The University of Calgary

ELECTRICITY DEREGULATION, ENVIRONMENTAL PERFORMANCE, AND CORPORATE COMPETITIVENESS

RYAN D. PARMENTER

A Master's Degree Project submitted to the Faculty of Environmental Design in partial fulfillment of the requirements for the degree of Master of Environmental Design (Environmental Science)

Calgary, Alberta
December, 2002

The undersigned certify that they have read, and recommend to the Faculty of Environmental Design for acceptance, the Master's Degree Project entitled

"ELECTRICITY DEREGULATION, ENVIRONMENTAL PERFORMANCE, AND CORPORATE COMPETITIVENESS"

submitted by

RYAN D. PARMENTER

in partial fulfillment of the requirements for the degree of Master of Environmental Design (Environmental Science).

Supervisor, Professor W. Ross, Faculty of Environmental Design, University of Calgary

W.A. Ross 2003-03-18

Name Date

External Advisor, Dr. R. Page, Vice President of Sustainable Development, TransAlta

Robin Page 12 Dec. 02

Name Date

Dean's Appointed Examiner, Mr. Roger Creasey

12 DEC/02

Name Date

ABSTRACT

ELECTRICITY DEREGULATION, ENVIRONMENTAL PERFORMANCE, AND CORPORATE COMPETITIVENESS

RYAN D. PARMENTER

December 2002
prepared in partial fulfillment of the requirements of the degree in the
Faculty of Environmental Design, The University of Calgary
Supervisor: Prof. W. Ross

The purpose of this Master's Degree Project is to analyse the recently deregulated Alberta power-generating industry in order to provide recommendations that would improve environmental performance and allow corporations to remain competitive. This research was conducted through an extensive literature review and key-informant interviews with representatives of the power-generating industry, government, and nongovernmental organisations.

Research concluded that the deregulation process has caused significant uncertainty and market instability for power generating corporations. It was found that the government has contributed significantly to both market and environmental legislative uncertainty. In addition, the economic decisions facing power generators was also found to have an influence on the environmental performance of individual corporations and the industry. This occurs as a result of new market conditions that require a more rigorous business case to justify investment in environmental initiatives. Environmental performance can also be influenced and affected by decisions relating to corporate strategy and reputation. These conclusions confirm that power generators face a unique set of internal and external challenges when attempting to improve environmental performance and remain competitive in a deregulated market.

Based on the research and conclusions, the development of four recommendations for the Alberta power generating industry was produced. The first recommendation is the development of a negotiated multi-pollutant, long-term covenant agreement between the industry and the government. The second recommendation is for the establishment of standardized, environmentally transparent consumer electricity bills. The third recommendation suggests continued efforts to develop commercially viable clean coal technology. The last recommendation calls for improved corporate reputation management by the power generating corporations.

KEY WORDS

electricity deregulation, environmental performance, corporate competitiveness, power generation, environmental regulation, corporate strategy, technology selection, corporate reputation

TABLE OF CONTENTS

1.0 - CHAPTER 1 – INTRODUCTION

> "Electric power is essential to modern life. It fuels much of industry, the incubator of the new-born, the computers of the commodity trader and the railways of the commuter. It is an input to almost all goods and services. At the same time, power generation, and its end use have negative environmental effects" (OECD/IEA, 1999, p.9).

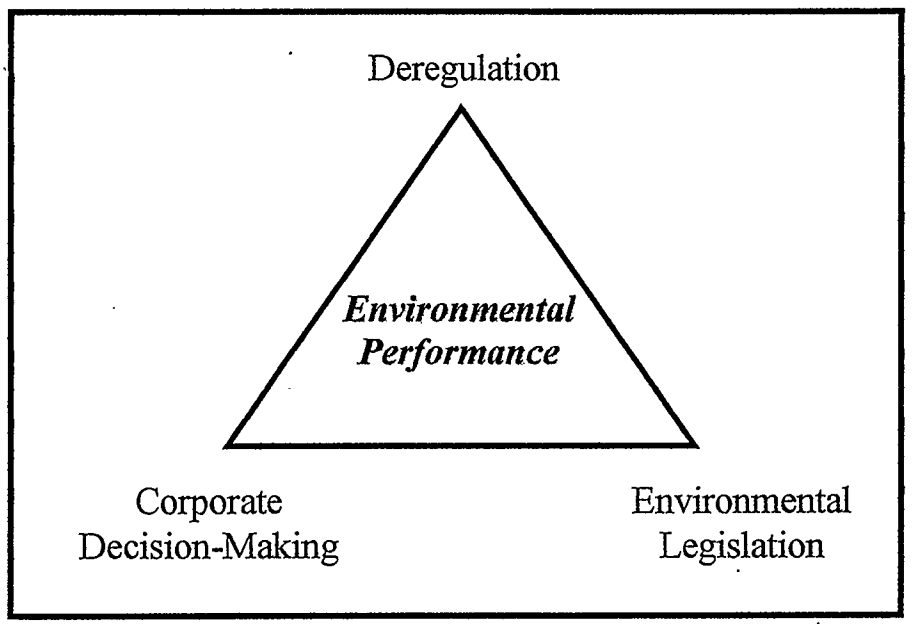
1.1 - INTRODUCTION

Electricity plays an important role in modern society. There are those who state that electricity has become a product that "has strong elements of necessity," yet it is often taken for granted (Trebing, 2001, p.397; Nguyen, 2002b). Current power generating industries have been able to avoid issues of reliability and availability of electricity, resulting in a consumer who is less aware of the commodity (Page, 2002). This creates a strong contrast for the consumer who takes electricity for granted, but also has a strong necessity for its use. This is further complicated by the fact that the generation of electricity is associated with a number of negative environmental consequences. These consequences can include local issues relating to the mining and transportation of input fuels, to the less obvious release of air emissions into the atmosphere (Trebing, 2001). Recently air emissions have become the focus of media attention with regards to power production (Mittlestaedt, 2002). The air emissions receiving the most attention are those produced from the burning of fossil fuels, including sulphur dioxide, nitrogen oxides, mercury, carbon dioxide, and particulate matter (Parker & Blodgett, 2001). Similar to electricity, air emissions are an issue that has a number of contrasts. Air emissions can be related to local events such as soil acidification and mercury deposition, as well as larger more complex issues such as global warming (OECD/IEA, 2001).

In a regulated market structure, the government is responsible for the overall environmental performance of the power-generating industry. In addition, the government also is responsible for market performance issues, such as rates of return, infrastructure management, as well as the overall configuration of the industry. When a power generating industry becomes deregulated, as it has in Alberta, the decision making process begins to be shared between government and industry. It is important to point

out that issues related to environmental performance are still monitored and controlled by the government. However, a different set of circumstances emerge as power generating corporations begin to have larger control and influence on their own competitiveness, as well as their environmental performance. Figure 1 provides a graphic illustration of the industry influences on environmental performance in a deregulated market.

FIGURE 1 – FRAMEWORK OF ENVIRONMENTAL PERFORMANCE



The process of deregulation can result in a number of circumstances that can influence both corporate competitiveness and environmental performance. The regulatory control and environmental legislation developed by the government has an impact on the competitive and economic nature of investments in power generating assets. Economic considerations facing corporations also can have an influence on the overall environmental performance of the company itself, as well as the industry. The corporate environmental strategies that are used by the power-generating companies also impact their ability to compete in the market, as well as the environmental performance of their operations. Through the detailed review of these interrelated concepts, this Master's Degree Project will demonstrate that the deregulated market presents unique internal and

external challenges for power generating corporations to address environmental performance while remaining competitive.

This research is timely not only because of the recent introduction of deregulation within the province of Alberta, but also given the growing concern regarding energy production and the resulting environmental consequences. This research includes the opinions and views of industry, government and non-government organizations in an attempt to assess the needs of business, the hopes of government, and the expectations of society. The issue of deregulation is often dealt with from a singular viewpoint (i.e., industry, public, government). This has the effect of presenting a single perspective on an issue that is complex, and has a number of stakeholders. In addition, the popular media deals with the issue of deregulation on an intermittent basis. This makes understanding the topic of deregulation difficult, as the media is currently one of the main sources of information on the subject. Each of these stakeholders has a vested interest in deregulation, and has to deal with it on a daily basis.

The intent of this thesis is to evaluate the issue of deregulation and its impacts on environmental performance and corporate competitiveness from a larger and more holistic perspective. For this reason, the research presented in this document should provide valuable insight into the issues relating to deregulation and the resulting conclusions may be useful to the power generating industry, the government, nongovernmental organisations, as well as the general public.

