WIND ENERGY ON THE HORIZON IN BRITISH COLUMBIA. A REVIEW AND EVALUATION OF THE BRITISH COLUMBIA WIND ENERGY PLANNING FRAMEWORK.

by

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ABSTRACT

This study examines the wind energy planning frameworks from ten North American jurisdictions, drawing important lessons that British Columbia could use to build on its current model which has been criticized for its limited scope and restriction of local government powers. This study contributes to similar studies conducted by Kimrey (2006), Longston (2006), and Eriksen (2009).

This study concludes that inclusion of wind resource zones delineated through strategic environmental assessment, programme assessment, and conducting research-oriented studies could improve the current British Columbia planning framework. The framework should also strengthen its bat impact assessment practices and incorporate habitat compensation.

This research also builds upon Rosenberg's (2008) wind energy planning framework typologies. I conclude that the typology utilized in Texas should be employed in British Columbia in order to facilitate utilizing wind power. The only adaptation needed is the establishment of a cross-jurisdictional review committee for project assessment to address concerns about local involvement and site-specific environmental and social concerns.

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I would like to thank my wife, Deb, and kids, Ayla and Rhys, for the love, help and support they provided to me over these past years, as well as the patience they showed in sharing my time and our money that went towards completing this program. Also, I would like to thank my supervisors, Dr. Eric Rapaport and Dr. Orland Wilkerson, as well as my committee member, Dr. Ken Otter, for their guidance and advice over the past few years. Thanks go out to Sea Breeze Power and our federal government, via NSERC, for the generous financial support they provided, as well as my former employer, Stantec, for funding my trip out to Niagara Falls in order to present an early iteration of this research at CIPs 2009 conference.

"Along the creek the land was sweet and arable, with plenty of water. It was a country big and rich enough for some legendary giant.
"If only nobody'd ever found us out," the boy would say, wistful for that lost world. He could tell stories about the northern lumber barons who came to rape the woods at the end of the last century with their great splash dams that, once opened, would roar and foam, juggling logs down the creek and into the Little Tennessee River and on to the lumber mills in Chattanooga. He said the old-timers boasted of walnut trees thirty feet in diameter, of immense cherries and cucumbers and chestnuts and buckeyes and poplars-a hundred kinds, all outsized and lordly." Youmans, p.15

Youmans 2005

I dedicate this report to God (the Father, Son and Holy Ghost). It was God who brought the opportunity to do this research to me and it was God that provided so amazingly for me and my family, continually, amazingly, all-knowingly, personally, and profoundly.

Apocalypse 21
1 And I saw a new heaven and a new earth. For the first heaven and the first earth was gone, and the sea is now no more. 2 And I John saw the holy city, the new Jerusalem, coming down out of heaven from God, prepared as a bride adorned for her husband. 3 And I heard a great voice from the throne, saying: Behold the tabernacle of God with men, and he will dwell with them. And they shall be his people; and God himself with them shall be their God. 4 And God shall wipe away all tears from their eyes: and death shall be no more, nor mourning, nor crying, nor sorrow shall be any more, for the former things are passed away.
...

Apocalypse 22

1 And he shewed me a river of water of life, clear as crystal, proceeding from the throne of God and of the Lamb. 2 In the midst of the street thereof, and on both sides of the river, was the tree of life, bearing twelve fruits, yielding its fruits every month, and the leaves of the tree were for the healing of the nations. 3 And there shall be no curse any more; but the throne of God and of the Lamb shall be in it, and his servants shall serve him. 4 And they shall see his face: and his name shall be on their foreheads. 5 And night shall be no more: and they shall not need the light of the lamp, nor the light of the sun, because the Lord God shall enlighten them, and they shall reign for ever and ever.

Isiais 53
3 Despised, and the most abject of men, a man of sorrows, and acquainted with infirmity: and his look was as it were hidden and despised, whereupon we esteemed him not. 4 Surely he hath borne our infirmities and carried our sorrows: and we have thought him as it were a leper, and as one struck by God and afflicted. 5 But he was wounded for our iniquities, he was bruised for our sins: the chastisement of our peace was upon him, and by his bruises we are healed.

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Introduction

Introduction to the Research

British Columbia currently has a wind energy planning framework that sets goals and guides land-use planning and project assessment. Wind energy planning frameworks[1] from ten North American jurisdictions (Alberta, Saskatchewan, Manitoba, Prince Edward Island, Nova Scotia, Wisconsin, Iowa, Kansas, Texas, and Washington State) were analyzed to determine if there are lesson-drawing (policy-transfer) opportunities for the British Columbia wind energy planning framework. The scope of wind energy planning frameworks analyzed is restricted to those that are provincial/state level and pertain to commercial wind farms (i.e., ≥ two megawatts nameplate capacity). This research contributes to, and is somewhat adapted from, Kimrey (2006), Longston (2006), Rosenberg (2008), and Eriksen (2009). As in the case of Kimrey (2006), Longston (2006) and Eriksen (2009), by reviewing other jurisdictions' planning frameworks, the research provides insight into how British Columbia can improve.

In contrast to other policy instruments (e.g., government financial incentives) involved in the utilization of wind power, land-use planning may be a non-controversial and relatively non-influential policy instrument (Varho 2006). However, planning can have a large influence on the utilization of wind power between countries (e.g., Nadaï 2007) and within countries (Nakamura 2007). The question is how procedural and substantive land-use planning can advance utilization of wind power while balancing

[1] Planning frameworks are administrative tools (guidelines, policies and regulations) that planning authorities use to control development. They 'take planning principles and put them into practice' and define a planning process' basic structure – providing the ground rules and main considerations. (adapted from Longston (2006).

competing land-use interests and environmental and socio-economic performance expectations.

The Gap in Knowledge

There are a number of commentators on the planning framework: British Columbia Citizens for Public Power, the British Columbia Community Energy Association, British Columbia Sustainable Energy Association, the Canadian Institute for Research on Public Policy, the Canadian Wind Energy Association (CanWEA), the CD Howe Institute, the David Suzuki Foundation, the Independent Power Producers of British Columbia (IPPBC), the Pembina Institute, the Premier's Technology Council, the Sierra Club, and Westcoast Environmental Law. As well, there are three academic research groups in British Columbia studying wind power: the University of Victoria's Institute for Integrated Energy Solutions, the University of British Columbia's Clean Energy Research Centre, and the University of Northern British Columbia's Centre for Wind Energy and the Environment. The primary focus of these research groups is engineering, integration into the transmission network, and avian impacts.

Commentators consistently point to their desire that the province establish wind resource zones (McDonough 2008; West Coast Environmental Law (2009) (as quoted in British Columbia Citizens of Public Power 2009). They also stress inclusion of strategic level planning and impact assessment, (for example: sustainable resource management plans), as a means to manage impacts of wind power (British Columbia Alternative Energy and Power Technology Task Force 2006, p.69; McDonough 2008). The British Columbia Alternative Energy and Power Technology Task Force (2006, p.69) has suggested that the province pre-permit project sites within the wind resource zones.

Finally, there is concern about the role that local communities can take in project approval (West Coast Environmental Law (2009) as cited in British Columbia Citizens of Public Power 2009).

This report identifies models that support the recommendations made by commentators, as well as expanding on the list of gaps in the framework. The comparative policy analysis is limited to a study of the elements found in wind energy planning frameworks such as information required for environmental and social impact assessment, land use designations, and other decision-making processes. Policy analysis of the effectiveness (e.g., practicality of policy guidance to industry), outcomes (e.g., whether the desired land use pattern is being achieved), costs, etc., is not a part of the scope of this report.

The analysis will identify elements lacking from the British Columbian planning framework and those elements that are better defined. The report recommends consideration of those elements that appear to be lacking if it is determined they would be both transferable and desirable to the British Columbian context. Further, the report recommends incorporation of wording from other jurisdictions that better define elements already included within BC's Planning framework. This practice of adopting foreign policies is called lesson-drawing or policy transfer (Rose 1991).

Wind energy planning studies have utilized lesson-drawing in the past. Some illustrations of this are as follows. Based upon five Ontario municipal wind energy planning frameworks, Longston (2006) used policy transfer in his Masters' research to develop a planning framework for a municipality in Ontario. Kimrey (2006) offered a state regulatory framework for North Carolina that would best achieve the goals of facilitating wind power utilization while minimizing negative impacts and providing for meaningful public involvement through comparative policy analysis of nine state wind power regulatory frameworks. Rosenberg (2008) compared numerous state wind energy planning frameworks and developed three framework typologies. He identified the most effective typology for facilitating wind power utilization and the main considerations for approving wind power project applications. Eriksen (2009) conducted a comparative policy analysis of states fitting Rosenberg's three typologies in order to suggest a typology that would be acceptable to citizens, planners, and policy makers of New York State. These studies show that policies in home jurisdictions can be altered by exploring the policies of foreign jurisdictions. Other aspects of windpower have been studied within Canada and British Columbia, as described below.

Windpower studies in Canada have focused on energy policy tools that federal and provincial governments can use to meet emissions targets (Jaccard et al. 2006; Jaccard & Rivers 2007; van Kooten & Timilsina 2008; Snoddon & Wigle 2009; Valentine 2010) or summarizing national wind power utilization (Islam et al. 2004; Liming et al. 2008; Hofman & Li 2009). Studies have also been conducted on other aspects of wind power. These include the impacts of the integration of wind power (Pitt et al. 2005), the impacts of wind farms on bats (Arnett et al. 2008; Baerwald et al. 2009), and the amount of land that would need to be allocated to wind power development in order to meet policy ambitions (Love 2003). In many cases, the studies have had a much broader scope than merely wind. For example, studies have often considered wind in the context of a number of solutions for developing a sustainable energy infrastructure. In fact, wind power figures less prominently as a solution for Canada in reducing emissions as compared to high priorities such as energy conservation/efficiency and reduction of emissions related to transportation.

Studies within British Columbia have focused on engineering, planning and environmental impacts, and discourse analysis. Within the realm of engineering, technical integration of wind power into the provincial electrical grid (Prescott et al. 2006), and costs and emissions reductions under varying levels of wind integration on Vancouver Island (Maddaloni et al. 2008) have been studied. Planning studies include the application of voluntary siting criteria to a conceptual project (Griffiths 2008) and the prediction of conflict areas (Craighead et al. 2009). Critiques of bird impact assessment techniques (Labrosse 2008; Thomas 2008) and the role of Independent Power Producers in electricity deregulation (Simmons 2008) contribute to the body of wind power research in British Columbia.

Griffiths' (2008) research has specific relevance to this study, indicating that the current framework does not respect local land use planning.

The Goals and Objectives

The goal of this research is to evaluate whether lesson-drawing opportunities are available for British Columbia's wind energy planning framework.

The objectives were to conduct a literature review and two empirical analyses. Important elements to look for in planning frameworks were identified through a literature review of the influence of wind energy planning frameworks on utilizing wind power and the issues encountered, the key environmental and social issues pertaining to wind farms, and the discourse surrounding wind power utilization. Criteria for determining transferability of policies were developed through a literature review of the theoretical understanding of policy transfer and natural, social, and systemic constraints (Houlihan, 2005) that are important in the transferability of policies between jurisdictions. A policy analysis using an inductive content analysis method was undertaken on the planning frameworks of ten provincial/state jurisdictions in North America. The jurisdictions selected are a) naturally favoured for utilizing wind power (e.g., suitable wind resource) or b) are similar in natural setting and/or energy mix to British Columbia. This policy analysis also included development of planning framework typologies. In addition, contrasting individual elements of the wind energy planning frameworks against the natural, social, and systemic constraints of the jurisdictions was undertaken to identify any relationships. Policy analysis using a deductive content analysis method was undertaken on British Columbia's wind energy planning framework. Based on the content analysis code developed above, gaps and anomalies in the British Columbian wind energy planning framework will be identified.

The Research Question

- ⊗ Does the British Columbian wind energy planning framework need updating through policy transfer? If so, what changes and additions are recommended?

Sub-questions to the main research question are:

- ⊗ What is a planning framework?
- ⊗ What is a wind farm and what are the generic and specific issues associated with a wind farm?
- ⊗ What is policy transfer?
- ⊗ What determines the transferability of a policy to another jurisdiction? How universal are wind energy planning frameworks between jurisdictions in different contextual settings?
- ⊗ What, if any, elements of planning frameworks are missing from the British Columbian framework?

Rationale for the Research

Wind power utilization depends upon technical factors (i.e., wind potential and constructability), the planning regime, the financial support system, visual and preservation values, and the degree of local involvement (Wolsink 2007; Ohl & Eichhorn 2010). It also depends upon the institutional fit of the development with policy and politics (Toke 2005; Wolsink 2010), the strength of the wind power policy (Miyamoto 2002; Ohl & Eichhorn 2010; Warren & McFadyen 2010), and the level of community ownership (Wolsink 2007; Toke et al. 2008; Warren & McFadyen 2010). Improving the wind energy planning framework would help to promote wind power utilization in British Columbia.

This study is especially crucial since:

a) Four new factors are set to change the market conditions in the province:
   - The province's energy plan calls for ambitious action to reduce the reliance on outside sources of electricity and to use clean energy technologies to satisfy future generation needs (British Columbia Ministry of Energy, Mines and Petroleum Resources 2007).
   - The B.C. government continually strives to build and improve upon policies that support the utilization of wind. The British Columbia Hydro Authority (BCHydro) has recently introduced a Standing Offer Program[2] (feed-in tariff) for small projects (between 0.5 to 15 MW). Tariffs are one of the most important energy policies to encourage the quick utilization of wind energy (e.g., Kissel & Krauter 2006; Valentine 2010). For example, Ontario installed 737 MW worth of wind farm capacity over the 1.5 years that the province offered a feed-in tariff (Ontario Power Authority 2008).
   - A number of better capitalised and more experienced energy companies have joined the British Columbian wind industry (e.g.,

[2] A Standard Offer Program is a non-competitive and open offer of a utility to purchase electricity from generators at pre-determined prices. This is contrasted with the competitive bids put out periodically by utilities to purchase electricity at negotiated prices. The Standard Offer Program is intended to ease the burden of securing power purchase agreements and are generally geared towards developers of small- to medium-sized generation facilities (e.g., 0.5 to 15MW capacity)

Fred Olsen Renewables (Canada) Ltd and Enbridge Wind Energy Inc.).

- Western Provinces and western States are electrically connected. All of the States in this group have established requirements to acquire a minimum amount of their electricity from 'clean' sources. The province has successfully worked towards demonstrating that its 'clean power' could help satisfy California's Renewable Portfolio Standard (British Columbia Office of the Premier 2007). By extension, the 'clean power' could help satisfy other nearby states.

b) Opposition to wind farms can grow quickly across a region. Although British Columbia has limited direct experience with wind energy, it is important that the province try to anticipate land use challenges as well as specific issues related to wind energy that may prevent achievement of the province's wind energy goals.
c) Lesson-drawing opportunities exist against the backdrop of other North American planning frameworks.

This study will help British Columbia benefit from the wind energy market while achieving its goals of sustainability and provide a planning framework where progress is measured and direction charted.

Contribution of this Study

a) Comprehensive, comparative policy analysis of the British Columbian wind energy planning framework
b) Identification of lesson-drawing opportunities
c) Building upon lesson-drawing research conducted in relation to wind energy planning frameworks
d) Building upon the typologies of wind energy planning frameworks
e) Developing the understanding of the scale of transferability of ground rules and main considerations
f) Contributing to the body of research conducted on wind power in British, Columbia, Canada, and the world

LIMITATIONS OF THE RESEARCH

Nadaï (2007) found that electricity policies draw on historical practices and political equity[3], so implementing a policy from another jurisdiction may not lead to the

[3] The built up value in the policy. The value is built up through a number of means including political lobbying, technical and financial resources, vested interest, precedent, and expectation.

same results. This would also translate to planning frameworks since they also draw on historical practices and political equity: wind energy planning frameworks in various jurisdictions may not lead to the same results in British Columbia. In drawing on practices from other jurisdictions, there are three questions to assess: Has the policy been effective? How does the overall context in one jurisdiction compare to that in another? What adaptations need to take place?

My particular interest lies in wind energy; however, studies show that a comprehensive clean energy planning framework, and primary emphasis on demand-side management, is most effective in utilizing a sustainable clean energy vision (e.g., Andrews et al. 2008; Jefferson 2008).

Organization of the Report

Chapter two contains the literature review and defines planning frameworks and commercial wind energy projects, including their main issues. It also provides a literature review of other items pertinent to the research: the theoretical considerations of lesson-drawing and its practice; the role of planning frameworks on wind energy projects; and discourse on wind energy projects. This will help inform the reader about the main considerations of wind power.

Chapter three describes the research design and methods, while chapters four and five provide the results of the policy analysis of the ten North American jurisdictions and British Columbia respectively, including descriptions of context for each of the jurisdictions. Chapter six provides a conclusion on the overall effectiveness of the study in answering the research question and provides lesson-drawing recommendations for the British Columbian wind energy planning framework.

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LITERATURE REVIEW

This chapter presents the literature review to provide a background for the comparative policy analysis undertaken (Chapters 4 &5). First, it is necessary to describe planning frameworks and it is informative to understand the factors that influence the effectiveness of wind energy planning frameworks in utilizing wind power. Second, it is helpful to provide a background on the structural components of a commercial wind farm, their land requirements, their key environmental and socio-economic issues, and the discourse surrounding wind power. Understanding those items will help highlight the issues that are most influential in deciding upon the utilization of wind power. Categories of discourse on wind energy, as presented later in this chapter, are used to build an initial categorization for conducting the content analysis of the eleven jurisdictions studied in the comparative analysis (Chapters 4 & 5). Finally, since the research is intended to identify lessons to be drawn from other jurisdictions to the British Columbian context, it is necessary to understand lesson-drawing and identify contextual features of jurisdictions that are influential in transferability from one jurisdiction to another.

THE WIND ENERGY PLANNING FRAMEWORK

The intent of this section is to provide a definition of planning frameworks and to highlight studies demonstrating the influence planning frameworks can have on utilizing wind power.

Defining 'Planning Framework'

Planners make recommendations on the allocation of land for competing uses (Beddoe & Chamberlin 2003) and attempt to approve development that satisfies the desires of the community rather than the proponent alone (Litman 2008). Planning frameworks are an administrative policy instrument (Stigson et al. 2009) used as a decision-making tool by planners and policy makers. Planning frameworks provide guidance on land use patterns across the landscape (Parks Canada 2007), promote certain development patterns, provide the context for review and approval of land-use applications, define roles and avenues of stakeholder input, and evaluate progress towards a community goal such as affordable housing.

A planning framework is composed of a number of items: principles, vision, problem identification, goals, objectives, scope, options, evaluation, evaluation criteria, policies, plans, a program, task or action, a target, and performance indicators (Litman 2008). The planning framework represents the "basic planning process structure" (Litman 2008, p.7). Planning frameworks provide the 'ground rules' and 'main considerations' for the review and approval of land-uses (Longston 2006). The 'ground rules' provide the context development can take place in, e.g., land-use X is acceptable within zone A and must be built according to M specifications. The 'main considerations' are those bits of information planners require about a proposed development in order to make their determination on the proposal (i.e., to provide the planning consent). A planning framework ideally provides for a transparent view of the decision-making process and the goals planners and policy makers are trying to achieve. To varying degrees of success, planning frameworks in a democratic country represent the wishes and desires of the community because public participation is an active component of their development and approval of them lies within the political leadership. On the other hand, since planning frameworks are part of the regulatory environment they can be perceived as a barrier to private landowners or project developers.

Planning frameworks have several varying aspects. Two approaches are commonly used: programmatic and communication (Adams 2008). A programmatic approach plans specific actions, for example designation of areas for utilizing wind power. A communication approach provides the context in which development can occur (ground rules) and a framework for considering impacts (main considerations). An example of this is planning through a development agreement between a municipality and a developer. Planning frameworks also have phases: consideration of the approach and process; generation of the content and principles; and, implementation, monitoring, and review (Adams 2008). Finally, planning frameworks can be informal, formal, or formal and legalized (Adams 2008).

Influence of Planning Frameworks on Wind Power Utilization

The Influence of General Characteristics

Due to a planner's professional responsibility to promote sustainability and increasing concern related to greenhouse gas emissions, Warburton (2004) is emphatic about the role planners must play in advancing the utilization of wind power. An effective means of promoting wind power is creating a planning framework that attempts to meld the technological realities with the more abstract environmental and social realities of wind farm development. Such a planning framework would increase awareness of goals, scope, and options as well as provide a mechanism for measuring progress towards those goals, leading to a sustainable wind energy industry.

Planning frameworks that enhance "the implementation process of renewable energy" (Wolsink 2007, p.2702) have the following characteristics:

- ⊗ open, democratic decision making (see also Barry et al. 2008)
- ⊗ participation and involvement of non-elites

- ⊗ open-ended approaches
- ⊗ institutional changes, rather than technological solutions, to address environmental problems (Wolsink 2007)

The planning framework should also:

- ⊗ articulate the prioritization of local interests and regional, provincial, and national goals (Loring 2007)
- ⊗ properly account for environmental management due to the pace and scale of change (Kellett 2003; Nakamura 2007);
- ⊗ consider cumulative effects and be strategic (Warren et al. 2005); and
- ⊗ encourage local government to define areas where wind power is a suitable land use so that local awareness of the environmental effects of power provision can be increased (Kellett 2003; Strachan & Lal 2004).

Incorporating these characteristics leads to a planning framework that captures widely accepted goals and implementation methods. Ideally, inclusion of non-elites would dampen the ability of political and/or technocratic actors to dominate planning framework development.

The literature indicates that opposition at the local level and lack of a common planning approach are the most significant barriers to wind energy utilization (Longston 2006). The characteristics outlined above are a standardized approach that meaningfully engages local government and citizens. Notwithstanding the societal demand for increased environmental stewardship, a planning framework should consider the expected response of targeted industries (Stigson et al. 2009). Attempts to protect the industry from burdens that would make them uncompetitive in a regional, national, and international market must also be considered (Stigson et al. 2009). Other items in a planning framework that cause consternation, primarily to developers, are the stringency of policies, the clarity and feasibility of planning framework elements (Varho 2006) and the organizational structure (e.g., regional vs. local approval) (Varho 2006; Toke et al. 2008).

The Consensus among researchers is that collaborative approaches have one of the highest positive influences on planning outcomes for wind power (Wolsink 2010) and that linking power production to the landscape is a crucial factor in wind power acceptance (Wolsink 2010); i.e., the wind farm, especially the turbines, is seen as an integral and welcome feature of the landscape (Nadaï & Labussière 2008). A collaborative approach involves locals in the selection of wind resource areas, defining local quotas, assessing the impact on landscape values (Wolsink 2007), selecting/ranking environmental and social criteria (Ohl & Eichhorn 2010) and determining mitigation. Employing this approach to planning regional emission/energy generation goals will greatly assist in utilizing wind power that anticipates the impacts, hopefully captures local support (Ohl & Eichhorn 2010), and prevents conditional supporters from becoming anti-wind campaigners (Wolsink 2007). The collaborative approach promotes the least divisive site, rather than the most technically appropriate (Adams 2008). Exclusion of exceptional wind resource areas due to the selection and weighting of environmental and social criteria (Ohl and Eichhorn 2010) and inability to resolve opposition based on landscape values[4] (Toke et al. 2008, p. 1142) are two weaknesses of the collaborative approach.

What are the Results?

One function of planning frameworks is to promote a certain land use pattern, in this case wind power utilization. Understanding the influence that planning frameworks have had on utilizing wind power and the challenges faced is important when making

[4] i.e., landscape characteristic and community identity (Wolsink 2010)

recommendations on a planning framework. Peer-reviewed literature is available on this topic,specifically the impact planning frameworks have on the planning consent[5] outcomes and progress through the review process (e.g., Beddoe & Chamberlin 2003; Toke 2005; Nadaï 2007).

