Planning For Wind Energy:

Evaluating Municipal Wind Energy Land Use Planning Frameworks in Southwestern Ontario with a Focus on Developing Wind Energy Planning Policies for the City of Stratford

by

Kristopher J. Longston

A thesis

presented to the University of Waterloo
in fulfillment of the
thesis requirement for the degree of
Master of Environmental Studies
in

Planning

Waterloo, Ontario, Canada, 2006

AUTHOR'S DECLARATION FOR ELECTRONIC SUBMISSION OF A THESIS

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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ABSTRACT

Wind energy provides an environmentally friendly and renewable source of electricity, that can help meet Canada's Kyoto commitments, help safeguard against future blackouts, reduce air pollution and create economic opportunities in the form of manufacturing jobs and land leases for farmers. From a land use planning perspective, however, wind turbines create challenges that municipalities and planners have to deal with more frequently. Ontario in particular lags behind countries such as Ireland and Australia in terms of providing a clear, equitable and comprehensive land use planning framework to deal with wind energy.

What is lacking in particular is a clear understanding of how Ontario municipalities are dealing with the issue of wind energy developments, whether the policies that are being developed adhere to good planning principles, what are the land use planning issues that are impacting wind energy development in Ontario and what are some recommendations that could be made to improve wind energy policies. A secondary goal of this thesis was to identify common elements of good wind energy planning frameworks that could be used to develop wind energy planning policies in the City of Stratford, which currently does not have any policies or a wind energy land use planning framework and is also where the author is employed as the City Planner.

To address this lack of information, this report focuses on the current state of wind energy planning policy development in southwestern Ontario and in particular; the types of wind energy planning frameworks have been developed in the world, the elements of "good" planning principles and frameworks and whether or not they are found in these frameworks, whether there are components of these policies that would be

appropriate for wider adoption in Ontario and finally, what types of framework should the City of Stratford develop for wind energy?

To address these questions, a literature review was conducted on wind energy land use planning issues and examples of international wind energy planning guidelines were reviewed. Additionally, five southwestern Ontario municipalities with wind energy policies were selected as case studies and Planners and other wind energy stakeholders were interviewed.

This study found that the main issues and barriers surrounding wind energy planning policy development in Ontario are visual impact, lack of education and a lack of a municipal planning framework. It was also determined that, the public reaction to wind energy proposals in Southwestern Ontario has been mostly positive and the conflicts that have arisen have been in instances where wind turbines are proposed in the vicinity of recreational properties. In terms of a wind energy planning framework, southwestern Ontario municipalities have for the most part opted for General Official Plan policies supporting wind energy development in principle and directing its development to certain land use designations subject to a zoning by-law amendment. The planning frameworks in the case studies for the most part conform to good planning principles identified, however, there was a large variation between the municipalities in terms of the level of detail within the planning framework. Finally, it was determined that the City of Stratford Official Plan and Zoning By-law are inadequate in terms of policy and regulations for wind energy.

This study recommends that the Ontario Provincial Government should follow up on the Wind Energy Information Sheet and the recent Provincial Policy Statement with a comprehensive land use-planning framework for wind energy developments that should borrow on existing international guidelines that have been developed. This study also recommends that the City of Stratford should update its Official Plan to include policies that address wind energy generation, should initiate a study to determine if there are any areas within the City that are considered to be natural heritage views or areas that should be protected from the visual impacts of wind energy production, should investigate permitting wind energy facilities in certain industrial areas of the City, subject to a zoning by-law amendment and should work with the County of Perth to develop a common set of zoning by-law regulations for wind energy developments.

ACKNOWLEDGEMENTS

I acknowledge the following people for their guidance and valuable input without which this report would not have been possible:

Dr. Murray Haight, thank you for all of your patience, guidance and insight throughout this process. I'm sure there were times when you wondered if I was a figment of your imagination.

Dr. Ian Rowlands, thank you for your input during the development of my thesis. Every time you provided comments, the document became a better product.

Thank you to my parents, they set a good example and showed me the way.

Most of all I would like to thank my wife Jo-Anne, without her support I most likely would have abandoned this long ago.

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1.0 - INTRODUCTION

The goals of this study are to examine and critically evaluate municipal land use planning approaches to wind energy development (specifically wind turbines) in southwestern Ontario for the purposes of identifying policies or frameworks that may be appropriate for wider adoption. A secondary goal of this research is to use the findings of the study to provide recommendations for the implementation of planning policies for wind energy development in the City of Stratford, where the author is employed as the City Planner.

Academic literature is lacking in terms of how local planning authorities, specifically in Ontario, are dealing with the emergence of wind energy developments and specifically the land use planning issues raised by these developments. In Ontario, some municipalities are faced with a wind energy development proposal without having any type of policies in place with which to assess or regulate it. In many cases, local planning authorities do not have the extensive experience in evaluating wind farm applications as they do with other forms of development, such as residential, commercial or industrial land uses (Beddoe and Chamberlin, 2003). Beddoe and Chamberlin further stated that:

> With a lack of precedents and/or clear guidelines from the federal government, local planning authorities are often forced to identify the key issues and information required in order to assess each wind farm applications anew...This problem is often compounded by the fact that planning staff often only have a limited knowledge of the wind industry, the constraints on wind energy development and government policy. (Beddoe and Chamberlin, 2003).

The need for this study stems from the fact that wind energy is gaining in popularity worldwide and is being actively promoted by the Ontario government in the form of

requests for proposals for the development of renewable energy sources, many of which involve wind energy. While much work has been done by the Ontario government on the economic side to make wind energy viable, little work has been done to implement a planning framework [1]for local municipalities to follow as they try to grapple with the land use planning issues that accompany wind energy development. Despite this, however, some Ontario municipalities have developed, mostly in house, their own planning frameworks to deal with wind energy developments. Little work has been done in terms of reviewing and evaluating these frameworks to determine if there are aspects of them that would be appropriate for wider adoption in Ontario and to determine whether these frameworks adhere to good planning principles. Additionally, there has been little investigation into how these municipalities developed their policies, what types of issues they encountered, or what lessons may be learned from their experiences.

Keeping in mind the problem of a lack of research on how local planning authorities in Ontario are addressing wind energy developments and a lack of critical evaluation of these policies, the following primary objectives provide the foundation for this study. First, the extent of wind energy land use planning policy development will be reviewed in an international, Canadian and Ontario context to determine if there are any common planning issues that are being encountered around the world. Additionally, any land use planning frameworks present in other countries will be evaluated to determine if any of their components could or should be extrapolated for use in Ontario municipalities. Evaluation of these frameworks will be based on a review of common good planning principles and frameworks. Secondly, the extent of land use planning policy

[1] Planning frameworks are administrative tools (guidelines, policies and regulations) that planning authorities use to control development. Types of planning frameworks include Official Plans, Zoning By-laws and Site Plan Control guidelines. Planning frameworks are described in further detail in Chapter 3.0.

development for wind energy in southwestern Ontario will be investigated and their frameworks will be evaluated. Specific focus will be on those municipalities that have developed planning policies for wind energy, with additional information provided by key players in the Ontario wind energy industry. Thirdly, based on a critical evaluation of the case study planning frameworks, recommendations for approaches that could be widely adopted by Ontario municipalities and the provincial government to help develop and implement wind energy planning frameworks will be provided. Finally, based on the findings of the study, recommendations for a wind energy planning framework for the City of Stratford will be developed.

Out of the above research objectives, the following research questions emerge to be investigated:

1. What types of wind energy planning frameworks have been developed in the world, what if any common policies do they share and are there elements that are suitable for implementation in Ontario?

2. What are considered elements of "good" planning principles and frameworks?

3. What is the current state of wind energy policy development in southwestern Ontario?

4. Do the wind energy planning frameworks that have been developed in southwestern Ontario adhere to commonly accepted good planning principles and planning frameworks? Are there components of these policies that would be appropriate for wider adoption in Ontario?

5. Based on the evaluation of the existing wind energy planning policies in southwestern Ontario, what types of framework should the City of Stratford develop for wind energy?

1.1 Summary of Research Methodology

This research was accomplished through a review of international wind energy frameworks, a review of relevant literature and documentation on wind energy planning

policy, a review of relevant newspaper articles, interviews with local planning authorities and key wind energy players in southwestern Ontario, and a review of planning documents in the five southwestern Ontario case study municipalities (adapted from Boles, 2003). A case study approach allowed for an in-depth examination to be conducted of the five municipalities, Perth County, Huron County, Elgin County, Bruce County and Grey County. Key informant interviews were conducted with municipal planners in the case study municipalities and also with wind energy experts from the Provincial Government, private practice and the wind energy industry. These supplemental interviews were used to augment the information gained from the case studies. A semi structured interview format was used as it provided the benefit of flexibility, as a list of predetermined questions were asked, but the interviewee was free to add extra comments, and the interviewer was allowed to pose additional questions after responses for the purpose of gaining additional information (adapted from Boles, 2003). In total, 17 interviews were conducted, with the interviewees being asked primarily the same set of questions, with the questions designed to encourage detailed responses. The questions were designed to gather information on the municipality's wind energy planning policies, barriers and issues encountered and any recommendations for other municipalities developing wind energy policies.

Apart from the semi-structured interviews, a literature review and internet search were conducted to research wind energy land use planning issues around the world and also to research any wind energy land use guidelines that are currently being used. Secondary sources of information included, a review of newspaper articles on the subject of wind energy, the scope of newspaper articles included those from international

sources, and Canadian sources and newspapers located in the case study municipalities. These additional sources of information were a valuable source of information providing further details and background information.

1.2 Scope and Limitations of the Study

The scope of this study was limited to land use planning policies as they apply to wind energy, with particular focus on five case study municipalities in southwestern Ontario. Included in the analysis was an examination of the land use policies and regulations in place for wind energy, the development of these policies, and the reflections of each municipality on their wind energy planning experiences to date, along with any barriers and/or issues encountered.

One possible limitation of this study relates to the qualitative research methodology. The selection of the limited number of individuals to interview could possibly be prone to bias or be unrepresentative. However, the researcher made an attempt to include many key players involved in the land use planning aspect of wind energy in southern Ontario (adapted from Boles, 2003). The potential for bias from the number of individuals is also addressed through the use of planning documents to supplement the interview data.

A second limitation arises from the fact that many of the wind energy planning documents in Ontario are relatively new, and in some cases they have not yet been used. As such, a discussion of their effectiveness is limited.

A third possible limitation was the fact that the researcher is a professional planner employed by the City of Stratford. This is a limitation as the researcher has had

previous contact with some of the interviewees in a professional capacity prior to this research being conducted. To overcome this limitation, the researcher maintained his role as a University of Waterloo student, and all interview material was approved by the University of Waterloo's office of Research and Ethics; material used in the recruitment and interviews is included in the Appendices.

Another possible limitation is the use of wind energy planning documents from other countries where regulatory requirements and planning processes may be different from Ontario. Some of the lessons learned and recommendations put forward in these documents may be specifically tailored to their respective areas and may not necessarily be suitable to "import" to other areas.

1.3 Summary of Research Findings and Significance

The research has shown that wind energy planning policy development is being approached with innovative policies that are specific to each municipality. The case study municipalities are aware of the importance of developing land use planning policies for wind energy. In terms of evaluation, it was determined that some of the case study municipalities had very comprehensive wind energy policies, whereas others were relatively simplistic in relation to common planning frameworks. It was found that the more comprehensive policies tended to be more in keeping with examples of good planning frameworks and contained examples of good planning principles, such as regard for provincial objectives in additional to local concerns and a methodology for addressing the issue of visual impact, noise and property setbacks. It was found that the barriers typically encountered did not include those primarily cited in the literature (bird kills,

noise, ice, property values, electromagnetic interference), but instead were centered primarily on visual impact and a lack of policy guidance from the Provincial Government. An interesting discovery was that most of the case study municipalities experienced a great deal of public support for wind energy development, as it was seen as an economic opportunity.

Based on these findings, several key recommendations were made to address the issues of overcoming planning barriers to wind energy in Ontario, specifically, for municipalities to designate areas in their Official Plans where wind energy is permitted, to address the issue of visual impact and to possibly restrict the use of small scale turbines in residential areas. Recommendations were also made on what role the Ontario Government should take with respect to land use planning and wind energy. To assist municipalities in dealing with the growing interest in wind energy, it was recommended that the provincial government develop sample Official Plan Polices, Zoning By-law regulations and sample site design guidelines. This would assist municipalities who are left on their own to develop planning policies for wind energy, and would help create a standard planning approach across the province, something that wind energy stakeholders indicated would be beneficial.

Finally, based on the review of international wind energy planning frameworks and the frameworks from the case study municipalities, this thesis provided recommendations for creating planning policies for wind energy in the City of Stratford. Specific recommendations included developing Official Plan policies that permit wind energy in industrial areas, developing zoning by-law regulations, and the importance of having policies compatible with those of neighboring Perth County.

1.4 Thesis Organization

This thesis is organized into eight chapters. Chapter 2 provides a general overview on wind energy and its proliferation throughout the world. Specific focus is on the recent wind energy incentives created by the Ontario government and how their successful implementation ties into the need for wind energy land use planning frameworks. Chapter 3 reviews examples of good "planning principles" and planning frameworks, which are used in evaluating the case study policy documents. Additionally, this chapter examines municipal approaches to wind energy development and specifically land use planning frameworks and policies for wind energy development from around the world; case study examples from Australia and Europe are provided and available material from Canada is examined. Chapter 4 summarizes the research methodology. The findings of this research are outlined in Chapter 5, through a descriptive presentation of the findings in each case study municipality and in the interviews with key wind energy players. Chapter 6 provides an analysis of these findings, and highlights key themes identified through the case studies. Chapter 7 outlines a proposed wind energy planning policy approach for the City of Stratford. Finally, Chapter 8 provides a summary of the key recommendations of the study and includes some concluding remarks.

2.0 – WIND ENERGY

The purpose of this chapter is to review the current status of wind energy development in the world. The focus will be on the current wind energy development climate in the province of Ontario and, specifically, the current economic incentives for wind energy provided by the Ontario government. This material is important to the thesis as it demonstrates that there is currently a push for wind energy development in Ontario by the Provincial Government. However, demonstrated in Chapter 3, comparatively little work has been done by the Province of Ontario to provide municipalities with the land use planning frameworks needed to evaluate and accommodate wind energy development proposals.

2.1 Introduction

A review of the literature on wind energy development and promotion underscores the fact that wind energy resources are being actively developed around the world and particularly in the province of Ontario. Most of the literature on wind energy falls into the following categories:

- General overview of what is wind energy, the benefits of wind energy, including environmental benefits, socio-economic benefits, energy security, the various types and sizes of turbines and more:
- The status of wind energy development in the world, and specifically the installed capacity, measured in megawatts (MW)
- Incentive programs provided by various countries to promote additional wind energy development.
- Information on the land use planning implications of wind energy developments, including but not limited to; noise, bird kills, visual impact, ice throw, etc. In some cases, land use planning frameworks have been developed in other countries to address these concerns. Information

on issues faced by planning authorities at the local level when dealing with wind energy developments.

The information contained in the first three bullets will be addressed in this Chapter, whereas the literature on the land use planning implications of wind energy will be the focus of Section 3.0.

While a lot of background information has been written on the history, benefits, problems, environmental impacts and types of wind energy (e.g. Akermann, 2002, Anonymous13, 2003, Anonymous15, 2004, AWEA, 2003c, Bilgen, 2004, Bueckert, 2003, Burrett, 2003, Burtt, 2004, BWEA, 2004, CANWEA, 2002, CIELAP, 2003, DWIA, 2004, EWEA, 2004, Gipe, 1995, Infield, 1995, Natural Resources Canada, 2004b, Ozgener, 2004, Peace, 2004, RNFPQ, 2004, Sahin, 2004, Shypula, 2005, Suzuki, 2005, Szklarski, 2002, Toronto Hydro, 2005, U.S. Department of Energy, 2004) these issues are not the primary focus of this research and will therefore not be discussed in great detail. The reason for this is that given the Ontario government's recent moves towards the development of alternative energy resources and the significant increase in wind energy capacity in the world, it would appear that planners in the province of Ontario have been or will be dealing with the issue of wind energy development in the near future. As a result, the main focus of Section 2.0 is the current push for wind energy by the Canadian and Ontario governments and how this is creating land use planning implications for local planning authorities who must provide planning approval for these projects.

2.2 Current Status of Wind Energy Generation in the World

Much information has been written on the potential wind energy resources in various countries, the programs being used to promote wind energy internationally and the current amount of installed wind energy capacity (Ackermann and Soder, 2002, AWEA, 2003c, CANWEA, 2003a, Dorfman, 2004, Elliot, 2002, Gipe, 1995, Hepbalsi, 2003, Kaygusuz, 2004, Rehman, 2003, Sahin, 2004, SEI, 2004, U.S. Department of Energy, 2004d).

At the present time, there is a significant imbalance around the world in terms of wind energy production. European countries such as the Denmark, Spain and especially Germany, have invested heavily in wind energy development and are producing a significant amount of their electricity from wind power. Other developing countries, such as India, are beginning to invest in wind and are rapidly expanding their wind energy capabilities. North America, and especially Canada, lags behind the rest of the world in terms of installed wind energy capacity (Ackermann and Soder, 2002, AWEA, 2003c, CANWEA, 2003a, Dorfman, 2004, Elliot, 2002, Gipe, 1995). It is, therefore, important to review the current status of wind energy development in the world to gain an appreciation of the staggering differences between various places in the world, and to understand the current wind energy climate, as it pertains to Canada.

2.2.1 Asia & the Pacific

During the 1990s, India achieved an impressive growth in wind turbine installation. Dubbed the "Indian Boom", the Indian government in 1992/1993 started to offer special incentives for renewable energy investments, e.g. a minimum purchase rate was guaranteed as well as a 100% tax depreciation was allowed in the first year of the

project (Ackermann and Soder, 2002). In addition, a "power banking" system was introduced, which allows electricity producers to "bank" their power with the utility and avoid being cut off during times of load shedding. On top of these incentives, some Indian States have introduced further incentives, e.g. investment subsidies, which led to the fast development of new installations between 1993 and 1997 (Ackermann and Soder, 2002). As of the end of 2005, India had 1,430 MW of installed capacity and has overtaken Denmark as the fourth largest wind market in the world (GWEC, 2006).

International aid programs primarily drive wind energy development in China despite some government programs to promote wind energy. Between 1999 and 2004, the World Bank planed to support five wind projects with a total installed capacity of 190 MW. As of January 1st, 2006, the Chinese wind energy market has been boosted in anticipation of the country's new Renewable Energy Law. As a result, nearly 500 MW of new capacity was installed in 2005, more than doubling the 2004 figure. According to the list of approved projects and those under construction, 2,000 MW of wind capacity could be installed by the end of 2006 (Ackermann and Soder, 2002, GWEC, 2006).

At the end of the 1990's, the first commercial wind energy projects started operation in Japan, where there is a growing interest in windpower (Ackermann and Soder, 2002).

Table 1 Wind Energy Development in Asia & the Pacific - Source: Ackermann and Soder, 2002, GWEC, 2006

Country	**Installed Capacity (MW) End of 1995**	**Installed Capacity (MW) End of 2005**
India	565	4,430
China	44	1,260
Australia	10	708
Japan	5	1,231

New Zealand	2	169
South Korea	0	98
Taiwan	0	87
Total	**625**	**7,983**

2.2.2 The Middle East and Africa

In contrast to other regions of the world, wind energy development in Africa is proceeding very slowly, as most projects require financial support by international aid organizations, as only limited regional support exists (Ackermann and Soder, 2002). Projects are planned in Egypt, where the New and Renewable Energy Authority (NREA) is planning a 600 MW project near the city of Zafarana, with further projects being planned in Morocco (250 MW) and Jordan (25 MW) (Ackermann and Soder, 2002). A 1999 study determined that South African wind energy resources could supply the country with five to six percent of its energy demands (van der Linde and Sayigh, 1999). In 2005, the relatively young African market saw a steady continuation of its growth; with an installation figure double that of 2004, with the main countries experiencing growth being Egypt and Morocco (GWEC, 2006).

Table 2 Wind Energy Development in the Middle East and Africa - Source: Ackermann and Soder, 2002, GWEC, 2006

Country	Installed Capacity (MW) End of 1995	Installed Capacity (MW) End of 2005
Other	8	35
Egypt	5	230
Morocco	0	64
Total	**13**	**329**

2.2.3 Europe

Europe is currently the world leader in terms of wind energy development and installed wind energy generating capacity, with two thirds of the world wide total

(Kayusuz, 2004). Ackermann and Soder (2002) identify that the main reason for this "was the creation of fixed feed in tariffs". The governments define these feed in tariffs as the price per kWh that the local distribution company has to pay for local renewable power generation fed into the local distribution grid over a guaranteed period. Fixed feed in tariffs have the effect of reducing the risk of fluctuating electricity prices and as a result provide a long-term secure income to investors (Ackermann and Soder, 2002)

No detailed data regarding the average size of the wind turbines installed in Europe is currently available. In Germany, however, the average size of turbines being installed has been steadily increasing with 1633 out of a total of 2079 newly installed wind turbines had a capacity of 750 kWh or more (some were > 1.5 MW) in 2001 (Ackermann and Soder, 2002, Kayusuz, 2004). Because of the heavy requirements needed for the road transport and installation on site, e.g. cranes, the multi-megawatt wind turbines are currently seldom used outside Germany and Denmark (Ackermann and Soder, 2002, Kayusuz, 2004).

The first offshore projects have materialized in Denmark, the Netherlands and Sweden. Further offshore projects are planned particularly in Denmark, but also in Sweden, Germany, the Netherlands and Ireland (Kaygusuz, 2004). Onshore, it is expected that there will be additional wind energy projects taking place in the near future in Spain, Turkey, France and Greece (Ackermann and Soder, 2002, Hepbasli and Ozgener, 2004 Kaldellis, 2005, Kaygusuz, 2004).

In the Netherlands, a new renewable energy policy was introduced in February 1998, which was based on fixed quotas combined with green certificate trading. Through this policy, the Government introduced fixed quotas for utilities regarding the amount of

renewable energy per year they have to sell via their network (Ackermann and Soder, 2002). Ackermann and Soder (2002) further note that "similar schemes are under discussion in other European countries, e.g. Denmark".

As of the end of 2005, Europe was still leading the global market with over 40,500 MW of installed capacity, representing 69% of the world's total. In 2005, the European wind capacity grew by 18%, providing nearly 3% of the EU's electricity consumption in an average wind year (GWEC, 2006). The Global Wind Energy Council (2006) reports "that despite the continuing growth in Europe, it appears that the general trend shows that the sector is gradually becoming less reliant on a few key markets, and other regions are starting to catch up with Europe". The growth in the European market in 2005 only accounted for about half of the total new capacity worldwide, down from three quarters in 2004 (GWEC, 2006).

Table 3 Wind Energy Development in Europe – Source: Ackermann and Soder, 2002, GWEC, 2006

Country	**Installed Capacity (MW) End of 1995**	**Installed Capacity (MW) End of 2005**
Germany	1,136	18,428
Denmark	619	3,122
Netherlands	236	1,219
UK	200	1,353
Other	175	6,634
Spain	145	10,027
Total	**2,511**	**40,783**

2.2.4 South and Central America

Despite large wind energy resources in many regions of South and Central America, Ackermann and Soder (2002) note that "the development of wind energy is very slow". It is speculated that this is a result of a lack of a wind energy policy as well as low energy prices and as accordingly, international aid programs have financially

supported many wind projects in South America (Ackermann and Soder, 2002). Washsmann (2003) states that "until 2001 there were no important favorable incentives for alternative energies in Brazil". Argentina, however, introduced a new policy at the end of 1998, which offers financial support to wind energy generation. Additionally, in Brazil, it was identified that some regional governments and utilities have started to offer higher feed-in tariffs for wind power (Ackermann, 2002, Wachsmann, 2003). The typical size of existing wind turbines is around 300 kW. Larger wind turbines are difficult to install, due to infrastructural limitations for larger equipment like cranes. Likewise, offshore wind projects are not planned, but further small to medium size (≤ 30 MW) projects are under development on shore (Ackermann and Soder, 2002).

Table 4 Wind Energy Development in South and Central America Source: Ackermann and Soder, 2002 GWEC, 2006,

Country	**Installed Capacity (MW) End of 1995**	**Installed Capacity (MW) End of 2005**
Caribbean	4	55
Argentina	3	27
Brazil	2	29
Other	2	31
Costa Rica	0	71
Total	**11**	**213**

2.2.5 United States

Wind energy development in the US slowed down significantly after the boom in California in the mid 1980s. In fact, the dismantling of old wind farms sometimes exceeded the installations of new wind turbines, which led to a reduction in installed capacity (Kaygusuz, 2004). In 1998 the Production Tax Credit (PTC) caused a second boom started in the United States, resulting in more than 800 MW of new wind power generation being installed in the USA, which included between 120 and 250 MW of

"repowering" development at several California wind farms (Ackermann and Soder 2002, Kaygusuz, 2004). The PTC added $0.016-0.017/kWh to wind power projects for the first ten years of a wind plant's life. A similar development took place before the end of 2001, which added 1600 MW between the middle of 2001 and the end of December 2001. (Ackermann and Soder, 2002, Kaygusuz, 2004)

The average wind turbine size installed in the United States at the end of the 1990s was between 500 and 1000 kW. The first megawatt turbines have also been installed in 1999 and since 2001; many projects have used megawatt turbines (Ackermann and Soder, 2002). In comparison to Europe the overall size of wind farm projects is usually larger, as typical projects in the US are larger than 50 MW, with some projects of up to 200 MW, whereas projects in Europe are usually between 20 to 50 MW (Ackermann and Soder, 2002).

Sahin (2004) identifies that "most of the new wind development in the United States is occurring outside of California". Further to this, Kaygusuz (2004) identifies that "the major drivers for further wind energy development in several states in the US are an extension of the PTC as well as fixed quotas combined with green certificate trading, known in the US as Renewable Portfolio Standard (RPS)". The certificates are called Renewable Energy Credits (RECs), with the other drivers being financial incentives, e.g. offered by the California Energy Commission (CEC), as well as green pricing programs (Ackermann and Soder, 2002). Green Pricing is a marketing program offered by utilities to provide customers with the choice to pay higher tariffs for "Green Electricity" and the utilities guarantee to produce the corresponding amount of electricity by using "Green Energy Sources" e.g. wind energy (Ackermann and Soder, 2002).

The Global Wind Energy Council (2006) identified that "as of the end of 2005, the US wind energy industry broke earlier annual records of installed capacity by installing nearly 2,500 MW, making it the country with the most new wind power". Citing the American Wind Energy Association, it was stated that this expansion is due to a current three-year window of stability in the federal incentive for wind energy, the production tax credit (GWEC, 2006).

Table 5 Wind Energy Development in the US Source: Ackermann and Soder, 2002, GWEC, 2006

	Installed Capacity (MW) End of 1995	**Installed Capacity (MW) End of 2005**
United States	1,655	9,149

2.2.6 Canada

> "Canada has a huge wind energy potential of more than 28,000 MW, which represents a significant new environmentally benign sustainable energy source but despite Government support for its development, the country has not embarked on a vigorous wind power program" (Islam et al., 2004).

During the 1990's, there was considerable growth in the installed capacity, but by the end of 1999 there was only 125 MW in place. It is reported that by the end of 2000, the capacity had increased to 137 MW, of which 74% was located in Quebec and 25% in Alberta (Islam et al., 2004). At the beginning of 2004, Canada had about 327 MW of installed wind generation capacity (Natural Resources Canada, 2004b).

It is expected that due to increasing awareness in the federal, provincial and municipal governments, the Canadian wind energy market will emerge as an abundant and cost effective clean energy source for the future (Government of Manitoba, 2004a&b, Government of Newfoundland & Labrador, 2003a&b, Government of Nova Scotia, No Date & 2003 & 2004, Government of the Yukon, 2004, Hydro Quebec, 2004, Manitoba

Hydro, 2004, GWEC, 2006, Ministry of Natural Resources, 2004a&c, Nova Scotia Power, 2004).

The Global Wind Energy Council (2006) reported that "as of the end of 2005, the installed wind energy capacity in Canada had increased by 53%".

Table 6 Wind Energy Development in Canada Source: Ackermann and Soder, 2002, GWEC, 2006

	Installed Capacity (MW) End of 1995	**Installed Capacity (MW) End of 2005**
Canada	21	683

2.3 Wind Energy Promotion in Canada

> "Canada's electricity industry is at an important crossroads. Provinces like Alberta, Saskatchewan, Ontario, New Brunswick and Nova Scotia are facing the need to make major reinvestments in electricity generation in the immediate future in order to replace old fossil-fuel plants and meet growing demand. With Canada's recent ratification of Kyoto, the country is also now committed to finding ways to significantly reduce emissions from the electricity sector. This represents a critical decision point for Canada. We either encourage immediate, large-scale investment in clean generation like wind energy or we replace the old capital stock with new fossil fuel plants, undermining Canada's ability to reduce emissions from the sector for the next 30 to 40 years until a new round of investment occurs" (CANWEA, 2002).

Natural Resources Canada (2004) indicates that the Government of Canada wants to support efforts by provincial and territorial governments, electric utilities, independent power producers and other stakeholders to develop wind energy as a source of electricity. Through its Wind Power Production Incentive (WPPI) program, the Government of Canada will provide financial support for the installation of 1000 MW of new wind energy capacity in Canada between 2002 and 2007 (Natural Resources Canada, 2004). As stated by Dorfman (2004), the WPPI program's "purpose is to encourage electric utilities, independent power producers and other stakeholders to gain experience in this

resource". The resulting capital investments are expected to amount to C$1.5 billion over that period. The electricity generated from this new capacity and the continued momentum in wind energy is expected to reduce GHG emissions by 3 million tonnes annually by 2010 (Natural Resources Canada, 2004).

The through its WPPI program, the Canadian Government indicates that it expects to help establish wind energy as a full-fledged competitor in the electricity marketplace by the Kyoto commitment period of 2008-2012 (Natural Resources Canada, 2004). It will allow producers to explore the potential for wind farms in various regions of the country. The Canadian Government also expects that the WPPI program will enhance existing experience in micro-siting individual turbines and in constructing and operating large-scale wind farms. Together with possible domestic manufacturing opportunities, this increased knowledge and experience will help reduce the cost of wind energy and make it a more cost-effective option to produce electricity (Natural Resources Canada, 2004).

By participating, wind energy producers will receive a financial incentive of about one cent for every kilowatt-hour produced during the first 10 years of activity of their new wind farms, represents about one half of the current cost premium charged for wind energy in Canada for facilities where conditions provide good feasibility (Natural Resources Canada, 2004). It is expected that this financial incentive will spur complementary actions and participation by provincial/territorial governments, retailers and power consumers. Natural Resources Canada (NRCan) will manage the WPPI program and will work with relevant authorities to ensure its success (Natural Resources Canada, 2004).

According to the federal government, the WPPI's primary focus is to encourage the production of electricity from large-scale wind turbines for sale in the electricity markets. NRCan has stated that it is also interested in the market potential for small-scale wind turbines aimed at the own-consumption electricity market (Natural Resources Canada, 2004). To this end, Natural Resources Canada has indicated that it is undertaking some initiatives under other programs to promote small wind-energy systems and that they will expand their activities in this area by assessing the potential market size for small wind energy systems and developing plans and strategies to address market barriers to penetration (Natural Resources Canada, 2004).

In December of 2002 the Canadian Wind Energy Association released an initial assessment of Canada's WPPI program, which found that the program was working well, but that the Association believed that it could achieve even better results with a few modifications, namely: doubling the WPPI amount per unit of production to 2 cents per kWh for the remaining four years of the program, increasing the total budget to accommodate 4.000 MW of installed capacity and removing the funding limits for the project (CANWEA, 2002). CANWEA indicated in this assessment that with the right financial incentives, wind energy can contribute 10,000 MW of new capacity by 2010 (CANWEA, 2002).

2.4 Wind Energy Promotion in Ontario

In response to the 2003 blackout in Ontario, there have been a number of articles written about the need for Ontario to pursue the development of renewable energy

sources and in particular wind energy (i.e. Avery, 2003, Bilgen, 2004, Bruce, 2003, Church, 2004, Cowan, 2004, Gorrie, 2004, Hamilton, 2003).

The Electricity Conservation and Supply Task Force was established in June 2003 "to develop an action plan for attracting new generation, promoting conservation and enhancing the reliability of the transmission grid". The task force consisted of 19 leaders from all parts of the electricity industry (ECSTF, 2004).

One of the recommendations of the task force was that renewable generation would be a vital part of the future electricity supply mix and that increased investment in renewable energy represents one attractive approach to help meet the Province's power needs, as Ontario's renewable energy potential is substantial (ECSTF, 2004) . The Province has committed to increasing the share of renewables in the Ontario power mix to 5 percent (1,350 MW) by 2007 and to 10 percent (2,700 MW) by 2010 (ECSTF, 2004). In terms of wind energy, the report estimates that there is a potential capacity of 2,100 to 6,200 MW of available power in Ontario. The report identified that the advantages of using wind power include: "speed of installation (6 months to a year after permitting is complete), no fuel cost, stable generation cost and a strong correlation to electricity requirements (installations produce more power in winter and during the day, which are times of peak demand in Ontario)" (ECSTF, 2004).

The present Ontario government has stated that the health and environmental consequences of burning coal to produce power are unacceptable and has committed to phase out coal-fired generation the earliest practical time frame to the Ontario Power Authority (OPA). This creates a need for major additions of new supply and demand reduction to begin immediately. To meet this demand, the Ontario government is seeking

up to 2,500 MW of new electrical generation and/or demand-side management initiatives to be in place as early as 2005, but no later than 2007. This amount would represent one third of the government's commitment to replace coal-fired generation with cleaner sources of energy or demand-side measures. As of the end of 2005, the Ontario government was seeking up to 300 MW of renewable energy capacity to be in service as soon as possible, to help meet its target of 5% (1,350 MW) of all generating capacity to come from renewables by 2007 (Ministry of Natural Resources, 2004).

In April of 2004, the Ontario government announced that it was initiating a Request for Proposal (RFP) process seeking an additional 300 MW of new renewable electricity capacity for Ontario. This will help the Ontario government meet its targets of generating 5% (1,350 MW) of Ontario's total energy capacity from renewable sources by 2007, and 10% (2,700 MW) by 2010 (Ministry of Natural Resources, 2004). In June of 2004, the Ontario government introduced legislation to reorganize Ontario's electricity sector to address the growing gap between supply and demand. The Electricity Restructuring Act, along with the creation of the Ontario Power Authority, proposed that the Ministry of Energy set targets for conservation, renewable energy and the overall supply mix of electricity in the province and that incentives be provided for more private sector investment in new generation to help meet growing demand (Ministry of Natural Resources, 2004). In response to the RFP, the Ontario government gave the go ahead to ten renewable energy projects that will provide 395 MW of energy, or enough electricity for over 100,000 homes. Of these projects, five are new wind farms, which would produce a combined 354 MW of electricity (Ministry of Natural Resources, 2004).

In the fall of 2005, the Ontario government announced the results of its 2nd RFP, which sought out large-scale projects of at least 20 MW in size. The Ontario government approved nine projects, which will provide 975 MW of renewable energy (Ministry of Energy, 2005). Of the nine projects approved, eight are new wind farms with a combined output of 955 MW.

In December of 2005, the Ontario Power Authority (OPA) released its Supply Mix Advice report. This report presents recommendations to the Ontario Minister of Energy on options for the future development of Ontario's electricity system, and responds to a request from the Minister on May 2, 2005 for advice on the appropriate mix of electricity supply sources to satisfy the expected demand in Ontario, taking into account conservation targets and new sources of renewable energy (OPA, 2006).

One of the main recommendations of the study was that renewable energy sources offer considerable potential, especially in the longer term. The study states that:

- Renewables, including wind, small hydro projects and hydro purchased from other provinces can provide a significant share of capacity and energy.

- It is clear, however, that putting in place the infrastructure needed to harvest the most promising sources, hydro imports and large-scale wind generation, will take considerable time and money.

- There are additional policy and regulatory constraints on some of these opportunities – a review to explore the potential and alternatives for facilitating development is advisable (OPA, 2006).

In terms of renewable energy sources, such as wind energy, the report concluded that Ontario should:

> *"Pursue an aggressive course for renewables within current constraints, while looking at ways to reduce these constraints."* (emphasis added OPA, 2006).

In addition to the RFPs and the OPA Supply Mix report, the Ontario government is also taking steps to reduce some of the financial barriers that affect the feasibility of many small scale renewable energy projects. According to the Ontario Sustainable Energy Association (OSEA), Ontario's proposed Standard Offer Contracts or Advanced Renewable Tariffs (ARTs) are the single most successful mechanism for stimulating the rapid development of renewable energy technologies worldwide (OSEA, 2006).

Tariffs are rates paid for electricity per kilowatt-hour generated. ARTs permit the interconnection of renewable sources of electricity with the electric-utility network and at the same time specifies how much the renewable generator is paid for their electricity. According to the OSEA, ARTs are the most egalitarian method for determining where, when and how much renewable energy capacity will be installed by enabling farmer, co-operative and First Nations and individual businesses to participate on an equal footing with large developers (OSEA, 2006).

The Standard Offer Program will provide a "standard price" which eligible generators will receive by simply complying with the eligibility criteria – without the administrative burden, complex contracting process and relatively expensive participation in the Renewable Energy Supply Requests for Proposals (RFPs) currently being used (OPA, 2006).

Under the standard offer program generators will be paid directly for every kilowatt-hour of electricity produced at the price set out in their standard offer contract. These generators must be connected to their electricity distributor's low voltage system in accordance with the electricity distributor's connection requirements. All costs associated with this connection and the related metering is paid by the generator (OPA, 2006).

By contrast, under Ontario's Net Metering program, generators are allowed to send electricity generated from renewable sources to the electrical grid for a credit toward their energy costs. Net metering measures the quantity of electricity you use against the quantity of electricity you generate resulting in a "net" total from which your electricity bill is calculated (OPA, 2006). The program states that excess generation credits can be carried forward for up to 12 months to offset future electricity costs but the local utility does not pay the customer directly for any excess generation (OPA, 2006). A generator that is a Net Metering program participant must meet all of the connection requirements of their electricity distributor including meter replacement costs OPA, 2006).

While many of the final details still need to be approved, the following is a summary of some of the most important pricing elements in Ontario as stated in the OPA report:

- Wind Energy Tariff: $0.11/kWh
- Biomass Tariff: $0.11/kWh, plus $0.0352/kWh for generation on peak
- Small Hydro Tariff: $0.11/kWh, plus $0.0352/kWh for generation on peak
- Solar Photovoltaics Tariff: $0.42/kWh
- Inflation Adjustment: 20% excluding Solar PV
- Term of Contracts: 20 years
- Project Size Limit: 10 MW (10,000 kW)
- Contracts are Open to All
- Simplified Interconnection
- No Cap or Limit on the Program
- Existing Systems from January 1, 2000 Included
- Contracts Available Fall 2006
- Program Review Every Two Years (OPA, 2006).

2.5 Summary

As we have seen in this section, many countries around the world have been placing heavily investing in the development of their wind energy resources. Typically

the promotion of wind energy development in these countries is accompanied by a type of economic incentive program to promote wind energy. The review has also demonstrated that the Canadian federal government and Ontario provincial government have developed and are in the process of developing economic policies to provide for a significant increase in wind energy production. While these incentives will provide a financial framework for the promotion of wind energy in Ontario, little work has been done to implement a planning framework for local municipalities to follow as they try to grapple with the land use planning issues that accompany large-scale wind energy development. The Ontario Power Authority went so far as to identify policy and regulatory constraints as an issue for the further development of renewable energy resources in Ontario and recommended that a review be undertaken to explore the potential and alternatives for facilitating development. One of the policy and regulator constraints facing wind energy in particular is that the wind turbines are subject to land use planning regulations. As discussed in Section 1.0, this lack of information on the land use planning side of wind energy in Ontario is the basis for this research and will be examined in detail in this report.

3.0 - LAND USE PLANNING AND WIND ENERGY

3.1 Introduction

While the benefits of wind energy (i.e. cleaner air, renewable power, energy security) are felt at a national and global level, the impacts of this land use (wind turbines) are most certainly felt at local level. Local municipalities and planning authorities throughout the world are the ones responsible for implementing the wind energy strategies of federal and provincial/state/territorial governments and are, in some cases, facing significant public opposition to wind energy developments (Anderson, 2000, Beddoe, 2003, Christensen, 1998, Country Guardian, 2000, Devine-Wright, 2005, Footner, 2004, Hedger, 1995, Hinshelwood, 2001, Martin, 2004, Strachan, 2004, Toke, 2005, Woods, 2003).

In Section 2.0, it was determined that there are many economic incentives for the promotion of wind energy development in Ontario. Section 3.0 will reveal that very little has been written on the subject of land use planning for wind energy at a local or provincial level, and what literature there is mainly comes from European sources.

The purpose of Section 3.0 is to review examples of good planning principles and planning frameworks for the purpose of evaluating the examples of international wind energy planning frameworks and the case study policies. The section will also provide a review of the available literature on the land use planning issues surrounding wind energy and of the literature concerning the problems facing local planning authorities when dealing with wind energy proposals, along with some common wind energy planning issues that appear to be universal. The end of Section 3.0 will feature a review and

evaluation of the samples of wind energy land use planning frameworks from other countries to determine if any components could be used in Ontario.

3.2 Planning Principles & Planning Frameworks

As discussed one of the objectives of this thesis is to review some of the international planning frameworks created to govern wind energy projects, and also to review the wind energy policies that have been developed in the five southwestern Ontario case study municipalities. In order to be able to review these policies and frameworks, it is important to first understand what constitutes "good planning principles" and what is commonly included in a "good planning framework"? The purpose of understanding these concepts is to develop a "yard stick" against which planning frameworks can be compared. The following section explores these questions.

Litman (2006) describes good planning as "insightful, comprehensive and strategic". He states that it requires more than simply extrapolating trends or considering single problems, instead it should try to understand underlying influences (Litman, 2006). A basic principle of good planning as identified by Litman (2006) "is that individual, short-term decisions should support strategic, long-term objectives". Litman (2006) further states that "in recent years the term *Sustainability* has been applied to comprehensive, strategic planning that explicitly considers long-term and indirect impacts". In addition to taking into account social and ecological constraints, such as resource depletion and ecological system services, sustainability planning makes a distinction between " *growth* (increased quantity, getting *bigger*) and *development*

(increased quality, getting *better*)," so true development is focused on using existing resources more efficiently rather than increasing resource consumption (Litman, 2006).

Lane and McDonald (2005) state that there are a number of important planning principles that apply to environmental planning, with the first being the principle of subsidiary "as it is necessary to think about the effective scope of community based environmental planning (CBEP) and recognize that local responses may be appropriate for some problems but that a wider gaze (and response) may be needed for other environmental problems." Lane and McDonald further identify that "CBEP is unlikely to be the best planning response for all problems, therefore, there is a need to place planning authorities at the appropriate scale of governance".

The second important planning principle that is identified is that it must be recognized that for many environmental planning problems there is a public interest as well as local interests (Land and McDonald, 2005). Lane and McDonald (2005) add to this by stating that "the notion of a public interest has tended to fall from view as a more devolved, deliberative approach has been pursued to environmental management in which the particular 'interests' of stakeholders are paramount", suggesting that the notion of the public interest in planning needs rejuvenation (Lane and McDonald, 2005).

A third important planning principle identified is that environmental planning activities need to have both short and long-term time horizons, and should be concurrently operational at local and wider scales (Lane and McDonald, 2005). Lane and McDonald (2005) further suggest that "a range of possible remedies follow from these principles…by linking 'bottom-up' planning efforts with the 'top-down' establishment of

strategic and regional criteria and priorities, planning in the community-based mode might be less parochial in focus and therefore deliver at wider scales".

A fourth important planning principle identified by Lane and McDonald (2005) is that "planners should assiduously seek to provide community groups with information and technical support that enables them to learn about the systemic dimensions and implications of their work as a means of assisting such groups to think regionally (even globally) while acting locally."

While there is not an "official" list of good planning principles, some planning agencies have attempted to put forward lists of guiding principles, which they feel constitute good planning. The Michigan Association of Planning (2006) offers the following planning principles for consideration to all cities, villages, townships, counties and regions in Michigan, as they feel the principles define what constitutes quality community planning:

1. The community planning decision-making process should, first and foremost, be concerned with the long-term sustainability of communities, environment and economy.

2. The community planning process should involve a broad-based citizenry, including public and private sector leaders, community interest groups and multi-disciplinary professionals. A positive relationship between development and the making of community should be established through a citizen-based participatory planning and design process.

3. Public policy and development practices should support development of communities that are:
    - diverse in land use, population and character;
    - designed for pedestrians and non-motorized transit as well as for motorized transit;

- shaped and physically defined by parks, open space and other natural resource areas;

- structured by physically defined, accessible public space and community institutions and based on local history, climate, ecology, and building practices;

- Physical solutions by themselves will not solve all problems. A coherent and supportive physical framework should be established to provide economic vitality, community stability, and environmental health.

4. Common challenges that should be addressed by community planning are:

    - increasing opportunities for reinvestment in established urban centers;
    - encouraging appropriate intensity and location of new development served by adequate public facilities;
    - minimizing the spread of low density, non-contiguous development;
    - encouraging a wide range of housing opportunities which serve all segments of our diverse population;
    - recognizing the value and encouraging the preservation of agricultural lands and natural resources;
    - encouraging the preservation and/or restoration of our natural and built heritage environments;
    - encouraging development in accordance with the adopted community master plan; and
    - recognizing that land use decisions may have impacts beyond community boundaries (MAP, 2006).

Since the topic of wind energy and the planning issues surrounding it lean more towards environmental and natural resource planning than more traditional urban planning, it is important to look at some planning principles that relate directly to environmental planning. The Michigan Society of Planning (2006) outlines the following environmental planning principles:

1. Community planning should recognize that natural resources are system-dependent, not limited to jurisdictional boundaries.

2. Lands with unique or sensitive resources should be preserved in their natural state.

3. The health and quality of the natural resource base are directly related to public health, welfare and economic growth.

4. Natural resource areas, farmlands and open space characterize the rural landscape. They are important and useful in shaping development and maintaining and establishing a rural community character.

5. To preserve rural community character, site design should encourage clustering of development and preservation of open space.

6. To preserve rural community character, site design should include desirable views and vistas across water features and farmlands.

7. Natural resources are limited in their ability to accommodate development without incurring damage. Development within our natural environments should occur in a balanced and sustainable manner.

8. Sensitive and fragile lands should be protected from degradation.

9. Wildlife habitat corridors should be interwoven with development to achieve environmental balance and maintain biodiversity (MAP, 2006).

With good planning principles as a starting point, planning frameworks take these principles and attempt to put them into practice. Litman (2006) "states that a *planning framework* defines a planning process' basic structure". This may be defined externally (for example, if the process is already established or legally proscribed), but there is often some degree of flexibility (Litman, 2006). The planning process usually progresses from the most general concepts to increasingly specific plans, programs and tasks. Below are typical planning framework components as identified by Litman (2006):

- *Principles* – A basic rule or concept used for decision-making.
- *Vision* – A general description of the desired result of the planning process.
- *Problem* – An undesirable condition to be *mitigated* (solved, reduced or compensated).
- *Goals* – A general desirable condition to be achieved.
- *Objectives* – Specific ways to achieve goals.
- *Scope* – The range (area, people, time, activities, etc.) to be included in a process.
- *Options* – Possible solutions to a problem or ways to achieve an objective.
- *Evaluation* – the process of valuing and comparing options.
- *Evaluation criteria – impacts* (costs and benefits) considered in an analysis.
- *Policies* – A general course of action.
- *Plans* – A scheme or set of actions. This may be a *strategic* (general and broad) or an *action* (specific and narrow) plan.
- *Program* – A specific set of objectives, responsibilities and tasks within an organization.
- *Task* or *Action* – A specific thing to be accomplished.
- *Target* – Something specific to be achieved.
- *Performance indicators* – Practical ways to measure progress toward objectives (Litman, 2006).

Based on a review of the material above and the material that will be reviewed later in this chapter, one can discern that there are some common land use planning principles that would apply to any policies or frameworks developed for wind energy. As Litman (2006) points out, "a principle of good planning is that individual, short-term decisions should support strategic, long-term objectives". This is important in terms of planning for wind energy as the switch to more renewable energy sources is a long term goal identified by the province, therefore this long term goal should be given significant consideration in any wind energy planning policy. Later in this chapter wind energy planning frameworks from Australia and Ireland are reviewed and it is uncovered that these planning frameworks do incorporate other provincial or federal environmental initiatives into the document. This is done to recognize the fact that wind energy planning frameworks can act as the vehicle for implementing provincial initiatives such

as the creation of alternative energy. The concept of including other provincial or federal initiatives in a wind energy planning framework is echoed in the planning principles provided by the Michigan Society of Planners (2006), which states that "community planning decision-making process should, first and foremost, be concerned with the long-term sustainability of communities, environment and economy".