1.2 – PURPOSE

The purpose of this Master's Degree Project is to analyze the recently deregulated Alberta power generating industry with respect to environmental performance and corporate competitiveness, in order to develop a list of recommendations for the industry to help corporations remain competitive and environmentally responsible within a deregulated market.

1.3 - PROJECT OBJECTIVES

(1) Document the background and history of deregulation in order to identify the changing regulatory framework that companies have dealt with, and how this has impacted environmental performance and corporate competitiveness (Chapter 2, 3).

(2) Analyze the three largest power-generating corporations (TransAlta, ATCO, EPCOR) in Alberta with respect to environmental performance and competitiveness in order to determine how these factors have changed through the deregulation process (Chapter 2, 5).

(3) Document the changing role of government with respect to environmental protection and deregulation in order to identify their evolving role and what impact this has had on power generating corporations (Chapter 2, 3).

(4) Document the decision making process used by corporations in order to determine their corporate environmental strategy as well as the economic considerations used in determining their investment strategy (Chapter 4, 5).

(5) Prepare a modest outline of the future trends of the power generating industry in Alberta with respect to the role of government, corporations and the industry's environmental performance (Chapter 6).

(6) Provide a set of recommendations for the Alberta power generating industry that will result in improved environmental performance while allowing for corporations to remain competitive in a deregulated market (Chapter 6).

1.4 - METHODOLOGY

The following research methods were used in order to meet the stated objectives.

- Literature Review
- Key Informant Interviews
- Recommendation Formulation

1.4.1 - LITERATURE REVIEW

The purpose of the literature review was to:

(a) document the issue of deregulation as a policy concept along with the Alberta experience with regards to deregulation,
(b) document the environmental performance of the Alberta power generating industry (TransAlta, EPCOR, ATCO),
(c) document the role of the government within the deregulation process including the formulation of environmental regulations and legislation,
(d) establish the theory of corporate strategy.

An initial search of the literature was conducted at the McKimmie Library at the University of Calgary using the WebCat system in order to search through the library catalogue. Searches were conducted using the following key words: electricity, deregulation, power generation, TransAlta, EPCOR, ATCO, corporate strategy, and environmental performance. This search provided little material, although a number of books were available that described the issue of deregulation in a global and country specific context. A number of books relating to deregulation by the Organization for Economic Cooperation and Development were found. These books provided information regarding the background and history of deregulation, the variety of deregulated market structures, and provided a small amount of information regarding deregulation in Canada. Few books were located that specifically dealt with deregulation in Canada or Alberta.

On the University of Calgary Library website a search was conducted in a number of journal indexes and abstracts found under the heading Library Electronic Resources. The main indexes used in the search included: ABI Inform Global (formerly ProQuest Direct), Business Source Premier, Environmental Abstracts, Pollution Abstracts, Economic Literature Database, and UMI ProQuest Digital Dissertations. These searches used similar key words as described above. Although a number of these electronic indexes were useful, ABI Inform Global was found to the most productive as it included

the majority of business journals as well as newspaper articles from the Wall Street Journal.

An extensive search was also conducted using the resources provided by the World Wide Web. Information collection focused mainly on the websites made available through specific organizations and corporations including:

- Canadian Electricity Association
- TransAlta Corporation
- EPCOR Utilities
- ATCO Power
- Alberta Environment
- Alberta Energy and Utilities Board
- Alberta Energy, Government of Alberta
- Power Pool of Alberta
- The Pembina Institute
- Ontario Power Generation
- Pollution Probe
- Clean Air Strategic Alliance

These websites provided extensive background information and were very useful. In addition to the use of these websites a general search of the web was conducted using similar key words as described above. These searches were moderately successful and identified other relevant and credible websites. The Internet was also used to monitor national and regional newspapers (The Globe and Mail, The Calgary Herald, and the Edmonton Journal) for headlines relating to power generation, environmental issues and deregulation.

The literature review was used to meet objectives 1-4.

1.4.2 - KEY INFORMANT INTERVIEWS

The key informant interviews were used in order to determine the role of each stakeholder within the deregulation process and allow an opportunity to discuss the larger implications of deregulation on the industry. Using the information obtained through the literature review, questions were designed in order to determine each perspective regarding the issues of deregulation, environmental performance and corporate

competitiveness. As a result of the broad range of organizations being approached for interviews, different question lists were created for each interview. Multiple open-ended questions were developed in order to allow for follow up questioning, clarification, or exploration of new concepts or ideas. Interviewees were also asked to make specific recommendations regarding changes or improvements to their organizations, or the deregulation system in order to improve both corporate competitiveness and environmental performance. Once the contact had been established, the list of questions was sent to the interviewee well in advance. This allowed the interviewee time to review the questions prior to the interview, allowing for a more effective discussion. Interviews were conducted with representatives from:

- TransAlta Corporation
- EPCOR Utilities
- ATCO Power
- Alberta Energy and Utilities Board
- Alberta Environment
- Pembina Institute
- Mirant Canada Energy Marketing Inc.
- Pollution Probe
- Ontario Power Generation

See Appendix A for a full list of key informant interviews. It should be mentioned that the original intention of the project was to compare the deregulation processes of Alberta and Ontario. However, given the different market structures and the varied timelines for each province it was felt that this would be a difficult comparison. In order to ensure that all perspectives were considered, a few key informant interviews were conducted in Ontario to add a different viewpoint and to strengthen the research and conclusions.

The interviews were used to meet objectives 2-4, while the interviewees' input regarding recommendations would be used in meeting the final objective.

1.4.3 - Recommendation Formulation

Using the information gathered from both the literature review and the interviews, a list of recommendations were drafted. In order to ensure the recommendations were appropriate and relevant to the target audience, the recommendations were presented to a

number of selected interviewees in order to provide further perspective from government, industry and environmental groups. The representatives were asked to review the recommendations and discuss their relevancy and applicability to their particular organization. The feedback from this process was then used in order to improve the recommendation list. This process resulted in the establishment of the final set of recommendations.

This research component was used to meet the final project objective.

1.5 - Document Overview

A brief description of each chapter in this document is provided below.

Chapter 1 – Introduction

(Current Chapter) This chapter has provided a brief introduction to the topic as well as an outline of the project objectives and the methods that were used to achieve them.

Chapter 2 – Deregulation and Market Structure

The second chapter provides an introduction to the concept of deregulation both in a general context as well as the specific deregulation process that has occurred in Alberta. This chapter also reviews the issue of deregulation with respect to corporate competitiveness and environmental performance. A general description of the market structure along with a review of the three key power-generating companies in Alberta is presented.

Chapter 3 – Environmental Legislation and Regulation

A description of the role and mandates of the provincial government bodies responsible for environmental legislation and regulation is provided. The review of air emission

standards and two current applications for coal-fired power plants are discussed in order to demonstrate issues and problems relating to this research project. A review of the potential implications of the Kyoto Protocol is also included.

CHAPTER 4 – ECONOMIC CONSIDERATIONS OF POWER GENERATION

Chapter 4 examines the economic considerations of electricity, the deregulated market, the impact of environmental legislation, and technology. Corporate decision-making is reviewed in order to provide an understanding of the corporate perspective and the criteria used in establishing an investment strategy.

CHAPTER 5 – CORPORATE STRATEGY AND THE ALBERTA POWER GENERATORS

This chapter reviews the corporate strategies used by the three power generating companies in Alberta. This provides additional insight into the area of corporate decision-making and the impacts on a corporation's competitive position and environmental performance.

CHAPTER 6 – CONCLUSIONS AND RECOMMENDATIONS

The final chapter presents four recommendations for the Alberta power-generating industry that address the issues and concepts identified throughout the previous chapters. In addition, a brief set of final conclusions is presented. A modest outline of the future of the Alberta power-generating industry is also provided.

1.6 - Suggestions For Further Research

The fairly recent adoption of deregulation in the province of Alberta makes this topic one that could be potentially investigated again in the future. Different research perspectives could also be taken in order to explore the different aspects of deregulation. For example, in time it may be appropriate to consider the issue of deregulation in a broader Canadian context. The evolution of the deregulated market in Ontario may provide a useful comparison to the issues and problems faced in the Alberta market. Another consideration would be to address the issue of deregulation and environmental performance from a political perspective. An analysis of the ways that the public and corporations shape the political landscape would be useful in understanding how environmental legislation and regulation is developed. Exploring the role of the consumer in deregulation would also be a useful study. The consumer impacts and understanding of the process would provide valuable insight into how government policy reaches and affects electricity consumers. Finally, it may be appropriate to conduct a similar study to the one presented in this document in the future. This work would allow for the comparison of corporate strategies and the environmental performance of the industry over a longer period of time, perhaps allowing for different conclusions to be established.