Much of the academic research that is applicable to this current study comes from Europe, particularly the United Kingdom. Notwithstanding distinct differences in such things as governance models and laws and regulation, the research can guide us on the types of problems and issues that arise in making decisions on projects. Overwhelmingly, the literature points to the challenges faced by local governments in approving projects proposed to meet regional goals. The state prepares targets for renewable energy and, in some cases, provides guidance to local government on reviewing applications. Proponents then submit applications to the local government for approval to construct and operate their project. Herein lies the problem. Local government reviews applications for which they have little experience, with little guidance for decision-making (either through their own policies or from the regional government). At other times, subjective interpretation of regional government guidance is an issue (Beddoe & Chamberlin 2003; Warren et al. 2005; Longston 2006; Nadaï 2007). Two examples of difficulties encountered in this hybrid approach of goal setting and project approval come from England and the Netherlands. There is just over a 50% approval rate of wind energy in

[5] Planning consent is defined as approval from a regulatory authority to construct and operate a proposed project in principle. This does not include approvals required for specific aspects of projects, for example, watercourse crossing permits.

England (van der Horst & Toke 2010)[6]. As well, there has been a failure to reach national installed wind energy targets and strong opposition in the Netherlands (Stevenson 2009).

The literature indicates that local planners do not have experience with wind power (Beddoe & Chamberlin 2003; Longston 2006), there is a lack of targets or spatial planning, and communities oppose wind farm development via formal or informal regulatory channels (Parkhill 2007). Concerning policies and guidance, either higher-level government is not providing guidelines for the review process and issues of consideration (Beddoe & Chamberlin 2003) or the policies and guidelines provided lack specific guidance and direction for approving projects (Beddoe & Chamberlin 2003; Kellett 2003). Another problem is the inconsistent interpretation, between various local planning boards, of guidelines provided by higher-level government (Beddoe & Chamberlin 2003; Warren et al. 2005; Longston 2006; Nadaï 2007). The spectre of local governance and the threat that it holds over the expansion of wind power figures prominently in the literature. Even reports prepared in British Columbia reference this problem (British Columbia Alternative Energy and Power Technology Task Force 2006, p.74) despite local governments' inability to deny projects in British Columbia (Macdonald 2009).

Local planners typically provide planning consent to residential, commercial, and industrial land development with common issues being noise, setbacks, and zoning

[6] Van der Horst and Toke (2010) conducted a study of all wind farm applications reviewed in England between the period of 1991 and 2005 to determine which of a suite of 117 local social capital variables were most influential in planning decision. They found that higher life expectancy, higher voter turnout, and a lower crime rate were most influential at the first decision. If applications were refused, they found that in addition to the variables already mentioned, the following were influential in cases where the refusal was upheld: higher proportion of self-employed and smaller businesses (van der Horst & Toke 2010). van der Horst and Toke (2010) suggest that developers could use these results to "inform the strategies of developers (i.e., targeting 'soft' communities)" (p.220) and locals could use it to argue against local wind farms, for example on grounds of environmental justice.

(Longston 2006). Within British Columbia, the role of local planners is consistent with this characterization. There is little precedent for the limits of local government authority over wind farms in British Columbia. There would presumably be no circumstance where a Regional District (or Municipality) could deny a commercial wind farm on provincial Crown land found within its jurisdiction. This is based on existing legislation that limits local government's role in clean energy planning consents (i.e., Bill 30 – the Ashlu River Bill: Macdonald 2009) and precedent with other energy projects (e.g., the Ashlu River Project, the Duke Point Project). Provincial crown land can account for a large portion of a Regional District's land base. The crown land may also occur adjacent to municipally-approved land uses deemed by the municipality to be incompatible with wind power.

Juxtaposed to the regional-local hybrid approach is the hierarchical, top-down approach. In this approach, the higher-level government is responsible for all aspects of the planning framework, from land-use planning down to project approval. Developers and bureaucrats alike favour this approach because it provides streamlined and more certain permitting for developers and it is cost-effective for bureaucrats (Wolsink 2010). Taking heed of developer and bureaucratic preferences, and possibly in response to failures in achieving wind power generation goals, jurisdictions such as Ontario have replaced their hybrid approach with the hierarchical, top-down planning approach. An alternate solution has been to provide developers the option of side-stepping the local approval requirements by establishing a state-level approval system, e.g., Washington State and Oregon (Bohn 2007) and Florida, Maryland, California, and Virginia (North American Windpower 2009). The majority of wind power applicants in Washington State have opted to stay within the local approval framework despite the option for them to seek approval from the State government (P. Anderson, personal communication, April 15, 2010). When given the choice, the company I worked for chose to avoid local approval of a project it was proposing in hopes for a more streamlined process and to avoid potential, negative local political and social influence on the planning process and/or outcome.

As a word of caution, the hierarchical approach, at least in Europe, has resulted in failure (Wolsink 2010). Results of the hierarchical, top-down planning approach are uneven in North America since some jurisdictions have struggled with it, e.g., New York State (Eriksen 2009), while others have been able to meet targets and avoid local opposition, e.g., Quebec. Perhaps the uneven results of both the hierarchical and hybrid approval systems prove that the technical factors of a site (Valentine 2010; Warren & McFadyen 2010) and the financial support system (Wolsink 2007; Ohl & Eichhorn 2010) are more important determinants for utilizing wind power.

The relevance to British Columbia at first glance is minimal, since the provincial government is in control of planning and regulation: from the setting of targets, to the provision of land tenure for the majority of projects, to the review and approval of environmental, social, and technical impacts. The tension between local and regional extends beyond power relationships of governing bodies, however, and is an important consideration for decision-making that has to do with scale. In the case of a purely hierarchical system, the strength of the wind energy planning framework is in its ability to facilitate reaching regional energy goals and objectives while ensuring local concerns are adequately addressed. Below is an example that demonstrates how one jurisdiction attempted to deal with the tension.

AN EXAMPLE FROM WALES

The situation in Wales is rather well studied and provides an interesting perspective on methods employed to balance regional and local tensions. Cowell (2007, 2010) describes the process used by Wales to transfer planning and approval authority of wind farms from the local to the regional government. Cowell (2007, 2010) notes that this change was in response to the regional government's perception that the local governments would not work fast enough and equitably enough between themselves to meet the ambitious targets set for wind power utilization. Cowell notes the tensions between meeting regional or national targets and "delivering renewable energy through local, collective endeavors" (2007, p. 302). Further, he notes tension between balancing an aspatial, rational, technocratic planning process with spatial, abstract, and complex environmental and social concerns (Cowell 2010).

While British Columbia does not share a similar planning structure (i.e., local authority) with the United Kingdom, the province does share "*a priori* commitments either to particular democratic ideals (such as participatory democracy), or the delivery of desired policy outcomes (such as wind power expansion)" whereupon "conflicts over wind energy and planning" (Cowell 2010, p.302) are predicated. Furthermore, despite the difference in governance, British Columbia can learn from some of the items introduced into the Welsh planning framework, namely:

- ⊗ **The creation of energy zones that had extra capacity to address targets and have loose boundaries.** The extra capacity was added in order to allow for exclusion based on local technical, environmental, and social issues while the loose boundaries were made so that local authorities could refine the energy zone.
- ⊗ **Acceptance of cumulative impacts in the energy zones.** In order to reduce the proliferation of wind farms across the

landscape, Wales accepted a higher threshold for cumulative impacts in the energy zones. This is akin to the enhanced forestry zones of British Columbia.

⊗ **Restriction of wind farms outside of the energy zones.** Wind farms larger than 5MW are not permitted outside of the energy zones.

⊗ **Use of habitat offsetting.** Wind developers are encouraged to offset direct impacts on birds and bats through habitat reclamation and/or enhancement in nearby locations.

⊗ **Community benefit requirements.** The planning guidance gives illustrations of community benefits in order to encourage their practice and equitability between communities. Illustrations, rather than requirements, are provided in order that planning consent not be contingent upon these benefits and appear to be a sort of bribery. Zografos and Martinez-Alier (2009) studied planning framework in a region of Spain that dictate benefit agreements with the local government. They point out the danger benefit programs can appear to be a type of consolation to community members, land-owners, and local government for their inability to actually having any real say in whether a project gets built in their community.

Cowell (2010) states that creating energy zones sets precedents and expectations on the development of lands that may be limiting for future energy choices. Environmental justice concerns may also arise due to planners' natural tendencies to view already commercialized lands as being suitable for wind energy (Cowell 2010). Another problem is that these energy zones can have excessive cumulative effects. Alternatively, previously industrialized lands may be in a state of recovery with locals anticipating their having a rural, natural countryside again. I heard these sentiments expressed in 2006 (November 2 – 3) at a wind power seminar held at the University of Northern British Columbia by the Centre for Wind Energy and the Environment. A regional government representative stated that the north has already set aside large parts of land for the energy, mining and agricultural industries of British Columbia and now they are being asked to absorb wind power.

What is a Wind Farm?

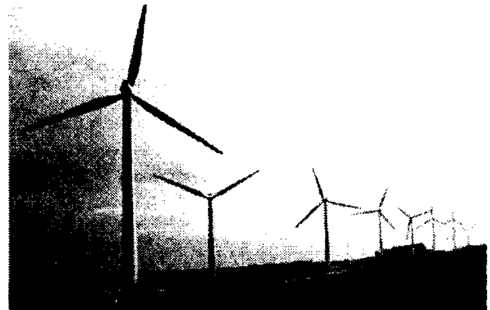


Figure 1 Wind farm in Wales

The intent of this section is to describe wind farms: the components of commercial wind farms, their land requirements, their key environmental and socio-economic issues, and the discourse surrounding wind power. This section will help the reader appreciate wind farms (Figure 1) and the key attendant issues and discourse in order to start answering some questions, such as: What would be important issues to consider or ground rules to employ, i.e., what form should a planning framework take?

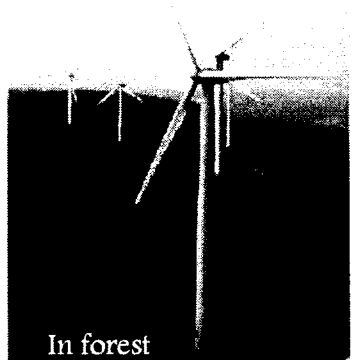
Introduction

Wind farms can be considered linear developmenst on the land, similar to petroleum wellsite and pipeline systems. Typologies for commercial wind farms are:

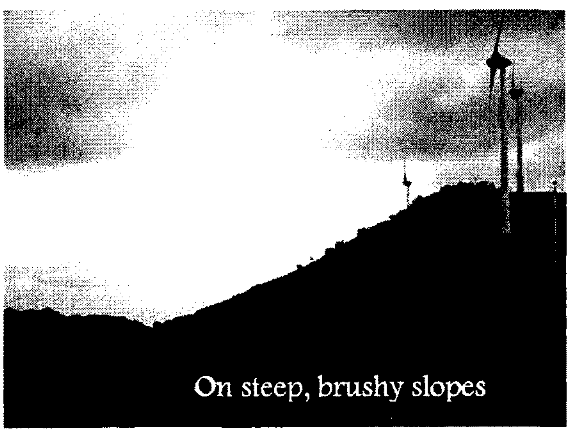
Size	Configuration
⊗ Small: one to six turbines (less than 20MW in capacity)	⊗ Single ⊗ Pair or small grouping
⊗ Medium: seven to twelve turbines (up to 20MW in capacity)	⊗ Linear
⊗ Medium – Large: thirteen to twenty-five turbines (20 and up to 50MW in capacity)	⊗ Curvilinear ⊗ Gridded ⊗ Random, dispersed
⊗ Large – Very Large: twenty-six to fourty-nine turbines (50MW and up to 100MW in capacity)	⊗ Random, condensed
⊗ Extra Large: more than fifty turbines and/or greater than 100MW in capacity	*adapted from typologies presented by Land Use Consultants (2009, p.8)*

Wind farms share some environmental and social impacts with other forms of linear development such as increased sediment loads at stream crossings during construction, impacts to the abundance and distribution of species, and changes to social norms. There are also impacts that are more unique to windfarms, such as reduction of abundance and distribution of birds and bats in and around the turbines, conspicuous visual changes to the landscape, mechanical and aerodynamic noise, shadow flicker[7], and ice throw[8] (Wizelius 2007). Figures 2, 3 and 4 are photographs of wind farms in various environmental settings and various configurations, respectively.

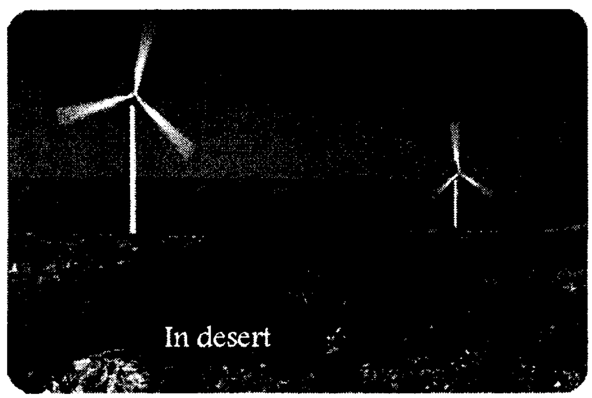
Source: Cowley Ridge wind farm. From "Alberta wind farms" by J. Pearson, 2008, Vancouver Island University.



Source: Waymart wind energy centre. From "Wind farms in Pennsylvania" by Pennsylvania Wind Working Group, 2010.



Source: Karnataka wind farm. From "How forest friendly is Karnataka's wind energy?" by Ameen, 2007, Tumkur's Environmental Issues blog.



Source: Texas wind farm. From "Renewable energy projects" by J. Lundquist, 2010, personal webpage

Figure 2 Wind farm in different settings

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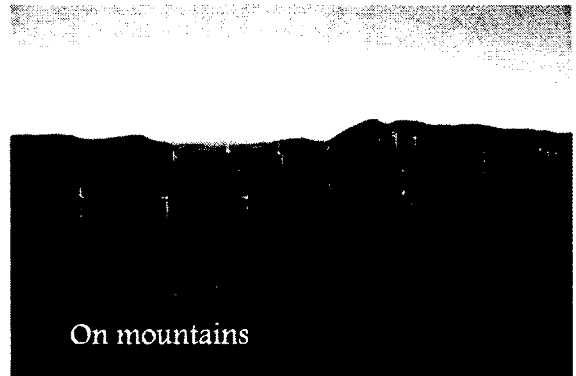
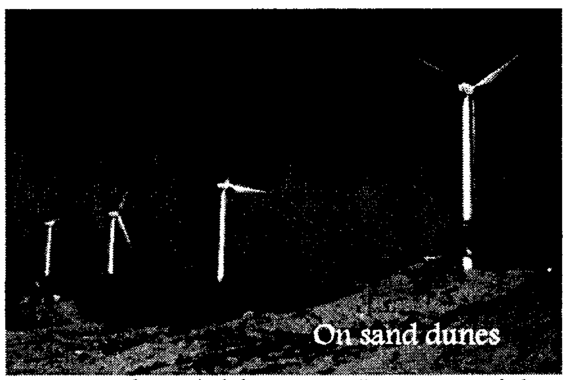
[7] The turbine blades shade the sun as they rotate between the receptor and the sun. The transition between shade and light as the individual blades pass over the sunlight can cause a flicker.

[8] Ice can build up on the blades during low wind periods. As wind speeds pick up and the blades begin to rotate, ice can be shed from the blades.

Source: Albany wind farm. From "Albany wind farm approved" by C. Thomson, WA Today, October 22, 2008.



Source: Kibby Mountain, Maine, USA. From "Harnessing the wind' by D. Rooks, 2010, Colby Magazine 98(4)



Source: Tarfaya wind farm. From "Nareva awarded 200MW Tarfaya wind farm development in Morocco", Renewabl, August 23, 2010.

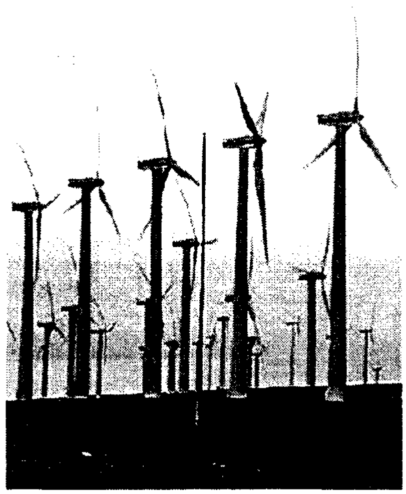
Source: Farr wind farm. From Siemens press pictures website directory, November 9, 2009.

Figure 3 Wind farm in different settings

Components of a Commercial Wind Farm

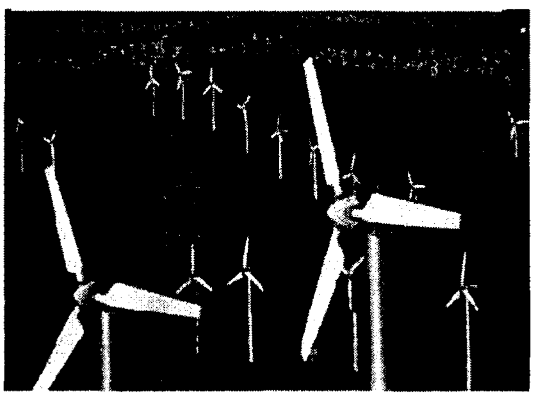
Wind farms have permanent and temporary components. The permanent components of a wind farm include:

- ⊗ turbines (including the foundation, tower, nacelle, and rotor);
- ⊗ collector network (including a transformer at the base of the turbine; electric distribution line buried from turbine to access road, buried or aerial from turbine string to substation);
- ⊗ control system (fiber optic lines co-located with the collector network);
- ⊗ control room and maintenance/storage facilities;

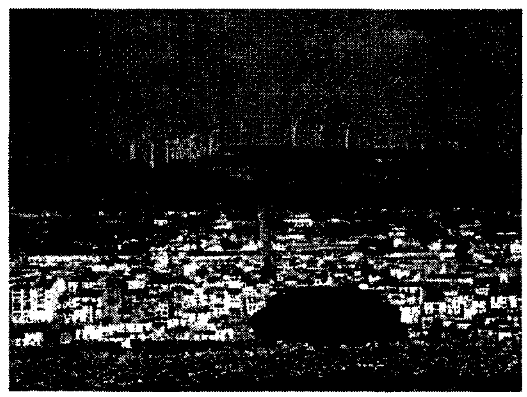


Source: National Wind Watch. Washington State, USA

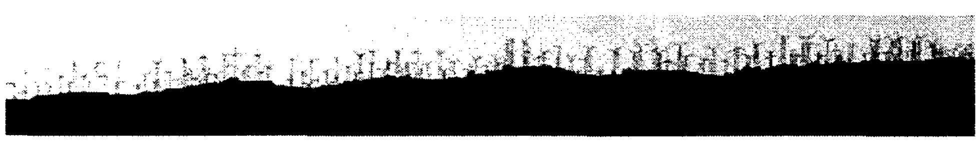
Source: National Wind Watch. Washington State, USA



Source: National Wind Watch. Germany



Source: National Wind Watch. Villefranca, Spain

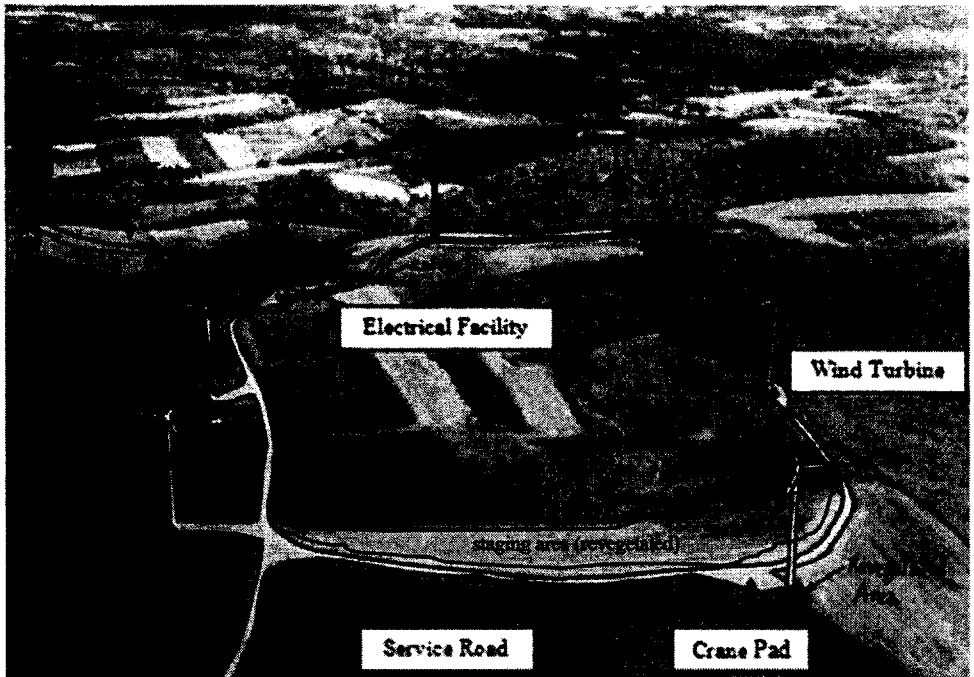


Source: National Wind Watch. Tehachapi Pass, California, USA.

Figure 4 Wind farms in different patterns and densities

- ⊗ transmission grid interconnection (e.g., substation);
- ⊗ transmission lines;
- ⊗ border zones for collector network and transmission lines;
- ⊗ on-site access tracks (existing and new); and
- ⊗ turbulence reduction zones, e.g., clearing forest (optional) (Tetra Tech EC, Inc. and Nixon Peabody LLP 2008, p.5-18).

Figure 5 depicts how the various components of a wind farm are connected to one another and how these components sit upon the land.



Source: Madison wind farm. Adapted from "New York State wind energy toolkit" by AWS Truewind, LLC 2009

Figure 5 Aerial view of a wind farm in eastern North America

The temporary components of a wind farm include:

- transportation network to the site (e.g., port, rail and stockyard, primary and secondary highways);
- staging areas (on and off site);
- puller and tensioner sites for transmission line cable stringing;
- concrete batch plant;
- rock quarry site for roads;
- decking yards for cleared forest;
- petroleum and waste handling sites (e.g., re-fueling stations and garbage bins); and
- topsoil, subsoil, and retained vegetation storage sites.

The manner in which wind farms are constructed is based on the machinery and equipment used, the topography, the vegetation, the soils and surficial geology, and the weather conditions during construction. Wind power development uses large trucks to bring turbine components into the site and uses large cranes to raise turbine components onto the tower. This necessitates the need for wide roads with larger turning radii, flatter incline and flatter vertical curvature than typically required for other industrial projects.

As well as the permanent and temporary features of a wind farm, there are permanent and temporary land requirements for these installations, namely:

1. permanent removal of soils or landcover
    a. vegetation and soil removed (e.g., under roads, turbines, substation)
    b. one plant community structural layer removed (e.g., taller trees under aerial electric and communication lines)
2. temporary removal of soils or landcover (and reclaimed post-construction)
    a. topsoils removed and then replaced (e.g., around turbines – covering foundation; road sides; trench area of buried electric/communication lines)
    b. soils and/or vegetation compacted (e.g., staging areas, decking area)

The largest impact of development is perhaps these temporary land requirements during construction (2a and b, above), which represent a large portion of the project footprint. Remediation of these involves post-construction reclamation, and hence, more attention to the post-construction reclamation of wind farms has been suggested (Committee on Environmental Impacts of Wind Energy Projects, National Research Council, 2007, p.296).

Land Requirements of Wind Farms

Land requirements are positively correlated with increasing topographical complexity (Tetra Tech EC, Inc. and Nixon Peabody LLP 2008, p.5-18) and larger equipment and machinery. The methods of construction and a detailed analysis of their impact on the spatial requirements of project construction are beyond the scope of this paper. These spatial requirements have a direct impact on the permanent and temporary loss of vegetation and soil. Boone et al. (2005, Appendix 7) estimates 16,000 to 18,000 m^2 of land are cleared per turbine to install a wind farm, whereas the U.S. Department of the Interior, Bureau of Land Management (2005, p.3-4) estimates 4,000 to 12,000 m^2 per turbine. Boone et al. (2005) base their estimate of land requirements from aerial photos so the lands estimate incorporates both permanent and temporary lands. The Bureau of Land Management estimate comes from dimensions stated in EIA applications. The EIA applications may have understated land requirements or only provided numbers associated with permanent land impacts. BCHydro estimates that wind farms have a footprint of 100,000 m^2 per 100MW (BCHydro 2006, p 7-34), or 2,000 m^2 per turbine assuming 2MW turbines, a figure often quoted by industry and substantially lower than what it being observed.

