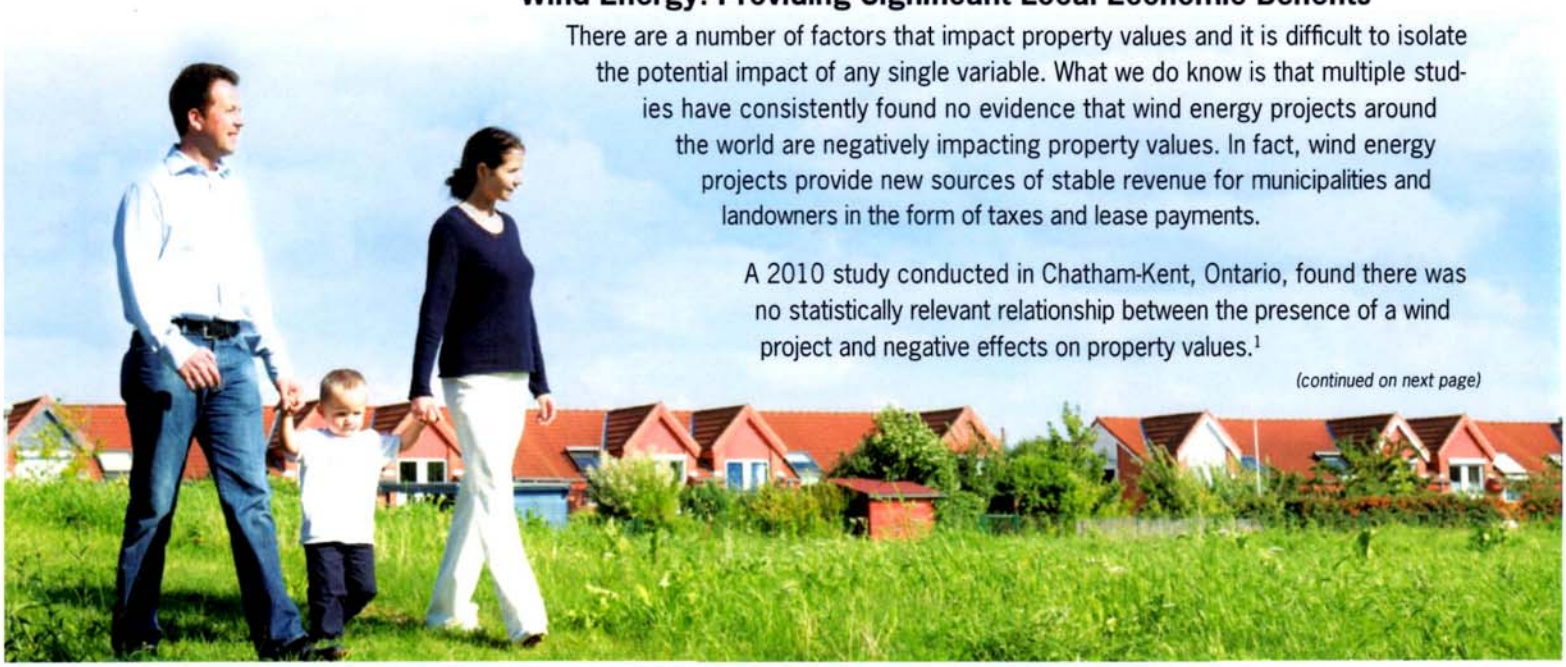
Wind energy is generating clean electricity, new jobs and economic development opportunities in communities across the country. While wind energy has enjoyed growing success in many countries for several decades, it is a relatively new contributor to the power system here in Canada. As such, it is natural for people to ask questions. As a responsible industry, we are committed to ensuring Canadians have the most up-to-date factual information on wind energy.

Wind Energy: Providing Significant Local Economic Benefits

There are a number of factors that impact property values and it is difficult to isolate the potential impact of any single variable. What we do know is that multiple studies have consistently found no evidence that wind energy projects around the world are negatively impacting property values. In fact, wind energy projects provide new sources of stable revenue for municipalities and landowners in the form of taxes and lease payments.

A 2010 study conducted in Chatham-Kent, Ontario, found there was no statistically relevant relationship between the presence of a wind project and negative effects on property values.[1]

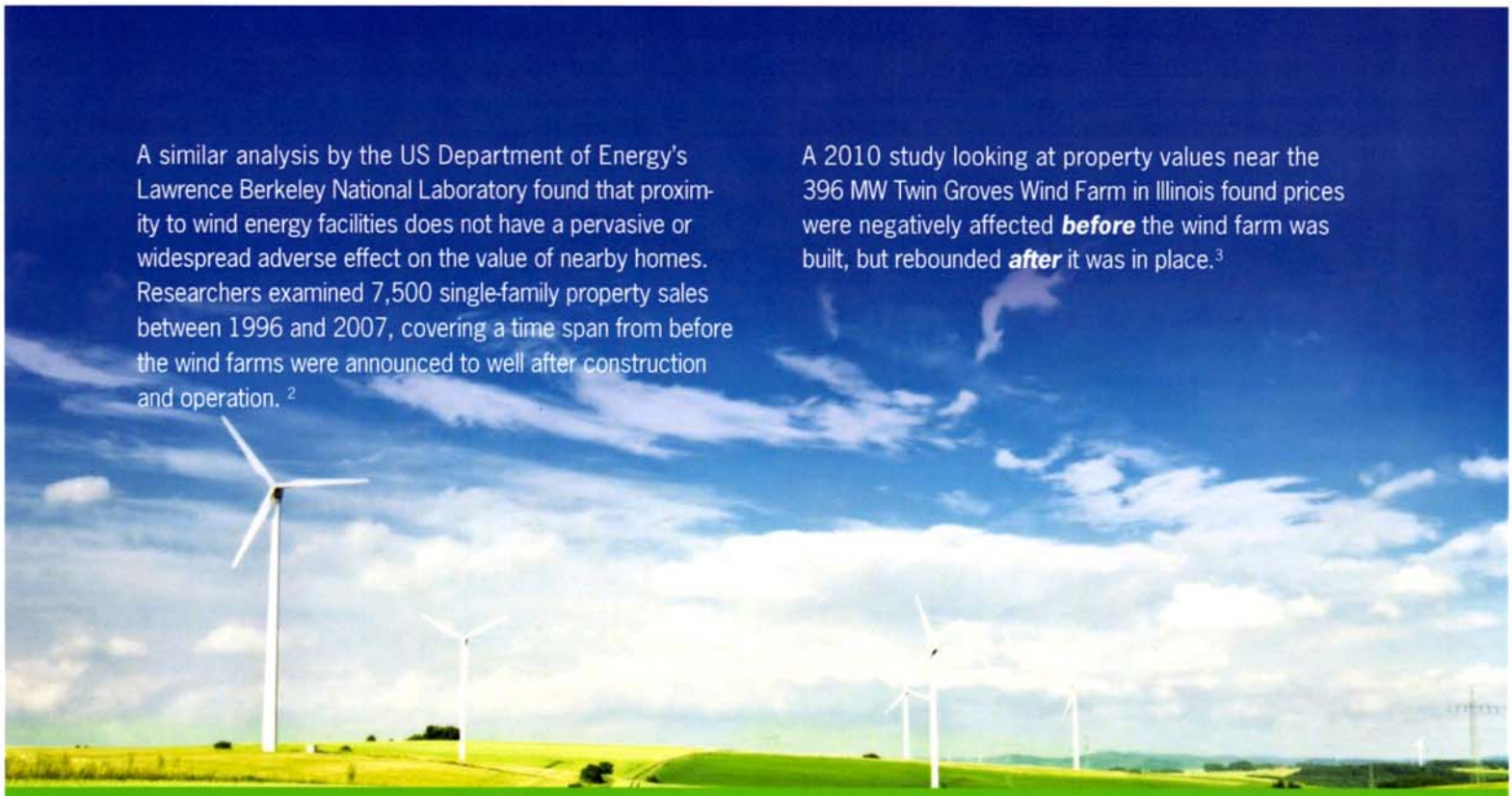
(continued on next page)



WINDVISION 2025
POWERING CANADA'S FUTURE

www.canwea.ca

canwea
CANADIAN WIND ENERGY ASSOCIATION | ASSOCIATION CANADIENNE DE L'ÉNERGIE ÉOLIENNE



A similar analysis by the US Department of Energy's Lawrence Berkeley National Laboratory found that proximity to wind energy facilities does not have a pervasive or widespread adverse effect on the value of nearby homes. Researchers examined 7,500 single-family property sales between 1996 and 2007, covering a time span from before the wind farms were announced to well after construction and operation. [2]

A 2010 study looking at property values near the 396 MW Twin Groves Wind Farm in Illinois found prices were negatively affected ***before*** the wind farm was built, but rebounded ***after*** it was in place.[3]

WHAT DO THE EXPERTS SAY?

"The Board finds there is no evidence to allow the Board to conclude that since the construction of the wind farm properties on what [the landowner] defines as the west side of the Island have sold for less than properties on the east side."

Assessment Review Board. Commission de révision de l'évaluation foncière. File No: WR 113994. Municipality: Township of Frontenac Islands

"Based on the data sample and analysis presented here, no evidence is found that home prices surrounding wind facilities are consistently, measurably, and significantly affected by either the view of wind facilities or the distance of the home to those facilities."

The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonistic Analysis

"In the study area, where wind farms were clearly visible, there was no empirical evidence to indicate that rural residential properties realized lower sales prices than similar residential properties within the same area that were outside the viewshed of a wind turbine."

Wind Energy Study – Effect on Real Estate Values in the Municipality of Chatham-Kent

"During the operational stage of the wind farm project, when property owners living close to the wind turbines actually had a chance to see if any of their concerns materialized, property values rebounded."

Wind Farm Proximity and Property Values: A Pooled Hedonistic Regression Analysis of Property Values in Central Illinois

Sources:

1. Wind Energy Study - Effect on Real Estate Values in the Municipality of Chatham-Kent (Canning Consultants Inc. and John Simmons Realty Services Ltd., February 2010)

2. The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonistic Analysis (Ben Hoen, Ryan Wiser, Peter Cappers, Mark Thayer, and Gautam Sethi, December 2009)

3. Wind Farm Proximity and Property Values: A Pooled Hedonistic Regression Analysis of Property Values in Central Illinois (Jennifer L. Hinman, May 2010)

WINDVISION 2025
POWERING CANADA'S FUTURE

www.canwea.ca

canwea
CANADIAN WIND ENERGY ASSOCIATION | ASSOCIATION CANADIENNE DE L'ÉNERGIE ÉOLIENNE

The sights and sounds of wind.

People have a lot of questions about wind turbines and what they look and sound like. Are they really big? How much sound do they make? What will it look like when a wind farm goes up in my community?

Far from being disinterested, developers want to answer these questions and more because building wind farms that address the needs and wishes of local communities is the way to build an industry that benefits all Canadians.

photos courtesy of Vision Quest

"Tour of the windmills was a surprise and very informative. Great exhibit lovely place" From the visitor guest book in the interpretive centre of the Wind Energy Institute of Canada

It's not just the view – it's the vision that counts.

The eye of the beholder.

Let's face it. There's no hiding a wind turbine. They are 30 stories tall and tend to be set in clusters. Having said that, many people find beauty and elegance in these sleek and modern structures. Many of these people are residents who live closest to wind farms.

Studies in Denmark and in other European countries where wind farms are prevalent show that proximity to the nearest turbine seems to have a surprising effect on people's attitudes. Residents who live closer than 500 meters to the nearest wind turbine tend to be even more positive about wind energy than people sited further away. [1]

Designing for the future.

Developers recognize that visual impacts are a concern for the community. That's why so much effort goes into the planning stages of a wind energy project. Developers are always looking for new and innovative ways to reduce impacts and gain the consent of the community.

There are computer modelling programs that use Geographic Information Systems (GIS) technology to show residents exactly what the landscape will look like once the farm is installed. These programs provide the community with visual answers to their questions. Residents get to see the farm from different perspectives, including how it may look from the local community centre or church – or even someone's living room window.

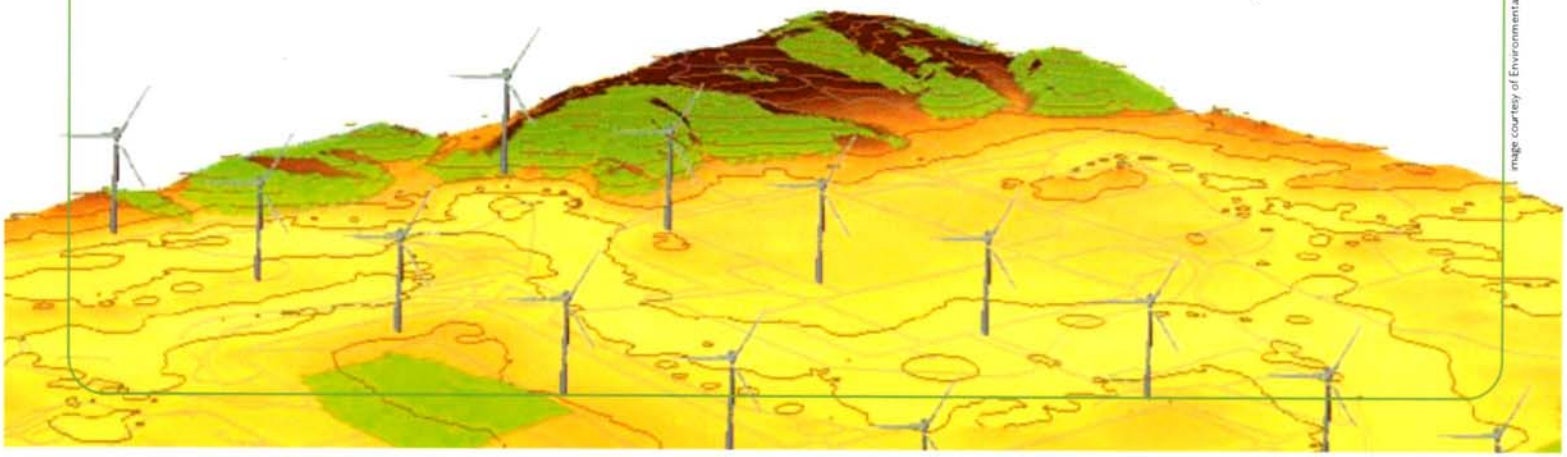


image courtesy of Environmental Systems Research Institute, Inc. (ESRI Canada)

photo courtesy of Vision Quest

CASE STUDY

Wind Energy Institute of Canada, PEI

Site draws 60,000 visitors annually

photo courtesy of WEIC

Noise reduction.

Are modern wind turbines noisy? The answer is no. Any mechanical device has the potential for mechanical noise – the sound that is emitted when two parts rub together. The good news is that this type of sound has virtually disappeared from today's well-engineered modern turbine.

In fact, turbines are so quiet that it's possible to carry on a normal conversation at the base.[2] At 300 meters from the base, the sound they make has been electronically measured and compared to a whispering voice.

Wind turbines operate under windy conditions, the harder the wind blows the faster the turbines spin. However, much of the sound from the blades is masked by the sound of the wind itself and of the accompanying sound of rustling leaves in nearby trees and shrubs.[3]

Wind farms and popular culture.

Where can wind turbines and wind farms be seen today? If you live near a wind farm, you can always visit. If you don't, you'd be surprised at where wind turbines are turning up. Look closely and you'll see them in TV ads, music videos and in other forms of popular culture. The wind turbine has even made it onto the 51¢ postage stamp from Canada Post!

Good science constantly helps us discover new information and unexpected results.

The Atlantic Wind Test Site was established in 1980 and by summer 2006 had evolved into the Wind Energy Institute of Canada (WEICan) – a research and testing facility for wind turbine technology. It is funded 70% by Natural Resources Canada and 30% by PEI Energy Corporation.

This site is home to the most diverse mix of wind turbine designs you'll find anywhere on the planet. Small wind turbines; large capacity turbines; giant "egg beater" vertical axis turbines – and all have generated one completely unexpected result – **tourism!**

The almost universal comment from the 60,000 visitors this site attracts each year is their astonishment at how quiet and how beautiful these wind turbines are.

Rave reviews don't end there. Because of the space constraints for WEICan, wind turbines are closer to local dwellings and roadways than would be permitted with present siting guidelines. Despite this, there has not been a single complaint from local residents. On the contrary, locals take great pride in 'their' wind plant and regularly hike along the access roads. To find out more about WEICan, please visit: **www.weican.ca**

Canadian Wind Energy Association
Powering Canada's future naturally
Toll Free: 1.800.922.6932
T: 613.234.8716 / F: 613.234.5642
www.canwea.ca

Natural Resources Canada | Ressources naturelles Canada

CanWEA acknowledges the contribution of Natural Resources Canada.

1: Andersen et al. (1997). Rapport om hvordan en dansk kommune blev selvforsynende med ren vindenergi og skabte ny indkomst til kommunens borgere. Nordvestjysk Folkecenter for Vedvarende Energi. Bishop et Proctor (1994).

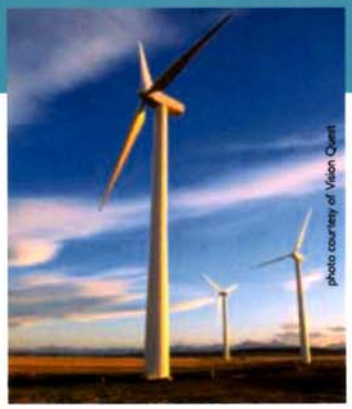
2: http://www.awea.org/pubs/factsheets/WE_Noise.pdf

3: http://www.bwea.com/ref/noise.html

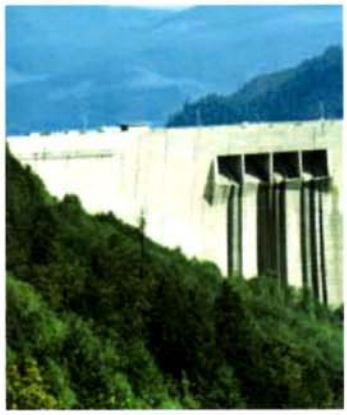
Wind power is here.

Wind power is determined by more than just how and when the wind blows. Wind energy is the culmination of years of studying the wind and perfecting the technology that harnesses it.

Wind is reliable and has the power to make a significant contribution to Canada's energy needs. In Denmark, 20% of electricity demand is currently met by wind energy. With our abundant resource, there's no reason why we couldn't follow their lead – and the Canadian wind energy industry is here to capture that potential.



"Wind has an availability factor of 98% – much higher than conventional forms of energy production."[1]



As long as there is wind, there will be wind power.

Changing winds.

Everyone knows that the wind is variable. Sometimes it blows, other times it doesn't. So how can wind power be a reliable source of energy? The answer to that lies in how we plan for variability.

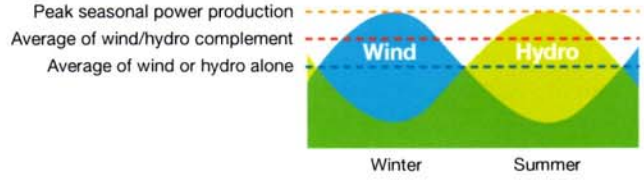
Most turbines are located in sites where there's enough wind to produce electricity 70-80% of the time. Naturally, the amount of electricity produced varies with the wind. The way we manage for this variability is to locate wind farms in different geographical areas so that turbines can take advantage of different prevailing winds. The fact is, the wind will never stop blowing everywhere at once – even within a single wind farm, it's unlikely that all the turbines stop spinning at one time. With Canada's large and varied wind resource, there's no doubt that the wind can power us well into the future.

The power of two.

In Canada, we would never rely on wind turbines alone to meet the entire country's electricity needs. Instead, we use wind in conjunction with other forms of compatible energy production.

One example is wind and hydro-electric. These two sources of energy are a natural fit. In the winter, wind is at its peak, allowing hydro to store energy for use when wind productivity is lower. Hydro dams can be closed relatively quickly allowing water reserves to build when peak wind is in full swing.

In the spring and fall, hydro is at its peak production and wind energy serves as its supplement. It's interesting to note how wind energy can help us better manage our precious water resources.



WIND POWER IS RELIABLE


photo courtesy of Vision Quest

"The variability of wind matches the variability of demand. Generally wind is strongest in cold-weather months when our demand for electricity is highest."[1]

Capturing the energy of wind.

Estimating energy productivity is done through a calculation called capacity factor. If a power plant produced at full capacity 100% of the time, it would have a capacity factor of 100%. Of course, wind is variable, so it doesn't have a 100% capacity factor – but neither does any other form of energy. No energy source, conventional or otherwise, works 100% of the time. It's simply impossible.

There are periods when power plants shut down for maintenance and repairs. There are times when resources run low or when unexpected outages occur.

One of the greatest attributes of wind is that it blows hardest – and therefore generates more electricity – in the winter. Wind power offers an opportunity to add more green energy to the grid and to add it during the coldest months of the year, when demand is heavy.

Wind turbines are reliable.

Wind-generated power is a reliable source of electricity. Wind turbines have one of the highest availability factors – a term that refers to the reliability of the turbines and the percentage of time that a plant is ready to generate energy. Wind has an availability factor of 98% – much higher than conventional forms of energy production.

Maintenance issues are also much smaller on a wind farm. At some conventional power plants, the entire plant may have to be shut down for repairs whereas at a wind farm maintenance takes place one turbine at a time.

Enhanced technology and design improvements have also played a part in increasing the reliability of wind power allowing turbines to generate electricity in all but the most extreme weather conditions. Plus wind forecasting technology has the potential to make wind energy more predictable and more reliable than ever before.

Yes, it's true; the wind blows some of the places all of the time, and all of the places some of the time – but it can't blow everywhere at once.

Wind is variable, but with good site selection, wind farms have access to strong and steady winds.

As of June, 2006, Canada's installed capacity was 1,049 MW – enough to power about 315,000 Canadian homes.

CASE STUDY

North Cape Wind Farm, PEI

Owner/operator:
PEI Energy Corporation


photo courtesy of PEI Energy Corporation

On line since 2001, PEI Energy Corporation's North Cape Wind Farm – sited in one of Canada's windiest locations – has an installed capacity of 10.56 MW. With a capacity factor of 40%, it generates about 35,000 MWh annually – enough to supply 3% of PEI's electricity requirements, or about 5,000 PEI homes.