2.0 - CHAPTER 2 – DEREGULATION AND MARKET STRUCTURE

> "One can indeed view the reform of the power sector as a co-evolution of the industry, its markets and its regulators" (OECD/IEA, 1999, p.91).

2.1 - CHAPTER INTRODUCTION

This first section of this chapter provides an overview of the concept and theory behind deregulation. Following this, a summary of the Alberta deregulation process as well as a review of the three provincial power-generating companies is provided in order to document the corporations and their initiatives as well as the market structure that they operate within. The information presented in this chapter was used to ensure that the final recommendations would be relevant given the nature of deregulation as a concept, as well as the specific conditions occurring within the province of Alberta. The material presented in this chapter is used to address the first and second project objectives (documenting the background of deregulation and analyzing the three corporations).

2.2 - THE CONCEPT OF DEREGULATION

Deregulation has been described as an effort to reduce "direct state control or oversight of various aspects of industry operations" (OECD/IEA, 1999a, p.2). Deregulation is generally part of a larger effort that is often referred to as market liberalisation.

> "Market liberalisation refers to the world-wide trend which aims to improve the economic efficiency of electricity supply industries by introducing elements of competition and moving toward market-based pricing. It shifts decision-making from government entities to the market. A basic objective of market liberalisation is to reduce prices paid by consumers for electricity" (OECD/IEA, 1999a, p.17).

This change in market structure can have significant impacts on the competitive nature of the market as well as the environmental performance of the industry. The introduction of

competition results in the development of a number of beneficial market forces. For example, the competitive nature of the marketplace forces companies to become more efficient in order to effectively compete within the market (Trebing, 2001). The drive for improved efficiency also encourages innovation among competitors and can often result in improved customer service (OECD/IEA, 2001; OECD/IEA, 1999).

The electricity customer plays a significant role within the deregulated marketplace. The ability of the customer to switch electricity suppliers is a factor that forces competitive behaviour among power producers. Whether or not the customer does in fact switch suppliers is not important. The ability of a customer to switch suppliers is enough to force a degree of market discipline among power generators (Harris, 2001). The significance of the electricity customer in the deregulated market is an important consideration that will be addressed in the final recommendations.

Table 1 provides a detailed list of the potential benefits that can be derived from the deregulation of the power generating industry. These points outline the benefits that are created from a competitive market.

TABLE 1 – POTENTIAL BENEFITS CREATED BY A COMPETITIVE ELECTRICITY INDUSTRY

- Encourages innovation (OECD/IEA, 2001)
- Consumer choice (Harris, 2001)
- Corporate profit maximization
- Improved economic efficiency (Trebing, 2001)
- Higher labour productivity
- Development of new energy services
- Reduction of regional price differentials (OECD/IEA, 2001)
- Potential for the creation of more jobs (Conklin & Hunter, 2001)
- Improved plant availability
- Improved customer service
- Reduction of excess capacity (OECD/IEA, 1999)
- Improved price signals to market participants
- Improved conditions for trade (NEB, 2001)
- Potential for improved shareholder value (Taft & Cooper, 2000)

More observations regarding deregulation are available as more countries begin to adopt this policy. "By the year 2006, more than 500 million people (and all large industrial users) in the OECD (Organization for Economic Cooperation and Development) area will be entitled to choose their electricity supplier. This accounts for nearly 50% of the population of OECD countries" (OECD/IEA, 2001, p.9). The growth of deregulation has largely been a result of the benefits achieved by this change in policy.

> "In a short term perspective, reforms have generally delivered their expected benefits. Large productivity increases have been reported in a number of countries, largely linked to the corporatisation and privatization of the utilities. Final electricity prices have decreased or remained stable in all countries examined and wholesale electricity prices have been low (e.g. relative to the cost of new generation)" (OECD/IEA, 2001, p.10-11).

Deregulation has also begun to spread throughout the United States. While a number of states have been moving towards deregulation, those recognised as the most successful have been Texas and Pennsylvania (Osborne, 2001; Noble, 2001; Case & Akman, 2001). The Pennsylvania market is a part of a larger area including New Jersey, Delaware, Maryland, the District of Columbia and Virginia, that have been involved in deregulation since 1997, with a degree of success. Overall, customers are thought to be better off as prices have dropped and there have been no issues with the reliability or availability of power in this region (Harris, 2001).

The concept of deregulation and the potential benefits created by a competitive market was used to analyse the Alberta deregulation process. The following sections of this chapter will continue the analysis. This section has outlined the potential positive benefits of deregulation. However, the process and results of deregulation are not always positive. There are a number of negative aspects relating to competition and environmental performance that can be caused by a change in market structure.

The majority of criticism regarding deregulation relates to the issues of corporate ownership and control. These issues include the notion of corporate conglomeration, market manipulation, increased corporate profit, and shareholder value (Higley, 2000; Taft & Cooper, 2000; Trebing, 2001). These are some of the negative impacts that can

occur as a result of introducing competitiveness into the power generating industry. From a corporate perspective, the issues of increased profit and shareholder value are likely to be considered positive outcomes. However, the corporate perspective is not the only consideration.

The government that is responsible for the design and implementation of deregulation also receives criticism. Concerns are often raised regarding the method and process that the government uses to deregulate the industry (Page, 2002). The fragmentation and continual intervention of governments into competitive markets often attracts criticism (Page, 2002). This can result in the development of the argument that the very word 'deregulation' is not appropriate. In many cases the process of deregulation causes the government to develop increasing amounts of regulatory bodies and regulations (Taft & Cooper, 2000; Kwoka Jr., 1997). The concern is that the increased amounts of regulation (in the deregulated market) can end up costing the government more than what it did for the older regulated market. The issue of government cost relating to deregulation will be specifically addressed in the final recommendations.

Negative public opinion can occur regarding deregulation if the public perceives that the government costs of regulation are increasing. The likelihood escalates if the market has become unstable or if consumers are paying higher prices for electricity. A negative public opinion can directly impact and influence the government's decision-making process with respect to deregulation. This topic will be discussed in more detail as it relates to specific events in the Alberta deregulation process. A negative public response to deregulation can also impact the reputations of power generating corporations. The issue of corporate reputations will be dealt with in more detail in Chapter 5. These points demonstrate the important role of both the public and the government in shaping the power generating industry. The issue of public influence will be dealt with throughout the document and the role of the government will be specifically addressed in Chapter 3.

In addition to these negative aspects of deregulation there are also concerns regarding the impact on the environmental performance of the industry. There is a concern that

deregulation is a market process that ignores the issues of environmental performance (Higley, 2000). The introduction of competition forces power-generators to seek out cheap power production methods (Hauter, & Slocum, 2001). This can result in the extended use of older generating facilities that produce increased amounts of pollution (Higley, 2000). This type of corporate behaviour could result in a decline of environmental performance within the power-generating industry. The issue of corporate decision-making regarding investing in power-generating assets and environmental technology will be discussed further in Chapter 4.

Table 2 provides a summary list of the potential negative impacts that can result from the deregulation of the power-generating industry.

TABLE 2 – POTENTIAL NEGATIVE IMPACTS OF DEREGULATION

- Price volatility/uncertainty
- Prolonged use of older/dirtier generating plants resulting in increased pollution
- Declining service
- Reduced safety
- Loss of jobs
- Fear of corporate conglomeration/consolidation (Higley, 2000)
- Reliance on capital markets resulting in increased corporate risk (Page, 2002)
- Price convergence resulting in increased cost for low cost regions
- Overall market instability (NEB, 2001)
- Increased regulatory burden on the government
- Reduced reliability
- Increased potential for market manipulation (Taft & Cooper, 2000)
- Neglect of transmission demand (GCSI, 2001)
- Corporate profit maximization (Trebing, 2001)

The previous section outlined the potential benefits of deregulation and examples where the deregulation process has created positive experiences. There have also been a number of examples where deregulation has not resulted in the intended benefits. For example, "despite some operational success, British restructuring of electric power has encountered a number of significant difficulties, including challenges to some of its premises, the inadequacy of key institutions, and the ironic need for rescue by regulation" (Kwoka Jr., 1997). California is another example of a market that has experienced

negative impacts from an attempt at deregulation. A number of negative consequences occurred as a result of interventions from varying levels of government allowing the fragmentation of the deregulation process (Page, 2002). Although the deregulation process was complex, the circumstances created a market that experienced skyrocketing energy prices, rolling brownouts, the near bankruptcy of power generating utilities, and the increased concern and hesitation among other American states who are considering deregulation (Wilcox, 2001; Slocum, 2001).