Turbines are spaced away from each other in order to optimize power production. The spacing can range from 3 to 4 rotor diameters between turbines and 8 rotor diameters between rows in uni-directional windflow regimes (AWS Truewind, LLC 2009). In omni-directional windflow regimes, the spacing between turbines is around 5 to 7 rotor diameters and 7 to 8 rotor diameters between rows (AWSTruewind, LLC 2009). Based on this spacing and 2MW wind turbines having a rotor diameter of 90 metres, a 100MW wind farm with five rows of ten turbines in an omni-directional windflow regime would occupy up to 16 km^2 (320,000 m^2 would be required for each turbine). Love (2003) provides a spacing of 5 rotor diameters (450m) between turbines and 10 rotor diameters (900m) between rows in uni-directional windflow regimes and says the row spacing would increase by an unspecified amount in the case of an omni-directional windflow regime. This spacing would lead to a total wind farm area of 15 km^2 (291,600 m^2 per turbine). The actual dimensions of wind farms are much greater than this to account for setbacks, undulations in the terrain, physical or biological features, substations, transmission and distribution lines, roads, etc. (Love 2003; AWS Truewind, LLC 2009) and non-homogeneity of the wind resource over a site (Love 2003). The American Wind Energy Association (2008, as cited in Labrosse 2008) estimates the land requirements of wind farms are 485,623 m^2 per (2MW) turbine when including roads, transmission lines, substations, etc.

McDonald et al. (2009) demonstrate that in considering direct land conversion impacts of energy development, wind power actually occupies much more land per amount of energy produced (72.1 km^2/TW-hr/yr) as compared to other sources of electricity (e.g., hydropower [54.0], natural gas [18.6], coal [9.7], geothermal [7.5], nuclear [2.4], and energy conservation [-18.2]). Of course, the total footprint is a combination of direct ***and*** indirect land conversion. Hydropower and wind power are the most conspicuous of this group of power sources due to their downstream and airspace footprint, respectively.

Key Environmental and Socio-Economic Issues

Wind power has environmental (e.g., bat kills and habitat loss/fragmentation) and socio-economic impacts (e.g., changes in traditions and values). However, it is not uncommon to hear wind power described as an environmentally benign technology by industry and their proponents (Canadian Wind Energy Association 2009), government agencies, and researchers (e.g., Islam et al. 2004; Warburton 2004; Islam et al. 2004 as quoted by Longston 2006) alike - although a few frame their argument by using the qualifier 'relatively'.

Coupled with the common description of the benign nature of wind power and variable, often subjective, socio-economic impact, it is common for proponents to underestimate the environmental impacts of wind development (e.g., raptor mortality [see Durbin 2009]). In addition, environmental mitigation provided in environmental impact statements may never be carried out, meaning the (residual) impacts have been underestimated.

What do studies tell us ***are*** the important environmental and socio-economic impacts of wind power development?

Beyond the Abstract Characterizations: What are the Actual Environmental and Social Impacts of Wind Power?

Wind farms lead to landscape impacts and effects, including impacts to visual aesthetics (Strachan & Lal 2004; Ohl & Eichhorn 2010; Wolsink 2010), landscape character (Strachan & Lal 2004), habitat impairment (Wolsink 2010), fragmentation (McDonald et al. 2009), and changes to public amenity (Szarka 2006). They notably lead to bird and bat collisions and avoidance behaviour (Strachan & Lal 2004; McDonald et al. 2009; Masden et al. 2010; Ohl & Eichhorn 2010) and health impacts arising from noise and shadow flicker (Ohl & Eichhorn 2010). Wind farms can also alter the community identity (Wolsink 2010). The literature Longston (2006) reviewed indicated that visual impact was the primary environmental – social concern, while Strachan and Lal (2004) found that mechanical and aerodynamic noise, in addition to visual aesthetics, were of most concern to the public. Thomas (2008) states that wind farm impacts on wildlife are, and continue to be, a pivotal environmental issue even leading to the stalling of wind farm developments (GAO 2005 as referenced in Thomas 2008).

According to BCHydro, the most prominent environmental and social impacts of wind farms are visual aesthetics, mechanical and aerodynamic noise, and wildlife impacts (BCHydro 2006, p 7-34). The British Columbia Integrated Land Management Bureau (BCILMB) lists marbled murrelets on the coast and sandhill cranes and rare bats in the interior of British Columbia as major management concerns (British Columbia Ministry of Agriculture and Lands 2008). The siting of wind farms and associated facilities in wetlands and alpine areas, as well as fragmentation of Ungulate Winter Range and Wildlife Habitat Areas are also major management concerns (British Columbia Ministry of Agriculture and Lands 2008).

All bird species are susceptible to direct and/or indirect impacts of wind power projects, although the scale and type of impact will vary. Variables that contribute to bird impact risk are a project's layout, the species presence/abundance/distribution, species behaviour, topographical and water features in the project area, amount and distribution of previously disturbed habitat, and weather conditions (Wyoming Game and Fish Department 2009[9]). Prey species responses to the wind farm, - for example prey congregating and living around turbines or prey responding to shadow flicker[10] - are influential as well (Wyoming Game and Fish Department 2009). Likewise, all bat species are at risk from wind farms (Wyoming Game and Fish Department 2009) but again the scale and type of impact will vary.

[9] A synoptic analysis of bird and bat studies conducted in North America and Europe

[10] Prey may flush from a hiding spot because they see a shadow pass over the ground and mistake it to be a predator swooping in

Post-construction monitoring involves identifying avi-faunal groups or species that are more susceptible to wind farm impacts. It should be noted that post-construction studies are primarily commissioned by wind power developers to satisfy terms and conditions of their permits and that the studies are largely focused upon direct impacts rather than indirect effects (Wyoming Game and Fish Department 2009).

Studies show that bird groups susceptible to direct impacts include (Wyoming Game and Fish Department 2009):

- ⊗ **birds with the habit of flying at 'strike-zone' heights.** raptors (red-tailed hawk [*Buteo jamaicensis*], burrowing owl [*Athene cunicularia*], American kestrel [*Falco sparverius*], Golden eagle [*Aquila chrysaetos*]), passerines, and waterfowl (trumpeter swan [*Cygnus buccinators*])
- ⊗ **grassland birds that do aerial displays.** (long-billed curlew [*Numenius americanus*], upland sandpiper [*Bartramia longicauda*], bobolink [*Dolichonyx oryzivorus*], vesper sparrow [*Pooecetes gramineus*], and horned lark [*Eremophila alpestris*]

I hypothesize that Sprague's pipit (*Anthus spragueii*) and sandhill crane (*Grus canadensis*) could join this list.

Studies show that bird species susceptible to indirect impacts[11] include (Wyoming Game and Fish Department 2009): grasshopper sparrow (*Ammodramus savannarum*), diskcissel (*Spiza Americana*), bobolink, pink-footed geese (*Anser brachyrhynchus*), long-tailed duck (*Clangula hyemalis*), common eider (*Somateria mollissima*), common scoter (*Melanitta nigra*), pochards (*Aythya farina*), mergansers (*Mergus* spp.), and goldeneyes (*Bucephala clangula*).

[11] Impacts other than collision, for example avoidance behaviour.

Bat species shown through studies to be susceptible to wind farms include (Wyoming Game and Fish Department 2009): big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*), little brown myotis (*Myotis lucifugus*), and Northern long-eared myotis (*Myotis septentrionalis*)

Based on the pace of wind power utilization and increasing bat kills at wind farms, there is potential for significant cumulative effects on (American) bat populations (Arnett et al. 2008).

Environmental and socio-economic impacts have direct impacts (e.g., bat kills, land conversion, tree removal, alteration of cultural beliefs, etc.) and indirect effects (e.g., wildlife response to turbines, seed dispersal changes, growth of service industries). These combined lead to an "ultimate impact" (Masden et al. 2010, p.3), for example reduced population size. It is easier to quantify and predict direct impacts than indirect impacts (Masden et al. 2010); however, in some cases the indirect effect can contribute more to the ultimate impact than the direct impact. For example, increased energy budgets due to turbine avoidance, rather than direct impacts (i.e., bird kills), have led to a change in eider abundance in the regional area of a European wind farm (Masden et al. 2010). McDonald et al. (2009) estimate that, similar to other forms of linear development, 3-5% of a wind farm area leads to direct impacts from clearing. Since the turbine blades extend out and upward from the directly impacted landbase, the direct impacts related to species avoidance behaviour and bird and bat mortality cover a greater area than many other forms of linear development. Additionally, the wind farms may have more pronounced indirect effects as compared to other forms of development. The problem is putting this indirect effect into context. Does reducing eider abundance in a wind farm area have ramifications for the population?

All this goes to demonstrate that, although studies can accurately quantify the direct impacts of wind farms (Baerwald et al. 2009), there is a weak linkage between indirect effects and their proportional contribution to the ultimate impact (Masden et al. 2010). Hence, there is a real problem in understanding what a project, or a series of projects, is doing at the population level until "there is a real probability of a substantial ecological change" (Masden et al. 2010, p.3). The problem of linkage between direct and indirect impacts to population change is not unique to wind farms and can apply to lesser or greater extents to a number of environmental and social phenomena. This points out that perhaps it is premature to determine the extent of impacts wind farms have on the environment and populations living around them, given the relative immaturity and rapid growth of wind power across the continent and the world.

I conclude that wind farm impacts are perhaps just a way of life, since mitigation such as power production curtailment and micro-siting of turbines may have little benefit or commercial acceptability (Arnett et al. 2008; Smallwood et al. 2009). We need to make choices based on the environmental consequences of our consumptive appetite, all the while trying to improve environmental management and doing our best to choose between alternate development paths. In light of the literature review, given the current understanding of wind power, impact on bats[12], habitat fragmentation, and cumulative impacts should be at the forefront of main considerations within a planning framework.

[12] projected annual mortality is expected to range between 33,017 to 110,667 by 2020 in the Mid-Atlantic Highlands of USA (Arnett et al. 2008) and 454 per year in Altamont if the entire area were repowered (Smallwood & Karas 2009)

Wind Power Discourse

Society is increasingly more sensitive to the impact of electrical infrastructure on the landscape (Serrallés 2004). This is due, in part, to power sources, particularly renewable energy, being spatially-located closer to human centres than in the past, when many power sources were both consolidated and distant from urban centres (Devine-Wright 2005; Andrews 2008; Ohl & Eichhorn 2010). Coupled with society's increasing demand for "locally sensitive solutions" (Warren et al. 2005, p. 870) and the prominence of discussion around emissions reduction (Liming et al. 2008), wind power is a popular topic of discussion for policy-makers and society. The following are presentations of wind power discourse in general and evidence of the discourse occurring in British Columbia, in particular. It is important to consider discourse since it has a role in "setting of priorities and the identification of instruments" and "fuses a complex reality" to bring forward the "interests and values" that are at stake (Szarka 2004, p.318). This section, as in the previous two, will help build the preliminary questions used in the content analysis.

General Discourse Surrounding Wind Power

There are four common arguments encouraging the development of wind power:

1. a need to reduce greenhouse gas emissions (Szarka 2004)
2. concerns regarding pollution and risk associated with fossil and nuclear energy (Szarka 2004)
3. security concern relating to political instability in energy producing regions and price escalation (Szarka 2004), and
4. economic development (Stevenson 2009).

Within the discourse, there are four actors:

1. **'climate-chaos' coalition:** the pro-wind coalition of industry and favourable NGOs who predicate the need for wind power utilization to attack GHG emissions (Szarka 2004; Stevenson 2009)
2. **'renewable energy showcase' coalition**: the pro-wind coalition of industry and favourable NGOs who predicate the need for wind power utilization to develop economic prosperity (Stevenson 2009)
3. **'traditional conservation and preservationist' coalition**: conservation organizations brought into the dialogue due to their consideration of the juxtaposition of habitat impairment stemming from wind power development and that stemming from climate change (Szarka 2004; Stevenson 2009), and
4. **'landscape protectors' coalition**: the anti-wind coalition of local, project-related opposition and national umbrella organizations (Szarka 2004; Mander 2008 as quoted in Stevenson 2009).

The common theme amongst the coalitions is the idea that renewable energy is a means to sustainability, so they are not always strictly bound to one discourse coalition and there can be overlap in their messages (Stevenson 2009).

The pro-wind coalition (aka 'climate chaos' and 'renewable energy showcase' coalitions) often uses the greenhouse gas argument because it gets large media attention and has led to positive policy results (Szarka 2004). It is also politically volatile and lends itself to individuals, especially politicians, not wanting to debate wind for fear of not appearing to care for the environment (Jefferson 2008). This argument makes the wind industry into "a green icon for an environmentally moralistic and aware society" (Parkhill 2007, p.312). Barry et al. (2008) further describe the pro-wind coalition as having an *a priori* assumption that wind power is "overwhelmingly supported" (p.83). The coalition contends that development (as opposed to conservation) is the favoured alternative, and "no one community can 'opt out' of its…obligations" (Barry et al. 2008, p.84). The coalition also contends that wind farms lead to less environmental impact than climate change, and more knowledge is the only thing needed to convince people, especially opponents, of the need for wind power. The coalition argues for better operating conditions (Szarka 2004). 'Streamline' is the word of the day in industry, and the wind industry is no exception. This group, especially the 'climate chaos' coalition can be characterized as desiring any action that may lead to reduction in GHG emissions, regardless of the adverse environmental and social impacts that arise, the cost-effectiveness, or the level of reduction achieved (Trebilcock 2009).

On the other side of the table is the anti-wind coalition (aka: 'landscape protectors') with their critique that wind power is unreliable, leads to trivial GHG reductions, and uses public funds inefficiently (Szarka 2004). They also portray an image of "local interests being...powerless against large centralized and impersonal forces of government or big business" (Barry et al. 2008, p.74). Members of this coalition claim themselves as being preservers of biodiversity and "wild places" (Parkhill 2007, p.312). This coalition is distrustful of the government, developers, and the regulatory process, tapping into the "populist suspicion that we live, ultimately, in a corporatist state" (Barry et al. 2008, p.74). Opposition to wind power predominantly revolves around landscape values at a particular site, but it also revolves around views on "cost and benefits" and "core beliefs about the way siting decisions should be made" (Wolsink 2007, p. 2701). The anti-wind coalition comes in the form of local opposition that tries to delay or halt a particular project (Szarka 2004). The coalition switches to being a monitor of the project's adherence to terms and conditions of approval if the project is approved (Szarka 2004). The local opposition can create a conglomerate with other local opposition groups and expand to become a regional force (McClymont & O'Hare 2008). Oftentimes opponents to wind energy development are discredited by the pro-wind group as uneducated and selfish (Szarka 2004; Barry et al. 2008; McClymont & O'Hare 2008), disaffected from the perils of the Earth.

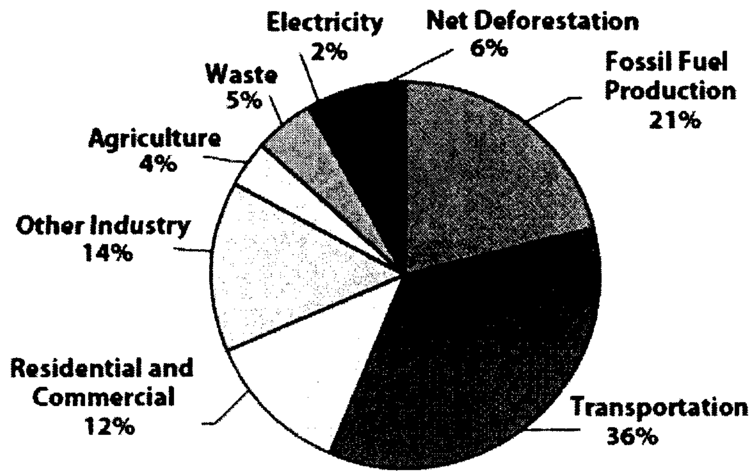
Stuck in the middle are conservation groups (aka: the 'traditional conservation and preservationist' coalition) that do not want to compromise their nature preservation stance but also wish to consider the impacts of climate change on biodiversity, so must enter into the debate on wind power (Szarka 2004). The anti-wind coalition stresses an emphasis on transportation, energy efficiency and demand side management as the most cost-effective and efficient means to achieve the goal of emissions reduction (Szarka 2004). Perhaps this is common ground for the anti-wind coalition and conservation groups.

Wind Discourse In British Columbia

The pro-wind coalition and conservation groups are present in British Columbia, but the anti-wind coalition is only represented by the local opposition at this point. Further, the actors follow the typologies presented by Szarka (2004) and Stevenson (2009). The full experience in British Columbia remains to be seen, but to use the actors described by Stevenson (2009), I suspect the green ('traditional conservation and preservationist') versus green ('climate chaos') discourse will become increasingly more prominent as wind farms are built. I also suspect energy conservation will arise as a new coalition to reshape, or combat, the 'renewable energy showcase' coalition because they argue that job creation and wealth can be created through conservation and efficiency initiatives rather than building more generation capacity.

The government, in promoting the utilization of wind power, captured the renewable energy showcase discourse, with emissions control and energy security playing a minor chord. This, I suspect is largely because of the economic downturn as well as British Columbia's low energy-related air pollution emission (see Figure 6). The pro-wind coalition also includes industry and industry organizations that particularly favour the economic development discourse, emphasize the abundant resources of the province, and market the potential for the province to become a North American leader in the 'green economy'. The industry also uses the climate-chaos dialogue, especially in relation to the Burrard Thermal Generating Plant.

In British Columbia, the anti-wind coalition is restricted to local project opposition, while the conservation groups tend towards support of the pro-wind coalition. As I said in the introduction to this section, there may be room for a coalition between local opposition and conservation groups. I expect consensus will come from the contention that public funds are best allocated to transportation-related emissions reduction. Indeed, transportation is the primary emitter in the province with a very insubstantial amount of emissions coming from electricity (see Figure 6); albeit some electricity is purchased from neighbouring jurisdictions for arbitrage and to satisfy un-met power needs.



Source: Community Energy Association 2008b

Figure 6 Greenhouse gas emission sources in British Columbia, 2006

McClymont and O'Hare (2008) found that stakeholder groups quickly assemble and can gather strong political and societal support, especially if the issues are not local, but, rather, are regional. Wind energy lends itself to being a regional issue since there are concerns about electricity prices, effectiveness in reducing emissions, and landscape impacts. There is already a strong campaign being brought forward against run-of-river hydro based on critiques about a lack of regional planning, no public ownership, and whether the projects are environmentally appropriate (e.g., as led by the British Columbian Wilderness Committee (2009) and Friends of Clayoquot Sound (2008)). Independent power producers and 'green' energy even became a 2009 provincial election campaign issue based on increasing retail electricity prices, privatisation, lack of local community economic and societal benefit, emphasis of electricity consumption rather than conservation, and environmental concern. The 'landscape protectors' coalition argues that the direct and cumulative impacts of run-of-river projects are too great for them to be called 'green' energy (British Columbian Wilderness Committee

2009). It is hypothesized that this will be their characterization of wind power as well. The coalition promotes the view that local government has no voice in power development (British Columbian Wilderness Committee 2009). The coalition also characterizes green energy power development as operating under a gold rush mentality with the province's and, importantly, the citizen's, natural resources and power supply "in the hands of for-profit developers" (British Columbian Wilderness Committee 2009).

Since run-of-river projects are the green energy developments being built right now, active mobilization against wind power has not yet occurred. If wind power takes off in British Columbia, it is suspected that the discourse campaign, especially from the opposition, will grow in force. The British Columbia Pacific Institute for Climate Solutions shares this sentiment (Evans 2008, p.14), believing that the opposition will stem from cumulative visual impacts. People and groups opposing individual projects may assemble into a unified, provincial advocacy group. This growth in opposition may not lead to the rejection of a specific wind power project (Aitken, McDonald, & Strachan, 2008), but it could lead to a provincial loss of appetite for wind, an appetite for wind power that is already weak due to a preference for firm electricity generation and better job creation than that provided from wind power. Potentially, the British Columbia wind energy planning framework would help to re-define landscapes so that wind turbine generators are seen as part of the landscape (Nadaï & Labussière 2008). The planning framework could also provide zonation to encourage the view that wind power is a compatible land use (Longston 2006; Nadaï & Labussière 2008). These features may ensure that a maelstrom of public animosity does not arise (Bohn 2007) towards the stated objectives of the British Columbian government to utilize wind power across the province and become a clean energy powerhouse for the western region of North America (Union of British Columbia Municipalities 2009).

LESSON-DRAWING

The intent of this section is to develop an understanding of lesson-drawing and the jurisdictional characteristics that influence transferability of a policy from one jurisdiction to another

What is Lesson-Drawing?

Public policy is comprised of problem definition, goals, and instruments (Pal 2006). Policies develop in response to problems over which the government has, or claims to have, control. There are theories on the exact mechanism of how the policy develops such as how problems rise to the top of the policy priority list but, in essence, they share the same general model of development: identify the problem, gather information, define evaluation criteria, identify and evaluate policy alternatives, pick a preferred policy, implement (Patton & Sawicki 1993). Policies also undergo measurement and evaluation to gauge such things as effectiveness in addressing the problem and cost (Pal 2006). For our current study, the policy problem is to reduce greenhouse gas emissions and the policy solution is to utilize wind power. The planning framework is a large component of the implementation, in the form of an administrative instrument used to encourage wind power utilization (Stigson et al. 2009).

Policy transfer can occur when a policy is either not performing according to expectations (Rose 1991; Mossberger & Wolman 2003; Evans 2006) or as a means of providing a 'quick-fix' to reduce political pressure (Mossberger & Wolman 2003;

Houlihan 2005). It can also occur through efforts to harmonize policies between jurisdictions (Hoberg 1991; Busch & Jörgens 2005) or be the result of military or economic coercion (Mossberger & Wolman 2003; Busch & Jörgens 2005). Policy transfer may also occur in order to move forward from a place of cognitive dissonance (Houlihan 2005), or irrationally and without critique (Mossberger & Wolman 2003). Lesson-drawing can also occur when a policy is up for a scheduled review and update, for example during update of a municipality's official community plan, or when there is a change in the governing bodies' ideology. Lesson-drawing is conducted in order to "learn something that [policymakers] do not already know" (Rose 1991, p.11) and to "generate new ideas and avoid 're-inventing the wheel'" (Wolman & Page 2002, p.497).

Factors that aid in the process of lesson-drawing are geographical proximity (Mossberger & Wolman 2003); communication between governmental institutions within a jurisdiction (Rose 1991) and interdependence, as in the protection of the environment or trade (Rose 1991). Lesson-drawing can also be aided by policy entrepreneurs[13] (Mossberger & Wolman 2003), a strong coalition proposing the lesson-drawing and a window of opportunity (de Jong 2004), and informal policy communities (aka epistemic communities) (Rose 1991; Mossberger & Wolman 2003). Federal government and international organizations (e.g., UN supported scientific bodies) are important in helping speed diffusion across states (Mossberger & Wolman 2003).

A general process of lesson-drawing, as adapted from Rose (1991), Mossberger & Wolman (2003), and Evans (2006) is schematicized in Figure 7 and described below:

[13] Individuals who market their abilities and familiarity with a given policy.