Together, with other wind farms, PEI will have 52 MW of installed wind capacity by mid 2007.

It's estimated that PEI could develop 200 MW of wind energy by 2015. PEI currently imports over 90% of its electricity from New Brunswick. By exporting excess wind energy during periods when production exceeds demand, it's feasible that PEI could net out as an energy self-sufficient province.

Purchasing agreement: North Cape Wind Farm's power is sold to Maritime Electric Company Limited for distribution. Maritime Electric can sell the power through their Green Power Program, which allows customers to purchase it at a premium price. This green power premium is passed along to PEI Energy Corporation. If the electricity available under this program becomes fully subscribed, then additional wind powered generators may be installed on PEI.

Canadian Wind Energy Association
Powering Canada's future naturally
Toll Free: 1.800.922.6932
T: 613.234.8716 / F: 613.234.5642
www.canwea.ca

Natural Resources Canada | Ressources naturelles Canada

CanWEA acknowledges the contribution of Natural Resources Canada.

1: Source: http://www.awea.org/faq/tutorial/wwt_basics.html
2: Source: http://www.windpower.org/en/tour/grid/season.htm

BLOWING SMOKE

Correcting Anti-Wind Myths in Ontario

environmental defence
INSPIRING CHANGE

OSEA
Ontario Sustainable Energy Association

environmental defence
INSPIRING CHANGE

OSEA
Ontario Sustainable Energy Association

ENVIRONMENTAL DEFENCE is Canada's most effective environmental action organization. We challenge, and inspire change in government, business and people to ensure a greener, healthier and prosperous life for all.

OSEA inspires and enables the people of Ontario to improve their environment, the economy and their health by producing clean, sustainable energy in their homes, businesses and communities.

ENVIRONMENTAL DEFENCE
116 Spadina Avenue, Suite 300
Toronto, Ontario M5V 2K6

www.environmentaldefence.ca

ONTARIO SUSTAINABLE ENERGY ASSOCIATION
156 Front Street West, Suite 201
Toronto, Ontario M5J 2L6

www.ontario-sea.org

INTRODUCTION

Ontario's communities must be more involved in the benefits and management of wind power projects. A $2.3 trillion[1] dollar race is unfolding around the world over the next decade to see who will gain the investment and jobs from the global clean energy shift now well underway. The degree to which Ontario secures the buy-in of its citizens will determine whether it will remain a leader in this race and in securing the benefits, or whether it will fall behind and be stuck with an old, polluting economy.

There is no doubt that the building of a wind power facility brings change to where it is located. Some people see the aesthetics of windmills as hopeful and beautiful while others see them as intrusive and ugly. Some benefit from rent or jobs related to the project, while others nearby do not. Taken together, the change, particularly when rapid, can bring controversy. This is now true in parts of Ontario.

Yet into these controversies has stepped a small group of anti-wind activists who have taken advantage of local concern to spread misinformation and fear. They have claimed, with no scientific backing, that there are health impacts. They have claimed, counter to the evidence, that wind power doesn't work or doesn't have benefits. They have succeeded in creating a misinformed backlash against wind power that now jeopardizes jobs, investment and environmental progress in Ontario.

A big part of the response to this situation must come from better practices by the Ontario government and wind power companies. More community-owned power projects must emerge to spread greater benefits to local communities. Earlier and better consultation with local communities must take place as projects are designed and implemented. Environmental assessments must be robust, and facility siting decisions done well. Communities must be real partners in development.

Another part of the response, however, must be to correct the record regarding the misinformation now being spread by anti-wind activists. Communities will not be able to make informed decisions while they are subjected only to a litany of fear-based arguments by those who simply want to shut down the industry. Ontario will not be able to be a leader in clean energy if it is held hostage by those whose only answer is "no."

This report aims to correct the main myths of the anti-wind activists, using credible scientific, mainstream sources to counter the collection of unfounded and unproven opinions promoted by those with only one agenda, to stop wind power.

Whether you live in a local community with a wind power project, are a member of a local council, are a member of the media or are simply an interested party, we hope you will take the time to research the issues for yourself so that you can come to your own informed opinion. Our future depends on getting it right.

Myth 1: **Health impacts**

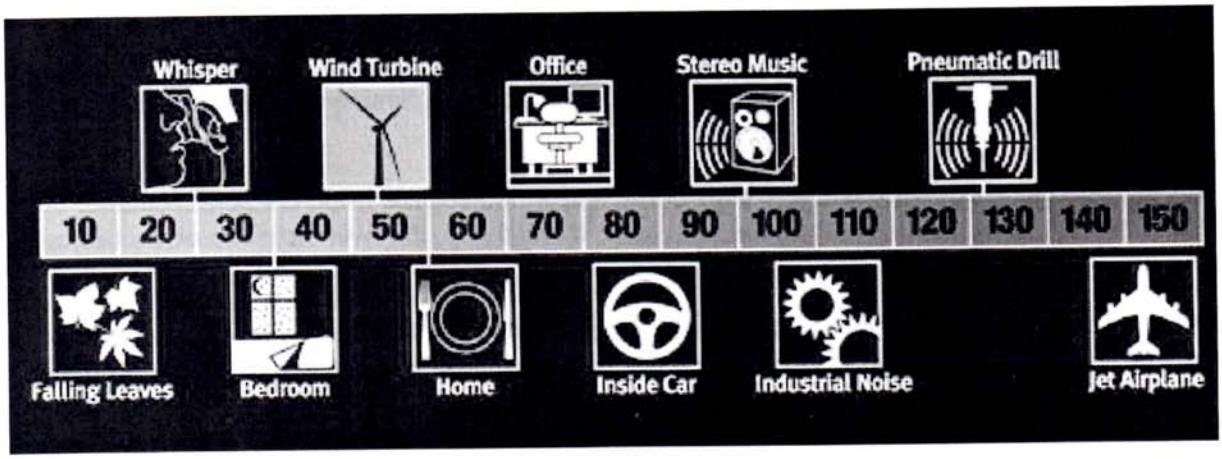
Reality: **Repeated studies around the world have found no scientific evidence of health impacts from wind power projects.**

The use of windmills dates back to Persia as early as 200 BC. Many think of the picturesque Dutch windmills used to drain the Rhine delta in the 14th century. The first electricity generating windmills were installed in 1887 in the U.K. and the U.S.. By 1900 Denmark had about 2,500 windmills in service. Around World War I, American windmill makers were producing 100,000 units a year for water pumping on farms and ranches. In 2010 there were enough installed windmills worldwide to produce 430 terrawatt (TW) hours per year, more than the total electricity demand of the U.K..[3]

In short, people have been living around and using all kinds of windmills for many generations. All of these windmills through history, whether for electricity or otherwise, have made a sound when turning. Now, though, anti-wind activists are alleging that the sounds of windmills lead to health impacts.

Ontario's current setbacks establishing a distance of at least 550m (six football fields long) between windmills and residences are designed to limit a person hearing windmill sounds to under 40 decibels (dB), comparable to indoor background sound, and a level that the World Health Organization says is below the level at which impacts on sleep occur.[4] This is not to say, however, that people cannot hear the sound of wind power installations, or that weather-related events like temperature inversions can't help project sounds further away.[5] Even with the setbacks, good siting decisions must still be made in consultation with the community, and the wind industry must keep developing quieter blades.

Comparison of everyday noises to utility-scale turbine sounds CREDIT: PEMBINA INSTITUTE, 2009



Even at a distance, some people still find the sound "annoying," and those perceptions deserve respect. Studies show, however, that perceptions vary from person to person, depending on their other feelings about windmills. A comprehensive study in Sweden and the Netherlands found that four to 10 per cent of interviewees expressed annoyance at windmill sound levels of 35 to 45 dB, but that this was heavily influenced by whether or not people found the windmills visually ugly (more annoyed) or whether they benefitted from them financially (less annoyed).[6] This speaks to the need to ensure that communities should both better benefit from and work together with local wind power projects.

A more granular anti-wind argument concerns alleged health impacts from "low frequency sound" and "infrasound" - those sounds that we find hard to hear and which are everywhere in the environment, coming from rivers, the wind itself and also from human sources like cars. Yet, after an extensive review, Ontario's Chief Medical Officer of Health concluded that "there is no scientific evidence...to indicate that low frequency sound generated from wind turbines causes adverse health effects."[7] This finding is echoed in scientific reviews done in the U.S., Australia, and Europe.

"It is clear that some people respond negatively to the noise qualities generated by the operation of wind turbines, but there is no peer-reviewed, scientific data to support a claim that wind turbine are causing disease or specific health conditions."

— Evaluation done for **WISCONSIN PUBLIC SERVICE COMMISSION**[12]

While it is important to remain open to new information, it is also important that the information be subject to rigorous scientific analysis, and not taken as fact because it appears on the Internet.

Another issue seized on by anti-wind activists is "shadow flicker" from blades turning in the sunshine that can occur for about 30 minutes at sunrise or sunset when the conditions allow.[8] Flickering shadows or light from all sources affects about five per cent of people who suffer from epilepsy, but the frequency of the flickering needs to be above 2.5 to 3 hertz - well above the rate of flickering associated with windmills turning.[9]

Finally, there are allegations of harm from electromagnetic fields (EMFs) from windmills. While the World Health Organization (WHO) does recognize adverse impacts from human exposure to very high levels of EMFs, such high levels are not associated with windmills.[10] In its extensive study of electromagnetic fields, the WHO has not found any evidence to conclude that exposure to low level electromagnetic fields is harmful to human health.[11]

Myth 2: **Viability**

Reality: **Wind power has been successfully used for decades and the world is rapidly scaling up its use because it works, particularly in light of climate change.**

The first large windmill to feed electricity into the grid did so in 1941 in Vermont.[12] The first modern wind farm was installed in New Hampshire in 1980.[13] Since that time, about 80 countries have installed wind power projects amounting to almost 200 gigawatts (GW) of capacity[14] – for reference, Canada's installed electricity capacity from all sources is 125 GW. Worldwide, wind power has been the fastest growing source of power generation for several years.[15]

Yet, despite all this, anti-wind activists claim that wind power isn't viable. That's certainly news to those thousands of engineers and utility managers around the world who have been successfully using wind power for decades.

A big part of the anti-wind activists' argument regarding viability is that the wind does not blow all the time – the power is intermittent. While this is true, the fact that wind power is part of an overall electricity system connected to multiple wind projects in different places, other electricity sources, and other jurisdictions who can trade electricity means that intermittency can be planned for and dealt with. Indeed, it is being successfully dealt with in countries like Denmark, Germany, and Spain which already have much higher levels of wind power on their grids than Ontario does.

Ontario's Independent Electric System Operator concluded that the province could reach peak wind penetration of 17 per cent with minimal system operation impacts.[16] Denmark is now exploring how it can achieve 50 per cent penetration of wind power by 2025, including the use of 'storage' in district heating systems.[17]

Digging deeper, anti-wind activists claim that wind power must have polluting electricity sources as backup, which just isn't true. Even if it were, it's bizarre to argue for dropping the clean part of the mix, leaving only the dirty part. The reality is that every megawatt hour of wind power delivered to the grid is a megawatt hour that does not have to come from someplace else, clean or otherwise.

At about 2 per cent of Ontario's electricity output by fuel type,[18] wind's intermittency is currently easily dealt with by other sources. Hydro, for example, accounts for about 20 per cent and can be used as a type of storage, drawing down water levels when wind is low and letting them build up when it is strong. Ontario could also explore pumped storage at hydro facilities, using wind power during strong wind periods to pump water back behind dams to release for power later.[19] With a better tie-in to the hydro-rich Quebec grid and more electricity trading with that province, the wind-hydro synergy could improve even more. Manitoba, for example, just signed a $4 billion deal with Minnesota to trade wind and hydro power.[20]

Finally, anti-wind activists allege that wind power isn't viable because it is too expensive. It must be pointed out that if cost is their concern, then they should be arguing against nuclear power, currently Ontario's largest and most expensive source of power, but we rarely hear this from them.

Clean energy in Ontario is currently awarded preferential pricing under the *Green Energy Act.* Nuclear energy in Ontario receives even greater public supports from the province in the form of bailouts for billions in cost overruns. Polluting energy in Ontario does not yet pay for its health and climate impacts that show up in places like hospital costs, although both the provincial and federal governments are moving forward to impose tougher regulations on these sources. Add to this the billions of upgrades to the grid itself that Ontario is finally moving ahead with after years of neglect, and we are left with a complicated picture of what is expensive.

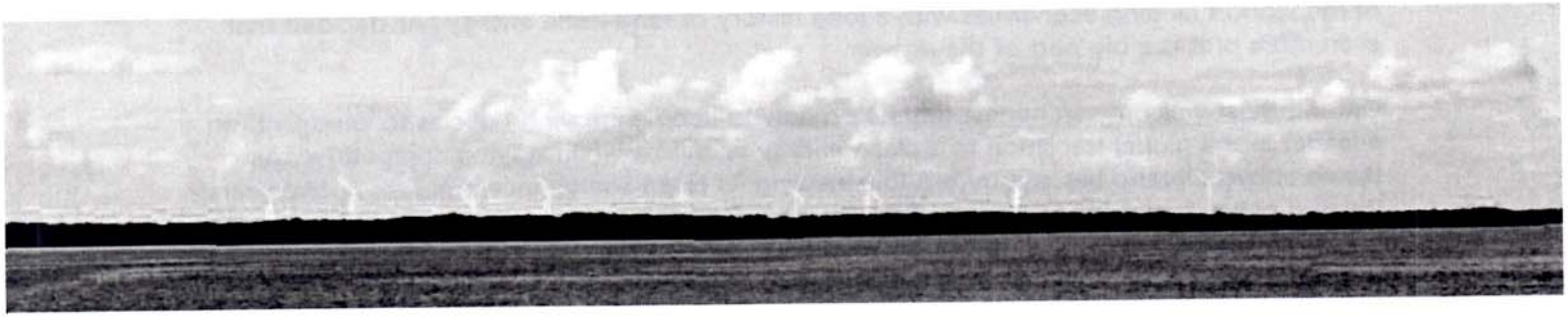
"Wind power is a proven generation technology that is working in today's electrical grids around the world."

— **UNIVERSITY OF MASSACHUSETTS,** Renewable Energy Research Laboratory[22]

So, while anti-wind activists make simplistic allegations that clean energy is responsible for rising power bills, the truth is that other factors have been much bigger drivers. Ontario's Environmental Commissioner recently analyzed the average power bill and found that clean energy incentives account for only about 0.2 cents of the typical 13 cent per kilowatt hour (kWh) that households pay for electricity, with conservation programs accounting for another 0.2 cents.[21]

Since this will go up, however, as more clean energy projects come on line, it is important to note that the Ontario government is going to review its preferential pricing for clean energy every two years.[22] Other jurisdictions like Germany, France and Spain have reduced clean energy incentives over time as the industry matures and achieves technical strength and economies of scale.[23] At the same time, the global shift towards making fossil fuels bear their true costs on health and the climate will only accelerate, reducing the relative cost of alternatives like wind power. It is expected that by 2020, wind power will be cheaper than both nuclear and fossil fuels.[24]

The future of energy will be clean. Will Ontario embrace the future?



Myth 2: **Economic & Environmental Benefits**

Reality: **WInd power is creating thousands of jobs across Ontario and letting us reduce the use of harmful fossil fuels.**

Workers in companies like DMI in Fort Erie, Siemens in Tillsonburg, or Samsung in Windsor would be oddly surprised to find that their jobs "don't actually exist,"[25] as alleged by anti-wind activists. The International Brotherhood of Electrical Workers - Construction Council of Ontario is more than surprised, passionately denouncing efforts to turn the clock back on clean energy as hurting working families, estimating that related projects have resulted in several million person years of employment.[26]

An independent study projects that 80,000 person years of employment will be created in Ontario in the wind industry between 2011 and 2018.[27] These jobs are diverse, ranging from component manufacturing, surveying, engineering, construction, materials supply, operations managers, repair crews, and more.

This sector offers more than a boost for Ontario's struggling manufacturing base. It is also creating a growing field of education and research. Schools like Kingston's St. Lawrence's College are training the next generation of green energy experts, while programs like Repower Ontario help workers make the transition to new careers in the green energy industry.[28]

Another argument seized on by anti-wind activists is that since clean energy incentives are paid for through electricity bills, this drives up the cost of power for industrial users overall, driving away jobs. Some in Ontario are citing the infamous "Spanish" study, a report done by a Spanish author with links to Exxon-Mobil that claimed a net job loss from renewable incentives in Spain. But the report has been thoroughly debunked by the U.S. government and others, including the right-leaning *Wall Street Journal*.[29]

Nonetheless, respected bodies like Ontario's Task Force on Competitiveness, Productivity and Economic Progress has flagged this issue as one to watch, and has opened a discussion about lessons from places like Germany with a longer history of promoting renewable energy than Ontario.[30] It must be noted, though, that the traditionally conservative Germans, under conservative Chancellor Merkel, have recently pledged to double down on renewable energy, rather than move away from it.[31] When faced with tough choices on the future of energy, one of the world's leading economies with a long history of renewable energy has decided that even more of it is a big part of the answer.

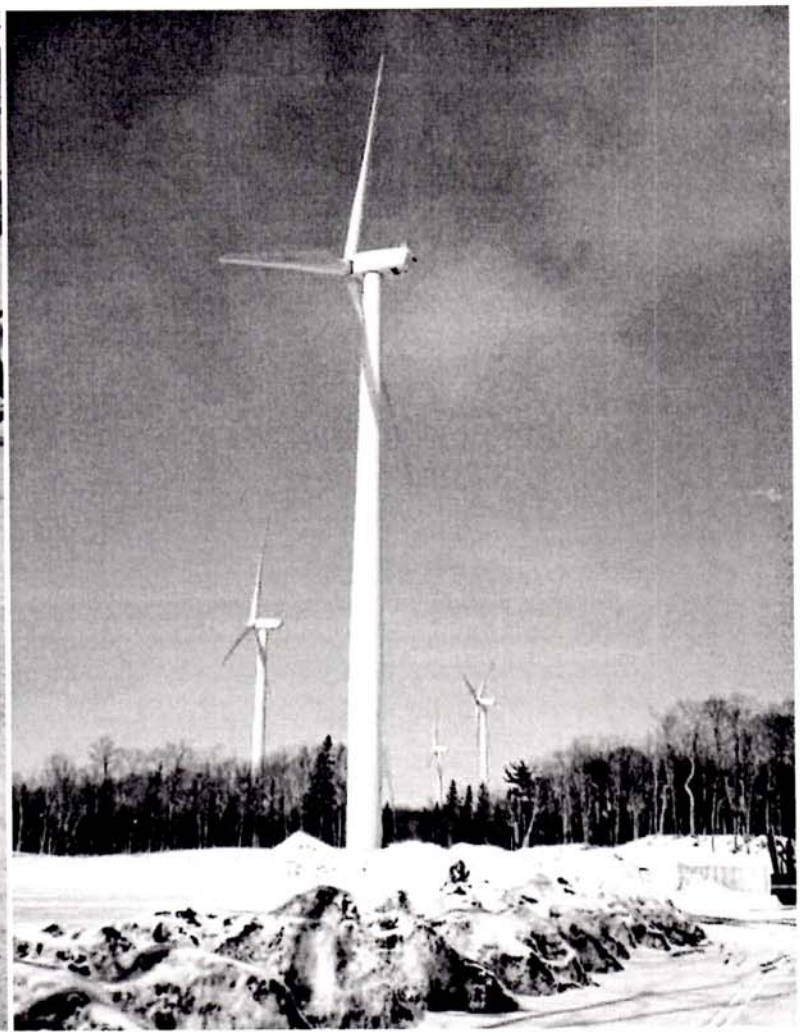
Ontario must welcome an honest debate on how to keep improving policies to keep Ontario a leader in the global transition to a clean energy economy while staying competitive. As stated above, Ontario has committed to reviewing its clean energy incentives every two years. Related policy tools also come into play. The Task Force, for example, advocates a carbon tax to drive renewable energy development and innovation.[32] There is also no reason, though, why a carbon tax and clean energy incentives cannot work hand-in-hand, with revenues from the former helping to finance the latter, for example.

As noted above, every kilowatt hour of electricity from wind power is one less that may need to come from burning fossil fuels to drive turbines. The Ontario Medical Association estimates that air pollution causes thousands of premature deaths each year as well as diseases such as asthma.[33] The Ontario Centre for Climate Impacts and Adaptation Resources outlines other costs to the province in the form of increased heat days, decreases in lake water levels, more fire, drought and pests in our forests, extreme weather events, and more invasive species.[34]

Make no mistake, the stark reality of climate change is forcing us to shift rapidly away from fossil fuels and towards renewable energy. This will also be true of our transportation system, which will necessitate the need for more electricity in that sector, while also providing a new source of storage with the widespread deployment of battery technology in electric vehicles. While Ontario must adjust its clean energy policy over time to learn from experience and to adjust to new developments, there is no turning back on the overall drive towards the deployment of renewable energy, including wind power.

"There is no end to the potential of alternative, non-polluting energy sources."

— PRIME MINISTER STEPHEN HARPER[41]



"Concerns about fairness and equity may also influence attitudes towards wind farms and allegations about effects on health. These factors deserve greater attention in future developments."
ONTARIO CHIEF MEDICAL OFFICER OF HEALTH[35]

"Although opposition to wind farms on aesthetic grounds is a legitimate point of view, opposition to wind farms on the basis of potential adverse health consequences is not justified by the evidence."
DR. DAVID COLBY, Chatham-Kent Acting Medical Officer of Health[36]

"The perception of the noise is also influenced by the attitude of the hearer towards the sound source. This is sometimes called the nocebo effect, which is the opposite of the better known placebo effect. If people have been preconditioned to hold negative opinions about a noise source, they are more likely to be affected by it."
NATIONAL HEALTH AND MEDICAL RESEARCH COUNCIL, Australian Government[37]

"Anti-wind information is widely available for free online and relatively simplistic, while the science debunking these claims is complex and often hidden behind an academic journal's pay-walls."
Ontario journalist ANDREA MCDOWELL[38]

"It is clear that some people respond negatively to the noise qualities generated by the operation of wind turbines, but there is no peer-reviewed, scientific data to support a claim that wind turbines are causing disease or specific health conditions."
Evaluation done for WISCONSIN PUBLIC SERVICE COMMISSION[39]

"The articles cited by those who are in favor of a [wind turbine] moratorium are either from non-peer reviewed journals (though some are labeled as "peer reviewed") or are misinterpreted analyses from peer reviewed journals...If there is any evidence for a moratorium, it is most likely on further use of fossil fuels, given their known and common effects on the health of our population."
DORA ANN MILLS, Maine Center for Disease Control and Prevention[40]

"Wind electricity is both variable and, to some degree, unpredictable, but experience and detailed studies from many regions have shown that the integration of wind energy generally poses no insurmountable technical barriers."
INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE[41]

"Wind power is a proven generation technology that is working in today's electrical grids around the world."