There are currently a number of American states that are reconsidering their ideas about deregulation. Nevada repealed its deregulation law in April 2001 (preventing the sale of state utilities), Arkansas pushed deregulation back a year, New Hampshire delayed the start of deregulation for a number of years, New Mexico delayed for five years and Oklahoma put it off indefinitely (Slocum, 2001). The state of Montana is going even further than delaying deregulation. The government in Montana is considering its options for buying back, or forcing companies to sell back generating assets in order to rebuild its regulated market (Caffrey, 2001). The government in Montana is reacting strongly as a result of the quadrupling of electricity prices for industrial customers (Higley, 2000). This significant increase in the industrial power rate caused a number of plant closures resulting in substantial job loss (Slocum, 2001).

From the review provided in this section, it is evident that there are a number of potentially positive and negative impacts that can occur as a result of the deregulation of the power-generating industry. This section has demonstrated the important role of the government, the corporation, and the electricity consumer in shaping both the competitive nature of the market as well as the environmental performance of the industry. This section also highlighted the importance of perspective. In some cases what is positive to one stakeholder, is considered to be negative by another. Perspective and local circumstances are important concepts to consider when dealing with deregulation. The length of time that a market has experienced deregulation is another consideration. This was demonstrated by the example of the deregulation of the British power generating industry that was originally considered a success, but has had to deal

with a number of negative issues over time (Kwoka Jr., 1997). It has also been shown that deregulation has often resulted in market instability. The role of the government, public, and stakeholder perspectives will be used to analyse the Alberta deregulation process in the following sections of this chapter.

2.3 - The Spread of Deregulation to Canada

The concept of deregulation first began in the early 1980s in the United Kingdom (Heintz et al., 2000). The concept began to evolve as an ideological movement stemming from the conservative Thatcher government (Kwoka, Jr., 1997; Page, 2002). The British government began to deregulate a number of industries including power generation (Kwoka, Jr., 1997). The deregulation of the power generating industry resulted in lower prices for electricity and a reduction of the role of the government (Kwoka, Jr., 1997). The United Kingdom provided the first example of a deregulated power generating industry and the experience had originally been considered a success (Heintz et al., 2000). This prompted other countries to follow their example. The United States then began to consider the issue of deregulation as a result of the energy crisis, as well as the approach to policy taken by successive conservative governments (Trebing, 2001). By the mid 1990s, state initiatives began to be developed to deregulate electricity markets (Slocum, 2001). The first states to adopt deregulation were Rhode Island, California, Pennsylvania, and Massachusetts (Trebing, 2001). By 2001, a total of 23 states had passed some form of deregulation legislation (Slocum, 2001).

Canada was not immune to the influence of both deregulation as an idea, or the fact that the US, its largest trading partner was beginning to implement this concept. "Growing reliance on market forces in other sectors of the economy and in other electric power jurisdictions in North America is causing Canadian provinces to consider the adoption of market-based structures" (NEB, 2001, p.x). Simultaneously, Canadian electricity markets had been relatively stable. Electricity prices in Canada had only marginally increased over the years (NEB, 2001). Despite increasing prices, Canadian energy prices have remained low compared with other industrialized countries and have been largely

unaffected by continental and international market forces (NEB, 2001). A growing number of provinces in Canada are beginning to consider deregulation at the wholesale level (NEB, 2001). Wholesale deregulation would allow independent power producers access to the transmission grid, creating competition in the generation of power (Trebing, 2001). Provinces considering wholesale deregulation include Manitoba, New Brunswick, Quebec, and British Columbia (NEB, 2001).

The Conservative governments in both Ontario and Alberta recently began to make a shift towards a deregulated market structure that includes competition at both the wholesale and retail levels. Ontario's electricity market began competition in the spring of 2002 (NEB, 2001). Alberta underwent a five-year transition to deregulation, and opened up its market to competition on January 1, 2001. With these two provinces deregulated, 40 percent of the Canadian electricity market is experiencing increased levels of competition (NEB, 2001).

2.4 - Deregulation In Alberta

This section outlines the process that led to the deregulation of Alberta's power generating industry. The information provided in this section was used to develop the role of the industry stakeholders in the process of deregulation allowing for more informed and functional recommendations to be developed. An outline of the competitive nature of the newly deregulated market also allowed the development of recommendations that are concerned with environmental performance while respecting the unique situation and circumstances of deregulation in Alberta.

In the 1980s the structure of the power generating industry in the province of Alberta consisted mainly of three large utility companies, TransAlta, EPCOR, and ATCO (Taft & Cooper, 2000). These companies were all regulated monopolies with exclusive rights to sell to customers in specific regions (CBC, 2001). The companies were vertically integrated, meaning that they were involved in the production, transmission, distribution and retail sale of power, while other smaller companies were also involved in the sale of

power (e.g., City of Calgary) (Taft & Cooper, 2000). During regulation, both the market and electricity prices were stable (NEB, 2001). In exchange for market stability the corporations were guaranteed a given level of return on their investments (e.g., 9-11%) (Marr-Laing, 2002a). "Utilities could build new generation with low risk since capital costs could be rolled into the provincial rate base and recovered from all consumers" (Heintz et al., 2000, p. 17). Nevertheless, as described above, deregulation was becoming a popular policy shift that was spreading throughout countries worldwide.

Within Alberta, the idea of deregulation began with a number of groups voicing their support for a change in policy. In the 1980s, farmers and small power producers began to lobby the government on the issue of deregulation. Farmers as a result of declining economic conditions wanted lower power prices, and small power producers wanted to gain access to the market (CBC, 2001; Page, 2002). Other support came from large industrial power consumers who felt that deregulation would allow them to exert pressure on power producers thus resulting in lower rates (Taft & Cooper, 2001). Environmental groups even voiced their support for a more flexible system that would allow for the development of alternative power sources such as wind (CBC, 2001). Initially the three large provincial power-generating companies welcomed the opportunity of an open and competitive market (Taft & Cooper, 2001). This prompted the Alberta Government Department of Energy to begin reviewing its policies in 1990 (Heintz & Lurie, 2000, p. 5). Industry, consumers, and environmental groups all showed support for the deregulation of the electricity industry.

In May of 1995, the Alberta government began a consultative process that resulted in the passing of the Electric Utilities Act that came into effect in January of 1996 (Heintz et al., 2000). This Act instigated a number of changes to the power generating industry, the most significant included:

- the requirement for the separation of generation, transmission, distribution, and retail,

- the creation of a non-profit power pool responsible for all provincial electricity trade,
- and the creation of a transmission administrator to operate the provincial transmission system and administer tariffs (Heintz et al., 2000).

This Act had the effect of opening up the areas of generation, distribution, and eventually retail to full competition, while maintaining government control and regulation over provincial transmission lines (Heintz et al., 2000). These changes began a dramatic shift in the corporate structures of the three large utility companies in the province. Each corporation had to divide its organization into separate divisions relating to generation, transmission, distribution, and retail. At EPCOR and ATCO, the corporations simply created new divisions to independently address each aspect of electricity provision (Kostler, 2002; Lewin, 2002). TransAlta ultimately removed itself from the transmission, distribution and retail aspects of the business, and focused solely on generation (Page, 2002).

Forcing the corporations to address each area of the business with distinct entities was the initial step. The government still had to address the issue of market power. The fact that three large companies dominated the power generation market caused the government to be concerned (Page, 2002). It was thought that one or all of these companies could influence the market price of energy by altering the supply and demand for power, and ultimately manipulating the price of energy to its advantage. In order to address this issue, the government decided to create long-term power purchase agreements (PPAs) "that specify the required output that each generating unit is obligated to produce and the price the owners will receive" (Case & Akman, 2001, p.6).

> "PPAs are similar to contracts. Each PPA is an arrangement between the owner of the generating facility and the PPA buyer. Buyers of PPAs have exclusive rights to the generation output of the facility, and can sell this energy to customers or to other marketers. The PPA buyer is obligated to pay the generator-owner the fixed and variable costs of producing the electricity specified in the PPA (like maintenance, administrative costs and feed stock)" (Wallace, 2001, p.10).