Lane and McDonald (2005) recognized that for many environmental planning problems there is a public interest that must be considered as well as local interests. This planning principle has a direct bearing on wind energy developments, where there is a public interest in creating a secure renewable energy source, but there is a local interest in having the turbines located or not located in the area. The idea of accommodating public as well as local interests in a wind energy planning framework is also uncovered in the Australian and Irish examples later in this chapter, where it is shown that they embrace the concept of creating alternative energy for the greater public interest, while also providing regulations to control wind energy developments in order to protect the local interest. As an additional example of good planning principles, Lane and McDonald (2005) identify that planners should assiduously seek to provide community groups with information and technical support that enables them to learn about the systemic dimensions and implications of their work is a means of assisting such groups to think regionally (even globally) while acting locally (Lane and McDonald, 2005). This planning principle applies in the case of wind energy as planners need to provide local residents with information on the benefits and issues surrounding wind energy developments.

Additional planning principles that need to be taken into consideration when evaluating wind energy polices is protection of the natural heritage of an area. This can be seen in the Michigan Association of Planners (2006) examples of environmental planning principles, which stress the need to protect and preserve the natural heritage of an area. The Michigan examples also stress site design when development is proposed in environmentally sensitive areas (MAP, 2006). This has a direct bearing on wind energy developments, which feature imposing structures such as wind turbines and distribution lines. Based on the literature reviewed later in this chapter, it will be determined that the issue of visual impact is one of the biggest issues surrounding wind energy and therefore any wind energy planning framework must contain provisions to address the issue of visual impact.

Finally, based on Litman's (2006) review of the components of the items that should be contained in a planning framework, it is shown that they should begin with general goals, which flow through to more specific regulations and guidelines to implement and achieve the desired goals.

3.2.1 Planning Framework Evaluation

Based on the above section, it can be determined that there are many elements would form part of a "good planning framework", as they have been identified as "good planning principles". However, many of the elements listed above, especially those from the Michigan Association of Planners, embody elements that apply to all facets of planning and include many ideals that are targeted at urban and transportation planning issues. Since these "good planning principles" do not have a direct bearing on wind energy developments, it is necessary to pare the above list down to identify planning

principles that would apply to wind energy planning frameworks. Therefore using the information contained in the above section and the information that will be reviewed later in this chapter, it can be determined that it would be possible to "test" a planning framework against the following criteria:

1. Does the planning framework support long term goals (i.e. Provincial and Federal objectives)?

2. Does the planning framework take into account the public interest (provincial or global) as well as the local interests?

3. Does the planning framework allow for public participation?

4. Does the planning framework protect the natural heritage (i.e. landscape) of an area?

5. Does the framework contain all or most of the components identified by Litman (2006) (i.e. moves from general concepts to increasingly specific plans, programs and tasks)?

In terms of the above wind energy planning framework test criteria, there are some elements that are common "good planning principles" and others that would be exclusive to a wind energy planning framework. Specifically, the visual impact criterion (No. 4) is a test that would be exclusive to wind energy. Additionally, the requirement for the framework to support provincial or federal goals is one that lends itself to wind energy and may not be typical of all planning framework. The other tests (No. 2, 3 and 5) are common "good planning principles" that should be part of any planning framework.

As discussed, the above criteria will be used to evaluate the wind energy planning frameworks in the case study municipalities.

3.3 Planning Issues Surrounding Wind Energy

After reviewing the current status of wind energy development in the world in Section 2.0, it becomes obvious that there is a current push at the global, national and provincial/state levels to develop wind energy. These incentives for wind energy are having thier biggest impact at a local level where the wind turbines and farms are physically situated. This is creating difficulties for local planning authorities, who are often the approval bodies for wind development projects and are forced to deal with this emerging land use within their existing planning frameworks and without clear policy direction from upper levels of government (i.e. CBC, 2004b, Daley, 2002, Kennedy, 2005, McVicar, 2004, Rogerson, 2004, Strauss, 2004, Swisher, 2004, Toke, 2005, Walker, 1995, Wolsink, 2000).

In this section, the issue of planning for wind energy at a local level will be explored by examining how local planning authorities throughout the world are tackling this issue. This information is important to the current climate in Ontario where there is a push from the provincial government to develop wind energy, but many municipalities do not have a lot of experience dealing with wind energy developments.

In Sweden, it has become obvious that wind power poses a challenge to land-use planning because of its specific characteristics and recent literature indicates that the planning system has had difficulties in handling wind power with increasing public opposition to wind power projects, with problems including: issues of lengthy and complicated application procedures and inadequate planning at the municipal level (Khan, 2003, Olerup, 2000). An important characteristic of the Swedish planning system identified in the literature is the high degree of autonomy of local governments, which

gives them influence over the siting of wind turbines, which combined with an ambiguous government policy towards wind power has turned local government into a key actor in the development of land based wind power (Khan, 2003, Olerup, 2000).

> A general conclusion with that there seems to be a dilemma in municipal planning between, on the one hand, the promotion of wind power and, on the other hand, the organization of a planning that effectively regulates the sitting of turbines and allows for citizen participation. The results show that there is a need to support and strengthen municipal planning capacities, and efforts in that direction are being undertaken by state and regional authorities in Sweden. The results, however also imply the need for stronger policy measures in order to avoid large differences between the way wind power is handled at the municipal level (Khan, 2003).

In February of 2003 England released the Energy White Paper, which is the first acknowledgement from the federal government that the planning system is a significant obstacle to the development of renewable energy in the United Kingdom (Beddoe and Chamberlin, 2003, Strachan, 2004). The generation of electricity from renewables is a key policy objective of the UK Government's Climate Change Programme, which identifies a range of measures to achieve the government's legally binding target, set under the 1997 Kyoto Protocol and then allocated in an EU agreement (Beddoe and Chamberlin, 2003). Given this legislative and policy framework, Beddoe and Chamberlin (2003) identify that "the planning system in England is under immense pressure to deliver renewable energy developments, yet it is widely recognized to be the most significant barrier to on-shore wind energy schemes".

Strachan and Lal (2004) conclude that the "the UK experience of wind farm developments reveal that planning systems have had difficulties in handling wind power…similar to those countries such as Sweden and the Netherlands". It was also noted that the rapid proliferation of wind energy developments in Scotland has resulted in

a large amount of public opposition from citizens and other interest groups (Strachan and Lal, 2004). Strachan and Lal (2004) further state that:

> "it is clear that the general characteristics of wind farm developments call for a well structured planning system, from the national level down to the local authority level, and one which addresses the obvious dilemma between the promotion of wind power by the national governments and the various political structures of the regional/local planning system that regulates the siting of turbines, and allows for citizen participation"

Unlike the situation for other forms of development, such as residential or office accommodation, local planning authorities do not have extensive experience in reviewing and processing wind farm applications. Beddoe and Chamberlin (2003) acknowledge that "with a lack of precedents, local authorities are often forced to identify the key issues and information required in order to assess each wind farm application anew, with councilors and planning officers having only a limited knowledge of the wind industry, the locational constraints on wind turbine developments and government policy". In particular, there are no detailed independent guidelines on how the visual impact of proposed wind farms should be represented, and there is a lack of baseline data from existing wind farms to enable the separation of speculation from technically supported facts (Beddoe and Chamberlin, 2003).

A literature review of material written on the topic of wind energy and the local planning process only yielded a few articles written on experiences in Sweden and England. However, these few articles were extremely useful in outlining that opposition at the local level and a lack of a common planning approach were affecting wind energy development in these two areas. Both areas also acknowledged the need for a "well structured planning system" for wind energy. This ties in directly to the topic of this

thesis, where in Ontario, municipal zoning and planning rules/processes have been identified as one of the policy areas requiring review in order to help meet the Ontario government's wind energy goals (CANWEA, 2004, OPA, 2006).

3.4 Common Wind Energy Planning Concerns

As mentioned the review of available literature on wind energy and land use planning identified several key issues that were commonly identified with wind energy planning applications. These issues are commonly dealt with by planners at the local level and can be problematic in cases where there has been little experience dealing with wind energy applications. These common issues are

- Potential impacts on both local and migratory bird populations
- Noise and visual impacts that could affect local residents
- Blade icing, a winter phenomenon whereby ice could form on the blade and become a possible projectile when the blades spin (CIELAP, 2003)

Many of these issues have been studied at great length and have been proven to not be an issue, or that they can be mitigated through site design. The issue of visual impact though is much less quantifiable and proves to be one of if not the biggest planning related obstacle to wind energy development (AWEA, 2003 (a,b and c), Atlantic Wind, 2004, Bishop, 2002, BWEA, 2001, Canadian Press, 2003, CANWEA, 2004, CIELAP, 2003, DeMeo, 2003, Environment Canada, 2004, Natural Resources Canada, 2004, Ontario Power Generation, 2002, Shang, 2000, Smith, 2004, Superior Energy, 2003, Walker, 2003, Westwood, 2004, Wolsink, 2000, Woods, 2003).

3.4.1 Bird Kills

A number of studies have shown that birds face greater hazards from threats like high-rise buildings, fossil fuel generators, automobiles and cats. Even in poor flying

conditions, the vast majority of birds can fly unharmed through slowly rotating turbine blades. Current wind turbine technology offers solid tubular towers to prevent birds from perching on them. Research has shown that very few birds are killed by properly located wind turbines, therefore, turbines should not be placed in the middle of areas of high concentrations of birds, i.e. in the centres of valleys, ridges, swales, or other microhabitats where large numbers of birds are known to fly or concentrate. The available research on bird kills and wind turbines stresses that careful siting studies should be done beforehand to prevent any potential problems are necessary. Additionally, in developments with multiple turbines, it is preferable that they be located in groups, as groups of turbines are more visible than solitary ones. (AWEA, 2003a&b, Atlantic Wind, 2004, Bishop, 2002, BWEA, 2001, Canadian Press, 2003, CANWEA, 2004f, CIELAP, 2003, DeMeo, 2003, Environment Canada, 2004, Important Bird Areas of Canada, 2002, Natural Resources Canada, 2004, Ontario Power Generation, 2002, Shang, 2000, Smith, 2004, Superior Energy, 2003).

3.4.2 Noise

Wind turbines make a "swishing" or "whooshing" sound as their revolving rotor blades encounter turbulence in the passing air. Compared to other types of industrial facilities, wind turbines are very quiet, however, turbines tend to be located in areas with lower background noises, such as rural areas (AWEA, 2003b).

A local example of noise concerns with wind turbines stems from the WindShare turbine at the CNE in Toronto. The Exhibition Place turbine is a joint venture between WindShare and Toronto Hydro Energy Services Inc. The turbine was erected in December 2002 and started generating power in January 2003. It was built by a Dutch

company, Lagerwey Windmaster B.V, and is the first of its kind in North America. The turbine stands 30 stories tall and has the capacity to power up to 250 homes (Windshare, 2006)

In this case the issue of noise pollution had to be placed in context, given that it is located in a dense urban area situated right beside a major highway that serves the downtown. Nevertheless, in 1999 Toronto City Council adopted the wind turbine location standards concerning noise and potential impacts to City residents:

- A 200 metre separation between wind turbines and residential low-rise dwellings;
- A 300 metre separation between wind turbines and high-rise residential buildings; and
- A 50 metre separation between wind turbines and sensitive natural areas or sensitive park use areas (City of Toronto, 1999).

The standards were based upon noise levels associated with typically sized turbines (660kW), the use of commonly employed separation distances for wind turbines around the world, and the Province of Ontario's standards regarding noise in "Outdoor Living Areas" as provided in Ontario's Ministry of Environment 1997 "Noise Assessment and Land Use Planning: Requirements, Procedures, and Implementation" (City of Toronto, 1999).

In 2005, the Province of Ontario began requiring commercial wind turbines to obtain a certificate of approval for noise emissions under section 9 of the Environmental Protection Act. Specific guidance is given in a document titled "*Interpretation for applying MOE Technical Publications to Wind Turbine Generators* (MOE, 2006)" The Ministry of the Environment (MOE) states that "the noise limits in the interpretation document are consistent with the MOE criteria set in the technical publications titled

"*Sound Level Limits for Stationary Sources in Class 3 Areas (Rural) – Publication NPC-232*" and "*Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban) – Publication NPC-205*"(MOE, 2006). The Ministry of the Environment does identify that at distances greater than 1000 metres, noise impacts from wind turbine operation is insignificant and therefore a certificate of approval is not required (MOE, 2006). In terms of exemptions from the above requirements, the landowner's residence, on the same premises as the wind turbine(s), is not a Point of Reception as defined by the MOE noise guidelines and is considered part of the facility containing the wind turbine. Therefore no noise limits would apply as the point of reception is located on a neighbouring property (MOE, 2006).

3.4.3 Visual Impact

In terms of the impacts of wind energy, the one issue that has generated the most interest and sparked the most controversy is the one of visual impact.

Near populated areas, wind projects may run into opposition from people who regard them as unsightly, or who fear their presence will reduce property values. On the other hand, many individuals consider wind turbines to be a symbol of sustainability. Recent studies of the first commercial wind developments in New England, as well as a number of studies in Europe, have shown greater public acceptance after construction than before. To minimize impacts, much of the literature has suggested that the layout of towers should be in some type of geometrical design to flow with the landscape and to avoid towers being scattered happenstance throughout the site (AWEA, 2003a&b, Atlantic Wind, 2004, Bishop, 2002, BWEA, 2001, Canadian Press, 2003, CANWEA, 2004, CIELAP, 2003, DeMeo, 2003, Environment Canada, 2004, Natural Resources

Canada, 2004, Ontario Power Generation, 2002, Piper, 2000, Santora, 2004, Shang, 2000, Smith, 2004, Superior Energy, 2003, Toke, 2003, Woods, 2003).

3.4.4 Ice

Ice shedding is considered to be a minor risk as modern wind turbines are built to withstand strong winds and ice build up. A control within the turbine shuts it down when winds exceed 100 km/h and automatically shuts off when it senses a load imbalance on the blades. Ice shedding is therefore a minimal risk. However, to mitigate this risk, security checks and operational procedures are agreed upon to secure safety (AWEA, 2003a&b, Atlantic Wind, 2004, Bishop, 2002, BWEA, 2001, Canadian Press, 2003, CANWEA, 2004f, CIELAP, 2003, DeMeo, 2003, Environment Canada, 2004, Natural Resources Canada, 2004, Ontario Power Generation, 2002, Shang, 2000, Smith, 2004, Superior Energy, 2003).

3.4.5 Wind Energy Externalities

Externalities are defined as "benefits or costs, generated as a byproduct of an economic activity, that do not accrue to the parties involved in the activity. Environmental externalities are benefits (positive externalities) or costs (negative externalities) that manifest themselves through changes in the physical or biological environment (Berkley Lab, 2006). It should be noted, however, that estimates of environmental externality costs are typically based on different assumptions, which makes comparisons difficult (Berkley Lab, 2006).

When looking at the positive environmental externalities associated with wind energy, it is important to note that wind energy produces no emissions, so there is no damage to the environment or public health from emissions. Wind energy is also free of

the environmental costs resulting from mining or drilling, processing, and shipping a fuel (AWEA, 2006).

In reviewing the list of wind energy planning concerns identified above, we see that bird kills, noise emissions and the visual impact of the turbines and their associated infrastructure are negative externalities that could be attributed to wind energy developments.

3.5 Upper Level Government Planning Frameworks for Wind Energy

As mentioned in Section 1.0, planning frameworks are administrative tools (guidelines, policies and regulations) that planning authorities use to control development. A review of wind energy planning literature in this chapter will reveal that in certain parts of the world, federal and state/provincial governments have realized the importance of dealing with wind energy at the local level and have gone to great lengths to produce guidelines and planning frameworks to assist local municipalities and planning authorities in dealing with wind energy. This section will also demonstrate that Ireland has taken the lead in developing wind energy planning policy to be implemented at a local level, while Australia has also done extensive work in this area. It will also be demonstrated that in North America (especially Canada and Ontario), however, very little has been done in terms of developing guidelines or a planning framework for local municipalities to implement a wind energy strategy.

The following represent a review of some upper level government (i.e. state, federal as opposed to local or municipal) wind energy planning documents that have been produced by federal and state/provincial governments around the world.

3.5.1 Australia

The state of Victoria, Australia, has published a planning framework for wind energy projects. Specifically this document is intended to help implement the State's renewable energy objective, which is:

> *To promote the provision of renewable energy including wind energy facilities in a manner that ensures appropriate siting and design considerations are met* (Sustainable Energy Authority Victoria (SEAV), 2002).

The Government of Victoria states that this policy recognizes that energy underpins the economy and quality of life of all Victorians and Government of Victoria is committed to achieving a more sustainable energy future by:

- contributing to national and international efforts to reduce greenhouse gas emissions by reducing the long-term dependency on energy from fossil fuels.
- increasing the security and diversity of Victoria's energy supply by increasing the proportion supplied from renewable sources including wind energy; and
- encouraging and supporting the development of sustainable industries (SEAV, 2002).

The State of Victoria has also determined that planning should contribute to the provision of renewable energy by facilitating wind energy development in appropriate locations. In particular, Victoria has stated that it will:

- Facilitate a consistent approach to the consideration of wind energy development proposals;
- Recognize that economically viable wind energy facilities are dependent on locations with consistently strong winds; and
- Consider the economic and environmental benefits to the broader community of renewable energy generation and the effects on the local environment and landscape (SEAV, 2002).

In Victoria, the State is required to assess all wind energy proposals that are over 30MW, and the local municipalities are responsible for assessing and approving all proposals less than 30MW (SEAV, 2002).. In terms of wind energy planning at a local level, the State of Victoria requires local planning authorities to take into account the *Policy and Planning Guidelines for Wind Energy Facilities in Victoria, 2002*. The State also provides that municipalities may issue permits for wind energy facilities on any land except for National Parks and all land reserved under the Australian National Parks Act (1975) (SEAV, 2002).

To assist local municipalities in processing wind energy development applications, the State of Victoria has provided the following criteria for decision makers to consider. These criteria include Contribution to Government Policy Objectives, Visual Amenity, Amenity of the Surrounding Area, Aircraft Safety and Flora and Fauna (SEAV, 2002).

3.5.1.1 Contribution to Government Policy Objectives:

In the assessment of wind energy projects, key consideration should be given to the extent to which the proposal contributes to:

- National and international efforts to reduce greenhouse gas emissions to 108% of 1990 levels by 2012;
- Efforts to maximize the State of Victoria's share of the renewable energy generation required nationally under the Commonwealth's Mandatory Renewable Energy Target;
- Increasing the security and diversity of Victoria's energy supply by increasing the proportion supplied from renewable energy sources including wind energy;

- Encouraging and supporting the development of sustainable industries; and

- The economic and employment benefits of renewable energy generation to Victoria (SEAV, 2002).

3.5.1.2 Visual Amenity

Local authorities must also consider the magnitude to which a wind energy proposal has a visual impact on the landscape. In assessing this issue, local authorities review:

- The visibility of the development;
- The locations and distances from which the development can be viewed;
- The significance of the landscape as described in a Significant Landscape Overlay; and
- The sensitivity of the landscape to change (SEAV, 2002).

The State of Victoria recognizes that wind energy facilities will have some degree of impact on the landscape. In determining the visual impact of a wind energy proposal, the State of Victoria encourages municipalities to weigh the visual impacts against the Government's policy in support of renewable energy development (SEAV, 2002). However, the guideline also provides some examples of visual mitigation measures that local approval authorities could consider:

- Siting and designing to minimize impacts on views from areas used for recreation based on landscape values and from dwellings;
- Locating arrays of turbines to reflect dominant topographical and/or cultural features, such as the coastline, watercourses, windbreaks or transmission lines;
- Using techniques such as colour, painting, etc, to reduce visual impacts from key vantage points;
- Selecting turbines that are consistent in height, look alike and rotate the same way;
- Spacing turbines to respond to landscape characteristics;
- Locating electricity lines underground wherever practical;
- Minimizing earthworks and provide measures to protect drainage lines and waterways;

- Minimizing removal of vegetation; and
- Minimizing additional clutter on turbines such as unrelated advertising and telecommunication apparatus (SEAV, 2002).

3.5.1.3 Amenity of the Surrounding Area

The State of Victoria acknowledges that a wind energy facility can affect the amenity of the surrounding area due to noise, blade glint, shadow flicker, overshadowing and electromagnetic interference (SEAV, 2002).

Noise

A wind turbine creates noise due to the mechanical movement of generators, rotor blades through the air and construction noise. The State of Victoria recommends that a wind energy facility should comply with the noise levels recommended for dwellings in New Zealand's standards (SEAV, 2002).

Blade Glint & Shadow Flicker

Blade glint can result from reflection of the sun from the turbine blades, whereas shadow flicker results from the position of the sun in relation to the blades of the wind turbine as they rotate. The State of Victoria acknowledges that shadow flicker can be modeled in advance and siting and design can mitigate the problem. In terms of regulations regarding blade glint and shadow flicker, the guidelines recommend that blades be finished with a surface treatment of low reflectivity and stipulate that shadow flicker experienced at any dwelling must not exceed 30 hours per year as a result of the operation of the wind facility (SEAV, 2002).

Electromagnetic Interference

The effect of wind turbines on electromagnetic waves will usually be relatively limited. Potential electromagnetic interference effects can be calculated from information about affected telecommunications transmitting or receiving stations, local conditions, turbine design and location (SEAV, 2002). The potential for electromagnetic interference from the generation of electricity from a wind energy facility should be minimized if not eliminated through appropriate design (SEAV, 2002).

Aircraft Safety

The height of wind turbines can be substantial resulting in potential impact upon nearby airfields. The State of Victoria recommends that turbines should not protrude any surface for any airfield and the Australian Civil Aviation Authority should be consulted (SEAV, 2002).

Flora and Fauna

The flora and fauna found at a proposed site should be considered and the State of Victoria requires that proposals review the potential impact of the development on habitat of animals and vegetation in the areas. Specific Australian Acts and Regulations must be followed in the review and certain site design requirements and ongoing monitoring may be required as part of an approval (SEAV, 2002).

3.5.2 Ireland

In terms of a European planning framework for wind energy, many different countries and organizations have released best practice guidelines for wind energy planning (BWEA, 2004b, DWIA, 2004, EWEA, 2002, Sustainable Energy Ireland (SEI),

2004b). This report will examine recently released draft wind energy planning guidelines from Ireland. The Irish guidelines are especially of interest because, once adopted, they will require planning authorities to have regard to them when evaluating wind energy proposals. Also of interest is the fact that municipalities in Ireland are legislated to prepare a wind energy development plan.

In 2004, the Ireland Department of the Environment released draft planning guidelines for wind energy projects. These guidelines are intended to offer guidance to planning authorities on planning for wind energy through the development plan process and in determining applications for planning permission (SEI, 2004b). The guidelines are also intended to ensure a consistency of approach throughout Ireland in the identification of suitable locations for wind farm energy developments. Once adopted, these guidelines will be incorporated into Ireland's *Planning and Development Act, 2000*, which will require planning authorities and An Bord Pleanala (Ireland's equivalent to the Ontario Municipal Board[2]) to have regard to them in carrying out their duties (SEI, 2004b).

3.5.2.1 Policy Context

In terms of a policy context the Ireland guidelines are designed to be used in conjunction with Ireland's other relevant national and regional guidelines and legislation governing wind energy projects.

In Ireland, local planning authorities are required to prepare a wind energy development plan, this plan must incorporate a statement of the planning authority's

[2] The Ontario Municipal Board is an independent, adjudicative tribunal that hears appeals and applications on land use disputes. When people can't resolve their differences on community planning issues, the OMB provides a public forum for resolving disagreements.

policies and objectives in relation to wind energy development as well as issues and criteria it will take into account in assessing planning applications for specific wind energy development proposals (SEI, 2004b). The development plan must achieve a reasonable balance between (a) responding to overall Government Policy on renewable energy and (b) enabling the wind energy resources of the planning authority's area to be harnessed in a manner that is consistent with proper planning and sustainable development (SEI, 2004b). Following the consideration of the strategic context in regional and national terms for wind energy development and also after full consultation with the appropriate bodies the development plan should set out the following policies and objectives:

- A positive and supportive statement of the importance of wind energy as a renewable energy source which can play a vital role in achieving national targets in relation to reductions in fossil fuel dependency and therefore green house gas emissions, together with an objective to ensure the security of energy supply

- Objectives to secure the maximum potential from wind energy resources of the planning authority's area commensurate with supporting development that is consistent with proper planning and sustainable development.

- Identification on development plan maps of key areas with the planning authority's functional area where there is significant wind energy potential and where, subject to any landscape planning, design of wind farm and amenity criteria given in the development plans and the planning authority is favourably disposed to granting planning permission development will be acceptable in principle.

- The specific criteria for wind farm development, which the planning authority will take into account when considering any wind energy, or related proposals in the key areas identified, based on the recommended siting and design criteria referred to in the guidelines (SEI, 2004b).

3.5.2.2 Planning and Environment Considerations

Ireland's draft planning guidelines are extensive in providing planning authorities with direction and best management practices for siting and design of wind energy development, environmental considerations and landscape planning and design.

In terms of siting and design recommendations for wind energy projects, the Ireland document provides guidance to planning authorities in decision-making in relation to the siting and design of wind energy developments in the landscape when assessing applications for planning permission (SEI, 2004b). In terms of siting and design of wind energy development, the guidelines deal with the principles of siting and location, spatial extent and scale, cumulative effect, spacing of turbines, layout of turbines and height of turbines. Additionally, the Ireland guidelines consider how these principles can be best applied within different types of landscapes. Guidance is also given in relation to associated development, including substation compounds, access tracks and fencing (SEI, 2004b).

The Ireland guidelines also address environmental considerations by recognizing that wind energy has the capacity to contribute significantly to the achievement of Ireland's National Climate Change Strategy by reducing the dependence on fossil fuels and subsequently by the reduction of greenhouse gas emissions (SEI, 2004b). The guidelines also recognize that wind energy developments have the potential to affect the environmental heritage of the area and consideration of a planning application for wind energy development will have to be balanced and have regard to the particular circumstances of each case (SEI, 2004b).

In terms of environmental considerations, the guidelines break this criterion down into several components including, natural habitats, geology, archeology, built heritage, noise, safety aspects, proximity to roads and railways, proximity to power lines, electromagnetic interference, shadow flicker and wind take (SEI, 2004b).

Finally, the Ireland guidelines address planning conditions that should be incorporated into the wind energy development plans prepared by various planning authorities. The guidelines require that these planning conditions be necessary, relevant to the development to be permitted, precise, reasonable and enforceable (SEI, 2004b). In addition to establishing the suitability of planning conditions, it is important to ensure that the reason for attaching each condition is clear and unambiguous and that the developer fully understands what is required. The Ireland guidelines go on to list matters that may be appropriately dealt with by the inclusion of conditions on a planning permission for wind energy development, including:

- Design and Layout (i.e. Flexibility of turbine layout on site, Landscape planning & design).
- Site Management Issues (i.e. Flora, Fauna and Habitats, Roads and Access Routes Construction, Noise, Shadow Flicker, Electromagnetic Interference, Aeronautical Interference, Associated Structures and Equipment, Quarrying, Windtake, Grid Connections)
- Environmental Monitoring
- Archaeology
- Financial Contributions (SEI, 2004b).

3.5.3 North America

When compared to Australia and Europe, North American countries lag behind in terms of developing a planning framework and guidelines for wind energy projects. In the cases of Canada and the United States, there is a lack of wind energy planning guidelines at the federal level or state/provincial levels.

3.5.3.1 United States

Currently, there is no federal level wind energy planning guidelines in the United States. To address this issue the National Wind Coordinating Committee (NWCC) developed the "Permitting of Wind Energy Facilities" handbook in 2002. In developing the handbook, the committee drew on the knowledge of various representatives from the wind energy industry, including electric utilities, state utility commissions, state legislatures, consumer advocates, wind equipment suppliers and developers, green power marketers, environmental organizations, and state and federal agencies (NWCC, 2002). The handbook was written for individuals and groups involved in evaluating wind projects: decision-makers and agency staff at all levels of government, wind developers, interested parties and the public. The handbook acknowledges that some jurisdictions in the United States have energy facility permitting processes, but participants may not be familiar with wind generation technologies and approaches to resolving wind permitting issues. The handbook also recognizes that other jurisdictions may have not dealt with any wind farms (NWCC, 2002).

As with the Australian and Irish guidelines, the NWCC handbook describes the typical steps in wind farm permitting and presents several steps common to many successful permitting processes. These steps are identified as pre-application, application

review, decision-making, administrative appeals and judicial review and permit compliance (NWCC, 2002). In addition to these steps, the handbook identifies eight elements that are suggested as keys to a successful process for permitting wind farms: 1) significant public involvement, 2) issue-oriented process, 3) clear decision criteria, 4) coordinated permitting process, 5) reasonable time frames, 6) advance planning, 7) timely administrative and judicial review and 8) active compliance monitoring (NWCC, 2002).

The NWCC handbook also examines some of the specific considerations that planning authorities need to be concerned with in reviewing wind farm proposals. These considerations are similar to those in the Irish and Australian guidelines, and include

- Land Use
- Birds and other biological resources
- Soil erosion and water quality
- Cultural and paleontogical resources
- Air quality and climate (NWCC, 2002).
- Noise
- Visual Resources
- Public health and safety
- Solid and hazardous wastes

The handbook concludes by providing case studies of wind farm developments in the States of Oregon and Minnesota. The case studies examined the issues that emerged during the permitting process (NWCC, 2002).

3.5.3.2 Canada

Canada, like the United States, is lagging far behind Europe and Australia in terms of developing planning policy for wind energy. There is a lack of a national planning and policy framework for both large-scale wind farms and smaller stand-alone turbines for residential use. As mentioned earlier in this report, the previous federal government has determined that wind energy is a major part of Canada's plan to achieve its targets under the Kyoto Protocol and has initiated the Wind Power Production Incentive (WPPI) to provide financial support for installation of 1000 MW of new wind

energy capacity in Canada over the next five years (Natural Resources Canada, 2004). However, the Canadian Government has not developed any type of best management practices or planning guidelines for wind energy development.

3.5.3.3 Ontario

In Ontario, municipal zoning and planning rules/processes have been identified as one of the policy areas requiring review in order to meet the Ontario government's wind energy goals (CANWEA, 2004). However, there are currently no provincial wind energy planning guidelines. The Province's only planning related document on wind energy is a four page information sheet titled "Wind Energy - Municipal Tools for Planning and Development", which was published in the spring of 2003. The handout introduces the benefits of wind energy, describes how wind turbines work, outlines where commercial turbines are located and identifies the potential for wind energy production in Ontario (Ministry of Municipal Affairs and Housing(MMAH), 2003). In terms of a planning framework for municipalities, the handout states that municipalities can play a key role in encouraging wind energy development by building community support through early consultation. It also states that municipalities can stimulate wind energy development application by establishing a clear planning framework for this emerging land use (MMAH, 2003). The handout then provides a sample flow chart for how wind energy proposals should be reviewed by municipalities:

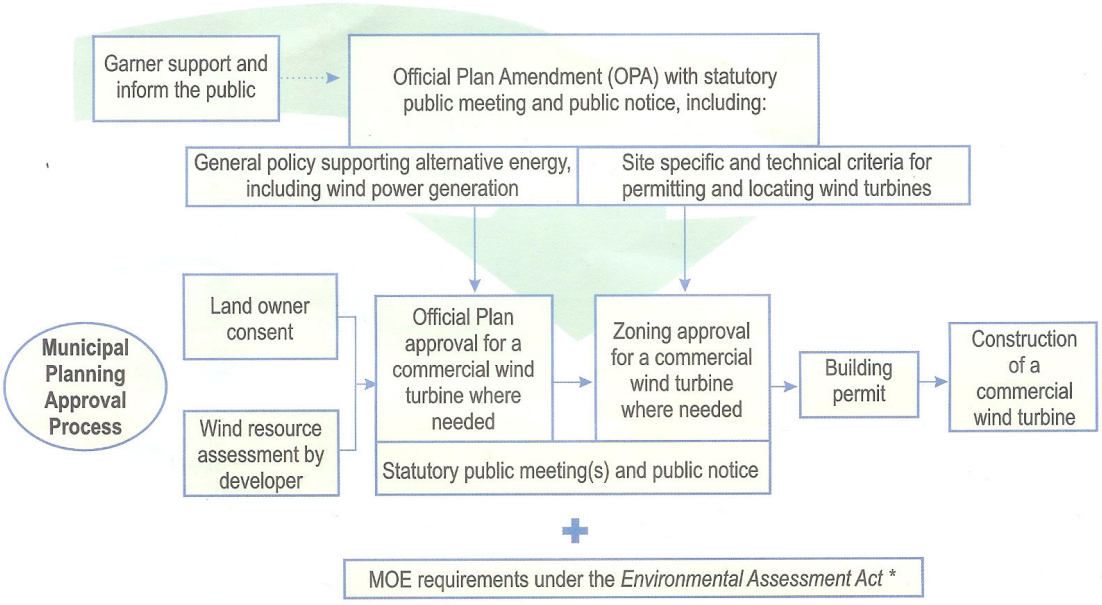


Figure 1 – Province of Ontario Wind Energy Planning Flow Chart Source: MMAH, 2003

What is critical about the above flow chart is that it does not give municipalities any concept of what should be included in their Official Plan policies, nor what should be included in any site specific and technical criteria for permitting and locating wind turbines. In fact, the document advises municipalities to contact the County of Bruce, which has developed wind energy policies. This is a very different approach from the Australian and specifically the Irish example, where not only were municipalities required to develop wind energy plan, but were instructed as to what issues should be covered in it. In Ontario, municipalities are left to develop their own wind energy planning framework, without any guidance from the province, which could potentially lead to large variations in wind energy regulations from municipality to municipality. The issue with this is that while the creation of renewable wind energy is of provincial interest, the actual creation of this resource, through the installation of wind turbines, is left up to the municipalities.

3.5.3.4 2005 Provincial Policy Statement

Since the 2003 "Wind Energy - Municipal Tools for Planning and Development" information sheet was released, the Ontario government has taken some steps towards introducing a wind energy planning framework by including renewable energy and wind energy in the recently adopted 2005 Provincial Policy Statement. The Provincial Policy Statement provides policy direction on matters of provincial interest related to land use planning and development. As a key part of Ontario's policy-led planning system, the Provincial Policy Statement sets the policy foundation for regulating the development and use of land (MMAH, 2005). With respect to wind energy, the 2005 Provincial Policy Statement contains the following section:

> 1.8.1 Planning authorities shall support energy efficiency and improved air quality through land use and development patterns which:
>
> a. promote compact form and a structure of nodes and corridors;
> b. promote the use of public transit and other alternative transportation modes in and between residential, employment (including commercial, industrial and institutional uses) and other areas where these exist or are to be developed;
> c. focus major employment, commercial and other travel-intensive land uses on sites which are well served by public transit where this exists or is to be developed, or designing these to facilitate the establishment of public transit in the future;
> d. improve the mix of employment and housing uses to shorten commute journeys and decrease transportation congestion; and
> e. promote design and orientation which maximize the use of alternative or renewable energy, such as solar and wind energy, and the mitigating effects of vegetation.
>
> 1.8.2 Increased energy supply should be promoted by providing opportunities for energy generation facilities to accommodate current and projected needs and the use of renewable energy systems and alternative energy systems, where feasible.
>
> 1.8.3 Alternative energy systems and renewable energy systems shall be permitted in settlement areas, rural areas and prime agricultural areas in

> accordance with provincial and federal requirements. In rural areas and prime agricultural areas, these systems should be designed and constructed to minimize impacts on agricultural operations (MMAH, 2005).

The 2005 Provincial Policy Statement is a major step towards introducing a wind energy-planning framework for Ontario as it now requires local planning authorities to have regard to alternative energy, and specifically wind energy. Section 1.8.3 goes so far as to permit alternative energy systems (including wind energy) in settlement areas, rural areas and prime agricultural areas. However, no guidance is given on best practices for wind energy developments, nor is any instruction given on how different projects should be assessed. Also the major issue of visual impact is not being addressed.

3.5.3.5 Niagara Escarpment Commission

One of the few wind energy planning policy documents that has been written by an Ontario planning authority was the October 2003 Wind Power Development Policy Report prepared by the Niagara Escarpment Commission (NEC). This document was prepared in response to two other wind power documents prepared by the Ministry of Natural Resources and the Renewable Energy Task Team (which is made up of representatives of Ontario's primary renewable energy industries – waterpower and wind power). The purpose of the NEC paper was to develop a policy on wind energy (specifically wind farms) in relation to the issues, objectives, land use policies and development criteria of the Niagara Escarpment Plan (NEP) and the Niagara Escarpment Planning and Development Act (NEPDA) (NEC, 2003).

The purpose of the NEPDA is:

> "to provide for the maintenance of the Niagara Escarpment and land in its vicinity substantially as a continuous natural environment, and to ensure only such development occurs as is compatible with that natural environment" (NEC, 2003),

In developing their policy on wind farms, the NEC indicated that they relied heavily on their past experience with telecommunication towers. This experience determined that the permitted uses and development criteria of the NEP did not lend itself to supporting tall, highly visible structures such as telecommunication and wind towers, above the escarpment horizon. The policies and criteria promote maintaining and enhancing the open rural landscape and attractive vistas associated with the natural and cultural landscape of the Escarpment (NEC, 2003, NEC, 2004).

Based on their review of past development applications for telecommunication towers and current information on wind turbines, the NEC determined that there is little ability to mitigate or minimize the visual impact of commercial wind towers (NEC, 2003, NEC, 2004). The policies of the NEP pertaining to the preservation of the natural scenery would not be easily achieved given the scale of current wind farm projects. The NEC determined in their 2003 Policy report that it does not seem appropriate to locate commercial wind turbine facilities in an area that is protected largely for its natural and scenic resource values. The report concluded by recommending that the Niagara Escarpment Commission adopt the following position on wind turbines:

1) The Commission supports the concept of wind power generation in appropriate locations in the province. The area of the Niagara Escarpment Plan should not, however, be the focus of large-scale industrial type wind power development. The emphasis must be on preserving the natural scenery in the Escarpment corridor over the long-term.

2) The Niagara Escarpment Plan was established "to provide for the maintenance of the Niagara Escarpment and the land in its vicinity substantially as a continuous natural environment, and to ensure only such development occurs as is compatible

with that natural environment." A key objective is to "maintain and enhance the open landscape character of the Niagara Escarpment in so far as possible, by such means as compatible farming or forestry and by preserving the natural scenery". As such, large-scale industrial-type wind power developments should not be permitted in those portions of the NEP that are prominent for their scenic resources and natural values. This would include Escarpment Natural Areas, Escarpment Protection Areas, portions of Escarpment Recreation Areas, and portions of the Escarpment Rural Areas that make up part of sensitive scenic landscape units.

3) Individual, smaller scale household or farm wind generators can be considered on a case by case basis as uses accessory to existing uses, throughout the NEP designations, as has been done in the past through the Development Permit review process.

4) The Niagara Escarpment Commission should review wind power proposals in areas adjacent to the Niagara Escarpment Plan boundaries, which may have a visual impact on prominent Escarpment features and landscapes, and provide comments based on the effects the facility(s) may have on the Escarpment landscape.

5) Finally, the issue of wind power generation is an emerging issue presently in a state of study and flux. Few commercial wind parks have been established in Ontario; a new industry is emerging, which may be subject to legislative and regulatory changes. Therefore, this issue should be revisited by the Commission at an appropriate future time, e.g., after a major wind park development has been established and evaluated in a jurisdiction other than the NEP, at which time the Niagara Escarpment Commission should consider amending the Niagara Escarpment Plan to prohibit, or limit, the use (NEC, 2003).

The NEC paper is interesting as it illustrates a number of issues regarding the current state of wind energy planning policy development in Ontario. Firstly, it is a clear example of how large and complicated the issue of visual impact is with respect to wind energy developments. In their fourth position, it is stated that all wind energy developments adjacent to the escarpment should be reviewed for visual impact on the prominent features of the escarpment. This is quite significant given the size of the escarpment and the fact that it stretches from Niagara to the Bruce Peninsula. Secondly, with position number five, the NEC report illustrates the fact that there is an absence of a

common planning framework to deal with wind energy. Thirdly and possibly most importantly, it shows that there are competing interests at play with the respect to wind energy, even within the Ontario Government. This is evident as the Ministry of Energy is pushing for more wind energy capacity through its RFP and ART programs, the Ministry of Municipal Affairs and Housing is trying to encourage wind energy through the new Provincial Policy Statement and the Wind Energy Information Sheet, yet the Niagara Escarpment Commission has taken the position that wind energy should not be allowed next to the Niagara Escarpment.

3.5.3.6 Wind Energy and The Ontario Environmental Assessment Act

While somewhat outside the realm of the municipal planning process, it is important to note that in Ontario, wind projects over 2 MW are subject to the requirements of the Ontario Environmental Assessment Act. Under the Environmental Assessment (EA) process, the first step involves the proponent assessing the project against a set of screening criteria and requiring it to provide the public with "notice of commencement". At this point the public can raise issues that if not addressed can trigger an "Environmental Review" by the Ministry of the Environment (CIELAP, 2003). The second opportunity for public consultations is provided when the proponent files a "Notice of Completion" at which point the public can request that the project be elevated to an individual EA during the notice period if the issues raised have not been adequately addressed. Common issues surrounding turbines under the EA process have been:

- Potential impacts on both local and migratory bird populations
- Noise and visual impacts that could affect local residents
- Blade icing, a winter phenomenon whereby ice could form on the blade and become a possible projectile when the blades spin (CIELAP, 2003).

That being said, the Canadian Institute for Environmental Law and Policy has reported that the novelty of wind turbines in Ontario has proven to be a major stumbling block. The environmental and socio-economic issues and impacts surrounding a proposed site from the design, construction and operation of a turbine are new to government regulators and citizen groups. This has led to lengthy and costly EAs due mainly to the uncertainty about the process and framework that a developer must meet in order to be issued an approval (CIELAP, 2003).

3.6 Conclusion

The available literature on wind energy confirms the challenges facing those who are involved with local level land use planning for this emmerging use. The lack of planning guidelines or a standardized planning framework for wind energy policy development has the potential to leave many municipalities in Ontario to try and develop their own policies, possibly without a firm understanding of the issues that need to be addressed.

The literature is clear on the benefits of wind power and the clean and relatively inexpensive energy that it produces. Research shows that in Europe and southern Asia, wind energy generating capacity is expanding at an exponential rate, whereas in North America it has been slower to catch on. However, that is not expected to last as it has been determined that there is a need to further develop the wind energy potential in Canada as a part of a strategy to reach the goals of the Kyoto Accord. Specifically, in Ontario, the provincial government has set a target of creating 300 MW of new renewable energy sources by 2007, most of which will be generated by wind power. This

300 MW target will involve an approximate 2000% increase in the amount of wind generating capacity in Ontario within the next 3 years. It is also anticipated that this expansion will take place without a wind energy planning framework in the province and without a standardized set of wind energy planning policies among Ontario municipalities, even thought some progress has been made with the recent changes to the Ontario Provincial Policy Statement.

The Canadian Wind Energy Association has identified the lack of wind energy policies and zoning regulations in Canadian municipalities as one of the barriers to wind energy development in Canada, whereas the recent OPA Supply Mix Report identified that some improvements need to be made to assist with the additional policy and regulatory issues surrounding wind energy developments (CANWEA, 2004c, OPA, 2006).

The literature on wind energy planning revealed that in Europe, especially Sweden and the United Kingdom, there is a growing sentiment that local and municipal planning authorities are having a difficult time balancing the promotion of wind energy development from a national perspective with the local planning concerns and opposition that arise when applications are received to construct the actual wind farms. The local opposition has been shown to be primarily focused on the visual impacts of the wind turbines on the landscape, but other local concerns include noise, bird kills, electromagnetic impacts, shadow flicker and ice shedding.

The research also revealed that some countries have developed national and state planning policies for wind energy development, which serve as guidelines and, in some cases, provide a legislative basis for wind energy policy development. However, there is

no Canadian wind energy planning policy guidelines that have been produced. In Ontario, one of the few policy documents prepared on wind energy development was the Niagara Escarpment Commissions recommendation to prohibit commercial wind farms on the Escarpment due to the visual impact they would have on the scenic views.

Even with the lack of federal and provincial wind energy planning guidelines, some Ontario municipalities have developed their own Official Plan policies and Zoning By-law regulations with respect to wind farms and wind turbines. The literature review did reveal, however, that there is a gap of information regarding:

1. How these municipalities developed their policies given the lack of direction from the province and what background information did they use.

2. If the policies that were developed by these municipalities adhere to good planning principles and frameworks? And, are components of these policies suitable for wider adoption in Ontario?

3. What kind of input/opposition, if any, did these municipalities receive from local residents and wind power representatives during the course of developing their wind energy policies and regulations,

4. What types of advice would they provide to other municipalities that have yet to develop wind energy policies

5. Where do they see wind energy development in Ontario heading in the future.

4.0 - RESEARCH METHODS

4.1 Research Design

Based on the research goals and objectives listed in the previous chapters, the following research questions emerged to be investigated:

1. What types of wind energy planning frameworks have been developed in the world, what if any common policies do they share, are there elements that are suitable for implementation in Ontario?

2. What are considered elements of "good" planning principles and frameworks?

3. What is the current state of wind energy policy development in southwestern Ontario?

4. Do the wind energy planning frameworks that have been developed in southwestern Ontario adhere to commonly accepted good planning principles and planning frameworks? Are there components of these policies that would be appropriate for wider adoption in Ontario?

5. Based on the evaluation of the existing wind energy planning policies in southwestern Ontario, what types of framework should the City of Stratford develop for wind energy?

This research was accomplished through a case study approach that included a combination of interviews and analysis of wind energy planning policy development in several Ontario municipalities. Five municipalities, Perth County, Huron County, Elgin County, Bruce County and Grey County were selected to act as the case studies. The case studies were selected as they were thought to be "instrumentally useful in furthering the understanding of the problem" (Schwandt, 2001: 23). This format of case study selection is known as "purposive sampling", in which cases are chosen because they offer the best opportunity to gain insight into the problem one is studying. Also, known as "criterion-based sampling", it requires that the researcher establish the criteria for which the cases will be selected and then cases are sought based on this criteria (Merriam, 1988:

48). The criteria used for the selection of the case studies in this research are included in Chapter five.

The chosen format for gathering information was semi-structured interviews with planning officials from each of the case study municipalities and also semi-structured interviews with key wind energy informants from the provincial Government, the wind energy industry and private consultants.

In addition to the semi-structured interviews, wind energy planning documents were also studied in order to fully understand the status of and policies surrounding wind energy development in the selected case study municipalities. Documents are important because they corroborate your observations and interviews, making the findings of the study more trustworthy (Glesne and Peshkin, 1992: 52). Documents are also important in qualitative studies as researchers may often be able to get access to documents that may otherwise be restricted (Hodder, 1994: 703-704). For this study, the additional documentation that was sought included, policy documents, zoning by-laws, guidelines, planning reports and newspaper articles. This additional information was valuable in providing in depth details and background information on the wind energy planning frameworks in each municipality. Further information was obtained from four wind energy workshops attended by the researcher within the last three years and newspaper and journal articles dealing with wind energy in the selected municipalities and throughout Ontario.

4.2 Case Study Municipalities and Selection

A case study methodology concentrates upon a single or small number of individuals or institutions (Birley and Moreland, 1998: 36). A case study approach was chosen for this research because it allowed for the study of a limited number of municipalities in great detail (Birley and Moreland, 1998: 36). By focusing on a small number of entities, the study approach seeks a "holistic description and explanation" (Merriam, 1988: 10). Yin (as cited in Merriam, 1988: 10) suggests that case study research design is particularly suited to situations where it is "impossible to separate the phenomenon's variables from their context". As a research strategy, a case study approach can be considered as an "all encompassing method" that is neither a data collection technique nor merely a design feature alone. Instead, the logic of the design incorporates specific approaches to data collection and analysis (Yin, 1994: 13). Important to this study is the fact that in qualitative research the emphasis is in process, meaning and understanding, rather that numbers to convey what the researcher has learned about the phenomenon (Merriam, 1988: 19-20).

The number of case study municipalities chosen for this research was five. This number chosen as it was thought to be a large enough sample size to make meaningful comparisons, while be being small enough to be able to complete a full analysis within the time constraints of the research.

In qualitative studies, there are three prevalent data gathering techniques; participant observation, interviewing and document collection (Glesne and Peshkin, 1992: 24). The use of multiple methods of data collection and sources of data for analysis is known as "triangulation". Triangulation also serves as a way of "reinforcing

information" learned in the interviews and as a means to identify a "state of affairs" by analyzing the way in which multiple types of data are related to each other (Woods, 1999: 4).