UNIVERSITY OF MASSACHUSETTS, Renewable Energy Research Laboratory[42]

"Renewable energy is an important new source of power generation which will help to reduce CO_2 emissions, stabilize energy costs and support long term prosperity for Canadian businesses."

RBC ROYAL BANK[43]

"Annual income from the wind development has allowed this municipality to achieve sustainability and to reduce property taxes."

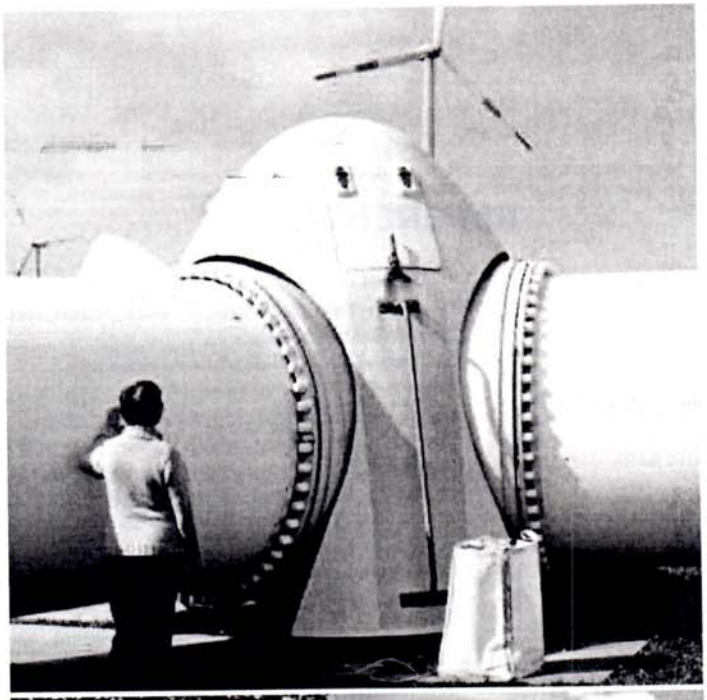
JIM VANDENHOEK, former mayor of Frontenac Islands[45]

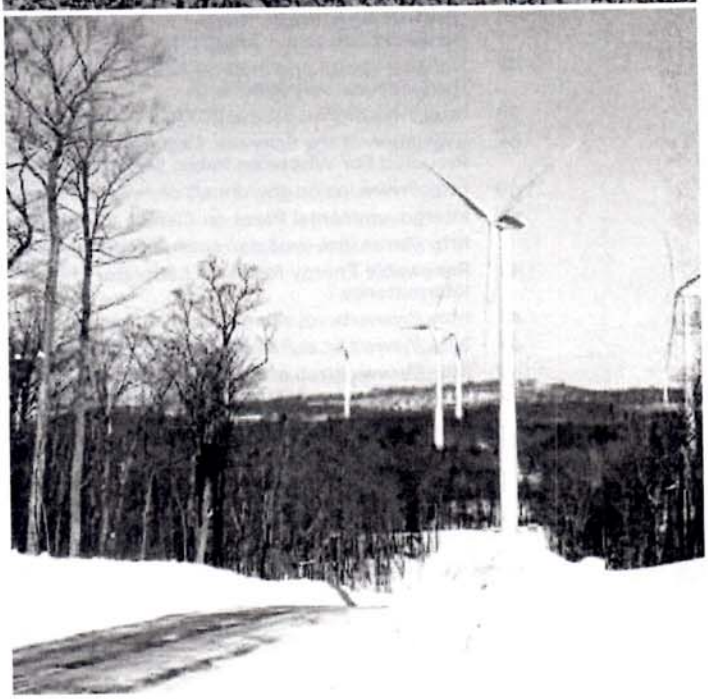
"There is no end to the potential of alternative, non-polluting energy sources."

PRIME MINISTER STEPHEN HARPER[44]

"Design of turbine blades is of course continually being improved; after all, the noise is a sign of inefficiency (rotational energy sacrificed by aerodynamic turbulence), so newer blades are likely to be quieter."

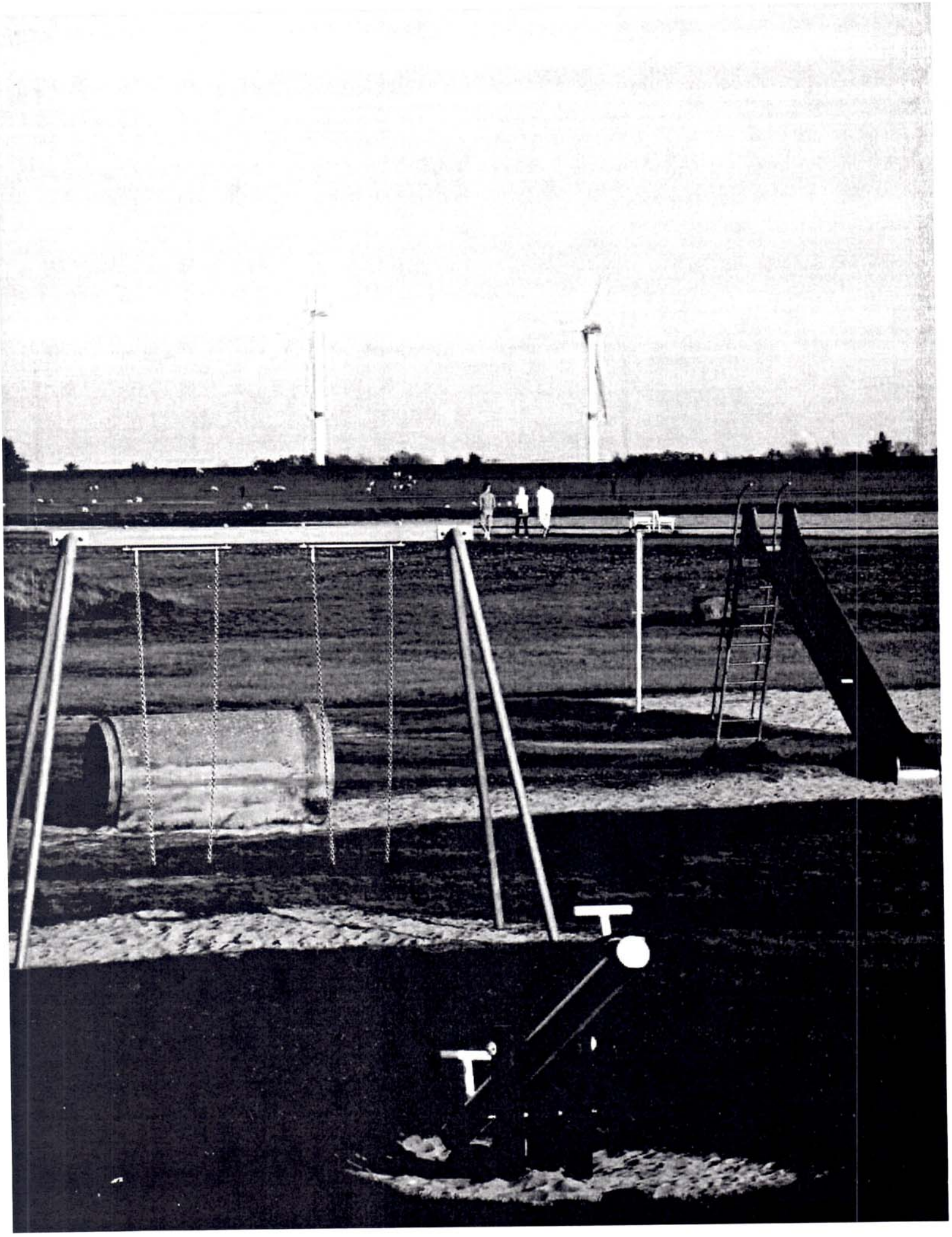
ACOUSTIC ECOLOGY INSTITUTE[45]

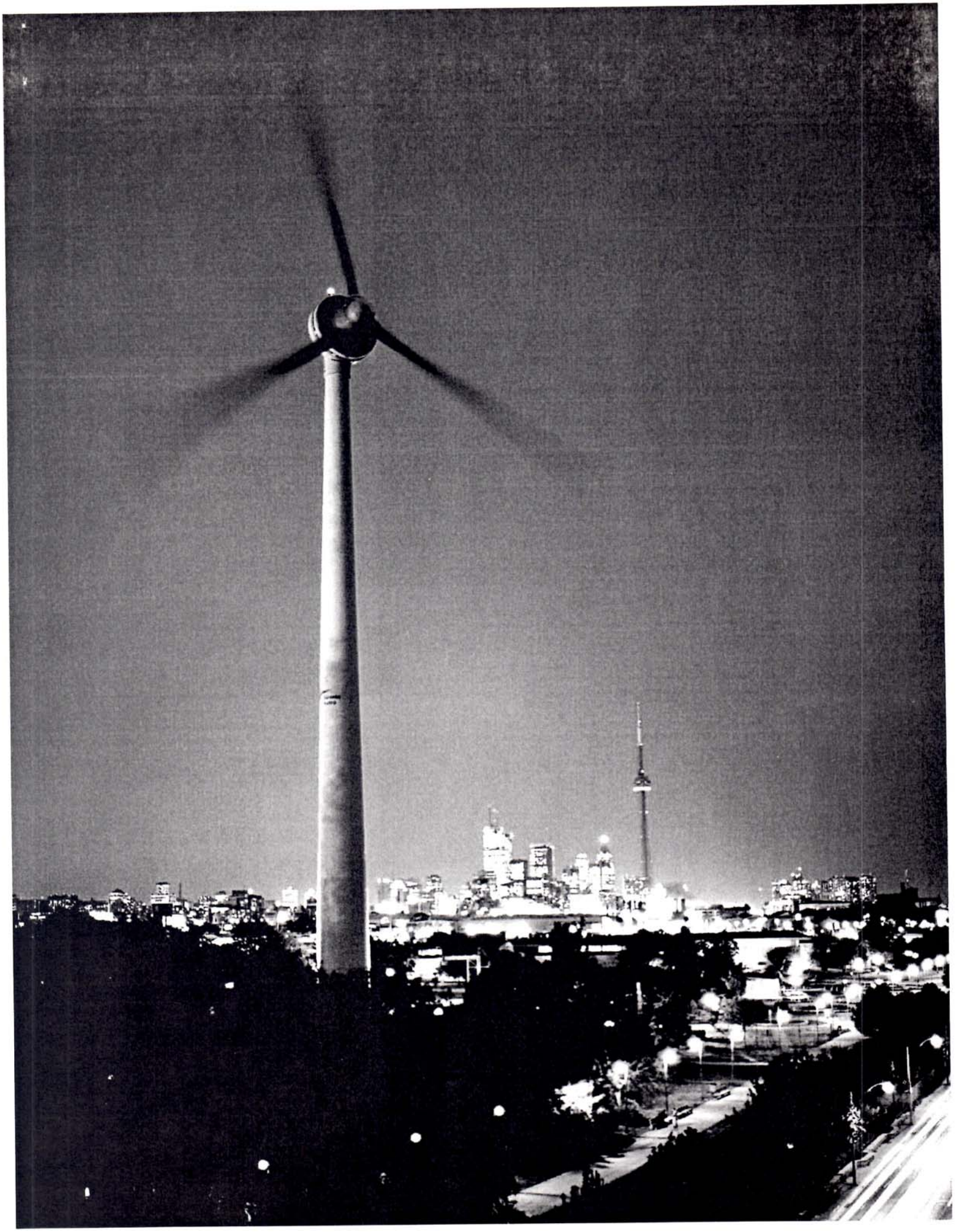




REFERENCES

1 http://www.pewtrusts.org/our_work_report_detail.aspx?id=62357
2 http://en.wikipedia.org/wiki/Wind_turbine
3 http://www.wwindea.org/home/index.php
4 Chief Medial Officer of Health Report, May 2010, The Potential Health Impact of Wind Turbines 2010 p. 6.
5 http://www.acousticecology.org/srwind.html
6 Chief Medial Officer of Health Report, May 2010,The Potential Health Impact of Wind Turbines, p. 6.
7 Chief Medial Officer of Health Report, May 2010,The Potential Health Impact of Wind Turbines p. 6.
8 Ontario's Public Health Agency, Wind Turbines and Health: A review of evidence, slide 19.
9 Chatham-Kent Public Health Unit, The Health Impact of Wind Turbines: A Review of the Current White, Grey and Published Literature, June 2008 p. 13.
10 Ontario's Public Health Agency, Wind Turbines and Health: A Review of Evidence, slide 17.
11 http://www.who.int/peh-emf/about/WhatisEMF/en/index1.html
12 http://technicacommunications.com/worlds-first-mw-wind-turbine/
13 http://www.umass.edu/windenergy/about.history.alumni.php
14 Global Wind Energy Association, Global Wind Energy Outlook 2010, p. 10.
15 http://www.eia.doe.gov/cneaf/solar.renewables/page/wind/wind.html
16 "Ontario Wind Integration Study". Ontario Independent Electric System Operatcr. 2006.
17 http://cleantechnica.com/2011/03/05/how-denmark-will-integrate-50-wind-power-by-2025/
18 http://www.ieso.ca/imoweb/media/md_supply.asp
19 "Simulation of a More Renewable Energy Mix for Ontario," by Malo P. Bourgon, Guelph Engineering Journal, (3) 2010.
20 http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/manitoba-hydro-signs-4-billion-power-deal/article2034611/
21 http://www.eco.on.ca/blog/2011/03/22/the-true-cost-of-renewable-energy-and-conservation/#comments
22 http://fit.powerauthority.on.ca/pricing-and-payment
23 Sustainable Prosperity Policy Brief September 2010, Ontario's Feed In Tariff For Renewable Energy: Lessons From Europe, September 2010.
24 Jacobson, M., Delucchi, M.A., A Path to Sustainable Energy, Scientific American. Nov, 2009.
25 John Laforet blog, May 12, 2011
26 http://www.marketwire.com/press-release/tim-hudak-and-ontario-tories-threaten-thousands-of-green-energy-jobs-1516437.htm
27 The Economic Benefits of the Wind Energy Sector in Ontario. Clearsky Advisors, June 2011.
28 http://eset.ati.sl.on.ca/
29 http://switchboard.nrdc.org/blogs/paltman/credit_for_trying_spanish_stud.html
30 Task Force on Competitiveness, Productivity and Economic Progress, Today's Innovation, Tomorrow's Prosperity, Ninth Annual Report, Nov 2010, p. 46-47.
31 http://www.rferl.org/content/germany_nuclear_power/2341155.html
32 Task Force on Competitiveness, Productivity and Economic Progress, Today's Innovation, Tomorrow's Prosperity, Ninth Annual Report, Nov 2010, p. 47.
33 https://www.oma.org/HealthPromotion/Smog/Pages/default.aspx
34 http://www.climateontario.ca/adaptation.php
35 Chief Medial Officer of Health Report, The Potential Health Impact of Wind Turbines, May 2010. p. 10.
36 Chatham-Kent Public Health Unit, The Health Impact of Wind Turbines: A Review of the Current White, Grey and Published Literature, June 2008. p. 17.
37 National Health and Medical Research Council, Australian Government, Wind Turbines and Health, A Rapid Review of the Evidence, July 2010. p. 2.
38 http://this.org/magazine/2010/06/15/wind-power/
39 Evaluation of the Scientific Literature on the Health Affects Associated With Wind Turbines and Low Frequency Sound, Prepared For Wisconsin Public Service Commission, Oct 2009. p. 7.
40 http://www.maine.gov/dhhs/boh/wind-turbines-neuro-acoustical.shtml
41 Intergovernmental Panel on Climate Change Special Report Renewable Energy Sources (SRREN) http://srren.ipcc-wg3.de/report/srren-spm-fd4, p. 5.
42 Renewable Energy Research Laboratory, Wind Power: Capacity, Factor, Intermittency, Fact Sheet 2a, "Capacity Factor, Intermittency,"
43 http://www.rbcroyalbank.com/commercial/financing/solar-panel-financing.html
44 http://www.cbc.ca/news/canada/story/2007/01/19/tories-environment.html
45 http://www.citizen.on.ca/news/2011-03-03/Local_News/OPA_awards_4_new_wind_power_contracts.html
46 http://www.acousticecology.org/srwind.html





environmental defence
INSPIRING CHANGE

116 Spadina Avenue, Suite 300
Toronto, Ontario M5V 2K6
tel 416 323-9521 fax 416 323-9301
email info@environmentaldefence.ca

www.environmentaldefence.ca

OSEA
Ontario Sustainable Energy Association

156 Front Street West, Suite 201
Toronto, Ontario M5J 2L6
tel 416-977-4441 fax 416-977-4441
email info@ontario-sea.org

www.ontario-sea.org

mpacnews

Summer 2012

MUNICIPAL PROPERTY ASSESSMENT CORPORATION

2012 Assessment Update

This year, MPAC will complete its second province-wide Assessment Update under the four-year cycle and phase-in program introduced by the Government of Ontario in 2008. The 2012 Current Value Assessments will reflect the January 1, 2012 legislated valuation date and will be in place for the 2013 to 2016 property tax years.

Property owners will be notified of their updated assessments when Property Assessment Notices are mailed starting in early September.

MPAC is preparing to launch an enhanced AboutMyProperty™ application this fall. The self-serve application, accessible through www.mpac.ca, will allow property owners to access detailed information about their property assessments.

Stay tuned for more information about the launch of the enhanced AboutMyProperty™ and the 2012 Assessment Update.

MPAC Welcomes New Board Members

The Minister of Finance has announced the appointment of several new members to MPAC's Board of Directors.

MUNICIPAL REPRESENTATIVES

Ken Hughes
Mr. Hughes is the Deputy City Treasurer for the City of Ottawa and the President of the Ontario Municipal Tax and Revenue Association (OMTRA).

Bob Kilger
Mr. Kilger is the Mayor of Cornwall. He previously served as a Member of Parliament from 1988 to 2004 and is currently involved in a number of community projects in Cornwall.

John Skorobohacz
Mr. Skorobohacz is the Chief Administrative Officer for the Town of Innisfil. He previously acted as Chief Administrative Officer for the City of Windsor and City Clerk for the City of Burlington.

PROPERTY TAXPAYER REPRESENTATIVES

Alf Chaiton
Mr. Chaiton is the President of Tweedsmuir Green Power Group. Previously, Mr. Chaiton was a Senior Advisor to the Mayor of Ottawa and a Senior Policy Advisor to the federal Minister of Industry, Trade and Commerce.

MPAC is accountable to the public through a 15-member Board of Directors composed of eight municipal representatives, five members representing property taxpayers and two provincial government representatives. All board members are appointed by the Minister of Finance. For more information about MPAC's Board of Directors, visit www.mpac.ca.

Property Assessment & Wind Turbines

When assessing any property, MPAC relies on the market to indicate the level of influence that a factor, such as wind turbines, may have on a property's value.

This is done through ongoing study and analysis of the market including the investigation of sales transactions. This market analysis typically reveals whether or not a factor has a negative or positive impact on a property's value.

continued on next page...

To date, MPAC's analysis of sales has indicated that the presence of wind turbines that are either abutting or in proximity to a property has neither a positive nor negative impact on its value.

On March 29, 2012, the Assessment Review Board, an independent tribunal of the Ontario Ministry of the Attorney General, released a decision respecting a property located on Wolfe Island. The Board found that based on the evidence in this case there appeared to be no evidence of any negative impact to the value of the property.

MPAC continues to monitor property values in areas where wind turbines are present and will reflect any impact to property values in the 2012 province-wide Assessment Update.

Have You Received Your 2011 MPAC Annual Report?

If you have not yet received your copy of MPAC's 2011 Annual Report, please contact your Municipal Relations Representative. You can also view the full report on our website at www.mpac.ca.

Highlights from the 2011 report include messages from MPAC's Chair and President and Chief Administrative Officer; the 2011 year in review; property assessment growth statistics; MPAC's Balanced Scorecard and Key Performance Indicators; and financial highlights.

Update on MPAC's Building Permit Exchange

INCREASING EFFICIENCIES AND DELIVERING TIMELY ASSESSMENTS

Measuring assessment growth and new development is a critical part of MPAC's core business. In 2011, MPAC added $28.4 billion in supplementary and omitted assessments to municipal rolls. That growth represents more than $300 million in new annual property taxes, which support the delivery of municipal services.

MPAC introduced a new process in 2011 to improve its building permit exchange with municipalities. Standardizing the process has many advantages including maximizing the addition of assessment growth for municipalities. This supports the delivery of municipal services and results in more timely assessment information for property owners.

Building permit information provided in the standardized electronic format is uploaded significantly quicker to MPAC's database and with greater accuracy. When MPAC receives information that is not in the standard electronic format, it must be keyed in manually which is both time consuming and can result in errors. If there are any discrepancies or missing information, MPAC will then contact the municipality for clarification, which causes further delays to the process.

The new exchange process also facilitates the easy sharing of building permit updates from municipalities. These updates, which include information such as occupancy date, are a critical trigger for MPAC in determining how to effectively prioritize workload, and when it is appropriate to visit a property. This ensures that MPAC staff visit properties when construction is completed and they are occupied, allowing us to process the new assessment.

We are pleased to report that we are making progress in standardizing the new electronic process and as of May, 215 of Ontario's 414 municipalities who issue building permits were using the new standard format.

Timely and accurate property assessments are important to both MPAC and Ontario municipalities and we are working toward bringing all municipalities on board with the new process.