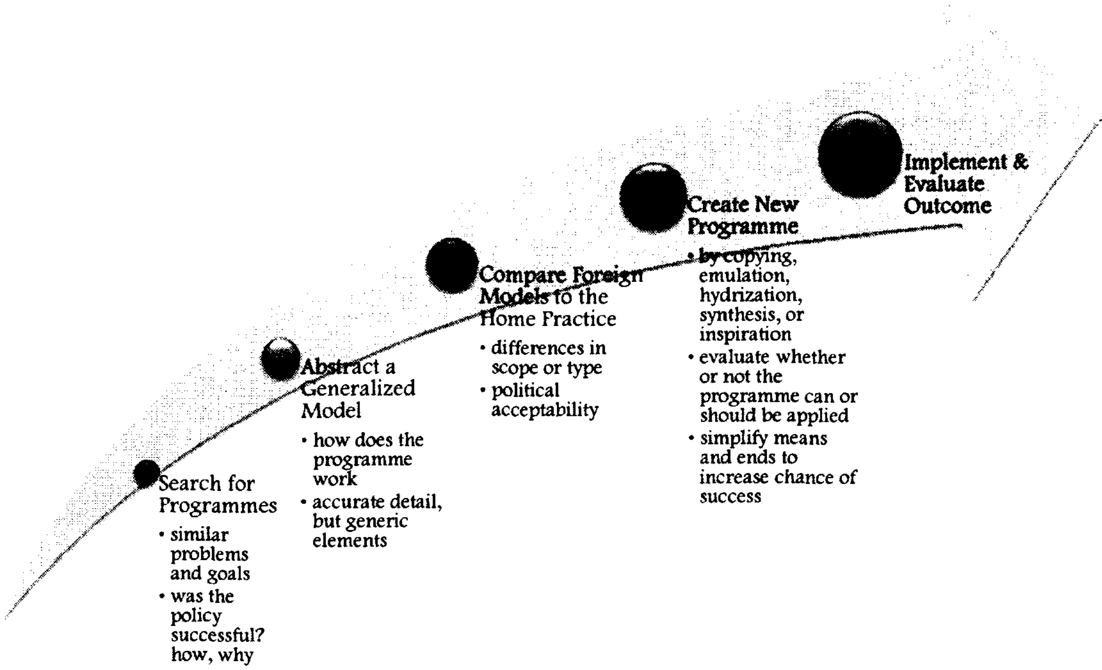


Figure 7 Schematic representing lesson-drawing methodology

1. **Search for similar programmes:**
   a. *Problems and Goals:* identify the problems being addressed and the goals associated with a policy or its variations. The adopter then determines the extent of similarity of their problems and the goals they wish to pursue. Preclusion of policy transfer is not the outcome if problems/goals differ between the adopter and adoptees. The adopter just needs a judgment on why policy transfer is still appropriate, for example, innovation and experimentation, rather than reduction of uncertainty (a common reason for policy transfer). A caution is that unrecognized differences could lead to unexpected policy failure.
   b. *Policy Performance:* extent of policy success, respects in which it was successful. Balanced assessment includes evidence of policy effects, plus consideration of advantages and shortcomings of particular policy or existing variations on a policy idea
2. **Abstract a generalized model:** the model should provide a description and have the basic elements but not be exhaustive in detail.
3. **Compare foreign models to the home practice:** construct a model of the home practice, look for differences in scope or type, and assess political acceptability of items that are lacking.
4. **Create new programme:**

a. Create a new programme through direct copy, emulation (copy with slight adjustment), hydridization (combine elements from two different places), synthesis (combine similar elements from three or more different places), or inspiration (novel programme with no analogue; stimulated by consideration of other programmes).
b. Determine whether the programme can be applied based on such things as the home jurisdiction goals.

5. **Implement and Evaluate Outcome:** implement the program and evaluate the anticipated versus realized outcome, effectiveness and efficiency.

In practice, lesson-drawing proceeds based on an official gathering of information from trusted sources in an informal process, since theory development and information gathering (as described above) is too costly, time-consuming, and/or hard to interpret and assess (Wolman & Page 2002). Often, the official's intuition assesses the 'fit' with the adoptee's environment (Wolman & Page 2002).

What Jurisdiction Parameters Influence Policy Transferability?

There are a number of natural, social, and systemic constraints to consider in determining whether a policy can be transferred (Houlihan 2005; Mossberger & Wolman 2003). Natural constraints relate to such things as topography and pollution. Social constraints relate to things such as social norms and cultural beliefs, and systemic constraints pertain to bureaucratic process, organizational structure, and ruling party (Houlihan 2005). Additional systemic factors influence transferability. These include: political, social, and economic institutions; political culture and partisan and interest group politics; public opinion; available resources; legal, political, or administrative structures needed to support the policy; and existence of other policies that affect efficacy (Mossberger and Wolman 2003). Transferability potential increases if the structure is in place to incorporate the foreign policies, there is similarity in constraints between jurisdictions, resources are available, and there are other complimentary policies.

Based upon my experience working as an environmental planner for a wind development company and the review I have conducted, key natural, social, and systemic factor constraints that will help to characterize jurisdictions have been developed. Table 1 presents the constraints.

Table 1 Natural, social, and systemic factors that will serve to characterize jurisdictions and possibly correlate to any convergence or divergence in planning frameworks

Natural Constraints	Social Constraints	Systemic Factor Constraints
– wind regime – topography – population per area – number of Level III ecological regions and type of Class II ecological regions where wind power is being utilized in the jurisdiction[14] – energy mix	– electricity price	– whether there is provincial/state level control and issuance of planning approvals – ability of provincial/state utility to develop and own projects – land ownership (Crown versus private) in wind development areas

Wind regime and topography are technical factors that, to a large degree, determine the profitability and constructability of wind farms. The hypothesis is that electricity price, energy mix, and ability of provincial utilities to develop and own projects are major motivating factors as to whether wind power utilization is a high-priority policy initiative. Similarities in planning frameworks may emerge where there are similarities in land ownership and/or ecoregions. Population density is a natural constraint since, presumably, there would be more competition for land. Consequently,

[14] Commission for Environmental Cooperation (2006)

there would be more land use conflicts, and wind energy would become more of a policy issue.

The constraints used to categorize British Columbia and the other jurisdictions assist in determining any relationship between planning frameworks, or specific elements thereof, and their jurisdictions. These relationships assist in determining the lessons to draw into British Columbia. Norms of acceptance of landscape and the place of humans, anthropogenic structures, and human-induced landscape change in rural/wild places are an important social constraint. However, within the scope of this research, it is too difficult and place-based an issue to explore and has, therefore, been left out of the jurisdiction categorization. Ideologies of the ruling party are an important constraint, as well (Houlihan 2005). The ideologies related to such things as the role of government in land use planning and decisions, the role of stakeholders, neo-liberalisation, environment, development, means of reducing greenhouse gas emissions, and likewise could have an influence on the shape and feel of the jurisdictions' planning frameworks. Determining the ideology of the ruling parties on these wide ranging issues is beyond the scope of this research.

SUMMARY

A review of the literature indicated that the most prominent ground rule consideration is the role of local interests in land-use planning and project approval. The balancing of regional goals and objectives with local, negative environmental and social impacts is a significant tension. The most prominent main considerations are electrical price, aesthetics (visual and acoustic), and environmental nuisance. The main environmental nuisance impacts relate to bats, habitat fragmentation, post-construction reclamation, and cumulative effects.

British Columbia policy analysis and discourse relating to the province's planning framework suggest the ground rules and main consideration of interest have some room for improvement. This includes the designation of wind resource zones, government-commissioned strategic and/or project environmental impact assessment, and consideration of cumulative effects. There is an identified struggle on the role of the local government in reviewing and approving projects: the provincial government wants to limit local government control, whereas other parties want the local government to have an authoritative capacity. Consideration of cumulative effects (Warren et al. 2005) and the involvment of local government in the designation of wind resource zones (Kellett 2003; Strachan & Lal 2004; Ohl & Eichhorn 2010) are two factors found to enhance a wind energy planning framework's ability to positively contribute to wind power utilization. Acceptance of cumulative effects within the wind resource zones, creating loose boundaries around the wind resource zones, restricting placement of wind farms outside of these zones, and using habitat off-setting are key features of creating wind resource zones (Cowell 2010). Particular attention is paid to the following in analyzing the planning frameworks:

- ⊗ What are the ground rules of the ten wind energy planning frameworks analysed?
- ⊗ Are there specific ground rules relating to wind resource zones, government-commissioned strategic- or project-environmental impact assessment, and local government involvement?
- ⊗ What are the main considerations of the ten wind energy planning frameworks analysed?

- ⊗ Are there specific main considerations relating to electrical price, aesthetics (visual and acoustic), and environmental nuisance (bats, habitat fragmentation, post-construction reclamation, and cumulative effects)?
- ⊗ Is there a relationship between jurisdiction constraints and planning frameworks?
- ⊗ How will I decide whether planning framework elements are common or jurisdiction-specific?

Natural, social, and systemic factor constraints play a role in how well a policy in a foreign jurisdiction will transfer to the home jurisdiction. Although in practice, lesson-drawing relies more on the policy makers' sense of what will work, their personal familiarity with the policy (for example through some study and site visits), and reliance on the experiences of trusted sources. Some of the natural, social, and systemic factor constraints used to characterize jurisdictions are wind regime, population per area, electricity price, and ruling political party.

3

RESEARCH DESIGN AND METHODS

Research approach

The research approach employed is a qualitative assessment of the similarities between different planning frameworks in jurisdictions outside of BC, and the factors that influence the policy decisions that are in place. An assessment is then made on whether similar factors are in place in BC and how that may influence the transferability of these policies to this province. As the methodology employed is largely subjective in nature, (Dr. J. Shultis, personal communication, March 4, 2007) suggests that the worldviews held by the researcher may bias conclusions. In these circumstances, the recommendation is that the researcher outlines their own world view, and acknowledges *a priori* how these might influence their interpretation of the data.

In this regard, my own worldview is that of Christianity. I am a Christian who is guided by instruction of the Church, the Bible, tradition, and the Holy Spirit. Each of these hold and promote a worldview that has a strong influence on my daily life. The Bible provides guidance on how to treat the environment and other people. While I have conducted this research in as objective a manner as I could, my worldview will influence the types of research I am conducting and the potential interpretation of actions. Thus, I take up the epistemological stance of a Christian social science researcher.

Method

Methods employed include a literature review, comparative policy analysis, and two empirical analyses using content analysis.

Literature Review

The review of literature on policy transfer was conducted to create an understanding of policy transfer and to build a theoretical framework for criteria that have an influence on the appropriation of policies from one jurisdiction to the next. The review of published literature, including journal articles, graduate theses, and governmental and industry guidelines on wind energy planning frameworks was also undertaken to:

- ⊗ generate an understanding of typical ground rules and main considerations,
- ⊗ understand the relationship between planning frameworks and planning outcomes, and
- ⊗ gain insight into discourse around planning frameworks.

This will help in review of planning frameworks, especially concerning main considerations.

Comparative Policy Analysis

The usual method used to conduct lesson-drawing is informally implemented through communication with colleagues in other jurisdictions, site visits, and research (Wolman & Page 2002). The basic steps of a formal lesson-drawing process are: identifying the problems and goals, gathering policies from other jurisdictions and assessing how those policies are performing, creating a generalized model of the foreign policies and the indigenous policy and doing a gap analysis, creating a new policy, and implementing, and measuring impact, of the policy (Rose 1991; Mossberger & Wolman 2003; Evans 2006). These steps, excluding assessment of the effectiveness of the foreign policies, were followed for this study. A generalized model of the planning frameworks was created (Figures 10a through 10d), with gaps identified in the content analysis

(Chapters 4 & 5) rather than through contrasting the indigenous and foreign planning framework models. Recommendations for inclusion in British Columbia's wind energy planning framework will be brought forward through synthesis of similar policies from the foreign jurisdictions.

Content Analysis

Content analysis is the analytical technique used to conduct the policy analysis since it allows the researcher to group together analogous utterances and ideas by finding patterns in speech or thought, and similarities and differences in data (Burnard 1996). Condensing the utterances and ideas into categories will describe the phenomenon (Elo & Kyngäs 2008), in this case, wind energy planning frameworks. The planning frameworks were the sample unit, and these include applicable policies, Acts, regulations, and guidelines. Some items in planning frameworks do not speak to planning *per se*, but speak to things such as the function of the authority in charge of the planning framework (or component thereof) – the content analysis excludes portions of the planning frameworks that do not pertain to ground rules or main considerations. Words or terms were the unit of analysis to derive the ground rules and main considerations. Further analysis of the main considerations will be undertaken in an attempt to rank the importance of each of the main considerations. Patterns were sought between planning frameworks, on the one hand, and the natural, social, and systemic constraints criteria used to characterize each of the jurisdictions, on the other, in order to highlightthose ground rules and main considerations that are specific to a certain context and those that are not.

The process of content analysis proceeds as follows (adapted from Burnard 1996, Hsieh & Shannon 2005, White & Marsh 2006, and, Elo & Kyngäs 2008):

- ⊗ Prepare a preliminary set of questions (foreshadowing questions) in order to assist in developing the code and looking for specific content. The foreshadowing questions are an initial step towards developing categories (or codes) and are based on the researchers' initial expectations about the meaning of the data and the expected categories of messaging in the data.
- ⊗ Read the text a number of times with note taking. At the completion of the first read, summarize the content and get familiar with content, keeping the foreshadowing questions in mind; add more questions if needed.
- ⊗ Thorough read the text, make notes (single words or short phrases) on the right hand margin, and account for all of the data, according to the foreshadowing questions. Take notes along the way on such things as impressions, theoretical insights, and preliminary coding.
- ⊗ Transfer the notes onto a blank worksheet (e.g., coding sheets) and generate categories of like thought that ultimately become the codes that are used for analysis. These codes can be labeled in any manner desired, just as long as the scheme is understood by the researcher.
- ⊗ Group together the codes into sub-categories. Group the sub-categories into higher level categories (generic category), and agglomerate or break out as necessary to eventually come up with main categories. The intent is that the resulting codes will capture the meaning of all data analyzed. Abstract these codes, sub-categories and generic categories into higher and higher level headings until main categories are generated. A maximum of twelve headings is suggested so that the dataset is manageable.
- ⊗ Prepare a preliminary code and analyze a sample set of total sample to ensure the code is adequate. All text should be accounted for. Finalize the code based on the results of this sub-sample.
- ⊗ Code the entire sample, break up the sample units into their individual codes, and group together all like coded data.
- ⊗ Explain the categories. Develop theory, in light of previous studies, when possible.

This is inductive content analysis, and it was used to generate a code that represents the planning frameworks used in the ten foreign jurisdictions. Deductive content analysis was used for analysis of the British Columbian wind energy planning framework since the code will already be generated from the content analysis of the ten other planning frameworks and the goal is to test the fit of the British Columbian planning framework to the code. In the case of deductive content analysis, a categorization matrix is prepared (generally through inductive content analysis) and the text is analysed for "correspondence with or exemplification of" the categories (Elo & Kyngäs 2008). All text was accounted for; with a code developed as per the inductive method for any text left remaining.

Potential limitations to the content analysis method are that textual data is separated from its context and requires interpretation (Burnard 1996), the sample size may not be scalable to the population (i.e., low validity) (Harwood & Garry 2003), and no independent analysis conducted to determine the reliability of the results (Harwood & Garry 2003).

Foreshadowing Questions

The following are foreshadowing questions designed specifically for this research and used to assist in developing the preliminary code. The foreshadowing questions were categorized according to (Litman 2008), i.e., ground rule and main consideration, serving as an initial step towards creating main categories.

Ground Rules:

- ⊗ planning consent authority held by?
- ⊗ size of windfarm subject to planning consent?
- ⊗ project stage planning consent is needed?
- ⊗ scope of assessment (i.e., wind turbine generators (WTGs) only, WTG and transmission line, all components)
- ⊗ all windfarms subject to planning consent or only those on provincial/state lands?

- ⊗ windfarms only permitted in wind resource energy zones or are they permitted anywhere? If only in WREZ, can exceptions be made – what is the process/review considerations if so?
- ⊗ projects or land use plans subject to an environmental impact assessment (project- or strategic-EIA, respectively)?
- ⊗ stakeholder consultation needed? Just notification required or is involvement needed. When is it required? Do stakeholders review certain documents?
- ⊗ First Nation/Indian Band consultation needed?
- ⊗ goals and objectives, targets, performance measures, and monitoring indicated? advisory board used for these activities? monitoring reports publicly available? what frequency is monitoring conducted? What issues, aside from main considerations (see below), are monitored?
- ⊗ planning framework designate areas that cannot be developed (e.g., parks, land conservancy, important agriculture lands)?
- ⊗ planning framework indicate areas of exceptional wind resource? planning framework require a minimum power output and request verification of the resource?
- ⊗ planning framework use a Decision Support System to graphically demonstrate the above two areas or any other areas?
- ⊗ planning framework specifically link with any provincial/state or local initiatives?
- ⊗ level of local government and public involvement in the decision making process?
- ⊗ bonds paid to government for decommissioning?
- ⊗ types of evaluation are used to ensure the planning framework is meeting its goals and targets?

Main Considerations:

- ⊗ main considerations for planning review? What are they? Can these main considerations be categorized to societal impact, aesthetic, and environmental nuisance?
- ⊗ proliferation and cumulative effects considered?
- ⊗ types of setbacks are used and if any, what are the dimensions?
- ⊗ main considerations used to benchmark performance and/or monitored? Which ones?

PLANNING FRAMEWORK DOCUMENTS

Table 2 contains the list of all planning framework documents analyzed. These documents are the complete representation of the provincial/state wind energy planning framework operating within each of the eleven jurisdictions being compared.

Table 2 List of documents that represent the provincial/state level wind energy planning framework of each of the eleven jurisdictions to be analyzed

Jurisdiction	Document List
Alberta	• Rule 007: Applications for power plants, substations, transmission lines, and industrial system designations (Alberta Utilities Commission 2009) • Rule 012: Noise control (Alberta Utilities Commission 2010) • Provincial wetland restoration/compensation guide (Alberta Environment 2007) • Wildlife guidelines for Alberta wind energy projects (Alberta Sustainable Resource Development 2006) • Handbook of inventory methods and standard protocols for surveying bats in Alberta. Appendix 5: Bats and wind turbines. Pre-siting and pre-construction survey protocols (Alberta Sustainable Resource Development 2008)
British Columbia	• The BC energy plan. A vision for clean energy leadership (British Columbia Ministry of Energy, Mines and Petroleum Resources 2007) • Independent power production in B.C.: an inter-agency guidebook for proponents (British Columbia Ministry of Agriculture and Lands 2008) • Application information requirement template with respect to an application for an environmental assessment certificate (British Columbia Environmental Assessment Office 2010) • Crown land use operational policy. Wind power projects (British Columbia Ministry of Energy, Mines and Petroleum Resources 2005) • Proponent guide to the environmental assessment review process (British Columbia Environmental Assessment Office 2005) • Environmental Assessment Act (Government of British Columbia 2002) • Reviewable projects regulation (British Columbia Environmental Assessment Office. 2006)
Iowa	• Alternative Energy Production Law (Iowa Utilities Board 2003)
Kansas	• Kansas energy plan 2009 (Kansas Energy Council 2009)

Jurisdiction	Document List
Manitoba	• Crown land policy and wind farms (Manitoba Innovation, Energy and Mines 2007a). • Manitoba wind farm development process (Manitoba Innovation, Energy and Mines 2007b) • Manitoba permitting and regulations - wind farm development (Manitoba Innovation, Energy and Mines 2007c) • The Environment Act (Manitoba Conservation 2010) • Classes of development regulation (Manitoba Conservation 1988)
Nova Scotia	• Environmental Goals and Sustainable Prosperity Act (Government of Nova Scotia 2007) • Towards a greener future. Nova Scotia's 2009 energy strategy (Nova Scotia Department of Energy 2009) • Towards a greener future. Nova Scotia's climate change action plan (Nova Scotia Environment 2009a) • Environmental assessment regulations (Nova Scotia Environment 2009b) • Activities designation regulation(Nova Scotia Environment 2007) • Approvals procedure regulation (Nova Scotia Environment 1995) • Proponent's guide to wind power projects: guide for preparing an environmental assessment document (Nova Scotia Environment 2009c) • Guide to addressing wildlife species in an EA registration document (Nova Scotia Environment 2009d)
Prince Edward Island	• Renewable Energy Act (Government of Prince Edward Island 2008) • Renewable energy designated areas regulation (Government of Prince Edward Island 2005) • Island wind energy. Securing our future: the 10-point plan (Government of Prince Edward Island. 2009a • Environmental impact assessment guidelines (Prince Edward Island Environment, Energy and Forestry 2010) • Environmental Protection Act (Prince Edward Island Environment, Energy, and Forestry 1988) • Planning Act (Government of Prince Edward Island 2009b)
Saskatchewan	• Saskatchewan energy and climate change plan (Government of Saskatchewan 2007) • The Environmental Assessment Act (Saskatchewan Environment 2002) • Guidelines for the preparation of a project proposal. Saskatchewan Environmental Assessment Review Process (Saskatchewan Environment 2003) • The Saskatchewan EA process (Saskatchewan Environment 2007) • A guide to the environmental assessment process (Saskatchewan Environment 2010)

Jurisdiction	Document List
Texas	• Senate Bill 20 (Government of Texas 2005) • Competitive renewable energy zones (CREZ) (Public Utility Commission of Texas 2009)
Washington State	• RCW 19.285.040. Energy conservation and renewable energy targets (Government of Washington State 2006a) • WAC 197-11State Environmental Policy Rules (Government of Washington State 2003) • Wind power guidelines (Washington Department of Fish and Wildlife 2009) • WAC 463-60. Applications for site certification (Government of Washington State 2009) • RCW 80.50.060. Energy facilities to which chapter applies (Government of Washington State 2001) • House Bill 2402 – 2005-06. Providing for expedited processing of energy facilities and alternative energy resources (Government of Washington State 2006b)
Wisconsin	• Executive Order #192 (Wisconsin Office of the Governor 2010) • PSC 4.10. Chapter PSC4. Environmental Analysis (Wisconsin Public Service Commission 2007) • Application filing requirements for wind energy projects in Wisconsin. Version 4.5. (Wisconsin Public Service Commission 2008) • WAC Chapter 196. Regulation of public utilities (Government of Wisconsin 2009) • Considering natural resource issues in windfarm siting in Wisconsin. A guidance (Wisconsin Department of Natural Resources 2004)

4

COMPARATIVE POLICY ANALYSIS OF TEN JURISDICTIONS

INTRODUCTION

In this chapter, the natural, social and systemic (jurisdictional) factors believed to be most important in influencing the form and function of provincial/state level wind power planning frameworks are presented. This leads into the comparative policy analysis of ten provincial/state jurisdictions chosen for this study (i.e., Alberta, Iowa, Kansas, Manitoba, Nova Scotia, Prince Edward Island, Saskatchewan, Texas, Washington State, and Wisconsin). To recap, these jurisdictions were chosen either because they had natural attributes conducive to wind power utilization (e.g., flat ground and high wind speeds) or shared some similarity with British Columbia, for example similar environmental setting or energy mix. Finally, relationships will be identified between the jurisdictional factors and elements of the wind power planning frameworks.

To start the discussion, it is helpful to provide a general overview of wind power utilization in North America as this gives some context to the overall 'problem'. Figure 8 depicts main regions where wind farms have been constructed in North America. Texas is the national leader of operating wind farms, with other notable mentions being Alberta, Iowa, and Washington State (Canadian Wind Energy Association 2010; American Wind Energy Association 2010).

Many jurisdictions participate, either actively or passively, in regional climate initiatives to better understand how industry and community can better contribute to the climate change impacts attributed to human activity and to create a market for change, for example by selling greenhouse gas reduction credits. These activities, in tandem with federal government and provincial/state actions, are helping to spur a wind industry that is seeing dramatic annual installed capacity growth rates of between 30 to 57% (National Energy

Board 2006; American Wind Energy Association 2008; Texas Window on State Government 2008; American Wind Energy Association 2009).