Table 7 - Relationship of Research Questions and Methods (adapted from Boles, 2003)

Questions/Methods	**Semi Structured Interviews with Planning Officials**	**Document Review**	**Supplemental Interviews/Newspaper Articles**
What types of wind energy planning frameworks have been developed in the world, what if any common policies do they share, are there elements that are suitable for implementation in Ontario?	Did you examine any international sources when developing your wind energy policies?	Review of any available wind energy planning frameworks from international sources.	Review of Newspaper articles to assess current push for wind energy development.
What are considered elements of "good" planning principles and frameworks?		Review of journals and other material dealing with good planning practices	
What is the current state of wind energy policy development in Southwestern Ontario? What have been the primary issues, barriers or constraints that have shaped wind energy policy development in Ontario municipalities?	Do you feel that there are barriers to wind energy development in Ontario? On what basis and with what information did your municipality develop its policies? Do you feel these barriers have influenced your municipality's wind energy policies? Did you receive any opposition to you wind energy policies?	Review of any available wind energy planning documents/reports from case study municipalities.	Interviews with wind energy experts & developers to verify position held by municipal planners. Review of Newspaper articles to identify barriers to wind energy development.
Do the wind energy planning frameworks that have been developed in southwestern Ontario adhere to commonly accepted good planning principles and planning	How did you municipality overcome any of the barriers? On what basis and with what information did your municipality develop its policies?	Review of any available wind energy planning documents/reports from case study municipalities.	Interviews with wind energy experts & developers to verify position held by municipal planners.

frameworks? Are there components of these policies that would be appropriate for wider adoption in Ontario?			
Based on the evaluation of the existing wind energy planning policies in southwestern Ontario, what types of framework should the City of Stratford develop for wind energy?	Do you feel that there is sufficient direction from the provincial government in terms of developing wind energy policies? Do you feel that guidelines from the Federal/Provincial government would assist wind energy planning policy makers at the municipal level? What types of guidelines do you feel would be beneficial? Are there components of your wind energy planning policies that you feel would be appropriate for adoption by other municipalities? If you could do it all again, what would you do differently?	Review of any available wind energy planning documents/reports from case study municipalities.	Interviews with wind energy experts & developers to verify position held by municipal planners.

4.3 Interviews

This thesis used a formal, semi structured and face to face interview format whenever possible. The purpose of this type of interview is to "capture the perspectives of staff and others associated with the program" (Patton, 1980: 196.) The open ended structure to the questions was necessary to "access the perspective" of the interviewees,

while avoiding influencing their responses (Patton, 1980: 196). In this type of interview, questions are guided by a list of issues that allows the researcher to respond to "the situation at hand, to the emerging views of the respondent and to new ideas on the topic" (Merriam, 1988: 73-74). This open-ended approach also allows the interviewee to express individual perspectives and experiences, while still keeping the interaction focused (Patton, 1988: 21).

The limitations with using a semi structured interview approach are that the researcher's presence and questioning may bias responses. Additionally, this type of information is "indirect" as it is "filtered" through the views of the interviewees (Creswell, 1994: 150). Finally, there is a concern that comparability issues may arise when interviewees are given too much latitude in giving responses (Creswell, 1994: 150).

In total, 12 interviews were conducted with 15 interviewees; in three cases two interviewees were interviewed at the same time to accommodate their schedules. The interviewees were asked primarily the same set of questions, with the questions designed to encourage elaboration in responses and to gather information on present wind energy policies and developments, their experiences with wind energy, any barriers they experienced in developing their policies and any recommendations they had. The list of interview questions is available in Appendix A. The majority of the interviews took place over a seven-month period in the spring and summer of 2005. The interviews lasted an average of one hour in length, but ranged from half an hour to one and a half hours in length. In total, 12 interviews were conducted in person and 3 were conducted via telephone.

4.4 Interpretation Process

In order to assess the data in its entirety, interpretation of the interviews did not occur until all the interviews were complete. The following steps were used in the interpretation process (adapted from Boles, 2003):

- Each transcript and or set of interview notes was reviewed independently. Key passages were highlighted, and notes were made of important ideas emanating from each interview.

- Based on the initial results of each interview, common themes and ideas that were repeated by more than one interviewee were selected.

- Additional information was added, at which point the researcher made connections and links between the themes and the interview comments. Some themes were combined if the material overlapped or was similar.

- The identified themes and related information were examined in whole, and related back to the original research question and objectives. This allowed the researcher to obtain an empirical view of the entire dataset as it relates to the thesis objectives, as opposed to the review of the individual interviews (Boles, 2003).

As mentioned previously, the above information from the interviews was supplemented from documentation for each city, newspaper and journal articles, and other relevant information.

5.0 - CASE STUDIES

5.1 Case Study Selection Criteria

The five case study communities were selected based on the following criteria (adapted from Szybalski, 2004):

- Local planning documents have been developed to specifically deal with the issue of wind power generation. This criterion was selected as the documents that were created allow for a meaningful comparison between them and a potential wind energy policy framework in the City of Stratford.

- Wind power generation facilities currently exist within the community; or the communities are faced with a proposal for wind energy, or the municipalities have taken a pro-active approach to wind energy policy development.

- Municipal staff familiar with the planning issues surrounding wind energy, or were responsible for creating the policies in the municipality were available to be interviewed.

- The municipalities were located in areas that have similar physical, economic, and political characteristics to the City of Stratford. For example they are located in southwestern Ontario, have populations less than 100,000 and are primarily rural agricultural.

The literature made it clear that a lack of knowledge exists on wind energy land use planning policy development in Ontario at the local or municipal level and specifically what types of policies are being developed, whether or not these policies adhered to good planning principles and whether or not components of them were suitable for wider adoption in Ontario, what issues or barriers have been observed and what lessons could be learned from these municipalities that have gone ahead and developed their own policies. This chapter profiles the approaches taken by five southwestern Ontario municipalities to address the land use planning aspect of wind energy in order to; 1) answer the research question of whether or not the wind energy planning frameworks that have been developed in southwestern Ontario adhere to commonly accepted good

planning principles and planning frameworks; 2) determine whether there are components of these policies that would be appropriate for wider adoption in Ontario, and 3) evaluate them in the context of the examples of good planning principles and frameworks reviewed in Section 3.2. Each case study profile will be structured in the same manner with the following sections:

- Review and evaluation of existing wind energy planning framework
- Issues encountered during and after policy development
- Any barriers to wind energy policy development, either real or perceived

As a means of triangulation, semi-structured interviews were also conducted with key players in the wind energy industry in Ontario. A summary of these interviews, and the themes uncovered is provided in Section 5.7. Subsequent triangulation information such as document review and newspaper articles is discussed in Section 6.0.

5.2 Perth County

Perth County is located east of approximately 180km northeast of Detroit and 160 km west of Toronto (see figure 2). The County has a geographical area of 2,218 square kilometers (Stats Canada, 2005), with the land use activities being predominantly agricultural (Perth County, 1998). The population of 73,675 (Stats Canada, 2005), is mostly located within the County's primary settlement areas of Listowel, Milverton and Mitchell and also within the separated cities of St. Mary's and Stratford.

5.2.1 Wind Energy Planning Framework

Perth County is an upper tier municipality that provides planning services for the four townships of Perth East, Perth South, North Perth and West Perth. There is one

County Official Plan and four township zoning by-laws. The most recent Official Plan was adopted in 1998.

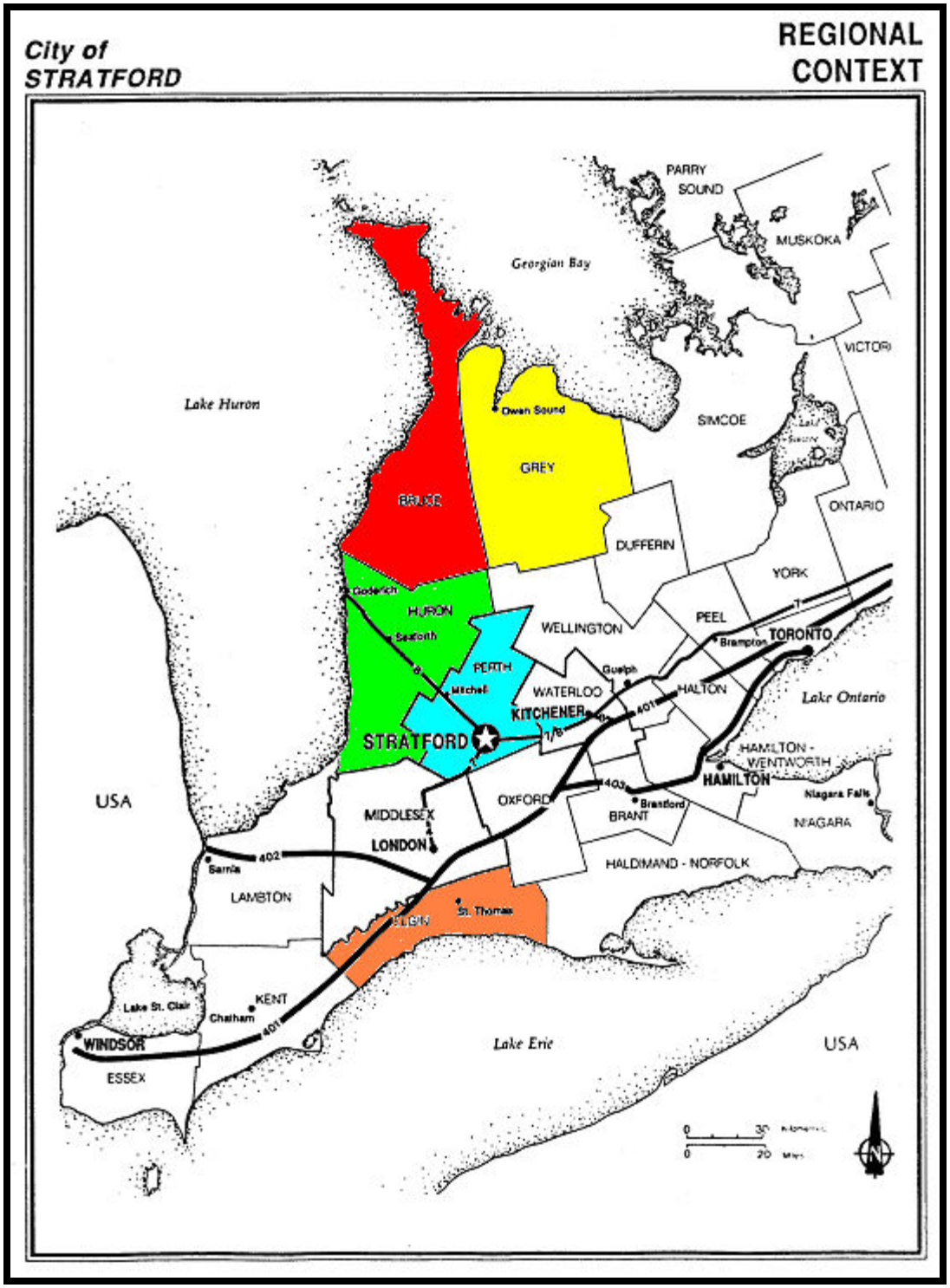


Figure 2 Case Study Municipalities – Map Source – City of Stratford Official Plan

In 2004, Perth County initiated an Official Plan amendment to update its Official Plan to address wind energy. The Official Plan amendment amended Section 17 of the County of Perth Official Plan, which deals with Community Facilities, Resources and Services. This Amendment (No. 40) to the County of Perth Official Plan (Appendix A) addresses wind energy by defining Wind Energy Generation Systems (WEGS) as mechanical devises designed to convert wind energy into electricity, and further breaks these systems down into small scale and large scale systems. Most importantly, the amendment states that:

> *"The County of Perth supports the development of Wind Energy Generation Systems (WEGS) for the production of electricity. These systems will be a source of renewable energy for the economic and environmental benefit to both the County and the Province."(County of Perth, 2004)*

The amendment permits small scale wind energy systems as of right in the "Agricultural" designation, subject to the provisions of the Zoning By-law of the local municipality. Small-scale systems are defined as those that are intended to primarily generate electricity for on-site domestic consumption and are normally comprised of one generating device (County of Perth, 2004).

The amendment also addresses the larger planning issue of commercial scale wind energy generating systems. The amendment defines these large-scale systems as those comprised of one or more generating units that are primarily intended to feed electricity into the transmission grid. Given their large nature, the Official Plan Amendment permits these "wind farms" in the agricultural area, but subjects them to zoning by-law amendment (County of Perth, 2004). The amendment recognizes that these commercial wind systems are considerably different to the uses typically found in

agricultural areas and as a result it sets out the following requirements that must be satisfied prior to the local Council considering a zone change application for a commercial wind farm:

- A site plan showing the location of the proposed structures and facilities, along with the height and location of all structures within 500m of the subject property.
- A professional engineer shall approve the base and tower design of the turbines
- A site plan agreement under Section 41 of the Planning Act.
- A noise study
- Setbacks for the turbines shall be established in the amending zoning by-law.
- Turbines within 10km of an airport shall require written approval from Transport Canada.
- Turbine locations shall be encouraged to minimize the disruption to agricultural uses.
- Commercial turbines shall have a minimum separation distance of 500m from "settlement areas".
- Commercial wind energy generating systems that are proposed in proximity to an area within a "Natural Resources/Environment designation", must demonstrate that there will be no adverse effect. (County of Perth, 2004)

In reviewing the wind energy policies from Perth County, it is important to evaluate them in the context of the indicators of good planning principles and frameworks reviewed in Section 3.2.1.

Does the planning framework support long term goals (i.e. Provincial and Federal objectives)?

The Perth County wind energy planning framework does support long term goals as the background report for the Official Plan Amendment (OPA) supplied by the interviewees (See Appendix B) makes reference to the provincial interest of promoting renewable energy. The report cites the MMAH Wind Energy Info Sheet (See Figure 1) and the findings of the Renewable Energy Task Force. In the actual wind energy OPA text, the document makes reference to the fact that wind energy provides a source of

renewable energy for the economic and environmental benefit to both Perth County and the Province of Ontario.

Does the planning framework take into account the public interest (provincial or global) as well as the local interests?

As mentioned above the Perth County wind energy planning framework does take into account the public interest as it mentions that renewable energy is a benefit to both the county and the province.

In terms of local interest, the OPA recognizes that wind energy developments will have an impact on the local population and attempts to minimize these impacts through the following:

- By permitting wind energy developments only in agricultural areas and not in urban areas;
- By requiring that they not be within 500m of a "settlement area";
- By subjecting the developments to site plan approval, thereby giving the municipality control over the design of the development;
- By requiring the applicants to submit a noise study to ensure that the proposal will comply with Ministry of Environment requirements;
- By requiring wind energy developments to apply for a zoning by-law amendment to identify site specific setbacks[3] and height provisions.

Does the planning framework allow for public participation?

The Perth County wind energy framework does allow for public participation by requiring wind energy developments to apply for a site specific zoning by-law amendment. Under the Ontario Planning Act a zoning by-law amendment requires a public meeting to be held by municipal council and requires that notification of this

[3] Setbacks refer to the minimum horizontal distance from a wind turbine to a property line or a structure such as building.

public meeting to be given to all property owners within 120m of the subject site and to be placed in a local newspaper. At the public meeting, concerned members of the public may voice their concerns to the municipal council before a decision is made on the application. By appearing at the public meeting, concerned members of the public also secure their appeal rights to the Ontario Municipal Board.

Does the planning framework protect the natural heritage (i.e. landscape) of an area?

The Perth County wind energy framework currently requires illustrations and elevations of the proposed site showing the locations of the proposed wind turbines in relation to all other buildings and structures within 500m of the site as part of the site plan approval process. While this will give planners an illustration of what the development will look like, there are neither guidelines for the layout of the turbines nor any regulations as to where turbines cannot be located.

Does the framework contain all or most of the components identified by Litman (i.e. moves from general concepts to increasingly specific plans, programs and tasks)?

The Perth County wind energy planning framework currently only includes Official Plan policies. In this case only the first four components on Litman's list of a good planning framework have been achieved.

5.2.2 Issues Encountered

Planners from Perth County indicated that their policies were developed in an attempt to take a pro-active approach to wind energy development. Council initiated this at the request of the surrounding townships, which had received some expressions of interest from wind energy developers. As of 2005, a feasibility study was being

undertaken by Countryside Energy Co-operative Inc., which is promoting the development of co-operatively owned local energy generation.

Planner A indicated that very little opposition was encountered during the development of the County's wind energy policies. Planner A also stated that they were aware of the common issues that the literature typically associates with wind energy, i.e. noise, ice-throw, bird kills, visual impact, NIMBY (not in my backyard), but did not encounter any of these issues in preparing their policies. Planner A also indicated that most literature indicates that many of these issues are in fact not true. Planner B indicated that one of the reasons that there was no public opposition to wind energy in Perth County was due to the fact that many landowners are farmers who are poised to benefit financially from wind energy development. Planner A also indicated that because Perth County was being proactive in its wind energy policy development and was not faced with an actual development proposal, there was not a lot of public interest.

One of the technical issues encountered when developing the policies was the issue of setbacks for wind turbines. In dealing with this issue, Planner A and Planner B indicated that they were not aware of any instances where a turbine had toppled over, but still felt that some type of protective setback should be established from residential areas.

5.2.3 Barriers Encountered

Planner A indicated that one of the barriers to wind energy development in Ontario is a lack of public education on the subject. Planner A felt that after wind farms become more common, the use will become more acceptable to the public. Planner A recommended a public education component for any wind energy policy development.

Planners A and B also identified a lack of direction from the Province of Ontario as a barrier to wind energy policy development. They indicated that a sample Official Plan Amendment and Zoning By-law amendment would be beneficial to help municipalities and would assist in ensuring a common set of municipal wind energy planning policies in the province. A guidance document was also identified as something that would be beneficial.

A non-planning related barrier to wind energy development that was identified was the current electricity grid system in Ontario, which makes it prohibitive for wind energy developers to connect.

5.2.4 Recommendations

Planners A & B recommended that municipalities should strive to complete and adopt wind energy Official Plan Policies and Zoning By-law regulations at the same time. This will lead to less confusion among the public, and wind energy developers and will also provide a clear direction as to what is expected of wind energy projects.

5.3 Elgin County – Municipalities of Bayham and Malahide

Elgin County is located on the north shore of Lake Erie, south of the City of London. The County is comprised of the municipalities of West Elgin, Dutton/Dunwich, Southwold, Central Elgin, Malahide, Bayham and the separated cities of St. Thomas and Aylmer. Elgin County has a population of 81,553, a third of which live in the City of St. Thomas (Stats Canada, 2005). The County has a landmass of 1,880 square kilometers, with one of its primary industries being agriculture (Elgin Connects, 2005). In terms of a

planning framework, each municipality administers their own Official Plan and Zoning By-law.

5.3.1 Wind Energy Planning Framework

In March of 2003, the municipalities of Malahide and Bayham retained a private planning consultant to prepare Official Plan Policies and Zoning By-law regulations to govern wind energy development. These documents (Appendix B) were formally adopted in October of 2003.

The purpose of the Official Plan amendments was to add policies regarding the establishment of wind energy conversion systems and to permit the establishment of wind turbines along the Lake Erie shoreline (Mun. of Bayham, 2003). The Municipalities felt that due to its strategic location along the north shore of Lake Erie and due to an increasing interest from wind energy developers, Official Plan policies were necessary to ensure the orderly development of wind turbines with the rural areas of the municipality. The area affected by the amendment is typically within 3-4 km of the Lake Erie Shore line (Mun. of Bayham, 2003). The policies of the Official Plan amendment address wind energy in the following manner:

- Stating that the municipality supports the development of wind energy systems for electricity production, as a source of renewable energy for the economic and environmental benefit of the Municipality and the province.
- Stating that large-scale wind farms will be permitted in areas within 3-4km from Lake Erie subject to a zoning by-law amendment.
- Permitting small-scale individual turbines for domestic consumption as of right in the "Rural" designation of the Official Plan.
- Wind farm sites will have access to public roads that can accommodate the construction and maintenance vehicles, and will be set back a sufficient distance from sensitive residential areas.
- Placing wind farm developments under site plan control.
- Indicating that commercial wind farms will be permitted in the "Rural" designation, subject to a Zoning By-law amendment. The amendment application is to be accompanied by the following studies:

- noise impact study
- visual impact studies
- environmental impact study where applicable
- appropriate studies if turbines are adjacent to airports or landing strips
- consideration as to the land use that will surround the base of the turbines (Mun. of Bayham, 2003).

In addition to the Official Plan policies, zoning by-law regulations for wind farms were also developed. The intent is that any commercial wind farm developer would have to apply for a zoning by-law amendment to have the policies apply to their property. The zoning regulations include:

- Definitions for wind farms, wind testing towers, wind turbines and accessory wind turbines.
- Permitting accessory wind turbines as of right in rural areas, subject to a setback requirement of 1.25 times the height of the turbine.
- Not subjecting wind turbines to any height restrictions.
- Maximum Lot coverage of 5%
- Requiring wind turbines to adhere to the following setback requirements:
  - From on-site residential use: 1.25 times height or 250m, which ever is greater.
  - From an off-site residential dwelling or institution: 300m
  - From village commercial: 450m
  - From village residential: 600m (Mun. of Bayham, 2003)

In comparing the Malahide and Bayham wind energy planning framework to the examples of good planning principles and frameworks reviewed in Section 3.2.1, we find the following:

Does the planning framework support long term goals (i.e. Provincial and Federal objectives)?

The Municipality of Bayham OPA does support long term goals as in the OPA text it states that the municipality supports the development of wind energy systems for electricity production, as a source of renewable energy for the economic and environmental benefit of the Municipality and the Province.

Does the planning framework take into account the public interest (provincial or global) as well as the local interests?

As mentioned above, the Bayham wind energy planning framework does take into account the public interest of developing renewable energy sources. The plan also takes into account the local interest by stating that it is intended that many of the safety, noise and visual impacts will be contained on the site of the wind farm. The OPA also takes into account local interests by stating that the sites will be separated from Urban Land Uses found in the Hamlets or Village designations of the Official Plan in order to reduce the potential impact of safety, noise and visual intrusion on these areas. In the Zoning Regulations for wind turbines (see above), the local interest is further taken into consideration through the setback requirements.

Does the planning framework allow for public participation?

The OPA for the Municipality of Bayham requires wind farm developments to apply for a Zoning By-law amendment to add the wind farm zone regulations to the property as an additional permitted use. As discussed in the Perth County example, this requirement ensures that there is a public process and an opportunity for public participation.

Does the planning framework protect the natural heritage (i.e. landscape) of an area?

The OPA for the Municipality of Bayham requires wind energy developments to provide the following studies as part of their required rezoning application:

- A visual impact study to determine the impact and mitigation measures required for the shadow or reflection of light coming from any part of the wind turbine on adjacent sensitive land uses;
- A visual impact study to determine the impact and mitigation measures required for wind turbines on the landscape as viewed from Lake Erie, municipal roads or other public access lands;

- An environmental impact study to identify and mitigate impacts on natural heritage features or functions (Mun. of Bayham, 2003).

These studies mixed with the requirement for site plan approval help to ensure that visual impacts will be identified and mitigated.

Does the framework contain all or most of the components identified by Litman (i.e. moves from general concepts to increasingly specific plans, programs and tasks)?

The Municipality of Bayham wind energy planning framework is comprised of Official Plan policies, zoning by-law and zoning by-law regulations, back up by the requirement for noise and visual impact studies as part of a zoning by-law amendment, followed by the requirement for site plan approval. These comprise many of Litman's requirements for a good planning framework.

5.3.2 Issues Encountered

The Planner from IBI Group indicated that the Official Plan and Zoning By-law policies that were prepared and adopted for the municipalities of Bayham and Malahide (which he indicated were identical) were prepared as a result of wind farm development that was proposed for the area. In terms of issues, the planner indicated that there was very little public opposition. As with the Perth County experience, many of the people who attended the public meetings were in fact farmers who were supporting the development.

The Planner also indicated that wind energy planning policies are a priority for those municipalities that have wind resources and less important for those municipalities that do not. The Planner felt that Ontario is about 10 to 20 years behind European countries in terms of planning policies and that there is an opportunity to avoid some of

the mistakes made, such as different styles of turbines within a development, turbine siting practices, noise and maintenance issues. The planner also stated that some of the perceived issues surrounding wind energy development such as blade throw and bird kills are really non-issues that they are, in fact, a cover for NIMBYISM and a diversion to the real issues surrounding wind energy development, which are aesthetics (the visual impact of wind turbines), property values and to a lesser extent the noise issue. To try and address the visual impact and noise issues, the municipality requires studies as part of the zone change application.

5.3.3 Barriers Encountered

The Planner indicated that a significant barrier to wind energy development in Ontario is:

> *"Trying to strike a balance between the public interest of having renewable energy across the province and the local interest of having a limited impact on the enjoyment and use of the rural area. The benefits of clean air and renewable energy accrues to the province as a whole, whereas the people in London and Toronto using green energy don't have to put up with the noise and visual impact of an array of turbines."*

The Planner stated that the adoption of the new Provincial Policy Statement, specifically the renewable energy policies, is a "huge plus" for wind energy development across the province, however, also felt that since we still do not have a large number of wind farms, the real public opposition is not there yet.

> *"In ten years when you see them all around the Great Lakes, there will be challenges to wind energy projects."*

The Planner also felt that the provincial government needed to give Ontario municipalities a starting point and then allow municipalities to tailor their Official Plan and zoning policies to their specific needs. Model Official Plan

policies and Zoning by-laws would be a benefit and would provide a good starting point.

The Planner also identified lack of education and common misconceptions about wind energy as a significant barrier:

> *"The biggest misconception is safety, as you have a better chance of being hit by lightning than being hit by a falling turbine. There is also a misconception about aesthetics, as no one has a good conception of what they look like."*

5.3.4 Recommendations:

In terms of recommendations, the planner indicated that it is important to place wind energy developments under site plan control and that the Province should require that wind turbines be subject to development permit applications under Section 70.2 of the Planning Act. The main reason for this recommendation was to be able to prevent a wind energy site from falling into disrepair (see Figure 3).

[Figure 3 Derelict Wind Farm on the Big Island of Hawaii – Author's photo]

"The biggest risk is that there is no way to force wind turbine developers to decommission turbines and there is no statutory requirement to force developers to maintain turbines. Seventy to 80% of visual complaints come when the turbines aren't working and there are old parts and other crap lying on the ground."

5.4 County of Bruce – Township of Huron-Kinloss

The County of Bruce is located in the northern part of Southwestern Ontario and is bordered by Georgian Bay to the north and east, Grey County to the east, Huron County to the south and Lake Huron to the west. The County encompasses an area of approximately 4,048 square kilometres and presently supports a population of approximately 64,215 people, as reported in the 1991 Census in 30 municipalities.

The County is composed of 16 Townships including Albemarle, Amabel, Arran, Brant, Bruce, Carrick, Culross, Eastnor, Elderslie, Greenock, Huron, Kincardine, Kinloss, Lindsay, St. Edmunds and Saugeen; six Towns including Chesley, Kincardine, Port Elgin, Southampton, Walkerton and Wiarton; and eight Villages including Hepworth, Lion's Head, Lucknow, Mildmay, Paisley, Tara, Teeswater and Tiverton (County of Bruce, 1997).

Bruce County is relatively narrow in shape with a substantial amount of coastline along Lake Huron and Georgian Bay. The shoreline has played a significant role in the development of tourism and resort industries adjacent to the shoreline. The County has traditionally been recognized as a strong agriculturally productive area. Beef cattle are the predominant livestock with farms reporting dairy animals, swine, poultry, cash crops, fruit and vegetables (County of Bruce, 1997)

One of the most significant single geographic features of Bruce County is the Niagara Escarpment. This area serves as a major tourist attraction and stretches north along the easterly portion of the Bruce Peninsula from Wiarton to Tobermory. The Lake Huron and Georgian Bay shorelines are equally significant natural features, which also serve as major tourist attractions from Point Clark in the south to Tobermory in the north (County of Bruce, 1997).

5.4.1 Wind Energy Planning Framework

The Bruce County Official Plan is the upper tier planning document, with the lower tier municipalities having some of their own Official Plans and each their own Zoning By-laws. The County Official Plan policies (Appendix B) define Wind Energy Conversion Systems (W.E.C.S) as mechanical devices designed to convert wind energy

into electricity (County of Bruce, 1997). These devices are broken down into two categories, small scale (< 50 k.V.a) and large-scale systems which are > 50 k.V.a and generally include more than one device. Small-scale systems are generally permitted in the "rural" designation under the municipal zoning by-law (County of Bruce, 1997).

Commercial scale generating systems are permitted by an amendment to the municipal zoning by-law. The Official Plan lays out the following issues that should be addressed by the local municipal council when considering an amendment for a commercial wind farm:

- Site plan for the area including location of the proposed turbines along with the location and height of all existing buildings and structures with 500m of the subject property.
- Professional Engineer to approve base and tower design of turbines
- Towers shall be placed under site plan control
- Applicant shall demonstrate compliance with MOE noise regulations
- Setbacks from road allowances, lot lines and structures shall be established in the Zoning By-law amendment.
- Where proposals are in close proximity to urban areas, a planning study will be required to address and mitigate potential issues.
- Prior to rezoning the applicants will be required to enter into a contract with Hydro One (County of Bruce, 1997) .

The County of Bruce is the only case study municipality to prepare application requirements for Commercial Wind Energy (Turbine) facilities. These guidelines were prepared by the County to formalize the zoning by-law amendment process for wind turbines. The intent of the guidelines is to provide the local municipal councils and wind energy developers with a list of items that need to be addressed before council can vote on an amendment. The application requirements (Appendix B) contain the following requirements:

- The need for the environmental screening report as required under the Environmental Assessment Act.

- The need for holding provisions to be applied to any site until certain requirements have been met:
    - Operational protocol and emergency services plan
    - Site plan agreement has been registered
    - Copy of the Ontario Energy Board license has been filed with the municipality
    - Turbines and bases are certified by a professional engineer
    - Information on construction schedule and details has been submitted and approved.
    - Any other issues as may be deemed critical by the local municipality, County of Bruce, Province of Ontario or Conservation Authority.
- General and site specific mapping and descriptions
- Wind farm details
- Visual impact assessment (This is one of the most detailed visual assessment criteria currently available for wind farm projects in the case study municipalities).
- An impact study of the proposal on the surrounding area, including Noise, Blade Glint, Shadow Flicker, Overshadowing and Electromagnetic Interference.
- A report on aircraft safety
- An environmental management plan

In reviewing the wind energy policies from the County of Bruce, it becomes clear that these wind energy policies are the most comprehensive among the case study municipalities and most closely resemble the examples of good planning principles and frameworks reviewed in Section 3.2.1.

Does the planning framework support long term goals (i.e. Provincial and Federal objectives)?

The County of Bruce Official Plan does not identify any specific Provincial or Federal goals that are being taken into consideration. The application guideline for wind energy developments does state that there are environmental, social and economic benefits associated with wind energy developments. However, it should be noted that the County of Bruce wind energy Official Plan policies are the oldest among the case study municipalities, dating back to 1997. Since the creation of wind energy is a relatively new

provincial directive, it is conceivable that the County of Bruce Official Plan policies would reference provincial and federal objectives were they to be revised.

Does the planning framework take into account the public interest (provincial or global) as well as the local interests?

As mentioned above, the broader public interest is not directly addressed in the County of Bruce Official Plan.

In terms of taking into account the protection of the local interest, this is accomplished through the very specific requirements (see above) that have to accompany any zoning by-law amendment application for a wind energy development.

Does the planning framework allow for public participation?

The Official Plan for the Township of Huron Kinloss (which is located in the County of Bruce) requires wind farm developments to apply for a Zoning By-law amendment to add the wind farm zone regulations to the property as an additional permitted use. As discussed in the Perth County example, this requirement ensures that there is a public process and an opportunity for public participation.

Does the planning framework protect the natural heritage (i.e. landscape) of an area?

Of the five case study municipalities, the County of Bruce has the most comprehensive framework in place to address the issue of natural heritage protection as part of wind energy developments. As part of a zoning by-law amendment to permit a wind energy development, applicants are required to provide a visual impact assessment. The County of Bruce also provides a suggested methodology on how to assess and mitigate visual impact issues (Appendix B), something which was not available from any of the other case study municipalities.

Does the framework contain all or most of the components identified by Litman (i.e. moves from general concepts to increasingly specific plans, programs and tasks)?

The County of Bruce wind energy planning framework is comprised of Official Plan policies, backed with a requirement for a zoning by-law amendment and site plan control. This is all supplemented with a comprehensive guideline package listing study requirements for zoning by-law amendment applications. Most importantly is the fact that the County of Bruce has developed a suggested methodology for assessing and mitigating the issue of visual impact, something which was absent in the other case study municipalities. For this reason, the County of Bruce has achieved all of the components identified by Litman as requirements of a good planning framework.

5.4.2 Issues Encountered

Bruce County is the Ontario municipality that has been dealing with wind energy proposals the longest and is the municipality that has the most experience with the land use from a policy perspective. Planner A from Bruce County indicated that one of the issues facing wind energy development in the County is opposition from recreational property owners. There are a large number of recreational property owners in the area, many of whom do not want the visual intrusion of the turbines. This issue, however, is not as prominent as in some other counties, as the wind resources in Bruce County are higher up, away from the shoreline. Cottagers may see them driving in, but they do not obscure their view of the lake.

The Planner identified the Niagara Escarpment as another wind energy planning issue in Bruce County. The Escarpment runs through the County and recent Niagara Escarpment Commission policy position has been to prohibit turbines on the escarpment (See Section 3.5.3.5).

5.4.3 Barriers Encountered

The Planner identified one of the main barriers to wind energy development in Bruce County as lack of power line transmission capacity. Because the existing infrastructure cannot handle additional capacity, wind energy developers are forced to construct their own power lines as part of the project.

5.4.4 Recommendations

The Planner recommended that:

> *"Official Plan Policies for wind energy should be as general as possible and should include areas where wind turbines are permitted and areas where they are prohibited so that developers and the public know what to expect."*

5.5 Huron County – Township of Ashfield-Colborne-Wawanosh

Huron County is located on the east coast of Lake Huron, west of Perth County and South of Bruce County. The County is comprised of the municipalities of Bluewater Central Huron, Huron East, Morris-Turnberry, South Huron, Town of Goderich and the Townships of Ashfield-Colborne-Wawanosh, Howick and North Huron. Comprising 3,402 square kilometers and supporting a population of 59,701 (Stats Canada, 2005) the predominant land use is agriculture, however, its proximity to the lake provides for many recreational activities.

5.5.1 Wind Energy Planning Framework

Wind energy is not addressed in the County Official Plan, but is addressed in some of the local Official Plans, resulting in some inconsistencies across the County in terms of different planning requirements for wind energy. Some municipalities do not

require an Official Plan amendment or Zoning By-law amendment for wind energy. The Huron County Planner has indicated that in general, Huron County has taken a permissive approach with respect wind energy. There were existing policies in the OP and Zoning By-laws, which allow "electrical facilities" in any zone. Originally intended for hydro substations and transmission lines, the Planning Department approached Council about interpreting this to mean wind energy facilities as well. The Planner indicated that Council wanted to attract wind energy development and decided to accept this interpretation. The Planner indicated that the current focus within Huron County is to update the Official Plans and Zoning By-laws to address wind energy directly.

The Planner indicated that The Official Plan and Zoning By-law policies for the Township of Ashfield-Colborne-Wawanosh (Appendix B) were updated in 2003 to include wind energy polices. The Official Plan policies are very general and very short. This was done purposely to allow as much flexibility as possible for wind energy development. Essentially, the Official Plan addresses wind energy in the Agricultural and Economic Development Sections of the Plan. The policies for Agricultural areas state that:

> *"Commercial scale infrastructure uses, such as wind energy facilities, may be permitted in the agricultural area subject to a rezoning to address compatibility with surrounding uses and to establish siting regulations. Supportive policies for wind energy are found in the Community Economic Development section of this Plan."*

The policies for Community Economic Development state that:

> *"The Township supports the development of wind energy facilities. Wind power is a renewable energy source which provides economic and environmental benefits to the municipality and its residents."*

In terms of Zoning By-law provisions, the following regulations apply to wind turbines:

> *"Notwithstanding these provisions windmills or wind generators shall be set back from any lot line a distance equal to 1 (one) times the height of the windmill or wind generator (height shall include rotor blades). In an agricultural zone, the setback from a side or rear lot line for windmills or wind generators may be reduced subject to an agreement with the abutting land owner registered on the title of the property containing the structure and on the title of the affected abutting property."*

The Planner indicated that similar Official Plan and Zoning By-law regulations were in the process of being prepared for the other municipalities in the County.

The planner also indicated that the Town of Goderich has passed an interim control by-law for wind generating devices within the City. This was enacted by Council as the City received a request for a commercial turbine within the City, which caught the City off guard. After receiving a legal opinion that the Zoning By-law could be interpreted both ways, Council decided to be safe and passed an interim control by-law to study wind turbines within the City.

In reviewing the wind energy policies from Huron County, it becomes clear that these wind energy policies are the least comprehensive among the case study municipalities when compared to the components identified in Section 3.2.1.

Does the planning framework support long term goals (i.e. Provincial and Federal objectives)?

The Huron County policies, specifically those from the Ashfield-Colborne-Wawanosh (ACW) Official Plan do not identify Provincial or Federal objectives that are being taken into consideration.

Does the planning framework take into account the public interest (provincial or global) as well as the local interests?

As mentioned above the ACW Official Plan does not directly identify any provincial objectives that the plan is taking into consideration, therefore it cannot be

stated that this planning framework directly takes into account the broader public interest. However, as discussed the policies are very general for the purpose of attracting wind energy development. In this context, it could be argued that the ACW wind energy policies indirectly support the broader public interest of creating renewable energy capacity.

In terms of taking into account the local interest, the ACW wind energy policies do not require a zoning by-law amendment and the current zoning by-law regulations with respect to wind turbines only deal with setbacks.

Does the planning framework allow for public participation?

In terms of allowing for public participation, the Huron County wind energy policies do not require an OPA or zoning by-law amendment to permit wind energy developments. Some of the other local municipalities also do not require Official Plan or Zoning by-law amendments to permit wind energy developments. In ACW, however, a zoning by-law amendment is required, with the only zoning restrictions applying to wind turbines are setback requirements. As discussed above, the County does solicit public input on site plan applications for wind energy developments, however, it should be noted that under the Ontario Planning Act, there are no opportunities for third party (i.e. general public) appeals to the Ontario Municipal Board. Based on this current approach there is less opportunity for public participation in wind energy developments in Huron County than in the other case study municipalities.

It should be noted that as of 2005 the County of Huron was working on revising its Official Plan policies and zoning by-law regarding wind energy developments.

Does the planning framework protect the natural heritage (i.e. landscape) of an area?

There are currently no requirements or policies pertaining to natural heritage protection for wind energy developments in Huron County or ACW.

Does the framework contain all or most of the components identified by Litman (i.e. moves from general concepts to increasingly specific plans, programs and tasks)?

As of 2005 there was not a specific planning framework for wind energy developments in Huron County, only general permissive policies. Therefore, most of the components of a good planning framework as identified by Litman are absent.

Again, it should be noted that the planner indicated that as of 2005, Huron County was looking at updating some of the wind energy planning polices, which may deal with some of these issues.

5.5.2 Issues Encountered

The Planner indicated that one of the issues that Huron County encountered was how to encourage wind energy within their existing planning framework. The Planner indicated that both Council and the public were supportive of wind energy development and as a result it was determined that they would take a liberal interpretation of their existing policies and permit wind energy developments without a need for an Official Plan or Zoning By-law amendment but would subject them to site plan control. In the absence of the public participation associated with a zoning by-law amendment, the County decided to invite the public to be involved in the site plan process. In the future they will combine the zone change and site plan processes.

As discussed, one of the unforeseen issues that arose in Huron County was the request to erect a wind turbine within the City. This turbine would have been on top of an existing industrial building in close proximity to a residential neighbourhood. To

address this, the Council imposed an interim control by-law in the City of Goderich so that the town could study the issue.

5.5.3 Barriers Encountered

In terms of barriers, the Planner felt that there were some significant non-planning policy related barriers, mainly dealing with the power generation hierarchy in the Province.

> *"The Province is doing a good job with the Request for Proposals[4] to kick start wind energy in Ontario. The problem is that this process only allows large industrial players to participate, because the province only looks at price. The move over time should be away from the large industrial electricity generation model to a community generation model, so that co-operatives can be formed which would encourage local wind energy generation."*

The biggest barrier to wind energy generation from a planning perspective is public education and public acceptance.

> *"There is a high degree of public acceptance to wind energy in Huron County, we were expecting a lot of opposition but none occurred. We had over 60 people show up in support of a wind energy proposal at one of our public meetings."*

In terms of reducing the barrier to wind energy, the planner stated that there are three issues that need to be resolved.

> *"The three things need to be addressed to fully remove the barriers to wind energy in the Province of Ontario are fixed pricing for renewable energy, streamlining the interconnection process for independent electricity generators and finally, a move towards as of right zoning for wind turbines."*

While the move to as of right zoning would remove a major hurdle for wind energy development, the planner indicated that it is still a little early for this in Ontario. The best

[4] See Section 2.4

way to plan for wind turbines is to identify areas in the OP where they would be permitted and then subject them to a zoning by-law amendment to ensure public participation and input.

5.5.4 Recommendations

In terms of recommendations for other municipalities developing wind energy policies, the Planner encouraged a permissive approach, meaning fewer regulations, in the Official Plan.

5.6 Grey County – Municipality of Grey Highlands

Grey County is located on the southern shores of Georgian Bay, approximately 150km north of Toronto. The County is comprised of the City of Owen Sound, the townships of Chatsworth, Georgian Bluffs, Southgate, West Grey and Grey Highlands, the Town of the Blue Highlands and the Town of Hanover. The population of Grey County is approximately 89,000 and the land area is approximately 4,500 km2 (Stats Canada, 2005). The predominant land use is agriculture, however there is a significant amount of recreational uses around the lakeshore.

5.6.1 Wind Energy Planning Framework

The planning framework for Grey County is the County Official Plan, which is the upper tier document; several lower tier municipalities also have their own Official Plans. The County Official Plan is currently silent on the topic of wind energy, however, the County has determined that an amendment to the County OP is not required provided the applicants can comply with the Environmental Assessment Act. The Planner also

indicated that the County was, as of April 2005, working on a wind energy green paper that would be the basis of a County Official Plan amendment for wind energy.

From a lower tier standpoint, two of the municipalities are taking steps to address wind energy in their Official Plans. The Municipality of Grey Highlands has been the most active, passing an interim control by-law on Wind Power generation (Appendix B) in June 2004 so that the municipality could study the impacts and planning issues surrounding wind energy. Since passing the interim control by-law, the municipality has hired a planning consultant to produce a report (Appendix B) on wind energy, including recommendations for Official Plan Amendments, Zoning By-law regulations and site plan requirements for wind turbines and wind farms. Some of the recommendations for the Official Plan amendment include:

- Update the current OP provisions related to power generation to reflect the difference between transmission and generation facilities (including privately operated facilities).

- Make specific reference to the threshold issue of visual impact and that the consideration of any project specific zoning by-law amendments is subject to this issue being addressed to the satisfaction of Council. This would be based on a review of the Wind Energy Facility (WEF) against visual impact policy on which all applications are weighed against. This policy would also contain the terms of reference for the landscape and visual impact assessment.

- Specific reference to wind energy and its benefits.

- Exclude WEFs from hazard lands, areas of provincially significant natural heritage features and settlement areas.

- Require a municipal review after the construction of the first WEF in the Municipality of Grey Highlands to assess the effectiveness of the planning approval framework, real versus perceived effects and the potential for cumulative impacts of multiple projects

- Apply site plan control to WEFs (Jones, 2005).

The current status of wind energy policy development in Grey County is similar to the situation in Huron County in that there is currently very little direction provided in the Official Plan or zoning by-law. In fact, there is even less direction in Grey County as the Official Plan is silent on the subject of wind energy. This fact may have contributed to the fact that there is now strong public opposition to a proposed wind energy development in the County. Some of the lower tier municipalities, however, have decided to address the issue of wind energy and have retained planning firms to assist them in developing a planning framework for wind energy.

As of 2005 the planning firm (Jones Consulting Group Ltd.) had produced a 6th discussion paper on developing a wind energy planning framework for the Municipality of Grey Highlands, entitled "*Preliminary Wind Energy Facility Planning Approval Framework*" (Appendix B). Since the process for developing a wind energy planning framework was in its latter stages, it was determined that the proposed policies contained in this draft report would be analyzed using the tests identified in Section 3.2.1 instead of the current wind energy planning framework in Grey County.

Does the planning framework support long term goals (i.e. Provincial and Federal objectives)?

In terms of supporting long term goals, the Municipality of Grey Highlands (MGH) draft wind energy facility framework does not identify any specific long term goals, but does state that wind energy facilities represent one of the most viable renewable energy generation resources. The report also acknowledges that if international, federal and provincial policies continue to mandate renewable energy, then wind energy facilities will have to be used and located in the most appropriate locations

(Jones, 2005). The report then goes on to state that the broad wind energy facility Official Plan policy being proposed would identify the local issues, address broader provincial and county policies, and identify the Planning Act mechanisms to approve wind energy facilities (Jones, 2005).

Does the planning framework take into account the public interest (provincial or global) as well as the local interests?

As mentioned above, the proposed planning framework does take into account the public interest by identifying that wind energy facilities are generators of renewable energy, which is of interest to the general public.

The proposed wind energy framework takes into account the local interest by proposing comprehensive requirements for visual impact assessments (See Appendix B). The proposed policies would also address the local interest by requiring all wind energy facilities to apply for project specific zoning by-law amendments to address the particular issues and the requirements for site plan approval (Jones, 2005).

Does the planning framework allow for public participation?

The MGH proposed wind energy planning framework does allow for public participation by requiring site specific zoning by-law amendments. The report on the proposed framework for MGH highlights the rational for site specific amendments by stating that they allow for ongoing knowledge, revised agency/political policies and continued public input to be considered during future applications. And also because of process as public attitude is already cautious and skeptical of wind energy facilities (Jones, 2005).

Does the planning framework protect the natural heritage (i.e. landscape) of an area?

The proposed wind energy planning framework for MGH does give significant consideration to the issue of visual impact. In fact, the background report on the proposed wind energy planning framework identifies this as perhaps the largest issue associated with wind energy developments based on a public survey conducted in the municipality. Based on this concern it is being recommended that a visual impact assessment be prepared and submitted with any proposed wind energy development and also be suggesting minimum criteria for mitigating the visual impacts of turbines and supporting infrastructure (Jones, 2005). These criteria can be found in the report contained in Appendix B.

Does the framework contain all or most of the components identified by Litman (i.e. moves from general concepts to increasingly specific plans, programs and tasks)?

The wind energy planning framework being proposed for MGH includes Official Plan policies, blanket zoning by-law regulations, the need for project specific zoning by-law amendments, site plan control and various background studies. This represents almost all of the components identified by Litman, with the only item missing being a guideline on how to approach the issue of visual impact.

5.6.2 Issues encountered

The Planner indicated that Grey County was forced to address wind energy planning policies as a result of proposed development. This proposal was for a 60-turbine wind farm, with 1.8 MW turbines. This proposal has been met with stiff public opposition from seasonal residents, who have formed their own citizen's coalition. The Planner indicated that the County was relying on the direction in the new Provincial Policy Statement, which promotes renewable energy and wind energy specifically. The

County is also interested in creating some security in the County's energy supply, as the Planner indicated that all of the electrical energy for Grey County came from somewhere else.

The Planner also indicated that Grey County's large seasonal resident population and the presence of the Niagara Escarpment are also significant issues for wind energy planning in Grey County.

5.6.3 Barriers Encountered

The largest barrier to wind energy in Grey County is the issue of visual impact. As discussed, there is a large group of seasonal property owners in Grey County who value the natural heritage and scenic landscape of the area and do not want the visual intrusion of wind turbines.

The planner also identified a lack of direction from the Province as a barrier to wind energy development.

> *"Municipalities are floundering because they don't have the resources to properly research wind energy issues. What would be beneficial would be a template for what policies should be along with best practices, something along the lines of what was done for pits and quarries and nutrient management."*

5.6.4 Recommendations

The planner recommended that municipalities take a proactive approach to developing wind energy planning policies so that both the public and developers are aware of what is required, before and application for a wind energy development is made. The planner also recommended that wind energy polices should have a mechanism for dealing with visual impacts.

"Rather than let developers provide a visual impact study, be proactive and determine if there are any heritage landscapes that should be protected and then set out criteria for judging the visual impacts."