For more information about MPAC's building permit exchange, contact your Municipal Relations Representative.

Introducing the New mpac.ca

On May 14, MPAC launched its redesigned website at www.mpac.ca. With its improved navigation and user-friendly design, the website was designed to help MPAC meet the increased needs of its stakeholders during the 2012 Assessment Update and new accessibility guidelines for the web.

continued on next page...

The "Municipalities" section provides easy access to Municipal Connect™, propertyline™, MPAC's calendar of events, assessment products and information, and videos.

If you have any questions or comments about the website, please contact your Municipal Relations Representative.

Visit with MPAC at the Association of Municipalities of Ontario (AMO) Conference

Representatives from MPAC will be attending the 2012 AMO Annual Conference from August 19-22 in Ottawa, where MPAC Chair Dan Mathieson and President and Chief Administrative Officer Antoni Wisniowski will present to attendees. Make sure to attend the session or stop by the MPAC booth to speak with MPAC's Municipal Relations Representatives.

Unable to attend the conference? MPAC's presentation will be posted at www.mpac.ca following the conference.

New Legislation for Cemeteries Means Taxation Changes

Recent changes to the *Assessment Act* and the consolidation of two Acts into the *Funeral, Burial and Cremation Services Act* bring changes to the property tax exemption for cemeteries.

The property tax changes, intended to come into effect on January 1, 2013, require cemeteries other than religious or municipal cemeteries that engage in certain non-interment, non-scattering, bereavement-related activities, to pay property tax on the portion of land used for such purposes. These activities include on-site funeral establishments, transfer services and crematoriums established after January 1, 2002.

Religious and municipal cemeteries engaging in these bereavement-related activities will be exempt from property tax, but will be required to make a payment into their care and maintenance fund equivalent to the property tax that would be payable if the land were liable to assessment and taxation.

To help MPAC accurately value and classify these properties, a letter and questionnaire will be sent to cemetery owners requesting information about their properties. We may also contact cemetery owners to clarify any information on the form or to schedule an on-site inspection.

Details can be found in a letter sent to Municipal Clerks, Treasurers and Tax Collectors in June by Arthur Anderson, MPAC's Director of Municipal Relations.

For more information, please contact your local Municipal Relations Representative.

MPAC IN YOUR COMMUNITY

Over the coming months, we are going to be out and about in Ontario communities and attending many conferences. Interested in having an MPAC representative attend one of your events? Contact your Municipal Relations Representative for more information.

AUGUST 19 – 22
Association of Municipalities of Ontario (AMO)
Annual Conference
Ottawa Convention Centre, Ottawa, Ontario

SEPTEMBER 9 – 12
Ontario Municipal Taxation and Revenue Association (OMTRA)
Annual Fall Conference
Minnett, Ontario

SEPTEMBER 9 – 12
Ontario Building Officials Association (OBOA)
Annual Meeting and Training Session
Sudbury, Ontario

A full listing of events can be found in the municipalities section of www.mpac.ca under "Calendar of Events."

Arthur Anderson
Director, Municipal Relations

1340 Pickering Parkway, Suite 101, Pickering (Ontario) L1V 0C4
Telephone: 905 831-4433 • Fax: 905 837-6280 • Toll-free: 1 877 635-6722
Email: arthur.anderson@mpac.ca • www.mpac.ca

Time to confront the anti-wind fear campaign

Media Release, June 9, 2011

OTTAWA - Sierra Club Canada's report ***The Real Truth About Wind Energy*** is available again on the Club's website. The report brings together the best science on the alleged health impacts of wind turbines.

A notice of legal action caused it to be temporarily removed after 1700 downloads.

"People want to know the truth. We will not be deterred from speaking out by bullying, intimidation or attacks on our reputation," said John Bennett, Executive Director of Sierra Club Canada.

Sierra Club Canada is just the latest target of anti-wind energy groups who appear to be out to destroy the reputations of those who do not share their views.

"We have been accused of being paid-off by government and industry - which is simply not true," said Bennett. "Even our youth wing has been smeared because it's a partner in the "High School Climate Challenge" (HSCC). The alleged crime? HSCC is a program of *Clean Air Champions* which receives funding from the Ontario Trillium Foundation.

"The real public health risk is from climate change and air pollution. This week the United Nations reported that in 2010, over 42 million people lost their homes due to natural disasters, including climate change-related storms, floods and drought," said Bennett. "That's 17 million more than the year before."

Sierra Club Canada believes rural Ontarians are being frightened and confused when it comes to wind energy.

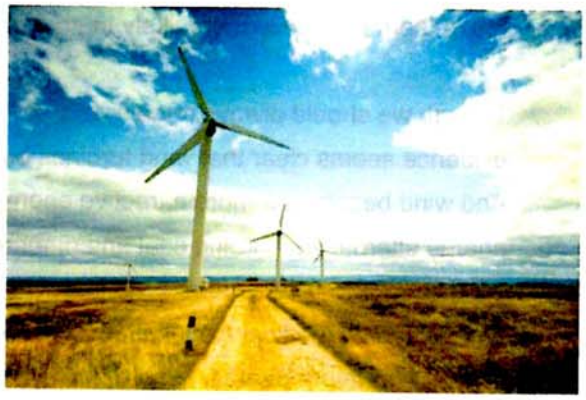
Sierra Club Canada remains strongly supportive of wind turbines but notes the importance of locating them away from residences, known migratory bird flyways and other sensitive areas.

John Bennett, Executive Director
Sierra Club Canada
(613) 291-6888
jb@sierraclub.ca

David Suzuki Foundation

SOLUTIONS ARE IN OUR NATURE

When it comes to health, wind power blows away the alternative



By David Suzuki with contributions from Dale Marshall, David Suzuki Foundation climate change policy analyst.

Wind energy is increasingly being considered a viable and attractive power source. Many countries, including the U.S., Germany, Spain, China, and India, are putting policies into place to drive the development of their wind energy industries. In Canada, the amount of wind energy being harnessed for use in our homes, offices, and factories has grown quickly over the past few years, led by Ontario with its Green Energy Act.

However, a backlash has been growing in many places where wind power is being developed. In Ontario, one of the main criticisms of wind development has been its impact on human health, mostly because of the noise that wind turbines produce. Yet, the peer-reviewed scientific research indicates that the sound from windmills, which generally falls into three categories (audible sound, low frequency, and infrasound), has little to no impact on human health.

This is especially true if windmills are built far enough away from residences. For example, the required setback in Ontario is 550 metres. At this distance, the audible sound from windmills has been found to be below 40 decibels, which is around the level of sound you'd find in most bedrooms and living rooms. Studies from the University of Massachusetts similarly found that even if the sound were audible, annoyance would be minimal.

Critics have also pointed to low frequency sound and infrasound as the source of health impacts from wind turbines. These are sounds that are either difficult to hear or inaudible to humans. However, Ontario's Chief Medical Officer of Health did a review of the scientific literature and found no evidence that low frequency sound from wind turbines causes adverse health effects.

Research from Sweden and the Netherlands may shed some light on the opposition that windmills are facing, despite the lack of evidence for human health impacts. At or just under 40 decibels, 73 per cent of

people could notice the sound and six per cent were annoyed. But those who did not like windmills or found them ugly were more likely to notice the sound and were more likely to be annoyed by it.

Though we should always remain open-minded about new and emerging research on any issue, the evidence seems clear that wind turbines built with appropriate setbacks do not constitute a health hazard. And wind becomes a more attractive energy source when you consider the health impacts of the main energy alternative, burning coal and other fossil fuels.

The Canadian Medical Association estimated that in 2008 Canada's air pollution was responsible for 21,000 premature deaths, 92,000 emergency room visits, and 620,000 visits to a doctor's office. Even if you look only at the health impacts of Ontario coal-fired power plants, the numbers are significant and startling.

When considering whether Canada needs to curtail the development of its wind resources or expand wind power in the way that Ontario's Green Energy Act proposes, we should heed the conclusion of Maine's Center for Disease Control. After dismissing the notion of a moratorium on wind development due to its health impacts, the Center's Dr. Dora Ann Mills concluded, "If there is any evidence for a moratorium, it is most likely on further use of fossil fuels, given their known and common effects on the health of our population."

As for the impacts on wildlife, that's another story. But "most scientific research shows that newer technologies and proper locating can overcome most of the threats to birds and bats. One recent study also noted that "the number of birds killed in wind developments is substantially lower relative to estimated annual bird casualty rates from a variety of other anthropogenic factors including vehicles, buildings and windows, power transmission lines, communication towers, toxic chemicals including pesticides, and feral and domestic cats."

It's never easy to find energy technologies that will satisfy everyone, but with the world facing ever-growing negative consequences of burning fossil fuels, we must weigh our options. In doing so, wind power comes out ahead. If we ensure that care is taken to use technologies with minimal environmental impact and to locate turbines in areas where effects on humans and animals are also minimal, there is no good reason to oppose wind power.

July 6, 2011
http://www.davidsuzuki.org/blogs/science-matters/2011/07/when-it-comes-to-health-wind-power-blows-away-the-alternative/

Answers to Frequently Asked Questions

1. **What entities receive the estimated $500,000 tax revenue from the project?**
   - Municipality of Kincardine, Bruce County and the Bluewater District School Board
   - Wind farms provide a new tax revenue stream for local municipalities, which can be used for the benefit of all. Communities can make new choices with funding from an increased tax base, such as local initiatives like community centres, roads, park maintenance and more.

2. **What is stray voltage and do we need to worry about the wind farm causing it?**
   - Stray voltage refers to the difference in voltage potential between two objects that a human or farm animal could make contact with at the same time, for example the barn floor and a grounded device such as a milking machine. The difference in voltage causes a nuisance shock in a human or animal that bridges the distance between the barn floor and the milking machine.
   - Ground currents result from unbalanced currents on the distribution lines that serve customers electrical devices. Wind farm collector lines are not connected to customer loads and are perfectly balanced, which prevents unbalanced currents getting into the ground that could cause stray voltage.
   - Wind farm contribution to stray voltage will be prevented through engineering studies and avoiding any collector lines using common poles with the utility collector system.
   - In Ontario, utilities must be in compliance with stray voltage standards and investigate complaints. The wind farm will comply with all applicable health and safety standards.

3. **What are electronic magnetic fields and are they a concern?**
   - Electromagnetic fields are a combination of invisible electric and magnetic fields. They occur both naturally (light is a natural form of EMF) and as a result of human activity. Nearly all electrical and electronic devices emit some type of EMF. The strength of the EMF decreases with the distance from the source. We have not seen any evidence that establishes a causal link between EMF and health effects to humans.
   - The magnetic fields produced by the generation and export of electricity from a modern wind do not pose a threat to public health. Test results on a wind turbine showed that the magnetic field at 10 feet from the wind turbine and associated transformer was less than the magnetic field from a household appliance. No measurable magnetic field is expected at a distance of 25 feet from the turbine studied[1].
   - EMF from wind farms is similar to EMF from the utility distribution system, except that the currents from the wind farm are balanced, unlike unbalanced currents from the utility power system. The wind farm collector lines will be mainly underground, not on common poles with the utility power system, so coupling between the utility power system and the wind farm collector system does not occur, effectively eliminating any electric fields.

4. **How will you prevent "dirty electricity" impacts?**
   - The term "dirty electricity" is a new term that seems to be unique to this geographical area. It may be a term intended to describe a common characteristic of electric power

systems known as harmonics. Harmonics are created by non-linear electrical loads such as computer power supplies, florescent lights, TVs and most electrical devices.

- Harmonics can develop in wind farm collector lines when the collector lines are positioned on utility poles in parallel with utility lines that service customers. The wind farm does not plan to use common poles with the utility lines as we plan to bury our collector lines underground wherever possible.
- In Ontario, generators and utilities must be in compliance with harmonic standards and the wind farm will be designed to meet all applicable health and safety design standards.

5. How is wind energy a viable source for power since it is intermittent?

- Electricity grids are already designed to handle variability in both demand and supply. Because of the natural variations in demand, the electric grid always has more power available than it needs. During a power plant outage – whether a conventional plant or a wind plant – backup is provided by the entire interconnected utility system.
- No power plant operates 100% of the time. There are periods when power plants shut down for maintenance and repairs and times when resources run low or unexpected outages occur. At some conventional power plants, the entire plant may have shut down for repairs, whereas wind farm maintenance takes place one turbine at a time.
- The wind turbines at the Armow Wind Project are expected to generate energy between 80-90% of the time on any average year, with the maximum production usually happening during the evening and morning and in winter months, when demand for electricity is highest. Wind forecasting technology makes wind energy easier to predict and more reliable than ever before.

6. How does wind energy affect the cost of energy?

- The cost of electricity from wind energy is predictable because there are no escalating fuel costs, unlike forms of conventional energy. Wind energy costs are stable because fuel isn't part of the equation. Once a wind farm project is built, the price of electricity from the project is set for its lifespan.
- Investing in wind energy also helps us offset our use of other precious resources. Studies have consistently shown that increased use of wind energy will actually result in lower prices to consumers for natural gas – and help conserve that resource for further generations in the process.

7. Should we be worried about safety issues, such as a fire or a turbine falling over?

- To date, there are currently more than 4,500 Siemens 2.3 MW model wind turbines operating around the world, which is the same model that will be used for this project. Siemens has confirmed that there have been no incidents of turbine collapse or fires with this turbine fleet.
- The chance of a turbine collapsing is extremely rare today because of better turbine design and engineering, as well as modern technology that senses any operating errors. The turbines are equipped with technology that automatically shuts them down during very high wind speeds.

- The health and safety of the public, landowners, and personnel at our wind projects is of utmost importance to Armow Wind. The project will be monitored on-site and by a remote operations center staffed 24/7.

8. Does sound or low frequency noise from wind turbines impact human health?

- For more than thirty years people have been living near more than 50,000 wind turbines operating in Europe and more than 35,000 wind turbines operating in North America.[2] There is no scientific evidence indicating that wind turbines have caused any adverse health effects.[3] Overall, health and medical agencies agree that the sound from wind turbines is not loud enough to cause hearing impairment and is not causally related to adverse effects.[4] Scientific evidence to date does indicate that at the typical setback distances there is no direct health risk from wind turbine noise, including low frequency noise and infrasound.[5]
- Wind turbine sounds are not unique. Based on the levels and frequencies of the sounds, a multidisciplinary scientific advisory panel comprising of medical doctors, audiologists, and acoustical professionals concluded that there is no evidence the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects.[6]

For reference, two recent governmental reports:

- The Massachusetts Department of Environmental Protection in collaboration with the Massachusetts Department of Public Health convened an independent panel of experts, which concluded in January 2012 that there is no evidence for a set of health effects from exposure to wind turbines.
- The Ontario Chief Medical Officer of Health's report in 2010 concluded that scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects, and there is no scientific evidence that vibration from low frequency wind turbine noise causes adverse health effects.

9. What are examples of sound levels?

Sound Sources (Noise) Examples with distance	Sound Pressure Level L_p dB
Jet aircraft, 50 m away	140
Threshold of pain	130
Threshold of discomfort	120
Chainsaw, 1 m distance	110
Disco, 1 m from speaker	100
Diesel truck, 10 m away	90
Curbside of busy road, 5 m	80
Vacuum cleaner, distance 1 m	70
Conversational speech, 1 m	60
Average home	50
Quiet library	40

10. Examples of organizations supporting wind energy.

"Ontario doctors, nurses, and other health professionals support energy conservation combined with wind and solar power – to help us move away from coal."

– Ontario College of Family Physicians, Registered Nurses Association of Ontario, Canadian Association of Physicians for the Environment, Physicians for Global Survival, the Asthma Society of Canada, and the Lung Association

"With a full review of available data, including that referenced by wind opposition groups, Sierra Club Canada adds its voice to the overwhelming majority of governmental, non-governmental, scientific and environmental groups in saying that a link between wind turbines and health concerns is unfounded."

– Sierra Club Canada

"This report aims to correct the main myths of the anti-wind activists, using credible scientific, mainstream sources to counter the collection of unfounded and unproven opinions promoted by those with only one agenda, to stop wind power...

- *Reality: repeated studies around the world have found no scientific evidence of health impacts from wind power projects.*
- *Reality: Wind power has been successfully used for decades and the world is rapidly scaling up its use because it works, particularly in light of climate change.*
- *Reality: Wind power is creating thousands of jobs across Ontario and letting us reduce the use of harmful fossil fuels."*

– Environmental Defence and the Ontario Sustainable Energy Association

"There is no end to the potential of alternative, non-polluting energy sources."

– Prime Minister Stephen Harper

"Although opposition to wind farms on aesthetic grounds is a legitimate point of view, opposition to wind farms on the basis of potential adverse health consequences is not justified by the evidence."

– Dr. David Colby, Chatham-Kent Acting Medical Officer of Health

"Renewable energy is an important new source of power generation which will help to reduce CO2 emissions, stabilize energy costs and support long term prosperity for Canadian businesses."

– RBC Royal Bank

"Annual income from the wind development has allowed this municipality to achieve sustainability and to reduce property taxes."

– Jim Vandenhoek, former mayor of Frontenac Islands

In addition, according to the Canada Wind Energy Association, The Canadian Association of Physicians for the Environment, Toronto Renewable Energy Co-operative, Pembina Institute, Bullfrog, The David Suzuki Foundation, Clean Air Alliance, Canada Auto Workers, County Sustainability Group, and Friends of Wind Ontario are all supporters of wind energy in Ontario.

11. How does wind energy compare to the health risks from coal-fired power plants?

- The process of generating energy from the wind does not produce any pollution. Wind energy doesn't contribute to smog, acid rain or climate change. An inevitable by-product of burning fossil fuels for electricity is air pollution, which can cause many forms of health impacts from respiratory disease, cancer and birth defects. When considering electricity generating options, we should consider the full range of costs – including those associated with environmental impacts like air pollution and long-term health effects.
- Conventional sources of energy also have higher environmental lifecycle costs because of all the activity it takes to turn these natural resources into electricity. For instance, coal must be extracted from the ground before shipped by truck or train or sent by pipeline to power plants for conversion into electricity. All this uses energy and creates air pollution.
- Environment Canada statistics show air pollution causes an estimated 5,000 premature deaths in Canada per year and thousands suffer from adverse health effects. Children and seniors suffer the greatest risk.
- According to Environment Canada, 18% of Canada's greenhouse gas emissions are created by burning fossil fuels to generate electricity, and nearly 12% of Canada's smog is a result of burning fossil fuels to produce electricity. The faster we bring more wind energy online, the faster we can clear the air.

12. What will happen to the soil that is excavated from the turbine sites?

- The soil that is excavated to install the turbine foundation structure will be used to backfill the foundation and redistributed around the turbine after construction. If there is excess material that is not needed for fill on project roads or other places in the project area, the soil can typically be left for the landowner to do what he/she wants with it.

13. If drainage tiles are damaged during construction, how and when are they repaired?

- There will be a survey of drainage tiles near excavation sites made before construction. Drainage tiles that are affected near the turbine sites are routed around the foundation area. Tiles cut during trenching operations are repaired within a couple of days or less. In Ontario most municipalities require a local licensed drainage contractor to do all of the repairs and dictate how the location of the cut and repair needs to be documented.

---

[1] "The Health Effects of Magnetic Fields Generated by Wind Turbines," Windrush, October 2004.

[2] e.g., Chatham-Kent Public Health Unit, 2008; Minnesota Department of Health, 2009; Australian Government, National Health and Medical Research Council, 2010; Australian Government, 2011, Massachusetts Department of Environmental Protection (MassDEP) and Massachusetts Department of Public Health (MDPH), 2012.

[3] e.g., Chatham-Kent Public Health Unit, 2008; Minnesota Department of Health, 2009; Australian Government, National Health and Medical Research Council, 2010; Australian Government, 2011, Massachusetts Department of Environmental Protection (MassDEP) and Massachusetts Department of Public Health (MDPH), 2012.

[4] e.g., Chatham-Kent Public Health Unit, 2008; Minnesota Department of Health, 2009; Australian Government, National Health and Medical Research Council, 2010; Australian Government, 2011, Massachusetts Department of Environmental Protection (MassDEP) and Massachusetts Department of Public Health (MDPH), 2012.

[5] Ontario Chief Medical Officer of Health, "The Potential Health Impacts of Wind Turbines," May 2010.

[6] W. David Colby, M.D., Robert Dobie, M.D., Geoff Leventhall, Ph.D., David M. Lipscomb, Ph.D., Robert J. McCunney, M.D., Michael T. Seilo, Ph.D., Bo Søndergaard, M.Sc., "Wind Turbine Sound and Health Effects An Expert Panel Review," Prepared for American Wind Energy Association and Canadian Wind Energy Association, December 2009.

3. Display Panels

Armow Wind Project

Welcome

Thank you for coming to the Armow Wind Focused Information Session

Please sign in at the front desk

We are here to:

- Provide information about changes made to the Noise Impact Assessment (NIA) following the Public Meeting on November 12, 2012.
- Incorporate comments received at this Focused Information Session into the Consultation Report Addendum that will be submitted to Ministry of the Environment (MOE).