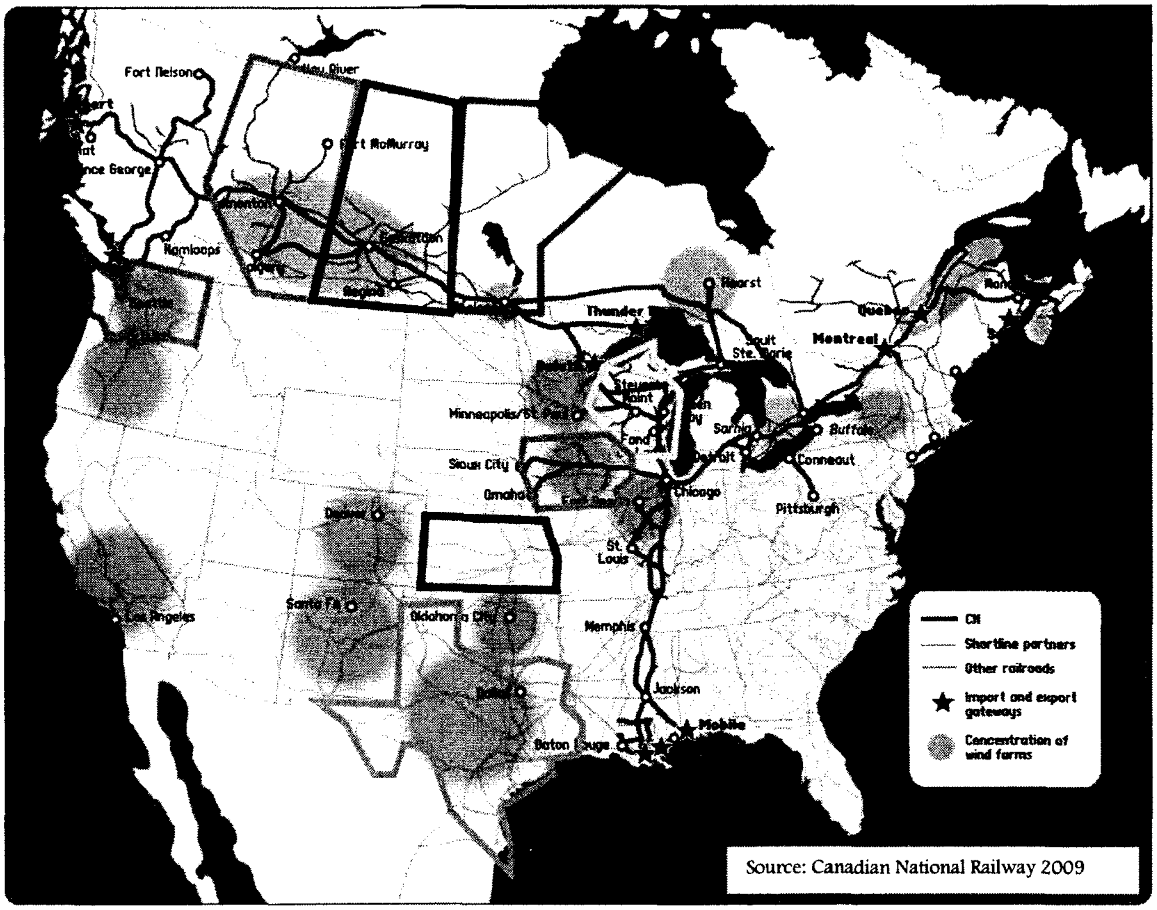


Figure 8 Regions of wind farm operation in North America, 2008

Despite the rapid capacity growth, wind power accounts for only 0.5 to 3% of generation in most jurisdictions in North America (Statistics Canada 2007a; Texas Window on State Government 2008; American Wind Energy Association 2009). Prince Edward Island and Iowa stand out as exceptions since wind power accounts for 22% and10% of electrical generation in those jurisdictions, respectively (Statistics Canada 2007a; Get Energy Active

2010). “Twenty by Thirty” (20 x '30) is a major initiative in the United States of America that intends to see 20% of electrical generation to come from clean energy by the year 2030 (U.S. Department of Energy 2008). This involves the coordination of electrical system operators, States, the federal government, and industry. The National Renewable Energy Laboratory (2010) has modeled the wind resource and transmission system for the mid-western and eastern United States of America. In the National Renewable Energy Laboratory eastern wind integration study (EnerNex Corporation 2010), the Great Plains represents the most high-quality wind resource in the east. The National Renewable Energy Laboratory (2010) generated three scenarios, each generating about 750,000,000 MWh per year and reducing CO_2 emissions on average by 4.5%, that would meet the 20 x '30 initiative. The Joint Coordinated System Plan (2008) also developed scenarios in the east to address the 20 x '30 initiative and was able to reduce emissions by 8% under their assumptions. Wind projects in both scenarios tend to be those located in the Great Plains or offshore. The Tennessee Valley Authority and Southeastern Electric Reliability Council tend to be wind-import regions due to lower wind quality and availability, while the Southwest Power Pool has very high penetration. Figure 9 depicts where one might expect to see dramatic increases in the number of windfarms across the landscape of the United States of America over the next number of years.

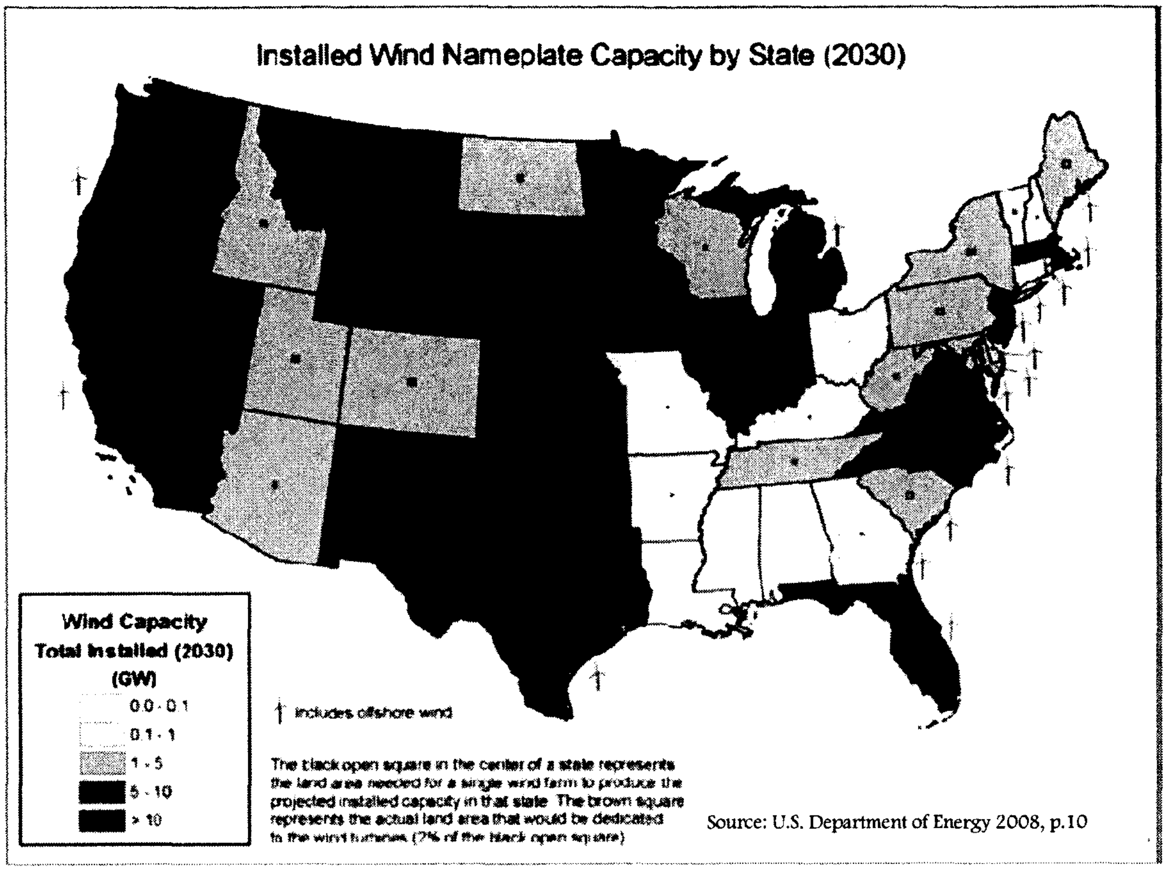


Figure 9 One scenario in the United States of America, of wind power installation that may occur in order to meet the 20 x '30 initiative

Jurisdictional Factors

Characterizing jurisdictions by a certain key number of factors can be useful in comparing jurisdictions against one another and, in the case of comparative policy analysis, offer one means of determining the fit of policies between jurisdictions. Five natural factors, one social factor, and four systemic factors were captured for each of the jurisdictions being studied. These are presented in Table 3 (see Chapter 2 for the factor selection rationale).

Table 3 Natural, social, and systemic factors of ten North American jurisdictions

Jurisdiction	Constraints		
	Natural	**Social**	**Systemic Factors**
Alberta **Installed capacity:** 656 MW **Land Base:** 640,045 km² **Capacity/land base:** 0.0010 MW/km²	wind regime: bottom 1/3 of province has wind speeds (at 80m elevation)) between 6 to 8m/s topography: flat to undulating, mountainous to the west population per area: 5.1 people/km² number of Level III ecological regions and type of Level II ecological regions where wind power is being utilized in the jurisdiction: 9; temperate and semi-arid prairies energy mix: 51% coal, 37% natural gas, 12% hydro/wind power	electricity price: 10.18 ¢/kWh (CDN)	whether there is provincial/state level control and issuance of planning approvals: provincial and local government approval ability of provincial/state utility to develop and own projects: yes land ownership (Crown versus private) in wind development areas: private or municipal
Saskatchewan **Installed capacity:** 171 MW **Land Base:** 588,276 km² **Capacity/land base:** 0.0003 MW/km²	wind regime: bottom 1/2 of province has wind speeds (80m) between 6 to 8m/s topography: flat to undulating population per area: 1.6 people/km² number of Level III ecological regions and type of Level II ecological regions where wind power is being utilized in the jurisdiction: 8; temperate and semi-arid prairies energy mix: 47% coal, 28% natural gas, 22% hydro	electricity price: 10.14 ¢/kWh (CDN)	whether there is provincial/state level control and issuance of planning approvals: provincial and local government approval ability of provincial/state utility to develop and own projects: yes land ownership (Crown versus private) in wind development areas: private or municipal

Jurisdiction	Constraints		
	Natural	**Social**	**Systemic Factors**
Manitoba **Installed capacity:** 104 MW **Land Base:** 552,370 km^2 **Capacity/land base:** 0.0002 MW/km^2	wind regime: bottom 1/3 of province has wind speeds (80m) between 6 to 8m/s topography: flat to undulating population per area: 2.1 people/km^2 number of Level III ecological regions and type of Level II ecological regions where wind power is being utilized in the jurisdiction: 11; temperate prairies energy mix: 91% hydro, 7% natural gas	electricity price: 6.62 ¢/kWh (CDN)	whether there is provincial/state level control and issuance of planning approvals: provincial and local government approval ability of provincial/state utility to develop and own projects: yes land ownership (Crown versus private) in wind development areas: private or municipal
Nova Scotia **Installed capacity:** 138 MW **Land Base:** 52,917 km^2 **Capacity/land base:** 0.0026 MW/km^2	wind regime: majority of the province has wind speeds (80m) between 6 to 8.5m/s topography: flat to undulating population per area: 17.3 people/km^2 number of Level III ecological regions and type of Level II ecological regions where wind power is being utilized in the jurisdiction: 3; Atlantic highlands energy mix: 45% coal, 24% oil, 18% non-hydro renewable energy	electricity price: 12.34 ¢/kWh (CDN)	whether there is provincial/state level control and issuance of planning approvals: provincial government approval ability of provincial/state utility to develop and own projects: yes land ownership (Crown versus private) in wind development areas: private or municipal

Jurisdiction	Constraints		
	Natural	Social	Systemic Factors
Prince Edward Island **Installed capacity:** 164 MW **Land Base:** 5,684 km² **Capacity/land base:** 0.0289 MW/km²	wind regime: majority of the province has wind speeds (80m) between 7 to 9.5m/s topography: flat to undulating population per area: 23.9 people/km² number of Level III ecological regions and type of Level II ecological regions where wind power is being utilized in the jurisdiction: 1; mixed-wood plains energy mix: 90% oil, 10% wind power	electricity price: 16.12 ¢/kWh (CDN)	whether there is provincial/state level control and issuance of planning approvals: provincial and local government approval ability of provincial/state utility to develop and own projects: yes land ownership (Crown versus private) in wind development areas: private or municipal
Iowa **Installed capacity:** 3,670 MW **Land Base:** 144,701 km² **Capacity/land base:** 0.0254 MW/km²	wind regime: majority of the State has wind speeds (80m) between 7 to 9m/s topography: flat to undulating population per area: 20.8 people/km² number of Level III ecological regions and type of Level II ecological regions where wind power is being utilized in the jurisdiction: 3; temperate prairies energy mix: 73% coal, 11% nuclear, 10% natural gas/non-hydro renewable energy	electricity price: 9.18 ¢/kWh (USD)	whether there is provincial/state level control and issuance of planning approvals: local government approval ability of provincial/state utility to develop and own projects: not applicable land ownership (State/Federal versus private) in wind development areas: private or county

Jurisdiction	Constraints		
	Natural	**Social**	**Systemic Factors**
Kansas **Installed capacity:** 1,026 MW **Land Base:** 211,900 km^2 **Capacity/land base:** 0.0048 MW/km^2	wind regime: majority of the State has wind speeds (80m) between 7 to 9m/s topography: flat to undulating population per area: 13.1 $people/km^2$ number of Level III ecological regions and type of Level II ecological regions where wind power is being utilized in the jurisdiction: 6; semi-arid prairies energy mix: 73% coal, 21% nuclear	electricity price: 8.81 ¢/kWh (USD)	whether there is provincial/state level control and issuance of planning approvals: local government approval ability of provincial/state utility to develop and own projects: not applicable land ownership (State/Federal versus private) in wind development areas: private or county
Texas **Installed capacity:** 9,707 MW **Land Base:** 678,051 km^2 **Capacity/land base:** 0.0143 MW/km^2	wind regime: half of the State has wind speeds (80m) between 8 to 10m/s while the other half has wind speeds (80m) between 5.5 to 7.5m/s topography: flat to rolling population per area: 36.7 $people/km^2$ number of Level III ecological regions and type of Level II ecological regions where wind power is being utilized in the jurisdiction: 9; semi-arid prairies energy mix: 49% natural gas, 37% coal, 10% nuclear	electricity price: 11.81 ¢/kWh (USD)	whether there is provincial/state level control and issuance of planning approvals: no approval required ability of provincial/state utility to develop and own projects: not applicable land ownership (State/Federal versus private) in wind development areas: private or county

Jurisdiction	Constraints		
	Natural	**Social**	**Systemic Factors**
Washington State **Installed capacity:** 1,914 MW **Land Base:** 172,348 km² **Capacity/land base:** 0.0111 MW/km²	wind regime: majority of the State has wind speeds (80m) between <4 to 4.5m/s topography: rolling/mountainous with flats in the east population per area: 38.6 people/km² number of Level III ecological regions and type of Level II ecological regions where wind power is being utilized in the jurisdiction: 8; cold deserts energy mix: 75% hydro, 22% nuclear/natural gas/coal	electricity price: 7.76 ¢/kWh (USD)	whether there is provincial/state level control and issuance of planning approvals: local government approval (although proponents can opt-in to a State-level approval process) ability of provincial/state utility to develop and own projects: not applicable land ownership (State/Federal versus private) in wind development areas: private or county
Wisconsin **Installed capacity:** 449 MW **Land Base:** 140,663 km² **Capacity/land base:** 0.0032 MW/km²	wind regime: majority of the State has wind speeds (80m) between 6 to 7.5m/s topography: flat population per area: 40.2 people/km² number of Level III ecological regions and type of Level II ecological regions where wind power is being utilized in the jurisdiction: 4; mixed-wood shield and mixed-wood plains energy mix: 65% coal, 20% nuclear, 10% natural gas	electricity price: 11.38 ¢/kWh (USD)	whether there is provincial/state level control and issuance of planning approvals: State-level approval ability of provincial/state utility to develop and own projects: not applicable land ownership (State/Federal versus private) in wind development areas: private or county

sources of information:

NOTE: wind farms are best built in areas exceeding 6 or 7m/s wind speeds at 80m

Canadian wind regime, excluding Nova Scotia and Prince Edward Island: Environment Canada (2003)

Nova Scotia wind regime: Nova Scotia Department of Energy (2010)

Prince Edward Island wind regime: Gasset, N., Y. Gagnon, G.J. Poitras (2005)

USA wind regime: AWS Truewind – National Renewable Energy Laboratory (2010).

Canadian population density: Statistics Canada (2007b)

USA population density: US Census Bureau (2009)

Canadian and USA ecological regions: Commission for Environmental Cooperation (2006)

Canadian energy mix: National Energy Board (2006)

USA energy mix: Get energy active (2010)

Canadian electricity prices: Manitoba Hydro (2010)

USA electricity prices: US Energy Information Administration (2010)

Alberta, Saskatchewan, and Wisconsin, are perhaps the best overall jurisdictions for wind power utilization from a purely technical viewpoint as they have a good wind resource, flat topography, and a relatively high electricity price, key determinants for wind power utilization (Valentine 2010; Warren & McFadyen 2010). Iowa and Kansas have an excellent wind resource and have flat topography; however, the electricity price is only moderately high. Texas has the opposite scenario from Iowa and Kansas: the electricity price is relatively high but the wind resource is comparatively moderate. Nova Scotia and Prince Edward Island have the matching attributes of Alberta, Saskatchewan, and Wisconsin concerning the wind resource and high electricity prices; however, wind farms in Prince Edward Island are being constructed in forested, or relatively more so, landscapes ,while those in Nova Scotia are being constructed in more complex topography. Manitoba has a good wind resource and flat topography, both positives for wind power utilization, but also has very low electricity prices making wind power much less competitive from an economic perspective. Washington State appears to be the worst jurisdiction for building a windfarm, due to its more complex topography (as a large part of the State sits in the Cascade mountain range), low wind resource, and low electricity price. In general, the American jurisdictions are dramatically more populated than the Canadian jurisdictions. Saskatchewan is the least densely populated area at 1.6 people per square kilometer, while Wisconsin is the most densely populated jurisdiction at 40.2 people per square kilometer (Statistics Canada 2007b; U.S. Census Bureau 2009). As stated in Chapter 2, higher population density may lead to more land use conflicts, which could be a main consideration within the planning framework. Since there is, presumably, more land use conflict, wind energy is likely a high priority policy issue, conceivably leading to a more formal and comprehensive planning framework. Alberta, Manitoba, Nova Scotia, Prince Edward Island, and Wisconsin are the only jurisdictions that have strong policy guidance regarding the assessment of compatibility of a wind farm with existing or planned land uses. Thus population density, as well as amount of private land ownership, may influence whether land use compatibility is an important consideration since three of those four jurisdictions have a high population density. Nova Scotia and Wisconsin arguably have the most robust planning frameworks in this sample. This possibly stems from these jurisdictions having high population density combined with a high proportion of the land base having a good wind resource, and an assumption that wind power is a topic of interest for the citizens in those jurisdictions.

It is interesting to view installed wind farm capacity in light of the above. Alberta leads in installed capacity in Canada, so the key factors of good wind resource, flat topography, and high electricity price seem to be accurate. One would, likewise, expect Wisconsin, on a per km^2 basis, to be a national leader in wind farm installed capacity, due to its good wind resource, flat topography, and a relatively high electricity price. This, however, is not the case. Washington State, and possibly Iowa, Kansas, and Texas, should be less favoured areas for wind power utilization (Iowa and Kansas having low electricity prices, Texas having a moderate wind resource, and Washington State having a poor wind resource and complex topography). However, Texas leads the nation, far surpassing any jurisdiction in the amount of installed capacity. With the relatively high electricity price, perhaps Texas is a comparatively lucrative market despite the comparatively lower wind resource. Iowa and, surprisingly, Washington State are also national leaders in installed capacity. Prince Edward Island leads North America in the amount that wind power contributes to the energy mix, indicating that, perhaps, the high electricity price and exceptional wind resource make up for any potential limitation the forests may pose on power production. One should keep in mind that the factors chosen to characterize the jurisdictions were deemed influential in the shape and form of a wind power planning framework but not necessarily indicative, or fully indicative, of wind power utilization levels.

All of the jurisdictions are comprised largely of privately held lands but vary in the role local and provincial/state government's play in the review and approval of proposed wind power projects. Iowa and Kansas give planning consent authority to local government. Nova Scotia and Wisconsin maintain planning consent at the Provincial/State level, whereas Alberta, Manitoba, Prince Edward Island, Saskatchewan, and Washington State have a combined approach of provincial/state level and local level planning consent. Texas conducts state-level land use planning but does not require project consents from either level of government. According to studies on planning framework typologies, Nova Scotia and Wisconsin have the most desirable planning framework typology (i.e., total control at the Provincial/State level) for the facilitation of wind power utilization (Beddoe & Chamberlin 2003; Toke 2005; British Columbia Alternative Energy and Power Technology Task Force 2006; Rosenberg 2008; Wolsink 2010). But, it is the jurisdictions that have a strong local government role that are leading the way in facilitating wind power utilization in North America.

Typologies of Wind Energy Planning Frameworks

Figures 10a-d depicts four typologies constructed from the eleven jurisdictions analyzed in this report. Figure 10a depicts the most prevalent planning framework typology wherein the province/state and local governments have important regulatory roles to play in the creation of land use planning, vision, and project review and approval (Alberta, Manitoba, Prince Edward Island, Saskatchewan, and Washington State). Figure 10b depicts the less common planning framework where the provincial/state government maintains control of land use planning and project review and approval (Nova Scotia and Wisconsin). Despite this planning framework being less common, some contend it is a more desirable typology for facilitating the utilization of wind power (Rosenberg 2008; Wolsink 2010). In both typologies, the province/state maintains control over land use planning, emission goals, and environmental impact assessment. The distinction between the typologies lies mainly within the role that the local government plays in project review and approval: lead authority in typology one and no role in typology two. Typology three is represented by Figure 10c. In this typology, the province/state creates emission goals and may conduct wind energy land use planning, while the local government maintains the role of review and approval of projects not unlike typology one (Iowa and Kansas). The distinction lies in the lack of provincial/state environmental impact assessment in typology three. These typologies align with those identified by Rosenberg (2008): typology one corresponding to 'state variation #2' (p.673), typology two corresponding to 'state variation #3' (p.676) and typology three corresponding to 'state variation #1' (p.673). A fourth typology (Figure 10d) has been identified, being a system wherein the Province/State creates emissions goals and conducts some level of land use planning with no requirements for project review and approval from any level of government (Texas). For the most part, the planning frameworks use a communication approach, where they communicate the context for utilizing wind power (Adams 2008). Elements in the planning frameworks reviewed that employ the programmatic approach (Adams 2008) are designation of wind resource zones and delineation of exclusion areas.

Jurisdictions holding to planning framework typologies Figure 10a, 10c and 10d have the most installed wind power (Figure 11). Iowa, Kansas, Prince Edward Island, and

Texas have a natural endowment suitable for utilizing wind power; however, Washington State is a bit of an anomaly since it has a poorer wind resource, complex topography, and low electricity prices. It is hypothesized that much of Washington States wind power generated electricity heads to California, attracting a higher electricity price and improving market conditions.