5.7 Wind Energy Industry Stakeholders

In addition to municipal and provincial wind energy planners, wind energy stakeholders from the private sector and from the Province of Ontario were interviewed in order to gain a broad view of the status of wind energy planning policy development in Ontario. The wind energy stakeholders interviewed included representatives from the Ministry of Municipal Affairs and Housing small wind energy sales & installation, wind farm developers, wind turbine manufactures, private sector planners with experience in wind energy applications.

5.7.1 Barriers to wind energy development in Ontario

Being one of the groups on the front lines, private wind energy industry stakeholders have a unique view of the barriers currently facing wind energy development in Ontario. The wind energy industry stakeholders interviewed as part of this research had a relatively positive outlook on the future of wind energy development in Ontario. There were, however, a couple of barriers that were common amongst those interviewed.

5.7.1.1 - NIMBY & Visual Impact

One of the primary barriers identified by wind energy experts was NIMBY (not in my back yard) and specifically opposition from recreational property owners. This opposition is similar to the experiences described by the municipal planners and relates to the visual impacts of the wind turbines. Representatives from the wind turbine-manufacturing sector highlight that:

"Hostility (towards wind farms) is limited to people who are not residents, the resistance is spearheaded by out-of-towners. The seasonal residents feel like they bought and paid for their viewscape."

Faced with this strong opposition to wind farms, the wind energy industry stakeholders indicated that they felt that municipalities sometimes adopt reactionary policies on wind energy development. The private sector planner described that:

"Municipalities are being reactive to public opposition towards wind farms and the perceived loss of property values. The ones (municipalities) that didn't have policies are scrambling. They should be focusing on education and policy formulation up front."

In terms of addressing the issue of NIMBYism (specifically the visual impact) as a barrier, the wind energy industry stakeholders cited the need for clear wind energy planning policy development. Clear planning policies at the municipal level would address the issue of uncertainty for both wind energy developers and the general public by defining the rules to which wind energy must adhere to. The key stakeholders in the wind energy industry all agreed that some areas should be off limits to wind energy development, however, it is important to identify these areas up front and then protect them with clear Official Plan policies:

"designate sensitive areas and then prohibit turbines"

One issue being advanced by the wind energy industry is as of right zoning for wind farms, especially in agricultural zones. The rational behind this view is that the environmental benefits of wind energy outweigh the other planning concerns. Also, the industry believes that the nature of wind farming lends itself well to agricultural uses.

5.7.1.2 Lack of Planning Policy

An issue identified as a barrier to wind energy development in Ontario by private industry stakeholders is a lack of consistency in terms of planning policy and in some

cases a lack of policy. The informants interviewed indicated that this problem stems from the fact that each municipality addresses wind energy differently and, as a result, wind energy developers are forced to deal with different policies in each municipality in which they wish to locate. As one wind energy developer indicated;

"Our experiences have varied tremendously in different areas."

It should be noted, however, that wind energy industry stakeholders did not express a desire to exempt wind energy developments from planning regulations. Instead, the stakeholders interviewed indicated a desire for municipalities to "take the guesswork" out of making applications, by providing clear policies that:

- Indicate a general support for wind energy, preferably in the Official Plan.
- Provide a clear understanding of where wind energy developments will be considered and where they are prohibited.
- What type of supporting materials are required (i.e. reports) when making an application
- A clear understanding of what is to be expected of wind energy developments in terms of aesthetics, design, visual impacts, noise etc.

5.7.1.3 Noise Issues

One of the barriers to wind energy development identified by wind energy industry stakeholders was the issue of noise. This is interesting as the issue of noise was rarely touched upon by the public sector stakeholders and was somewhat dismissed as a non-issue in the literature that was reviewed. The wind turbine manufacturer representative indicated that:

"noise is the real restriction that drives the siting of wind turbines, viewscapes and visual impact are in the eye of the beholder."

The issue of noise was especially a concern with the smaller stand alone wind turbines, as these units tend to be located closer to residential areas. The private wind energy expert indicated that:

> *"Small turbines are simply too noisy for their size and it is not a good idea to locate these units close to people. They do, however, provide an essential service at remote sites."*

This concerns ties into the concerns raised by the Huron County Planner and reflects why they would want an interim control by-law to study the effects of small wind turbines near residential areas. To address noise concerns with stand alone wind turbines, some consideration should be given to restricting these types of turbines to industrial areas and prohibit them within a certain distance from residential areas.

5.7.1.4 Energy Regulation in Ontario

A reoccurring theme among wind energy industry stakeholders was the issue of the current energy regulation structure in Ontario. Of concern was the fact that the current RFP system employed by the Ontario Government requires developers to put up financial bonds that are too expensive for most of the smaller and medium sized wind energy developers. The result is that only a few larger wind energy developers are able to submit proposals to generate wind energy for the government of Ontario. A private wind energy expert interviewed also commented that a fixed price system, similar to those in Europe, for electricity generated by wind was also a necessity to see wind energy really take off in Canada. While they are valid barriers to wind energy development in Ontario, the current electricity price structure and electricity regulatory framework in Ontario are beyond the scope of this report. It should be noted, however, that the new Standard Offer Contracts may solve these concerns.

5.8 Conclusions

An analysis of the case study municipalities and interviews with the other wind energy stakeholders reveals that there are some interesting similarities and differences among them in terms of attitudes towards wind energy development, level of planning framework detail, barriers and issues encountered and public opposition. Additionally, it was determined that some of the wind energy policies were more comprehensive and in keeping with good planning principles, whereas others were more simplistic in nature, which is not in keeping with good planning principles.

5.8.1 Attitudes Towards Wind Energy

An interesting result of the case study review was the realization that there were some significant differences in the attitudes towards wind energy among the five municipalities. For the municipalities of Perth County, Huron County and Elgin County, the Councils of those municipalities wanted to encourage wind energy and either took a proactive approach to developing wind energy policies in the hopes of attracting wind energy development (Perth County & Elgin County), or took a permissive approach to allowing wind energy developments and included them under their existing Official Plan, without the need for an Official Plan or Zoning By-law Amendment.

In the case of County of Bruce and the proposed policies for the Municipality of Grey Highlands, the municipalities took a more cautious approach to wind energy developments and imposed a comprehensive set of Official Plan, Zoning By-law and site plan control guidelines to regulate their use. In the Municipality of Grey Highlands, an interim control by-law was passed to prohibit wind energy developments until the municipality could further study them.

There are some possible explanations for this difference in attitude towards wind energy, including recreational properties, predominant land use and natural heritage. The key informants in Perth County, Huron County and Elgin County all viewed wind energy as a form of agricultural use, where a resource was being "harvested". This view fit in well with the predominantly agricultural nature of these counties. Bruce and Grey Counties by comparison had a higher number of recreational property owners who came to the area for the views and amenities that the close proximity to Lake Huron and Georgian Bay provides. In these counties, there seemed to be more apprehension to wind energy development and the visual impact that it would have on these areas.

5.8.2 Level of Planning Framework Detail

As discussed there was a significant difference among the case study municipalities in terms of the level of planning framework detail for wind energy. Additionally, there were some differences in the policies when compared to good planning principles and frameworks in Section 3.2.1. as shown in Table 8.

Perth County and Huron County had Official Plan Policies that permitted wind energy in certain land use designations subject to a zoning by-law amendment. Elgin County developed a special zoning category for wind energy developments, complete with setbacks and other requirements. Developers must apply for this special zoning and meet all the requirements. Bruce County has the most detailed planning framework for wind energy developments, including guidelines for visual impact studies and other site plan level detail requirements. Grey County appears to be headed in a similar direction, given the planning report recommendations provided to the Municipality of Grey Highlands.

In terms of adhering to good planning principles, most of the municipalities contained the common elements identified in Section 3.2, in that the policies had regard for provincial objectives as well as local concerns, addressed the issue of visual impact and were working towards educating the public on the issues surrounding wind energy developments. Most of the case study municipalities had also developed a clear planning framework to address wind energy developments. With that being said, Bruce County and the proposed policies for the municipality of Grey Highlands stood out as having the most comprehensive wind energy planning policies, which were the most in keeping with the good planning principles and frameworks identified in Section 3.2 These policies were also the most similar to the Irish and Australian examples analyzed earlier. Huron County and the current policies in Grey County, by contrast, have a more "open" approach to wind energy development, and had not developed a clear comprehensive strategy for assessing development applications. However, it should be noted that this was done on purpose with the intent of attracting wind energy development.

Table 8 Comparison of Case Study Municipality Wind Energy Planning Frameworks

	Does the planning framework support long term goals (i.e. Provincial and Federal objectives)?	Does the planning framework take into account the public interest (provincial or global) as well as the local interests?	Does the planning framework allow for public participation?	Does the planning framework protect the natural heritage (i.e. landscape) of an area?	Does the framework contain all or most of the components identified by Litman (i.e. moves from general concepts to increasingly specific plans, programs and tasks)?
Perth County	Yes	Yes	Yes	Limited	Missing guidelines to address issue of visual impact and zoning regulations to implement OP

					policies
Elgin County	Yes	Yes	Yes	Adequate – requires visual impact studies as part of zoning amendment application	Missing guidelines to address issue of visual impact
County of Bruce	No – however policies were developed in 1997	Yes	Yes	Yes	Yes
Huron County	No	No	Varies – Some municipalities require a zoning by-law amendment others make site plans available for public review	No	Missing almost all of the components.
Grey County (proposed)	Yes	Yes	Yes	Yes	Yes

5.8.3 Barriers, Issues and Public Opposition

Analysis of the five case study municipalities revealed that there were some common issues and barriers shared by all the municipalities and some that were unique. The level of public opposition was also dramatically different.

Some of the biggest barriers to wind energy development included dealing with the visual impact of the turbines, lack of guidelines from the province and some non-planning related barriers such as access to the existing electricity grid.

The visual impact issue was more prominent in those municipalities that bordered the Great Lakes, and especially in those municipalities where the Niagara Escarpment passed through. Visual impact was not so much of an issue in the landlocked

municipality of Perth County and on the inland areas of Elgin and Huron County, where there was a large agricultural base. Those municipalities with visual impact concerns (Bruce and Grey Counties) were taking steps to address the issue by developing visual impact study guidelines as part of any wind turbine development proposal.

The issue of public opposition, which is increasing in Europe, was found to be a non-issue in the majority of the case study municipalities, in fact there was overwhelming public support for wind energy development in Perth, Huron and Elgin Counties. Public opposition was strongest in Grey County, where a citizen's coalition has formed in opposition to wind energy developments.

All key informants in the case study municipalities agreed that they would benefit from a wind energy policy manual from the provincial government. Draft Official Plan Policies, Sample Zoning By-laws and Site plan criteria were all touted as needed. Key informants from the Ministry of Municipal Affairs and Housing have indicated that the province is working on some wind energy guidelines, but that they have no intention of standardizing wind energy planning requirements across the province.

The result of this is that, at present, there are significantly different land use planning requirements for wind energy across the province and especially within the case study municipalities in southwestern Ontario.

6.0 – ANALYSIS

6.1 International Wind Energy Guidelines

After comparing the upper level government planning frameworks for wind energy from Australia and Ireland to what is currently available in Ontario and against the good planning principles and frameworks outlined in section 3.2, it becomes clear that there are some common themes within these documents that could be applied in Ontario to provide municipalities with some provincial guidance on assessing wind energy developments.

Wind Energy Planning Frameworks designed to compliment other Environmental or Energy Initiatives

One common element observed in both the Australia and Irish wind energy planning guidelines was the fact that the guidelines had been developed to complement and help implement other environmental or energy initiatives. In the Australia example, the planning guidelines are intended to help implement the State's renewable energy objectives and meet the Commonwealth's Mandatory Renewable Energy Target. The Australian guidelines have identified that planning should contribute to the provision of renewable energy by facilitating wind development in appropriate locations. In the Ireland example the wind energy guidelines are meant to work with a number of other relevant national guidelines including their National Climate Change Strategy and their Wind Energy Development Plan. In Ireland, they have determined that wind energy development and land use planning are intrinsically linked and, therefore, require all local planning authorities to prepare a wind energy development plan. But unlike the current

situation in Ontario, specific guidelines and mitigation measures are provided by the Irish government to help the local planning authorities in developing their plans.

As discussed in Section 3.2 a principle of good planning is that individual, short-term decisions should support strategic, long-term objectives. The Australian and Irish examples subscribe to this principle as one of the main objectives of their wind energy planning policies is to supplement their long-term energy and environmental initiatives. Additionally, the Australian and Irish examples demonstrate that community planning decision-making process should, first and foremost, be concerned with the long-term sustainability of communities, environment and economy.

Because wind energy development is very dependent on wind energy projects getting approved by local planning authorities, the Government of Ontario should consider the examples of Australia and Ireland in developing its overall renewable energy strategy. As discussed, much of the focus in Ontario has been on the economic side of promoting wind energy development and little has been done to provide a tool to help local municipalities implement these goals. In fact the OPA Supply Mix Report identified policy and regulatory constraints as an issue for the further development of renewable energy resources in Ontario and recommended that a review be under taken to explore the potential and alternatives for facilitating development (OPA, 2006). Additionally, a coordinated approach to wind energy may help to alleviate the current situation different branches of the government taking opposing views on wind energy development.

Provide Municipalities with a Common Framework for Assessing Wind Energy Projects

Another common element found in the Australian and Irish examples was the provision of a common set of rules for local planning authorities to follow when assessing wind energy development proposals. The advantage of this approach is that it ensures a "level playing field" for wind energy developers who may have projects in different jurisdictions. It also ensures that developers will know what the rules are upfront. As discussed in Section 3.2, the planning process usually progresses from the most general concepts to increasingly specific plans, programs and tasks. In the examples of a good planning framework in Section 3.2, the frameworks generally start with principles and visions, progress to goals, objectives and regulations and finally end with monitoring and evaluation. The comprehensive wind energy guidelines issued by Australia and Ireland fulfill these examples of good planning frameworks.

In the Australian example the guideline dictates that in processing applications, planning authorities shall have regard for issues such as Blade Glint & Shadow Flicker, Electromagnetic interference, Air Craft Safety, Flora and Fauna, Noise, Visual Amenity and Amenity of the Surrounding Area. The guideline goes further to suggest standards for municipalities to use and gives guidance on how to deal with these issues. The Irish document is extensive in providing planning authorities with direction and best management practices for sitting and design of wind energy developments. The document is also very thorough in that it gets down to the level of site plan design.

A standard planning framework for municipalities to follow is something that is not available from the Ontario government, but they are encouraging municipalities to develop their own frameworks. Some municipalities have gone ahead and developed

their own policies independently. It was found, however, that this individual approach has resulted in different standards across the province, leading to some uncertainty for developers.

Provide Direction on Addressing the Issue of Visual Impact

One of the most important aspects of the Australian and Irish examples is that they provide a method to help municipalities address the planning issue of the visual impact of wind turbines, which is a very common and very subjective argument against wind energy projects. As shown in the examples of good planning principles from Section 3.2 the issue of protection of the natural heritage of an area is extremely important. This ties in directly to the need to address the issue of visual impact when developing wind energy planning policies.

The Australian example sets out what local municipalities are to review when assessing the visual impact of a wind project, including the visibility of the development and how far away it can be viewed. A Significant Landscape Overlay is also provided in the document to determine where sensitive landscapes are. The Irish example provides different options for turbine layout, depending on the type of landscape the project is located in.

In Ontario, there is not a common approach for addressing the visual impacts of wind energy developments, even though this is probably the most controversial aspect of a wind development. Some government departments, however, have taken their own position on the visual impact of wind farms (i.e. Niagara Escarpment Commission) and banned their development in certain areas. The fact that some Ontario Ministries are

pushing for wind energy development, while others are prohibiting it is an indication that a province wide land use-planning framework for wind energy developments is required.

6.1.1 Top Down versus Bottom Up Approach to Wind Energy Policy Development

It is important to identify that this study has reviewed two different approaches to developing wind energy planning frameworks. In chapter three, the Australian and Irish wind energy planning frameworks provided examples of a "top down" planning approach were the state or federal governments developed a wind energy planning framework that was to be implemented at the local level. In the southwestern Ontario case study municipalities, examples were given of "bottom up" planning approach where the policy development was driven by local issues, thereby creating a planning policy that was unique to the municipality. The question with respect to this research is which approach is better suited for the development of wind energy planning frameworks in Ontario?

In this case it can be determined that the best solution is a combination of the two approaches. The interviews with the planners and the key informants yielded that there was a common sentiment that sample guidance documents from the province would be very beneficial to give municipalities a starting point for developing wind energy planning frameworks. It was identified in the interviews that most planners felt that they did not have the background information needed to develop wind energy planning policies and in most cases had to start from scratch doing their own research, or they borrowed heavily from other municipalities that had already developed policies. Representatives from the wind energy industry identified that a lack of a common

approach to wind energy among Ontario municipalities was a barrier to wind energy development.

On the other hand, it was observed during the interviews that there was a difference among the case study municipality in terms of the amount of public opposition encountered and in terms of the importance of the issue of visual impact. In these cases it can be argued that a "bottom up" planning approach would be more beneficial in order to tailor the wind energy policies to the specific needs and values of the municipality. For example in the case of Perth County and Huron County were visual impact was not identified as a major issue and there was a large amount of public support for wind energy, less emphasis could be placed on the issue of visual impact. In Grey County, however, were there is a large seasonal population and a greater concern regarding the visual impact of the turbines, greater emphasis could be placed on identifying areas where wind turbines would be prohibited and providing specific requirements on addressing the issue of visual impact.

In summary, the wind energy planning process in Ontario would benefit the most from a combination of "top down" and "bottom up" planning approaches. This could be accomplished by having the provincial government provide guidelines and sample Official Plan policies and Zoning By-law regulations for municipalities to use as resource. This would provide municipalities with a starting point and would help achieve a common wind energy planning approach across the province. In terms of a "bottom up" approach, municipalities should be free to tailor their wind energy policies to their specific needs to address local issues.

6.2 Current State of Wind Energy Planning Frameworks in Ontario

The current state of wind energy planning policy development in the five case study municipalities in southwestern Ontario is very broad both in terms of policy development and the scope of the policies. As seen in Section 5.8 and specifically Table 8, some municipalities have little or no wind energy policies, while others have had policies for close to 10 years. With respect to those municipalities with wind energy planning policies, they can range from very simple policies (Huron County) to very comprehensive policies (County of Bruce).

After evaluating the case study wind energy planning policies against some common examples of good planning principles and planning frameworks, it became clear that there were wide variations in this area also.

By contrast, Australia and Ireland have well-established planning policies for wind energy, which provides a solid planning framework for dealing with the land use.

6.3 Barriers to Wind Energy Development

One of the major objectives of this report was to determine if the barriers identified in the literature were in fact barriers to wind energy planning policy development in Ontario and, if so, how were Ontario municipalities addressing or overcoming these barriers in developing their wind energy policies. Key informants revealed that many of the perceived barriers to wind energy development were in fact non-issues and for the most part, there is significant support for wind energy development in Ontario. In fact, the key informant interviews indicated that farmers in southwestern

Ontario are interested in wind farms and especially the opportunity to generate revenue from an additional crop. A review of newspaper articles from southwestern Ontario supported this view and also indicated that the idea of community owned co-operative wind farms is also generating interest in southwestern Ontario (Burtt, 2004; O'Conner 2004; O'Conner, 2005; Shypula, 2005; Waugh, 2004).

Also, the attraction of wind energy was not only limited to large developers, but also to some individual homeowners in the case study areas. In reviewing some of the wind energy newspaper articles (See Appendix C) it was determined that small wind systems are increasing in popularity in the case study municipalities as backup power options and co-generation systems for private homeowners (O'Conner, 2005; Pettapiece, 2002).

Additionally, some electricity providers are now providing customers with the option of purchasing "green energy" which is produced by wind power (Shypula, 2004; Tracey, 2003).

The issues of bird kills, electromagnetic interference, shadow flicker, blade throw and tower failure have not been issues to this point in wind energy policy development in Ontario. In fact, some key informants indicate that these issues are merely "window dressing" for the real land use planning issues surrounding wind energy, namely visual impact, decreases in property value and to a lesser extent, noise.

The biggest barrier to wind energy planning policy development in southern Ontario is the issue of visual impact and by extension, property value reduction. This is such a large issue because it cannot be quantified and is a matter of opinion. This issue is given credence by the position of the Niagara Escarpment Commission, to not permit

wind farms on the escarpment and their recommendation to not allow wind turbines where they obscure the view of the escarpment. This issue was confirmed during a review of newspaper articles, which highlighted that wind energy projects are running into opposition in Grey County, primarily due to the visual impacts of the turbines. This opposition is very evident in Europe; however, opposition to wind farms is becoming evident in Canadian and Ontario newspapers as well, specifically around the Niagara Escarpment (Canadian Press, 2003; Martin, 2004, Strauss, 2004; Vidal, 2004).

Interestingly, in the case study municipalities, very little public opposition was observed during the wind energy planning process. In fact, the municipalities of Perth, Huron and Elgin Counties all experienced a large amount of public support for wind energy development, especially from the farming community where the turbines were proposed to be located. It was also discovered that the only areas where there was public opposition to wind energy development were in cases where wind farms are being proposed near recreational properties, as in the Bruce County and Grey County examples. In these cases, there was a significant amount of opposition from seasonal residents who were objecting to the visual appearance of the turbines on the landscape.

The wind energy industry stakeholders also reaffirmed the fact that visual impact was one of the biggest issues surrounding wind energy development in Ontario, especially near the Great Lakes. This corroborates with the information uncovered in the literature review, where visual impact is one of the biggest planning issues facing wind energy development in Europe and Australia. It should be noted, however, that these areas have developed comprehensive guidelines and standards for visual impact, something that is lacking in a Canadian and specifically an Ontario context.

The key informant interviews and a review of newspaper articles uncovered some non land use planning related barriers to wind energy development in Ontario, primarily a lack of public education surrounding wind energy and access to the Ontario power grid. This is something that was not found in the European examples, where public awareness surrounding wind energy is much broader and where fixed price structures are in place for wind energy.

6.3.1 Implications of the Move Towards Standard Offer Contracts

As identified in Section 2.0, the province of Ontario has not only provided financial incentives in the form of Requests for Proposals to stimulate the creation of large renewable energy projects, but has also created the Standard Offer Contract program to try and stimulate smaller wind energy developments. This has land use planning implications as it could result in more smaller wind energy developments, involving one or two turbines, or smaller wind turbines, whereas many of the wind energy planning frameworks discussed in this report were designed with larger multiple turbine projects in mind. The impacts of smaller developments are that there could be more of them and in the case of smaller turbines; they could be located closer to or in residential areas. This is significant as the impacts of wind turbines are the same be it one or multiple units. Municipalities should be ensure that their policies are applicable in cases were there is one turbine.

6.4 Overcoming the Barriers

Using the case study municipalities, it becomes clear that the five southwestern Ontario case study municipalities are using a variety of techniques to address and overcome the barriers to wind energy development.

In the case of Huron County, taking a permissive approach to wind energy development and accepting it under current electricity generation policies in the County Official Plan and municipal Zoning By-laws overcame the issue of a lack of wind energy policies. This allowed the municipality to encourage wind energy development without putting the entire development on hold while policies were developed, and not allowing the process to be subjected to appeals to the Ontario Municipal Board. The County has continued this approach as it works to develop better and more comprehensive planning policies for wind energy. This is not to say that Huron County was totally permissive of wind energy development, as an interim control by-law was enacted in the Town of Goderich to prevent a wind turbine from being erected in a residential area.

In the County of Bruce and Grey County, where there is more public opposition to wind energy developments, these municipalities are overcoming the barrier of little provincial policy guidance and visual impact concerns by developing their own comprehensive visual impact study requirements and other requirements that have to be met as part of wind energy approvals. In the case of Grey Highlands, an interim control by-law was used to hold off any wind energy development application until the municipality had a chance to develop its own wind energy planning framework and submission requirements.

In summary, municipalities in southwestern Ontario are being inventive when it comes to wind energy policy development and developing policies that are suited to their specific needs and the existing climate towards wind energy development in their respective municipalities. As discussed, those municipalities where wind energy is widely supportive have taken a more permissive approach in their policy development, whereas those municipalities that have to protect natural heritage areas and have a higher seasonal property owner population have taken a more conservative approach and have developed very comprehensive policies.

Key informants from the Government of Ontario indicated that as of 2005 the province is working on a set of recommendations for municipalities when dealing with wind energy. They stressed, however, that these were not mandatory and that the province maintained that wind energy was a land use issue that was going to be left up to the municipalities.

6.4.1 Multiple Approaches to Overcoming Wind Energy Development Barriers

Based on the information gained from the literature review, case study municipality interviews and interviews with key wind energy industry stakeholders it was determined that the barriers to wind energy development in Ontario were not solely limited to a lack of wind energy policies or a lack of guidance from the Ontario government to help municipalities to develop wind energy policies. The information also identified that additional barriers to wind energy development in Ontario included the need for financial incentives to make wind energy commercial viable in comparison to other forms of electricity generation and also difficulties in accessing the electricity infrastructure in some areas (i.e. County of Bruce).

While it was mentioned earlier that these latter two issues were beyond the scope of this research, it is important to identify that these other two issues are equally important to the development of wind energy generating capacity in Ontario. The development of wind energy planning frameworks is just one of the pieces to solving the wind energy puzzle.

6.5 Policies Appropriate for Wider Adoption

Given the lack of guidance in terms of a land use planning framework from the provincial government, one of the objectives of this research was to determine how Ontario municipalities developed wind energy policies and whether or not these policies were appropriate for wider adoption in Ontario, based on their conformity with the examples of good planning principles outlined in Section 3.2 and 3.2.1 and through the issues identified by the planners in the five case study municipalities.

One of interesting aspects of the case studies was the history of how municipalities were developing their wind energy policies. Key informants indicated that the Ontario Municipalities were not in fact using European examples, but were developing their own policies from scratch. Many borrowed heavily from the County of Bruce wind energy policies that were developed in the late 1990s and were one of the first sets of wind energy policies in Ontario. Interestingly, as other municipalities develop their own policies, some are choosing to go with more lenient requirements as they felt those in the County of Bruce were too strict (i.e. Perth County & Huron County). It should be noted, however, that the recent wind energy policy report being

completed for the Municipality of Grey Highlands borrows heavily on the Australian and European policy examples analyzed earlier in the report.

In terms of selecting policies that could be adopted for wider use in the province, there are some common themes that could be used in other municipalities, which directly relate back to the common elements found in the Irish and Australian examples and also conform to the examples of "good planning principles".

6.5.1 Designating areas where wind energy is permitted

One common theme encountered in the key informant interviews was that wind energy policies should establish a clear direction for wind energy for both wind energy developers and the public. Statements from the wind energy industry stakeholders backed up this sentiment. The case study municipalities are addressing this by designating areas in the Official Plan where wind energy is permitted. This eliminates the need for wind energy developers to amend the Official Plan and sends a clear message that wind energy is supported in the municipality. Municipalities should conduct their own internal review to determine where wind energy facilities can be supported and then permit them in those areas in the Official Plan. In the case study municipalities, these areas were typically agricultural and rural areas where the wind energy uses fitted in with the other land uses and did not impact residential areas. The newspaper articles reviewed also provided a clear indication that farmers were very interested in placing wind turbines on their properties as an additional revenue source. In more urban municipalities, acceptable wind energy sites areas may be industrial areas,

where the nature of wind energy production in similar to the existing manufacturing and industrial uses.

As discussed in Section 3.0, recent changes to the Provincial Policy Statement in Ontario have authorized the location of alternative energy sources settlement areas, rural areas and prime agricultural areas. Municipalities should now act on this change and designate specific areas for wind energy development.

In terms of good planning principles, the pre-designation of areas for wind energy in the Official Plan forces municipalities to consider wind energy in the context of provincial energy goals and objectives and also to evaluate them in terms of the other goals and policies in the Official Plan. This approach also ensures that there is an opportunity for public involvement and education on the issue of wind energy.

6.5.2 Addressing the issue of visual impact

An important and recurring theme was the issue of visual impact of the wind energy facilities. Since this issue was identified in the literature review, newspaper articles and in almost every key informant interview, it can be considered as the biggest planning related barrier to wind energy development in Ontario. The issue of protecting the natural heritage of an area was also identified as being a good planning principle in the material reviewed in Section 3.2. As seen by recent policies from the Niagara Escarpment Commission, the issue of visual impact is at direct odds with the need for renewable energy generation in Ontario. The interesting thing about visual impact that was noted in the key informant interviews and newspaper articles is that it is a big issue in municipalities where there are natural heritage views and vistas and recreational areas

(i.e. County of Bruce & Grey County), and less of an issue in municipalities where there are no such heritage views, or where there is public support for wind energy (i.e. Perth County & Huron County).

Therefore, it would be advisable for municipalities to determine if in fact there are any areas that they want to protect from the visual impacts of wind energy development. This could be accomplished through an internal review and through an open house process to gauge public opinion. If there are areas that should be protected, then the municipality should investigate developing visual impact study criteria that would have to be addressed as part of any wind energy development application. From this perspective, the municipalities could review the criteria that have already been developed for the County of Bruce and that have been recommended in the Municipality of Grey Highlands. If it is determined that there are no areas that should be protected from visual impact, then the municipality does not need to address this issue.

6.6 Provincial Direction

One of the focal points of this thesis was the fact that municipalities in Ontario have been pretty much left on their own to develop land use planning policies for wind energy, even though the creation of environmentally friendly renewable energy sources is a provincial interest. Some recent direction has come in the form of an updated provincial policy statement in March of 2005, which directs that alternative energy systems shall be permitted in settlement areas and agricultural areas. This direction does not go far enough to address the issues that are frequently encountered by planners trying to deal with wind energy. The municipal planners interviewed all agreed that it would

help them if the province could provide some direction in terms of recommended planning policy for wind energy.

6.6.1 Sample Official Plan Policies

In a number of interviews, municipal planners expressed an interest in the province developing sample Official Plan policies for wind energy. This would greatly assist planners who are attempting to develop policies from scratch, and would help to address the inconsistency that arises from each municipality "doing their own thing" when it comes to laying the planning groundwork for wind energy development. By developing sample Official Plan policies, the province could provide direction on how wind energy developments should proceed and could help implement the alternative energy directives of the new Provincial Policy Statement. The following issues have been identified in the analysis of the Australian and Irish wind planning frameworks and in the case study municipality frameworks as representative of good planning principles when addressing wind energy developments. Therefore, should the province decide to develop a sample wind energy Official Plan policy, the following issues should be taken into consideration:

- Allowing wind farms in certain areas (i.e. agricultural areas, industrial areas), subject to a required separation distance from residential areas
- Addressing the issue of visual impact. Some options for achieving this would be to designate certain areas that the municipality wanted protected from wind farms as "heritage viewscapes", and then prohibit turbines in those areas.
- Providing a detailed description of what types of information will be required as part of any zone change application for a wind farm.
- Indicate that small wind turbines will not be permitted in residential areas due to noise concerns.

6.6.2 Sample Zoning By-law Regulations

A number of municipal planners interviewed also expressed an interest in the province providing sample zoning by-law regulations for wind farms and small-scale wind turbines. The intent of providing these sample zoning by-law regulations would be to achieve some type of standard set of regulations when dealing with the site-specific details of wind farms and turbines. In considering the Official Plan policy issues addressed above, it is recommended that these sample zoning by-law regulations would contain:

- Setbacks for wind turbines from property lines and other turbines
- Number of turbines per property or per hectare
- Height restrictions

6.6.3 Design Guidelines for Wind Farms

As discussed, the Australians and Europeans are much further ahead in developing guidelines for wind energy developments. The Ontario government should investigate producing province wide guidelines for wind energy projects, similar to the ones from Australia and Ireland, which were described in Section 3.0 of the report. As discussed any design guidelines from the province should specifically focus on the three areas out lined below:

Wind Energy Planning Frameworks designed to compliment other Environmental or Energy Initiatives

As seen in the Australian and Irish wind energy planning guidelines, they were designed to compliment other alternative energy initiatives. Additionally, we have seen that the Province of Ontario has been actively promoting the development of alternative energy sources and specifically wind energy in the form of the Renewable Energy RFPs

and the Standard Offer Contracts. Developing wind energy land use planning guidelines to assist in the implementation of these renewable energy initiatives would assist with the regulatory framework that was identified as an issue in the OPA Supply Mix Report. A coordinated approach would also be beneficial to address the current issue with the Niagara Escarpment Commission restricting wind energy developments near the escarpment, the Ministry of Energy encouraging development and the Ministry of Municipal Affairs permitting wind energy developments in a wide range of areas with the new Provincial Policy Statement.

Provide Municipalities with a Common Framework for Assessing Wind Energy Projects

As discussed, one of the common elements of the Australian and Irish wind energy planning guidelines was the fact that they provided a common methodology for municipalities to process and approve wind energy planning applications. This removes some of the guesswork for wind energy developers, and the public, as every player is aware upfront of what the rules and requirements are. The need for a common set of guidelines across all Ontario was an issue that was brought up by key players of the wind energy industry during the interview process. A common set of guidelines may also help address the regulatory barrier that was identified in the OPA Supply Mix Report. A common comprehensive wind energy-planning framework would also be consistent with the "good planning principles" and "planning frameworks" identified earlier.

Provide Direction on Addressing the Issue of Visual Impact

Possibly the biggest advantage of the Province developing land use planning guidelines for wind energy would be to address the issue of assessing the visual impact of wind energy developments and to provide some direction for mitigating this issue.

Throughout the research, the issue of visual impact continued to appear as one of the predominant land use planning issues associated with wind energy. This was evident in the literature from the European experiences, from the policies adopted by the Niagara Escarpment Commission, from the newspaper articles and from the key informant interviews. Additionally, the need to protect the natural heritage of an area was identified as a "good planning principle". Providing a fair and comprehensive method of assessing and mitigating the issue of visual impact would be a major step towards solving one of the major land use stumbling blocks associated with wind energy development.

6.7 Recommended Steps for Wind Energy Policy Development in Stratford

One of the secondary goals of this thesis was to review the current stated of wind energy planning policy development in Ontario, specifically southwestern Ontario, and based on that review recommend a policy direction for wind energy in the City of Stratford. These recommendations are further explored in Section 7.0 of this report.

7.0 - CITY OF STRATFORD & WIND ENERGY POLICY DEVELOPMENT

7.1 Background and Current Policy and Land-Use Planning Framework

Stratford is a community of 29,676 (Statistics Canada, 2005), located in southwestern Ontario, approximately 160km west of the City of Toronto. Situated within the County of Perth, Stratford is situated in the centre of a rich, productive agricultural area. It is also home to the "Stratford Festival" and has a reputation as the North American home of Shakespearean Theatre (City of Stratford, 1993). Stratford is also a significant manufacturing centre and a regional service centre. In terms of a land use-planning framework, development in the City is governened by the City of Stratford Official Plan 1993-2013 and City of Stratford Zoning By-law 201-2000, neither of which addresses the issue of wind energy. The City also has adopted various other reports, some of which encourage sources of renewable energy and wind energy in particular.

7.1.1 Wind Energy and the City of Stratford Official Plan

Despite being a crucial land use planning document, the City of Stratford Official Plan is deficient in terms of offering direction on wind energy planning. It offers a basic approach to electric power supply and other utilities and also broadly covers environmental protection and energy conservation. These policies, while beneficial, focus mostly on energy conservation and do not directly consider wind power generation. Section 3 of the Official Plan, entitled "Environmental Protection" contains the follow provisions that could be applied to wind energy generation:

> *"to improve the quality of the urban environment and to protect its natural heritage;*
> *to achieve a high standard of environmental excellence in the use, development and redevelopment of land and the provisions of public services and facilities."* (City of Stratford, 1993)

Section 13.5 of the Official Plan deals with electric power supply and other utilities. The goals and policies for electric power supply in the Official plan include:

> *"i) To provide an adequate, cost efficient supply of electric power to all developed areas of the City.*
>
> *ii) To facilitate the provision of all public utilities and similar services necessary to meet the needs of the community."* (City of Stratford, 1993)

The Official Plan also sets out the following policies for electrical power supply and other utilities:

> **"***System Development*
> *The development of electric power facilities shall occur in an orderly and cost efficient manner to facilitate the efficient and reliable provision of electric power capable of meeting the existing needs and future needs of the community.*
>
> *Location of Facilities*
> *Electric power facilities as well as facilities of a similar nature (e.g. natural gas, telephone, television cable) are permitted in all land use designations of this Plan.*
>
> *Expansion and Environmental Impact*
> *In the provision of electric power facilities and other public utilities, regard shall be had to the policies of Section 3 of this Plan.*
>
> *Compatibility with Neighbouring Uses*
> *Where the provision of public utilities involve the establishment of buildings, structures or other facilities which may be visually incompatible with neighbouring uses, efforts shall be expected in the locating and design of these facilities to minimize any adverse visual impact as is practicably possible. Buffering measures will be required as a condition of any approval required by the City"* (City of Stratford, 1993).

7.1.2 Roundtable on the Environment for the 21st Century Report Charting Stratford's Environmental Future

In 1993, a citizen group presented Stratford City Council with the Roundtable for the Environment Report, which became the City's guiding document for environmental decision-making.

In 2004, a new citizen group, established by Stratford City Council, completed a report card on the City's environmental accomplishments since 1993 and prepared a new environmental plan, which was adopted by Council in 2005. This report identified the following goals

- Reduce energy use within the City of Stratford
- Switch to locally generated sources of energy and generate 10% of the municipality's energy needs locally within 10 years. (City of Stratford, 2004).

And it also identified the following actions for the Municipality to follow:

- Streamline permit process for environmentally friendly developments and construction
- Buy green produced electricity for municipal operations
- Move to smaller scale systems such as wind, photovoltaic panels, micro-hydro generation, methane, industrial waste heat, ground source/geo-thermal heating and cooling, mini-turbines within storm and waste systems.
- Direct 1-2% of Festival Hydro's profit towards the production of green energy in the area (City of Stratford, 2004).

7.1.3 Recommendations for Wind Energy Planning Framework in Stratford.

Between the Official Plan and the Roundtable Report, there is a rudimentary framework for wind energy planning policy. However, there is significant room for improvement, based on the literature review, case study analysis, and key informant interviews.

7.1.3.1 Develop Official Plan Policies that Specifically Address Wind Energy

Key informants in the case study municipalities indicated that general official plan policies that support wind energy are instrumental in attracting and promoting wind energy development. The current City of Stratford Official Plan policies are too ambiguous and leave the door open to interpretation as to whether or not an Official Plan amendment is required.

7.1.3.2 Compatibility with Perth County Official Plan Policies

Given the fact that wind farms are composed of multiple turbines spread over a large area, it is unlikely that the City of Stratford will ever have a wind farm located entirely within its boundaries. The most likely scenario for a wind farm in Stratford would be that a few individual turbines forming part of a larger wind farm would be located within the City boundaries. Alternatively, there is the potential for "stand alone" turbines used for electricity generation at industrial sites. To facilitate these scenarios, it is recommended that any wind energy policies developed for Stratford be compatible with the wind energy policies in Perth County.

7.1.3.3 Location

Currently under Section 13.5.2 of the Official Plan, electric power facilities are permitted in all land use designations. This policy is too broad and was not developed with wind turbines in mind. Key informants have indicated that Official Plan Policies for wind energy should give clear direction as to where wind energy facilities are permitted. In the case study municipalities, these locations were almost exclusively rural or agricultural areas, so that they would have the least amount of impact on built up

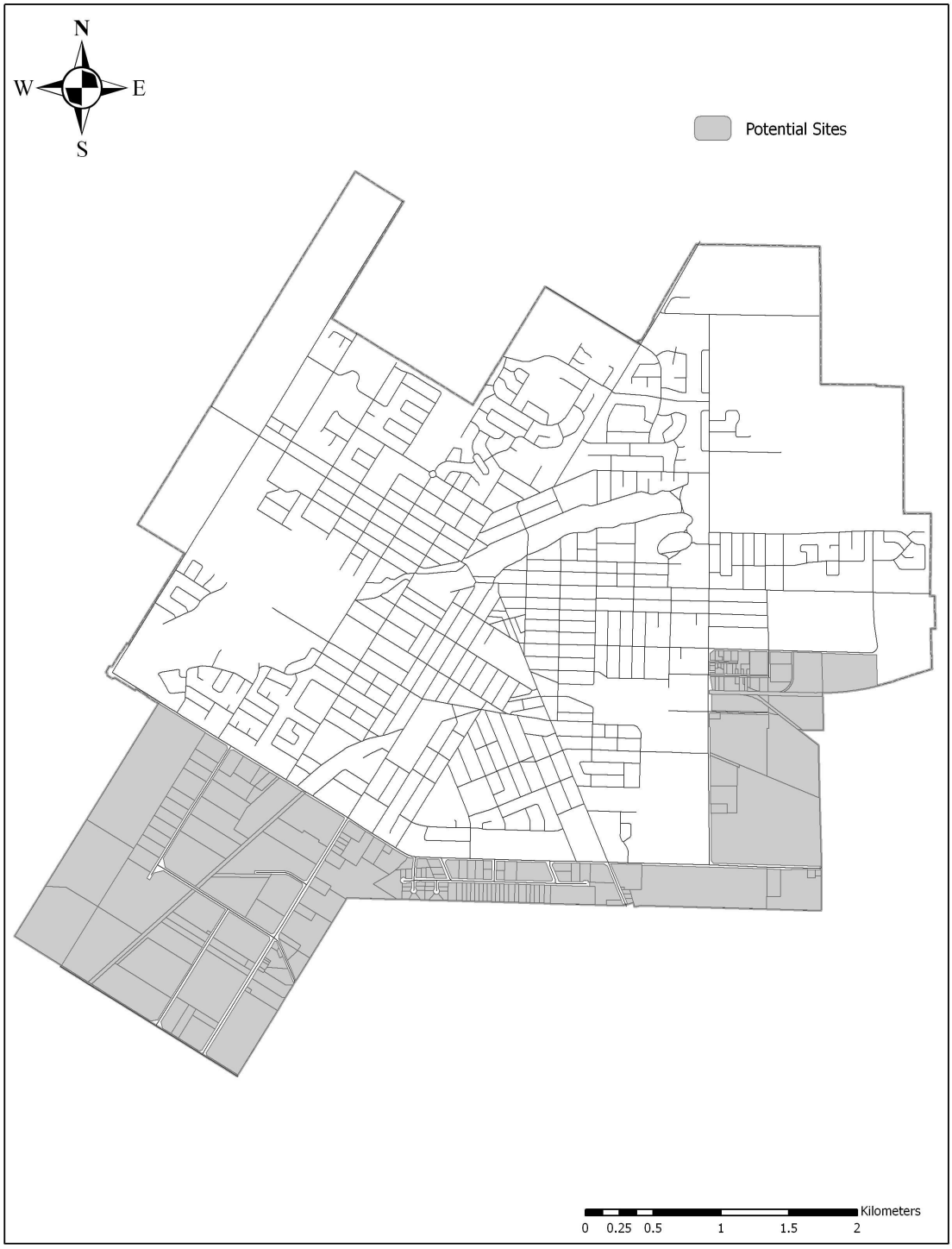
residential areas and because wind energy was seen as being compatible with agricultural practices.

In Stratford there are no agricultural areas, however, there are exclusively industrial areas in the south and east ends of the City. Given the nature of the existing uses, the industrial areas would be compatible with wind energy production and wind turbines. To ensure that wind turbines were adequately buffered from residential uses, it is recommended that only those industrial areas south of Lorne Avenue and East of Romeo Street be considered (See Figure 4).

The City of Stratford Official plan is scheduled to be updated in 2007 (Dembek, 2005). Wind energy policies could be added during this time as part of a larger review of the Official Plan, or they could be added as a separate amendment to the current Official Plan. It is recommended that wind energy policies be added as part of a separate amendment for the following reasons:

1) By proceeding with an amendment at this time, wind energy policies can be added in the near future without having to wait for 2007. This will ensure that Stratford is prepared from a policy perspective should wind energy developers look to establish in Stratford.
2) Should local industries want to erect a single turbine for private energy production, the policies will be in place.
3) The biggest reason to proceed with a separate amendment is so that there can be a wind energy public education process. One of the themes identified indicated that there was a need in Ontario for public education on wind energy. A separate Official Plan amendment process would allow the City an opportunity to have the City's Council and population focused on the issue.

Figure 4 – Potential Areas for Wind Energy Development in Stratford – Source Author



7.1.3.4 Need for Zoning By-law Amendment

One of the themes identified was that the eventual progression of wind energy planning policy in Ontario may be towards as of right zoning[5] for wind turbines. However, it has been determined that wind turbines are still a new and emerging land use in Ontario and the zoning by-law amendment process allows for much needed public education and input.

Since there are no existing wind turbines in close proximity to the City of Stratford, the residents or City planning staff have not had any experience in dealing with them. Therefore, it is recommended that any new Official Plan Policy for wind energy subject turbines to a zoning by-law amendment process.

In terms of what to require as part of a rezoning application for a wind turbine, the City may wish to review the current requirements from Bruce County, and the Zoning By-law provisions from the Municipality of Bayham.

7.1.4. Wind Energy Co-operatives

While beyond the scope of this thesis, a reoccurring theme among key wind energy stakeholders was the need for co-operatively owned wind energy developments. The benefits of this type of wind energy generation was the sense of community ownership among the local population, this in turn creates a better sense of acceptance for the turbines.

Additionally, the co-operatives allow for the local creation and use of renewable energy. One of the recommendations of the Roundtable report was to invest 1 to 2% of Festival Hydro's profits into the production of renewable energy. While the City of

[5] Meaning that wind turbines are a permitted use and not subject to an Official Plan or Zoning By-law amendment. This would remove the need for a public process under the Planning Act.

Stratford may not have a land base large enough for its own wind farm, Festival Hydro could invest in wind energy co-operative in the area.

8.0 - CONCLUSIONS AND RECOMMENDATIONS

Based on the literature review, key informant interviews and case study review, it can be determined that wind energy policy development, while in its infancy in Ontario, will only increase in importance as the province and local municipalities strive for cleaner, renewable energy sources. Learning from the literature review, key informant interviews, case studies and newspaper articles, the following key conclusions and recommendations are made:

8.1 Key Conclusions

1. There are several unsubstantiated concerns with respect to wind energy, including bird kills, safety, and real estate depreciation and to a lesser extent, noise. The main issues and barriers surrounding wind energy planning policy development in Ontario are visual impact, lack of education and a lack of a municipal planning framework. A major non-planning barrier to wind energy development in Ontario is the state of the existing transmission infrastructure.

2. There are five criteria that can be applied to determine whether a wind energy planning framework conforms to "good planning principles". These criteria are:

    - Does the planning framework support long term goals (i.e. Provincial and Federal objectives)?
    - Does the planning framework take into account the public interest (provincial or global) as well as the local interests?
    - Does the planning framework allow for public participation?
    - Does the planning framework protect the natural heritage (i.e. landscape) of an area?

- Does the framework contain all or most of the components identified by Litman (2006) (i.e. moves from general concepts to increasingly specific plans, programs and tasks)?

3. There are examples of federal and/or state wind energy planning guidelines available from Australia and Ireland. These wind energy planning frameworks share three common elements that would be appropriate for adoption by the Ontario provincial government. These components are:

    - They are designed to compliment other environmental or energy initiatives.
    - They provide municipalities with a common framework for assessing wind energy projects.
    - They provide direction on addressing the issue of visual impact

4. With the exception of one municipality, the public reaction to wind energy proposals in Southwestern Ontario has been mostly positive. The conflicts that have arisen have been in instances where wind turbines are proposed in the vicinity of recreational properties.

5. In terms of a wind energy planning policy framework, southwestern Ontario municipalities have for the most part opted for General Official Plan policies supporting wind energy development in principle and directing its development to certain land use designations subject to a zoning by-law amendment. In some cases, small wind energy generation is permitted as of right. The planning frameworks in the case studies for the most part conform to the good planning

principles identified, however, Bruce County's policies stood out as being the most comprehensive and in keeping with the good planning principles identified, whereas Huron County was on the other end of the planning framework spectrum with very general policies.

6. There are some common elements found among the case study municipalities that would be appropriate for wider adoption in Ontario. These elements are:
    - Designating areas in the Official Plan where wind energy is permitted
    - Addressing the issue of visual impact

7. There are documents that the Provincial Government could develop to aid local Ontario municipalities in developing wind energy planning policies. These documents are:
    - Sample Official Plan policies
    - Sample Zoning By-law regulations
    - Design guidelines for wind farms

8. The City of Stratford Official Plan and Zoning By-law are inadequate in terms of policy and regulations for wind energy. Given its key geographic location within Perth County, the City should update its Official Plan and Zoning By-law to be complementary to the County Policies.