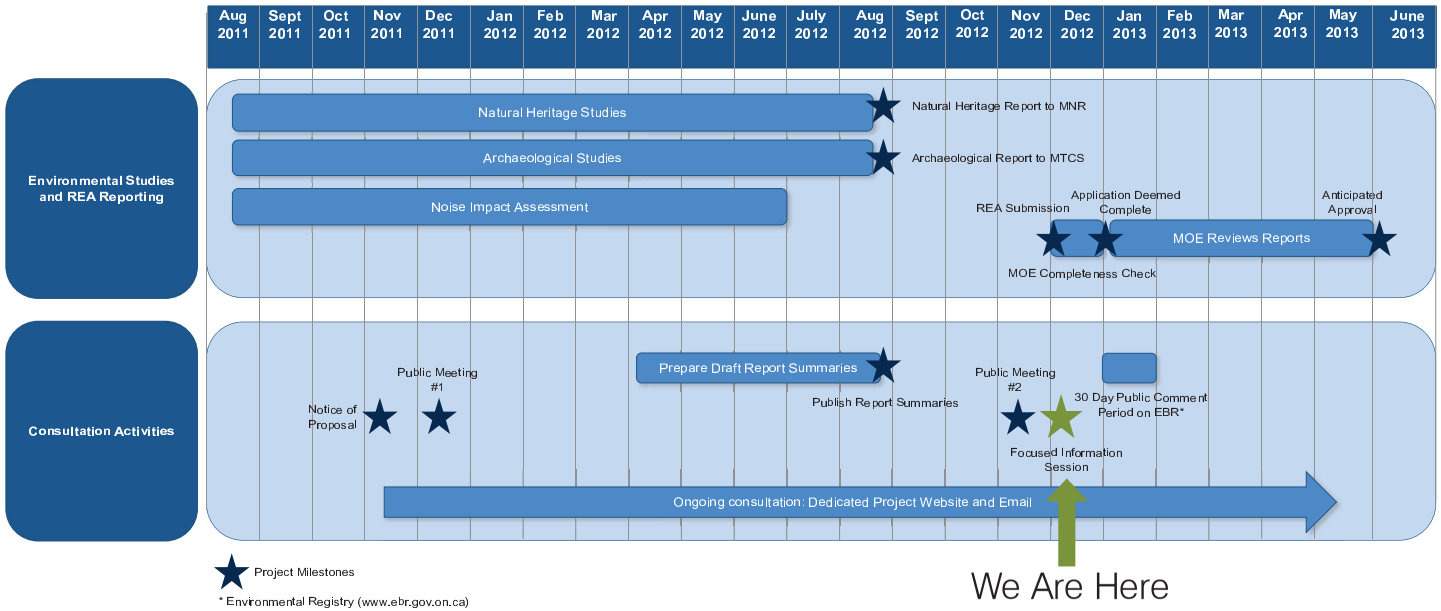
Armow Wind

Armow Wind Project

REA Process

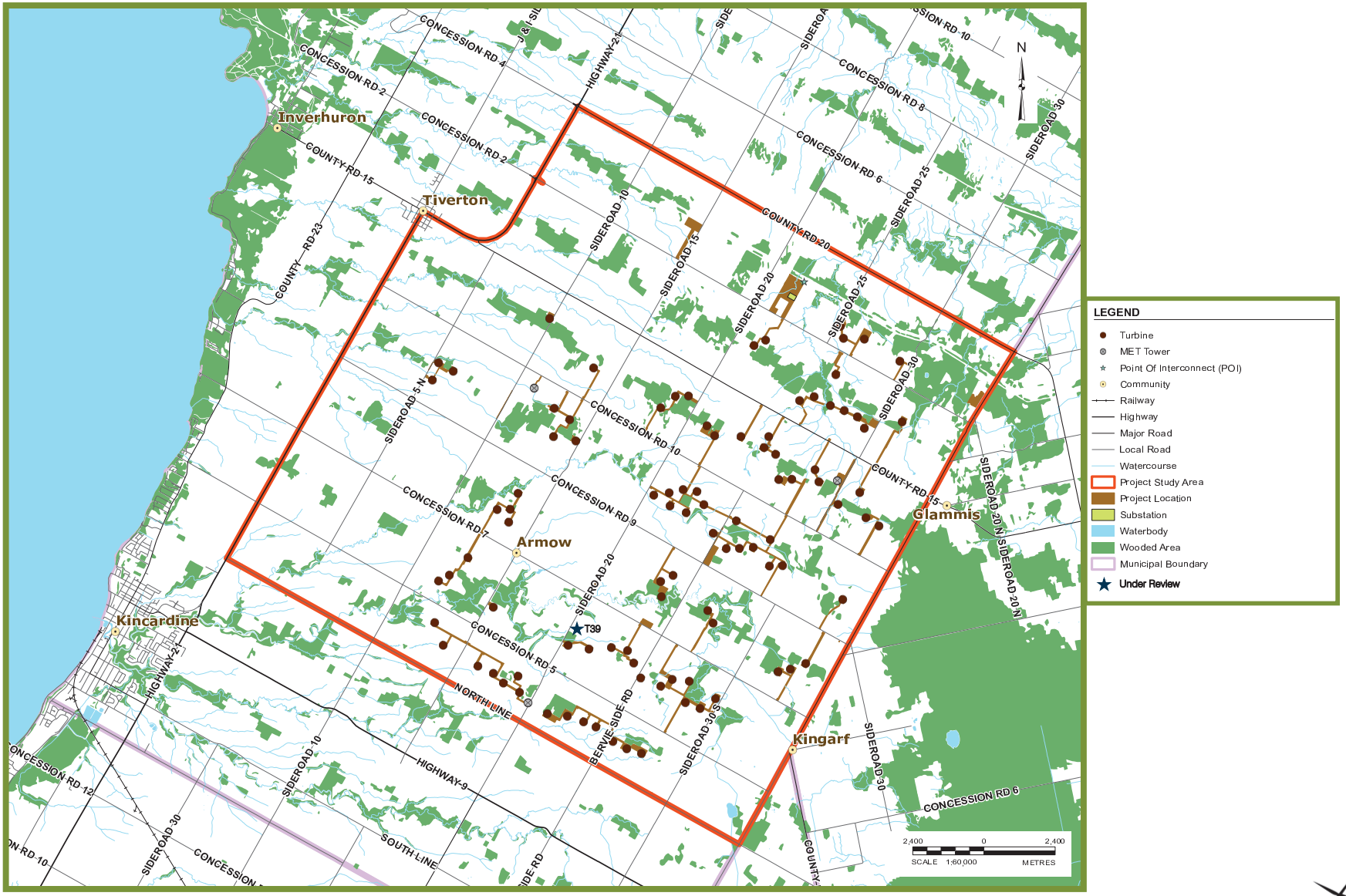
- Before construction can begin, the Armow Wind Project must apply for, and be granted, a Renewable Energy Approval (REA) by the Ministry of the Environment (MOE).
- The REA process is governed by Ontario Regulation 359/09, as amended by O. Reg 195/12.
- As part of the REA approval process, Samsung and Pattern must carry out extensive studies to understand and mitigate the potential effects of the Project on, but not limited to the following:
  - Natural Heritage: plants, water and animals (specifically birds and bats).
  - Cultural Heritage: archaeology and built heritage.
  - Noise receptors (e.g. dwellings).
- The REA process also requires that the proponents consult with community members, municipalities and Aboriginal communities.

REA Schedule



Armow Wind

Project Layout

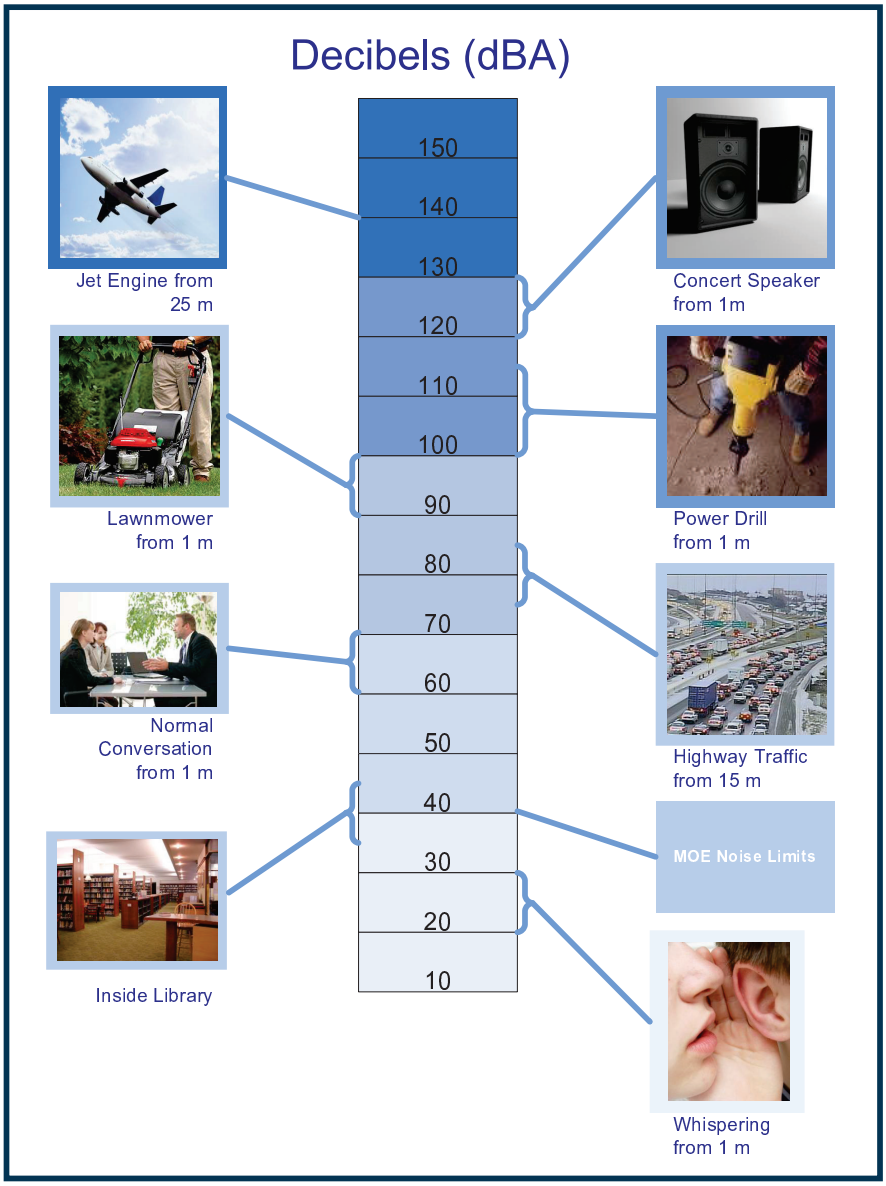


Armow Wind

Sound - dBA Scale

Renewable Energy Approval Sound Requirements

- Turbines must be placed greater than 550 metres from the closest sound receptor.
- Sound levels must adhere to the Ministry of Environment guidelines.



- As with all other sound-generating activities (e.g., airports, highways, industry, nuclear plants, gas turbines) the Ontario Government requires that wind projects meet specific regulations with respect to sound.
- Unlike all other sound-generating activities, wind projects must consider cumulative sound impacts from all wind projects within 5 kilometres.

Armow Wind Project

Armow Wind

Armow Wind Project

Changes to the Noise Impact Assessment

The following revisions were made to the Noise Impact Assessment:

- Table 7-2 revised to provide the corrected *Nearest Turbine* and *Distance to the Nearest Turbine* values and Appendix F revised to to provide corrected *Turbine IDs, GPS Coordinates and Output Rating Levels* (please see adjacent board for specific revisions);
- Receptor V_757 reclassified as *Participating*.
    - The receptor is located on a parcel with Project facilities and is considered to be a participating receptor.
- Added new receptor (R_801) results.
    - This receptor is located on the same parcel as R_153 and was not previously included.
- Turbine 39 and Receptor 775 are currently under review. T39 has been removed from, and R775 included in, the current Noise Impact Assessment. Final results of the review will be reflected in the final documents posted on www.erb.gov.on.ca and available for public comment once the REA submission is deemed complete.
- Vacant Lot Receptor (VLR) locations were added to five (5) lots within 1.5 kilometers of turbines.
- Added peak sound power level to Table 4-1.
- Updated text in report to reflect above changes.

The results of the Noise Impact Assessment (NIA) are unchanged and remain valid for the list of receptors and turbine layout proposed for this Project.

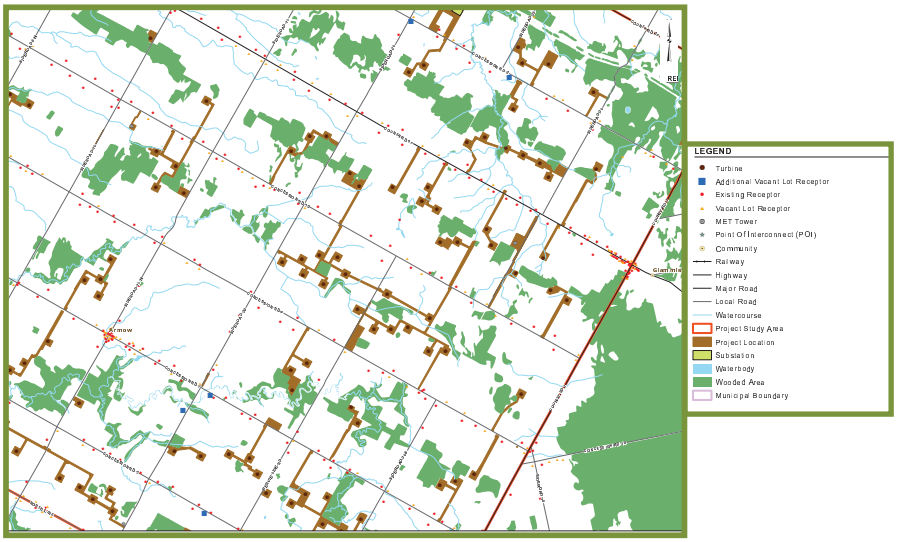
Armow Wind

Armow Wind Project

Changes to the Noise Impact Assessment

The map below shows the removal of Turbine 39 (T39).

The map below shows the additional VLRs.



Armow Wind

Armow Wind Project

Changes to the Noise Impact Assessment

Below are the changes that were made to Table 7-2 of the Noise Impact Assessment.

Table 7-2: Wind turbine noise impact assessment summary – Participating receptors

Participating receptor ID	Height [m]	Distance to Nearest Turbine [m]	Nearest Turbine [ID]	Calculated Sound Pressure Level at Dwelling [dB(A)]
R_66	4.5	~~907~~605	~~36~~79	37.4
R_67	4.5	~~814~~397	~~36~~80	42.6
R_120	4.5	~~876~~863	~~47~~115	38.0
R_121	4.5	~~870~~841	~~47~~115	38.1
R_129	4.5	~~804~~690	~~40~~100	39.~~2~~0
R_143	4.5	~~711~~565	~~116~~98	40.4
R_144	4.5	~~850~~706	~~116~~98	39.8
R_145	4.5	~~761~~714	~~116~~98	39.8
R_150	4.5	~~570~~393	~~70~~83	41.9
R_155	4.5	~~813~~775	~~23~~92	39.6
R_166	4.5	544	61	41.3
R_178	4.5	~~1973~~879	~~73~~74	36.2
R_187	4.5	~~788~~620	~~13~~97	40.0
R_213	1.5	~~1265~~789	~~60~~102	36.9
R_216	4.5	~~900~~670	~~9~~105	39.7
R_219	1.5	~~773~~676	~~9~~105	38.3
R_220	4.5	711	14	39.9
R_224	4.5	450	57	40.9
R_225	4.5	579	57	40.4
R_226	4.5	~~610~~548	~~57~~94	40.~~4~~5
R_233	4.5	~~801~~696	~~11~~91	37.6
R_321	4.5	748	30	39.2
R_324	4.5	764	30	40.2
R_326	4.5	~~806~~781	~~26~~89	40.0
R_327	4.5	~~786~~698	~~26~~83	40.0
R_329	4.5	822	24	39.1
R_338	4.5	~~1030~~716	~~18~~108	39.1
R_371	4.5	865	37	36.6
R_393	4.5	754	42	38.~~8~~5
R_408	4.5	~~661~~571	~~66~~82	39.~~7~~6
R_409	4.5	756	50	38.8
R_412	4.5	~~955~~660	~~50~~113	39.0
R_413	4.5	~~1408~~726	~~50~~114	37.7
R_437	1.5	761	30	37.4
R_443	4.5	1221	37	34.~~1~~0
R_500	4.5	~~727~~465	~~47~~110	39.9
V_608	4.5	364	5	42.0
V_757	4.5	524	Substation	39.8

Below are the changes that were made to Appendix F of the Noise Impact Assessment.

APPENDIX F COORDINATES OF TURBINES

Coordinates of turbines to be installed in the Armow Wind Farm and the substation location, as well as the broadband sound power levels of each noise source are listed below in UTM17-NAD83 projection:

Turbine ID	Easting [m]	Northing [m]	Broadband PWL [dB(A)]
~~T4~~T10	460785	4897921	~~101~~106
T100~~T5~~	460169	4891172	~~101~~102
T101~~T6~~	466788	4898947	102
T102~~T7~~	~~467276~~467274	~~4894919~~4894893	~~101~~105
T103~~T8~~	467729	4894074	~~102~~105
T104~~T9~~	458938	4890421	102
T105~~T10~~	467373	4896459	~~106~~101
T106~~T11~~	~~468372~~468294	~~4896657~~4896614	~~102~~106
T107~~T12~~	466747	4894603	102
T108~~T13~~	458941	4894875	~~101~~105
~~T14~~T11	462777	4897234	102
T110~~T15~~	463381	4889634	102
T111~~T18~~	~~463772~~463760	~~4889881~~4889869	~~106~~102
T112~~T19~~	465221	4895826	~~103~~101
T113~~T21~~	461259	4888833	~~102~~104
T114~~T22~~	461585	4888655	102
T115~~T23~~	461956	4888538	~~102~~103
T116~~T24~~	462694	4890339	102
~~T25~~T12	464367	4896252	~~101~~102
~~T26~~T13	465621	4895205	101
~~T27~~T14	466182	4895442	102
~~T28~~T15	466268	4895147	102
~~T29~~T18	459810	4896249	~~102~~106
~~T30~~T19	460352	4896143	~~104~~103
~~T31~~T21	462245	4894821	~~104~~102
~~T32~~T22	462622	4894878	~~106~~102
~~T33~~T23	462959	4894956	102
~~T34~~T24	463039	4894395	~~105~~102
~~T35~~T25	463465	4894592	~~106~~101
~~T36~~T26	464009	4893522	~~102~~101
~~T37~~T27	464337	4893527	102
~~T39~~T28	464666	4893553	102
~~T40~~T29	465090	4893742	102
~~T41~~T30	465060	4893097	~~102~~104
~~T42~~T31	465388	4893104	~~102~~104
~~T43~~T32	466845	4892281	~~102~~106
~~T44~~T33	458435	4894474	102
~~T45~~T34	458746	4894479	~~102~~105
~~T47~~T36	457280	4892873	102
~~T48~~T37	457729	4893302	102
~~T49~~	~~460352~~	~~4891598~~	~~102~~
~~T50~~T4	464682	4898466	~~102~~101
~~T51~~T40	460681	4891076	~~103~~102
~~T52~~T41	461220	4891113	~~104~~102
~~T56~~T42	461614	4891037	102

Turbine ID	Easting [m]	Northing [m]	Broadband PWL [dB(A)]
~~T57~~T43	461768	4890734	102
~~T58~~T44	461935	4890372	~~101~~102
~~T59~~T45	462426	4890172	~~101~~102
~~T60~~T47	463020	4889772	102
~~T61~~T48	458346	4890486	~~105~~102
~~T63~~T49	460549	4889305	~~104~~102
~~T64~~T5	466865	4898641	~~102~~101
~~T65~~T50	460839	4889178	103
~~T66~~T51	467371	4898626	~~105~~104
~~T67~~T52	468239	4898092	102
~~T68~~T56	464971	4898601	102
~~T69~~T57	465799	~~4897111~~4897131	~~103~~101
~~T70~~T58	466148	4897228	~~102~~101
~~T73~~T59	~~464921~~464934	~~4895976~~4895989	102
~~T74~~T6	466690	4897755	~~106~~102
~~T75~~T60	467413	4894276	~~102~~105
~~T76~~T61	460197	4896667	~~106~~104
~~T77~~T63	459822	4896943	102
~~T78~~T64	465279	4890523	~~102~~103
~~T79~~T65	463701	4891711	~~102~~105
~~T80~~T66	459648	4889504	102
~~T81~~T67	458335	4892100	~~105~~102
~~T82~~T68	457127	4891173	~~102~~103
~~T83~~T69	462419	4896959	102
~~T84~~T7	466554	4897005	101
~~T85~~T70	462409	4892727	~~101~~102
~~T87~~T73	459708	4899129	~~102~~106
~~T88~~T74	457373	4897847	102
~~T89~~T75	456855	4897632	~~102~~106
~~T90~~T76	458595	4890252	~~104~~102
~~T91~~T77	457961	4890664	~~104~~102
~~T92~~T78	458976	4890025	102
~~T94~~T79	457000	4892740	102
~~T95~~T8	466884	4896882	102
~~T96~~T80	456905	4891725	~~101~~105
~~T97~~T81	457006	4898054	~~101~~102
~~T98~~T82	460147	4889442	~~101~~102
~~T99~~T83	462716	4892873	~~102~~101
T84~~T100~~	462437	4892354	~~102~~101
T85~~T101~~	463695	4893900	102
T87~~T102~~	458708	4894168	102
T88~~T103~~	462642	4894569	~~105~~102
T89~~T104~~	463573	4892018	~~105~~104
T9~~T105~~	467210	4896729	102
T90~~T106~~	465579	4890590	~~101~~104
T91~~T107~~	463100	4897245	~~106~~102

Turbine ID	Easting [m]	Northing [m]	Broadband PWL [dB(A)]
T92~~T108~~	463725	4896277	102
T94~~T110~~	465047	4896257	~~105~~102
T95~~T111~~	463309	4894916	~~102~~101
T96~~T112~~	464266	~~4894208~~4894203	~~102~~101
T97~~T113~~	465289	4895208	101
T99~~T114~~	463549	4896523	~~104~~102
T98~~T115~~	463109	4890298	~~103~~102
T35~~T116~~	465945	4890725	~~102~~106
Substation	465689	4899620	109.8

Armow Wind

Armow Wind Project

NIA Quality Assurance

Based on feedback from the November 12, 2012 Public Meeting, GL GH conducted an internal review of the Noise Impact Assessment Report.

This review found that human error had resulted in reporting errors in Table 7.2 and Appendix F.

GL GH has implemented the following procedures to ensure the consistency and accuracy of the NIA:

- **NIA Review Process:** two engineers re-ran all noise model calculations independently and two peer reviewers inspected the re-runs;
- **GIS Verification:** to ensure that all outputs provided are consistent with inputs in GIS mapping;
- **Improved Standard Conversion Tool:** to reduce the likelihood of human error when moving model results into reports;
- **Enhanced Standard Quality-Control Program:** includes the development of an improved NIA quality-control checklist, as well a systematic checking procedure by the GIS department and at least one engineer;
- **Approval Process:** continue to have at least one employee at the Team Leader level or above approve the NIA; and
- **Vacant Lot Identification:** ensured that the vacant lot receptor selection process included a systematic review of all receptor classification by the GIS Team Leader.