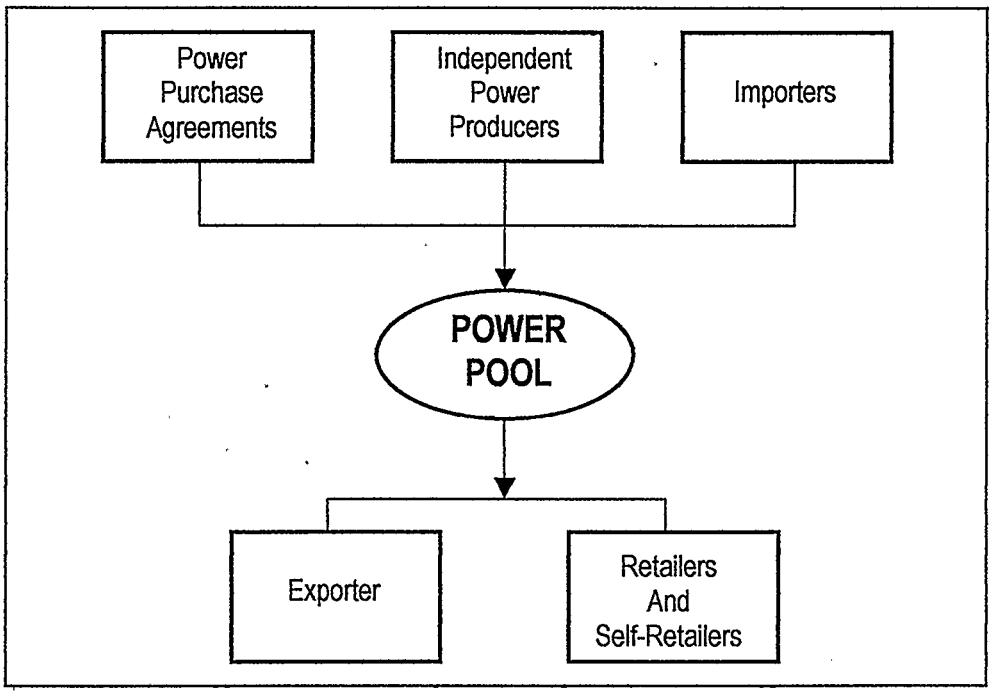
The PPA buyer also has the option of turning the contract back to the power pool to be re-auctioned (Page, 2002). The PPAs are intended to last for 20 years, or the life of the power plant, which ever is shorter. "Once the PPA expires, control of the generator reverts back to the utility owner who has the option to retire, refurbish or repower the unit" (Heintz & Lurie, 2000, p.47). The government decided that in order to sell these PPAs, an auction would be held (Case & Akman, 2001). Auctions for the PPAs were held for two reasons. The first is that by dividing up the existing generation between a number of companies, the issue of market power would be addressed. Second, the Alberta energy consumers had been paying into the provincial generation assets for a number of years. By selling off the provincial power generation through PPAs, the Alberta customers would recoup their investment in the regulated generation assets (Wallace, 2001).

In order for the auction to be considered a success it would have to raise "at least $3 billion, as well as introduce seven to 10 new competitors in the marketplace" (Wallace, 2001, p.11). The auction was held in August of 2000, and the results were somewhat disappointing. Of the forty companies that expressed interest in the auction, only seven placed bids, resulting in only five companies buying generating capacity. Only two-thirds of the power generating capacity was sold, and the auction raised only $1.1 billion dollars (Wallace, 2001). The government was forced to hold a second auction in December of 2000, which was only able to raise another $1 billion dollars, still roughly one billion away from the intended target of $3 billion (CBC, 2001). Despite the lack of success with the auction process, the government proceeded with deregulation.

> "Effective January 1, 2001, the market was opened up to true competition. Large industrial customers are responsible for securing their own supply of power. In so doing, they are free to enter into long-term contracts. For up to three years, small industrial and commercial customers have the option to continue buying their power at a regulated rate from their distribution company. Residential and farm customers have this option for five years" (Case & Akman, 2001, p.6).

Figure 2 provides a graphic illustration of the newly established industry structure.

FIGURE 2 – ALBERTA'S DEREGULATED INDUSTRY STRUCTURE



2.5 - THE ALBERTA EXPERIENCE

Alberta's transition to a deregulated market has not been as smooth as the government intended. The government was partially to blame for the problems that occurred. During the transition phase, the regulatory structure the government was going to implement was uncertain. The government was adamant that it was going to deregulate; yet the details regarding how this was going to occur were limited. This had the overall impact of creating uncertainty for the market participants (Heintz et al., 2000, Heintz & Lurie, 2000, Carlisle, 2001).

"The province created an uncertain investment climate by failing to announce details of how the power-market transition would be managed" (Carlisle, 2001). "The delay in formulating clear market rules for the new competitive environment forestalled the development of new generation, which led to a shortage of in-province generation and an

increase in power prices" (Case & Akman, 2001, p.7). Beginning in 1996, the provincial demand for energy was greater than supply as a result of market uncertainty. Provincial reserve margins (the amount by which existing generating capacity exceeds required generating capacity) began to decline over that period (OECD/IEA, 1999a). In 1996 reserve margins were in the range of 10-15% and by 2000 they had dropped to 5-8% (Taft & Cooper, 2000). Since 1996, the average power pool price has been increasing dramatically. The average pool price for electricity was $14 per MWh in 1996, and increased to $253 per MWh in October of 2000 (Taft & Cooper, 2000).

Deregulation was not the only cause of rising prices in Alberta. Other conditions were also occurring that were beyond the control of government regulators. The average natural gas price had increased over 40% since 1999 reaching prices that were almost three times as high as they were in 1996 (Wallace, 2001). The American Pacific Northwest was experiencing price increases as a result of the negative circumstances in California (Wallace, 2001). This created a situation that caused energy imports to be reduced due to expense, while increasing the demand for exports. The cost of importing electricity into the province of Alberta was becoming more expensive as a direct result of BC's connections with the Pacific Northwest. At the time, the low water levels also limited BC's ability to generate hydropower, driving prices for exports higher (Page, 2002). The substantial expense of imported electricity only added to the difficulties for the Alberta market. The lack of investment combined with high export prices made Alberta electricity prices extremely volatile. This volatility increased as a result of planned and unplanned outages at provincial power plants (Wallace, 2001).

As a result of escalating prices, the notion of deregulation was not well received by the public or the media. Alberta's five-year plan to deregulate was labelled a "public relations disaster" (Simpson, 2001). Articles were written stating that the Alberta government had attempted to fix something that was not broken (Noble, 2001). The government was forced to respond given the dramatic increase in the cost of electricity being paid by consumers. The high cost of energy was also threatening 30,000 manufacturing jobs in the province (Simpson, 2001). In mid-December of 2000, the

government announced a rebate program worth $2.3 billion dollars in order to relieve the problems caused by rising energy prices. The government also cancelled plans for $500 million dollars worth of price increases (Simpson, 2001).

The conditions that were causing the cost of electricity to rise in Alberta began to subside in the spring of 2001. The average monthly pool price for 2002 (to date) is $37.01 per MWh (Power Pool of Alberta, 2002). This price is slightly higher than 1996 levels (prior to deregulation) but significantly lower than the prices being paid during the late fall and early winter of 2001. The large variation in price demonstrates the market volatility that can be experienced in a deregulated market. The large price swings also demonstrate the uncertainty faced by both corporations and electricity consumers.

Much like the prices of electricity in the province, the opinions regarding deregulation have fluctuated significantly. While some media attention regarding the issue of deregulation has been positive; the majority of articles portray the process and its effects as negative (Nguyen, 2002b). There is continued concern regarding the issue of market power and control as the three large power-generating companies continue to control such a large portion of the market share (Noble, 2001). The Mayor of Edmonton, Bill Smith expressed his opinion and stated that provincial deregulation has failed to attract any new investment in power generation (May & Cryderman, 2002). These comments indicate that there is a definite concern regarding the competitive structure of the deregulated market. This results in the consideration of issues such as whether or not there is abuse of market power by generating corporations, and whether this industry structure will provide incentive for other corporations to develop assets in Alberta.

Jim Wachowich, a lawyer for the Consumers Coalition of Alberta stated "that not only are consumers paying higher prices now than before deregulation, they must grapple with greater complexities on a commodity they used to take for granted" (Nguyen, 2002b, B1). Others have even stronger comments regarding deregulation in Alberta.