8.2 Key Recommendations

1. The Ontario Provincial Government should follow up on the Wind Energy Information Sheet and the recent Provincial Policy Statement with a comprehensive land use-planning framework for wind energy developments. This framework should contain sample Official Plan Policies, Zoning By-law Regulations and guidelines for wind energy developments. The sample Official Plan Policies should contain direction on the following elements:

    - Allowing wind farms in certain areas (i.e. agricultural areas, industrial areas), subject to a required separation distance from residential areas
    - Addressing the issue of visual impact. Some options for achieving this would be to designate certain areas that the municipality wanted protected from wind farms as "heritage viewscapes", and then prohibit turbines in those areas.
    - Providing a detailed description of what types of information will be required as part of any zone change application for a wind farm.
    - Indicate that small wind turbines will not be permitted in residential areas due to noise concerns.

    The sample Zoning By-law regulations should contain direction on the following issues:

    - Setbacks for wind turbines from property lines and other turbines
    - Number of turbines per property or per hectare
    - Height restrictions

    The guidelines for wind energy developments should contain the following elements:

    - Designed to compliment other environmental or energy initiatives (i.e. Request for proposal, alternative energy development, Niagara Escarpment preservation).

- Provide municipalities with a common framework for assessing wind energy projects.
- Provide direction on the issue of visual impact.

2. Ontario municipalities should consider developing wind energy planning frameworks. These planning frameworks should contain at least two elements. Theses elements are:
    - Designating areas in the Official Plan where wind energy is permitted.
    - Addressing the issue of visual impact.

3. The City of Stratford must update its Official Plan to include policies that address wind energy generation. This process could be undertaken as a separate amendment or as part of a 5-year review process. Initiating a separate Official Plan Amendment to address wind energy generation would allow for a public and council education process that would provide an opportunity to dispel many of common issues surrounding wind energy.

4. The City of Stratford should initiate a study to determine if there are any areas within the City that are considered to be natural heritage views or areas that should be protected from the visual impacts of wind energy production.

5. The City of Stratford should investigate permitting wind energy facilities in certain industrial areas of the City, subject to a zoning by-law amendment.

6. The City of Stratford should work with the County of Perth to develop a common set of zoning by-law regulations for wind energy developments. This would ensure continuation should any proposed wind farm be located partially within the City and partially within the County.

7. The City of Stratford should investigate the possibility of having Festival Hydro invest in a wind energy co-operative. This would achieve the Roundtable goal of investing in locally generated renewable energy.

9.0 - LIST OF KEY INFORMANT INTERVIEWS

_____ _____, County of Perth
Date Conducted: April 22, 2005

_____ _____, County of Perth
Date Conducted: April 22, 2005

_____ _____, Elgin County
Date Conducted: April 29, 2005

_____ _____, Renewable Energy Consultant
Date Conducted: May 4, 2005

_____ _____, Renewable Energy Consultant/Sales Representative
Date Conducted: May 4, 2005

_____ _____, Huron County
Date Conducted: June 16, 2005

_____ _____, Bruce County
Date Conducted: April 29, 2005

_____ _____, Wind Energy Researcher/Private Sector Planner
Date Conducted: September 23, 2005

_____ _____, Gray County
Date Conducted: October 12, 2005 – Telephone Interview

_____ _____, Wind Power Consultant
Date Conducted: October 13, 2005

_____ _____, Niagara Escarpment Commission
Date Conducted: October 18, 2005 – Telephone Interview

_____ _____, Ministry of Municipal Affairs & Housing
Date Conducted: October 25, 2005

_____ _____, Ministry of Municipal Affairs & Housing
Date Conducted: October 25, 2005

_____ _____, Vestas Canada
Date Conducted: October 27, 2005 – Telephone Interview

_____ _____, Wind Power Co-operative
Date Conducted: November 2, 2005

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Appendix A – Sample Interview Questions and Office of Research Ethics Protocol Material

Information Letter

Dear Name,

You recently received (by mail or e-mail) a copy of a letter telling you about my study through the University of Waterloo, conducting research under the supervision of Professor Murray Haight on the issues surrounding municipal wind energy planning policy development. Wind energy is quickly becoming a pressing issue for many Ontario municipalities and the purpose of my research is determine how municipalities are going about developing their wind energy planning policies and what types of barriers or issues they are encountering. Therefore, I would like to know your views on wind energy planning policy development and hear about your experiences with this issue.

I would appreciate the opportunity to speak with you about wind energy planning policy development and would like to interview you in person, at a time and place that is convenient to you. With your permission, I would like to audiotape the interview as this will allow me to keep a complete and accurate record of what you tell me. However, if you prefer not to have the interview audiotaped, I will take notes by hand instead. If an in-person interview is not possible, I would like to arrange for a telephone interview instead. Please note that you will not be identified by name or any other personal information; your responses will be grouped together with those of municipal representatives and you will be referred to as 'a representative of municipal government' in any publications resulting from this study. Your involvement in this study is entirely voluntary and there are no known or anticipated risks to participation in this study. If you agree to participate, the interview should not take more than 45 minutes to 1 hour. Your will be asked about your views on wind energy planning policy development and your experiences in this field. You may decline answering any questions you feel you do not wish to answer. The data collected will be kept in a secure location.

If after receiving this letter you have any questions about this study or would like additional information to assist you in reaching a decision about participation, please feel free to contact Professor Murray Haight at 888-4567 ext. 3027.

I would like to assure you that this study has been reviewed and received ethics clearance through the Office of Research Ethics. However, the final decision about participation is yours. Should you have any comments or concerns resulting from your participation in this study, please contact Dr. Susan Sykes in the Office of Research Ethics at 888-4567 ext. 6005.

Thank you in advance for your interest in this project.

Sincerely,

Kris Longston

CONSENT FORM

I have read the information presented in the information letter about a study being conducted by Kristopher Longston of the School of Planning at the University of Waterloo. I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and any additional details I wanted.

I am aware that I have the option of allowing my interview to be tape recorded to ensure an accurate recording of my responses.

I am also aware that excerpts from the interview may be included in the thesis and/or publications to come from this research, with the understanding that the quotations will be anonymous.

I was informed that I may withdraw my consent at any time without penalty by advising the researcher.

This project has been reviewed by, and received ethics clearance through, the Office of Research Ethics at the University of Waterloo. I was informed that if I have any comments or concerns resulting from my participation in this study, I may contact the Director, Office of Research Ethics at (519) 888-4567 ext. 6005.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

☐YES ☐NO

I agree to have my interview tape recorded.

☐YES ☐NO

I agree to the use of anonymous quotations in any thesis or publication that comes of this research.

☐YES ☐NO

Participant Name: _____ (Please print)

Participant Signature: _____

Witness Name: _____ (Please print)

Witness Signature: _____

Date: _____

Interviews - Municipal Wind Energy Policy Makers

1) *Which municipality/local land use planning body do you work for?*

2) *How long have you been in your current position?*

3) *What is the current state of wind energy planning policy development in your municipality?*

4) *Do you feel that wind energy policy development is a priority in your municipality? Why/why not?*

5) *Have you developed wind energy planning policies? Why/why not?*

6) *Are you developing wind energy planning policies? Why/why not?*

7) *Do you feel that there are barriers to wind energy development in Ontario? If not why? If so, what are they?*

8) *Why do you feel these barriers exist? Why do you fee there are no barriers?*

9) *Do you feel that these barriers have impacted wind energy policy development in Ontario? If so how?*

10) *Have these barriers impacted/shaped/influenced your municipality's wind energy policies? If so how? If not, why?*

11) *How/why did your municipality overcome the barriers to wind energy policy development?*

12) *Did you receive any opposition during the development of your wind energy planning policies?*

13) Where did the opposition come from?

14) Was there any public/private support for your policies?

15) On what basis and with what information did your municipality develop its policies?

16) Do you feel that there is sufficient direction from the provincial/federal government in terms of developing wind energy policies?

17) Do you feel that guidelines from the Federal/Provincial government would assist wind energy planning policy makers at the local/municipal level? What types of guidelines do you feel would be beneficial?

18) Do you feel that Federal/Provincial direction on wind energy policy development would assist local municipalities in Ontario?

19) Do you feel that your wind energy planning policies could be improved?

20) Do you feel that your municipality's wind energy policies are effective?

21) Are there components of your wind energy planning policy that you feel would be appropriate for adoption by other municipalities?

22) If you could do it all again, what would you do differently?

23) Can you think of anyone else that would be able to provide valuable information on this topic?

Interviews - Wind Energy Experts

1) By whom are you employed?

a) government
b) private company
c) university
d) other _____

2) In what capacity are you/have you been involved with wind energy planning policy development?

3) How long have your been involved with wind energy planning policy development?

4) What do you feel is the current state of wind energy planning policy development in Ontario municipalities?

5) Do you feel that wind energy policy development is a priority in Ontario municipalities? Why/why not?

6) Have you had any involvement in developing wind energy planning policies? Why/why not?

7) If yes, what was your role?

8) Do you feel that there are barriers to wind energy development in Ontario? If not why? If so, what are they?

9) Why do you feel these barriers exist? Or, why do you feel there are no barriers?

10) Do you feel that these barriers have impacted wind energy policy development in Ontario? If so how?

11) Do you feel that these barriers impact/shape/influence municipal wind energy policies? If so how? If not, why?

12) How do you feel municipalities are overcoming the barriers to wind energy policy development?

13) Have you experienced or are aware of any opposition to municipal wind energy policies?

14) Where did the opposition come from?

15) Have you experience or are aware of any public/private support for municipal wind energy policies?

16) On what basis and with what information do you feel municipalities are developing their wind energy planning policies?

17) Do you feel that there is sufficient direction from the provincial/federal government in terms of developing wind energy policies?

18) Do you feel that guidelines from the Federal/Provincial government would assist wind energy planning policy makers at the local/municipal level? What types of guidelines do you feel would be beneficial?

19) Do you feel that Federal/Provincial direction on wind energy policy development would assist local municipalities in Ontario?

20) Do you feel that wind energy planning policies could be improved?

21) Do you feel that current municipal wind energy policies are effective?

22) Do you feel that Ontario municipalities would benefit from wind energy planning policies in other provinces/countries?

23) If you could change certain aspects of wind energy planning policy in Ontario, what would they be?

24) Can you think of anyone else that would be able to provide valuable information on this topic?

Interviews - Wind Energy Industry Stakeholders

1) By whom are you employed?

e) government
f) private company
g) university
h) other _____

2) What is your role in the company/organization?

3) How is your company/organization involved in wind energy development?

4) What has been the extent of your involvement with wind energy planning policy development?

5) How is your company/organization impacted by municipal wind energy planning policies?

4) What do you feel is the current state of wind energy planning policy development in Ontario municipalities?

5) Do you feel that wind energy policy development is a priority in Ontario municipalities? Why/why not?

6) Have you had any involvement in developing wind energy planning policies? Why/why not?

7) If yes, what was your role?

8) Do you feel that there are barriers to wind energy development in Ontario? If not why? If so, what are they?

9) Why do you feel these barriers exist? Or, why do you feel there are no barriers?

10) Do you feel that these barriers have impacted wind energy policy development in Ontario? If so how?

11) Have these barriers impacted your company/organization?
12) Do you feel that these barriers impact/shape/influence municipal wind energy policies? If so how? If not, why?

13) ***Do you feel these barriers have impacted/influenced how your company/organization operates?***

14) ***How do you feel municipalities are overcoming the barriers to wind energy policy development?***

15) ***Have you experienced or are aware of any opposition to municipal wind energy policies?***

16) ***Has your company/organization experienced any opposition to wind energy development?***

17) ***Where did the opposition come from?***

18) ***Have you experience or are aware of any public/private support for municipal wind energy policies?***

19) ***Has your company/organization experienced any support for wind energy development?***

20) ***On what basis and with what information do you feel municipalities are developing their wind energy planning policies?***

21) ***Do you feel that there is sufficient direction from the provincial/federal government in terms of developing wind energy policies?***

22) ***Do you feel that guidelines from the Federal/Provincial government would assist wind energy planning policy makers at the local/municipal level? What types of guidelines do you feel would be beneficial?***

23) ***Do you feel that Federal/Provincial direction on wind energy policy development would assist local municipalities in Ontario?***

24) ***Do you feel that municipal wind energy planning policies could be improved?***

25) ***Do you feel that current municipal wind energy policies are effective?***

26) Do you feel that Ontario municipalities would benefit from wind energy planning policies in other provinces/countries?

27) If you could change certain aspects of wind energy planning policy in Ontario, what would they be?

28) Can you think of anyone else that would be able to provide valuable information on this topic?

Appendix B – Wind Energy Planning Policies, Frameworks and Background Reports from Case Study Municipalities

AMENDMENT NO. 40

TO THE

COUNTY OF PERTH OFFICIAL PLAN

Prepared by:

Council of the Corporation of the County of Perth

July, 2004

AMENDMENT NO. 40

TO THE

COUNTY OF PERTH OFFICIAL PLAN

TABLE OF CONTENTS

BY-LAW NUMBER 2853 A.D. 2004
THE CORPORATION OF THE COUNTY OF PERTH

TO ADOPT AMENDMENT NO. 40 TO THE COUNTY OF PERTH OFFICIAL PLAN

The Council of the Corporation of the County of Perth in accordance with the provisions of Sections 17 and 21 of the Planning Act, R.S.O. 1990 hereby enacts as follows:

1. Amendment No. 40 to the County of Perth Official Plan, consisting of the attached text, is hereby adopted.

2. That the Clerk is hereby authorized and directed to proceed with the giving of written notice of the County's decision in accordance with the provisions of the Planning Act, R.S.O. 1990.

3. This By-law shall come into force and take effect on the day of the final passing thereof.

Read a first and second time this 18th day of August, 2004.

Read a third time and finally passed this 18th day of August, 2004.

Ian Forrest, Warden

Judy Schweitzer, Clerk

****

Certified that the above is a true copy of By-law Number 2853, A.D. 2004 as enacted and passed by the Council of the Corporation of the County of Perth on August 18, 2004.

Judy Schweitzer, Clerk

CERTIFICATE

Under Section 17 of the Planning Act, R.S.O. 1990

I, David G. Hanly, hereby certify that the requirements for the giving of notice, as prescribed by regulation made by the Lieutenant Governor-in-Council under Section 17 of the Planning Act, R.S.O. 1990, and the holding of a mandatory public meeting for **Amendment No. 40** to the County of Perth Official Plan adopted by Council on the 19th day of August, 2004 were complied with by the Corporation of the County of Perth.

I also certify that the requirements for the giving of notice regarding **Amendment No. 40** as described in Section 17 of the Planning Act, RSO 1990 were complied with by the Corporation of the County of Perth.

Dated at the City of Stratford
this 24th day of August, 2004

David G. Hanly, MCIP, RPP
Planning Director

****

I hereby certify this to be a true copy of my certificate regarding **Amendment No. 40** to the County of Perth Official Plan.

David G. Hanly, MCIP, RPP
Planning Director

NOTICE OF THE ADOPTION OF AN OFFICIAL PLAN AMENDMENT

BY THE CORPORATION OF THE COUNTY OF PERTH

TAKE NOTICE that the Council of the Corporation of the County of Perth adopted Amendment No. 40 to the County of Perth Official Plan by By-law No. 2853, A.D. 2004 at a meeting of Council on the 19th day of August, 2004 under the provisions of Sections 17 and 21 of the Planning Act, R.S.O. 1990.

Official Plan Amendment No. 40 applies to all areas in the County that are designated "Agriculture" and it has the effect of providing policies to deal with wind energy generation systems. Under these policies:

(i) small wind energy generation systems (e.g. intended to generate primarily for on-site domestic consumption and normally comprised of only one generating device) are permitted in areas designated "Agriculture" subject to provisions that will be set out in the local municipal Zoning By-laws; and

(ii) commercial wind energy generation systems (e.g. comprised of one or more generating units that are primarily intended to feed electricity into the transmission grid) are permitted in areas designated "Agriculture" subject to satisfying a number of policies dealing with matters such as base and tower design, site plan agreement, noise attenuation, setbacks (from roads, lot lines, structures), setbacks from airports, setbacks from designated settlement areas (both in and outside of the County), impacts on areas designated "Natural Resources/Environment", and an amendment to the local municipal Zoning By-law.

AND TAKE NOTICE that any person or agency may appeal the County's decision to approve Amendment No. 40 to the County of Perth Official Plan to the Ontario Municipal Board by filing with the Clerk of the County of Perth not later than the **13th day of September, 2004** a notice of appeal setting out the objection to the Official Plan amendment and the reasons in support of the objection and accompanied by the proper fee.

Amendment No. 40 to the County of Perth Official Plan is available for inspection at the County Planning Office (address noted below) during regular office hours.

The decision of the Council of the Corporation of the County of Perth is final if a notice of appeal is not received before or on the last day for filing a notice of appeal.

NOTE: Only individuals, corporations and public bodies may appeal a decision of the approval authority to the Ontario Municipal Board. A notice of appeal may not be made by an unincorporated association or group. However, a notice of appeal may be made in the name of an individual who is a member of the association or the group on its behalf.

DATED AT THE CITY OF STRATFORD THIS 24th DAY OF AUGUST, 2004

Mr. Dave Hanly, Planning Director for the County of Perth
County Court House, 1 Huron St. Stratford, ON N5A 5S4 Telephone: (519) 271-0531 ext. 232 Fax: (519) 273-5967

Maps showing the location of the "Agriculture" designation in the County of Perth are available for review at the County of Perth Planning and Development Office and in the local municipal offices (North Perth, Perth East, Perth South, West Perth).

THE CONSTITUTIONAL STATEMENT

PART A - THE PREAMBLE does not constitute part of this Amendment.

PART B - THE AMENDMENT, consisting of the following text, constitutes Amendment No. 40 to the County of Perth Official Plan.

Also attached is **PART C - THE APPENDICES** which does not constitute part of this Amendment. These appendices (I through III inclusive) contain the background data, planning considerations, and public involvement associated with this Amendment.

PART A - THE PREAMBLE

Purpose

The purpose of this Amendment is to add new policies regarding Wind Energy Generation Systems to Section 17 of the County of Perth Official Plan.

Location

The new policies regarding Wind Energy Generation Systems (WEGS) are limited to areas within the "Agriculture" designation as shown on Schedule "A" to the County of Perth Official Plan.

Basis

The Province of Ontario recently established a new priority on renewable energy resources. Wind power generation has been of particular importance to the provincial government since wind energy is the fastest growing electricity source in the world.

In March 2004, the provincial government announced its policy framework to allow for wind power generation sites on Crown-owned land. Prior to this announcement, there were two private wind generation systems which were operating in Perth County. There has also been some discussion of the possibility of the installation of a commercial scale wind turbine in the Township of Perth East.

As a result of these above-noted events, the Council of the Corporation of the County of Perth initiated this Amendment to the County Official Plan to establish an appropriate set of policies to guide the location of any new wind energy generation systems.

PART B - THE AMENDMENT

All of this document entitled "Part B - The Amendment" consisting of the following text constitutes Amendment No. 40 to the County of Perth Official Plan.

DETAILS OF THE AMENDMENT

The County of Perth Official Plan is hereby amended by adding the following policies to Section 17:

"17.9 WIND ENERGY GENERATION SYSTEMS

Wind Energy Generation Systems (WEGS) consist of mechanical devices designed to convert wind energy into electricity. These systems can occur at small or large scales in the County. Small scale systems are intended to generate primarily for on-site domestic consumption and normally are comprised of only one generating device. Large scale systems are more appropriately described as Commercial Wind Energy Generating Systems and involve one or more generating devices. The latter systems are generally referred to as "Wind Farms" and are usually located in areas where climate (i.e. wind) conditions create a conducive environment for WEGS.

The County of Perth supports the development of Wind Energy Generation Systems (WEGS) for the production of electricity. These systems will be a source of renewable energy for the economic and environmental benefit to both the County and the Province.

17.9.1 Small Wind Energy Generating Systems

In the "Agriculture" designation of the County of Perth Official Plan, Small Wind Energy Generation Systems primarily intended for on-site domestic consumption of wind energy generated electricity shall be permitted, subject to the provisions in the Zoning By-law of the local municipality.

17.9.2 Commercial Wind Energy Generating Systems

Commercial Wind Energy Generating Systems (CWEGS) are comprised of one or more generating units that are primarily intended to feed electricity into the transmission grid.

Given the usually large scale of CWEGS, it is anticipated that these facilities will tend to locate outside of urban areas. Therefore, Commercial Wind Energy Generating Systems are permitted in the "Agriculture" designation as shown on Schedule "A" to the County of Perth Official Plan; however, an Amendment to local municipality's implementing Zoning By-law is required. A CWEGS is considerably different from the typical uses located within the "Agriculture" designation. Therefore, it is important to carefully control the establishment of these large systems, to ensure the compatibility of the land use, and the safety of neighbouring residents.

Prior to the local Council considering the approval of a CWEGS, the following policies shall be addressed:

(i) A site plan shall be provided illustrating the location of the proposed turbines, as well as the location and height of all existing structures on the subject property and the location and height of all existing structures within 500 metres of the subject property;

(ii) A professional engineer shall approve the base and tower design of the turbines;

(iii) A Site Plan Agreement, pursuant to the provisions of Section 41 of the Planning Act, R.S.O. 1990 shall be required and should include location of road access, parking, accessory buildings, vegetative buffers, location of external works/facilities, storm water management/drainage and any other identified mitigation measures;

(iv) The applicant shall review noise attenuation measures with the Ontario Ministry of the Environment, to ensure that the proposal will comply with the Ministry's requirements;

(v) Setbacks from road allowances, lot lines, and structures (on-site and off-site) and maximum height provisions shall be established in the Zoning By-law Amendment;

(vi) Commercial Wind Energy Generating Systems constructed within 10 kilometres of an airport reference point will require the written approval of Transport Canada. Such approval will provide assurance that there will be no adverse effect on the instrument approaches to the airport;

(vii) Climatic conditions are the principal locational criteria for Wind Energy Generating Systems. Such uses may be permitted in the "Agriculture" designation but will be encouraged to locate on lands of lesser agricultural capability where climatic conditions are of a similar nature. The County of Perth encourages wind turbine placements that minimize the disruption to agricultural uses, and normal farming practices;

(viii) Commercial Wind Energy Generating Systems shall have separation distances of at least 500 metres from either a "Settlement Area" on Schedule "A" of the County Official Plan (including designated settlement areas for abutting municipalities, such as the City of Stratford and the Town of St. Marys), or any sensitive land use (such as schools, nursing homes, etc). Depending upon the scale of the proposed CWEGS, additional separations may be required due to Ontario Ministry of the Environment noise requirements from sensitive land uses. Where potential commercial wind energy generation sites are proposed within proximity to a "Settlement Area" in the County Official Plan, or a sensitive land use, the applicant's planning study shall address the potential impacts of the wind generation system on these adjacent land uses and explain how such impacts may be reduced;

(ix) Commercial Wind Energy Generating Systems that are proposed in proximity to an area within a "Natural Resource/Environment" designation on Schedule "A" of the County Official Plan, must demonstrate that there is no negative environmental impact on the feature within the "Natural Resource/Environment" designation; and

(x) An amendment to the local municipal Zoning By-law may provide for a holding provision which should be removed when a contract has been executed to allow the Commercial Wind Energy Generating System to be connected to a transmission grid for electrical distribution."

PART C - THE APPENDICES

The following appendices do not constitute part of Amendment No. 40 to the County of Perth Official Plan, but are included as information supporting the Amendment.

APPENDIX I - BACKGROUND TO THE AMENDMENT

The Province of Ontario recently established a new priority on renewable energy resources. Wind power generation has been of particular importance to the provincial government since wind energy is the fastest growing electricity source in the world.

In March 2004, the provincial government announced its policy framework to allow for wind power generation sites on Crown-owned land. Prior to this announcement, there were two private wind generation systems which were operating in Perth County. There has also been some discussion of the possibility of the installation of a commercial scale wind turbine in the Township of Perth East.

As a result of these above-noted events, the Council of the Corporation of the County of Perth initiated this Amendment to the County Official Plan to establish an appropriate set of policies to guide the location of any new wind energy generation systems.

APPENDIX II - PLANNING CONSIDERATIONS

The reports from the County of Perth Planning Office are attached to the Amendment No. 40 document.

County Council, following its consideration of the proposed policies, the Public Meeting comments, and all written submissions, concluded that the proposed amendment was appropriate and therefore proceeded to adopt it by By-law.

APPENDIX III - PUBLIC PARTICIPATION

This appendix contains the following:

1. Notice of Public Meeting;
2. Correspondence received as a result of the review process;
3. Public Meeting Agenda and Name/Address List;
4. Excerpts from the Minutes of the Community Services Committee's June 3, 2004 Public Meeting, and County Council's July 8, 2004 session.

COUNTY OF PERTH PLANNING AND DEVELOPMENT OFFICE 7

April 28, 2004

REPORT TO: County of Perth Community Services Committee

SUBJECT: Wind Energy Generation

PURPOSE OF THE REPORT:
In January 2004, County Council directed Planning Office staff to prepare a report regarding Official Plan policies and Zoning regulations related to "Wind Generated Electricity".

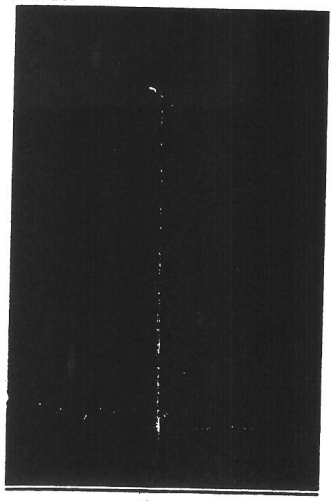
#C5/2004 RECOMMENDATION:That the Community Services Committee recommend to Perth County Council that the Planning Department be requested to proceed with an OPA application outside of the five year review with a view to accommodate the implementation by July 2004 of wind turbine generation for both private and commercial use as well as energy generation for re-sale.

This report has been prepared to describe wind energy projects, identify potential land use impacts, discuss policy approaches and recommend future actions.

WIND POWER GENERATION:
Wind energy involves the conversion of kinetic wind energy into electricity. In more detail, the wind propels the large blades of the wind turbine which turn a shaft that rotates a dense coil between the poles of a powerful magnet in the generator which produces the electricity. The power generated is either connected to the electrical panel of an individual property or power is sent to the electrical grid for consumption by others.

There are various sizes of wind power generation systems, which generally can be characterised as commercial scale systems, and individual scale systems. The wind power generation projects vary from very small systems of one wind turbine serving an individual farm operation, homeowner or business wishes to build an electrical generation facility exclusively for their own use. This operation would normally consist of one wind turbine located close to the building. (1 – 40 kW). These systems typically include a tower up to 90 ft. high with 2 or 3 turbine blades, each up to 10 ft. long making a total height of 100 ft. from the base of the tower to the tip of the highest blade.

At the other end of the spectrum are larger commercial wind facilities consisting of a few or hundreds of wind turbines generating 40 kW to 100 mW of power. These facilites require significant amounts of land, support buildings and a connection to the electricial distribution grid. These large commercial scale wind turbines that have tower heights ranging from 30 - 100 + metres (100 - 300 + feet) above the ground and the length of each blade ranges from 5 - 30 + metres (16.4 – 100 + feet). These turbines are generally rated between 225 kilowatts (kW) and 3 megawatts (mW).



PROVINCIAL INTEREST:
The Province of Ontario recently established a new priority on renewable energy resources. Wind power generation, is of particular importance since it is the fastest growing electricity source in the world (Ontario Ministry of Municipal Affairs and Housing "InfoSheet" (attached) on "Wind Energy").

In October, 2001, a task force of energy industry representatives produced a report entitled, "Harnessing Wind Power in Ontario" wherein they recommended the development of this alternative energy source. Just over a year later in December, 2002, the Renewable Energy Task Force submitted its report outlining ways to implement the recommendations of the Ontario Select Committee on Alternative Fuel Sources to the Alternative Energy Commissioner of Ontario. In March, 2004 the Province announced its policy framework to allow for wind power sites on Crown-owned land.

COUNTY OF PERTH OFFICIAL PLAN:
Section 17.4 contains policies regarding electric power facilities. The policies are as follows:

All existing electric power facilities and the development of new electric power facilities, including all works as defined in the Power Corporation Act (such as transmission lines, transformer stations, and distributing stations), shall be permitted uses in any land use designation throughout the County provided that:

(a) such project satisfies the following:

  (i) the complete review process necessary under the Environmental Assessment Act, including regulations made under the Act;

  (ii) any other relevant statutes; and

  (iii) hearings held in accordance with Provincial statutes and regulations where valid objections had been properly filed.

(b) the proponent of such facilities takes into account the policies of this Official Plan in developing its program;

(c) the proponent of such facilities shall be required to consult with the County regarding the locational criteria for new electric power facilities;

(d) other electric power facilities including buildings and structures not used directly for the generation and supply of power shall comply with the applicable provisions of the local municipality's implementing Zoning By-law;

(e) the proponent will provide the County with the opportunity to study and comment on its construction and rehabilitation plans in order that the measures to be undertaken to protect agricultural land and restore it to its prior condition of productivity and the long term effects after rehabilitation is completed can be examined in light of the interests of County landowners; and

(f) it is understood by the proponent that County Council reserves the right to take whatever measures are considered appropriate to seek redress for the municipality and/or individual landowners and/or a group of landowners if conditions of the approval of the undertaking by the Environmental Assessment Board or a Joint Board under the Consolidated Hearings Act are not satisfactorily addressed and met by the proponent.

ZONING BY-LAWS: While there is no specific mention of small wind turbines in any of the local Zoning By-laws, wind turbines are considered as accessory uses in the situation where they serve the main use on the property. In the "Agricultural Zone" wind turbines are permitted as a part of the farm use, subject to a maximum height of 30 m (98.43 ft.), and a minimum front, side, and rear yard of 18 m (59.06 ft.). A Zoning Amendment is required to permit wind turbines for personal use in any other zone, since the height limitations (4.5 m (14.76 ft.) have the effect of prohibiting them.

WIND ENERGY EXPERIENCE IN OTHER ONTARIO MUNICIPALITIES:
Some municipalities within Ontario have either recently amended, or are in the process of amending their planning documents to regulate commercial wind power generation proposals. These municipalities include: Bruce County; Huron County; Prince Edward County; Township of Bayham; Township of Huron; Township of Malahide; City of Kingston; City of Sault St. Marie; and the City of Thunder Bay. The commonly used definitions are listed below (modified from the County of Bruce):

Wind Energy Generation System (WEGS): means any device such as a wind charger, windmill, or wind turbine that converts wind energy to electrical energy.

Wind Energy Generation System Accessory Facilities: means those facilities, equipment, machinery, and other devices necessary to the proper operation and maintenance of a wind energy conversion system, including access roads, collector and feeder lines, and substations.

Commercial Wind Energy Generation System (CWEGS): means one or more Wind Generating Systems (WGS), that singly or collectively produce more than a total of 40 kilowatts (kW) based on 'nameplate rating capacity' and are connected to the provincial transmission grid.

Small Wind Energy Generation System (SWEGS): means any combination of WGS with a combined nameplate capacity of less than 40 kilowatts (kW).

INFORMATION SOURCES:
The Ontario Ministry of Municipal Affairs and Housing convened a Conference Call with staff from a number of the above-noted municipalities, as well as the County of Perth, in March, 2004 in order to discuss the following issues: Municipal Experience to Date; Information Gaps on Wind Turbines and the Planning Approval Process; Key Challenges (including: Municipal Staff Training; Public/Council Education); and Policy Gaps. The Ministry has yet to distribute the printed minutes of the Conference Call, including suggested policy options for consideration.

Planning Staff attended the Wind World/Solar World Conference on March 5, 2004 in Mississauga, as well as the Wind Power Meeting hosted by the Perth Federation of Agriculture on April 1, 2004 in Stratford (which featured Ted Cowan (OFA), and Paul Gipe (Ontario Sustainable Energy Association). Information and reports were received from: the Township of Malahide; and the Municipality of Bayham (William Pol, Cumming Cockburn Planning Consultants), the County of Bruce (David Smith), the County of Huron (Scott Tousaw), and the County of Prince Edward (Brian McComb).

Based on the above-noted conference call, and further discussions with municipalities which have already proceeded to amend their Planning Act documents, the following concerns need to be specifically addressed:

i) Official Plan Policies: The Official Plan should include goals and objectives regarding wind generated electricity. These policies should also set out specific criteria for small-scale wind generation systems, as well as commercial scale wind generation systems. These policies should state when Environmental Studies, Zoning Amendments, and Site Plan Agreements are required.

ii) Zoning By-law Regulations: A Zoning By-law should specifically define small-scale wind generation systems, and commercial-scale wind generation systems, and provide regulations for both types of systems. For commercial-scale systems, the Zoning By-law should require wind turbine setbacks and limit the number of wind turbines per hectare in order to control the potential off-site noise, safety, visual and environmental impacts. Regulations should also include provisions for the provincial licensing and approval requirements for energy production and distribution, in the definition of a wind turbine.

Where a wind energy proponent is undertaking a test project, a Temporary Use By-law for a period of up to three years may be appropriate. The individual Temporary Use By-law should establish specific regulations for the proposed temporary use.

iii) Environmental Approvals: The Ontario Ministry of the Environment recently issued new environmental assessment requirements for electricity projects under the Ontario Environmental Assessment Act (EAA). These guidelines, which require an Environmental Screening process, apply to both public and private sector electricity generation and transmission projects that have a capacity equal to, or greater than 2 MegaWatts (mW). A "Category 'B' Project", as defined by the EAA, is a project with environmental effects that can be mitigated. Windfarms which generate in excess of 2 mW are considered Category 'B' projects and must undergo an Environmental Screening Process.

The Environmental Screening Process is a self-assessment that requires proponents to identify the potential environmental effects of their project. Once this step is completed, the proponent must consult with governmental agencies, and members of the public to outline measures to mitigate any environmental impacts on the following:

Surface and ground water;	Land;
Air & Noise;	Natural Environment;
Resources;	Socio-Economic;
Heritage & Culture;	Aboriginal; and Other

Screening Reports for existing wind turbines in Ontario list a number of areas where the project could have negative effects on the environment and socio-economic conditions in the immediate area including: Operational Activities (i.e. collision hazard to birds and bats; and sensory disturbance of wildlife); Decommissioning and Abandonment Activities; Accidents and Malfunctions; and Potential Socio-Economic Impacts (i.e. noise; visual; property values; and economic effects).

Proponents must make the conclusions of their screening reports available for public review. However, an Environmental Screening Report (ESR) is not peer reviewed by the Ministry of the Environment. The EAA is a *self-approval process,* this means that unless the public or an agency outside of the MOE raise issues regarding the conclusions and/or proposed mitigation measures, the Report is considered complete and the proponent is allowed to proceed and is expected to follow the Report recommendations during the development phase.

Members of the public and agencies who feel that the proponent's impact assessment or management measures are not adequate can request the Ontario Ministry of the Environment to require the proponent to either conduct a more detailed Environmental Review of the project, or to prepare an individual Environmental Assessment. If no requests for elevation are received during the 30-day public review period the proponent issues a "Statement of Completion" and the project may proceed, subject to any other required approvals.

It should be noted that wind energy projects also require a Certificate of Approval under the Ontario Environmental Protection Act. In addition, if a wind energy proposal may have a significant impact on First Nations' lands, or on birds, wildlife, national parks, waterways, fisheries, telecommunications transmission and/or aviation, or which are sited on federal land or receive federal funding, such wind energy proposal are likely to be subject to the federal Environment Assessment process, among other federal legislation.

iv) Site Plan Approval: Through the County Official Plan policies, the local municipalities may apply site plan control to various land uses. Where there is an application for commercial wind

generation, consideration should be given to requiring site plan approval, depending on the location and possible impact on surrounding land uses.

v) **Building Permits:** The local municipalities are responsible for the issuance of building permits in accordance with the Building Code. Given the lack of experience in dealing with wind turbines, the local municipal Building Official may wish to obtain advice from an engineering consultant when an application is received for either small-scale or commercial scale wind energy systems.

WIND ENERGY IMPACTS :

Much of the information in this section is from William Pol, Cumming Cockburn Planning Consultants, and David Smith, Bruce County Planning Department).

For the purposes of this report, only land use impacts related to commercial scale wind turbine, where the wind energy facility has a rated production capacity of more than 40 kW of power, are discussed. Where testing for wind energy is under consideration, the structures and potential impacts are temporary and should be evaluated on a site specific basis. The testing may also consider the off-site impacts of the project. The scale and siting of the project should ensure that the impacts of noise, light and safety risk are contained primarily on the site where the structure is operated.

i) **Public Health and Safety:** The concerns to public health and safety are related to blade throw, tower failure and falling ice. Blade throw is the rare instance where the turbine blade, or pieces of the blade, separate from the rotor and fly off downwind with potential personal injury or property damage. Tower failure is the falling of the tower to the ground resulting from high ice loads, poor foundations, salt corrosion at the base, or high winds. In certain weather conditions ice may build up on the turbine blades and as the blades warm the ice melts and either falls to the ground or can be thrown by the blades. Another concern is the ice falling from the tower structure and/or generator housing, directly under the wind turbine.

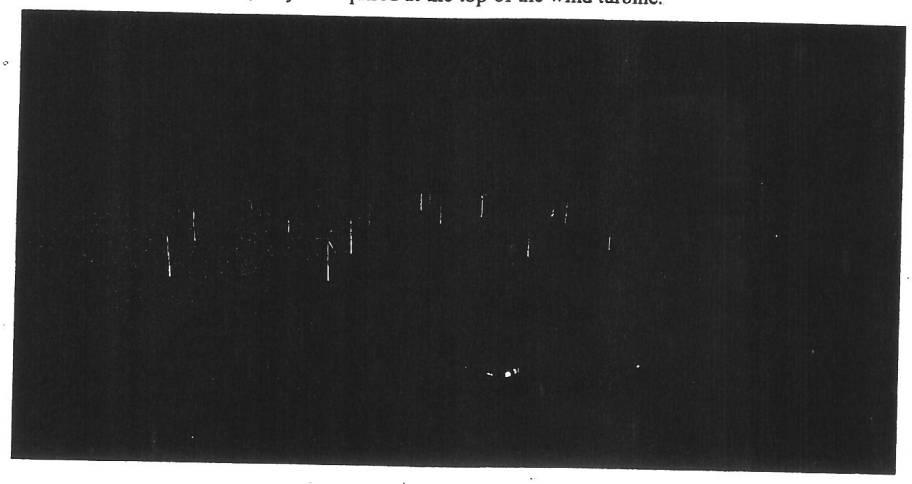
ii) **Land Use Compatibility:** Depending on the site, size and design of the project, wind turbine development may be compatible with other land uses, including agricultureal and open space uses.

iii) **Noise Impacts:** Noise impacts are generated by wind passing over and past the blades of the turbines (swishing or whooshing sound) and mechanical noise from the generator bearings, creaking of the turbine structure, or high speed cooling fans. When the wind is turbulent, it can make low frequency noise as it buffets the towers or an impulsive noise every time a blade passes through the wind shadow in a downwind turbine design. The most noticeable aerodynamic noise is created by the wind, just above the cut-in wind speeds and before the background wind noise, rises to mask the noise of the turbine. Typical noise levels from a wind turbine at 200 m (656 ft.) away is approximately 45 decibels. It is important that wind turbines be sited far enough from senstive land uses in order that the noise emitted is not a nuisance. The Ontario Ministry of Environment has criteria regarding setback from sensitve land uses, and acceptable noise levels for wind turbines.

iii) **Birds and Environmental Resources:** Birds and bats are at risk of being hit or striking the structures or the blades of wind turbines. Normally, migrating birds fly at heights between 1,500 and 2,500 feet above ground level and are not at risk. Studies have confirmed that when visible, birds will change direction and fly around wind turbines. An additional concern is any impact on environmentally significant landforms or natural vegetation during construction and installation of the wind turbines.

vi) Air Quality and Climate: There are no air emissions from the wind turbine generation process because there is no combustion of gases involved. With respect to local micro-climate impacts, there is normally a slight reduction in wind speed, increased turbulence and slightly increased relative humidity.

v) Visual Impacts: There are visual impacts of the wind turbines. The first, and most obvious is visual impact of the tower structure and blades, 18 – 30 storeys high, can have a visual impact on the horizon and on viewing areas. The number and concentration of turbines in any one area, will affect the visual impact of this land use. Secondly, under certain conditions, the reflection of sunlight from the wind turbine blades when they are in motion. Thirdly, the "shadow flicker" phenomenia occurs under certain combinations of geographical position and time of day, the sun may pass behind the blades and cast a shadow. When the blades rotate the shadow of the wind turbine flicks on and off. Lastly, given the height of a wind turbine, night time lighting may be required to meet Transport Canada requirements for aeronautical obstructions. A single solid red light, similar to those installed on communication towers, may be required at the top of the wind turbine.



vi) Municipal Infrastructure: The need for municipal services for the operation of wind generating facilities is limited to the availability of roads to accommodate heavy equipment needed for site preparation, transportation of construction supplies and components, and for the erection of turbines and electrical poles/towers. The need to provide municipal sanitary or municipal water services or other utilities would be limited to the needs of rural industrial land uses.

vii) Interference with Broadcast Signals: Microwave, TV, radar or radio transmissions may be affedcted by the presence of wind turbines. Depending on the proximity of airports or communication towers and the location of wind turbines, there may be impacts on air navigation or communication transmissions to be considered.

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PROPOSED OFFICIAL PLAN POLICY:
Based on the above-noted information, the Planning Office is recommending that the followning policies be incorporated into the County Official Plan to permit commercial wind energy generation facilities, and to permit wind energy facilities for on-site domestic use on properties within the "Agriculture" designation. Given the potential impacts on adjacent land uses in other land use designations, including Settlement Areas, an Official Plan and Zoning Amendment should be required to address potential land use compatibility issues.

x.x WIND ENERGY GENERATION SYSTEMS

Wind Energy Generation Systems (WEGS) consist of mechanical devices designed to convert wind energy into electricity. These systems can occur at small or large scales in the County. Small scale systems are those which generate less than nameplate capacity rating of 40 kilowatts and normally comprise only one generating device. Large scale systems are more appropriately described as Commercial Wind Energy Generating Systems and involve one or more generating devices which collectively produce more than nameplate capacity rating of 40 kilowatts. The latter systems are generally referred to as 'Wind Farms' and are usually located in areas where climate (i.e. wind) conditions create a conducive environment for WEGS.

The County of Perth supports the development of Wind Energy Generation Systems (WEGS) for the production of electricity. These systems will be a source of renewable energy for the economic and environmental benefit to both the County and the Province.

x.x.x Small Wind Energy Generating Systems

In the "Agriculture" designation of the County of Perth Official Plan, Small Wind Energy Generation Systems for on-site domestic consumption of electrical wind energy may be permitted, subject to the provisions in the Zoning By-law of the local municipality.

x.x.x Commercial Wind Energy Generating Systems

Commercial Wind Energy Generating Systems (CWEGS) produce electricity in excess of nameplate capacity rating of 40 kilowatts and are comprised of one or more generating units. The Commercial Wind Energy Generating Systems are intended to feed electricity into the transmission grid.

Given the usually large scale of CWEGS, it is anticipated that these facilities will tend to locate outside of urban areas. Therefore, Commercial Wind Energy Generating Systems are permitted in the "Agriculture" designation of the County Official Plan; however, an Amendment to local municipality's implementing Zoning By-law is required. A CWEGS is considerably different from the typical uses located within the "Agriculture" designation. Therefore, it is important to carefully control the establishment of these large systems, to ensure the compatibility of the land use, and the safety of neighbouring residents.

Prior to the local Council considering the approval of a CWEGS, the following policies shall be addressed:

(i) A site plan shall be provided illustrating the location of the proposed turbines, as well as the location and height of all existing structures on the subject property and the location and height of all existing structures within 500 metres of the subject property;

(ii) A professional engineer shall approve the base and tower design of the turbines;

(iii) A Site Plan Agreement, pursuant to the provisions of Section 41 of the Planning Act, R.S.O. 1990 shall be required and should include location of road access, parking, accessory buildings, vegetative buffers, location of external works/facilities, storm water management/drainage and any other identified mitigation measures;

(iv) The applicant shall review noise attenuation measures with the Ontario Ministry of the Environment, to ensure that the proposal will comply with the Ministry's requirements;

(v) Setbacks from road allowances, lot lines, and structures (on-site and off-site) and maximum height provisions shall be established in the Zoning By-law Amendment;

(vi) Commercial Wind Energy Generating Systems constructed within 10 km of an airport reference point will require the written approval of Transport Canada. Such approval will provide assurance that there will be no adverse effect on the instrument approaches to the airport;

(vii) Climatic conditions are the principal locational criteria for Wind Energy Generating Systems. Such uses may be permitted in the "Agriculture" designation but will be encouraged to locate on lands of lesser agricultural capability where climatic conditions are of a similar nature. The County may require a report justifying the need to locate such systems on prime agricultural lands, based on the criteria described in Policy 2.1.3 of the Provincial Policy Statement, and which demonstrates wind turbine placement that minimizes the disruption to agricultural uses, and normal farming practices.

(viii) Commercial Wind Energy Generating Systems shall have separation distances of at least 500 metres from either a "Settlement Area" on Schedule "A" of the County Official Plan, or any sensitive land use. Depending upon the scale of the proposed CWEGS, additional separations may be required due to Ontario Ministry of the Environment noise requirements from sensitive land uses. Where potential commercial wind energy generation sites are proposed within proximity to a "Settlement Area" in the County Official Plan, or a sensitve land use, the applicant's planning study shall address the potential impacts of the wind generation system on these adjacent land uses and explain how such impacts may be reduced;

(ix) An amendment to the local municipal Zoning By-law may provide for a holding provision which should be removed when a contract has been executed to allow the Commercial Wind Energy Generating System to be connected to a transmission grid for electrical distribution.

RECOMMENDATION:

The Community Services Committee should consider scheduling a public meeting and publishing a notice for an Amendment to the County Official Plan to add policies to permit wind energy generation systems on a commercial basis in the "Agriculture" designation and to permit wind energy facilities for on-site domestic use.

After the above-noted Official Plan Amendment is adopted, the Committee should encourage the local municipal Council's to amend their Zoning By-laws to permit wind energy facilities as a defined use which may be added to the permitted uses in the "Agricultural Zone" in the Zoning By-law; and encourage the local municipal Council's to amend their Zoning By-laws to specifically permit wind energy facilities without an amendment, exclusively for domestic use, where they comply with the accessory uses and structures provisions of the "Agricultural Zone (A)" of the local Zoning By-law.

AMENDMENT NUMBER 4

TO THE OFFICIAL PLAN

OF THE

MUNICIPALITY OF BAYHAM

SUBJECT: **WIND ENERGY POLICIES**
MUNICIPALITY OF BAYHAM

The following text constitutes
Amendment Number 4 to the Official Plan of
the Municipality of Bayham

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OFFICIAL PLAN

OF THE

MUNICIPALITY OF BAYHAM

THE attached text constituting Amendment No. 4 to the Official Plan of the Municipality of Bayham was prepared upon the recommendation of the Council of the Municipality of Bayham after evaluation of public input pursuant to the provisions of the **PLANNING ACT**.

THIS Amendment was adopted by the Council of the Corporation of the Municipality of Bayham by By-law No. 2003-074, in accordance with Section 17 of the **PLANNING ACT**, on the 11th day of October 2003.

MAYOR _____ **CLERK** _____

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BY-LAW NO. 2003-074

THE Council of the Corporation of the Municipality of Bayham, in accordance with the provisions of the **PLANNING ACT**, hereby enacts as follows:

1. **THAT** Amendment No. 4 to the Official Plan of the Municipality of Bayham consisting of the attached text is hereby adopted.

2. **THAT** the Clerk is hereby authorized and directed to make application to the Minister of Municipal Affairs and Housing for approval of the aforementioned Amendment No. 4 to the Official Plan of the Municipality of Bayham.

3. **THAT** no part of this By-law shall come into force and take effect until approved by the Minister of Municipal Affairs and Housing.

ENACTED AND PASSED this 11th day of October 2003.

MAYOR **CLERK**

CERTIFIED that the above is a true copy of By-law No. 2003-074 as enacted and passed by the Council of the Corporation of the Municipality of Bayham.

CLERK

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OFFICIAL PLAN
OF THE MUNICIPALITY OF BAYHAM
AMENDMENT NO. 4

1. **PURPOSE**

The purpose of this amendment is to add policies to the Official Plan of the Municipality of Bayham regarding the establishment of wind energy conversion systems. The amendment is primarily intended to permit the establishment of wind turbines along the Lake Erie shoreline.

2. **LOCATION**

The area affected by this amendment generally comprises the areas of Concession I, II, III, and IV, in the Municipality of Bayham. It is anticipated that most wind power development will generally occur within 3 – 4 kilometres of the Lake Erie shoreline.