Armow Wind

Armow Wind Project

Additional Review of the NIA

There are a number of additional reviews in place for the NIA Report, including:

- In-house verification of sound models by Armow Wind;
- 30 day public comment period on the EBR following the application being deemed complete; and
- Extensive review by the Ministry of the Environment's noise experts during the REA review period.

To ensure the accuracy of the updated NIA, Armow Wind contracted a fourth party review of the NIA by Hatch Engineering.

On December 10, 2012, Hatch provided a fourth party review of the updated NIA. Hatch determined that, based on the information provided, the layout is in compliance with the MOE's *Noise Guidelines for Windfarms* (2008).

Armow Wind

Armow Wind Project

Thank You & Next Steps

Next steps:

- Summarize and respond to comments received at this Focused Information Session in a Consultation Report Addendum
- Submit Consultation Report Addendum to MOE
- MOE reviews submitted REA reports including the Consultation Report Addendum
- MOE deems application complete
- 30 day public comment on Environmental Registry (www.ebr.gov.on.ca)
- Up to 6 month MOE technical review of the REA Application

To learn more about the Project, please visit our website or contact:

www.armowwind.com
519-396-9433
info@armowwind.com

We value your feedback and would like to hear what you think

Kindly complete a comment sheet before you leave so that your comments can be included in the Consultation Report Addendum. Comments received after today will not be included in the Addendum.

If you have not signed in at the registration desk, please do so before you leave.

Armow Wind

Visualizing Sound

98 TURBINE LAYOUT WITH SIMULATED SOUND ISOCONTOUR LEVELS (WIND SPEED OF 6 m/s)

4. Comment Forms

Armow Wind Project

Focused Information Session, December 11, 2012
Tiverton Community Centre

Please take a moment to fill out this questionnaire and place it in the envelope provided. Your input is important. Comments will become part of the Consultation Report Addendum.

1. How did you learn about this Focused Information Session (please check all that apply)?

☐ Newspaper Advertisement ☐ Other:

☑ Personal Letter or Email

☐ Word of Mouth

☐ Website

2. What was your main reason for attending this Focused Information Session?

TO SEE IF TURBINES PLANNED ARE MITIGATING THE KINCARDINE AIRPORT

3. Did this Focused Information Session meet your information needs?

☐ Yes ☑ Somewhat ☑ No

Please explain:

TURBINES ARE STILL PROPOSED IN FRONT OF THE RUNWAYS.

4. **Please provide any other comments or questions related to the Armow Wind Project:**

Please provide your contact information below if you would like to receive Project updates. Please note that your personal information will not be affiliated with your comments and will be kept confidential.

Name: _____

Street Address: _____

City/Province: _____

Postal Code: _____ Email: _____

Thank you for taking the time to fill out this questionnaire. Kindly complete this comment sheet before you leave so that your comments can be included in the Consultation Report Addendum. Comments received after today will not be included in the Addendum.

Armow Wind Project

Focused Information Session, December 11, 2012
Tiverton Community Centre

Please take a moment to fill out this questionnaire and place it in the envelope provided. Your input is important. Comments will become part of the Consultation Report Addendum.

1. How did you learn about this Focused Information Session (please check all that apply)?

☐ Newspaper Advertisement ☑ Other:

☐ Personal Letter or Email

☐ Word of Mouth

☐ Website

2. What was your main reason for attending this Focused Information Session?

to Support

3. Did this Focused Information Session meet your information needs?

☑ Yes ☐ Somewhat ☐ No

Please explain:

4. **Please provide any other comments or questions related to the Armow Wind Project:**

Please provide your contact information below if you would like to receive Project updates. Please note that your personal information will not be affiliated with your comments and will be kept confidential.

Name: _____

Street Address: _____

City/Province: _____

Postal Code: _____ Email: _____

Thank you for taking the time to fill out this questionnaire. Kindly complete this comment sheet before you leave so that your comments can be included in the Consultation Report Addendum. Comments received after today will not be included in the Addendum.

Armow Wind Project

Focused Information Session, December 11, 2012
Tiverton Community Centre

Please take a moment to fill out this questionnaire and place it in the envelope provided. Your input is important. Comments will become part of the Consultation Report Addendum.

1. How did you learn about this Focused Information Session (please check all that apply)?

☐ Newspaper Advertisement ☑ Other:

☐ Personal Letter or Email

☐ Word of Mouth

☐ Website

2. What was your main reason for attending this Focused Information Session?

Support

3. Did this Focused Information Session meet your information needs?

☑ Yes ☐ Somewhat ☐ No

Please explain:

4. **Please provide any other comments or questions related to the Armow Wind Project:**

Please provide your contact information below if you would like to receive Project updates. Please note that your personal information will not be affiliated with your comments and will be kept confidential.

Name: _____

Street Address: _____

City/Province: _____

Postal Code: _____ Email: _____

Thank you for taking the time to fill out this questionnaire. Kindly complete this comment sheet before you leave so that your comments can be included in the Consultation Report Addendum. Comments received after today will not be included in the Addendum.

Armow Wind Project

Focused Information Session, December 11, 2012
Tiverton Community Centre

Please take a moment to fill out this questionnaire and place it in the envelope provided. Your input is important. Comments will become part of the Consultation Report Addendum.

1. How did you learn about this Focused Information Session (please check all that apply)?

☐ Newspaper Advertisement ☐ Other:

☒ Personal Letter or Email

☐ Word of Mouth

☐ Website

2. What was your main reason for attending this Focused Information Session?

NOISE

3. Did this Focused Information Session meet your information needs?

☑ Yes ☐ Somewhat ☐ No

Please explain:

wanted info on latest rev of report table 7.2
was informed available on line - also available in ~~hard~~ hard
copy at office - I will pick up copy
wanted info on complaint resolution - informed part of report

4. Please provide any other comments or questions related to the Armow Wind Project:

Skeptical of complaint resolution process due in large part because of lack of response of other local wind turbine operator's response. Would like to see complaint resolution process drawn up prior to project approval. Process would need to be expediant with written or verbal contact availability

Please provide your contact information below if you would like to receive Project updates. Please note that your personal information will not be affiliated with your comments and will be kept confidential.

Name: _____

Street Address: _____

City/Province: _____

Postal Code: _____ Email: _____

Thank you for taking the time to fill out this questionnaire. Kindly complete this comment sheet before you leave so that your comments can be included in the Consultation Report Addendum. Comments received after today will not be included in the Addendum.

Armow Wind Project

Focused Information Session, December 11, 2012
Tiverton Community Centre

Please take a moment to fill out this questionnaire and place it in the envelope provided. Your input is important. Comments will become part of the Consultation Report Addendum.

1. How did you learn about this Focused Information Session (please check all that apply)?

☐ Newspaper Advertisement ☐ Other:

☑ Personal Letter or Email

☐ Word of Mouth

☐ Website

2. What was your main reason for attending this Focused Information Session?

info

3. Did this Focused Information Session meet your information needs?

☑ Yes ☐ Somewhat ☐ No

Please explain:

4. **Please provide any other comments or questions related to the Armow Wind Project:**

Please provide your contact information below if you would like to receive Project updates. Please note that your personal information will not be affiliated with your comments and will be kept confidential.

Name: _____

Street Address: _____

City/Province: _____

Postal Code: _____ Email: _____

Thank you for taking the time to fill out this questionnaire. Kindly complete this comment sheet before you leave so that your comments can be included in the Consultation Report Addendum. Comments received after today will not be included in the Addendum.

Armow Wind Project

Focused Information Session, December 11, 2012
Tiverton Community Centre

Please take a moment to fill out this questionnaire and place it in the envelope provided. Your input is important. Comments will become part of the Consultation Report Addendum.

1. How did you learn about this Focused Information Session (please check all that apply)?

- ☐ Newspaper Advertisement
- ☐ Other:
- ☒ Personal Letter or Email
- ☐ Word of Mouth
- ☐ Website

2. What was your main reason for attending this Focused Information Session?

TO ASK SPECIFIC QUESTIONS OF PROPONENTS CONCERNING DEVELOPMENTS.

3. Did this Focused Information Session meet your information needs?

- ☐ Yes
- ☒ Somewhat
- ☐ No

Please explain:

AS ALWAYS, WE AWAIT MORE THOROUGH ANSWERS TO MANY OF THESE QUESTIONS.

4. **Please provide any other comments or questions related to the Armow Wind Project:**

Please provide your contact information below if you would like to receive Project updates. Please note that your personal information will not be affiliated with your comments and will be kept confidential.

Name: _____

Street Address: _____

City/Province: _____

Postal Code: _____ Email: _____

Thank you for taking the time to fill out this questionnaire. Kindly complete this comment sheet before you leave so that your comments can be included in the Consultation Report Addendum. Comments received after today will not be included in the Addendum.

Armow Wind Project

Open House, November 12, 2012
Best Western Governor's Inn

Please take a moment to fill out this questionnaire and place it in the box provided, or mail it to the address below. Your input is important. Comments will become part of the public record.

1. How did you learn about this Public Open House (please check all that apply)?

☑ Newspaper Advertisement ☐ Website

☐ Personal Letter or Email

☐ Word of Mouth

☐ Other:

2. What was your main reason for attending this Public Open House?

To learn more about the project and to express my concerns.

3. Did this Public Open House meet your information needs?

☐ Yes ☑ Somewhat ☐ No

Please explain:

The amount of material presented is too much to be able to take it in during the time I had available.

Also, the presentation was completely one sided in favour of the proponents. I would like to see a study of a representative group of residents who live in close proximity to the turbines, including some who benefit financially and others who do not.

4. Please provide any other comments or questions related to the Armow Wind Project:

I am located on the property to the E side of the proposed access/power line route from Conc. 11 to Turbines 97 & 13. The access road is too close to our property & will negatively affect us, both in construction dust and noise and potential long term effects from the transmission line. This project will convert the subject lands into an industrial park and this goes against it's agricultural zoning. We are facing an industrial development that will permanently destroy the features that brought us here - quiet, dark, beautiful open skies, low light interference at night for stargazing and piece of mind. I have spent time within the Underwood turbine development and I feel nauseous when inside a similar distance to what is proposed for the land surrounding my house. Also, the noise is significant, particularly in low winds when the turbines are and the wind is quiet.

Finally - why so close? A minimum 1 km set back is the [illegible] in many parts of the world.

If you would like to be kept informed about the status of the Project, please provide your contact information below. Please note that your personal information will not be affiliated with your comments and will be kept confidential.

Name: _____

Street Address: _____

City/Province: _____

Postal Code: _____ Email: _____

Thank you for taking the time to fill out this questionnaire. If you require more time, you are welcome to take the questionnaire home and send it back to **info@armowwind.com**, or mail it into: **Ian Callum, Project Manager**
Golder Associates Ltd.
2390 Argentia Rd.
Mississauga, ON
L5N 5Z7

5. Formal Letters and Responses

08-Dec-2012

Comments
on the
Noise Impact Assessment for the Armow Wind Project (Document #: 800235-CAOT-R-01, Issue G, Final)

Documents have been obtained through a freedom of information request from the Ministry of the Environment relating to noise complaints and health problems at the Melancthon Wind Power project. One of the documents is the report from a MOE Provincial Officer describing the findings at that wind power project. A copy of that released MOE report is attached.
The noise calculations for that project would have been done using the same international standard, ISO 9613, currently being used for the Armow Wind Project, and yet there have been a large number of complaints to the MOE about noise problems.

Under Issues, Section 1.1 of the released MOE report states "Noise Emissions .... are producing large number of complaints alleging adverse effects (i.e. Harm or material discomfort .... rendering property unfit for human use ....), ... ". See also section 2.1.

- Is Samsung-Pattern aware of the fact that a number of complaints have been made to the MOE about the noise and health problems from other wind power projects, such as Melancthon?

Under Issues, Section 1.2 of the released MOE report states "Reports generated by the owner, as well as MOE noise measurements, are unable to demonstrate non-compliance with the CofA noise limits... ". See also section 2.2.

- Is Samsung-Pattern able to measure noise emissions from the wind turbines and prove that they meet the noise guidelines, especially taking into account infrasound?

Under Issues, Section 1.3 of the released MOE report states "At least two families have moved out of their homes due to noise impacts from the operation ..... MOE District Staff are aware of at least 6 cases where CHD has bought out resident's homes ... ". See also section 3.1.6.

- Is Samsung-Pattern aware of the fact that wind companies are purchasing homes because they're no longer fit for human habitation?

Under Issues, Section 1.5 of the released MOE report states "MOE Provincial Officers have attended at several of the complainant's residences and have confirmed that despite the noise emissions apparently complying with applicable standard\CofA(Air) limits, that the noise emissions are in fact causing material discomfort...". See also sections 3.1.5 and 3.3.2.

- Is Samsung-Pattern aware that the MOE has confirmed health problems from wind turbine noise even when the noise emissions comply with ministry guidelines?
- Is Samsung-Pattern aware that the health problems being claimed in other wind farms may not be related exclusively to the audible spectrum of sound which is what the noise calculations are currently based on?

Under Issues, Section 1.6 of the released MOE report states "GDO Provincial Officers have measured wind turbine noise levels at complainant's homes that appear to indicate non-compliance with the CofA(Air)".

- Is Samsung-Pattern aware that the noise calculations based on ISO 9613 may be low compared to actual noise levels in the field and therefore the actual noise may exceed the noise guidelines?

Under Issues, Section 1.7 of the released MOE report states "Environmental Assessment .... Staff have stated to District Staff that any field measurements of noise emissions from wind turbines will be inconclusive at best as there is currently no practical, reliable and defensible methodology to measure noise emissions from wind turbines. As such there is no way to measure compliance, (or lack thereof), with guideline\CofA limits in the field".

- Does Samsung-Pattern have a reliable method to measure noise emissions from wind turbines and prove that they're not causing health problems to residents within the project area?
- What will Samsung-Pattern do when complaints of health problems are received for the residents within the project area?
- Will Samsung-Pattern ignore complaints of health problems just like the MOE, Ministry of Health and other wind companies are currently doing?

Under Challenges, Section 2.4 of the released MOE report states "The conventional approach to addressing noise complaints by requiring compliance with the applicable NPC guideline limits will not address this set of complaints. This would also appear to be the case for a number of other wind turbine facility complaints across the province". See also sections 3.1.7.

- The Melancthon project is obviously not the only case with complaints of health problems. Is Samsung-Pattern aware that the MOE guidelines for noise are not conservative enough to prevent health problems with wind turbines?

The noise calculations for wind power project are being made according to the international standard ISO 9613. This standard assumes downwind propagation, moderate ground-based temperature inversion and calculates the A-weighted sound pressure level. Even with some of these considerations, the MOE is receiving many complaints of health problems as per the attached MOE memo.

Now that Samsung-Pattern is aware of these noise complaints and health problems, why are the noise calculations not including the following items, which are part of the ISO standard and the MOE Guidelines?

- The ISO standard says that the calculations are accurate to approximately +-3dB(A) and the MOE Guidelines says that the noise assessment must represent "predictable worst case". Why are you not adding 3 dB(A) to the noise calculations to take into account this margin of error since your calculations could be low by at least 3dB(A)?
- The noise calculations use a Ground Attenuation Factor of 0.7, which represents a porous ground with vegetation. Again, the MOE Guidelines say that the noise assessment must represent "predictable worst case", why are you not using a value closer to 0.0, which is more representative of Spring, Fall and Winter conditions?
- The MOE Guidelines state that 5dB(A) are to be added to the noise calculations for tonality. Why is Samsung-Pattern not adding anything at all to the calculations for tonality?
- The noise calculations are based on the dB(A) scale which is only the audible noise. Knowing that the turbines are causing health problems as stated in the released MOE report attached, why is Samsung-Pattern not calculating the noise impact based on the dB(C) scale? This would take into account low frequency noise like infrasound.
- Does Samsung-Pattern know the Wind Shear coefficient for the Armow project and have the noise calculations taken into account the actual wind Shear coefficient rather than just the " moderate ground-based temperature inversion" that's assumed in the ISO standard?
- Since the MOE Field Staff state that any field measurements of noise emissions from wind turbines will be inconclusive, why is Samsung-Pattern still erecting wind farms knowing that they may cause health problems to the residents, as per the released MOE memo attached?

Any engineer doing work for the public in Ontario MUST not only be registered as a Professional Engineer, but must also be in possession of a Certificate of Authorization, or be working under a company Certificate of Authorization, which requires the company to have one Professional Engineer hold the Certificate of Authorization for all engineers working for it.

- Can Samsung-Pattern provide the Municipality of Kincardine with proof that GL Garrad Hassan holds a Certificate of Authorization?
- Can Samsung-Pattern explain to the Municipality of Kincardine why Mr Andrew Brunskill, who is registered as Engineer Intern Trainee number 100137623 with the Professional Engineers of Ontario, has not had a Professional Engineer with a Certificate of Authorization stamp this Noise Assessment for GL Garrad Hassan?
- Is Samsung-Pattern aware that any document dealing with public safety in Ontario must be stamped by a Professional Engineer?

Thank you

Ministry of
the Environment

Freedom of Information and
Protection of Privacy Office

12th Floor
40 St. Clair Avenue West
Toronto ON M4V 1M2
Tel: (416) 314-4075
Fax (416) 314-4285

Ministère de
l'Environnement

Bureau de l'accès à l'information
et de la protection de la vie privée

12e étage
40, avenue St. Clair ouest
Toronto ON M4V 1M2
Tél. : (416) 314-4075
Téléc. : (416) 314-4285

Ontario

November 23, 2012

[redacted]
Orangeville, ON L9W 2Y8

Dear [redacted]

RE: *Freedom of Information and Protection of Privacy Act* Request
Our File # A-2011-03046

This letter is further to your request made pursuant to the *Freedom of Information and Protection of Privacy Act* for all letters, memos, records, emails, reports and communications between the Guelph District Office, Senior Environmental Officers Tomlinson and Hall and any other Ministry of the Environment office, including the Toronto Implementation and/or Approvals office, regarding a proposed Provincial Officer's Order for the Amaranth and Melancthon wind turbines and the transformer station operated by Canadian Hydro Developers (now owned by TransAlta).

Your request was for records from March 2009 to September 2010 but the ministry also wants to ensure you are aware of our comprehensive framework and regulatory tools as it relates to wind turbines. The ministry has developed a standardized approach to compliance activities related to wind turbines and has a variety of tools to ensure compliance with all approvals ranging from voluntary abatement to mandatory orders.

Regarding this particular site, ministry staff conducted many inspections and had numerous discussions with the company about actions that could reduce noise from the wind farm. While the ministry considered issuing an order to address noise, the discussions with TransAlta were successful and TransAlta agreed to place 24 turbines into an extended noise reduced operating mode from 7:00 p.m. to 7:00 a.m. when wind shear is high to reduce noise. This voluntary action addressed the noise issues ministry staff had identified and an order was not required.

While the ministry has always been able to measure noise from various sources, in August 2011, the ministry refined its noise measurement protocol for wind turbines. This standardized noise measurement protocol specific to wind turbines allows the ministry to determine the specific source of noise (i.e., distinguish the turbine noise level from the background noise level). Following the release of the protocol, the ministry has used it a number of times at the site that is the subject of your request and determined that there were no exceedances of noise standards when using the new protocol.

The ministry encourages the public to report any concerns about wind turbines to their

local district office (office numbers for the district offices are available on the ministry's website) or call the Spills Action Centre (1-800-268-6060) if they are experiencing any noise impacts so that the ministry can respond appropriately.

If you have any questions regarding this matter, please contact me at (416)327-1434.

Yours truly,

H. Ritzer

Heidi Ritzer
Manager, Corporate and Freedom of Information Services
Information Management and Access Branch

Attachment

Flynn, Magdelene (ENE)

From: Hall, Cameron (ENE)
Sent: March 25, 2010 9:09 AM
To: Glassco, Jane (ENE)
Subject: RE: latest copy of the Order/Report
Attachments: Provincial Officer Report - WTGS - March 12, 2010.doc; Director's Order - WTGs - March 12, 2010.doc; Figure 1 Melanchton EcoPower Centre March 8, 2010.pdf; Figure 2 Melanchton EcoPower Centre - WTGs March 8, 2010.pdf; Figure 3 Director's Order - WTGs to Cease Discharge of Sound Contamination - Melanchton Ecopower Centre March 8, 2010.pdf; Table 1 WTG Locations.doc; Table 2 Residence Locations.doc

Good Day Jane:

I have attached the most recent draft versions (March 12, 2010) of the Provincial Officer's Order and language for the Director's Order. .

s.13

I can discuss at your convenience.

Cameron Hall
Sr. Environmental Officer
Guelph District Office
Ministry of the Environment
1 Stone Road W., 4th Floor
Guelph, ON N1G 4Y2
(519) 826-4261
(519) 826-4286 (fax)

From: Glassco, Jane (ENE)
Sent: Thursday, March 25, 2010 8:57 AM
To: Hall, Cameron (ENE)
Subject: latest copy of the Order/Report

I would like to re-send the Order and Report to Bill....Could you please give me the latest copy? thanks

Jane

Flynn, Magdelene (ENE)

From:	Glasseo, Jane (ENE)
Sent:	March 25, 2010 9:32 AM
To:	Bardswick, Bill (ENE)
Cc:	Hall, Cameron (ENE); Tomlinson, Gary (ENE)
Subject:	FW: latest copy of the Order/Report
Attachments:	Provincial Officer Report - WTGS - March 12, 2010.doc; Director's Order - WTGs - March 12, 2010.doc; Figure 1 Melanchton EcoPower Centre March 8, 2010.pdf; Figure 2 Melanchton EcoPower Centre - WTGs March 8, 2010.pdf; Figure 3 Director's Order - WTGs to Cease Discharge of Sound Contamination - Melancthon Ecopower Centre March 8, 2010.pdf; Table 1 WTG Locations.doc; Table 2 Residence Locations.doc

Hi Bill:

During our teleconference next week, Cam will go thru the report and the order in detail with you.....