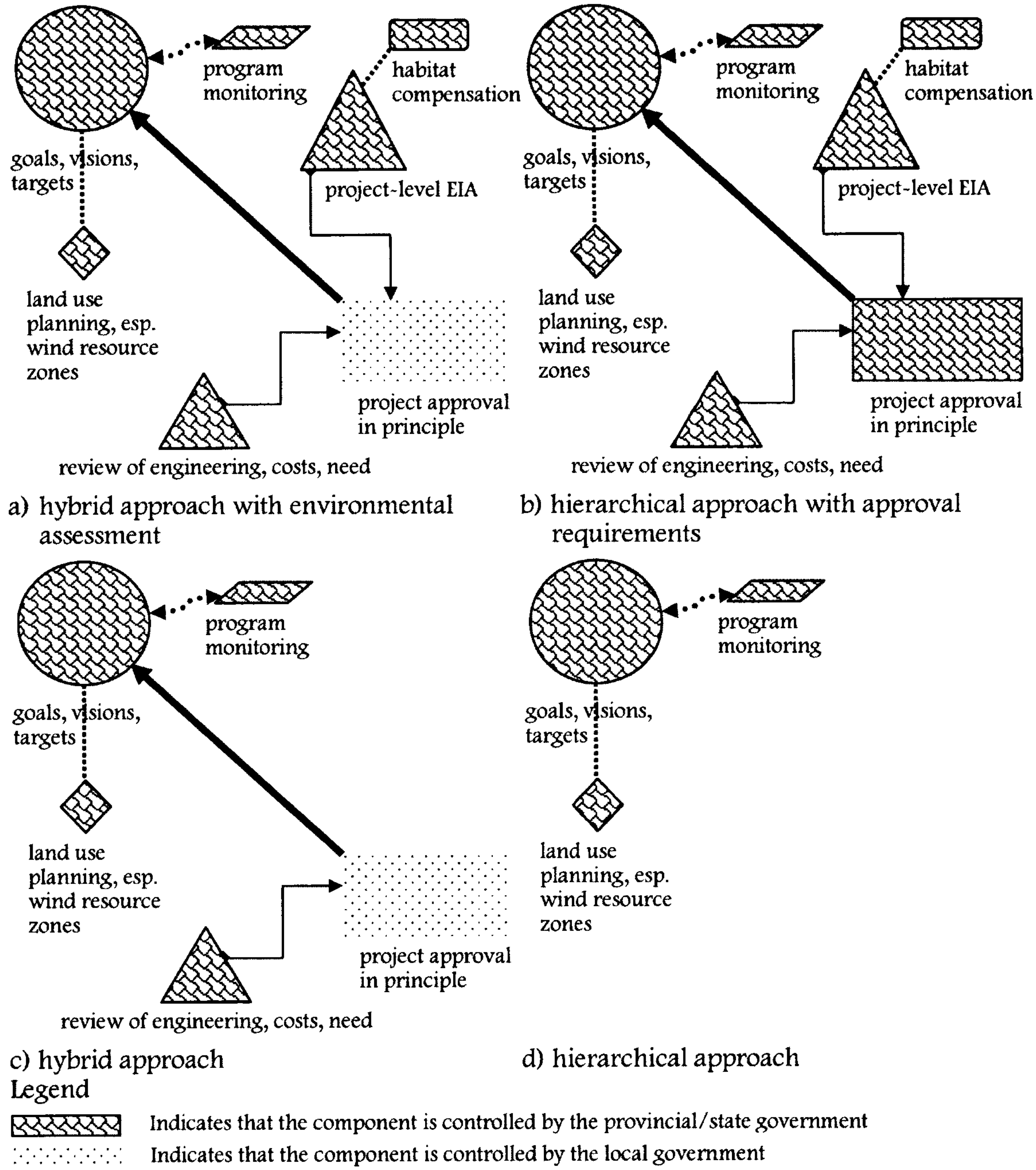


Figure 10 Four wind energy planning framework typologies being utilized within North America

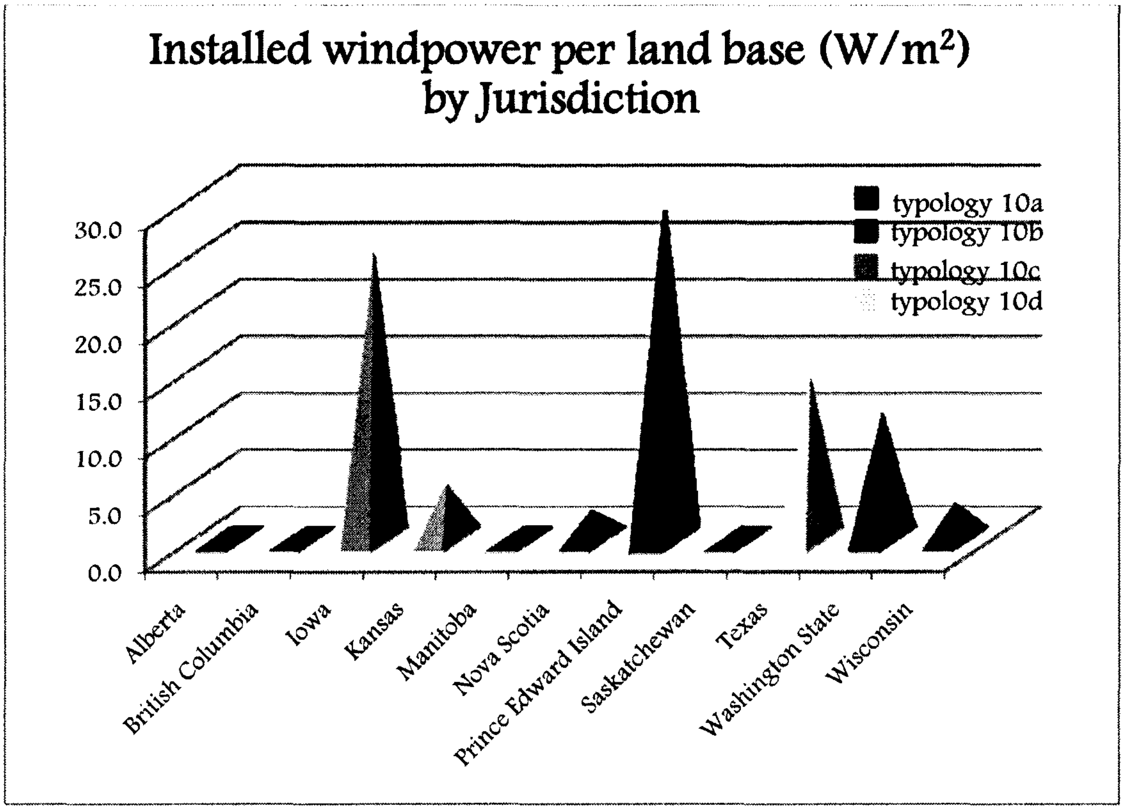


Figure 11 Installed wind power capacity (W/m^2) and the planning framework typology of the jurisdiction studied.

Comparative Policy Analysis Using Content Analysis

Introduction

The ten jurisdictions' wind power planning frameworks were broken down into concepts or ideas through content analysis. The wind power planning frameworks consisted of an energy plan that indicated the jurisdictions vision and goals concerning wind power utilization. The planning frameworks also contained legislation and/or regulations that framed the application review process, specified roles and responsibilities, and described information requirements. Planning frameworks in some cases contained guidelines that provided clarification in the case that the legislation and/or regulations not directly related to wind power. In some cases, regulations specifying utilization areas or guidelines related to wildlife were available.

Code

Upon first review and coding of the wind power planning frameworks there were 246 codes (Appendix A, Tables A.2 to A.4) grouped into six category types[15]. This initial coding was refined to reduce the number of category types from six to three and to reduce the total number of codes to 37 (4 mega-categories, 24 kilo-categories, and 16 categories)(Appendix A, Tables A.1). Most of the codes relate to ground rules (20 codes) while the remaining codes relate to main considerations (11 codes), administrative issues (5 codes) and emission/electricity goals (1 code). The ground rules mega-category deals with such things as wind resource zone designation or exclusion, environmental impact assessment requirements, local government powers, and habitat compensation requirements. The main considerations mega-category deals with information requirements, for example, assessment of cumulative effects. The administrative mega-category concerns items like conformance of advice, programme assessment, and duration of review while the goals mega-category pertains to electrical generation or emission goals/targets.

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[15] Category labels were generated to mimic the metric system but any label for the category types can be used, for example numbering them. The level of category type is inversely related to the specificity of the code. For example, say category types for fruits was undertaken. Under mega-category would be the type of fruit, under kilo-category would be the region the fruit came from, under category would be the shape of the fruit, under centi-category would be the colour of the fruit, and under milli-category would be texture of the skin. The last three categories could be condensed to be one category labeled 'appearance of the fruit'.

Description of the Wind Energy Planning Frameworks

There was a wide range in the breadth and depth of planning frameworks. Some planning frameworks were very limited in their scope. For example, those from Texas, Kansas, and Iowa matched only four, three, and two codes respectively. The planning framework in Texas has established wind resource zones (Public Utility Commission of Texas 2009) and a clean energy vision and goal (Government of Texas 2005), but there are no further components to the planning framework; most notably no permit requirements for developers. Iowa has surpassed their clean energy goal, with no environmental or public acceptance issues attributed to wind power, and a large privately-owned landbase, leading the state to not consider facilitation of wind power a policy issue and, therefore, not requiring a planning framework (G. Watkins, personal communication, April May 4, 2010). The state government of Kansas has a limited role in wind power planning; control and planning occur primarily at the local government level. Matching twenty-six and twenty-two codes respectively, Wisconsin and Nova Scotia lie at the other end of the spectrum. These jurisdictions specify a number of ground rules and require a fair amount of information in their consideration of proponent applications for construction and operation. The remaining jurisdictions lie within the spectrum, tending towards more robust planning frameworks and matching roughly fifteen codes on average.

The majority of jurisdictions had electrical generation or emission goals, the most distinction between jurisdictions arising from the ground rules and administrative mega-category families of each of the planning frameworks. Nova Scotia and Wisconsin were the prominent jurisdictions as for specifying administrative features in their planning frameworks (Appendix 1: Table A.1). Almost all planning frameworks specified regulatory referral and consultation requirements as well as thresholds for requirement to undertake an environmental impact assessment and quite commonly specified main considerations of land use compatibility and impacts on flora and fauna.

Features deemed to be of most concern to wind energy planning frameworks are wind resource zones, impacts to bats, impacts to aesthetics, electrical rate implications, consideration of post-construction reclamation, strategic environmental assessment, assessment of cumulative effects, and the extent of local powers in project review and approval (see Chapter 2 for rationale of selecting these features). These features, for the most part, pertain to ground rule or main consideration mega-category families (refer to Appendix 1 for the code of each feature discussed in the following pages). Absence of a feature from the documented planning framework does not mean that the feature does not come into play. This is especially true of main considerations where the planning framework may not have documented requirements for assessment of certain impacts, bats for example, but proponents routinely assess those impacts. A certain amount of flexibility must exist, especially under the main considerations mega-category, due to the evolving understanding of wind power impacts. In addition, some components of the planning framework are not specifically written to address wind power and instead may need to be generic enough to capture a number of project types.

Wind Resource Zones

Only two of the ten jurisdictions have established wind resource zones: Prince Edward Island and Texas (Government of Prince Edward Island 2005; Public Utility Commission of Texas 2009). Each jurisdiction has established these zones in light of the exceptional technical conditions, i.e., wind resource and interconnection to the electrical system. Texas has gone further: within the wind resource zones since wind power developers are free to operate in an otherwise un-regulated environment (Jodi Stemler Consulting 2007, p.45; Texas Window on State Government 2008, p.174). Prince Edward Island expects development to occur in the proscribed areas but still conducts a thorough review of proposed projects. Establishment of wind resource zones does not appear to be correlated to any of the jurisdictional factors. It is suspected that the establishment of these zones has more to do with the financial merits of doing so. Prince Edward Island, perhaps, is more concerned with the efficient use of land due to the high population density and receives a financial reward for doing so. The province may also have benefited from wind resource analysis at little to no cost to themselves. Texas, on the other hand, presumably, has allocated its planning framework budget to wind resource zone delineation and eliminated planning review process costs.

Impacts to Bats

Four of the ten jurisdictions (Alberta, Nova Scotia, Washington State, and Wisconsin) deal directly with avian impacts within their planning frameworks (Alberta Sustainable Resource Development 2006; Nova Scotia Environment 2009c; Alberta Sustainable Resource Development 2008; Wisconsin Public Service Commission 2008, p.23; Washington Department of Fish and Wildlife. 2009). Alberta is leading the way with provincial bat survey and impact assessment guidelines (Alberta Sustainable Resource Development 2006; Alberta Sustainable Resource Development 2008). Washington State provides bat survey and operational monitoring guidelines (Washington Department of Fish and Wildlife 2009, p.5-6). Wisconsin mentions that bats need to be assessed and references federal guidance concerning impact assessment (i.e., U.S. Fish and Wildlife guideline and NWCC guideline) (Wisconsin Department of Natural Resources 2004, p.3-4). Likewise, Nova Scotia specifically mentions the requirement to assess impacts to bats and refers to federal guidance documents, but it also provides general guidelines that are to be followed in assessing impacts (Nova Scotia Environment 2009c, p.10).

In summary, Alberta and Washington State have a strong policy, since they have specific guidelines for bat impact assessment. Wisconsin has a weak policy, since it only mentions that bats need to be assessed but does not provide any additional support or information. Nova Scotia has a moderate policy since, similar to Wisconsin it does refer individuals to federal guidelines (i.e., Canadian Wildlife Service guideline) but in addition, the province provides some description of its own information requirements and guidance.

Impacts on Aesthetics

Three jurisdictions (Alberta, Nova Scotia, and Wisconsin) explicitly address impacts on aesthetics (Nova Scotia Environment 2009c, p.5, p.6, and p.11, Sections 6.1.8 and 6.1.9; Wisconsin Public Service Commission 2008, p.35; Alberta Utilities Commission 2009, p.10). Nova Scotia, perhaps, goes the furthest in trying to assess visual integration of windfarms into the landscape (Nova Scotia Environment 2009c, p.11, Section 6.1.8 – bullet 2), as well as considering shadow flicker and blade glint (Nova Scotia Environment 2009c, p.12, Section 6.1.10), while Wisconsin only assesses the impacts of shadow flicker (Wisconsin Public Service Commission 2008, p.35, Section 12.0). Alberta does not specifically address visual impacts, but the province has established guidelines and procedures for noise control. Nova Scotia and Wisconsin likewise have established guidelines and procedures for noise control but as, stated above, have assessed impacts on visual aesthetics.

Electrical Rate Implications

Wisconsin is the only jurisdiction that specifically addresses implications to electrical rates in light of wind power utilization (Government of Wisconsin 2009, p.43, item 196.378, (4r)). The state assessed electrical rate impacts in its annual assessment of the wind power programme. Although only one jurisdiction has specifically incorporated this feature in its planning framework, the feature is not expected to correlate with any of the jurisdictional factors.

Consideration of Post-Construction Reclamation

Washington State is the only jurisdiction to specifically request information regarding post-construction reclamation (Washington Department of Fish and Wildlife 2009, pp.6 and 11). Prince Edward Island, Saskatchewan, and Wisconsin require environmental protection plans (Saskatchewan 2003; Wisconsin Public Service Commission 2008, Sections 6.4 to 6.7; Prince Edward Island Environment, Energy and Forestry 2010, p.21). Environmental protection plans specify the environmental mitigation requirements of projects. In practice, post-construction reclamation is a key component of environmental protection plans, so Prince Edward Island, Saskatchewan, and Wisconsin can be considered to request this within their planning framework, although their policies are weak since they do not explicitly request post-construction reclamation detail or provide guidance. Alberta and Nova Scotia require wetland compensation with one consideration being the post-construction reclamation of any impacted wetlands (Alberta Environment 2007, p.5; Nova Scotia Environment 2009c, p.7, Section 6.1.5 – bullet 13). Post-construction reclamation consideration does not legally extend beyond wetlands in these jurisdictions.

Strategic Environmental Assessment

Wisconsin includes strategic environmental assessment within its planning framework (Wisconsin Public Service Commission 2007, p.14, PSC 4.40) but more as a potential activity rather than one that has been undertaken. It is suspected that government budgets and interests must align before this feature is carried out, but this is the only jurisdiction that even alludes to these types of high-level assessment.

Cumulative Effects Assessment

Alberta, Nova Scotia, Washington State, and Wisconsin consider cumulative effects in reviewing project proposals (Nova Scotia Environment 2009c, p.12, Sections 6.1.10 and 6.2.7; Wisconsin Public Service Commission 2007, p.12, item (2)8.; Washington State Department of Fish and Wildlife 2009, p.3; Alberta Environment 2010). The jurisdictions, excluding Alberta, receive information and assessment from the project proponents so a criticism could be that this remains a project-driven assessment procedure with limited top-down control or direction. Alberta, on the other hand, incorporates the project-driven assessment into the provincial cumulative effects management framework (Alberta Environment 2010), so the province can measure, predict and control cumulative effects from the top-down, or provincial, level.

Local Powers

Local governments have total authority over planning consent review and approval in two jurisdictions (Iowa and Kansas). Notably they are American jurisdictions. Two other American jurisdictions do not allow local governments to rule on planning approvals, either because the State maintains that authority (Wisconsin) unless an area has been designated as future residential or commercial development or because there are no planning approval requirements for projects (Texas). Nova Scotia is the only

Canadian jurisdiction that maintains project approval-in-principle authority at the provincial level. The remaining Canadian jurisdictions and Washington State use a joint approach; the province/state reviews and approves the environmental impacts, and then the local government reviews and approves the project.

Other Features of the Planning Frameworks

GOALS

Most of the jurisdictions (excluding Alberta, Iowa, and Saskatchewan,) include an emission reduction or clean energy production goal and target in their planning frameworks. More commonly, jurisdictions would specify a target percentage contribution of clean energy to total electrical generation or a percentage reduction in emissions. Two jurisdictions (Kansas and Texas) specified installed capacity targets. This provides a target for the jurisdiction to reach and can provide one indicator of how the programme is functioning.

HABITAT AND WETLAND COMPENSATION

Washington State has established a habitat compensation requirement (Washington Department of Fish and Wildlife 2009, pp.8-13), and Alberta and Nova Scotia have established a wetland compensation requirement within their respective wind energy planning frameworks (Alberta Environment 2007; Nova Scotia Environment 2009c). The planning frameworks outline how to assign value to habitat or wetlands and provide compensation ratios of replaced-to-disturbed habitat. For example, 2 units of lodgepole pine forest and woodlands are to be restored for every 1 unit of like plant community lost (Washington Department of Fish and Wildlife 2009, p.19).

ASSESSING THE PROGRAMME AND RESEARCH-ORIENTED STUDIES

Nova Scotia, Prince Edward Island, and Wisconsin routinely assess progress in their programmes, most commonly assessing emissions reductions and amount of installed clean energy (Prince Edward Island 2008, p.5, item 3.(2); Nova Scotia Environment 2009a, p.33; Government of Wisconsin 2009, p.42, item 196.378(2)(a)1.; Wisconsin Office of the Governor 2010). Washington State, as well as Wisconsin, conducts research-oriented studies (aka: environmental impact assessment follow-up) to better understand the impacts of windfarms on wildlife (Washington State: Washington State Department of Fish and Wildlife 2009, p.7) and human health (Wisconsin: Government of Wisconsin 2009, p.43, item 196.378(4g) (e)).

LESSON-DRAWING

None of the planning framework features, and especially those specifically discussed above, show a relationship with any of the jurisdictional factors and, hence, may be transferred to the British Columbian context. It is hypothesized that, in many instances, inclusion of the feature is a question of personnel, technical, and financial resources (for example, wind resource zone establishment and strategic environmental assessment) rather than there not being a contextual fit. Alternatively, the feature may not be specifically mentioned within the documented planning framework but in practice the feature is included. Albeit, this is an example of weak policy. A good example is assessment of impacts to wildlife and post-construction reclamation. In these instances, it becomes more of a question of uniformity in practice and interpretation. For the most part, features were missing from planning frameworks in those jurisdictions that used the local government driven planning framework typology, as would be expected.

SUMMARY

In answer to the questions posed at the end of Chapter 2, there are ground rules pertaining to wind resource zones, strategic environmental assessment, and local government involvement, and there are main considerations pertaining to electrical price, aesthetics, bats, post-construction reclamation, and cumulative effects. Each of these features is specified within at least one, and in many cases more, jurisdictions' wind energy planning frameworks. No jurisdiction had all features within its planning framework. Alberta, Nova Scotia, Prince Edward Island, Washington State, and Wisconsin came closest to including all features within their planning frameworks. Three jurisdictions (Iowa, Kansas, and Texas) had relatively simple planning frameworks. Iowa and Kansas still maintain some control over wind power at the county level whereas Texas largely leaves wind power un-regulated.

The jurisdictional factors were useful in characterizing the jurisdictions but were not useful in contrasting them in terms of level of wind power utilization – for example, most windfarms are being developed in prairie dominated jurisdiction – nor did they provide any indication of relationship to the features of planning frameworks. The eight planning framework features analysed, plus the five additional features uncovered through the content analysis, do not have any barriers to transfer stemming from contextual constraints.

5

BRITISH COLUMBIA LESSON DRAWING

INTRODUCTION

This chapter investigates the jurisdictional factors for the province, presents the results of the provincial wind energy planning framework content analysis, and provides recommendations for inclusion of any items lacking from those described in Chapter 4.

The planning framework for British Columbia is formally contained within the British Columbia Energy Plan (British Columbia Ministry of Energy, Mines and Petroleum Resources 2007), the Operational Policy for Wind Energy (British Columbia Ministry of Energy, Mines and Petroleum Resources 2005), and the Independent Power Producers guidebook for planning consents (British Columbia Ministry of Agriculture and Lands 2008). Although not a part of the planning framework, options and evaluation reports prepared by BCHydro also provide information that could easily fit into being a component of a planning framework. For example, the BCHydro Integrated Electricity Planning program provides an analysis of how the provincial utility is to respond to customer electricity needs over a twenty-year period; including a number of 'planning framework'-like components. Likewise, BCHydro has a wind power department that conducts research and models the provincial wind resource. In so doing, BCHydro has created a decision support system that could be assimilated into the planning framework as a targets component.

Excluding the operational policy for wind power, the planning framework applies to clean energy projects as a whole rather than strictly wind. The BCILMB and British Columbia Ministry of Energy and Mines develop the planning framework. Based on my experience working with Sea Breeze Power, BCILMB takes the lead role in policy development (excluding the energy plan) and adapts the policy in anticipation of problems based on the experience of other jurisdictions that have installed wind power (e.g., noise setbacks) or based on land uses that already occur on the British Columbian landscape. The BCILMB conducts its own internal research but also relies on input from industry groups (mainly Independent Power Producers of British Columbia (IPPBC) and the Canadian Wind Energy Association (CanWEA) and businesses (e.g., Sea Breeze Power) in developing policies.

Other British Columbian government agencies conduct analyses of outcomes of policy related to wind power (e.g., British Columbia Hydro impact of energy plan on ratepayer and British Columbia Transmission Corporation (BCTC) impact of wind integration on transmission system) but do not actively participate in the planning framework. According to the definition of a planning framework, the results of these analyses can be included in the planning framework as indicators, etc. although this is not formally done at present. From a developer's perspective, these results do form part of the planning framework as they are used for the justification of development (e.g., BCHydro can acquire X MW of wind power) and the ground rules (e.g., X MW of wind power can be integrated onto the transmission grid on Vancouver Island).

Goals and objectives for clean energy in British Columbia are provided by the British Columbia Ministry of Energy and Mines (British Columbia Ministry of Energy, Mines and Petroleum Resources 2007). Planning consent for wind farms in British Columbia is received from provincial authorities (the British Columbia Integrated Land Management Bureau for projects >50 MW capacity; the British Columbia Environmental Assessment Office for projects <50 MW capacity). Local governments provide approvals in relation to zoning; however, they do not have the powers to deny projects. The planning framework resides with three agencies: the Ministry of Energy and Mines, the Ministry of Agriculture (Integrated Land Management Bureau), and the Ministry of Environment.

Policies are developed in response to a problem or goal. British Columbia has the goal of becoming energy self-sufficient by 2016 and becoming an energy exporter thereafter. Equally important is that British Columbia wishes to develop a sustainable electricity generation infrastructure, wind energy ranking lower than other clean energy technologies on a sustainability assessment (BCHydro 2006). Since the planning framework may be tested, it is an opportune time to determine if there are any features that the province can add to its framework in light of practices in other jurisdictions and criticisms received about the province's current framework.

For context concerning the potential growth of wind power in the province, the following is provided. Based on the provincial energy plan, clean energy is to account for 90% of total generation. Figures provided by BCHydro indicate that wind power (on- and off-shore) could potentially contribute 16,000 GWh per year in the province of British Columbia (BCHydro 2006). Assuming a capacity factor of 30% and 2 MW wind turbines this would equate to 6088 MW of installed wind power or 3044 wind turbines in the province. BCHydro estimates that the province has 9,452 MW of readily available wind power potential (primarily coming from the Peace and Southern Interior regions) and 6,730 MW of ambitious wind power potential (primarily coming from the North Coast and Peace regions) (BCHydro 2009).