3. **BASIS OF THE AMENDMENT**

Due to its strategic location along the north shore of Lake Erie and due to an increasing interest by manufacturers for the establishment of wind energy systems in this location, the Municipality of Bayham has deemed it necessary to provide policies within their Official Plan to ensure the orderly development of wind turbines within the rural areas of the Municipality.

The policies outlined in this amendment have been developed in accordance with the Provincial Policy Statement with specific regard for issues relating to compatibility with surrounding land uses, long-term protection of agricultural uses, and setbacks from environmentally sensitive areas and hazardous areas.

These policies are intended to accommodate the development of individual wind turbines for on-site power consumption, as well as operations consisting of one or more wind turbines (wind farms) established for the purpose of producing energy for the public electricity grid.

Development of such uses will be pursuant to the approval of an implementing Zoning By-law Amendment.

4. **DETAILS OF THE AMENDMENT**

i) Section 4.2 – Rural Uses of the Official Plan of the Municipality of Bayham is hereby amended by adding the following subsection:

"4.2.8 **Wind Energy Resources**

4.2.8.1 The Municipality of Bayham supports the development of wind energy systems for electricity production, as a source of renewable energy for the economic and environmental benefit of the Municipality and the Province. In the Rural designations of the Official Plan, small scale individual wind turbines, for on-site domestic consumption of electrical wind energy will be permitted as of right. Wind farms, comprising one or more large wind turbine(s), where electrical wind energy is sold to the electrical grid, may be permitted through a zoning by-law amendment. It is intended that many of the safety, noise and visual impacts will be contained on the site of the wind farm.

4.2.8.2 Wind farms shall generally be located in Concession I, Concession II, Concession III and Concession IV, south of Calton Line, on large parcels of agricultural land having limited residential development on-site or nearby. The sites will be separated from Urban Land Uses found in the Hamlets or Villages designations of Schedule "A" in order to reduce the potential impact of safety, noise and visual intrusion on these areas. The proposed sites will have access to a public road with the existing design capacity to accommodate construction and maintenance vehicles needed for the wind farm. The site will have sufficient area to provide setbacks from sensitive residential and institutional land uses and to provide safety from structure collapse or falling ice. The wind energy system shall be designed, built, operated and maintained by firms/ individuals qualified to undertake the work.

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4.2.8.3 Wind Farms may be permitted by Zoning By-law amendment, in the Rural designation identified above, where the applicant demonstrates, through appropriate studies, undertaken by qualified professionals, that all issues related to the amendment application have been addressed. The applicant is encouraged to contact the municipality prior to commencing the background studies, to determine the nature and scope of the issues, which need to be addressed. The proponent shall undertake one or more of the following applicable studies:

a) A noise impact study will be undertaken to determine setbacks from wind farms so that, noise levels will not exceed the Ministry of the Environment noise standards for sensitive land uses;

b) A visual impact study will be undertaken to determine the impact and mitigation measures required for the shadow or reflection of light coming from any part of the wind turbine on adjacent sensitive land uses;

c) A visual impact study will be undertaken to determine the impact and mitigation measures required for wind turbines on the landscape as viewed from Lake Erie, municipal roads or other public access lands;

d) Where natural heritage features or functions are identified in the Official Plan, an environmental impact study shall be undertaken on the feature and measures identified to mitigate the impact;

e) Where landing strips, aerodromes or telecommunication systems exist in proximity to the proposed wind farm, a study shall be undertaken to ensure the siting and operation of the turbines will not impact on the operation or safety of these land uses.

f) Where vacant lands are located in proximity to a wind farm, consideration shall be given to allowing future development of those vacant lots in accordance with the noise, safety and visual impact or mitigation criteria for existing development.

4.2.8.4 Wind farms shall be subject to a site plan agreement, for the location of road access, parking, accessory buildings, vegetative buffers, location of external works/facilities, storm water management/drainage and any other identified mitigation measures."

DECISION

With respect to Official Plan Amendment No. 4
Subsection 17(34) of the Planning Act

I hereby approve as modified, Amendment No. 4 to the Official Plan for the Municipality of Bayham, adopted by By-law No. 2003-074, as follows:

1. Section 4.2.8.3 is modified by adding the following new clause:

"g) A planning justification report which demonstrates that the proposed wind turbines are located on lower priority agricultural lands, where possible; and which demonstrates wind turbine placement that minimizes the disruption to agricultural uses and normal farm practices.

h) Where a significant amount of agricultural land is proposed to be removed from agricultural use for the development of a wind farm, Council shall require the proponent to demonstrate that the proposed wind farm is a secondary use; protects agricultural uses and normal farm practices; and is compatible with and will not hinder surrounding agricultural operations."

Dated at London this 31st day of March, 2004.

John Maddox
Director
Municipal Services Office - Southwestern
Ministry of Municipal Affairs and Housing

4) **THAT** By-law No. 456-2003, as amended, is hereby further amended by adding Section 30.0 – WIND FARM ZONE REGULATIONS, as shown on Appendix 1, which is attached to and forms part of this by-law.

5) **THIS** By-law comes into force:

a) Where no notice of objection has been filed with the Municipal Clerk within the time prescribed by the Planning Act and regulations pursuant thereto, upon the expiration of the prescribed time; or

b) Where notice of objection has been filed with the Municipal Clerk within the time prescribed by the Planning Act and regulations pursuant thereto; upon the approval of the Ontario Municipal Board.

READ A **FIRST** TIME THIS 4th DAY OF March 2004.

READ A **SECOND** TIME THIS 4th DAY OF March 2004.

READ A **THIRD** TIME AND **FINALLY PASSED** THIS 4th DAY OF March 2004.

MAYOR **CLERK**

PLANNING ACT
NOTICE OF THE PASSING OF A ZONING BY-LAW BY
THE CORPORATION OF THE MUNICIPALITY OF BAYHAM

TAKE NOTICE that the Council of the Corporation of the Municipality of Bayham passed By-Law No. Z460-2004 on the 4th day of March 2004 under Section 34 of **THE PLANNING ACT**.

AND TAKE NOTICE that any person or agency may appeal to the Ontario Municipal Board in respect of the By-law by filing with the Clerk of the Municipality of Bayham not later than the30th day of March 2004, a notice of appeal setting out the objection to the By-law and the reasons in support of the objection.

ONLY INDIVIDUALS, CORPORATIONS AND PUBLIC BODIES may appeal a zoning by-law to the Ontario Municipal Board. A notice of appeal may not be filed by an unincorporated association or group. However, a notice of appeal may be filed in the name of an individual who is a member of the association or group.

THE PURPOSE of the amendment is to add new definitions, general provisions, and regulations related to the establishment of wind turbines in the Municipality of Bayham. A key map is not attached as these regulations will apply to the entire municipality.

THE EFFECT of this By-law will be to allow for the establishment of privately-owned wind turbines as well as larger wind farm operations in rural areas of the Municipality.

The complete By-law is available for inspection in the municipal office during regular office hours.

DATED AT THE MUNICIPALITY OF BAYHAM THIS 10th DAY OF MARCH 2004.

Margaret Underhill
Planning Co-ordinator / Deputy Clerk
Municipality of Bayham
P.O. Box 160
Straffordville, ON, N0J 1Y0
Telephone: (519) 866-5521
Fax: (519) 866-3884

NOTE: The fee for filing an objection or appeal of a Zoning By-law to the Ontario Municipal Board is presently set at $125.00 by the Province of Ontario.

THE CORPORATION OF THE
MUNICIPALITY OF BAYHAM
BY-LAW NO. Z460-2004

BEING A BY-LAW TO AMEND BY-LAW No. Z456-2003

WHEREAS the Council of the Corporation of the Municipality of Bayham deems it necessary to amend Zoning By-law No. Z456-2003;

THEREFORE, the Council of the Corporation of the Municipality of Bayham enacts as follows:

1) **THAT** By-law No. 456-2003, as amended, is hereby further amended by amending Section 2.0 – Definitions, by adding the following new subsections:

"2.254 **Wind Farm** shall mean a development of one (1) or more wind turbines, together with any related appurtenances, intended to provide electricity off-site for sale to an electrical utility, or other intermediaries.

2.255 **Wind Testing Tower**, shall mean a single structure erected on a temporary basis, normally not exceeding one year, for the purpose of testing the potential wind strength for generating electricity.

2.256 **Wind Turbine**, shall mean a structure including a tower, nacelle, blades and related appurtenances, designed, erected and maintained under the appropriate qualified supervision, and used for the conversion of wind energy into electricity for sale to an electrical utility or other intermediaries. The height of the wind turbine shall be measured from the highest point of the tower, to the lowest grade elevation at the base of the tower.

2.257 **Wind Turbine, Accessory**, shall mean not more than one accessory structure including a tower, nacelle, blades, and related appurtenances, designed, erected and maintained by a qualified personnel, used for the conversion of wind energy into electricity primarily for use on site and having a nameplate capacity not exceeding 50 kilowatts."

2) **THAT** By-law No. 456-2003, as amended, is hereby further amended by amending Section 4.0 – General Provisions, by adding the following new subsection:

"4.57 ACCESSORY WIND TURBINES

Accessory wind turbines may be located in any Agriculture (A1, A2), Rural Residential (RR), Estate Residential (ER) Rural Commercial (RC) or Rural Industrial (M2) Zone, where the minimum setback is 1.25 times the height of the wind turbine from the nearest portion of the structure to the front, side and rear lot lines and where the height is measured from the highest point of the blade rotation to the lowest grade elevation at the base of the tower. No wind turbine shall be located within the front yard depth or exterior side yard depth.

3) **THAT** By-law No. 456-2003, as amended, is hereby further amended by amending Section 4.0 – General Provisions, by deleting subsection 4.29 and replacing it with the following new subsection:

"4.29 HEIGHT

The height regulations of this By-law shall not apply to any silo, grain handling equipment, wind turbines, wind testing towers, ornamental dome, chimney, communications tower, cupola, steeple, church spire, water storage tank, elevator enclosure, flag pole, skylight, clock towers, ventilators, antennae, radio or television receiving or transmitting equipment, or any accessory mechanical appurtenances. Such features, however, shall be erected only to such height as is necessary to accomplish the purpose they are to serve."

MEMORANDUM

VIA Fax / Mail

TO:	**Township of Malahide**	**DATE:**	**February 4, 2003** P:\2002\03\Windmills.MEM.doc
FROM:	**William Pol**	**FILE:**	**2002**
SUBJECT:	**Wind Generated Electricity – Township of Malahide**		

1.0 INTRODUCTION

In October 2002, Cumming Cockburn Limited was asked to proceed to develop draft Official Plan policies and Zoning regulations related to "Wind Generated Electricity" in partnership with the Municipality of Bayham. The request was made in response to an enquiry from an electrical wind generation proponent to install a wind testing facility in the Township. This memo was prepared to describe wind energy projects, identify potential land use impacts, discuss policy approaches and recommend future actions. Through our background research, it became evident, that there are a number of alternative energy sources, in addition to wind energy, that may be considered in the same Official Plan policies and Zoning By-law regulations. The range of alternative energy sources includes wind energy, solar energy, biomass energy and geothermal energy.

2.0 ALTERNATIVE ENERGY FORMS

The purpose of alternative energy generation is to reduce our reliance on traditional fossil fuels, lessen the impact on the environment caused by the burning of fossil fuels and offer economical energy alternatives to the consumer. While alternative energy forms generally have fewer impacts on the environment, they are not without their own localized risks and effects. The following paragraphs provide an overview of the alternative energy forms.

2.1 Wind Energy

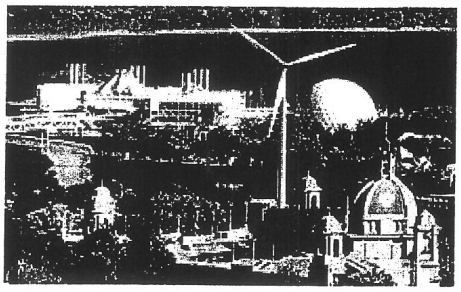
Wind energy, involves the conversion of kinetic wind energy into electricity through the rotation of large blades facing into the wind. The rotors turn generators mounted on high towers, which produces the electricity. The power generated is connected to the electrical grid for use by individuals or sold on the open market. The turbine's blades begin spinning with a wind speed of approximately 11 kilometers per hour and normally start generating electricity with a wind speed of 16 kilometers per hour.

Over time the towers and blades have become higher and higher to increase the access to consistent winds. The tower heights now range from 30 – 49 metres (100 – 160 feet) above the ground and rotor spans range from 25 – 44 metres (82 – 144 feet). These turbines are rated at 225 – 750 kilowatt (kW). Effectively, the rotor span rises above the height of the tower to create a physical structure, which is 55 – 94 metres high (180 - 300 feet) or roughly the height of an 18 – 30 storey building. The towers are made out of either a lattice work (open frame) or tubular steel construction. The

tubular towers are anchored to a concrete pad foundation, 4.5 - 10 metres (15 – 35 feet) deep, while the lattice towers use three or four smaller piers at a similar depth. The following picture shows an example of a wind turbine recently installed and in operation at Exhibition Place in Toronto.

Wind Turbine Stats:

- **Stands 94 metres tall (30 stories)**
- **Blades are 29 metres long**
- **Weighs 121,000 kg**
- **Rotates 21 times a minute**
- **Has a life span of 20+ years**
- **Powers 250 homes annually**



The size of wind projects vary from small systems of one or several towers generating 1 kW to 25 megawatts (MW) providing on-site power to larger commercial wind facilities consisting of 20 to 1,000 towers generating 5 to 100 MW of power. A 50 MW wind facility, consisting of 200 towers may require up to 600 hectares (1,500 acres) of land area to function, but the amount of land actually occupied by towers and buildings would range from 3% – 5% of the total site, leaving the rest available for other compatible land uses, such as agriculture.

2.2 Solar Energy

Solar energy requires the conversion of kinetic heat energy from the sun into electricity through the exposure of specially designed panels that convert heat into electrical energy. These panels are mounted on the roofs of buildings and angled to absorb as much of the heat as possible. Normally, the solar energy is for on site use, although there are commercial solar energy facilities in climates, with higher rates of sun exposure.

2.3 Biomass Energy

Biomass energy involves the burning of organic waste such as sawdust, wood chips, biosolids or manure for conversion into heat for the production of electricity. Alternatively, the production of methane from organic matter can be burned to create electricity. There is a feasibility study underway in Chatham-Kent to create electrical energy from the burning of biosolids.

2.4 Geothermal Energy

Geothermal energy involves the conversion of the constant temperature in the upper 3 metres of the earth into heating in the winter and cooling in the summer. An electrically powered heat pump moves a fluid through a series of pipes buried in the ground to absorb or relinquish heat found in the ground. The geothermal heat pump uses much less energy because it draws existing heat or cooling from the ground.

3.0 SCALE OF WIND GENERATED ELECTRICITY

Alternative energy generation, and in particular wind energy generation, has three scales of operation. The first scale would involve pilot projects to determine if the physical characteristics of the site provide sufficient wind energy for economical commercial production of electricity. The size of the wind turbine or wind testing towers may be similar to permanent towers, but will likely have a limited number of years of operation. This test scale of operation may be considered a temporary use.

The second scale of electrical wind generation operation is for on-site use, where an individual farm operation, homeowner or business wishes to build an electrical generation facility exclusively for their own use. This operation would normally consist of one wind turbine located close to the building. When the wind turbine generates surplus electrical power, there may be an opportunity to feed this power into the public electrical grid.

The third scale of operation for alternative energy forms is the commercial/industrial production of wind energy for sale to the open market. This scale of development may include hundreds of wind turbines, requiring significant amounts of land, support buildings and a connection to the Ontario hydro distribution grid. The use of land is extensive and can occur compatibly with agricultural crop or livestock production. There is also an opportunity to locate the towers in Lake Erie and have a land based maintenance and electrical distribution system.

4.0 WIND ENERGY IMPACTS

The discussion on land use impacts is related to commercial scale wind generated electricity, where the wind facility has a rated production capacity of more than 1 kW of power. Where testing for wind energy is under consideration, the structures and potential impacts are considered temporary and should be evaluated on a site specific and time limited basis. The testing may also consider the off site impacts related the project.

Structures and facilities, which provide less than 1 kW of power, may be considered accessory, to the main use of the lands for farm, industrial, commercial or residential purposes. The scale and siting of the project should ensure that the impacts of noise, light and safety risk are contained primarily on the site where the structure is operated. The following sections discuss commercial/industrial wind facilities, where the electrical energy generated is used off site and the number of power generating turbines is greater than one.

4.1 Public Health and Safety

The concerns to public health and safety are related to blade throw, tower failure and falling ice. Blade throw is the rare instance where the turbine blade, or pieces of the blade, separate from the rotor and fly off downwind with potential personal injury or property damage. Tower failure is the falling of the tower to the ground resulting from high ice loads, poor foundations, salt corrosion at the base, or high winds. In certain weather conditions ice may build up on the turbine blades and as the blades warm the ice melts and either falls to the ground or can be thrown by the blades. Another concern is the ice falling from the tower structure and/or generator housing, directly under the wind turbine.

4.2 Municipal Infrastructure

The need for municipal services for the operation of wind generating facilities is limited to the availability of roads to accommodate heavy equipment needed for site preparation, transportation of construction supplies and components, and for the erection of turbines and electrical poles/towers. The need to provide municipal sanitary or municipal water services or other utilities would be limited to the needs of rural industrial land uses. Depending on the proximity of airports or communication towers and the location of wind turbines, there may be impacts on air navigation or communication transmissions to be considered.

4.3 Noise Impacts

Noise impacts are generated by wind passing over and past the blades of the turbines (swishing or whooshing sound) and mechanical noise (tonal noise) from the generator bearings, creaking of the turbine structure or high speed cooling fans. When the wind is turbulent, it can make low frequency noise as it buffets the towers or an impulsive noise every time a blade passes through the wind shadow in a downwind turbine design. The most noticeable aerodynamic noise is created by the wind, just above the cut-in wind speeds and before the background wind noise, rises to mask the noise of the turbine.

4.4 Visual Impacts

Visual impacts are created by the reflection of light (normally the sun) off of the turbine blades onto surrounding residences or roads and the aesthetic impact of the tall structures on the landscape. The reflection of sunlight would normally be temporary, while the sun is at a certain angle relative to the blades. Secondly, the visual impact of the tower structure and blades, 18 – 30 storeys high, can have a visual impact on the horizon and on viewing areas. The number and concentration of turbines in any one area, will affect the visual impact of this commercial/industrial land use.

4.5 Birds and Environmental Resources

Birds and bats are at risk of being hit or striking the structures or the blades of wind turbines. Normally, migrating birds fly at heights between 1,500 and 2,500 feet above ground level and are not at risk. Studies have confirmed that when visible, birds will change direction and fly around wind turbines. An additional concern is any impact on environmentally significant landforms or natural vegetation during construction and installation of the wind turbines.

4.6 Air Quality and Climate

There are no air emissions from the wind turbine generation process because there is no combustion of gases involved. With respect to local micro-climate impacts, there is normally a slight reduction in wind speed, increased turbulence and slightly increased relative humidity. These impacts are spread approximately 7 – 20 rotor blade diameters, downwind and are considered relatively insignificant.

MEMORANDUM

TO:	Township of Malahide	**DATE:**	March 22, 2004
FROM:	William Pol, MCIP, RPP Consulting Planner to the Township of Malahide	**PROJECT:**	2002 – Advisory P:\2002\04\AIM-ErieShores\WindFarmMem.doc
RE:	AIM PowerGen – Wind Farm Official Plan and Zoning By-law Amendment		

The purpose of this memo is to present the draft Official Plan amendment for the Township of Malahide and the AIM Power Gen Zoning By-law Amendment, to permit the development accessory wind turbines and a commercial wind farm along the north shore of Lake Erie. There are a number of wind turbines proposed, each producing 1.8 megawatts of electrical energy on tubular towers with a hub height of 78 metres and three blades with a length of 39 metres. The towers will be connected to the electrical grid along a transmission corridor of the former railway line running between Port Burwell and Tillsonburg. The following memo is divided into three parts addressing the draft Official Plan amendment, the proposed zoning by-law regulations and the proposed mapping changes.

By way of background, Council undertook a site visit of the Bruce Wind Farm on March 31, 2003 and Cumming Cockburn Limited presented a wind farm report to Council in May, 2003 presenting draft Official Plan and Zoning regulations for wind farms. Further activity was deferred pending the application by AIM Power Gen received in Janaury 2004

Part I - Official Plan Policies

1. The draft Official Plan amendment is divided into four parts. The policies will be added to Section 4.0 Land Use Policies, Section 4.2 Rural Uses of the Plan. It will apply to all lands designated Agricultural in the Township.

   - Part 1 indicates Council's support for as of right accessory wind turbines for on-site use and support for commercial wind farms through a zoning by-law amendment.
   - Part 2 directs commercial wind farms to locations in the rural area with limited residential development nearby to provide separation distances from potential impacts.
   - Part 3 sets out background work to be undertaken by applicants in support of a zoning by-law amendment. This background information can be evaluated to determine the potential impact of the turbines.
   - Part 4 of the policy provides for site plan agreements for wind farms to ensure site details are addresses during construction and operation of the wind turbines.

2. The remainder of this section will address how the proposed amendment fulfills the criteria of the Official Plan. The location of the zoning by-law amendment is in conformity with the draft Official Plan policies, in an area along the lakeshore, generally removed from residential areas and in agricultural areas where sufficient setbacks can be provided to mitigate potential safety, noise and visual impacts. With respect to safety, the turbines automatically stop rotating when there is an ice build up on the blades to prevent damage to the blades. Ice build up on the top of the tower will eventually evaporate or fall to the base of the turbine without any public risk.

Consulting Engineers of Ontario | 350 Oxford Street West, Suite 203 London, ON N6H 1T3 | T: 519.472.7328 | F: 519.472.9354

3. The noise criteria established in Section 4.2.8.3 a) of the draft Official Plan amendment relies on the Ministry of Environment standards of 45 dBA from 7 am to 7 pm and 40 dBA from 7 pm to 7 am at the wall of a dwelling unit. Noise is generated from the wind against the blades and from the gear box at the top of the tower. The most significant noise impact will be when the wind turbine is turning in light wind conditions. In stronger wind the background noise will mask the turbine noise. In discussions with AIM Power Gen and other experts in the field, a Vestas 666 kV wind turbine can meet the daytime standard at a setback of 240 metres and the night time standard at 400 metres setback. AIM will be required to demonstrate noise levels which meet the MOE standard, for the wind turbines they are proposing to use, prior to site plan approval.

4. Section 4.2.8.3 b) of the draft policy, addresses shadow flicker and reflection from the movement of the wind turbine blades, which may occur at limited times when the sun is at an oblique angle and there is sufficient sunlight to create the shadow. These potential impacts decrease quickly as turbine is separated from the residential land use. Painting of the blades with a matt finish will reduce sunlight reflection. Shadow flicker is only a temporary impact at limited times of the year. The exact location of the turbines may be adjusted to minimize possible shadow impact.

5. Section 4.2.8.3 c) of the draft policy sets out the policy regarding visual impact along the Lake Erie shoreline. The impact is expected to be minimal based on the setbacks required from the eroding shoreline and the increased setbacks of 600 metres from the Village of Port Bruce. Over time as the structures become part of the everyday landscape, they will blend into the landscape, similar to electric transmission towers, telephone poles etc.

6. Section 4.2.8.3 d) of the draft policy identifies natural features which need to be considered as part of the application. The applicant has undertaken migratory bird studies and determined that the wind turbines proposed will have no impact on the bird population. There are no other natural heritage features which are in the areas proposed for the zoning by-law. The required setbacks from natural hazards of the shoreline or ravines, will be determined through the existing zoning setbacks in co-operation with the Conservation Authority.

7. Section 4.2.8.3 e) sets out draft policy for landing strips and telecommunications systems. There is one NAV CAN beacon located on the north half of the 3rd Concession in Lot 30. It is located more than three (3) kilometres from the wind turbine locations and is very unlikely to create a conflict with land use. No air strips have been identified in proximity to the proposed zoned areas which may be impacted by the turbines.

8. Section 4.2.8.3 f) is a draft policy to consider the impact of wind turbines on normal farm practice. We have received comments from the Ministry of Municipal Affairs regarding the placement of turbines to reduce the possible impact on normal farm practices. In speaking with land owners, there is an interest in placing the turbines where there will be the least impact on farm operations. The literature suggests that not more the 5% of any one area is required for the development of the wind farm. The draft policy indicates where they will be located to limit disruption and when a significant amount of land is taken out of agricultural production, a report will be undertaken.

Part II - Zoning By-law Regulations:

1. The text of the draft Zoning By-law amendment is divided into four parts. The first part adds the required definitions, the second part allows for the establishment of accessory wind turbines in certain zones, the third part addressed the height of the structure; and the last part creates zone regulations to permit the turbine and setbacks. The regulations will apply to any contiguous area zoned to permit a wind turbine. Where property lines running through an area zoned to permit wind turbines it will be interpreted to be

one contiguous lot for zoning purposes and not limit the location of a turbine on a common lot line. This regulation is based on a common wind development agreement across abutting properties. Where new amendments for wind turbines are received, the applicant would be expected to request the Wind Farm (WF) Zone be applied in addition to the existing Agricultural Zoning for the site.

2. The definitions amendment includes the following:

   - Wind Farm – a commercial operation of more than one wind turbine;
   - Wind Turbine – a structure including blades for the conversion of wind energy into electrical energy, constructed and operated by qualified personnel; and
   - Accessory Wind Turbine - a wind turbine of not more than 50 kilowatt capacity, primarily for domestic use.

3. The second section amends the General Provisions to allow an accessory Wind Turbine with a capacity of not more than 50 kilowatts to be built in the rural area of the municipality not closer to a lot line than 1.25 times the height of the tower.

4. The third section amends the General Provision with respect to Height to permit a turbine and the wind testing towers at a height required to accomplish the purpose they serve. There is no height limit on the towers because the towers are increasing in height and power as technology improves. The height is indirectly limited by the setbacks from the surrounding dwellings and roads.

5. The Wind Farm Zone will be added as Section 21.0 to the By-law. The permitted Wind Farm use will be in addition to the permitted Agriculture (A1) Zone uses. The uses will allow the Wind Farm and any accessory uses needed for the operation and maintenance of the wind turbine. It is intended to clearly allow the continuation of all permitted agricultural land uses. The minimum lot area of 10 hectares and 100 metres of lot frontage are proposed as reasonable standards for the establishment of at least one wind turbine.

6. The required setback from roads and property lines in another zone is the blade length plus 10 metres, but not less than 30 metres. This setback is recommended on the basis that it allows flexibility to locate the towers on areas of the lot which are not suitable for agricultural uses and away from residential or institutional land uses which may be impacted by the noise from the turbines. The rotor blade for the proposed tower is approximately 39 metres long and the additional 10 meters would make the setback 49 metres. This setback is more than three times the front yard setback of 15 metres, permitted in the Agricultural (A1) zone, allowing sufficient area for the construction of the base and a small area for an access road and connection to the electrical grid.

7. The setback from on-site residential buildings is 250 metres or 1.25 times the turbine height whichever is greater. This standard is slightly less than that for off-site dwellings on the basis these owners enjoy some benefit from having the turbines on their lands. The off-site residential and institutional setback is 300 meters. Based on the literature and preliminary studies, this setback is sufficient to meet the Ministry of Environment requirements for noise levels for day time outdoors limits.

8. The setback from the Hamlet zones, is increased to 450 metres to recognize the larger number of residences and to create a greater visual setback from the area. The setback from the Village of Port Bruce, Village of Springfield and Town of Aylmer is increased to 600 metres to recognize the larger population and allow for future growth of the urban areas without creating a conflict with the wind turbines.

9. Finally, in order to ensure that the primary use of the land remains in agricultural production, a maximum lot coverage for the turbine, accessory buildings/structures and road, is limited to not more than 5% of any one lot. In reviewing background material, the lot coverage range is normally 3% - 5% of the lot for wind farm buildings/structures and is therefore not a significant restriction.

Part III - Zoning By-law Maps:

1. The Zoning By-law has been divided into two separate by-laws for the purpose of convenience. The first by-law creates the Wind Farm (FW) definitions and zone regulations. The second by-law applies the zone to specific areas of the municipality where the wind farms will be permitted. Where a resident is concerned about the Wind Farm text, they can appeal that amendment. Where a property owner expresses concern regarding the use of a particular area for wind turbines, they can appeal the map amendment.

2. AIM Power Gen has applied for a zone change on 6 individual areas (see the attached key map) which are abutting for zoning purposes, but may be held in separate ownerships. Subsequent to the notice of the amendment, certain property owners advised they had not completed lease agreements with AIM Power Gen. Those properties have been removed from the proposed zoning by-law amendment. The areas have been further revised from the original newspaper notice as a result of discussions with the applicant to lands in Concessions I, II and III and selected lots from 18 to 35. We have applied the draft zoning by-law regulations to the lands requested for rezoning.

3. Based on the application of the draft zoning regulations, all 6 of the 6 sites requested in the zoning amendment are suitable for the location of a wind turbine and are recommended to have the Wind Farm zone applied. These sites are generally large, contiguous with abutting lands under lease with the same wind farm corporation and have sufficient setbacks from hamlets, villages and off-site residential uses to minimize potential impact.

Conclusion:

1) The draft Official Plan policies, were prepared and reviewed for the purpose of providing a framework for Council to consider area specific zoning by-law amendments and having regard to the Provincial Policy Statement;

2) The proposed zoning regulations are appropriate for the development of accessory wind turbines and large scale wind farms, providing setbacks which mitigate potential safety, noise and visual impacts on sensitive residential/institutional uses; and

3) The area specific Wind Farm mapping amendments, submitted by AIM Power Gen are applied to lands which are capable of accommodating wind turbines and conform to the intent of the draft Official Plan polices and Zoning By-law regulations.

CUMMING COCKBURN LIMITED
William Pol, MCIP, RPP
Consulting Planner to the
Township of Malahide

Appendix 1

SECTION 30 – WIND FARM (WF) ZONE REGULATIONS

30.1 **PERMITTED USES**

No land shall be used and no buildings or structures shall be erected, used, or altered in the Wind Farm (WF) Zone except for the following purposes:

Wind farm;

Uses permitted in the associated Agricultural A1 or A2 Zone.

Accessory uses

30.2 **PERMITTED BUILDINGS AND STRUCTURES**

Buildings and structures for the permitted uses.

30.3 **MINIMUM LOT AREA AND LOT FRONTAGE**

a) 10.0 hectares

b) 100 metres

30.4 **MINIMUM YARD WIDTH/DEPTH**

1.0 times the total length of the rotor blade, plus 10.0 metres, from the base of the tower to the common wind farm zone boundary and any public road right-of-way limit, but not less than 30 metres.

30.4 **MINIMUM SETBACKS**

a) From an on-site residential use:	1.25 times the height of the wind turbine or 250 metres, whichever is greater
b) From an off-site residential dwelling or institutional building:	300 metres
c) From a Village Residential (R1/R2), Central Business District (C1), Local Commercial (C2) or Tourist Commercial (C3) Zone in the Village of Vienna as shown on Schedule "H":	450 metres
d) From a Village Residential (R1/R2), Central Business District (C1), Local Commercial (C2) or Tourist Commercial (C3) Zone in the Village of Port Burwell as shown on Schedule "I", and a Hamlet Residential (HR) and Hamlet Commercial (HC) Zone:	600 metres

30.5 **MAXIMUM LOT COVERAGE**

The use of the lot for wind turbine structures, accessory buildings and structures, road access, storage areas and any area removed from agricultural production shall not exceed 5% of the lot area.

30.6 **EXCEPTIONS – Wind Farm (WF) Zone**

4.11 ENERGY CONSERVATION AND DEVELOPMENT

It is the policy of County Council, when considering development or redevelopment, to encourage, where practical, measures which lead to the conservation of energy resources. These measures may include:

a) maintaining a reasonably compact urban form;

b) establishing efficient pedestrian and vehicular transportation networks;

c) providing neighbourhood services and facilities in proximity to residential development to reduce vehicular travel;

d) avoiding development which results in extensive loss of sunlight to adjacent land uses;

e) encouraging the energy-efficient design of buildings;

f) encourage the use of energy efficient appliances, heating and cooling systems, low water bathroom facilities, and other innovative technologies;

g) allowing for the placing of buildings on lots to encourage passive solar energy gain; and

h) incorporating district heating, solar and wind energy and similar designs into residential, commercial, institutional and industrial development.

i) incentives for the use of energy efficient technology.

4.12 WATERSHED PLANNING

The County encourages the preparation of watershed and subwatershed studies where major development or redevelopment are proposed, which would have a significant downstream impact upon a watershed. These studies are most needed in areas with both development pressures and highly sensitive natural environments to provide some understanding of the relationship between water resources and land use activities. The development of sound watershed and subwatershed plans will require cooperation between all effected

municipalities, Government agencies and interested groups to ensure that potential cross boundary environmental impacts are addressed. The results of watershed studies should be incorporated into the County and/or Municipal Official Plans whenever practical.

4.13 SURFACE WATER MANAGEMENT PLANS

In order to control flooding, ponding, erosion and sedimentation and to protect, as much as possible, water quality and aquatic habitat or other natural habitat which depend upon watercourses and other water bodies for their existence, surface water management plans (or stormwater management plans) shall be required for some forms of new development. Stormwater management techniques are constantly evolving as well as being dependent on the location. Thus, new development will comply with the stormwater management standards in general acceptance at the time a development application is made, through consultation with the appropriate Government agencies.

Local Official Plans should implement specific surface water management policies.

Surface water management plans shall be required for any new development consisting of more than five lots or for commercial or industrial developments with large amounts of impervious area.

Such plans may be required for other developments, as determined by the local municipality in consultation with the appropriate Government agencies, if the area has existing drainage problems or if runoff could significantly affect adjacent lands or water quality.

4.14 WIND ENERGY CONVERSION SYSTEMS

Wind Energy Conversion Systems (W.E.C.S.) consist of mechanical devices designed to convert wind energy into electricity. These systems can occur at small or large scales in the Municipality. Small scale systems are those which generate less than nameplate capacity rating of 50 kV.a and normally comprise only one generating device. Large scale systems are more appropriately described as Commercial Generating Systems and involve one or more generating devices which collectively produce more than nameplate capacity rating of 50 kV.a. The latter systems are generally referred to as 'Wind Farms' and are usually located in areas where climate (ie. wind) conditions create a conducive environment for W.E.C.S.

4.14.1 **Small Scale Generating Systems**

Small scale generating systems produce less than nameplate capacity of 50 kV.a and generally tend to generate electricity only for the property owner.

The establishment of a small scale generating system is normally permitted under the zoning provisions of the Municipality's Zoning By-Law as a structure accessory to the principle use of the property.

4.14.2 Commercial Generating Systems

Commercial generating systems are a more intensive use and produce in excess of nameplate capacity rating of 50 kV.a and comprise one or more generating units. The commercial scale systems are intended to feed electricity into the transmission grid of Ontario Hydro in keeping with Ontario Hydro's policies regarding Renewable Energy Technologies.

Given the usually large scale of Commercial Generating Systems, it is anticipated that these will tend to locate outside of urban areas. A Commercial Generating System is considerably different from the typical uses located within the Agricultural or Rural areas. The County therefore feels that it is important to carefully control the establishment of these large scale systems, to ensure the compatibility and safety of neighbouring residents.

Commercial generating systems will be permitted by an Amendment to the Zoning By-Law. Prior to the local Council considering the approval of a Commercial Generating System, the following policies should be addressed:

(i) A professional drawing or Site Plan shall be provided illustrating the location of the proposed turbines, as well as the location and height of all existing buildings and structures on the subject property and the location and height of all existing buildings and structures within 500 metres of the subject property.

(ii) A professional engineer shall approve the base and tower design of the turbines.

(iii) The development shall be subject to Site Plan Control under the Planning Act, and an appropriate agreement may be required.

(iv) The applicant shall review his approach with the Ministry of the Environment and Energy concerning noise attenuation, to ensure that the proposal will comply with the Ministry's requirements.

(v) Setbacks from road allowances, lot lines, and structures (on-site and off-site) and maximum height provisions shall be established in the Zoning By-Law Amendment.

proximity to urban areas, or multiple lot subdivisions depending upon the number of turbines proposed. Where potential wind farm sites are proposed within proximity to an urban area of multiple lot subdivision, the applicant's planning study shall address the potential impacts of the wind farm on these adjacent land uses and explain how such impacts may be reduced.

(viii) Prior to rezoning, a contract has to be executed with the local utility or Ontario Hydro, to allow connection for electrical distribution.

3.0 LAND USE POLICIES

3.1 Land Use Designations and General Policies

The land use policies of this Plan have been developed through the use of land use designations as shown on the Land Use Plans forming Schedules to this Plan.

The Land Use Plan includes the following schedules:

Schedule "A-1"	General Land Use Plan
Schedule "A-2"	Village of Lucknow Secondary Plan
Schedule "A-3"	Village of Ripley Secondary Plan
Schedule "A-4"	Lakeshore Urban Area Secondary Plan

Each land use designation within this section of the Plan is described in terms of its objectives, uses and development policies. The applicable policies of the balance of this Plan shall be considered in conjunction with the land use policies under this section.

The following public and regulated services and utilities are permitted in all land use designations subject to compliance with a Provincial or Federal Act or the regulations governing such use.

1) All electric power facilities as defined by the Power Corporation Act.
2) Infrastructure required for municipal water supply and distribution, sewage collection and treatment, public roads and trails supportive of the land use policies of this Plan;
3) Any building, structure, facility or use of or by the Township of Huron-Kinloss or the County of Bruce.
4) Facilities required for telecommunication and data transmission.

Administrative offices, maintenance buildings or yards of regulated service or utility companies shall conform to the appropriate land use designation and policies of this Plan.

The Township's Zoning By-law may establish regulations which limit or regulate the provision of public and regulated services and utilities.

3.1.1 Commercial Wind Generation Systems

Commercial wind generation systems (wind farms) are defined as one or more wind generating devices (turbines) which collectively produce more than nameplate rating capacity of 2 MW and are connected to the provincial transmission grid of Hydro One. Commercial wind generating systems are permitted in the Agricultural and Rural Areas designations of this Plan subject to the requirements of this Plan and an amendment to the Zoning By-law.

Small scale systems defined as one wind generating device of nameplate rating capacity of less than 2 MW are permitted as an accessory structure in the Agricultural and Rural Areas without amendment to the Zoning By-law.

The Zoning By-law will provide regulations for all wind generating devices governing the maximum height and setbacks to public roads and adjoining lots.

Council will evaluate the suitability of the location and land use compatibility of proposed commercial wind generating systems and require the following:

a) A Site Plan shall be provided illustrating the location of the proposed turbines, as well as the location and height of all existing buildings and structures on the subject property and the location and height of all existing buildings and structures within 500 metres of the subject property.

b) A professional engineer shall approve the base and tower design of the turbines.

c) The development shall be subject to Site Plan Control under the Planning Act, and an appropriate agreement may be required.

d) The applicant shall review their approach with the Ministry of the Environment and Energy concerning noise attenuation, to ensure that the proposal will comply with the Ministry's requirements.

e) Commercial Wind Generation Systems constructed within 10km of an airport reference point will require the written approval of Transport Canada. Such approval will provide assurance that there will be no adverse effect on the instrument approaches to the airport.

f) Commercial Wind Generation Systems are permitted in Rural Areas and may be permitted in Agricultural Areas where they can be located on land of lower agricultural capability or ensure the continued use of prime agricultural land for farm use and minimize the loss of production farm land. All sites shall be separated from urban areas by a minimum of 1,200 metres and comply with the regulations of the Zoning By-law.

g) Wind farms which generate in excess of 2 MW of energy are subject to an Environmental Screening Process as set out in the Ontario Environmental Assessment Act.

3.2 Agricultural Areas

3.2.1 Objectives

Agriculture is the predominant use of land in the Township of Huron-Kinloss. The protection of the agricultural land base is of primary importance for the maintenance of the economic and social fabric of the community. The protection of prime agricultural land as defined in the Provincial Policy Statement is established in this land use designation.

3.2.2 Definition

The Agriculture Areas designation includes contiguous prime agricultural land as defined in the County of Bruce Official Plan and isolated pockets of non-prime land as defined by the minimum requirements of the County Plan.

It is the intention of this definition to remove any small pockets of non-prime agricultural land that may compromise agricultural use and effective farm operations on prime agricultural land.

3.2.3 Permitted Uses

Within areas designated Agricultural Areas on Schedule "A-1" of this Plan, the permitted uses include agricultural uses, secondary uses and agriculturally related uses. Existing institutional uses, such as places of worship, schools and cemeteries, are also permitted in the Agricultural designation.

3.2.3.1 Primary Uses

Agricultural uses include the growing of crops, raising of livestock, poultry and other animals for food or fur, aquaculture, apiaries, orchards, forestry and specialty farming. It also includes agricultural research, nursery and horticultural crops. Farm residence, farm buildings and structures, including greenhouses and buildings and structures for the parking, storage, processing and treating of products grown or raised on the farm are permitted.

In addition to the primary farm residence, one accessory dwelling unit may be created through an addition to or the conversion of an existing farm residence.

COUNTY OF BRUCE

PLANNING & ECONOMIC DEVELOPMENT DEPARTMENT

⊠ Box 848, 30 Park Street, Walkerton, Ontario N0G 2V0 (519) 881-1782 Fax (881-1619)
□ Box 129, 578 Brown Street, Wiarton, Ontario N0H 2T0 (519) 534-2092 Fax (534-1174)
Chris LaForest, MCIP Director

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RE: Application Requirements for Commercial Wind Energy (Turbine) Facilities

Dear

The County of Bruce and its member municipalities are committed to the development of wind energy facilities in suitable locations in the County. Proposals for Commercial Wind Energy (Turbine) Facilities will be assessed against Provincial, County and local planning policies; information provided by agencies and the public; and in relation to other matters as specified in the Planning Act R.S.O. 1990 (as amended), the Environmental Assessment Act and the Environmental Protection Act.

Wind turbines used to generate electricity can have significant visual, environmental and amenity impacts depending on their location. Planning can contribute to the provision of renewable energy by facilitating wind energy development in appropriate locations in a manner that appropriately balances their environmental, social and economic benefits with any demonstrated visual, environmental and amenity impacts. The County and member municipalities will endeavour to balance these matters in favour of an overall net community benefit.

In order to facilitate a viable wind energy industry, planning applications need to include sufficient information and explanation to allow the approval authorities to come to sound and timely decisions. The following Application Requirements should assist you in the design and siting of your proposed wind energy facilities and in preparing planning applications. The Application must be accompanied by sufficient material for the Province, County, local councils and the public to understand what is proposed and the potential impacts, if any, from such an approval.

APPLICATION REQUIREMENTS
The following information must accompany an application for a wind energy facility. The Report may include maps, site drawings, photographs and other supporting documents.

1. ENVIRONMENTAL ASSESSMENT ACT
[Electricity Projects Regulation (Ontario Regulation 116/01)]

Wind Turbine projects that are ≥ 2MW in size (as listed in Section 4 of the Electricity Projects Regulation) are subject to the *Ontario Environmental Assessment Act (EAA)*. These projects are classified as Category B projects under the EAA and are considered to be projects that have potential environmental effects that can likely be mitigated. Proponents are not required to prepare an individual Environmental Assessment on the condition that they complete an Environmental Screening Process (as set out in Part B of the Guide).

It should be noted that the Environmental Screening Process also outlines a process by which members of the public and agencies with outstanding environmental concerns can request that a project in Category B be elevated to an individual Environmental Assessment (Category C Project).

Due to the scale and nature of the project, you should undertake preliminary consultation and issue scoping prior to formally commencing the screening process. The Planning Department, municipalities and the Conservation Authority would like to review the issue scoping/screening criteria prior to commencement. This is to ensure that you do not encounter any hold up at the review stage in regards to issues deemed important to each of the stakeholders. It is recommended that you commence the screening process before project planning, site layout and facility design have progressed too far and before irreversible decisions or commitments are made.

Timing of Submission: The County of Bruce, member municipalities and the Conservation Authority are of the opinion that the Environmental Screening Report is a critical information element in determining whether the economic, social and environmental impacts/mitigation measures of the proposed wind farm are acceptable. Therefore as per Section 34(10.2) (Other Information) of the Planning Act R.S.O. 1990 (as amended) the respective approval bodies will require that the completed Environmental Screening Report or an Environmental Review Report be submitted together with any application(s) submitted under Section 34 of the Planning Act. Application(s) however may be submitted prior to the completion of the 30day public and agency review.

2. PLANNING APPROVALS & APPLICATIONS

Zoning By-law Applications and Consent Applications
At this time it is anticipated that a separate By-law and Schedule will be required and prepared for each lot of record on which a turbine(s) are to be erected. This means that multiple by-laws and schedules will be prepared. Passing an individual By-law for each lot of record will allow the proponent and the municipality to address individual appeals to individual turbine locations as opposed to the entire wind park.

As per County of Bruce By-law No. 3569, the standard fee for zoning is $795.00 per application and includes the peer review for the Conservation Authority. Common practice in the County is to require one application and one fee for each parcel of land to be rezoned. The standard fee for consent (if required) is $745 per consent.

It is understood that that the proposal is quite extensive and covers a number of properties. After discussion with the Director of Planning, we are willing to recommend to Bruce County Agriculture, Tourism and Planning Committee a reduction in the application fees as follows:

1 zoning fee per 5 lots of record	e.g., 15 lots = 15/5= 3 x $795 = $2,385.00
1 consent fee per 5 lots of record	e.g., 15 lots = 15/5= 3 x $745 = $2,235.00

Note: There is also a $100.00 fee due upon certification of a deed in regards to consent applications.

This recommendation is based on the amount of work that we would have to do on the file or files, the costs of public notices, the number of public meetings required, and overall administrative costs.

Site Plan Control
As discussed with the municipalities, all of the sites/properties will be subject to Site Plan Control as per Section 41 of the Planning Act R.S.O. 1990 (as amended). A Site Plan Agreement between the applicants/proponents and the municipality will be required for each property. The Agreement is to be prepared according to the requirements of each municipality and any costs of registration or preparation shall be at the applicants/proponents expense. Items to be reviewed under Site Plan Control requirements may include those set out in Appendix 'A' attached.

Holding Provisions
As per Section 36 of the Planning Act R.S.O. 1990 (as amended) a Holding provision will be applied to all of the sites/properties until the following requirements have been met:

a) An Operational Protocol and Emergency Services Plan shall be filed with the Municipality. Details of the operating protocols including policies for dealing with extreme weather, icing etc. (Operational Protocol) and an emergency services protocols including safety, accident prevention, local emergency services liaison etc. (Emergency Services Plan).

b) A 'Site Plan Agreement' as per Section 41(7)(c) has been registered as per Section 41(10) of the Planning Act RSO 1990 as amended.

c) A copy of the Ontario Energy Board license, or other documentation, indicating that the developer may operate as a licensed electricity generator has been filed with the Municipality.

d) That any turbine(s) to be erected obtain 'type certification/type certificate' (international standards issued by the International Electrotechnical Commission IEC) from a certified approval body indicating conformity with national and/or international standards. The Project shall implement only turbines that have achieved type certification by a reputable and experienced third party verification institute such as DNV, GL, Risø, or WindTest and demonstrate a design life of at least 20 years.

e) That detailed construction drawings of the turbine foundations have been filed with the Chief Building Official **and** that the turbine foundations have been designed, **and** certified by a professional engineer who holds a recognized engineering licence in Canada.

f) Information on Construction Period: Details of access routes to be used by construction traffic. Details of weight, width and axle loading of vehicles and frequency of special loads. Detailed phased programme for the construction period together with estimates of traffic generation (type and volume), ancillary temporary structures required for construction period.

Prior to commencement of development, the developer may be required to lodge with the Municipality a cash deposit, a bond, or other security to secure the reinstatement of public roads which maybe damaged by the transport of materials to the site, coupled with an agreement empowering the Municipality to apply such security or part thereof to the satisfactory reinstatement of the public road. The form and the amount of the security shall be as agreed between the Municipality and the developer.

g) Any other issues as may be deemed critical by the local Municipality, County of Bruce Province of Ontario or Conservation Authority.

3. GENERAL AND SITE SPECIFIC MAPPING AND DESCRIPTIONS
The General Map and Description and the Site Specific Map and Description shall use maps and site plans, photographs or other techniques to accurately describe the following required information.

General Map and Description:
In relation to all lands within 500 metres of any lot of record proposed for a turbine(s) [mapped at a scale no more than 1:10,000].