> "Our study found that deregulation of electricity has brought little benefit to Albertans and small businesses in Alberta. Despite government assurances

> that Albertans would be protected from higher energy prices, we have seen that price hikes are inevitable. These price increases could take several forms: direct payments to the electrical industry, lost tax dollars, higher taxes than would otherwise be necessary, or lost enhancements to health, education and social welfare. Albertans are paying a premium to satisfy the ideological imperative of 'competition' in the electrical industry" (Wallace, 2001, p.36).

This statement highlights the previously mentioned concern that the public is experiencing uncertainty and volatility from a market that is not truly competitive (Wallace, 2001). There is also criticism and support regarding the impact of deregulation on the environmental performance. There are those who state that deregulation has improved the environmental performance of power generators and the industry as a whole (Nguyen, 2002b). These arguments are based on the fact that market principles influencing investment decisions will likely lead to improved environmental performance and efficiency within the industry (Nguyen, 2002b). It has been stated that "under a deregulated system, producers are less willing to lay out capital on long time frames, and tend to opt for gas-fired plants, which cost less, take half the time to build and produce far less emissions" (Nguyen, 2002b, B1). Others agree that there is a provincial shift of electricity production from coal to natural gas, which results in improved environmental performance of the power-generating industry.

> "Tom Adams of Toronto-based Energy Probe (an environmental and consumer advocacy group) said deregulation also should be credited for Alberta's power supply diversifying into a cleaner mix of fuels, away from its reliance on coal, which produces high greenhouse gas emissions. 'Alberta's experience has helped the province move to a much less coal-dependent power system'" (Nguyen, 2002b, B1).

In contrast to the positions outlined above, there are those who claim that the same market incentives will cause negative environmental impacts. For example, there has been a growing concern over the introduction of competition into the power generating industry. It is perceived that deregulation will cause power generators to sell more power, use existing cheap coal power plants longer, and ultimately lead to more pollution (CBC, 2001a, Hauter, & Slocum, 2001, Higley, 2000). Power plant development and corporate selection of environmental technology will be dealt with further in Chapter 4.

There are those who review the situation with a long-term perspective and believe that the shift from coal is temporary, and that Alberta's environmental performance will eventually decline. Thomas Marr-Laing, the director of the Energy Watch Program at the Pembina Institute states that:

> "while we have seen an increase in natural gas generation and wind power relative to coal since deregulation, more than 2,400 megawatts of new coal generation has been announced -- half of this capacity has been approved and one plant is under construction. Companies *are* more wary about placing 40-year bets on coal plants, so, to offset the economic uncertainty of deregulation, the provincial government and industry have agreed to weak (i.e. cheap) pollution-control standards. In fact, Alberta is on a track to increase greenhouse gas emissions from the electricity sector by more than 80 per cent by 2010, with large increases in emissions of particulate matter, nitrogen oxides, sulphur dioxide, mercury and other pollutants as well. The future of deregulation points to higher consumer prices, higher pollution and more coal" (Marr-Laing, 2002, A16).

These comments highlight the need for a long-term perspective when assessing the environmental performance of the power generating industry. The ability to assess the true impact of deregulation on environmental performance may be difficult due to the short time frame that the province of Alberta has experienced deregulation. The OECD states that "an assessment of environmental and reliability performance has to wait until much more information becomes available. Many factors other than competition have a large effect on reliability and environmental impact and therefore it is difficult to isolate the impact of competition" (OECD/IEA, 2001, p.53).

The section above highlighted the opinions of a number of the stakeholders in the power generating industry (i.e., the government, public, and environmental groups). These opinions are critical as stakeholders such as politicians, and environmental groups help to structure the environmental performance of the power generating industry. These opinions are also important as they portray the messages relayed in the media, and ultimately influencing public opinion of the electricity market. This information was used to determine the roles of industry stakeholders and provide an understanding of existing viewpoints regarding deregulation, environmental performance and corporate

competitiveness. The opinions and concerns of the industry stakeholders will be reflected in the final recommendations. The importance of industry stakeholders is also dealt with in more detail in Chapter 5. The specific circumstances of the Alberta deregulation process were also outlined in detail. This information is useful in ensuring that any recommendation reflects the unique market circumstances in Alberta.

2.6 - ALBERTA POWER GENERATION

The previous sections outlined that there are a number of factors that can influence the environmental performance of the power-generating industry. It is also imperative to consider the power generating corporations who ultimately make the decisions regarding the type of fuel to burn as well as the environmental technology that will be used. These decisions impact the environmental performance of the company, influence the overall performance of the industry, and decide the energy production mix of the province. This section provides an overview of the three largest power-generating companies in Alberta as well as a review of the environmental initiatives that these corporations are involved in. The information presented in this section was used to ensure that any recommendation to the industry would reflect the nature of the power generating companies, and be aware of existing environmental initiatives.

The Alberta power generating industry has an installed capacity of approximately 11,335 MW (Alberta Energy, 2002). The majority of this capacity is thermal power, with coal plants making up over 50% of capacity, and natural gas being responsible for roughly one-third (Alberta Energy, 2002). Given the heavy reliance on thermal generation from fossil fuels, the power generation industry is responsible for 23% of the province's greenhouse gas (GHG) emissions (Lakeman, 2002). The remaining power (roughly 10%) is produced through smaller renewable projects; comprised of hydro, wind and biomass (Alberta Energy, 2002). For an overview of the Alberta Power Generating Industry see Table 3. While there are a number of small industrial and independent power producers within Alberta, three main corporations dominate the industry. These corporations are TransAlta, EPCOR and ATCO Power.

TABLE 3 – ALBERTA'S GENERATION CAPACITY

Year End 2001 Capacity (Megawatts)	Coal	Gas	Renewables*	Total Installed
Generation - Utility Owned				
ATCO Power	1,563	105	—	1,668
EPCOR	768	841	—	1,609
TransAlta	3,290	695	795	4,780
Emergency Capability	—	—	—	—
City of Medicine Hat	—	211	—	211
Subtotal	***5,621***	***1,852***	***795***	***8,268***
Generation - Independently Owned				
Industrial	—	950	—	950
Independent Power Producers	42	1,865	210	2,117
Subtotal	***42***	***2,815***	***210***	***3,067***
Interconnections				
British Columbia	—	—	—	800
Saskatchewan	—	—	—	150
Subtotal	—	—	—	***950***
Grand Total	**5,663**	**4,667**	**1,005**	**12,285**

*Includes hydro, wind and biomass. (Alberta Energy, 2002)

TransAlta is the largest power producer within the industry, and currently produces roughly 50% of Alberta's power (Alberta Energy, 2002). Table 4 provides a breakdown of TransAlta's provincial assets. TransAlta Corporation is a larger entity that also owns and operates more than 8,000 MW of generation capacity in countries such as the United States, Australia, and Mexico (CEA, 2002). The corporation has nearly $8 billion in assets, and has more than 2,300 employees (TransAlta, 2002). TransAlta formerly participated in the areas of transmission and distribution, but recently sold those operations in order to focus their efforts on power production.

TABLE 4 – TRANSALTA CORPORATION'S ALBERTA POWER GENERATING ASSETS

Plant	Fuel Source	MW
13 Hydro Plants	Hydro	801
Wabamum	Coal	569
Sundance	Coal	2029
Keephills*	Coal	754
Sheerness	Coal	366
Poplar Creek	Gas	360
Fort Saskatchewan	Gas	120
Meridian	Gas	215

* Keephills planned expansion – 900 MW

(TransAlta Corporation, 2002)

As a result of TransAlta's large reliance on coal-fired generation, the company is the second largest emitter of GHGs in the country (Nguyen, 2002). Only Ontario Power Generation produces more. TransAlta's operations in Canada are responsible for 6% of the country's GHG emissions (Nguyen, 2002). In response to these significant environmental concerns, the corporation has developed a number of environmental initiatives, including:

- The establishment of a ($100 million) Sustainable Development Research and Investment Fund in order to invest in the development in new generation technology as well as renewable energy.
- The registration of corporate power generating facilities with ISO 14001 environmental management systems.
- Formerly a founding member of the Greenhouse Emissions Management Consortium (GEMCo), which provides market-based leadership in greenhouse gas management through a number of mechanisms (Page, 2002).
- The diversification of the corporate power-producing portfolio to include wind energy. The company has now invested a total of $50 million in Vision Quest Windelectric Inc. (Page, 2002).

- Being a founding member of the Canadian Clean Power Coalition, which recently announced a plan to "develop, construct, and operate a full-scale demonstration plant by 2007 to test the technical, environmental and economic viability of new clean coal technology" (TransAlta, 2002a).
- The public declaration of the goal to reduce "Canadian net carbon dioxide emissions from existing operations to zero by 2024" (TransAlta, 2001).