This amount of wind power installed to meet the energy plan goal would equate to anywhere between 12 to 55 km^2 of permanent land disturbance using metrics provided by the U.S. Department of the Interior, Bureau of Land Management (2005) and Boone (2005), respectively. Using a turbine grid comprised of 2MW wind turbine generators having a 90m rotor diameter with a 5D x 10D and a 7D x 8D (*n* diameter lengths between turbines and *n* diameter lengths between rows: as per Love (2003) and AWS Truewind, LLC (2009), respectively) leads to total land cover area ranging from 888 km^2 to 974 km^2; permanently converted land would account for up to 6% of the wind farm area. This would, at most, cover 0.1% of the provincial land base but would be concentrated in the Peace region, the north end of Vancouver Island, the Okanagan, and the central and north coast, potentially in areas of high ecological (e.g., wildlife breeding or migrating, rare/unique plant communities, etc.) or social (e.g., forest harvesting, visual quality, etc.) value. If the transmission lines, roads, and substations are included, the areal impact of this amount of wind power would be on the order of 1,478 km^2 (American Wind Energy Association 2008, as cited in Labrosse 2008), still a marginal impact on British Columbia's total land mass, but quite a large impact within the forecasted development regions. Additionally, and not considering differences in species presence, distribution, and abundance, this amount of wind power could account for 29,222 to 48,704 bat and 6,088 to 30,440 bird deaths per year based upon metrics provided in Arnett et al. (2008, Table 1: Pacific Northwest) and Kingsley and Whittam (2005), respectively. Based on estimates provided by Smallwood and Karas (2008), annual bat deaths could be as low as 454; however, in light of the potential for large scale impacts a conservative approach should be taken and the higher end of bat impacts should influence policy direction until it is proven that the scale of impacts is not being realized. Bird and bat species present in British Columbia that have been implicated to be at risk to direct and indirect impacts from wind farms are presented in Table 4.

Table 4 List of bird and bat species present in British Columbia implicated to be at risk from wind farms in literature

Bird Species	Bat Species
bobolink (*Dolichonyx oryzivorus*)○ burrowing owl (*Athene cunicularia*) △ common eider (*Somateria mollissima*) common scoter (*Melanitta nigra*) grasshopper sparrow (*Ammodramus savannarum*)△ golden eagle (*Aquila chrysaetos*) goldeneyes (*Bucephala clangula*) horned lark (*Eremophila alpestris*) long-billed curlew (*Numenius americanus*)○ long-tailed duck (*Clangula hyemalis*)○ Mergansers (*Mergus* spp.) red-tailed hawk (*Buteo jamaicensis*) sandhill crane (*Grus canadensis*) trumpeter swan (*Cygnus buccinators*) upland sandpiper (*Bartramia longicauda*) △ vesper sparrow (*Pooecetes gramineus*)	big brown bat (*Eptesicus fuscus*) hoary bat (*Lasiurus cinereus*) little brown myotis (*Myotis lucifugus*) northern long-eared myotis (*Myotis septentrionalis*)○ silver-haired bat (*Lasionycteris noctivagans*)

sources of information:

British Columbia Conservation Data Centre (2010)

Wyoming Game and Fish Department (2009) {note: Wyoming GFD reviewed peer-reviewed literature to list susceptible species}

△ on Provincial red-list: species is extirpated, endangered, or threatened in the province.

○ on Provincial blue-list: species is of special concern, and at risk, in the province.

To date, commercial wind farms are developed for electricity sale to BCHydro through BCHydro's power calls (2002, 2006, and 2008). There have been three power calls with ten wind farms awarded power sale contracts, representing 918 MW of capacity. Unfortunately, there has been a high attrition rate. Thus, only two projects accounting for 232 MW have been installed by the second quarter of 2011. With the goal of achieving 6,088MW of installed wind power and an estimated target year of 2015, this would require an annual build rate of 1,464 MW or 732 turbines per year.

Jurisdictional Factors

Table 5 provides the jurisdictional factors for British Columbia. These factors are provided as a means of comparing the other ten jurisdictions to British Columbia since no correlation was found between jurisdictional factors and features of wind energy planning frameworks.

Table 5 Natural, social, and systemic factors of British Columbia

Jurisdiction	Constraints		
	Natural	**Social**	**Systemic Factors**
British Columbia **Installed capacity:** 104 MW **Land Base:** 924,815 km² **Capacity/land base:** 0.0001 MW/km²	wind regime: bottom 1/3 of province has wind speeds (80m) between 4 to 6m/s topography: rolling/mountainous with flats in the central and north population per area: 4.4 people/km² number of Level III ecological regions and type of Level II ecological regions where wind power is being utilized in the jurisdiction: 14; boreal plain and Western cordillera energy mix: 83% hydro, 11% natural gas, 6% non-hydro renewable energy	electricity price: 7.74 ¢/kWh (CDN)	whether there is provincial/state level control and issuance of planning approvals: provincial government approval ability of provincial/state utility to develop and own projects: no land ownership (Crown versus private) in wind development areas: provincial Crown land

sources of information:

British Columbia wind regime: Environment Canada (2003)

NOTE: wind farms are best built in areas exceeding 6 or 7m/s wind speeds at 80m

British Columbia population density: Statistics Canada (2007b)

British Columbia ecological regions: Commission for Environmental Cooperation (2006)

British Columbia energy mix: National Energy Board (2006)

British Columbia electricity prices: Manitoba Hydro (2010)

British Columbia is much the same as Washington State, perhaps unsurprisingly. Both jurisdictions share a less than favourable wind regime, have complex topography (British Columbia having the Cascade and Rocky Mountain Ranges within the province), and a hydro dominated electrical supply leading to relatively cheap electricity. Washington State has more people per square kilometre than British Columbia and, in this regard, British

Columbia remains distinctly Canadian (i.e., low population, large land base). British Columbia differs from all other jurisdictions, save Wisconsin and Nova Scotia, in its retention of authority to review and approve wind power projects (i.e., British Columbia follows wind energy planning framework typology two). This typology is hypothesized to better facilitate wind power utilization (Beddoe & Chamberlin 2003; Toke 2005; British Columbia Alternative Energy and Power Technology Task Force 2006; Rosenberg 2008; Wolsink 2010). This typology seems to 'fit' the province, considering that a very large proportion of land in British Columbia is provincially owned and managed. By contrast, both Wisconsin and Nova Scotia have predominantly privately-owned land bases. In fact, British Columbia stands out in stark contrast from the other ten jurisdictions in this matter of having a high Crown-owned land base.

Deductive Content Analysis

Content analysis of the British Columbian wind energy planning framework was conducted using the code generated from the ten jurisdictions. The British Columbia planning framework conforms to that code except in the specifics under buffers. In addition to buffers for residences and lot lines, the province has specified buffers for adjacent wind farms in order to reduce wake effects. The provinces planning framework aligned with 16 of the 44 codes, on par with many of the other jurisdictions being studied.

Description of the Wind Energy Planning Framework

The British Columbian wind energy planning framework is comparable to many of the other planning frameworks reviewed. The planning framework indicates the size of project regulated, delineates the role of local government, provides electrical generation goals, and contemplates the same general suite of issues in approving projects.

Opportunities for Lesson-Drawing

Through the literature review content analysis of the ten other jurisdictions, eleven features came forward as candidates for possible transfer into the British Columbian wind energy planning framework. Five of those features already exist in the province's planning framework (see Table 6) and hence did not need to be recommended for inclusion. The features that are lacking revolve around more strategic level tasks, such as wind resource zone delineation, assessing the programme, strategic environmental assessment, and cumulative effects assessment.

Table 6 Presence/absence of planning framework features in the British Columbian wind energy planning framework that are to be considered for lesson-drawing

Planning Framework Feature	Present in the Current Planning Framework	Absent from the Current Planning Framework
Wind Resource Zones		X
Impact to Bats		X
Impacts on Aesthetics	X	
Electrical Rate Implications		X
Consideration of Post-Construction Reclamation	X	
Strategic Environmental Assessment		X
Cumulative Effects Assessment	X	
Local Powers	X	
Goals	X	
Habitat and Wetland Compensation		X
Assessing the Programme and Research-Oriented Studies		X

Wind Resource Zones

Wind resource zones have been prepared by BCHydro (2009) and by the Western Governors' Initiative (Western Governors' Association 2009) in their attempts to plan for generation and transmission of energy across the province or western North America, respectively. These wind resource zones are not part of the provincial wind energy planning framework, through either legislation or guidance. It is certain that industry is already using these to glean some insight into potential wind resource areas and the interests of BCHydro, the main client, but there are no formal requirements or integration of the wind resource zones into the provincial planning framework. For example, developers are not restricted to these zones.

Wind resource zones were established in Wales to identify where individuals could expect wind power utilization to occur, to identify strategic level environmental issues (e.g., broad land use, wildlife, or aesthetic conflicts), and to plan for an expected outcome based on wind power technical requirements and public and regulatory acceptance of social and environmental impacts (Cowell 2010). Establishing wind resource zones can build an expectation for development that may not be an intended or acceptable outcome. Establishing these zones may raise the speculation that there is an environmental justice issue, especially if areas that are going to be re-established to a natural condition in the near-future are preferentially treated for the placement of wind farms, while the community is eagerly awaiting the return of 'nature' (Cowell 2010). Use of large scale wind data and/or including social or environmental factors as site selection criteria, in addition to technical factors like wind resource and constructability, may preclude good sites (Ohl & Eichhorn 2010). The presence of these informal wind resource zones may mean that a relatively inexpensive opportunity for the province exists if they are interested in incorporating this feature into their planning framework.

Impacts to Bats

Although impacts to bats are not specifically spelled out, in practice bats are a species of interest in British Columbia, with the Alberta guidelines being used for information on survey methodology and impact assessment. British Columbia has weak policy concerning bats.

Electrical Rate Implications

BCHydro continually monitors and reports on electric rates (e.g., BCHydro 2006) so informally this information is available, although it is not officially incorporated into the planning framework. Additionally, the electric rates and utility revenue requirements are not specifically isolated to impacts deriving from wind power.

Strategic Environmental Assessment and Cumulative Effects Assessment

Strategic environmental assessment and cumulative effects assessment are worthwhile ventures to undertake as they can assist in identifying potential issues before project developments occur and they can assist in establishing ecological and social thresholds to development. The social value in these undertakings is perhaps not disputable; however, the financing of these tasks is. There has been some confusion on cumulative effects assessment conducted in the Province, some believing that it is not conducted (e.g., British Columbia Citizens for Public Power 2009). Despite cumulative effects assessment being a discretionary consideration under British Columbia's *Environmental Assessment Act* (Government of British Columbia 2002), in provincial environmental assessment guidance documents (e.g., British Columbia Ministry of Agriculture and Lands 2009, p.126; British Columbia Environmental Assessment Office 2004, p.21 and 24) it has been portrayed as a requirement only for those projects that trigger the Federal *Environmental Assessment Act*. New BC EIA guidance documents do not indicate cumulative effects assessment is discretionary, but it does clarify that both jurisdictions assess cumulative effects (British Columbia Environmental Assessment Office 2010, p.14). Relying on project-driven cumulative effects assessment, as the province does, may not be holistic enough or effectively tracked by regulatory agencies.

Habitat and Wetland Compensation

Compensation for the loss of habitat and/or wetlands is a requirement that is steadily becoming a norm across North America. Aside from the obvious ecological and social benefits of the practice, there are cost implications for industry and regulators.

Assessing the Programme and Research-Oriented Studies

Evaluating progress and conducting research to better understand the impacts of windfarms are two basic components to a complete planning framework (Litman 2008). It would actually seem that assessment is being done outside of the planning framework already, e.g., measures of installed capacity and electric rate implications done by BCHydro (e.g., BCHydro 2006) and monitoring, related to the terms and conditions of that project's environmental approval and operational results, conducted by wind farm proponents.

Summary

Through deductive content analysis it was determined that the British Columbian wind power planning framework conformed to the coding derived from the content analysis of the ten other jurisdictions (as presented in Chapter 4). One item occurring solely in the British Columbian planning framework fell under the buffer category, this being the practice of British Columbia establishing buffers in regard to adjacent windfarms to limit wake effects. In regards to the natural, social, and systemic criteria used to characterize the jurisdictions, the province differs dramatically from all other jurisdictions in the large amount of provincial Crown land relative to privately held land. The province also differs from most jurisdictions in that it retains project consent authority rather than bestowing this upon local government.

Six items are suggested for transfer into British Columbia's wind energy planning framework (see Chapter 6):

1. delineation of wind resource zones;
2. assessment of electrical rate implications;
3. strengthening of the planning framework in regard to impacts on bats;
4. inclusion of strategic environmental assessment;
5. requirement for habitat and/or wetland compensation; and,
6. assessment of the programme and conducting of research-oriented studies.

By incorporating these items into the current planning framework, British Columbia will address concerns about the lack of strategic planning and the contextualization of environmental and social impacts (Union of British Columbia Municipalities 2003; McDonough 2008; British Columbia Citizens for Public Power 2009). The province will further act upon the suggestion that the province take a more active role in facilitating wind power utilization (British Columbia Alternative Energy and Power Technology Task Force 2006). Additionally, the province will strengthen the regional approach by incorporating habitat compensation rules into the planning framework, and strengthen the policy in areas that are currently weak, i.e., bats, or wanting, i.e., assessment of the programme and research-oriented studies.

6

CONCLUSION AND RECOMMEDATION

SUMMARY AND CONCLUSION

Ten wind energy planning frameworks from North American jurisdictions were analysed to determine whether lesson-drawing opportunities exist for British Columbia's provincial wind energy planning framework. The jurisdictions analyzed use one of four wind energy planning framework typologies (see Figure 10). The most prevalent planning framework employs a combined approach where the province/state and local governments have important regulatory roles to play in the creation of land use planning, vision, and project review and approval (Figure 10a). Studies indicate that a planning framework that is completely controlled by the provincial/state government (Figure 10b) is the more desirable typology for facilitating the utilization of wind power (Beddoe & Chamberlin 2003; Toke 2005; British Columbia Alternative Energy and Power Technology Task Force 2006; Rosenberg 2008; Wolsink 2010). This did not bear out when comparing the amount of installed capacity in each of the jurisdictions against the wind energy planning framework typologies being used (Figure 11). This could be indicating the dominance of technical factors and government incentives in wind power utilization.

Key features for wind energy planning frameworks are wind resource zones, impacts to bats, impacts to aesthetics, electrical rate implications, consideration of post-construction reclamation, strategic environmental assessment, assessment of cumulative impacts, the extent of local powers in project review and approval, establishment of electricity/emission goals, habitat and wetland compensation, and assessing the programme and research-oriented studies. These planning framework features were identified based on a literature review of the problems faced by wind energy planning frameworks, key environmental and social impacts of wind farms, discourse surrounding the utilization of wind power, and policy analysis conducted on the British Columbia planning framework, as well as through the comparative policy analysis. None of these features appeared to have any relation to contextual constraint features that were used to characterize each of the jurisdictions and can all, therefore, be considered for transfer into British Columbia.

Resolution of the Research Question

In answer to the research question posed, some features do exist in other jurisdictions that can be incorporated into the British Columbia wind energy planning framework – there is an opportunity for updating through lesson-drawing.

Recommendations for Lesson-Drawing in British Columbia

The following features are recommended for lesson-drawing consideration:

1. **Delineation of Wind Resource Zones.** The province should identify over-sized wind resource zones, as in the case of Wales (Cowell 2007, 2010), that would allow for shrinkage due to local opposition. The wind resource zones should be established in consultation with stakeholders, including local government and non-elites (Kellett 2003; Strachan & Lal 2004; Wolsink 2007; Ohl & Eichhorn 2010). The province could allow for exceptions to development in the wind resource zones if wind resources can be proved, as in Prince Edward Island's policy (Government of Prince Edward Island 2005, Section 3.(1) (b)). The wind resource zones would help to determine where wind power is a compatible land use (Longston 2006; Nadaï & Labussière 2008).

2. **Conducting Strategic Environmental Assessment and Strategic Level Cumulative Effects Assessment.** It is suggested that the province conduct strategic environmental assessment and strategic level cumulative effects assessment as part of the planning framework. One method for inclusion of cumulative impact assessment is through use of strategic environmental assessment (Stinchombe & Gibson 2001). Conducting strategic environmental assessment in tandem with delineating wind resource zones would be most effective. Conducting strategic-level land-use planning (i.e., wind resource zone delineation and strategic environmental assessment) would address short-comings identified by commentators in the province (Union of British Columbia Municipalities 2003; McDonough 2008; British Columbia Citizens for Public Power 2009). It would further secure the province's position as a wind power facilitator, a quality identified as important for the growth of wind power utilization in the province (e.g., British Columbia Alternative Energy and Power Technology Task Force 2006, p.74). Monies could be recouped by either changing policy to allow BCHydro to construct and operate wind farms or to auction off pre-assessed areas. Targeting auction sites for sale to community-owners could bolster other policy objectives.

3. **Strengthening of the policy concerning impacts to bats.** The policy for assessing and managing impacts to bats should be strengthened based on the presence of a number of bat species in the province and the weak policy concerning impacts to bats,. For example, the province could delineate areas incompatible for wind power utilization, provide ranking of site sensitivity

and resultant assessment and/or monitoring requirement, and provide mitigation standards.

4. **Requiring Habitat Compensation.** Habitat compensation requirements should be included in the planning framework. Industry is already familiar with the practice of habitat compensation in relation to watercourses, and this is one means of addressing the linkage between development and degradation. Incorporating the identification of habitat compensation needs and priorities into the strategic environmental assessment and wind resource zone designation would be most effective and would lend itself to being a regional habitat management program.

5. **Assessing the Programme and Research- Oriented Studies.** BCHydro is assessing impacts of wind power on electrical rates, while wind power companies conduct compliance monitoring. Each of these are components of programme assessment. The province needs to re-package the information from BCHydro and the companies so that it is specific to, and formally integrated with, programme assessment and/or research-oriented studies. This information will assess performance of the provincial planning framework in facilitating the achievement of the provincial goal of wind power utilization and assess the social and environmental consequences of that wind power utilization. Nova Scotia, Prince Edward Island, Wisconsin, and Washington State are jurisdictions that provide an example of the scope and frequency of programme assessment and research-oriented studies. As concerns arise or dissipate so too shall the focus of research-oriented studies.

Upon completion of strategic planning, the province should adopt a planning framework typology akin to that used in Texas to facilitate aggressive utilization of wind power. Unlike Texas, a cross-jurisdictional project 'review' should be included in British Columbia to address concerns about environmental impacts and local participation. The exact shape or form the 'review' would take is unclear, but it would be characterized as quick, pertaining only to site-specific issues, and have minimal risk in not receiving approval. The review process should be led by the BCILMB, in line with the current role that the BCILMB has, and would involve the local government. Even large projects would remain under the rule of the BCILMB, rather than the BCEAO[16], the process would be much quicker since regulatory review and public consultation would be limited or non-existent, and there would be no risk associated with the proponent not receiving an 'approval'. Local governments would still not have project-in-principle approval powers. It is envisioned that habitat compensation requirements and research-oriented studies provide bargaining power to local government. The project 'approval' process would be similar to the Fisheries and Oceans model for works in and around water: BCILMB would provide standards and guidelines for construction and operation of wind farms, indicate the habitat compensation and research-oriented study requirements, and request special studies. If wind farm proponents were able to meet the design standards, provide the special studies, and agree with the compensation and research-oriented study requirements, they would be free to proceed. The only 'approval' needed would be submission of a notification letter to the BCILMB and local government X days in advance of construction. It is likely that many regulators will know of the project well in advance

[16] In light of strategic environmental assessment already undertaken in the wind resource zone, it is presumed the Executive Director will not require a formal environmental impact assessment for reviewable projects pursuant to Section 10(1)(b) of the British Columbia Environmental Assessment Act (Government of British Columbia 2002).

of notification. What this approach does is provide wind farm proponents with 'site-control', allows them more time and money to dedicate to getting a power purchase agreement, and gives them added security for the project, an important ingredient for securing project financing. Strategic level environmental and social issues would already be addressed; the design standards and special studies would be used to address site-specific issues.

The recommendations will help British Columbia achieve its goal of becoming a clean energy powerhouse, sustainably.

FUTURE STUDY

Four areas of future study are suggested.

a) More refined policy analysis of the features recommended for lesson-drawing. Analysis is suggested to revolve around methods of implementing the feature, resource (personnel and financial) requirements, and cost-benefit analysis.
b) Planning is the balancing of competing land uses over a shared landscape and includes public consultation. Creation of an updated planning framework would preferably include public input in the visioning, goals and objectives setting, and targeting. For example, an analysis of stakeholder comments on wind energy projects reviewed by the British Columbia Environmental Assessment Office, workshops, and surveys and interviews would enhance the recommendations made in this report.
c) Analysis of the results of wind energy planning frameworks being used in these, and other, North American jurisdictions. Since facilitation of wind power utilization does not seem to be a major result of wind energy planning frameworks, other results should be analyzed. This could include such things as the implications of the wind planning frameworks in changing public response to wind power, their contribution to integrated land use management, their contribution to the protection of species and habitat, and the costs associated with these features and any novel approaches being used to reduce and/or share these costs.
d) Since patterns of planning framework typology being used in each of the jurisdictions did not follow any discernable pattern in relation to jurisdiction context constraints, further investigation may be warranted in regards to the results of the planning frameworks in each of the jurisdictions since these constraints are hypothesized to have an effect on results (Nadaï 2007).

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APPENDIX 1. CODING WORKSHEET

Table A.1 The coding worksheet of the inductive and deductive content analysis conducted on eleven Provincial-/State-level wind energy planning frameworks in North America.