- proposed turbine locations with an accompanying table indicating the setbacks from all buildings and structures within 500 metres of the proposed turbine;
- property owner identification on all lots of record within 500 metres of a proposed turbine;
- roadways within the area including type and classification;
- contours;
- direction of prevailing winds;
- private 'airstrips';
- location of existing/proposed ancillary infrastructure including transmission lines;
- individual dwellings and buildings and structures including height within 500 metres of a proposed turbine including the current use of such buildings and structures;
- location of any subdivisions, hamlets, primary or secondary urban areas or rural residential clusters (means four or more adjacent rural residential lots generally 1 hectare or less in size sharing a common lot boundary) within 700 metres of a proposed turbine;
- locations of wind measuring masts, microwave towers, telecommunication towers, etc. within 500 metres of a proposed turbine;
- extent of lands where the developer(s) have exercised property options;
- distances to other existing and/or proposed wind energy facilities;
- sites of significant wetlands, significant woodlands, significant wildlife habitat, significant areas of natural and scientific interest; fish habitat; significant valley lands significant portions of the habitat of endangered and threatened species including significant habitat corridors for the movement of endangered and threatened species;
- sites of cultural heritage and archaeological resources;
- any other notable features or characteristics of the area.

Site Specific Map and Description
In relation to each site(s)/lot [mapped at a scale no less than 1:1,000]:

- turbine locations including proposed setbacks to lot lines,
- proposed setbacks to all buildings and structures on the lot of record;
- height of all buildings on the lot;
- proposed ancillary facility location including substations, roadways (permanent and temporary), underground/overground wiring;
- existing use all buildings and structures on the lot;
- lot dimensions and lot area;
- contours of the lot;
- adjoining roads including type and classification;
- locations of wind measuring masts, microwave towers, telecommunication towers, etc.;
- drainage ditches, municipal drains (including underground), and watercourses including intermittent streams;
- location of any easements;
- any significant wetlands, significant woodlands, significant wildlife habitat, significant areas of natural and scientific interest; fish habitat; significant valley lands significant portions of the habitat of endangered and threatened species including significant habitat corridors for the movement of endangered and threatened species on the lot;
- any sites of cultural heritage and archaeological resource on the lot;
- any other notable features or characteristics of the lot.

4. WIND FARM DETAILS

The Wind Farm Details section may use reports, maps, site plans, photographs or other techniques to accurately describe the following required information.

- Description of the project including number of turbines and ancillary infrastructure, summary of wind measurement findings, proposed duration of the project.

- Details of proposed method/routing of connections to the grid.

- An indication of whether the proposed development will proceed in stages and, if so, the timing of each stage.

- Make and model of turbines, rated power output, rotor diameter, cut-in and cut-off wind speeds, hub heights, full drawings of turbine and tower with specifications of construction materials, colour and finishes (with specialist advice to suit requirements of the location) manufacturer's certification of noise emission including sound power and narrow band frequency spectrum;

- Cross sections showing existing and proposed ground levels in relation to proposed towers and other structures.

5. VISUAL IMPACT ASSESSMENT

Although local government has at its disposal somewhat sophisticated planning legislation, the community at large is still concerned that fundamental changes may occur in the physical and visual quality of their environment and often suspects that planning and consent may be given to a development without the full disclosure of effects on the community. Thus, local government in a rural area is often motivated by community groups and individuals to impose stringent planning conditions which ensure that both the developers and the community are aware of the effects of the development and the alternatives available. The presentation of the evidence must be in a form that can be clearly understood and assessed by all parties (Aylward and Turnbull, 1977)

The term Visual Impact Assessment describes a systematic analysis of the possible impacts on the environment resulting from a proposed development and the investigation of the means available to mitigate the effects of such proposals prior to implementation. Visual impact is defined as a change in the appearance of the landscape as a result of development that can be positive (improvement) or negative (detraction) (IEA and the Landscape Institute, 1995).

Visual impact is assessed largely by qualitative judgements, as it is concerned with the human appreciation of, and interaction with, the landscape. In comparison with the environmental issues, visual impact is perhaps one of the best publicized and most contentious issues, usually because of the adverse

effect that a new development can have on natural or "unspoilt" landscape and the intense feelings of the public towards this subject (Fortlage, 1990).

A description of the visual effect of the proposed wind turbine/s on the locality shall be provided. This may include illustrations, photographs and other graphic representations of the appearance of the wind farms and transmission lines (where applicable) from all significant vantage points including views from both the land, the lakeshore/beach and the lake where relevant. A landscape analysis is likely to be required particularly in locations of high landscape quality. The existing landscape should be described and the potential visual impact of the proposal assessed as the visual effect of the development is likely to be one of the more significant issues in the assessment of the application.

For more details and guidance refer to Appendix B: Visual Impact Assessment Methodology

Visual Impact Reduction Considerations
The following measures to reduce the potential visibility/amenity impact should be considered and those measures 'chosen' should be documented as supporting information to the Application:

- siting and designing to minimise impacts on views from areas used for recreation based on landscape values and from dwellings;
- locating arrays of turbines to reflect dominant topographical and/or cultural features, such as the coastline, watercourses, windbreaks or transmission lines;
- using techniques such as colour, painting, etc. to reduce visual impacts from key vantage points;
- selecting turbines that are consistent in height, look alike and rotate the same way;
- spacing turbines to respond to landscape characteristics;
- undergrounding electricity lines wherever practicable;
- minimising earthworks and provide measures to protect drainage lines and waterways;
- minimising removal of vegetation; and
- minimising additional clutter on turbines such as unrelated advertising and telecommunications apparatus.

6. AMENITY OF THE SURROUNDING AREA
A wind energy facility can affect the amenity of the surrounding area due to noise, blade glint, shadow flicker, overshadowing and electromagnetic interference. The Application shall include information and review of on the following issues:

(a) Noise
A wind energy facility can create noise due to the:
- mechanical noise produced by the wind turbine generators;
- movement of the rotor blades through the air; and
- construction noise.

The Ministry of the Environment recommends adequate separation distances between incompatible land uses. The Ministry Publication LU-131 Noise Assessment Criteria in Land Use Planning (October 1997) provides direction when reviewing land use applications involving potential noise sources.

It is recommended that further consultation between yourself, the County, Municipality and the Ontairo Ministry of Environment be undertaken to determine a suitable noise propagation model. Potential options include New Zealand Standard *NZ6808:1998, Acoustics—The Assessment and Measurement of Sound from Wind Turbine Generators* (www.standards.co.nz) or The Assessment and Rating of Noise from Wind Farms, September 1996. (ETSU-R-97, The Working Group on Wind Turbine Noise http://www.dti.gov.uk/energy/renewables/publications/noiseassessment.shtml)

(b) Blade glint
Blade glint can result from reflection of the sun from the turbine blades. Blades shall be finished with a surface treatment of low reflectivity to minimise the potential for blade glint.

(c) Shadow flicker
Shadow flicker results from the position of the sun in relation to the blades of the wind turbine as they rotate. This occurs under certain combinations of geographical position and time of day. The seasonal

duration of this effect can be calculated from the geometry of the machine and the latitude of the potential site.

Shadow flicker can be modelled in advance and siting and design can mitigate the problem. This is more likely to be an issue for turbines located to the east or west of a dwelling.

Mathematical modeling of the Shadow Flicker potential for all residences located within 1,000 m of the proposed wind farm to assess any potential impacts.

The shadow flicker experienced at any dwelling in the surrounding area shall not exceed 30 hours per year as a result of the operation of the wind energy facility. The Application shall indicate how shadow flicker has been calculated and the results of the modelling.

(d) Overshadowing
Wind turbines, like other tall structures will cast a shadow on the neighboring area when the sun is visible. Figuring out the exact shape, place, and time of the shadow from a wind turbine requires a lot of computation, but at least one professional wind software program can do this very accurately, even in hilly terrain, and with house windows of any size, shape, location and inclination facing in any direction (Danish Wind Industry Association).

The Application shall indicate how overshadowing has been calculated and the results of the modelling.

(e) Electromagnetic interference
The effect of wind turbines on electromagnetic waves will usually be relatively limited. Potential electromagnetic interference effects can be calculated from information about affected telecommunications transmitting or receiving stations, local conditions, turbine design and location. The potential for electromagnetic interference from the generation of electricity from a wind energy facility should be minimised, if not eliminated, through appropriate turbine design and siting. The siting of wind turbines in the 'line of sight' between transmitters and receivers should be avoided.

A survey of installations likely to be affected including radio, television, air and sea transport navigation, microwave transmissions, etc. is to be provided. Facilities shall be installed at the developer's expense to ensure that radio or television transmission in the area is not interfered with by the proposed development. Consultation with the relevant authorities prior to the wind turbines being commissioned should be undertaken. Should pre- and post-testing show impacts, remedial measures will be required.

7. AIRCRAFT SAFETY
The height of wind energy turbines can be substantial resulting in potential impact upon nearby airfields. Consultation with Transport Canada is necessary to determine any airfields within a 10 km radius and associated requirements.

Turbines should not protrude into any obstacle limitation surface for any airfield. Transport Canada should be consulted.

8. ENVIRONMENTAL MANAGEMENT PLAN
The Application shall include an Environmental Management Plan. An Environmental Management Plan sets out future operational and maintenance requirements; establishes how mitigation measures and other required monitoring is to take place; and outlines how decommissioning and rehabilitation of the site will take place. The Environmental Management Plan shall include:

a) Environmental Mitigation
Measures outlining the process to address any adverse effects that may be discovered during operation of windfarm and measures addressing any mitigation requirements outlined in the Environmental Screening Report.

b) Decommissioning and Rehabilitation
A rehabilitation plan for the site(s), including removal of structures, plant and machinery, reinstatement of landscape, boundaries and landscaping etc.

Prior to the commencement of development the developer may be required to lodge with the Municipality a cash deposit, a bond, or other security to secure the satisfactory reinstatement of the site upon

cessation of the project, coupled with an agreement empowering the Municipality to apply such security or part thereof to the satisfactory reinstatement of the site. The form and the amount of the security shall be as agreed between the Municipality and the developer.

Summary of Submission Requirements

In summary, an application(s) must be accompanied by the following information:

1. Environmental Screening Report
2. Planning Applications
3. General and Site Specific Mapping and Descriptions
4. Wind Farm Details
5. Visual Impact Assessment
6. Amenity of the Surrounding Area
7. Aircraft Safety
8. Environmental Management Plan

Five copies of all information, maps, diagrams, reports etc. are required

If you have any questions or require clarification please contact me at your convenience.

Yours truly,

David M. Smith
Senior Planner
County of Bruce

Appendix 'A': Potential Site Plan Control Requirements

1. The wind turbines, including the mast and the blades shall be finished externally in a colour acceptable to the Municipality. Colours should match those permitted in adjoining developments. Samples of coloured material shall be submitted for the written agreement of the Municipality before development commences. Cables within the site of the proposed development shall be laid underground. All wind turbines shall be geared to ensure that the blades rotate in the same direction.

   Reason: In the interest of visual amenity.

2. All accessory buildings/ancillary control facilities shall be finished in natural/neutral colours.

   Reason: In the interest of visual amenity.

3. Rock and soil excavated during construction shall not be left stockpiled on site following completion of the construction works. Details of the disposal of excavated rock and soil shall be submitted to and agreed with the Municipality prior to commencement of work on the site.

   Reason: In the interest of visual amenity.

4. Transformers associated with each individual turbine and mast shall be located either within each turbine mast structure or shall be located underground beside the mast.

   Reason: In the interest of visual amenity.

5. Before development commences on the site, the developer shall submit to the Municipality detailed proposals for the control of silt-laden discharges from the site arising from construction activities.

   Reason: In the interest of environment protection.

6. Monitoring of noise levels shall be agreed with the Municipality prior to commencement of development and in the event of noise levels being exceeded the developer shall submit to the Municipality detailed proposals for ameliorating excessive noise levels for their agreement.

   Reason: To ensure a minimum level of noise disturbance.

7. Details of the colour and finish of any fencing around control building together with landscaping proposals thereto shall be submitted and agreed in writing with the Municipality prior to commencement of development.

   Reason: In the interest of visual amenity.

Appendix B: A suggested methodology for Visual Impact Assessment

INTRODUCTION

Assessing wind farm developments for visual impact is an important part of the planning application review process. It is, however, only one of a number of criteria against which the overall impact of a wind farm development will be assessed. The broader planning framework requires an assessment of a range of economic, environmental and social impacts that are likely to occur - the assessment of visual impact is to be carried out within this context.

GENERAL PRINCIPLES OF VISUAL IMPACT ASSESSMENT

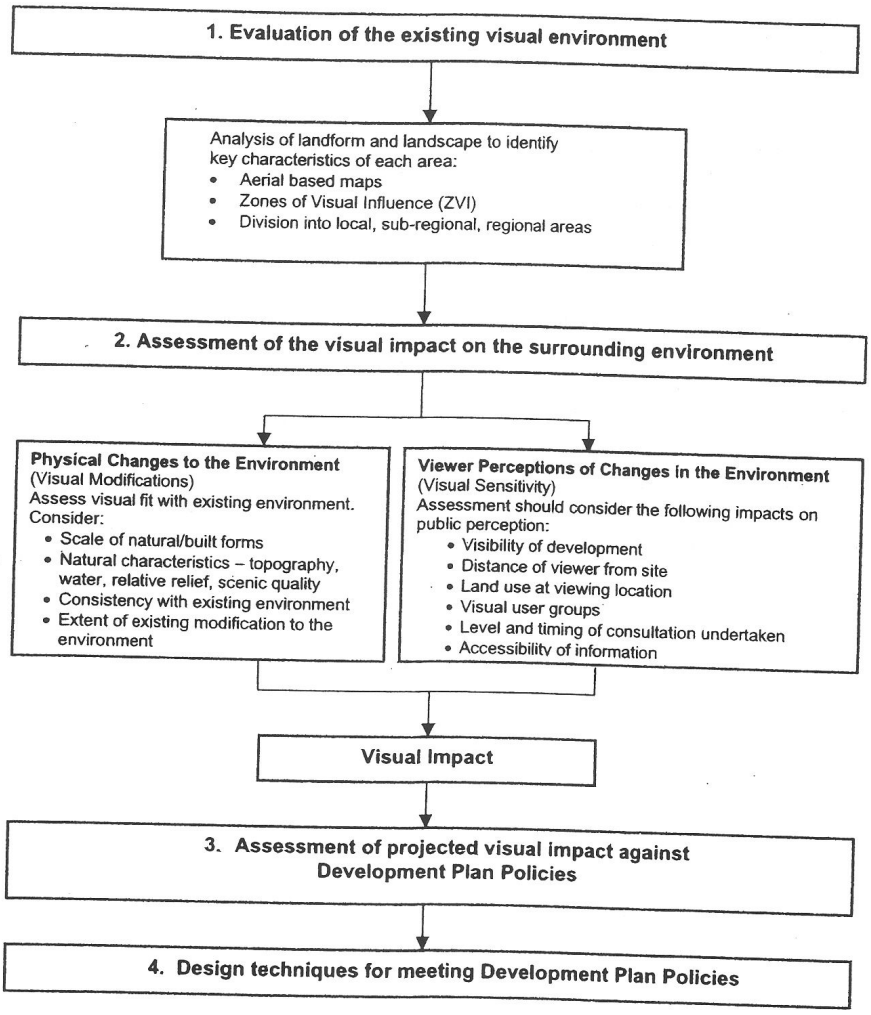
Core principles of visual impact assessment include an evaluation of the existing visual environment and an assessment of the likely impact a development may have on that environment. Effective visual impact assessment considers the following key components:

- Visual modification - this assesses the extent to which the proposed development is likely to physically modify the existing visual environment.
- Viewer sensitivity - this is concerned with the key factors that are likely to influence the degree to which the physical modifications are perceived as affecting visual amenity.

Typically, visual amenity is determined through an assessment of the extent to which a proposed development 'fits' or is consistent with its environment. Wind farms differ from some other forms of development in that they have a unique size and appearance and can be spread over a number of kilometres. Given this potential impact on the visual amenity of an area, a diverse range of public responses can be expected.

Judgements about the impact on visual amenity are highly subjective. Assessments of visual impact must take into account both the extent of the physical modification to the landscape and the degree and nature of viewer sensitivity to the proposed modifications. Cross referencing the two main components in this manner enables the key issues relating to visual amenity to be identified and ensures that any modifications to the proposal's design are appropriately targeted. Section 2 of Figure 2 demonstrates how both visual modification and viewer sensitivity factors feed into the assessment of visual impact.

Figure 2 Visual Impact Assessment Methodology



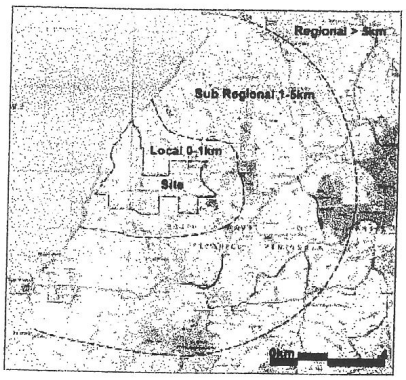
SUGGESTED METHODOLOGY

There are a variety of methodologies that can be used in the assessment of the visual impact of wind farms. The methodology suggested in this appendix has been recommended because it provides a comprehensive coverage of both the physical and the perceptual aspects of assessment. Based on the key issues identified in Figure 2 the following discussion provides greater detail to be considered in visual impact assessment, as well as some strategies for dealing with these issues. This approach is relevant for both wind turbines and transmission lines.

1 Evaluation of the existing visual environment

The first step in evaluating the existing visual environment is to divide the locality into local (0-1km), sub-regional (1-5km) and regional (> 5km) visual catchment areas and to assess the capacity of the land to absorb change using a rating of low, moderate or high. (Figure 3).

Figure 3 Adapted from Map of Primary Catchment Area for Starfish Hill Wind Farm, *courtesy Tarong Energy and Sinclair Knight Merz*



The evaluation of these areas should include an analysis of:

- land use within and adjoining the site
- topography
- screening potential of existing vegetation
- location of houses, settlements, walking trails, roads etc
- significant sites (cultural, heritage, indigenous, high scenic value)
- views and viewing locations.

Techniques used in landscape evaluation include the preparation of visual aids such as:

- maps depicting significant topographical and vegetation features
- photo montages that simulate the appearance of wind turbines from key viewing points
- zones of visual influence maps which are used to quantify the impact of turbines as seen from key viewing points.

These techniques provide a visual record of the existing landscape and a simulation of the appearance of turbines on that landscape. They provide a reasonable idea of the degree of visual modification likely to occur. However, in using these aids as part of the assessment process it is important to be aware that the accuracy of the final product is dependent on the quality of the resources and processes used in its preparation which are, to some extent, constrained by the available technology. It is important to remember that:

- zones of visual influence maps provide a worst case scenario as they do not include features such as vegetation or buildings that might screen turbines from viewing points.
- base mapping data which uses 10 metre contour intervals can result in inaccuracies and misrepresentations in photomontages. Contour intervals of 2-5 metres provide a more accurate result.

2 Assessment of the visual impact on the surrounding environment

The visual impact of a wind farm development can be determined by first assessing and then combining the projected levels of visual modification and viewer sensitivity. For instance, a proposal which is projected to result in a high degree of visual modification but is assessed as having a low degree of viewer sensitivity is likely to result in a moderate degree of visual impact. Two key components in the development of these projections are an analysis of visual impact as viewed from key locations identified in the zones of visual influence map (Figure 4) and an analysis of visual user groups identified through community consultation (Figure 6). The analyses generally involve:

- the preparation of photo montages to simulate the appearance of turbines as they would be viewed from key locations (Figure 5)
- an assessment of the degree to which turbines are likely to affect views from selected locations – generally undertaken by someone with experience in visual assessment
- the gathering of information from surveys
- discussion at community consultation meetings to determine the sensitivity of various visual user groups to the projected changes.

Figure 4 Zones of Visual Influence Map for Tungketta Hill Wind Farm,
courtesy Tarong Energy and Sinclair Knight Merz

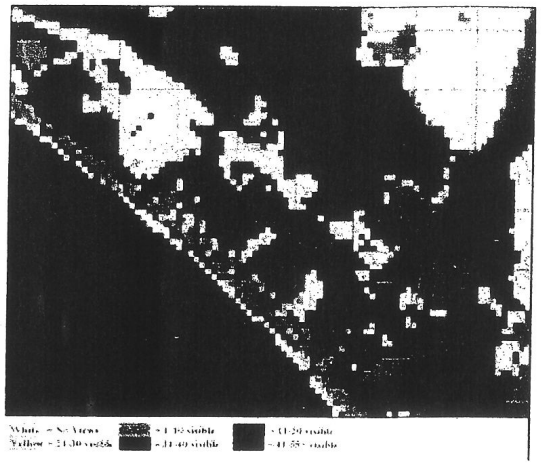
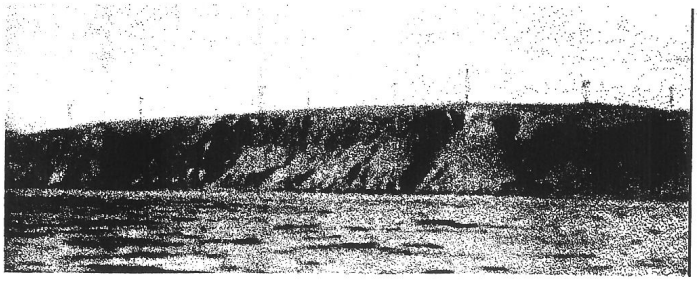


Figure 5 Photomontages of Starfish Hill Wind Farm - developed from locations identified by ZVI Maps,
courtesy of Tarong Energy and Sinclair Knight Merz
View east at Salt Creek Hill from Ocean – 3km distant



View north-west at Starfish Hill from Main South Road – 1.5km distant

Major factors to take into account when determining the degree of visual fit with the current landscape include the degree to which the environment has already been modified and the general characteristics of the setting. Specifically, these may include:

- the scale of natural and built form
- the presence of water
- relative relief
- topographic ruggedness
- the overall scenic quality.

Research suggests that scenic quality is perceived to increase in tandem with the presence of water forms, topographic ruggedness and relative relief. This is particularly the case in 'natural' environments that have experienced little modification through farming practices or settlements. The development of wind farms in such areas may result in a high degree of visual modification. Conversely, in regions that have experienced major alterations through human activities, the degree of visual modification is likely to be low.

The projection of viewer sensitivity requires analysis on two levels as the degree of sensitivity is affected by both the physical environment from which the development is viewed and the psychological/social environment which informs how the individual views the development. On the physical level, viewer sensitivity is assessed in relation to:

- the visibility of the development from critical viewing areas and view angle
- the distance of the viewer from the site (the further away the viewing point is from the development site the less sensitive the viewer will be to the development)
- land use of the area viewed (viewer sensitivity to the development is minimized when there is a close visual fit between the existing land use and the proposed development).

Using these factors to assess viewer sensitivity provides information relating to the sensitivity of the visual catchment areas that will be affected by the proposed development and highlights the degree to which the development is likely to modify the visual amenity. The information gleaned from this exercise can also prove useful if it becomes necessary to redesign or relocate the wind farm site.

Location and design factors influence the degree of viewer sensitivity to the proposed development, however, the degree of sensitivity is also affected by how the viewer perceives the development. Factors which influence the perception of the development include:

- the visual user group to which an individual belongs
- the extent to which the local community was consulted
- the amount of information available to the local and wider community.

Perception of wind farm developments is influenced by the quality of information that is made available to the local and wider community and by the extent to which the local community is consulted. Significant changes to community perception of a development can occur when the issues and sensitivities of a particular setting are understood.

Community consultation provides a forum in which to disseminate information and also makes it possible to gather information about visual user groups and issues of concern to a variety of stakeholders. This assists developers to assess likely viewer sensitivity and, where possible, to design the wind farm with these sensitivities in mind. Extensive consultation undertaken prior to the lodgement of an application also makes it possible for the community to have genuine input into the siting and design process and influences how they are likely to perceive the proposed wind farm. Consultation thus has the capacity to minimise the perceived impact on visual amenity and contributes to good planning outcomes. Wind farm developers experienced in this field have found that comprehensive consultation with the community increases rather than reduces the support for wind farm projects.

The visual user groups likely to be affected by a wind farm development will vary according to the location. In general, the following categories are likely to apply:

- local residents
- special interest groups
- regional residents and communities
- tourists:
  - mass market tourists
  - nature based tourists
  - eco-tourists.

The information provided by an analysis of visual user groups helps to identify the areas of greatest sensitivity and also highlights the reasons for that sensitivity. In doing this, any changes to the development proposal can be focused on the areas where they are most needed. Figure 7 is an example of a model which is used to summarise the results of an analysis of viewer sensitivity levels in relation to visual user groups, distance from the proposed development and the type of land use from which the projected development would be viewed.

Figure 6 Viewer Sensitivity Levels, *adapted from Wind Farms: Visual Assessment Review, EDAW (Aust) Pty Ltd*

LOCAL RESIDENTS			
Natural area / Recreation	H	H	L
Rural Residential	H	H	L
Tourist Roads	H	M	L
TOURISTS – GENERAL			
Natural area / recreation	M	M	L
Accommodation	M	M	L
Tourist Roads	M	M	L
ECO TOURISTS			
Natural area	H	H	L
Accommodation	H	H	L
Tourist Roads	H	H	L
ENVIRONMENTAL GROUPS			
Scenic Vistas	H	H	L
Natural Areas	H	H	L
Wildlife Parks	H	H	L
REGIONAL COMMUNITIES			
Natural area	M	M	L
Rural residential	M	L	L
Main Roads	L	L	L

3 Assessment of projected visual impact against Development Plan policies

Once the projected visual impact of a wind farm has been determined it needs to be assessed, along with a number of other factors, against the policies set out in the relevant Development Plan. When assessing the visual impact of wind farms, planning authorities should consider the need to encourage the development of renewable energy and associated industries while at the same time preserving the amenity of the local area.

4 Design techniques for meeting Development Plan policies

Although wind farms may not always be easily absorbed into the environment there are a number of techniques which can minimise their impact on the landscape. These include:

- set backs from sensitive areas
- siting wind farms away from key viewing locations such as prime tourist destinations and routes, national parks and significant scenic sites
- the use of landscape design principles which:
  - respond to natural and cultural landscape features
  - avoid visual clutter and enhance aesthetic appeal
  - enable views through the wind generator layouts.

The use of these principles may influence decisions relating to:

- the size and number of turbines in the development – fewer and larger turbines have less visual impact than more and smaller turbines and are equally as energy efficient
- whether wind farms are designed with a cluster or a linear pattern
- colour schemes for towers, nacelles and blades etc.

Additional challenges in the consideration of visual amenity can occur through cumulative impacts resulting from successive wind farm developments. The visual impact of one wind farm on an area may be acceptable, but additional wind farms proposed in close proximity may make the cumulative impact unacceptable. Assessment of cumulative visual impacts can be challenging due to the time lags which occur between lodgement of applications and construction of developments. At any one location it is possible for several applications to be in various stages of lodgement or approval and, until construction has actually begun, there is no certainty that any of the proposals will be completed. In these circumstances the planning authority should take into account the potential cumulative visual impacts of any subsequent applications which are proposed in proximity to the first approved application. This puts the onus on subsequent developers to ensure that negative cumulative effects do not occur as a result of their proposed development.

In response to your inquiry regarding policies for wind energy development, I have included as an example, the policies from the Ashfield-Colborne-Wawanosh Official Plan, Huron County, that was recently approved (October, 2003). Wind energy is addressed in two sections of the Plan (Agriculture and Community Economic Development), so I have copied both references below. In addition, I have included the relevant provision (Section 3.10) from the Ashfield Zoning By-law that addresses height. At this point in time, a rezoning is not required, however, the process of consolidating a new Zoning By-law for Ashfield-Colborne-Wawanosh will soon be started and the requirement for rezoning for wind generation facilities will be addressed to bring conformity between the new Official Plan and the Zoning By-law. The other Municipalities in Huron County are including similar policies in their new Official Plans.

Official Plan Policies:

Community Facilities and Infrastructure

Community facilities for social, recreational, administrative or other purposes, such as community centres, sports facilities or government offices, will locate in villages/hamlets to avoid conflicts with agriculture and to enhance urban areas. Existing uses and their expansion will be permitted in the agricultural designation.

Communities relying on horse-drawn transportation may require localized schools or churches in rural areas. These uses may be permitted by rezoning without amendment to this Plan. These uses will locate on existing lots, will not be permitted to be severed and will avoid prime agricultural land where possible. The MDS formula may be tailored to accommodate these uses on the host farm.

Infrastructure uses deemed to be public uses will be permitted in the agricultural area. These uses are required throughout the countryside and include:

facilities and corridors for utilities such as water, sewage, electricity, communications, and oil/gas wells and transmission;
roads, railways and trails; and
flooding and erosion control works.

Commercial scale infrastructure uses, such as wind energy facilities, may be permitted in the agricultural area subject to a rezoning to address compatibility with surrounding uses and to establish siting regulations. Supportive policies for wind energy are found in the Community Economic Development section of this Plan.

Economic Development
All economic development activities shall be in keeping with the land use policies of this Plan. The Township will consider innovative activities or land uses which:

promote sustainable economic development;
protect and enhance the natural environment; and
are compatible with surrounding land uses.

The Township supports the development of wind energy facilities. Wind power is a renewable energy source which provides economic and environmental benefits to the municipality and its residents.

Zoning By-law Provisions:

3.10. EXCEPTIONS TO HEIGHT LIMITATIONS

The height limitations of this By-law shall not apply to church spires, clock towers, water tanks, elevator enclosures, flag poles, television or radio antennae, ventilators, skylights, chimneys, windmills, silos or grain elevators or silos. Notwithstanding these provisions, windmills or wind generators shall be set back

from any lot line a distance equal to 1 (one) times the height of the windmill or wind generator (height shall include rotor blades). In an agricultural zone, the setback from a side or rear lot line for windmills or wind generators may be reduced subject to an agreement with the abutting land owner registered on the title of the property containing the structure and on the title of the affected abutting property. (Amended by By-law 27-2002).

THE CORPORATION OF THE MUNICIPALITY OF GREY HIGHLANDS
BY-LAW NUMBER 2004-34

Interim Control By-law

BEING a By-law to impose interim control on the use of lands, buildings and structures within the Municipality.

WHEREAS Section 38 of the Planning Act, R.S.O. 1990, c.P.13, as amended, provides that where Council of a local municipality has, by by-law or resolution, directed that a review or study be undertaken in respect of land use planning policies in the municipality or in any defined area or areas thereof, the Council of a municipality may pass a by-law to be in effect for a period of time specified in the by-law, which period shall not exceed one year from the date of the passing thereof, prohibiting the use of land, buildings or structure within the municipality or within the defined area or areas thereof for, or except for, such purposes as set out in the by-law.

AND WHEREAS the Council of the Corporation of the Municipality of Grey Highlands by resolution, directed that a review and study be undertaken in respect of land use planning policies relating to electric power generation facilities, and specifically including wind turbines throughout the Municipality of Grey Highlands.

AND WHEREAS the Council of the Corporation of the Municipality of Grey Highlands has determined that it is in the public interest to prohibit the use of all lands within the Municipality for electric power generation facilities, with certain exceptions, so as to allow the Municipality to review and, if considered appropriate, implement the findings of the review and study referred to herein;

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE MUNICIPALITY OF GREY HIGHLANDS ENACTS AS FOLLOWS:

1. Notwithstanding the permitted uses and regulations of Zoning By-laws 10-1978, 50-1981, 400-83, 45-1990, and 96-8, as amended, no lands buildings or structures within the Municipality of Grey Highlands shall be used for electric power generation facilities except for the following:
   i. Legally existing electric power generation facilities;
   ii. An undertaking not subject to the Planning Act, as defined under Sections 62.(1) and (2).
   iii. The re-construction or construction of private windmills less than 17 metres (56 feet) in height.
2. For the purposes of this By-law an electric power generation facility includes, but is not limited to, wind turbines or any similar apparatus that produces electricity from wind power.
3. This By-law shall remain in effect for a period of one (1) year from the date of its enactment.

READ A FIRSTAND SECOND THIS 14TH DAY OF JUNE 2004
READ A THIRD TIME AND FINALLY PASSED THIS 14TH DAY OF JUNE 2004.

Mayor, Brian Mullin

Clerk, Debbie Robertson

Planning Analysis Discussion Paper No. 6

Preliminary Wind Energy Facility Planning Approval Framework

Municipality of Grey Highlands

Submitted by

The Jones Consulting Group Ltd.

Submitted to

Wind Power Committee

JONES

CONSULTING GROUP LTD.

PLANNERS. ENGINEERS. SURVEYORS

3rd January 2005

Renewable Energy Review
Municipality of Grey Highlands

Discussion Paper Summary

Discussion Paper No. 1 23rd August 2004	Wind Energy Facilities – Planning Approval Framework To build upon the terms of reference and to respond to the items of direction identified by the Wind Power Committee at their July 2004 meeting.
Discussion Paper No. 2 29th September 2004	Wind Energy Facilities – Municipality of Grey Highlands To continue to build upon the terms of reference for wind energy facilities dated August 2004.
Discussion Paper No. 3 1st November 2004	Wind Energy Facilities – Municipality of Grey Highlands To summarize relevant land use planning issues as they apply to future Wind Energy Facilities. A discussion of why each issue is relevant is followed by a discussion of considerations for any future planning approval framework and public open house.
Discussion Paper No. 4 24th November 2004	Renewable Energy Sources – Municipality of Grey Highlands To review potential renewable energy generation sources that may be considered within the Municipality of Grey Highlands. This review was undertaken as part of the Municipality's interim control by-law that seeks to review electrical generation facilities in order to determine the most appropriate planning approval framework.
Discussion Paper No. 5 24th December 2004	Renewable Energy Sources – Municipality of Grey Highlands To review issues that have arisen from the public open house and discuss other issues of relevance including the positions of relevant stakeholders.
Planning Analysis Paper No. 6 **3rd January 2005**	**Preliminary WEF Planning Approval Framework – Municipality of Grey Highlands** **To discuss whether the Municipality of Grey Highlands should consider commercial wind energy facilities as a compatible land use. A summary of planning options is then presented based on real or perceived issues identified in the stakeholder consultation and wind energy review process.**

Table of Contents

Renewable Energy Facilities
Discussion Paper No. 6

1.0 Introduction

The purpose of this paper is to discuss whether the Municipality of Grey Highlands (MGH) should consider commercial wind energy facilities as a compatible land use. The consideration of WEFs is discussed in terms of threshold issues (i.e.. fundamental issues that cannot be overcome with any planning approval framework) and technical issues (particular issues that can be addressed through appropriate planning controls). A summary of planning options is then presented based on issues considered relevant as identified through stakeholder consultation (outlined in Discussion Paper No. 5) and the wind energy review process (primarily contained in Discussion Paper No. 4).

The planning options presented are preliminary only subject to further discussion with the Committee and Stakeholders. The options are based on existing planning controls, a review of available literature and stakeholder input.

2.0 Why are Wind Energy Facilities wanting to locate in MGH?

WEFs represent one of the most viable renewable energy generation resources. If International, Federal and Provincial policies continue to mandate renewable energy, then WEFs will have to be used and located in the most appropriate locations.

Using terminology from the David Suzuki Foundation, locations for WEFs in the MGH can be discussed in terms of accessible resource areas and acceptable resource areas (Etcheverry et al, 2004, 23). Accessible resource areas are those areas appropriate for physical or topographic reasons. As discussed in previous discussion papers, reasons why the MGH is well suited for WEFs includes proximity to transmission infrastructure, having one of the better wind energy resource areas in the Province, and an already visually and environmentally altered farming landscape. It are these characteristics that are encouraging WEF operators to consider locating in the MGH rather than other less viable areas in the Province. On this basis, it is likely no coincidence that two of the ten renewable energy projects approved for support by the Provincial are located in or close proximity to the MGH.

Whether the accessible resources in the MGH are also an acceptable resource in terms of the potential impact of WEFs is what will be discussed in the following sections.

3.0 Can MGH prohibit Wind Energy Facilities?

The Planning Act allows for the prohibition of particular land uses, however the prohibition must be based on sound planning principles – not simply a political decision based on NIMBYism.

Corporations, who consider the MGH one of the better areas in the Province for wind generation, would likely appeal the prohibition of WEFs. Any appeal to the Ontario Municipal Board (OMB) would need to be defensible which could be very difficult given that WEFs are being operated successfully in other locations.

Instead of prohibiting, MGH could develop a comprehensive planning approval framework to ensure that WEFs are compatible with not only existing land uses but also the Municipality's long term vision. A true test of any framework will be to provide greater certainty and balance when approving a new land use without being overly onerous to the point of essentially prohibiting WEFs from the MGH.

4.0 Should MGH provide for Wind Energy Facilities?

This is the question that the wind energy review has been working towards answering from the beginning and leads to other questions such as:

- On what basis should the MGH allow or not allow WEFs?
- Can issues associated with this land use be overcome through appropriate and responsible planning controls or are their fundamental issues that could not be addressed and therefore preclude WEFs from locating in the MGH?

To answer the above questions this paper will first look at the reasons why WEFs are being considered in the MGH. The discussion will then examine what are considered to be threshold (i.e.. fundamental) issues that would need to be addressed in order for WEFs to be considered as a permitted land use. Finally, on the basis that the threshold issues could be overcome, technical issues associated with the potential impacts of WEFs will be discussed and draft planning provisions introduced.

4.1 Threshold Issues

The following three issues are considered fundamental as to whether to permit WEFs in the MGH.

4.1.1 Visual Impact

There are two main considerations with respect to potential visual impact within the MGH. The first consideration is the potential impact on views to and from the Niagara Escarpment. The second consideration is the potential visual impact on rural character and tourism values. However, addressing and minimizing the visual impact in general will assist in addressing each of the above considerations.

The proximity of a world biosphere requires a greater degree of review for WEF proposals. While the Niagara Escarpment Plan (NEP) protects the escarpment itself, this plan does not extend sufficiently outwards to include the potential area of visual influence for today's large wind turbines. As a result, MGH carries a responsibility as the abutting approval agency to ensure that WEFs to do detract from the landscape values of the escarpment. If there is an unacceptable visual impact on these values, then the WEF has not addressed this fundamental issue and should not proceed.

In addition to the escarpment, MGH also has a recognized rural landscape that forms part of the municipality's identity which supports a tourist base. Previous visual impact studies for WEFs in other areas consider the rural landscape to be already altered (i.e.. cleared lands with agricultural buildings) and of lower value than intact natural landscapes (i.e.. pristine landscape with no evidence of human interference) and thus a better location for wind turbines (Etcheverry et al, 2004, 23). No studies with respect to potential impacts on tourism have been found as part of the renewable energy review.

When attempting to address the threshold impact of visual analysis, there are 2 potential methods:

1 Undertake a municipal wide landscape evaluation in the absence of any specific WEF proposal that identifies and ranks important landscape units and the ability of the landscape to absorb visual change. While the NEC has some of this information for valley areas of the escarpment, it does not have this information for views in the upper areas of the escarpment looking outwards over the NEP boundary.

Prohibiting WEFs on the basis of visual impact without any documented assessment is considered premature and inappropriate. This is especially true given the variables of WEF siting, subjectivity of visual impact, and the large view sheds of the MGH. While this option is proactive, it is also very expensive. In addition, a future WEF proposal may challenge the findings of a municipal wide visual landscape evaluation on the basis that the specific details of the proposal mitigate the potential visual impact and thus maintain the identified landscape value.

2. The second alternative is to assess this threshold issue at the onset of a specific WEF in light of specific and detailed information on the WEF project and the landscape in which it is contained. This task will be challenging given the 'subjective' nature of visual impact analysis and landscape evaluation and the fact that the study will be proponent driven. Therefore, broader public impacts should be weighed more heavily in the analysis than the localized visual impacts felt by nearby land owners.

A specific visual impact study prepared by the proponent could best assess the visual impact and suggest appropriate mitigation measures if required. This assessment would be based on the specific detail of the landscape accommodating the facility together with the particular turbine design and its siting.

A peer review of this study on behalf of the MGH is considered appropriate given that visual assessment is relatively subjective in nature and will be used to address a threshold issue. The scope of the visual impact study would need to be expanded to consider not only the NEP but also the rural character of the MGH and its associated tourism attributes.

4.1.2 Application of MDS

If the Provinces' intention, as opposed to the local planning office of the Ontario Ministry of Agriculture and Food (OMAF), is to apply MDS to WEFs, then the potential impact and subsequent 'sterilization' of large areas of agricultural/rural land would be considered a threshold issue. However, the possible application of MDS appears to be from a lack of coordination between OMAF, its local office and the County that can be clarified through further discussions.

In our opinion, the application of MDS appears to stem from a misconception by OMAF that WEFs replace an agricultural/rural use with a commercial use that displaces large areas of productive land. The reality is that modern WEFs, particularly those using larger and fewer wind turbines, do not occupy large amounts of agricultural/rural land (typically 1 acre/turbine and associated access tracks).

Another reason that MDS should not apply is that the formula's purpose is to minimize interface issues between agricultural and non-agricultural based uses based on potential odour. In our opinion, there is no reason to establish buffers around existing agricultural facilities or their proposed expansion because WEFs operate without active management by staff and have few visitors. On this basis, there is no reason why an automatic wind turbine should be considered to be impacted upon by odour or be able to preclude nearby agricultural expansions.

Based on preliminary feedback from planning policy staff from OMAF and discussions with senior planners at the Counties of Grey and Bruce, it is considered that this threshold issue can be overcome through further clarification of OMAF policy. This will assist the County, who has delegated approval authority, with the consideration of any future WEF application.

4.1.3 Lease Terms & Future Land Use

Another potential threshold issue that requires further investigation is the details of lease agreements that are being offered to or been accepted by landowners in the MGH. The Ontario Federation of Agriculture (OFA) expressed some concern that leases between landowners and WEF operators may limit present and future agricultural operations. Typical lease durations in Ontario are up to 50 years – any control over land for this period of time could have significant impacts on the future of agricultural and rural operations in the MGH. Limiting agricultural expansion of a farm in the MGH for such a long period has the potential to undermine the very land use fabric on which the municipality was built.

The need for stability and security for WEFs and their significant infrastructure costs is recognized but so are the potential restrictions facing current and future generations. The difficulty is addressing this threshold issue is whether the content of leases between two parties should be subject to the intervention of an Municipality and whether the Municipality has the legislative authority to regulate WEF leases on the basis that the content of the lease may not be to their satisfaction. Legal advice should be sought by the MGH together with further discussions with the lawyer for the OFA to determine if this threshold issue is relevant.

4.2 Technical Issues

In addition to the threshold issues identified in Section 4.1, there are many technical issues that need to be considered as part of the review of WEFs. These technical issues are summarized broadly as follows:

- Visual impact
- Shadow flicker
- Noise
- Electromagnetic interference
- Ice throw

- Siting
- Environment
- Health & safety

The provisions addressing each of these technical issues and their possible land use conflicts are outlined in Section 5 of this paper.

4.3 Summary

MGH has the ability to contribute to renewable wind energy through its favourable topography, climatic conditions, and supporting infrastructure. Given these favourable conditions for WEFs and the fact that there are many existing WEF facilities already in operation around the world (including smaller and more densely populated countries), an assessment of the threshold issues must first be considered.

The threshold issue of visual impact on the Niagara Escarpment and rural character of the MGH cannot be addressed in the absence of detailed visual assessments. These assessments should come from specific WEF proposals when sufficient detail is known to make the most informed decision.

The threshold issue of the application of MDS will be addressed with further consultation with OMAF and Grey County. In the unlikely event that OMAF's final position is to apply MDS, then sample calculations will be undertaken to determine the impact. Following an assessment of these calculations, a recommendation will be made on whether MDS remains a threshold issue.

The contents of land leases for WEFs will be further examined to determine if they have a negative impact on the future operation of agricultural/rural activities. If the leases are considered overly prohibitive, Council will discuss planning approval options with their lawyer.

In summary, if threshold issues can be addressed, then planning provisions will be suggested that address the various technical issues to avoid land use conflicts.

5.0 Planning Approval Framework

5.1 Framework Overview

If threshold issues are overcome, the first step would be to amend the current MGH Official Plan to update its policies with respect to power generation facilities and WEF land uses. The OPA would also include details outlined in Section 5.2 below. Given that changes to the OP are at the more

broad strategic level, an OPA for each WEF is not considered required. The broad WEF policy outlined in the OP would identify the local issues, address broader Provincial and County policies, and identify the Planning Act mechanisms to approve WEFs (subject to threshold issues being addressed). These mechanisms would include a general zoning by-law amendment to establish minimum provisions required for all WEFs, the need for a project specific zoning by-law amendment to address the particular issues, and the requirement for site plan approval.

A single OPA for all WEFs in the MGH would be consistent with the current Grey County OP (Section 5.1.3 6a) as it only contains very general policy with respect to energy generation facilities. The details of any revised MGH OP policy would be subsequently reevaluated as part of the County's 5-year Official Plan review. This review may result in local WEF policy being revisited for the sake of consistency.

In addition to a broad level zoning by-law amendment to establish minimum provisions, it is proposed to approve specific WEFs through a zoning by-law amendment process for the following reasons:

- Section 34 of the Planning Act allows for Council to pass zoning by-laws that restrict use of land, protect natural features, and dictate the construction of building and structures (including height, location, size, spacing, character and use).
- The Planning Act requires that amendments to zoning by-laws have statutory public involvement – unlike projects considered under the site plan approval process.
- Approval of a WEF through a project specific zoning by-law is subject to third party appeal rights to the Ontario Municipal Board. This is important for residents who may be skeptical or nervous about a new land use as it makes the approval process more accountable and transparent.
- A zoning by-law amendment may contain provisions that cannot be required through the site plan approval process (i.e. character and appearance of turbine models).

The degree of conditions that can be imposed through the zoning by-law amendment process should be discussed with the lawyer of MGH. Proposed WEFs should address all relevant technical issues through a combination of zoning provisions and site plan approval.

5.2 Official Plan

Provisions of an Official Plan Amendment should include:

- Update the current OP provisions related power generation to reflect the difference between transmission and generation facilities (including privately operated facilities).
- Make specific reference to the threshold issue of visual impact and that the consideration of any project specific zoning by-law amendment is subject to this issue being addressed to the satisfaction of Council. This would be based on a review of the WEF proposal against visual impact policy on which all applications are weighed against. This policy would also contain the terms of reference for the landscape and visual impact assessment.
- Specific reference to wind energy and its benefits.
- Exclude WEFs from hazard lands, areas of provincially significant natural heritage features, and settlement areas.
- Require a municipal review after the construction of the first WEF in the MGH to assess the effectiveness of the planning approval framework, real versus perceived effects and the potential for cumulative impacts of multiple projects.
- Apply site plan control to WEFs.

5.3 Zoning By-law

Based upon other municipal experiences, the most effective means of providing for a WEF is through a project specific zoning bylaw and subsequent site plan approval. We support this approach.

Zoning by-law amendment options include:

- A 'blanket' rezoning to allow WEFs in appropriately designated areas.
- A project specific rezoning to assess and approve a particular WEF.
- A site specific rezoning for each particular turbine.

A blanket rezoning to approve WEFs across wide areas of the municipality is not considered appropriate given that each WEF will have its own particular impacts and resultant planning provisions. However, a municipal wide rezoning to establish general (i.e. baseline) requirements is recommended.

Subsequently, a rezoning for a specific WEF project would then be considered appropriate on the basis of:

- The particular characteristics of a project and its sites can be incorporated into the implementing zoning by-law.
- Given that WEF projects are by their nature quite large in area, a significant number of applications would not be required.
- Ongoing knowledge, revised agency/political policies and continued public input can be considered during future applications.

With respect to turbine specific rezoning, Bruce County recommends that the rezoning of every land parcel be separate so that any appeals for a particular turbine site would not hold up the balance of the WEF (LaForest, 2004, 3). While this idea has merit and would assist the wind developer, it is not recommend for two reasons.

The first reason is that the size of a WEF and its individual turbines means that every application should be considered collectively. It is conceivable that the relocation of a single turbine could impact on the overall layout of the project. The construction of the remaining WEF could impose constraints on the optimum siting of turbines if they were considered separately.

The second reason is because of process. Public attitude is already cautious and skeptical of WEFs. The confusing nature of separate applications and possible separate appeals would not help the openness and transparency of the process. In addition, the handling of multiple applications (possibly 50) would be onerous from a municipal processing point of view.

Any zoning by-law should contain a holding provision to ensure that an appropriate site plan agreement is in place.

5.4 Site Plan Approval

Following the zoning by-law amendment, a site plan approval process would be required to address the following details as allowed under the Planning Act (Section 41 (7)):

- Details of access to and from the lands;
- Loading and parking facilities including any accessways;
- Pedestrian access;
- Lighting facilities;
- Walls, fences, hedges, trees and any facilities for landscaping or the protection of adjoining land;

- Storage and collection areas (including waste);
- Easements, conveyed to the municipality;
- Proposed grading.