TransAlta further demonstrates its commitment to environmental performance by producing a yearly Sustainable Development Report (Wharton, 2002). The corporation's efforts in reporting have been recognized by a study that analyzed the nature of corporate sustainability reporting in Canada. Of the 35 company reports that were assessed (based on 52 criteria), TransAlta placed fifth overall (Stratos, 2001). The corporation has also been recognized by the Canadian Institute of Chartered Accountants, and given the award of excellence in Environmental and Sustainability Reporting for three consecutive years (CICA, 2001; CICA, 2002; Page, 2002). TransAlta has also been given the distinction of being listed on the Dow Jones Sustainability Group Index (TransAlta, 2001). The index tracks the performance of sustainability leaders across the globe, and is intended to select leaders in their industry based on environmental, social and economic criteria (TransAlta, 2001). Through the accumulation of a large portfolio of initiatives such as those described above, TransAlta demonstrates its commitment to improving its environmental performance.

In comparison to TransAlta, EPCOR is somewhat of a different entity. This corporation is owned entirely by the City of Edmonton. EPCOR produces roughly 15% of the electricity in Alberta (Alberta Energy, 2002). Table 5 lists EPCOR's Alberta generating assets. EPCOR is also involved in electrical transmission and distribution networks, building and operating water and wastewater treatment facilities, as well as infrastructure (EPCOR, 2002). This allows the company to compete in a wide range of industries. The corporation's head office is in Edmonton, and has operations throughout Alberta, British

Columbia, Ontario and the U.S. Pacific Northwest. Currently the corporation has a customer base of 1.6 million, and has over $4 billion in assets (CEA, 2001).

TABLE 5 – EPCOR'S ALBERTA POWER GENERATING ASSETS

Plant	Fuel Source	MW
Taylor Coulee	Hydro	13
Genesee*	Coal	820
Clover Bar	Gas & Landfill	660
Rossdale	Gas	221
Joffre	Gas	416
Weather Dancer	Wind	1

* Genesee planned expansion – 400 MW

(EPCOR, 2002)

Similar to TransAlta, EPCOR is involved in a number of environmental initiatives (EPCOR, 2002). Its activities differ somewhat as EPCOR is a fully integrated utility company that is directly involved with the general public as a sales agent for both power and water services. For this reason, EPCOR participates in certain initiatives that are not common among corporations whose main focus is power generation, such as TransAlta. Some of EPCOR's initiatives include:

- The registration of their power-generating plants with ISO 14001 environmental management systems.
- The voluntary reporting of corporate pollutants to the National Pollutant Release Inventory, which is a legislated, national program to provide public access to pollutant information (EPCOR, 2001).
- The participation in Canada's Voluntary Challenge & Registry program to address the issue of greenhouse gases. "EPCOR has had a greenhouse gas reduction and offset plan in place since 1994. We have continually set, met or exceeded our annual greenhouse gas emission reduction targets" (EPCOR, 2001, p.14).

- The completion of the "world's largest trans-Atlantic trade of carbon dioxide emission offsets" (EPCOR, 2001, p.21).
- Membership in the Greenhouse Emissions Management Consortium.
- The participation in a number of conservation programs, which help EPCOR's customers reduce the amount of energy that is used in homes and businesses.
- Involvement in the Action by Canadians program, a program developed by the Energy Council of Canada, intended to bring the goal of reducing greenhouse gas emissions to a personal level.
- The provision of the customer option of purchasing green power through a green power program.
- The funding and support of research efforts in sustainable resource development and clean combustion technology at the University of Alberta (EPCOR, 2001).

EPCOR also produces a yearly Environment and Sustainable Development Report. In a study analyzing Canadian sustainability reporting (mentioned above), EPCOR's efforts were ranked 13th out of the 35 companies that were evaluated (Stratos, 2001). Through initiatives such as these, it is clear that as a corporation, EPCOR demonstrates a commitment to environmental performance.

ATCO Power is a company that is more comparable to TransAlta as a result of its independent ownership. ATCO Power owns and operates facilities in Canada, Great Britain, and Australia (ATCO, 2001). Including operations in Canada, ATCO Power has 2400 MW of generation capacity operating or under construction, and currently produces 15% of provincial power (ATCO, 2001). ATCO Power is a division of the larger entity known as the ATCO Group. ATCO Group is an Alberta-based corporation with a worldwide group of companies that are active in the areas of power generation, logistics and energy service, as well as technologies and industrials. The corporation employs 6000 people worldwide, and has assets totalling $4.2 billion (ATCO, 2001).

TABLE 6 – ATCO'S ALBERTA POWER GENERATING ASSETS

Plant	Fuel Source	MW
Battle River	Coal	670
HR Milner	Coal	145
Sheerness	Coal	760
Sturgeon	Natural Gas	18
Rainbow Lake	Natural Gas	178
Poplar Hill	Natural Gas	45
Primrose	Natural Gas	85
Joffre	Natural Gas	480
Valleyview	Natural Gas	45

Note: 1 Hydro Plant, 2 Natural Gas Plants currently under construction

(ATCO Power, 2002)

The information available regarding the environmental performance of ATCO is limited. The majority of the literature that is available focuses largely on the ATCO Group, of which ATCO Power is subsidiary (ATCO, 2001). It should be noted that during the course of research for this project, ATCO Power did make changes to its website in order to provide a section on environmental issues. On the web page referring to their environmental performance, ATCO states that it uses the following principles:

- Integrate the environment into decision-making and design.
- Meet or surpass environmental regulatory requirements.
- Build partnerships with customers and others.
- Share information on our environmental impact and collaborate to develop practical solutions.
- Participate in public and regulatory reviews.
- Promote employee environmental awareness.
- Monitor, report, and audit.
- Promote energy efficiency.
- Prepare for environmental emergencies.
- Support appropriate environmental research (ATCO, 2002b).

As a result of the standards enforced by the Canadian Electricity Association, ATCO began establishing environmental management systems for its power generating stations. The first station to receive ISO 14001 registration is the Sheerness plant (ATCO, 2001). This is the plant that is co-owned by TransAlta. The company also made public a 1999 environmental review of generating plants, and a 2000 environment health and safety report (ATCO, 2002c). The larger entity known as the ATCO Group is a member of The Alberta EcoTrust Foundation as well as FEESA – an environmental education society (ATCO, 2001).

Although these three companies take different approaches to both business and environmental initiatives, they are largely responsible for shaping the environmental performance of electricity generation in the province of Alberta. This section outlined the environmental performance initiatives that the three power generating companies are involved in. It has also been demonstrated that both TransAlta and EPCOR are involved extensively in a number of significant environmental initiatives. Through the analysis of the three companies and their operations recommendations can be directed to specifically address market structure as well as the corporate entities operating within the industry. Each of these three corporations will be referred to throughout this document in order to provide examples of the changes relating to deregulation, environmental performance and corporate competitiveness. Each of the three corporations environmental strategies will be reviewed in more detail in Chapter 5.

2.7 - CONCLUSION

Globally, deregulation has become popular, and the conditions that promote this type of policy are likely to continue to spread. The debate over the positive and negative aspects of deregulation demonstrates the broad and complex nature of the subject. It also reveals the fundamental issue of competitiveness that is the basis of deregulation, and the corresponding shift of responsibility and decision making from government to the free market.

This chapter has outlined a number of issues resulting from the theory of deregulation and the deregulation experience in Alberta. The deregulation process in Alberta has experienced significant regulatory and market uncertainty that has influenced corporate competitiveness, public opinion and environmental performance. It was also identified that deregulation and environmental performance should be approached with a long-term perspective (Marr-Laing, 2002). The introduction to the three large power generators in Alberta established that the approach to environmental performance varied among the corporations and that there are a number of environmental initiatives currently being developed. This proactive work can be used to base further improvements of environmental performance of the industry and will be directly discussed in the final recommendations. It is also important to consider that these corporations have been operating throughout the uncertainty of the deregulation process, and continue to operate within the volatile deregulated market. The key issues (summarized below) presented in this chapter will be dealt with throughout the document, and reflected in the conclusions and recommendations.