CODE ID	mega-category	kilo-category	category	Canadian Jurisdictions: British Columbia	Alberta	Saskatchewan	Manitoba	Prince Edward Island	Nova Scotia
	administrative								
A1			strategic environmental assessment, long-term planning, identifying barriers						X
A2			uniformity and consistency of advice; decisions based upon fact and the record; environmentally efficient						X
A3			duration, especially of review process and public consultation	X				X	
A4			assessing the programme, for example progress in clean energy use, emissions reduction as well as changes in electricity price and utility revenue requirements					annually	every 5 years
A5			ability to appeal decisions made by the regulator	X					
	goals								

CODE ID	mega-category	kilo-category	category	Canadian Jurisdictions: British Columbia	Alberta	Saskatchewan	Manitoba	Prince Edward Island	Nova Scotia
G1		emission or electricity goal, especially related to emissions reduction or increased use of clean energy		X		32% reduction in emissions from 2004 levels by 2020		15% of electricity sold to be from renewable sources by 2010	10% reduction in emissions from 1990 levels by 2020 + 18.5% generation from renewable sources by 2013; 25% by 2020
	ground rule								
		preferred utilization areas							
GR1a			wind resource zones (WRZ) have been established by the Province/State					X	
GR1b			WRZs have not been prepared but general or site-specific areas will be excluded, for example provincial parks and waterfowl staging areas				X		X
GR1c			proponents are able to construct and operate outside of WRZs as long as the wind resource can be verified to be an efficient use of land					sites having windspeeds 7.5+m/s	

CODE ID	mega-category	kilo-category	category	Canadian Jurisdictions: British Columbia	Alberta	Saskatchewan	Manitoba	Prince Edward Island	Nova Scotia
GR1d			Province/State has established buffers in respect to residences, property lines and roads	X has also established buffers in respect to adjacent wind farms				four times the turbine height	dependent upon site characteristics, scale of development and ambient noise
		local powers							
GR2a			local jurisdictions have total authority over the approval of construction and operation of wind farms		X	X	X	X	
GR2b			local jurisdictions can deny windpower in areas designated as future residential or commercial development						
GR2c			local jurisdictions cannot deny the construction and operation of wind farms but can specify zoning and setback constraints to development	X					X
GR2d			ability for proponent to opt-in to State-level siting review process instead of the local process						
		consultation							
GR3a			referrals by reviewing agency to other government agencies, stakeholders and the public	X	X	X	X	X	X

CODE ID	mega-category	kilo-category	category	British Columbia	Alberta	Saskatchewan	Manitoba	Prince Edward Island	Nova Scotia
				Canadian Jurisdictions					
GR3b			required consultation with other government agencies, stakeholders and the public specified for the proponent	X	X	X	X	X	X
GR4			project size threshold to which the planning framework, planning consent process and/or formal environmental impact assessment process applies	planning framework and consent process: 100+ kW; EIA: all projects larger than 50MW	planning framework and consent process: all projects larger than 1MW; no EIA trigger	EIA: all projects	EIA: all projects	planning framework and consent process: 100+ kW; EIA: all projects larger than 1MW; all electrical transmission >69kV	planning framework and consent process: 100+ kW; EIA: all projects larger than 2MW
GR5			level of information to be provided by the proponent varies based upon such things as project scale, location and Minister's discretion	X		X		X	X
GR6			habitat compensation agreement requirement, including habitat valuation and compensation ratios for permanent and temporarily disturbed lands and post-construction reclamation requirements						
GR7			wetland compensation agreement requirement, including wetland valuation and compensation ratios for permanent and temporarily disturbed lands and post-construction reclamation requirements		X				X

CODE ID	mega-category	kilo-category	category	British Columbia	Alberta	Saskatchewan	Manitoba	Prince Edward Island	Nova Scotia
				Canadian Jurisdictions					
GR8		technical advisory committee used for environmental impact assessment review, windpower siting and review and/or post-construction monitoring				X		X	
GR9		research-oriented studies to deepen the understanding of wind power impacts, especially on avian wildlife and human health							
GR10		requirement for a decommissioning plan and means to undertake the plan				X	X		X
GR11		signs not pertaining to the company or the WTG manufacturer not allowed on the WTG						X	
GR12a		other authorizations needed prior to issuance of planning consent			X		X		
GR12b		list of other authorizations to be included in the application for planning consent		X	X				X
	main consideration								
		environmental impact							
MC1a			specialised guidance related to the assessment of impacts on birds and bats, including survey methodology		X				X
MC1b			assessment of environmental impacts such as those to earth, flora, fauna fish resources	X	X	X	X	X	X

CODE ID	mega-category	kilo-category	category	British Columbia	Alberta	Saskatchewan	Manitoba	Prince Edward Island	Nova Scotia
			Canadian Jurisdictions						
		social impact							
MC2a			specialised guidance related to the assessment of visual and noise impacts, including photo-simulations, landscape assessment and noise modelling	X	X				X
MC2b			assessment of compatibility of the windfarm with landowners, current and future land uses and land use planning and zoning	X	X	X	X	X	X
MC2c			assessment of compatibility with specific land uses, for example agriculture		X		X		X
MC2d			assessment of impacts on social, cultural and economic variables, including demography, employment, business, and archaeological and historical resources	X	X	X			X
MC3		assessment of cumulative effects included in the review process			X	X			X
MC4a		project description, for example type and number of wind turbines, estimated energy production and in-service date		X	X		X	X	
MC4b		detailed project description including permanent and temporary land requirements and specific construction and operation tasks							X
MC5		consideration of alternative locations or energy sources		X		X			

CODE ID	mega-category	kilo-category	category	Canadian Jurisdictions					
				British Columbia	**Alberta**	**Saskatchewan**	**Manitoba**	**Prince Edward Island**	**Nova Scotia**
MC6		compilation of mitigation commitments into an environmental protection plan to be used by construction and operation contractors		X		X		X	

CODE ID	mega-category	kilo-category	category	American Jurisdictions				
				Washington State	**Texas**	**Kansas**	**Wisconsin**	**Iowa**
	administrative							
A1		strategic environmental assessment, long-term planning, identifying barriers					X	
A2		uniformity and consistency of advice; decisions based upon fact and the record; environmentally efficient		X			X	
A3		duration, especially of review process and public consultation					X	
A4		assessing the programme, for example progress in clean energy use, emissions reduction as well as changes in electricity price and utility revenue requirements					annually	
A5		ability to appeal decisions made by the regulator					X	
	goals							

CODE ID	mega-category	kilo-category	category	American Jurisdictions				
				Washington State	**Texas**	**Kansas**	**Wisconsin**	**Iowa**
G1			emission or electricity goal, especially related to emissions reduction or increased use of clean energy	3% generation from renewable sources by 2012; 9% by 2016; 15% by 2020	5,880MW by 2015; 10,000MW by 2025	1,000MW by 2015	10% generation from renewable sources by 2015; 25% by 2025	
	ground rule							
		preferred utilization areas						
GR1a			wind resource zones (WRZ) have been established by the Province/State		X			
GR1b			WRZs have not been prepared but general or site-specific areas will be excluded, for example provincial parks and waterfowl staging areas					
GR1c			proponents are able to construct and operate outside of WRZs as long as the wind resource can be verified to be an efficient use of land					
GR1d			Province/State has established buffers in respect to residences, property lines and roads					
		local powers						
GR2a			local jurisdictions have total authority over the approval of construction and operation of wind farms	X		X		X
GR2b			local jurisdictions can deny windpower in areas designated as future residential or commercial development				X	
GR2c			local jurisdictions cannot deny the construction and operation of wind farms but can specify zoning and setback constraints to development		X		X	
GR2d			ability for proponent to opt-in to State-level siting review process instead of the local process	X				
		consultation						

CODE ID	mega-category	kilo-category	category	American Jurisdictions				
				Washington State	Texas	Kansas	Wisconsin	Iowa
GR3a			referrals by reviewing agency to other government agencies, stakeholders and the public	X			X	
GR3b			required consultation with other government agencies, stakeholders and the public specified for the proponent				X	
GR4		project size threshold to which the planning framework, planning consent process and/or formal environmental impact assessment process applies		EIA: all projects	planning framework and consent process: all projects; no EIA trigger	planning framework and consent process: all projects; no EIA trigger	planning framework and consent process: all projects; EIA: projects that have the potential to significantly affect or have the potential to significantly affect the environment	planning framework and consent process: all projects; no EIA trigger
GR5		level of information to be provided by the proponent varies based upon such things as project scale, location and Minister's discretion						
GR6		habitat compensation agreement requirement, including habitat valuation and compensation ratios for permanent and temporarily disturbed lands and post-construction reclamation requirements		X				
GR7		wetland compensation agreement requirement, including wetland valuation and compensation ratios for permanent and temporarily disturbed lands and post-construction reclamation requirements						
GR8		technical advisory committee used for environmental impact assessment review, windpower siting and review and/or post-construction monitoring		X			X	

CODE ID	mega-category	kilo-category	category	Washington State	Texas	Kansas	Wisconsin	Iowa
				American Jurisdictions				
GR9		research-oriented studies to deepen the understanding of wind power impacts, especially on avian wildlife and human health		X			X	
GR10		requirement for a decommissioning plan and means to undertake the plan					X	
GR11		signs not pertaining to the company or the WTG manufacturer not allowed on the WTG						
GR12a		other authorizations needed prior to issuance of planning consent					X	
GR12b		list of other authorizations to be included in the application for planning consent					X	
	main consideration							
		environmental impact						
MC1a			specialised guidance related to the assessment of impacts on birds and bats, including survey methodology	X			X	
MC1b			assessment of environmental impacts such as those to earth, flora, fauna fish resources	X			X	
		social impact						
MC2a			specialised guidance related to the assessment of visual and noise impacts, including photo-simulations, landscape assessment and noise modelling				X	
MC2b			assessment of compatibility of the windfarm with landowners, current and future land uses and land use planning and zoning	X			X	
MC2c			assessment of compatibility with specific land uses, for example agriculture	X			X	
MC2d			assessment of impacts on social, cultural and economic variables, including demography, employment, business, and archaeological and historical resources	X			X	
MC3		assessment of cumulative effects included in the review process		X			X	
MC4a		project description, for example type and number of wind turbines, estimated energy production and in-service date						
MC4b		detailed project description including permanent and					X	

CODE ID	mega-category	kilo-category	category	American Jurisdictions				
				Washington State	Texas	Kansas	Wisconsin	Iowa
			temporary land requirements and specific construction and operation tasks					
MC5			consideration of alternative locations or energy sources				X	
MC6			compilation of mitigation commitments into an environmental protection plan to be used by construction and operation contractors				X	

Table A.2 **The initial coding and subsequent flocculation of codes, derived from content analysis, into mutually exclusive, but comprehensive categories for the administrative and goal mega-categories of eleven Provincial-/State-level wind energy planning frameworks in North America.**

Initial Coding: mega-category / kilo-category / category	CODE ID	Flocculation of initial codes into condensed coding: mega-category / kilo-category
administrative		**administrative**
State may prepare generic environmental impact statements (i.e., undertake strategic environmental assessment)	A1	
identify barriers to utilization	A1	strategic environmental assessment, long-term planning, identifying barriers
long-term approach to planning and decision-making	A1	
participation in regional and international initiatives	A1	
consistency in advice	A2	
uniform standards for siting	A2	uniformity and consistency of advice; decisions based upon fact and the record; environmentally efficient
environmentally efficient project planning	A2	
decisions based upon fact and the record	A2	
duration of project review process	A3	duration, especially of review process and public consultation
assessing progress		
growth in renewable energy production	A4	
growth in renewable energy employment and economic activity	A4	assessing the programme, for example progress in clean energy use, emissions reduction as well as changes in electricity price and utility revenue requirements
impact of clean energy on electricity rate and utility revenue requirements	A4	
appeal process	A5	ability to appeal decisions made by the regulator
emissions goal		**Goals**
emission based RPS	G1	emission or electricity goal, especially related to emissions reduction or increased use of clean energy
electrical generation emission caps	G1	
electricity goal		
clean energy generation	G1	emission or electricity goal, especially related to emissions reduction or

Initial Coding				Flocculation of initial codes into condensed coding	
mega-category	kilo-category	category	CODE ID	mega-category	kilo-category
	State-level operations clean energy electricity consumption level		G1		increased use of clean energy
	prorate generation capacity by utility operating in the State		G1		
	import clean energy electricity		G1		
	capture renewable energy market		G1		

Table A.3 **The initial coding and subsequent flocculation of codes, derived from content analysis, into mutually exclusive, but comprehensive categories for the ground rules mega-category of eleven Provincial-/State-level wind energy planning frameworks in North America.**

Initial Coding					Flocculation of Initial Codes Into Condensed Coding			
mega-category	kilo-category	category	centi-category	milli-category	CODE ID	mega-category	kilo-category	category
ground rule						ground rule		
	preferred utilization areas						preferred utilization areas	
		province/state wind resource zone (WRZ)						
			WRZs have been identified and mapped (and windpower development is restricted to these area(s))		GR1a			wind resource zones (WRZ) have been established by the Province/State
				schedule of locations	GR1a			
				mapped WRZs	GR1a			
		automatically exclude provincial parks and ESAs			GR1b			WRZs have not been prepared but general or site-specific areas will be excluded, for example provincial parks and waterfowl staging areas
		exclude areas due to site-specific land use or habitat						
			waterfowl staging areas		GR1b			
			recreation areas		GR1b			
			current or future public infrastructure sites		GR1b			
		ability to construct and operate outside of WRZs			GR1c			proponents are able to construct and operate outside of WRZs as long as the wind resource can be verified to be an efficient use of land
		setbacks from the Province/State rather than the local government						
			closest distance to residences		GR1d			Provincial/State has established buffers in respect to residences, property lines and roads
			closest distance to a new residence can be built to a windfarm		GR1d			
			closest distance to lot line		GR1d			

Initial Coding						Flocculation of Initial Codes Into Condensed Coding		
mega-category	kilo-category	category	centi-category	milli-category	CODE ID	mega-category	kilo-category	category
			closest distance to a road		GR1d			
			closest distance to an existing windfarm lease		GR1d			
	local powers							
		local jurisdictions have total authority over the approval of construction and operation of wind farms			GR2a			local jurisdictions have total authority over the approval of construction and operation of wind farms
		local jurisdictions can deny windpower in areas designated as future residential or commercial development			GR2b			local jurisdictions can deny windpower in areas designated as future residential or commercial development
		local jurisdictions cannot deny the construction and operation of wind farms but can specify zoning and setback constraints to development			GR2c			local jurisdictions cannot deny the construction and operation of wind farms but can specify zoning and setback constraints to development
		ability for proponent to opt-in to State-level siting review process instead of the local process			GR2d			ability for proponent to opt-in to State-level siting review process instead of the local process
	consultation						consultation	
		referrals by reviewing agency			GR3a			referrals by reviewing agency to other government agencies, stakeholders and the public
			to other regulatory agencies		GR3a			
			to First Nations/Indian Bands		GR3a			
			to community councils		GR3a			
			to Crown corporations		GR3a			
			sign off from agency responsible for determining need for EIA		GR3a			
		proponent consultation requirements			GR3b			required consultation for the proponent with other government agencies, stakeholders and the public
			affected parties (landowners)		GR3b			

Initial Coding						Flocculation of Initial Codes Into Condensed Coding		
mega-category	kilo-category	category	centi-category	milli-category	CODE ID	mega-category	kilo-category	category
				share project information only	GR3b			
				identify environmental concerns not identified by the proponent	GR3b			
				actively consult and gather concerns and seek their resolution	GR3b			
				dispute resolution process available to IPP and provincial government	GR3b			
			general public		GR3b			
				advertise project	GR3b			
	thresholds for review							
		size threshold that regulation pertains to			GR4		project size threshold to which the planning framework, planning consent process and/or formal environmental impact assessment process applies	
		formal environmental impact assessment process threshold			GR4			
	level of information							
		level of information dependent upon project scale, location and surrounding environment			GR5		level of information	
		level of information dependent upon discretion of the Minister			GR5			
	habitat compensation							
		preferred placement of facilities and activities to lesser quality habitat			GR6		habitat compensation agreement requirement, including habitat valuation and compensation ratios for permanent and temporarily disturbed lands and post-	

Initial Coding: mega-category	kilo-category	category	centi-category	milli-category	CODE ID	Flocculation of Initial Codes Into Condensed Coding: mega-category	kilo-category	category
		displacement selection rules			GR6		construction reclamation requirements	
		habitat mitigation agreement			GR6			
			habitat classification and mitigation compensation requirements for temporary habitat loss		GR6			
			habitat classification and mitigation compensation requirements for permanent habitat loss		GR6			
			habitat valuation and compensation rules for temporary habitat loss		GR6			
			habitat valuation and compensation rules for permanent habitat loss		GR6			
			compensation site acquisition		GR6			
			post-construction restoration plan		GR6			
			measuring restoration success for temporarily disturbed areas		GR6			
			compensation 'by-fee' option		GR6			
	wetland compensation				GR7		wetland compensation agreement requirement, including wetland valuation and compensation ratios for permanent and temporarily disturbed lands and post-construction reclamation requirements	
	advisory committee							
		State's and public's interests represented by a wind siting council			GR8		technical advisory committee used for environmental impact assessment review, windpower siting and review and/or post-construction monitoring	
		assessment led by a Technical Review Committee			GR8			
		post-construction advisory committee established for the proponent and regulatory agencies			GR8			

Initial Coding						Flocculation of Initial Codes Into Condensed Coding		
mega-category	kilo-category	category	centi-category	milli-category	CODE ID	mega-category	kilo-category	category
	research-oriented studies							
		research-oriented studies to develop understanding of wind power impacts on wildlife			GR9		research-oriented studies to deepen the understanding of wind power impacts, especially on avian wildlife and human health	
		research-oriented studies to develop understanding of wind power impacts on human health			GR9			
	decommissioning							
		decommissioning plan required			GR10		requirement for a decommissioning plan and means to undertake the plan	
		means to undertake decommissioning required			GR10			
	signs not pertaining to the company or the WTG manufacturer not allowed on the WTG				GR11		signs not pertaining to the company or the WTG manufacturer not allowed on the WTG	
	other approvals				GR12a		other authorizations needed prior to issuance of planning consent	
		list of other approvals needed and their status			GR12b		list of other authorizations to be included in the application for planning consent	
			environmental impact assessment required					
				provide copy with planning consent application	GR12b			
			transportation/highways					
				referral only	GR12b			
				copy of permit	GR12a			
			transportation/aviation					
				copy of permit	GR12a			
			waterways					
				provision of information	GR12b			

Initial Coding					Flocculation of Initial Codes Into Condensed Coding			
mega-category	kilo-category	category	centi-category	milli-category	CODE ID	mega-category	kilo-category	category
				needed for permitting				
			agreements with affected parties (landowners), at least in principle, needed prior to approval		GR12a			
			interconnection agreement needed prior to approval		GR12a			
			power purchase agreement needed prior to approval		GR12a			

Table A.4 The initial coding and subsequent flocculation of codes, derived from content analysis, into mutually exclusive, but comprehensive categories for the main considerations mega-category of eleven Provincial-/State-level wind energy planning frameworks in North America.

Initial Coding							Flocculation of Initial Codes Into Condensed Coding		
mega-category	kilo-category	category	centi-category	milli-category	micro-category	CODE ID	mega-category	kilo-category	category
main consideration							main consideration		
	environmental impact							environmental impact	
		avian species				MC1a			specialised guidance related to the assessment of impacts on birds and bats, including survey methodology
		general setting description				MC1b			assessment of environmental impacts such as those to earth, flora, fauna fish resources
			general setting map			MC1b			
			need to have recent aerial photography			MC1b			
		general overview of environmental impacts				MC1b			
		valued environmental components				MC1b			
		availability of information				MC1b			
		reliability and applicability of information to the site				MC1b			
		names and credentials of proponents environmental investigators				MC1b			
		impact on resources and ecosystem functions				MC1b			
		mitigation				MC1b			
		compensation				MC1b			
		weather				MC1b			
			adequate for power generation			MC1b			
			designed to accommodate extreme wind and ice			MC1b			
		air quality				MC1b			
			air emission rates of proposed project			MC1b			
			proposed project's contribution to GHG			MC1b			

Initial Coding							Flocculation of Initial Codes Into Condensed Coding		
mega-category	kilo-category	category	centi-category	milli-category	micro-category	CODE ID	mega-category	kilo-category	category
			emission reductions						
		geology				MC1b			
			soil excavation and handling			MC1b			
			erosion risk of surficial materials			MC1b			
			permeability and porosity			MC1b			
			acid producing/consuming property of bedrock			MC1b			
			sulphides and carbonates of bedrock			MC1b			
			geotechnical assessment of the practicality and cost of WTGs, their foundation and roads			MC1b			
		surface water				MC1b			
			quality and quantity			MC1b			
			run-off and absorption			MC1b			
			flooding			MC1b			
				floodplain map		MC1b			
			discharges to water from construction and operation			MC1b			
			predicted on-site and downstream effects			MC1b			
			mitigation and monitoring			MC1b			
		groundwater				MC1b			
			groundwater movement, quantity and quality			MC1b			
			predicted effects			MC1b			
			mitigation			MC1b			
		wetlands				MC1b			
			wetland impact map			MC1b			
			sources of information and experts used			MC1b			
			mitigation			MC1b			

Initial Coding							Flocculation of Initial Codes Into Condensed Coding		
mega-category	kilo-category	category	centi-category	milli-category	micro-category	CODE ID	mega-category	kilo-category	category
			compensation			MC1b			
		flora				MC1b			
			priority species			MC1b			
			biodiversity			MC1b			
			predicted effects			MC1b			
			mitigation and monitoring			MC1b			
		fauna				MC1b			
			priority species			MC1b			
			large number of common species or rare species			MC1b			
			habitat value and species needs			MC1b			
			habitat map			MC1b			
			ecology and behaviour			MC1b			
			predicted effects			MC1b			
			mitigation and monitoring			MC1b			
		fish and fish habitat				MC1b			
			watercourse crossing impact map			MC1b			
			priority species			MC1b			
			predicted effects			MC1b			
			mitigation and monitoring			MC1b			
		effect of the environment on the proposed project				MC1b			
	social impact							social impact	
		aesthetics				MC2a			specialised guidance related to the assessment of visual and noise impacts, including photo-simulations, landscape assessment and noise modelling
			visual			MC2a			
				fit within the landscape		MC2a			

Initial Coding						Flocculation of Initial Codes Into Condensed Coding			
mega-category	kilo-category	category	centi-category	milli-category	micro-category	CODE ID	mega-category	kilo-category	category
				photo-simulations		MC2a			
				proximity to scenic spots		MC2a			
				proximity to parks		MC2a			
				shadow flicker and blade glint		MC2a			
			noise			MC2a			
				predicted effects		MC2a			
				mitigation and monitoring		MC2a			
		list of occupants, residents, and landowners within a certain distance of the proposed development				MC2b			assessment of compatibility of the windfarm with landowners, current and future land uses and land use planning and zoning
			land ownership map			MC2b			
		land use				MC2b			
			impact on current and planned land use			MC2b			
				by project's permanent and temporary land requirements		MC2b			
				land use planning compatibility		MC2b			
			mitigation			MC2b			
			local government zoning map and any zoning changes needed			MC2b			
			current land use						
				agriculture		MC2c			assessment of compatibility with specific land uses, for example agriculture
				oil and gas field		MC2c			
				airports and aviation		MC2c			
				mines and quarries		MC2c			
				private water wells		MC2c			
				public water supply		MC2c			
				environmentally significant areas		MC2c			
				State government can require		MC2c			

Initial Coding							Flocculation of Initial Codes Into Condensed Coding		
mega-category	kilo-category	category	centi-category	milli-category	micro-category	CODE ID	mega-category	kilo-category	category
				vegetation trimming to reduce wake effects					
				windpower priority if provincial interest outweighs other current land user		MC2c			
				overlapping wind farms not allowed		MC2c			
				recreation and tourism		MC2c			
				transportation		MC2c			
				electrical distribution		MC2c			
				list of any local government infrastructure and facility improvement needs		MC2c			
		electromagnetic interference				MC2d			
		economy				MC2d			assessment of impacts on social, cultural and economic variables, including demography, employment, business, and archaeological and historical resources
			workforce size and skills			MC2d			
			local revenue and other community benefits			MC2d			
		human health				MC2d			
		archaeology/historic resources				MC2d			
	cumulative effects					MC3			assessment of cumulative effects included in the review process
	project description								
		facilities/activities under consideration						project description	
			WTGs only			MC4a			project description, for example type and number of wind turbines, estimated energy production and in-service date
			WTGs and transmission line			MC4b			detailed project description including permanent and temporary land requirements and specific construction and operation tasks
				site drawing		MC4b			
			entire windfarm, including permanent and			MC4b			

Initial Coding							Flocculation of Initial Codes Into Condensed Coding		
mega-category	kilo-category	category	centi-category	milli-category	micro-category	CODE ID	mega-category	kilo-category	category
			temporary workspace						
				site preparation and construction activity, location and schedule		MC4b			
					land requirements	MC4b			
					vehicle and crane specifications	MC4b			
					proximity to highway, watercourse and property boundaries	MC4b			
					waterway and wetland construction methods	MC4b			
					construction site lighting	MC4b			
					staging areas and parking	MC4b			
					drilling and blasting requirements for WTGs	MC4b			
					permanent structures	MC4b			
					temporary structures	MC4b			
					risk management	MC4b			
				operations and maintenance activity, location and schedule		MC4b			
					water use	MC4b			
					waste management	MC4b			
					transportation	MC4b			
					noise management	MC4b			
					viewscape protection	MC4b			
					risk management	MC4b			
				decommissioning		MC4b			
					goals and objectives of decommissioning	MC4b			
					revegetation and habitat connectivity	MC4b			

Initial Coding							Flocculation of Initial Codes Into Condensed Coding		
mega-category	kilo-category	category	centi-category	milli-category	micro-category	CODE ID	mega-category	kilo-category	category
					cost and source of funds	MC4b			
			road access routes			MC4b			
		WTG				MC4b			
			site legal description			MC4b			
			siting amendment for WTG moved more than 50m			MC4b			
			model and nameplate capacity			MC4b			
			blade rate of revolution			MC4b			
			materials and colour			MC4b			
			turbine siting selection process and setbacks used			MC4b			
			scale drawings of turbines			MC4b			
		purpose and need				MC4b			
		energy production estimate				MC4b			
		project impact on energy usage				MC4b			
		project contribution to renewable portfolio standard				MC4b			
		electrical system impacts				MC4b			
			engineering			MC4b			
		list of utilitie(s) that proponent has a power purchase agreement with and the amount of contracted electricity				MC4b			
		sources of public funding that will be used				MC4b			
		in-service date				MC4b			
		operating fuel requirements				MC4b			
		capital, land and operating costs				MC4b			
	alternatives					MC5			consideration of alternative locations or energy sources
		alternative locations				MC5			

Initial Coding							Flocculation of Initial Codes Into Condensed Coding		
mega-category	kilo-category	category	centi-category	milli-category	micro-category	CODE ID	mega-category	kilo-category	category
		alternative sources of electricity				MC5			
	environmental protection plan/environmental management plan					MC6			translation of mitigation commitments into environmental protection plan for use by construction and operation contractors
		erosion control and storm water management plan				MC6			
		materials management plan				MC6			
		pit/trench dewatering plan				MC6			