Jane

Flynn, Magdelene (ENE)

From: Bray, Dave (ENE)
Sent: March 12, 2010 8:48 PM
To: Hall, Cameron (ENE)
Cc: Bardswick, Bill (ENE); Tomlinson, Gary (ENE); Glassco, Jane (ENE); Bray, Dave (ENE)
Subject: RE: Canadian Hydro Developers\TransAlta Draft Order
Importance: High

Cam. As a follow-up to our conversation this afternoon regarding the meeting scheduled for April 8, 2010 with Bill and EAAB staff,

s.13

Dave Bray
District Supervisor
Guelph District Office
Ministry of the Environment
1 Stone Road West
Guelph, ON
N1G 4Y2

519-826-6549
1-800-265-8858 X66549

From: Bardswick, Bill (ENE)
Sent: March 08, 2010 5:20 PM
To: Tomlinson, Gary (ENE); Glassco, Jane (ENE); Bray, Dave (ENE)
Cc: Hall, Cameron (ENE)
Subject: RE: Canadian Hydro Developers\TransAlta Draft Order

s.13

Flynn, Magdelene (ENE)

From: Glassco, Jane (ENE)
Sent: March 08, 2010 9:05 PM
To: Tomlinson, Gary (ENE); Bray, Dave (ENE)
Cc: Hall, Cameron (ENE)
Subject: RE: Canadian Hydro Developers\TransAlta Draft Order

Gary:

s.13

Jane

From: Tomlinson, Gary (ENE)
Sent: March 8, 2010 5:15 PM
To: Glassco, Jane (ENE); Bardswick, Bill (ENE); Bray, Dave (ENE)
Cc: Hall, Cameron (ENE)
Subject: Canadian Hydro Developers\TransAlta Draft Order

Dave\Jane\Bill:

Two developments:

Flynn, Magdelene (ENE)

From: Tomlinson, Gary (ENE)
Sent: March 08, 2010 6:04 PM
To: Bardswick, Bill (ENE); Glassco, Jane (ENE); Bray, Dave (ENE)
Cc: Hall, Cameron (ENE)
Subject: RE: Canadian Hydro Developers\TransAlta Draft Order

Ok, message received and understood. Cam and I will stand down until directed otherwise.

Sounds like we are not all on the same place on the information loop on this one.

I'll get into it more in the morning.

G.W. Tomlinson
Provincial Officer
Badge # 132
Senior Environmental Officer
Guelph District Office
West Central Region
Ontario Ministry of the Environment
Tel: 519 826 4272
Fax: 519 826 4286
Gary.Tomlinson@ontario.ca
Spills Action Centre 1 800 268 6060

From: Bardswick, Bill (ENE)
Sent: March 08, 2010 5:20 PM

s.13

s.21

s.21

We met with CHD on September 8, 2009 and advised them we believed the noise emissions from the WTGs and the Transformer Station were causing adverse effects, contrary to ss 14(1) of the EPA – a "Notice of Violation". We asked them to respond in writing to us by September 11, 2009 with a plan which the Company would undertake to address the discharge of noise contaminants to the natural environment from both the Transformer Station and Wind Plant. On September 8, 2009 I asked CHD to consider taking actions to address the Company's contaminant discharges including for example immediately shutting down during the evenings the 3 WTGs nearest the

s.21 residence. The Company did not do this but advised the Ministry via a September 11, 2009 e-mail from Mr. Tripp that the Company had "curtailed the RPM of the closest 3 turbines between the hours of 7 pm to 6 am to the lowest RPM setting available from the manufacturer."

s.13

The Ministry agreed to the Company's time extension to give the Company until September 25, 2009 to make the requested written submission to the Guelph District Office.

On September 28, 2009 we received a letter via e-mail from Mr. T. W. Bermingham, of Blake, Cassels & Graydon LLP. Mr. Bermingham states in his letter that he was asked by the Company to coordinate the Company's response to our request for a written plan on how the Company was going to proceed with addressing the noise contamination being discharged to the natural environment from the Company's Transformer Station and Wind Plant. Mr. Bermingham's response on behalf of the Company appears to suggest "An enormous investment has been made to build Canada's largest and premier wind energy facility"; "Canadian Hydro continues to audit both the TS pursuant to the Certificate of Approval (Air) and, under its municipal commitments the wind turbine generators."; and, "To assist in bringing this discussion to closure, we request a meeting in part to review the facts surrounding both the TS and the wind turbine generators, and, even more importantly, to explain policy and legal reasons why the maintenance of a consistent position by the MOE is extremely important, both to Canadian Hydro and to the cause of Green Energy in Ontario."

Unfortunately the September 28, 2009 written response from Mr. Bermingham did not include any "practicable mitigation measures that could be implemented related to noise from turbines or the transformer station" nor any "discussion/information related to limitations/challenges associated with potential mitigation measures, including technical/operational limitations, contractual limitations, and economic considerations." The September 28, 2009 CHD response was not satisfactory for the purposes of addressing the ongoing ss 14(1) EPA contraventions.

s.13

From: Glassco, Jane (ENE)
Sent: October 30, 2009 10:44 AM
To: Tomlinson, Gary (ENE); Hall, Cameron (ENE)
Subject: FW: Noise Complaint Investigations, Melancthon EcoPower Centre, Certificate of Approval Air: 2429-7DZHCV

Jane

From: Bardswick, Bill (ENE)
Sent: October 29, 2009 5:17 PM
To: French, Kevin (ENE)
Cc: Tracey, Cheryl-Ann (ENE); Lancaster, Deborah (ENE); Glassco, Jane (ENE); Dumais, Doris (ENE)
Subject: FW: Noise Complaint Investigations, Melancthon EcoPower Centre, Certificate of Approval Air: 2429-7DZHCV

Here is CHD's response. I haven't discussed the letter with Jane and staff . I will discuss with you after we have had a chance to review and discuss internally within WCR.

One thing I have figured out though is that we do need to have CHD sit down with us and explain how they operate these things and what they can or cannot do wrt controlling the individual turbines. How they operate under different meteorological conditions – what control do they have - is it automated – is it manually controlled – what are the different modes of operation and how do those modes impact noise levels etc. We are clueless in this regard so we have some learning to do with them to understand.

I went out last night for about 5 hours (got home midnight) and got some real first hand experience with different types of noise that the turbines can create. The same turbine or groups of turbines could create 3-4 different types of noise and at different magnitudes at different times in the evening all depending on meteorological conditions, time of day, their orientation, and how they readjusted themselves (auto or by manual control – we don't know) to wind speed and direction. Also I was able to experience first hand wind shear conditions (no wind at ground but turbines still generating and creating noise) and how that plays an important role in noise impacts.

Bill Bardswick
Director West Central Region
Ontario Ministry of Environment
119 King Street West 12th Floor
Hamilton Ontario L8P 4Y7
Telephone 905-521-7652

EMail bill.bardswick@ontario.ca

From: Bryan Tripp [mailto:BTripp@canhydro.com]
Sent: October 29, 2009 2:55 PM
To: Glassco, Jane (ENE)
Cc: Bardswick, Bill (ENE)
Subject: Noise Complaint Investigations, Melancthon EcoPower Centre, Certificate of Approval Air: 2429-7DZHCV

Dear Jane

Further to the request by Mr. Bill Bardswick, please find attached a letter providing the Ministry of the Environment ("MOE") with details of the additional voluntary interim mitigation steps Canadian Hydro has taken on a without prejudice basis to reduce the sound levels at receptor locations of concern as identified by the MOE.

Sincerely,

Bryan M. Tripp, P.Eng, MASc.
Environmental Lead
Canadian Hydro Developers, Inc.
Building a Sustainable Future®
Tel: 519.836.4648 ext. 222
Cell: 519.994.4745
Fax: 519.836.4745
em: btripp@canhydro.com
web: www.canhydro.com

Table 1: WTG Locations

WTG Number	Municipality	Lot	Concession	GIS Easting	GIS Northing	Phase
1	Melancthon	7	7SW	553632	4878515	1
2	Melancthon	8	7SW	553699	4878711	1
3	Melancthon	8	7SW	553470	4878806	1
4	Melancthon	9	7SW	553292	4879035	1
5	Melancthon	9	7SW	553517	4879206	1
6	Melancthon	5	7SW	553795	4879494	1
7	Melancthon	6	6SW	555776	4879080	1
8	Melancthon	6	6SW	555831	4879302	1
9	Melancthon	5	6SW	554773	4880005	1
10	Melancthon	302	4SW	558014	4879846	1
11	Melancthon	301	4SW	557837	4879633	1
12	Melancthon	299	3SW	556265	4880530	1
13	Melancthon	302	3SW	557179	4880055	1
14	Melancthon	302	3SW	556864	4880272	1
15	Melancthon	300	4SW	558138	4880194	1
16	Melancthon	296	3SW	558194	4880744	1
17	Melancthon	297	3SW	558190	4881040	1
18	Melancthon	290	3SW	556962	4881059	1
19	Melancthon	294	4SW	557026	4880582	1
20	Melancthon	294	4SW	557247	4880926	1
21	Melancthon	292	3SW	557060	4881222	1
22	Melancthon	291	3SW	556946	4881547	1
23	Melancthon	288	4SW	556087	4881414	1
24	Melancthon	287	4SW	559005	4881703	1
25	Melancthon	285	3SW	555070	4882124	1
26	Melancthon	285	3SW	556169	4882472	1
27	Melancthon	300	2SW	556036	4881586	1
28	Melancthon	300	2SW	556546	4881832	1
29	Melancthon	298	2SW	559416	4882076	1
30	Melancthon	288	3SW	556780	4882025	1
31	Melancthon	301	4SW	557717	4879374	1
32	Melancthon	294	2SW	558611	4882005	1
33	Melancthon	293	2SW	555511	4882720	1
34	Melancthon	293	2SW	555512	4882975	1
36	Melancthon	287	2SW	557376	4883205	1
37	Melancthon	287	2SW	557602	4883475	1
43	Melancthon	5	6SW	554602	4880277	1
44	Melancthon	287	2SW	556254	4883372	1
45	Melancthon	11	6SW	553755	4880758	1
46	Melancthon	11	6SW	553804	4880485	1
47	Melancthon	281	2SW	556363	4884055	1
48	Melancthon	282	2SW	555582	4883869	1
49	Melancthon	284	2SW	555645	4883522	1
50	Melancthon	1	6SW	554716	4879720	1
51	Melancthon	294	2SW	558424	4882271	1

WTG Number	Municipality	Lot	Concession	GIS Easting	GIS Northing	Phase
53	Amaranth	28	10	554098	4875561	2
54	Amaranth	27	10	554532	4875971	2
55	Amaranth	29	9	557128	4876025	2
56	Amaranth	30	10	554409	4876444	2
57	Amaranth	30	10	554394	4876712	2
60	Amaranth	38	9	555676	4877009	2
61	Amaranth	30	9	556252	4876865	2
62	Amaranth	34	8	558643	4875259	2
64	Amaranth	30	8	556824	4877440	2
65	Amaranth	29	8	556696	4876662	2
66	Amaranth	28	8	556748	4876437	2
67	Amaranth	27	8	559092	4875850	2
68	Amaranth	27	8	558815	4875363	2
69	Amaranth	27	7	558231	4875726	2
70	Amaranth	28	7	559285	4875947	2
71	Amaranth	29	7	559277	4876992	2
72	Amaranth	30	7	558231	4877969	2
73	Amaranth	30	6	559691	4876236	2
74	Amaranth	30	6	559596	4877021	2
75	Amaranth	28	6	559603	4877247	2
76	Amaranth	28	6	559591	4877285	2
77	Amaranth	28	10	554008	4876112	2
101	Melancthon	12	9SW	[illegible]	4879540	2
102	Melancthon	13	9SW	551101	4879874	2
104	Melancthon	13	7SW	552238	4879858	2
105	Melancthon	14	7 SW	551047	4880185	2
106	Melancthon	14	7 SW	551912	4880565	2
108	Melancthon	16	7SW	551280	4880647	2
109	Melancthon	16	7	551600	4881044	2
110	Melancthon	19	7 SW	550540	4881841	2
111	Melancthon	19	7 SW	550461	4882003	2
112	Melancthon	19	6 SW	551297	4882968	2
113	Melancthon	18	6SW	551639	4882814	2
114	Melancthon	18	6SW	551891	4882386	2
115	Melancthon	16	6SW	552017	4881846	2
116	Melancthon	17	6	553125	4881107	2
117	Melancthon	12	5SW	552990	4881425	2
118	Melancthon	13	5SW	553381	4881593	2
119	Melancthon	14	5SW	553904	4882077	2
122	Melancthon	18	5 SW	552234	4882555	2
123	Melancthon	19	5 SW	551323	4883290	2
124	Melancthon	267	4	553619	4883389	2
126	Melancthon	274	4SW	553957	4883375	2
127	Melancthon	277	4SW	554414	4883019	2
128	Melancthon	278	4SW	554441	4882575	2
129	Melancthon	280	4SW	554791	4882459	2
130	Melancthon	282	4SW	555205	4882343	2
131	Melancthon	283	4SW	555289	4883020	2

WTG Number	Municipality	Lot	Concession	GIS Easting	GIS Northing	Phase
133	Melancthon	270	3SW	554820	4883474	2
134	Melancthon	266	3SW	553262	4885179	2
135	Melancthon	265	3SW	553357	4884916	2
136	Melancthon	263	3SW	552846	4885011	2
137	Melancthon	263	3SW	552679	4885471	2
138	Melancthon	257	3SW	551796	4886196	2
139	Melancthon	257	3SW	551340	4885880	2
141	Melancthon	258	3SW	550817	4886560	2
142	Melancthon	253	2SW	551157	4886751	2
143	Melancthon	253	2SW	553326	4886032	2
144	Melancthon	269	2SW	553593	4886385	2
145	Melancthon	268	1SW	554047	4886284	2
146	Melancthon	264	1SW	554427	4887106	2
147	Melancthon	272	2SW	554879	4885203	2
148	Melancthon	274	2SW	555068	4884824	2
149	Melancthon	276	2SW	555409	4884589	2
150	Melancthon	275	2SW	555792	4885181	2
151	Melancthon	278	2 SW	556063	4884706	2
152	Melancthon	279	2 SW	556206	4884383	2
153	Melancthon	278	1NE	557396	4886324	2
154	Melancthon	278	1NE	557150	4885854	2
155	Melancthon	276	1NE	557021	4886459	2
156	Melancthon	274	3 NE	556796	4885786	2
157	Melancthon	272	1 NE	556636	4887133	2
158	Melancthon	269	2NE	556134	4887641	2
159	Melancthon	269	2NE	555653	4888083	2
160	Melancthon	325	1NE	555337	4887790	2
161	Melancthon	265	1NE	554831	4887882	2
162	Melancthon	264	1NE	555182	4886191	2
163	Melancthon	263	3NE	555331	4888523	2
164	Melancthon	15	3NE	556805	4889490	2
165	Melancthon	16	4NE	556236	4889822	2
166	Melancthon	329	1NE	557982	4888083	2
204	Melancthon	10	3NE	558014	4888714	2
205	Melancthon	260	2 SW	552802	4886805	2
206	Melancthon	265	3SW	554042	4885081	2
207	Melancthon	268	2SW	554224	4885619	2
208	Melancthon	11	3NE	557345	4888106	2
209	Melancthon	10	3NE	557754	4888049	2
210	Melancthon	9	3NE	558019	4887646	2
Transformer site	Amaranth	15	6			1

Ministry of the Environment
Guelph District Office
1 Stone Road West
4th Floor
Guelph, Ontario N1G 4Y2
Tel.: 519 826-4286
Fax: 519 826-4286

Ministère de l'Environnement
1, chemin Stone ouest
4e étage
Guelph (Ontario) N1G 4Y2
Tél.: 519 826-4286
Téléc.: 519 826-4286

Ontario

Table 3: Calculated Wind Shear Coefficients - Residence 5

Date	Time	Comment	WTGs (80 m height) Hourly Average Wind Speed (m/s) of nearest WTGs	MOE Ground Level (2 m height) Hourly Average Wind Speed (m/s)	Calculated Wind Shear Coefficient
2009/11/24	3:00 PM	Whistle	2.25	1.5	0.11
2009/11/25	7:00 AM		6.89	4.2	0.13
2009/11/28	7:00 AM		9.46	4.8	0.18
2009/11/29	9:50 PM		3.43	2.7	0.19
2009/11/30	4:40 PM		5.23	2.7	0.18
2009/11/30	9:50 PM		6.56	0.1	1.13
2009/12/01	6:30 AM		8.80	4.1	0.21
2009/12/02	2:45 AM	Woke up	8.06	2.3	0.34
2009/12/03	9:50 PM		9.44	5.1	0.17
2009/12/04	4:20 PM		8.39	4	0.20
2009/12/08	10:39 PM		9.48	2.9	0.32
2009/12/12	7:39 PM		8.58	2.9	0.29
2009/12/13	10:00 AM		10.29	5	0.20
2009/12/27	2:30 AM	Woke up; WTGs 60, 62 and 64 off	6.70	2.8	0.34
2010/01/10	5:00 AM		8.62	1.2	0.53
2010/01/14	1:00 AM		4.39	1	0.40
2010/01/15	12:15 PM		4.27	2.9	0.10
2010/01/23	12:00 PM		5.31	3.8	0.09
2010/01/23	8:26 PM		7.40	4.4	0.14
2010/01/24	3:18 AM		5.83	1.6	0.35
2010/01/24	9:41 PM		8.22	3.9	0.20
2010/01/25	8:30 PM		11.13	7	0.13
				Average:	0.27

Flynn, Magdelene (ENE)

From: Tomlinson, Gary (ENE)
Sent: August 21, 2009 5:38 PM
To: Tomlinson, Gary (ENE); Bardswick, Bill (ENE)
Cc: Glassco, Jane (ENE); Hall, Cameron (ENE)
Subject: RE: Canadian Hydro Developers Noise Abatemetn Plan
Attachments: CHD Transformer CofA 7257-7DDJP3.pdf; CHD Turbine CofA 2429-7DZHCV.pdf; npc103.pdf; NPC-232.pdf; 4709e Interpritation Wind Turbines.pdf; 4709e.pdf

It occurs to me that it might be valuable for you to also have copies of the two CofA(Air) for the CHD Site, as well as a copy of NPC-232, and the "interpretation documents" while you are reviewing the "plan".

G.W. Tomlinson
Provincial Officer
Badge # 132
District Supervisor (Acting)
Guelph District Office
West Central Region
Ontario Ministry of the Environment
Tel: 519 826 4272
Fax: 519 826 4286
Gary.Tomlinson@ontario.ca
Spills Action Centre 1 800 268 6060

From: Tomlinson, Gary (ENE)
Sent: August 21, 2009 5:30 PM

To: Bardswick, Bill (ENE)
Cc: Glassco, Jane (ENE); Hall, Cameron (ENE)
Subject: Canadian Hydro Developers Noise Abatemetn Plan

Bill:

Further to our telephone conversation this afternoon, below is the abatement plan we discussed to address the Canadian Hydro Developers wind turbine and transformer noise complaints in Dufferin County. As we discussed I have identified the issues and challenges we are faced with, as well as the proposed strategy and the abatement plan itself.

1.0 Issue:

1.1 Noise Emissions from Canadian Hydro Developers, (CHD), Dufferin County wind turbine operations, (Melancthon I and Melancthon II now collectively known as *Melancthon EcoPower Center*), are producing large numbers of complaints, (dating back to March, 2006), alleging adverse effects, (i.e. harm or material discomfort, allegations of adverse effect on health, rendering property unfit for human use, loss of enjoyment of normal use of property, and, interference with the normal conduct of business), due to the noise emissions from the 133 wind turbines, and the associated step-up transformer station.

1.2 Reports generated by the owner, as well as MOE noise measurements are unable to demonstrate non- compliance with the CofA (Air) noise limits, (NPC-232 and NPC-232 via the "Interpretation Document for Wind Turbine Generators").

1.3 Area residents are continuing to complain of noise emissions causing adverse effects. At least two families have moved out of their homes due to noise impacts from the operation of the Melancthon EcoPower Center. MOE District Staff are aware of at least 6 cases where CHD has bought out resident's homes to address and silence their ongoing noise complaints.

1.4 Operationally with regard to noise, (due to its subjective nature), MOE has taken the position that for a contravention of S.14(1) EPA to be demonstrated that there must also be a demonstrated exceedance of the applicable NPC guideline, (and conversely that no exceedance of the applicable standard indicates no S.14(1) EPA contravention).

1.5 MOE Provincial Officers have attended at several of the complainant's residences and have confirmed that despite the noise emissions apparently complying with the applicable standard\CofA(Air) limits, that the noise emissions are in fact causing material discomfort to the residents in and around their homes.

1.6 GDO Provincial Officers have measured wind turbine noise levels at complainant's homes that appear to indicate non-compliance with the CofA(Air).

1.7 Environmental Assessment and Approvals Branch, (EAAB), Staff have stated to District Staff that any field measurements of noise emissions from wind turbines will be inconclusive at best as there is currently no practical, reliable and defensible methodology to measure noise emissions from wind turbines. As such there is no way to measure compliance, (or lack thereof), with guideline\CofA limits in the field.

1.8 An approved and defensible procedure exists to measure noise emissions form transformer stations. Measurements of the noise emissions from the Melancthon EcoPower Center step-up transformer station by both CHD's consultant and MOE Provincial Officers indicate compliance with the NPC-232\CofA(Air) limits.

1.9 District Staff have recently met with Amaranth Township Council regarding this matter. Amaranth Council strongly expressed its concern as to the ongoing complaints and the apparent inability of MOE to address the various complaints\complainants except to state that the noise emissions from the facility are in compliance with the applicable limits. Staff from the other municipality that the Melancthon EcoPower Center is also located in, (Melancthon Township), have indicated that its municipal council is also deeply concerned with MOE's apparent inability to address the various complaints.

2.0 Challenges:

2.1 Valid complaints continue to be received by MOE. MOE District Provincial Officers have verified that the complaints of adverse effect by area residents are for the most part justified.

2.2 MOE District Provincial Officers are unable to confirm compliance, (or more to the point demonstrate non-compliance), with the CofA (Air) limits for the wind turbines as there is no practical, reliable and

defensible methodology to measure noise emissions from wind turbines. In the opinion of District Staff, noise emissions from the wind turbines are causing the area residents adverse effect.