The above conditions of a site plan approval and agreement would assist in ensuring that the intent of the zoning bylaw is met and that particular requirements of a project are implemented. The intention for site plan approval is to implement particular requirements that cannot legally be conditions of a zoning by-law amendment. The appropriate 'mix' of zoning by-law provisions and requirements of a site plan agreement needs to be refined at the application stage.

6.0 Land Use Planning Issues & Mitigating Responses

Using the results of Discussion Paper No. 3, this section will list potential land use issues associated with WEFs, confirm if the issue is relevant, and suggest potential planning controls to mitigate its impact.

6.1 Visual Impact

This is perhaps the largest issue of WEFs. Besides noise, this was the second most frequent concern listed in the public survey collected at the Open House. The Municipality's location adjacent to the Niagara Escarpment further underlines the sensitivities of this land use.

The proximity of the Niagara Escarpment is a key consideration of allowing WEFs in parts of the MGH. Council must ask themselves:

> *Why should a WEF be permitted to have a visual impact on a valuable and limited asset if they can be located elsewhere?*

6.1.1 Landscape & Visual Impact Assessments

What makes this issue one of the most difficult to address is the subjective nature of determining existing landscape values, the appearance of wind turbines on the landscape, and whether the turbines have a negative or positive impact on that landscape. The size and physical presence of wind turbines is uncontested (Planisphere, 2004, 6). Therefore, it is the value of the landscape and degree of impact that needs to be assessed and considered. These considerations would need to be balanced at the threshold issue assessment stage prior to a specific rezoning application proceeding.

If the threshold issues are considered addressed through the visual impact study undertaken in accordance with Council policy and its terms of reference, then a further visual assessment should be undertaken that addresses the particular technical issues of a WEF.

Landscape evaluation is generally concerned with rating the scenic or visual aesthetic value of an existing landscape and then examining the ability of the landscape to absorb visual change based on viewer sensitivity (Planscape 2004, 11). Traditional approaches (i.e. landscape ranking criteria) undertaken by professionals have been criticized for lack of community input, bias towards natural areas, poorly defined viewer groups and inability to capture the intangible and emotional values of a landscape (Planisphere 2004, 11).

For MGH, the most likely criticism of requiring a proponent to provide a visual impact report justifying the siting of a WEF is the possibility of having local residents not fully understanding a technical assessment. This may result in distrust and a desire for community involvement and increased transparency.

6.1.2 Planning Response

If an application is to be considered in MGH, it is recommended that a visual impact assessment be prepared that utilizes the existing work of the Niagara Escarpment Commission (if applicable), a description and evaluation of existing landscape features (including its ability to absorb change), a systematic analysis of possible impacts combined with quantitative research related to public attitudes (locally and regionally) towards visual impacts of wind farms.

This latter requirement is currently being used by proponents in Australia to confirm that the appropriate location of a WEF has been chosen and that the siting is acceptable to the community from a visual impact perspective (Offer Sharp, 2004, 3). Benefits of this process include:

- Ability to document perceived landscape values for future reference.
- Greater level of community participation.
- Ability for the proponent to confirm site suitability and public acceptance.
- Ability to quantify and justify public attitudes rather than relying on the qualitative judgments of external consultants (Wyatt, 2004).

It would be expected that any reasonable concerns identified through this process be mitigated wherever possible to ensure that visual impact is minimized. This may include a reduction in turbine numbers, micrositing to a more accepted location, or establishing appropriate visual screening.

In addition, the visual impact analysis should also explore and discuss visual impact reduction measures.

Based on experiences at other WEF sites, MGH should specify the following minimum criteria for mitigating visual impacts of turbines and supporting infrastructure:

- Siting WEFs to minimize visual impacts particularly from residences and higher landscape value areas (ie. tourist routes).
- Ensure that a proposed WEF has a density of turbines compatible with the surrounding landscape. Depending on the landscape and topography, fewer larger turbines may have less of a visual impact.
- Ensure that all turbines in a WEF are identical. Literature suggests that WEFs containing different looking turbines or turbines with different rotational speeds add to visual clutter and hence have a greater visual impact (Planisphere, 2004, 9).
- Encourage larger and fewer turbines that are of 'monopole' construction and are finished in an appropriate colour of matte finish. Fewer larger turbines generally have less of a visual impact that greater numbers of smaller turbines. Turbines of monopole construction tend to be more 'elegant' and minimalist thus being less intrusive on the landscape. Finishes of an appropriate colour and of matte finish reduce the potential for reflection and reduces the turbine's presence in the surrounding landscape (Sustainable Energy Authority Australia, 2003).
- No artificial lighting except for minimum aircraft safety requirements.
- Prohibit any form of signage or identification on the turbines or supporting infrastructure. While some municipalities allow developer or manufacturer signage, any form of promotion on objects that are already visually sensitive is considered inappropriate. Smaller scale signage at key viewpoints or at the actual turbine site could be equally effective.
- Minimize disturbance to the natural environment including watercourses, vegetation removal and earthworks.
- All cabling for the WEF to be located below grade with the possible exception of external connections beyond the on-site substation subject to the satisfaction of Council. Underground cabling can reduce vegetation removal and reduce visual clutter.
- Outdoor storage of materials shall only occur in one location co-located with the maintenance building and appropriately screened to the satisfaction of Council. Consolidation of non-agricultural activities will reduce potential visual clutter.

- All applications will be referred to the NEC for their comment. Council shall specifically consider these comments in their review of the application. The distance from the NEP from any point within the MGH could, depending on particular characteristics, be within view of the NEP.

6.2 *Shadow Flicker*

Shadow flicker from individual turbines can be calculated and modeled to determine potential impacts on existing residences (likely east or west of a turbine location).

6.2.1 Shadow Flicker Assessment

Shadow flicker should be assessed for all residences within 1 km of a turbine. This study shall take into consideration prevailing wind directions, turbine height, and assume no cloud cover. One kilometer has been used in other studies and in the case of MGH, represents an appropriate radius given the topography and climate of the area.

6.2.2 Planning Response

Provisions with respect to minimizing the impact of shadow flicker should include:

- WEFs shall be sited to avoid shadow flicker on and within 30 meters of existing residences.

This provision will ensure that shadow flicker does not impact on existing residences and their immediate surrounds. Landowners should not have to endure shadow flicker if they wish to enjoy their immediate private open space.

Shadow Flicker avoidance can be achieved by siting turbines to avoid the potential altogether, implementing a management plan to have the turbine shut down during the duration of shadow flicker, and/or provide source evergreen landscape screening on the land of the residence being affected.

In addition, as part of any future public consultation process, properties identified as being affected by shadow flicker should be consulted separately to specifically explain the issue and potential future impacts on that property.

6.3 Noise

Noise from wind turbines is a widely studied effect that has resulted in a variety of noise standards being implemented to minimize impact.

6.3.1 Noise Assessment

In Ontario, noise from wind turbines is governed by a Certificate of Approval issued by the Ministry of the Environment. These Certificates ensure that a WEF complies with MOE Guideline NPC-233 which limits sound levels. The noise study submitted with the C of A application should also be submitted with the rezoning application and include an assessment of tonal noise issues or infrequent noise events that impact on the amenity of nearby residents. Such a study shall establish a compliance checking, dispute resolution and rectification process.

6.3.2 Planning Response

Provisions with respect to mitigating noise impacts should include:

- Turbines shall be located at appropriate setbacks to ensure that noise levels from the turbine, at any existing point of reception (as defined in NPC-233 and outlined below) on the same parcel of land as the turbine, comply with applicable Ministry of Environment noise guidelines.
- Turbines shall be located at appropriate setbacks to ensure that noise levels from the turbine at the boundary of any abutting parcel of land not part of the WEF site (or under lease to the proponent of the WEF) do not exceed noise levels as defined in Ministry of Environment publication NPC–233).
    - This provision will help ensure that property owners not participating in the WEF are not unduly impacted upon within their property, particularly if there is ever any intent for the development of a "Point of Reception" within that property.
    - "Point of reception" is defined as "any point on the premises of a person within 30 meters of a dwelling or a camping area, where sound or vibration originating from other than those premises is received. For the purpose of approval of new sources, including verifying compliance with Section 9 of the Act, the Point of Reception may be located on any of the following

existing or zoned for future use premises: permanent or seasonal residences, hotels/motels, nursing/retirement homes, rental residences, hospitals, camp grounds, and noise sensitive buildings such as schools and places of worship."

- The proximity of a WEF to a non-participating property should not have the ability to affect the future development potential or enjoyment of that land.

- A WEF proponent may not use the terms of any lease to reduce their obligations with respect to NPC – 233.

6.4 Electromagnetic Interference (EMI)

The effect of wind turbines, particularly in rural areas, is generally limited. However, effects can occur with both commercial transmission infrastructure (particularly microwave operations) and residential reception.

6.4.1 EMI Assessment

Electromagnetic emissions (EME) from wind generators and their transmission infrastructure is considered low and comparable to existing similar transmission facilities based on experiences at other WEF developments. The impact of WEFs actually appears to be the potential interference of electromagnetic signals of the surrounding area.

6.4.2 Planning Response

Provisions with respect to mitigating EMI should include:

- The siting of wind turbines in the 'line of sight' between transmitters and receivers should be avoided. (Sustainable Energy Authority Victoria, 2003, 26).

- The potential EMI of any proposal shall be assessed by the applicant in consultation with relevant private, commercial and government bodies prior to the final siting and submission of any application (Kerry County Council, 2002, 5.10). This consultation is to ensure that stakeholders with existing communication infrastructure in the vicinity are not impacted upon by the specific siting of a WEF. If the stakeholders require a report, the report's scope and relevant guidelines shall be determined/identified during preliminary consultation.

- A WEF proposal shall include measures to monitor the effects of the development on transmission facilities and procedures to remedy any interference when the facility becomes operational. This may include facilities installed at the developer's expense to ensure that transmissions in the area are not degraded or interfered with (Kerry County Council, 2002, 5.10) (LaForest, 2004, 6).

6.5 Ice Throw

The climatic conditions of the MGH will likely result in ice build-up on wind turbines. While it has been shown that ice throw and its associated atmospheric conditions are considered to be a relatively infrequent event, it should be responded to nonetheless (Seifert, 2003, 8). It is not known how the climatic conditions of Grey Highlands will affect a particular type of turbine and produce ice throw.

6.5.1 Ice Throw Assessment

Falling ice from the actual turbine tower tends to be a lesser issue as the ice falls within the turbine footprint. However, if public access is permitted within this footprint, measures to reduce risk should be undertaken. Whether these measures are through the use of fences to prohibit access or signage will depend on legal advice and the requirements of the WEF operator.

The larger issue is that of ice being thrown off the turbine blades while they are in motion. In most cases, the majority of ice throw situations will occur within the buffers established by provisions related to noise, shadow flicker, etc..

Two options exist for ice throw mitigation. The first is a management plan for ice conditions that can shut down individual turbines if wind speed, direction and weather conditions will result in ice throw over a public road or an abutting property. The second is to implement standard ice throw buffers around every turbine.

6.5.2 Planning Response

Provisions with respect to mitigating ice throw should include:

- Each turbine will have signage mounted on the tower or within close proximity of the turbine warning of falling ice dangers.
- A WEF application shall include the preparation of an ice throw report indicating the "risk circle" of every turbine based on the equation d=(D+H) x 1.5 where d is the maximum

throwing distance, D is the rotor diameter, and H is the hub height (all distances in meters). Where "risk circles" overlap public roads or abutting property boundaries not part of the WEF site, a management plan shall be prepared confirming how the operation of the turbine will be controlled to avoid ice throw (Seifert et al, 2003, 4). If Council is not satisfied that ice throw can be managed, the risk circle shall not cross the boundary of any adjoining public road or property not part of the WEF site.

- To deal with ice falling from a non-operating turbine, a minimum setback equivalent to the total turbine height (including the rotor) shall be applied to any public road, abutting property boundary (not part of the WEF site) and on-site residence, or commercial/institutional building accessed by the public.

6.6 Siting

In addition to the various setbacks outlined above, it is considered appropriate that other standard siting guidelines be applied to ensure the compatibility of the land use.

6.6.1 Siting Assessment

Standard minimum setbacks should be established for key interfaces of a WEF will help ensure that any potential land use conflicts are minimized.

6.6.2 Planning Response

Provisions with respect to the siting of WEFs should include:

- Wind turbines should be setback a minimum of 1.25 times the height of the turbine from any public road, abutting property boundary (not part of the WEF), permanent and seasonal residences, hotels/motels, hospitals, camp grounds, schools, places of worship, and commercial or industrial facilities accessed by the public. This distance is the result of a review of other municipal setbacks for wind energy facilities and reports addressing risks from turbines. The rational behind this distance is that the probability of risk from either ice throw or turbine failure is minimized at a distance equal to the turbine height plus an additional 25% (Seifert et al, 2003, 2)(Braam, 2002, 4).
- Wind turbines shall be setback a minimum of 500 meters from any urban settlement area or rural cluster. This figure is based upon similar figures already established by several municipalities in Ontario and has good land use planning rational in terms of ensuring an

adequate buffer for any potential impacts and allowing for limited future expansion of the urban settlement areas. While figures vary between 450 meters and 700 meters, no rational was found to support these figures. However, based on the potential impacts of turbines found during this review and the opportunity for limited urban growth, 500 meters appears to be reasonable distance.

- WEFs are discouraged on Class 1, 2, and 3 agricultural lands and where possible should be located adjacent to active cropping areas. Any WEF component (including access roads) located on prime agricultural lands would have to justify why it cannot be positioned in an alternative location. Supporting buildings, storage and construction areas are not to be located on Class 1, 2 and 3 agricultural lands.

6.7 Environment

While most if not all of the environmental impacts will be addressed through the environmental assessment process, MGH should ensure that all relevant requirements are met.

6.7.1 Planning Response

Provisions with respect to the environment should include:

- Siting to ensure the minimization of vegetation loss, habitat destruction, soil erosion and bird and bat mortality.
- Preparation of an Environmental Management Plan addressing:
    - Procedures for noise, access, materials storage and pollution management.
    - Identification of all possible contaminants on the land during construction and post construction.
    - Identification of construction and operational activities that could lead to site contamination and methods to control these risks.
    - Procedures for the rehabilitation and reinstatement of areas for construction including, but not limited to, access and staging areas.
    - Monitoring program of bird and bat mortality rates in the WEF site submitted to the Municipality annually.

- Surplus lands required for the construction of the turbine be rehabilitated to the maximum extent that still allows for ongoing maintenance requirements.

- Within 6 months of a turbine not producing power, a status report will be supplied to Council. If the turbine is not operational within 1 year from the time it ceased producing power (or other time at the discretion of Council), decommissioning shall commence in accordance with the approved decommissioning plan.

- A decommissioning plan shall be prepared and include the following provisions;
    - Remove all equipment associated with the wind turbine and/or WEF.
    - Remediate any contaminated lands;
    - Restore and revegetate all previously developed areas including access road, transmission facilities, etc.
    - Provide details of staging, transportation requirements, silt control, etc.
    - Establish of the cost of decommissioning and how this will be funded entirely by the developer (ie. how would scrap value be realized).
    - Establish and justify an appropriate security amount to be held by the MGH to cover the cost of decommissioning if the developer fails to cover the costs. This amount shall be to the satisfaction of Council.

- The turbines approved by the site specific rezoning shall not be altered in any way to change their appearance or noise output without approval by the MGH. Replacement turbines that differ in any way from those approved in terms of appearance, noise, and supporting infrastructure needs may be subject to an amendment of the implementing zoning bylaw or site plan approval amendment if the changes are considered by the Municipality's planner to have any significant impact. Future planning provisions should establish guidelines for determining when changes to a WEF are considered minor and can be dealt with under staff delegation.

6.8 Health & Safety

This section deals with health and safety issues to ensure that this form of industrial development does not have a negative impact on staff or the public.

6.8.1 Planning Response

Provisions with respect to health & safety should include:

- Preparation of a traffic management plan during construction and decommissioning to the satisfaction of the Township, County and Ontario Ministry of Transportation including details of:
    - Vehicle access points to the WEF.
    - Details of oversized vehicles, their routing and escort procedures.
    - Need for road upgrades (including intersection and private access points).
    - Provision of directional and tourist signs.
    - Designation of car parking areas and bus facilities as appropriate to support any public information and viewing areas.
- All private access roads to turbines shall be gated to prevent vehicle access as close to the public road as possible without hindering existing landowners.
- Fencing of the turbine is optional depending on the operational and legal requirements of a particular operator. Signage may be used to warn visitors and staff of any potential dangers and provide emergency contact numbers.
- All WEFs components shall be secured to prevent unauthorized access.
- The locations on on-site hazardous materials (i.e. lubricants, coolants, etc) will be appropriately identified externally.
- Prior to the start-up of the facility, an emergency services introduction and initiation will be carried out for relevant municipal staff and firefighters. These sessions will be carried out annually or at the request of Council if more immediate staff initiation is required.

7.0 WEF Application Information Requirements

The following is a summary of the required information for WEF applications or approvals:

- Visual Assessment Report meeting the criteria outlined in Section 5.1.
- Location Justification report including an assessment of potential implications for existing land uses.

- Site plan information including all buildings and works, access roads, and supporting infrastructure.
- Assessment of the proposal against the purpose and objectives of the Niagara Escarpment Plan with respect to visual impact.
- Environmental Assessment consistent with the requirements set-out by the Ministry of the Environment and the Canadian Environmental Assessment Act (if applicable). All WEF applications are to be referred to the Canadian Environmental Assessment Agency by the proponent. Confirmation of this process to be supplied to the MGH. The EA shall also consider:
    - Bird Migration and the Migratory Birds Act
- Report assessing Shadow Flicker and mitigation measures.
- Noise study confirming how the project will comply with MOE standards, tonal noise and the process for handling possible future noise complaints.
- Security payment to ensure noise compliance checking, dispute resolution and rectification (if required).
- Confirmation that EMI issues are not a problem with existing transmission infrastructure by the relevant private, commercial and government bodies.
- EMI management plan outlining how EMI issues will be remedied once the WEF commences operation.
- Ice throw report addressing the provisions outlined above in Section 5.6.
- Construction management plan providing details of staging, access, silt control, construction areas, temporary structure, vehicle type and movements, etc.
- Traffic Management Plan as per the provisions listed in Section 5.9.
- Confirmation from the Hydro Distribution Authority that proposed transmission connection and route is appropriate.
- Decommissioning Plan and securities as outlined in Section 5.8.

It is recommended that scoping of the above information requirements be undertaken in consultation with all relevant agencies prior to the application process.

8.0 Environmental Assessment

Given the importance of this new land use to Council, it is recommended that no exceptions be granted to the provisions of the Zoning By-law or Official Plan on the basis that the project is subject to the provisions of the Environmental Assessment Act.

While this is inconsistent with existing Municipal and County policy, these policies were formulated prior to this 'dispersed' form of energy generators in Ontario. Many of the provisions required to overcome technical issues and establish an appropriate land use outcome may not be addressed through the EA screening process.

9.0 Conclusion

The planning approval framework outlined above, subject to threshold issues being addressed, is based on a combination of minimum setback distances and performance based provisions. This will allow WEF proponents to site wind turbines specifically to minimize impacts on existing land uses while maximizing turbine viability.

The purpose of the provisions outlined in this paper is to provide a starting point and base for future stakeholder discussions. These provisions are not absolute – they seek to be as comprehensive as possible when dealing with a new land use.

Actions that need to be undertaken in January 2005 include:

- Discussions with MGH's legal council to discuss and establish that any planning approval framework is consistent with the Planning Act and legally defensible.
- Circulate draft planning provisions for comment to the relevant stakeholders and the County and its member municipalities.
- Carry out the necessary actions outlined in this paper to determine what threshold issues are relevant and how they may be overcome. This includes further discussions with OMAF with respect to MDS requirements and CANWEA and the OFA with respect to the content of lease agreements.

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Appendix C – Newspaper Articles

Area farmers hoping to harvest wind energy

By Donal O'Connor
Staff reporter

A 50-metre wind tower that will test wind velocity in one of three preferred locations in Perth County is expected to be up and running within a month.

The results of the test, Jaret Henhoeffer informed the annual meeting of the Perth County Municipal Association on Wednesday, will give a good indication of the viability of wind-generated power in the county.

The tower will support anemometers, essentially spinning wind cups, at 30-, 40- and 50-metre heights and will record wind speed and direction at 10-minute intervals. The apparatus is designed to find out exactly how much wind is available for wind turbines within a 20-kilometre radius of similar topography.

The project, which is being undertaken through the Community Futures Development Corp. (CFDC), is a key factor in determining the potential that exists in the county for wind-powered electrical power generation.

In an interview following his presentation, Mr. Henhoeffer, the general manager of CFDC, said the plan is also to erect a similar test tower in Huron County. Both should be operating within two months.

"We hope to catch the winter wind. Winter winds are key here," he said.

The towers will record data for 12 months, but Mr. Henhoeffer said there'll be indications well before the end of that period about the suitability of inland winds for generating power.

"We'll know in three to six months if it's a dramatic yes or no," he said. "We don't expect a dramatic yes."

Perth County planning director Dave Hanly, left, and Jaret Henhoeffer, general manager of Community Futures Development Corp., are shown after their presentations on wind power at this week's annual meeting of the Perth County Municipal Association.

Photo by Donal O'Connor

"We know we're not as windy as the shoreline, but we want to know if we're windy enough for profitable wind developments of all sizes — small, medium and large."

The projects are being supported by the Huron and Perth federations of agriculture, the CanAdapt program of Agriculture Adaptation Canada, Huron Business Development Corp. and Ontario Co-op Association.

And Perth County council has contributed $10,000 towards the studies, each of which costs $40,000.

"We're trying to create a farmer-driven and farmer-friendly enterprise," said Mr. Henhoeffer.

Both he and Perth County planning director Dave Hanly cited wind power as a potential growth industry for the region, one that's compatible with agriculture and that can directly benefit farmers as well as other local investors.

Farmers can earn $5,000-$10,000 annually per tower by leasing land for installations and from royalties, they said. But based on experiences in Germany and Denmark, an important element in getting things moving will be economic incentives from government.

Mr. Henhoeffer said typical contracts for a wind tower would earn a farmer $2,400 annually in land rent in addition to $2,500 to $7,500 in royalties. Most contracts are for 20 years and match the life of the turbines. And they usually involve only a half-acre of land that's accessible by road.

"If you compare it to cash cropping, it's by far the most profitable cash crop you're ever going to farm," he said.

The wind power tests are being handled by Green Breeze Inc., an Ontario company whose president is a Huron County resident. The company was also involved in selecting the test sites.

While Mr. Henhoeffer also mentioned the potential in Perth County for converting biomass to usable energy, he said wind power is the first renewable energy in which the cost of production is down to a level that allows smaller investors to become significantly involved.

See Wind, page 28

A LITTLE BIT COUNTRY

PAUL KNOWLES

Rising from environmental catastrophe

The proprietor looked out into the plaza that is the heart of the Swiss town of Brig. The sidewalk cafes were busy. Vacationers were

heart of Brig swelled and then, as debris formed dams at the bridges, surged at full-storey height through the community.

Two lives were lost, the tales of impossible rescues and unlikely survivals still seem fresh, and most of the downtown was ruined.

Some of ancient Brig survived unscathed. The Stockalper Palace, built in 1525, was left

This being Switzerland, the restoration of Brig could not be left to individual enterprise nor happenstance. A plan was conceived, rules were made and bylaws approved. By the end of the reconstruction — our hostess at the cafe recalled being closed for a full year, one year after she and her husband bought the hotel — every dam-

since the Renaissance. Of course, the mountains around Brig have been there considerably longer than that, and it is to those mountains that this community owes its life. It's also those mountains, though, that have threatened the town's existence, as recently as 14 years ago.

Looking toward the future, Brig residents

Wind energy

• From page 21

He noted that for a Perth County project to proceed there has to be an appetite for it from the Ontario Ministry of Energy and a desire on the ministry's part to purchase power at a price that makes it viable to producers. The federal government's throne speech commitment to wind power and its $150 million in pledged funding is also encouraging for the development of wind power, he said.

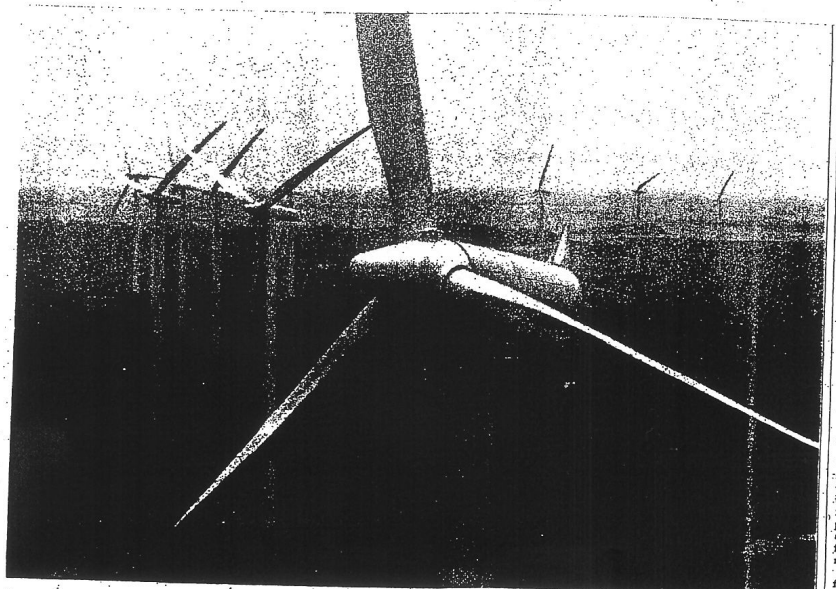
Mr. Hanly outlined progress made so far in the planning department to allow for construction of wind towers that are typically 100 metres high, not including an attached 30- to 50-metre propeller.

An amendment to the county official plan was adopted Aug. 18, he noted, and is in full force and effect. The amendment makes small wind energy systems a matter of right on agricultural land, subject to several conditions, including a 500-metre separation distance from settlements such as hamlets and towns, proper engineering and noise levels.

The rustling of leaves on some days can produce more noise than newer model wind turbines, he added.

Commercial wind energy generation systems are permitted on agricultural land subject to site-plan and site-control agreements. A current goal is to have local zoning bylaws across the county amended to permit the wind-driven generators so there's a uniform set of requirements across the county, said Mr. Hanly.

The 56th annual meeting of the Perth County Municipal Association was held at the Downie Optimist hall in St. Pauls.



he 20 windmills at Smoela on the northwestern coast of Norway produce enough power for 6,000 family homes per year. BJOERN SIGURDSON / AGENCE FRANCE-PRESSE

As the city's energy needs rise, green solutions are starting to become more appealing

Change is in the wind

By James Cowan

The City of Toronto has tilted toward windmills. For two years now, a 30-storey-tall wind turbine has silently spun on the Exhibition grounds, becoming both lakeside landmark and a testament to the viability of renewable energy. And the windmill, a joint venture between Toronto Hydro and Windshare, is not the only green energy source in the city.

This August, EnWave District Energy launched its Deep Lake Water Cooling project, which uses lake water rather than electricity to air-condition office buildings. Two weeks later, Toronto Hydro installed a giant bank of solar panels on its southern service centre, the largest project of its kind in the city. But while the green-power projects generate warm and fuzzy feelings, do they generate enough power to make a dent in the city's energy deficit? Will Toronto's growing number of green energy initiatives make a difference?

The need for new energy sources — clean or not — is readily apparent. Dwight Duncan, Ontario's Energy Minister, told reporters this week the province must "re-emphasize the need for energy self-sufficiency" in the face of global oil prices that exceed, or hover just below, US$50 a barrel. Without homegrown electricity, he said, the province will be unable to prevent sharp increases in power prices. "The times now get 20% of their electricity from wind," he added.

But the minister neglected to mention Denmark has more than one, and basic arithmetic suggests it would need many, many more to power the city. At peak efficiency, the existing turbine can power 250 homes. There are approximately 970,000 households in the city. That means the city would need 3,779 more windmills to cover its residential power usage. Just to match Denmark's 20% benchmark, it would need 775 additional turbines.

Similarly, Toronto Hydro's solar project does not offer any immediate answers to the city's power crunch. It cost $300,000 to install the panels that now cover the front of the utility's Commissioners Street building, and those panels generate only enough power to cover most of the building's lighting needs.

> *Toronto would need 3,779 more windmills to power its homes*

Of all the green projects in Toronto, it is EnWave's deep-lake cooling that promises to make the biggest impact on the city. At its peak, the system can air-condition 100 buildings or 20 million square metres of building space. Enwave claims its system will reduce the amount of energy required to cool the buildings involved and remove 40,000 tonnes of carbon dioxide from the air, the equivalent of taking 8,000 cars off the road or shutting off 12,000 air conditioners. Still, it costs $1,400 to dig an additional metre of trench for the pipes necessary to extend the project. It is unlikely deep lake-cooling will be expanding downtown any time soon.

Blair Peberdy, a vice-president at Toronto Hydro, says the city will likely need a reliable source of electricity for the considerable future. Those "reliable" sources are not sexy: Nuclear, coal or hydro power remain the best options.

"Considering the amount of electricity the city of Toronto uses and will use in the future, we need in the province a very stable and plentiful source of competitively priced electricity. That base load of power is critical to the economic and social welfare of the province," he says. "But alternative energies like solar, like wind, are all part of the equation."

To suggest these green projects exist solely to replace traditional energy sources might be missing the point. Peberdy says power suppliers must begin contemplating a future where dozens of even hundreds of wind turbines, solar panels or bio-diesel generators feed electricity into the central grid. Pilot projects such as the wind turbine allow Toronto to learn how to manage de-centralized power generation. And for that reason, the electricity provider is pushing ahead with other pilot projects. For example, one of Toronto Hydro's call-centres will soon be powered by a bio-diesel generator.

"As electricity prices rise in On-

PETER J. THOMPSON / NATIONAL POST

Toronto's lone wind turbine could provide power to 250 family homes.

come attractive options and will have a niche in the overall market," Peberdy says. "And from our research, the public is interested in it and does want to see more cleaner forms of energy brought online."

Indeed, the swooping windmill our city, even if they aren't quite ready for us yet.

"I think it's a good example for the public to see what these types of technologies are, what they look like, how they sound," Peberdy says. "It kind of demystifies

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Blown away!

Manitoulin ideal environment for windfarm projects

by Cheryl Waugh

MANITOULIN - It was a year ago this week that much of Ontario fell into darkness thanks to a massive blackout that hit the province and most of eastern United States. And, as millions of people sat in the dark - for some it was days before power was restored - one thing was strikenly clear: Ontario had energy problems. Simply speaking, too much energy was being used, not enough was being produced.

It became apparent that developing new energy sources should be at the top of the priority list for any Ontario government. The net result of the blackout? Manitoulin may be well-suited to become part of Ontario's energy solution. The answer, my friend, is blowing in the wind.

There are currently three commercial wind farm projects at various stages of development on the Manitoulin. Northland Power Inc. is developing a 54 MW wind farm on McLean's Mountain; Schneider Power Inc. (SPI) has a 21 MW project near Providence Bay; while Superior Wind Energy Inc. is reviewing a possible 100 MW operation in the Little Current vicinity. Both M'Chigeeng and Sheshegwaning First Nations have also stated they are looking at potential wind farms as economic development initiatives. There is no other place in Ontario that has more potential windfarm projects on the go then Manitoulin.

However, the sheer amount of projects is enough to have anyone think that the Manitoulin landscape is about to become dotted with windmills. One huge, and very expensive problem stands in the way of that event occurring - there are serious constraints on Manitoulin's power grid. All the proposed projects can not go forward without Ontario Hydro vastly upgrading the Manitoulin line.

But even with those limits power companies still want to develop and invest in Manitoulin, and at their own expense. Northland Power, SPI, and Superior Wind are all legitimate, well-financed power companies.

Northland Power was established in 1987 by James Temerty, who prior to founding Northland Power owned and operated the world's largest privately held chain of ComputerLand stores. The company also has former Canadian Prime Minister John Turner on its Advisory committee.

Northland Power has developed and now manages and operates power plants across Ontario, as well as in the Ukraine. It is also involved in a $95 million 54 MW wind power project that will be built in the Gaspe region of Quebec. (For more on Northland Power, see its website at www.northlandpower.ca)

Manitoulin's own 54 MW project should come in at around the $95 million mark as well, albeit most of that cost will come from capital expenses.

The cost of building and erecting windmills has come down in price over the last decade but it is still a costly venture.

The McLean's Mountain project will see Northland Power spending approximately $25 million on construction materials and labour, and an additional $3 million to $4 million on transportation. During construction 20-25 full-time positions are expected to be created, while six to nine full-time permanent positions are expected to be created post-construction.

Northland Power Business Development Director Jonathan Sandler said his company, while acknowledging that experience is key when building windmills, throughout the development, construction and operations process.

"We're already working with a lot of local people," said Mr. Sandler. He explained Northland Power has already spent development dollars on the Manitoulin, including using local people for land registry services, using local motels when making trips to Manitoulin, as well as using the Gore Bay Airport.

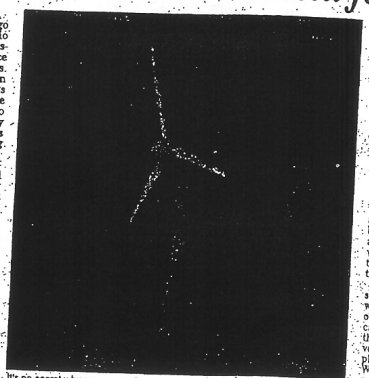
"Development takes a long time, and we've been developing this project for a long time," said Mr. Sandler. "We held our first public meeting in December 2002. We've been investing time and money for quite awhile to move this project along. Hopefully, people will see how much investment has been made to date."

The wind farm currently in development in Providence Bay is a little different in that SPI is building the venture on its own property, whereas Northland Power is leasing its property from local farmers. The Schneider family has been cottaging on Manitoulin for many years, and the 21-MW windmill development is being built on their farmland, on Highway 542 between Spring Bay and Providence Bay. SPI is a 112-year-old, privately run, family business. The company prides itself on its association with environmental groups, such as the World Wildlife Fund, the Ontario Federation of Naturalists, and the Dr. David Suzuki Foundation. (For more on SPI, see its website at www.schneiderpower.com.)

President and Chief Executive Officer Thomas Schneider said, wind farms can work in harmony with the rest of the Manitoulin, if it is done right.

"Wind is one of Manitoulin's untapped natural resources," said Mr. Schneider. "It could help economic development on the Island. I think it is a positive development."

The total cost of the Providence Bay project, which will have approximately seven to 14 wind turbines on 400 acres, is around $30 million. Four full-time jobs - three of them non-skilled labour - will be created once the windfarm is built. SPI also plans to add a tourism element to its venture. It's creating an information centre so that tourists can stop in and learn about the wind farm operations. The information centre should create another four to five season-grand exception is a huge wind farm located in the Mojave Desert outside of Palm Springs. Billed as "The Ultimate Power Trip", the tour takes visitors through a 90-minute eco-adventure as they travel under the blades of the windmills. Visitors are told to "bring your camera and hang on to your hats". According to its website, www.windmillstours.com, it is the only tour of a working wind farm in the world.



It's no secret why proponents for new wind farm projects are taking a long look at Manitoulin: the wind. Few areas offer as many opportunities for the growing industry as the world's largest freshwater island does.

The question of the impact on Manitoulin's tourism is one of the concerns facing the windfarm projects. There are some vocal dissenters, most notably where the McLean's Mountain project is concerned. Concerns range from noise pollution to the possible death of birds in the blades, and of course, simply not wanting to look at a big windmill.

SPI has hired Dr. Ross James, an ornithologist, to conduct field surveys near its proposed project site. One field survey has already been completed, while a second survey is scheduled for this fall. Dr. James, formerly of the Royal Ontario Museum, received the Distinguished Ornithologist Award from the Ontario Field Ornithologists in 1998.

Mr. Schneider said the threat to birds from wind turbines is minimal, and can be mediated by proper placing of the wind turbine. "We know what is in the area and what we can do to compensate," said Mr. Schneider. He added that wind turbine technology has improved so much that the threat to birds is no longer an issue. Buildings with windows, including every house, are more likely to cause bird mortality, he said. "You would need a bird with suicidal tendencies, or you would need severe storm conditions to push the bird into the wind turbine, and birds don't fly in severe storms."

At a recent meeting in Spring Bay he explained that studies on birds at wind energy facilities in North America and Europe indicate that birds are aware of the wind turbine towers and avoid flying close to operating blades.

However, two letters to the editor have been printed in the Expositor opposing the windfarm initiative. Both letters concerned the operation proposed for McLean's Mountain, and the windfarms as eyesore concern - consequently affecting tourism - do is make them invisible, said Mr. Sandler.

Northland Power is looking at placing 30 wind turbines on 2000 acres of farm land on McLean's Mountain. The company has created simulated pictures of what their project would look like from various points surrounding it. According to Northland Power, one wind turbine will be visible along Highway 540, while six will be visible along Highway 6.

But, the eyesore concern can also be described as "beauty is in the eye of the beholder".

A lot of people love the sight of windmills, said Rick Martin, who also represents Northland Power, because it expresses a renewable and clean power source. "The windmills are not going to built on the bluff, but will be built in from the edge," he explained.

He also noted as for people who simply don't want to look at a windfarm, "we can't spend all of our time fighting with people we can't come to terms with. But, they are a minority, although a vocal minority. Many many people are inviting this project in. Windmills are a progressive alternative for anyone who is concerned about the environment."

While the potential for windfarm development on Manitoulin is a new development, the concept of harnessing the wind for power is not. Five thousand years ago, the Egyptians used wind power to sail their ships on the Nile River. Windmills came later, when people used them to grind their grain. Although The Netherlands is famous for its use of windmills, the earliest known windmills were in Persia (Iran).

Windmills work by slowing down the speed of wind. The wind flows over the airfoil shaped blades causing them to lift and turn. The blades are connected to a drive shaft that turns an electric generator to produce electricity.

Wind is produced by the uneven heating of the earth's surface by the sun. Wind is air in motion. The earth's surface is made of various land and water formations, so it absorbs the sun's radiation unevenly. During the day, the sun causes the air over landmasses to heat more quickly than air over water. The warm air over the land expands and rises, and the heavier, cooler air over water moves in to take its place, creating local winds. At night it's reversed because air cools more rapidly over land than it does over water. Wind is a renewable resource because it will continue to be produced as long as the sun shines on the earth.

However, even with new technology modern wind machines still have to wrestle with the problem of what to do when the wind isn't blowing. A source of constant wind is needed for a windmill to be effective. Generally, wind speed increases with altitude and over open areas with no windbreaks. The best places for windmills are the tops of smooth, rounded hills; open plains, shorelines, or mountain gaps that produce wind funneling.

That means places like McLean's Mountain, or 10 Mile Point, where Superior Wind Energy is apparently conducting wind tests, are the best sites for an efficient windmill operation. The community has to decide whether or not they want them at those sites.

Not much is known about Superior Wind Energy Inc. plans on Manitoulin. Superior Wind is the newest of the three wind companies looking at building on Manitoulin, but it has impressive backers. Founded in January 2002 Superior Wind is a joint venture of Brascan Corporation, which owns 51 percent of the company, and Harmony Wind Energy, which owns the other 49 percent. (For more information on Superior Wind, see its website at www.superiorwindenergy.com.)

Brascan is an asset management company that focuses on real estate and power generation. The company has direct investments of $17 billion and a further $7 billion of assets. It is listed on both the New York and Toronto Stock Exchanges. Brascan's power generation capacity is mainly through hydroelectrical power. It is the largest independent producer and distributor of power in both Ontario and Quebec, and has 112 hydroelectric power generating plants in North America. There is five more in Brazil.

It's office property portfolio features the World Financial Center in New York, BCE Place in Toronto, and Canary Wharf in London, UK. (For more information on Brascan, see its website at www.brascancorp.com.)

According to Superior Wind's website, the company wants to start a 100 MW facility somewhere in Ontario, and are conducting wind tests to determine the best location for such a facility. Manitoulin is on its list.

But, no company can just plunk down a power generating operation, anywhere in Ontario, and start producing power on whim. The industry is monitored by the independent electricity market operator (IMO). Anyone wanting to produce over 10 MW of power must register with the IMO, which then conducts a system impact assessment.

The IMO was created in 1998 by the Electricity Act of Ontario. It is an independent, not-for-profit corporation, which has its board chair and directors appointed by the Ontario government. It's the connection for all areas of power generation in the province, generators that produce it, transmitters that send it across the province, retailers that buy and sell it, industries and businesses that use it in large quantities, and local distribution companies that deliver it to people's homes. In short, it sets the industry standards.

The system impact assessments are public documents and can be found on the IMO website. All three projects on Manitoulin are registered, although the Northland Power site is listed under Repower Wind Corp., who initialized the project. (For access to the reports go to the IMO's website at www.theimo.com; click on 'inside the market', scroll down the left side of the page until you find the 'Services' header, then click on connection assessment. You'll find all power generating development projects in Ontario listed.)

Besides setting industry standards, the IMO also monitors the system and identifies what's needed to maintain reliability in the future. It prepares 18-month and 10-year forecasts of the growth in demand for electricity and assesses whether there will be adequate generation and transmission

continued on page 11A...

The Manitoulin Expositor

..Manitoulin ideal environment for windfarm projects

..continued from page 1A

acilities.

In January of 2004, Energy Minister Dwight Duncan said he wanted 300 MW of renewable energy capacity as soon as possible. Wind power companies are currently bidding for those 300 MW. The request for proposals (RFP) closes on Wednesday, August 25. The province's initiative is to build 2700 MW of renewable power by 2010, which would represent 10 percent of the province's energy needs. Both Northland Power and SPI are bidding in this round of RFPs, using their Manitoulin operations.

"The government of Ontario is making a commitment to renewable energy," said Mr. Sandler. "The government is saying, 'We need energy. Where is it going to come from?' Manitoulin has a natural competitive advantage with this new opportunity. You don't want to exploit the resource and rape the Island with all these wind turbines. You have to plan and develop it."

Which is why both Northland Power and SPI continue to hold public meetings, to gauge the reaction of Manitoulin residents to their plans and to ascertain whether or not the people of Manitoulin want wind turbines here.

Along with the fact wind turbines are a renewable resource, they also come with no financial cost to Manitoulin. The companies themselves will build and maintain the plants, along with any roads that need to be built to access them. The Island can also expect to reap tax benefits, and the wind farms should help to strengthen Manitoulin's power grid.

There is one other benefit, at least as far as the Northland Power initiative is concerned, for area farmers. Northland Power already has potential lease agreements with several farmers with land on McLean's Mountain. Those farmers will get annual revenue from the windfarm, while still being able to maintain their agriculture operations.

Bud Wilkin, of Little Current, in a letter to the editor published in the August 4 edition of the Manitoulin Expositor, explained that revenue from the Northland Power windfarm will allow farmers to spend a little more freely especially since the BSE crisis hurt the industry. "Our agreement with Northland states all roads to be constructed, culverts to be installed and roads to be maintained will be at their costs, as are all other components for this facility (no cost to NEMI)," he wrote. He goes on to write that he hopes "others will not delay and stifle an environmentally friendly development that is not as hard to look at as the communication towers that are there now. No smoke stacks, no pollution, just wind."

Both Mr. Martin and Mr. Sandler believe there is a strong sentiment in favour of the project at McLean's Mountain. Northland Power spent the Haweater Weekend conducting a survey of area residents and tourists' opinions on the project, said Mr. Sandler. Two hundred and seventy people were surveyed and the responses were very positive. "It was in the high 90s range," he said.

"We're giving people an opportunity to provide feedback, and we're working very hard to reduce the visual impact."

(Northland Power's next public meeting is scheduled for this Thursday, starting at 7 pm, at the NEMI recreation centre.)

The interesting twist in the tourism question is the fact Manitoulin is getting free publicity because of these developments. SPI sent out a press release that offered its first round of flow-through private offerings on its Providence Bay, Manitoulin Island development. The press release was reported on the websites for Bay Street Times, MSNBC, Yahoo! Finance, and CBS Market Watch. SPI's website also has links to Manitoulin websites, including the Chamber of Commerce, and the township of Central Manitoulin.

While the opportunity is there for windfarm development on Manitoulin, both SPI and Northland Power said they will not build the farms if the community doesn't want it.

Added Mr. Martin, "If the community doesn't want progress, we can't force it."

Mr. Schneider said the concerns that people have of windfarms can be minimized - be it noise or the perceived bird threat - except for one, the visual impact of windfarms, and that concern is based on opinion.

"There isn't a lot of environmental concerns when you're talking about wind turbines," he said. "So it basically comes down to opinion...either you like it, or you don't."

Wild Blueberry Coffee Cake

Although perfect for afternoon coffee break, the rich, sour cream batter and wickedly indulgent glaze make this cake a tempting treat for any occasion.

For the cake:
1/2 cup butter, softened
1 1/4 cups granulated sugar
2 eggs
1 tsp vanilla extract
2 1/4 cups all-purpose flour
1 tsp baking soda
1/4 tsp salt
1 cup sour cream
5 1/2 cups wild blueberries, approximately 1 1/2 lbs fresh or frozen

For the topping:
3/4 cup brown sugar
1/2 cup broken walnuts or pecans
1/4 tsp ground cinnamon

For the glaze:
1/4 cup butter
1/2 cup granulated sugar
1/4 cup whipping cream
1/2 tsp vanilla extract

For the cake:

Preheat the oven to 350F. Butter and flour a 9 inch spring form pan. Using an electric mixer, cream the butter and sugar until light. Add the eggs and vanilla and beat until fluffy. In a separate bowl, combine the flour, baking soda and salt. Add the dry ingredients to the egg mixture in three parts, alternating with the sour cream. Mix well after each addition, scraping the bowl as necessary. Fold in the blueberries and spread in to the prepared pan.

For the Topping:

Combine the sugar, walnuts and cinnamon. Sprinkle over the batter in the pan. Bake for fifty to sixty minutes or until a cake tester inserted in the centre comes out clean.

For the glaze:

Combine the butter, sugar, cream and vanilla in a small saucepan over medium heat or in the microwave. Bring to a simmer and cook until the sugar disolves. Pour over the warm cake. Cool the cake completely before removing it from the pan. Store refrigerated in a tightly covered container for up to four days.

Serves eight to ten.

Blueberry Cornmeal Muffins

Prepare muffin tin. Preheat one to 400F.
3 eggs, well beaten
1 cup buttermilk, add and beat well
6 Tbsp butter melted, add and blend
1/2 tsp vanilla, add and blend
In a separate bowl, sift together
1 1/2 cups flour
1 Tbsp baking powder
1/2 cup cornmeal,
1/3 cup sugar
1/4 cup cinnamon
1/4 tsp nutmeg

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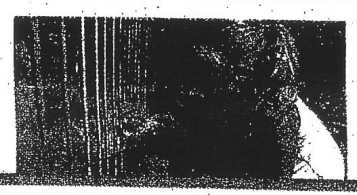
THE RECORD

BUSINESS
Why Ayr lost a farm equipment business.
PAGE D8

LOCAL
Celebrating the Steckle Homestead barnyard classroom.
PAGE B1



SPORTS
Blue Jays fire manager Tosca.
PAGE D1

Harvesting the wind

Local farmers say they can provide power – if regulations let them

BY BOB BURTT
RECORD STAFF

WATERLOO REGION

The wind turbine on Jacob Martin's farm stands silent, but Martin hopes the large blades will be soon spinning profits for his farm.

Martin's farm is on Martin Creek Road near Benjamin Road in Woolwich Township, just outside Waterloo. A short distance away at Edwin Martin's beef farm on Hessen Strasse Road, the large blades on a wind turbine turn slowly as an afternoon breeze becomes powerful enough to turn the blades and ultimately produce electricity.

Both men are hoping their windmills will not only keep the lights on and the farm equipment running, but produce enough extra power to be sold to Waterloo North Hydro.

"You need the wind to be at least 10 miles per hour to turn the blades, and more to generate power," Edwin says as he looks at the imposing structure reaching almost 80 feet into the air.

Like Jacob, Edwin has been intrigued by windmills and wind turbines all his life.

It's too soon to say how profitable the venture will be, but the pair hope their $35,000-plus investments will pay for themselves in 10 to 12 years.

An early measure of Edwin's success will come soon when he receives his first hydro bill since he began producing power.

He has entered into an agreement with Waterloo North Hydro that will allow him to sell any excess power generated to the utility.

"If I produce as much as I use, I won't be buying any power. The more the wind blows, the better it is."

Edwin says there are areas more conducive to turning wind into electricity such as tall hills or the shores of lakes where the stronger winds blow.

SEE WIND: PAGE A2

BRENT DAVIS, RECORD STAFF
Corn stalks frame a windmill on Jacob Martin's Woolwich farm.