2.3 MOE District Provincial Officers are able to demonstrate compliance with the CofA(Air) limits for the step-up transformer, however in the opinion of District Provincial Officers the noise emissions from the step-up transformer are causing area residents adverse effect.

2.4 The conventional approach to addressing noise complaints by requiring compliance with the applicable NPC guideline limits will not address this set of complaints. This would also appear to be the case for a number of other wind turbine facility complaints across the province.

3.0 Strategy:

3.1 The strategy to address these fairly unique series of complaints and circumstances is predicated upon the following items, (in no particular order):

3.1.1 With regard to the operation of the wind turbines, conventional noise measurement protocols should be considered of no current use, and most likely will not be for an extended period of time in the future.

3.1.2 The development\acceptance of an interim field wind turbine noise measurement methodology will not occur in a suitable time frame to be of any use in addressing these particular complaints.

3.1.3 As EAAB has indicated that essentially any measurements of noise emissions from wind turbines will be inconclusive at best as there is currently no practical, reliable and defensible methodology to measure noise emissions from wind turbines; the various reports generated by CHD are only useful in demonstrating that the wind turbine noise is impacting on the complainants. Likewise the field measurements obtained by MOE District Staff must be viewed in the same light.

3.1.4 The transformer measurement events by both MOE and CHD's consultant appear to indicate that there is compliance with the noise emission limits in NPC-232\the CofA(Air); despite this they are useful in demonstrating that the step-up transformer

station is impacting on the complainants.

3.1.5 MOE District Provincial Officers have attended at several of the complainants residences and have confirmed that the noise emissions from the Melancthon EcoPower Center are causing an adverse effect to the complainants.

3.1.6 At least two families have moved out of their homes, (i.e. do not sleep there any more), as a result of the noise emissions impacting on them during the night time hours. Reasonable people do not leave their homes to sleep elsewhere for frivolous reasons.

3.1.7 It is well settled in the courts and before the ERT that compliance with a CofA(Air), (or standard\guideline), does not guarantee that there will be no S. 14(1) EPA contravention(s), and that compliance with the limits in a CofA(Air) do not necessarily constitute a defence to a claim that the emissions regulated by the CofA(Air) are causing an adverse effect.

3.1.8 MOE District Provincial Officers are aware that CHD can reduce the noise emissions from the wind turbines via a process of limiting the allowable revolutions of the blades on the turbines, and\or stopping the turbines altogether.

3.1.9 MOE District Provincial Officers are aware that CHD can reduce the noise emissions from the step-up transformer by totally enclosing the transformer inside an acoustical structure, (a building).

3.2 Based on 3.1 above, the intent of the GDO is to inform CHD that in it's opinion the noise emissions from the Melancthon EcoPower Center are causing an adverse effect contrary to S.14(1) of the EPA, and ask it to forthwith address the contravention of S.14(1) of the EPA via at last the abatement measures identified above for he time period of either 19:00 Hrs. or 23:00 Hrs. to 07:00 Hrs.

3.3 Failing to obtain voluntary abatement action will result in the issuance of a Provincial Officer Order requiring at a minimum the above noted actions.

3.3.1 The justification\grounds for the Provincial Officer Order will

be that MOE Provincial Officers have attended at the complainants residences and confirmed that the noise generated by the various components of the Melancthon EcoPower Center are impacting on the complainants and are causing them material discomfort contrary to S.14(1) EPA.

3.3.2 Additionally reports generated by CHD and observations\measurements obtained by MOE District Provincial Officers confirm that the noise being emitted by the Melancthon EcoPower Center is impacting on the complainants residences.

3.4 With regard to the operational practice identified in item 1.4 above, as the wind farm noise issue is not something that MOE has been asked to address previously it is appropriate for it to develop operational procedures to address that various problems\adverse effects that relate to it as they become apparent to MOE. In this case it is appropriate, and in the public interest, to modify it's operational procedures for wind energy facilities to indicate that compliance with the CofA(Air)\NPC-205 \NPC-232\the interpretation documents does not also demonstrate compliance, (i.e. no contravention of S.14(1) EPA).

3.5 As it has been verified by MOE Provincial Officers that an adverse effect is occurring, and therefore a contravention of S.14(1) EPA is occurring, that appropriate abatement action must occur forthwith, and if necessary be made mandatory via a Provincial Officer Order.

4.0 Abatement plan:

4.1 Meet with CHD, (during week of 24 August), to:

4.1.1 Explain MOE's current position with Melancthon EcoPower Center's compliance with the CofA(Air), and CHD's contravention of S. 14(1) EPA.

4.1.2 Discuss abatement options to resolve the noise issues with the transformer and wind turbines.

4.2 If CHD agrees to voluntarily address the complaints by forthwith identifying the abatement options and implementing them, (i.e. total enclosure of the transformer station, and stepping down the revolutions of the wind turbines and\or discontinuing wind turbine operation between

either 19:00 Hrs. or 23:00 Hrs. and 07:00 Hrs.), write a letter to confirm the abatement plan and schedule.

4.2.1 Monitor compliance with the agreed abatement plan.

4.2.2 If necessary, make the agreed to abatement plan mandatory via a Provincial Officer Order. See also item 4.3.1 below.

4.3 If CHD refuses to address complaints in a voluntary manner move to mandatory abatement.

4.3.1 If mandatory abatement is required, (i.e. Provincial Officer Order), craft an Order and send to WCR Legal Support, (Brian Byrnell), for review.

4.3.2 Issue the Order.

4.3.2.1 Defend Order at ERT, (if necessary).

4.3.3 Monitor compliance with the Order.

4.4 GDO continue to work with company to find immediate solutions so people can return to their homes.

4.5 GDO to continue to work with CHD to find immediate solutions to complaints of adverse effect.

4.6 Share information\actions taken by MOE with Amaranth and Melancthon Township Councils\Staff as appropriate.

4.7 Continue to meet with Amaranth Council\Staff, (and Melancthon Township if required) on a monthly basis.

4.8 Continue to collect information, (field measurements), on the transformers and wind turbines.

4.9 Work with future expert\consultant\EAAB on improved ways to measure and abate noise issues caused by wind turbines and transformers.

G.W. Tomlinson

Provincial Officer

Badge # 132
District Supervisor (Acting)
Guelph District Office
West Central Region
Ontario Ministry of the Environment
Tel: 519 826 4272
Fax: 519 826 4286
Gary.Tomlinson@ontario.ca
Spills Action Centre 1 800 268 6060

Please consider the environment before printing this email!

SP Armow Wind Ontario LP
322 Lambton Street
Kincardine, Ontario N2Z 1Z1
Canada

December 20, 2012

RE: COMMENTS ON THE NOISE IMPACT ASSESSMENT FOR THE ARMOW WIND PROJECT

Dear [redacted],

Thank you for your letter, dated December 8, 2012, outlining your questions and comments on the Noise Impact Assessment for the Armow Wind Project (the Project). Please be advised that the documents submitted as part of the Renewable Energy Approvals application will be available for your review on the Environmental Registry (www.ebr.gov.on.ca) once the application is deemed complete. Many of the potential adverse environmental effects that could result from the Project are assessed in detail in these reports. We welcome an opportunity to discuss any questions or concerns that you may have regarding the Project.

The questions and comments in your letter have been addressed in the order they originally appeared.

Question:
Is the Proponent is aware of the fact that a number of complaints have been made to the MOE about the noise and health problems from other wind power projects, such as the Melancthon Wind Power Project.

RESPONSE:
The Proponent cannot comment on complaints made to the MOE regarding projects in which it is not involved.

Since 2008, the Ontario Ministry of the Environment's Noise Guidelines for Wind Farms [1] ("the Guidelines") require the assumption of summer night time shear. As a result, all noise calculations reported in the Armow Noise Impact Assessment [2] were undertaken using the turbine's peak sound power level (PWL), regardless of the wind speed at a height of 10 m. The Melancthon Wind Farm began commercial operation in 2006 [3]. While GL GH has not carried out a thorough review of the Melancthon Noise Impact Assessment, it is likely that the less conservative, pre-2008 methodology was employed.

QUESTION:
Is the Proponent able to measure noise emissions from the wind turbines and prove that they meet the noise guidelines, especially taking into account infrasound?

RESPONSE:
Internationally recognized protocols exist for the measurement of noise in the environment, and specifically from wind turbines, including ISO 1996 [4], IEC 61672 [5], and IEC 61400-11 [6]. These protocols are widely accepted in the industry. IEC 61400-11 [6] states that optional measurements may include directivity, infrasound, low-frequency noise and impulsivity, as described in Annex A of [6].

It is noted that the turbine noise emission levels themselves do not need to directly meet any guidelines; it is rather the aggregate audible noise level produced by the turbines at reception points that must respect the 40 dB(A) limit required by the MOE guidelines.

QUESTION:
Is the Proponent aware of the fact that wind companies are purchasing homes because they're no longer fit for human habitation?

RESPONSE:
Armow Wind is aware that other wind companies have purchased homes but cannot comment on the rationale for these decisions.

QUESTION:
Is the Proponent aware that the MOE has confirmed health problems from wind turbine noise even when the noise emissions comply with ministry guidelines?

RESPONSE:
Armow Wind is not aware that the MOE has confirmed any health problems attributable to wind turbine noise, whether at, below or above Ministry guidelines.

The vast majority of scientific evidence available to date demonstrates clearly that wind turbines do not pose a significant risk to human health. Studies and literature reviews from around the world have confirmed this, including a recent study that stated that, "the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects".

QUESTION:
Is the Proponent aware that the health problems being claimed in other wind farms may not be related exclusively to the audible spectrum of sound which is what the noise calculations are currently based on?

RESPONSE:
Infrasound refers to the sound waves with a frequency below 20 Hz. Low frequency sound refers to frequency between 20 and 200 Hz. Natural sources of infrasound and low frequency sound include severe weather, waves on seashore, and wind in the trees. Like other devices such as cars and refrigerators, wind turbines also produce low frequency noise and infrasound. The level at which wind turbines produce low frequency noise and infrasound is well below the threshold and sensitivity of hearing for these frequencies.

The noise impact assessment was performed in accordance with the MOE Guidelines [1] which are written in terms of A weighted decibels and 1/1 octave band centre frequencies.

QUESTION:
Is the Proponent aware that the noise calculations based on ISO 9613 may be low compared to actual noise levels in the field and therefore the actual noise may exceed the noise guidelines?

RESPONSE:
GL GH calculates sound pressure levels using CadnaA software which is an implementation of ISO 9613-1 and ISO 9613-2 [7]. The accuracy of the ISO 9613-2 method is estimated to be ±3 dB(A). However, given the conservative nature of the additional assumptions incorporated here, the probability of the overall noise simulation being underestimated is reduced.

The conservative assumptions made as part of the Ontario guidelines [1], in addition to those inherent in ISO 9613-2, include:

- Receptors are always downwind (as described in ISO 9613-2);
- No attenuation due to foliage, trees or obstacles (referred to as Afol in ISO 9613-2)
- Temperature and humidity settings are always favourable to propagation
- Summer night-time shear conditions are always assumed when determining turbine sound emission levels
- When windy, the ambient noise may be louder than the sound generated by the wind turbine
- A 5dBA tonal penalty was applied to the transformer.
- All vacant lot receptors are assumed to have a height of 4.5 m.

There is uncertainty associated with the predictions, as is the case with any engineering model. The conservative assumptions used influence the uncertainty of the approach. Considering the conservative nature of the aforementioned assumptions, it is considered to be less likely that a value is significantly underestimated.

QUESTION:
Does the Proponent have a reliable method to measure noise emissions from wind turbines and prove that they're not causing health problems to residents within the Project area?

RESPONSE:
Please refer to the response provided on page 1 of this letter regarding the measurement of turbine noise.

QUESTION:
What will the Proponent do when complaints of health problems are received for the residents within the Project area?

RESPONSE:
As outlined in the Design and Operations Report, submitted as part of the Renewable Energy Approvals application for the Armow Wind Project, a formal complaint resolution protocol will be developed. Complainants will be advised on actions that will be taken to investigate and, if necessary, remediate the cause of the complaint, as well as proposed actions to prevent similar occurrences in the future.

QUESTION:
Will the Proponent ignore complaints of health problems just like the MOE, Ministry of Health and other wind companies are currently doing?

RESPONSE:
As outlined in the Design and Operations Report a formal complaint resolution protocol will be developed. Complainants will be advised on actions that will be taken to investigate and, if necessary, remediate the cause of the complaint, as well as proposed actions to prevent similar occurrences in the future.

QUESTION:
The Melancthon project is obviously not the only case with complaints about health problems. Is the Proponent aware that the MOE guidelines for noise are not conservative enough to prevent health problems with wind turbines?

RESPONSE:
The Armow Wind Project has committed to some of the strictest regulations and strictest setbacks when adhering to O. Reg. 359/09. The vast majority of scientific evidence available to date demonstrates that wind turbines do not pose a significant risk to human health. Studies and literature reviews from around the world have confirmed this, including a recent study that stated that, “the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects”.

QUESTION:
The ISO standard says that the calculations are accurate to approximately +/- 3 dBA and the MOE Guidelines say that the noise assessment must represent the “predictable worst case”. Why are you not adding 3 dBA to the noise calculations to take into account this margin of error since your calculations could be low by at least 3 dBA?

RESPONSE:
“Predictable Worst Case” is defined in NPC-232 [8] as follows:

“The assessment of noise impact requires the determination of the "predictable worst case" impact. The "predictable worst case" impact assessment should establish the largest noise excess produced by the source over the applicable limit. The assessment should reflect a planned and predictable mode of operation of the stationary source.

It is important to emphasize that the "predictable worst case" impact does not necessarily mean that the sound level of the source is highest; it means that the excess over the limit is largest. For example, the excess over the applicable limit at night may be larger even if the day-time sound level produced by the source is higher.” [8]

According to the definition, “predictable worst case” is not referring to the inclusion of an uncertainty level in the calculation. See the above response for an explanation of the conservative assumptions made as part of the Guidelines [1].

QUESTION:
The noise calculations use a Ground Attenuation Factor of 0.7, which represents a porous ground with vegetation. The MOE Guidelines say that the noise assessment must represent the “predictable worst case”, why are you not using a value closer to 0.0, which is more representative of Spring, Fall and Winter conditions?

RESPONSE:
Please see above for the definition of “predictable worst case” as per NPC-232 [8].

Ground attenuation is mainly the result of sound reflected by the ground surface interfering with the sound propagating directly from source to receiver [7]. The ground factor is not a direct result of vegetation in the area; rather, it is a result of the porosity of the ground. (In ISO 9613, the sound attenuation as a result of vegetation is taken into account through a separate factor, Afol, which has been assumed to be zero here as per the Guidelines.)

The acoustical properties of the ground are taken into account through the ground factor G. Three categories of reflecting surface are specified in ISO 9613, as follows:

a) Hard ground, which includes paving, water, ice, concrete and all other ground surfaces having a low porosity. Tamped ground, for example, as often occurs around industrial sites,

b) Porous ground, which includes ground covered by grass, trees or other vegetation, and all other ground surfaces suitable for the growth of vegetation, such as farming land. For porous ground G= 1.

c) Mixed ground: if the surface consists of both hard and porous ground, then G takes on values ranging from 0 to 1, the value being the fraction of the region that is porous.

The guidelines specify that a global value ground factor of 0.7 is appropriate. The proponent has followed the noise modeling methodology described in the Guidelines [1].

QUESTION:
The MOE Guidelines state that 5 dBA are to be added to the noise calculations for tonality. Why is the Proponent not adding anything at all to the calculations for tonality?

RESPONSE:
Siemens has provided a noise measurement report which describes the measurement and analysis of the sound power level and tonality of the SWT-2.3-101 [9]. Siemens has stated that the level of tonality in the near field is acceptable; thus, no tonality penalty was applied [9].

The substation Broadband Sound Power Level value includes a 5 dB(A) tonal penalty.

QUESTION:
The noise calculations are based on the dBA scale which is only the audible noise. Knowing that turbines are causing health problems as stated in the released MOE report attached, why is the Proponent not calculating the noise impact based on the dbC scale? This would take into account low frequency noise like infrasound.

RESPONSE:
Please refer to the response provided on page 2 of this letter regarding low frequency noise and infrasound. The proponent has followed the noise modelling methodology describes by the MOE [1].

QUESTION:
Does the Proponent know the Wind Shear coefficient for the Armow Project and have the noise calculations taken into account the actual wind Shear coefficient rather than just the "moderate ground-based temperature inversion" that's assumed in the ISO standard?

RESPONSE:
GL GH has modeled the sound emitted by the turbines based on specifications supplied by Siemens, available as Appendix E in the NIA [2]. Siemens has provided Warranted Acoustic Emissions, which specify the broadband sound power level (PWL) of the turbine as a function of the wind speed at a height of 10 m above ground level. This inherently includes an assumption regarding wind shear (and associated surface roughness), which relates the wind speed at a height of 10 m to the wind speed at the turbine's hub height. The Guidelines [1] specify the sound level limit at a receptor as a function of wind speed at a height of 10 m above ground level, and this methodology complies with the Guidelines.

During the summer at night-time, shear is assumed to be high, i.e. "worst case". In this case, the wind speed at 10 m will be significantly lower than the wind speed at the turbine's hub height. The standard assumption about shear made by Siemens does not apply; therefore, an adjustment is required. GL GH has assumed that for wind speeds of 6 m/s and greater at a height of 10 m, the shear may be high, resulting in a much greater wind speed at the turbine's hub height than

at a height of 10 m. As a result, for sound modeling at 10 m wind speeds of 6 to 10 m/s, GL GH has assumed that each turbine is producing its peak PWL.

For example, if the 10 m wind speed is 6 m/s, then the sound level limit at a class 3 receptor is 40.0 dB(A) [1]. Using standard shear assumptions, if the 10 m wind speed is 6 m/s, then from the specifications for the SWT-2.3-101, the PWL is 105.4 dB(A).

However, if summer night-time shear is assumed, as was done for all calculations in the NIA, then the shear is greater than that assumed by Siemens. Under summer night-time conditions, at a 10 m wind speed of 6 m/s, the turbine's PWL is conservatively assumed to correspond to the maximum value for the turbine, rather than the PWL corresponding to a wind speed of 6 m/s at 10 m in the noise specifications. From the specifications for the SWT-2.3-101, the resulting PWL is then 106.0 dB(A). The maximum PWL of the turbine, 106.0 dB(A), was used for all 10 m wind speed scenarios considered.

QUESTION:
Since the MOE Field Staff state that any field measurements of noise emissions from wind turbines will be inconclusive, why is the Proponent still erecting wind farms knowing that they may cause health problems to the residents, as per the released MOE memo attached?

RESPONSE:
Please see the response on page 1 regarding the measurement of turbine noise. The vast majority of scientific evidence available to date demonstrates that wind turbines do not pose a significant risk to human health. Studies and literature reviews from around the world have confirmed this, including a recent study that stated that, "the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects".

QUESTION:
Can the Proponent provide the Municipality of Kincardine with proof that GL Garrad Hassan holds a Certificate of Authorization?

RESPONSE:
GL GH has P.Eng's on staff and holds a Certificate of Authorization. All legislated requirements regarding the qualifications of the individuals involved in developing the noise report have been adhered to.

QUESTION:
Can the Proponent explain to the Municipality of Kincardine why Mr. Andrew Brunskill, who is registered as Engineer Intern Trainee number 100137623 with the Professional Engineers of Ontario, has not had a Professional Engineer with a Certificate of Authorization stamp this Noise Assessment for GL Garrad Hassan?

RESPONSE:
Please refer to the above response. All legislated requirements regarding the qualifications of the individuals involved in developing the noise report have been adhered to.

QUESTION:
Is the Proponent aware that any document dealing with public safety in Ontario must be stamped by a Professional Engineer?

RESPONSE:
All legislated requirements regarding the qualifications of the individuals involved in developing the noise report have been adhered to.

Sincerely,

Brian Edwards, Project Developer
Samsung Renewable Energy Inc.
55 Standish Court
Mississauga, ON L5R 4B2
Phone: 905-501-5667

Jody Law, Project Developer
Pattern Renewable Holdings Canada ULC
100 Simcoe St. Suite 105
Toronto, ON M5H 3T4
Phone: 416-263-8029

References

1. Ministry of the Environment, Noise Guidelines for Wind Farms, Interpretation for applying MOE NPC Publications to Wind Power Generation Facilities, October 2008.

2. GL Garrad Hassan, Armow Wind Farm Noise Impact Assessment, GL GH Document No. 800235-CAOT-R-01, Issue G November 2012.

3. TransAlta. Melancthon. Available online at http://www.transalta.com/facilities/plants-operation/melancthon. Accessed December 2012.

4. International Organization for Standardization (ISO), Acoustics – Description, measurement and assessment of environmental noise, ISO 1996, 2003-2007.

5. International Electrotechnical Commission (IEC), Electroacoustics – Sound level meters, IEC 61672, 2002-2012.

6. International Electrotechnical Commission (IEC), Wind turbine generator systems – Part 11: Acoustic noise measurement techniques, IEC 61400-11, 2002.

7. International Organization for Standardization (ISO), Acoustics - Attenuation of Sound During Propagation Outdoors - General Method of Calculation, ISO 9613-2, 25 p., 1996.

8. Ministry of the Environment, NPC-232: Sound Level Limits for Stationary Sources in Class 3 Areas (Rural), October 1995

9. Siemens Wind Power A/S, 2008. Noise Measurement, SWT-2.3-101. “Noise Measurement xxxx Txx AJJ redacted version 16 April 2011.pdf”, received via email from Jody Law to GL GH November 2012.

At Golder Associates we strive to be the most respected global company providing consulting, design, and construction services in earth, environment, and related areas of energy. Employee owned since our formation in 1960, our focus, unique culture and operating environment offer opportunities and the freedom to excel, which attracts the leading specialists in our fields. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees who operate from offices located throughout Africa, Asia, Australasia, Europe, North America, and South America.

Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

solutions@golder.com
www.golder.com

Golder Associates Ltd.
2390 Argentia Road
Mississauga, Ontario, L5N 5Z7
Canada
T: +1 (905) 567 4444

Golder Associates