2.7 - KEY ISSUE SUMMARY

Recommendations will consider and reflect:

- the important role of the government in shaping the competitive structure of the deregulate market,
- the importance of the role of customers ability to select their energy provider in the deregulated market,
- the importance of minimising the cost of the government's involvement in the deregulated market,
- the government's role in causing the regulatory uncertainty and market volatility that led to a number of problems in the Alberta market,
- the increase in negative media coverage regarding deregulation and the influence on public perception and opinion,
- the importance of viewing the issue of deregulation and environmental performance over the long-term,

- the varied opinions and perspectives from industry stakeholders regarding the issues of corporate competitiveness and environmental performance,
- the important role of power-generating corporations in shaping the environmental performance of the industry,
- the existing initiatives of the power-generating corporations to address the issues of environmental performance of their operations.

3.0 - Chapter 3 – Environmental Legislation and Regulation In Alberta

> "Environmental regulation does not lead inevitably to innovation and competitiveness or to higher productivity for all companies. Only those companies that innovate successfully will win" (Porter & van der Linde, 1995, p.134).

3.1 – Chapter Introduction

The purpose of this chapter is to outline the regulatory and legislative framework that deregulated power generators must consider when making decisions. This chapter will summarize those involved in developing and enforcing environmental regulations within the province of Alberta, and how they impact the environmental performance and competitiveness of the deregulated power generating industry. An overview of the opinions and likely impacts of the Kyoto Protocol is also provided. The information presented in this chapter is used to establish recommendations that reflect the setting of the provincial regulatory structure and integrate with existing environmental legislation. This chapter directly addresses the third objective of this project, the documentation of the role of government in influencing the environmental performance and corporate competitiveness of the deregulated market.

3.2 - The Alberta Energy and Utilities Board

The newly deregulated market is beginning to allow competitive forces to make an increasing number of decisions. As the market is evolving, so is the role of government organizations (AEUB, 2002). The balance between government regulation and free market forces is fundamental in understanding the environmental performance of power generators in Alberta. Therefore, the comprehension of the methods and structure of government control are essential for establishing recommendations regarding the Alberta power generating industry. Under the newly deregulated market structure, the Alberta government utilizes two organizations for the development and enforcement of provincial

environmental legislation. These two organizations are Alberta Environment and the Alberta Energy and Utilities Board (AEUB) (Alberta Resource Development, 2000).

Prior to deregulation, the government of Alberta had a number of regulatory bodies in place to monitor the industry, and process applications for new developments (AEUB, 2002). With the onset of deregulation, the government attempted to streamline these various organizations into a singular entity, the Alberta Energy and Utilities Board (AEUB, 2002). The AEUB was created in February of 1995 through the amalgamation of the Energy Resources Conservation Board and the Public Utilities Board (AEUB, 2002). "The mission of the Alberta Energy and Utilities Board is to ensure that the discovery, development, and delivery of Alberta's resources take place in a manner that is fair, responsible, and in the public interest" (AEUB, 2002).

The AEUB has a number of legislative directives applicable to power plants. These mandates are a part of the provincial Energy and Resources Conservation Act. One mandate requires that the AEUB "give consideration to whether the project is in the public interest, having regard for the social and economic effects of the project and the effects of the project on the environment" (AEUB, 2000). Other mandates require the AEUB "to effect the conservation of, and to prevent the waste of, the energy resources of Alberta," and "to control pollution and ensure environment conservation in the exploration for, processing, development and transportation of energy resources and energy" (AEUB, 2000). The AEUB receives applications for new power plants, and must review the application with all of these factors in mind.

> "The AEUB grants approval for construction, connection and operation of new electric power generation and transmission facilities in Alberta. Before considering an application, the AEUB usually requires prior approval from local authorities on land use and right-of-way authorization and approval on environmental matters from Alberta Environment" (Alberta Resource Development, 2000, p.7).

The AEUB also uses a larger set of criteria to determine the outcome of the review process. "In the Board's view, the public interest will be largely met if applications are

shown to be in compliance with existing provincial health, environmental, and other regulatory standards in addition to the public benefits outweighing negative impacts" (AEUB, 2002, p.5). Essentially, the board is there to maintain and ensure that power generators abide by, and operate under the existing legislation provided by other government organizations, and determine if the project is in the public interest (Lota, 2002). In addition to reviewing applications for development, the AEUB plays a significant role as a regulator of the competitive nature of the provincial electricity market. Key responsibilities of the AEUB include: "the regulation of the Transmission Administrator, the regulation of distribution companies (except municipalities and Rural Electricity Areas (REAs) and all matters relating to competition at the retail level" (Heintz et al., 2000, p. 19).

There is little debate regarding the significance of the AEUB in the electricity market. However, there are criticisms regarding the role of the provincial government in shaping regulatory control in the newly deregulated market (Wallace, 2001; Taft & Cooper, 2000). There are those who criticize the governments relinquishing of regulatory control, and state that the government is no longer responsible for key aspects of the electricity industry. For example, the former organization known as the Public Utilities Commission was responsible for providing the cost of electricity generation to the general public in their annual report. Wallace (2001) argues that without that information known to the public and the AEUB, it is difficult to make a decision that is in the public's interest. The issue of the public's interest will be dealt with in more detail in the following sections of this chapter. Wallace (2001) also points to the fact that the Electric Utility Planning Council (now part of the AEUB) was responsible for determining the provincial reserve margins for the market. There are concerns that without a governing body monitoring reserve margins, that costs could rise significantly or brownouts could occur (Wallace, 2001). This issue of reserve margins is discussed further in the following chapter.

Others criticize that the government's attempt to reduce regulatory bodies has been unsuccessful (Taft & Cooper, 2000). Although groups have been amalgamated to create

the AEUB, a number of other government bodies have been created to monitor and regulate new aspects of the market. The government had to create the Market Surveillance Administrator, the Transmission Administrator, and the Power Pool of Alberta (Taft & Cooper, 2000). "As well, the provincial department of Resource Development has become a very active participant in the electricity industry: guiding auctions; closely monitoring industry activities; distributing rebates to offset price jumps; setting a host of regulations; and intervening directly on prices" (Taft & Cooper, 2000, p.9).

While the government is attempting to remove itself from the industry, it paradoxically has created a great deal of regulation and regulatory bodies. As previously mentioned, there is concern that the costs of regulation can increase, rather than decrease. There is apprehension regarding a government that is experiencing higher regulatory costs for an industry that they have less control over (Taft & Cooper, 2000). In addition, the market is more volatile and has consumers paying higher prices for electricity (Nguyen, 2002b). Any recommendation regarding environmental performance and competitiveness should therefore consider the role of the government and the overall cost of implementation. While there has been a dramatic shift in market structure and the government bodies responsible for regulation, the group that deals specifically with environmental regulations has remained constant.

3.3 - ALBERTA ENVIRONMENT

Alberta Environment has been one of the most stable elements in the electricity market throughout the deregulation process (Geekie, 2002). Its mission, which has not changed as a result of deregulation, is to "manage the use of our diverse landscapes to sustain a healthy environment, a prosperous economy and strong communities" (Alberta Environment, 2002). This involves "making decisions regarding the timing and location of water resource allocations and decisions about releases into air, land and water" (Alberta Environment, 2002). Alberta Environment is also responsible for developing and enforcing environmental standards and policies. These policies are intended to be

developed in partnership with industry and the public, with the intention of being fair; yet firm (Alberta Environment, 2002).

As mentioned in the first chapter, the generation of electricity has a number of environmental impacts. The most serious of these relate to air emissions. The release of sulphur dioxide, nitrogen oxides, mercury, carbon dioxide, and particulate matter, are the major concerns with energy production from fossil fuels (Parker & Blodgett, 2001). In order to address the issue of air pollutants, Alberta Environment has established an Air Quality Management System. The key components of this system include: emission standards, ambient air quality objectives, modelling, monitoring, reporting, approvals, and compliance assurance (Angle, 2002). While all of these activities are important components of addressing air quality, the two that have a significant and direct impact on the development of power generating assets are the emission standards and approvals (Geekie, 2002).

3.4 - Air Emission Standards

Air emissions standards are based on the maximum heat rate or maximum power output of the unit as well as the long-term performance of the installed pollution control equipment (Angle, 2002). The standards are loosely based on the currently available emission reduction technology (Griffiths, 2002). For a number of years, the province was using guidelines established in 1993 at the national level (Griffiths, 2002). These guidelines were based on the technology available during the 1980s (Griffiths, 2002). The Alberta government was not concerned with the dated guidelines because of the limited development of power generating assets in the province over a number of years (Griffiths, 2002). The government was forced to reconsider these standards as both TransAlta and EPCOR were beginning to develop plans to build two large coal-fired power plants (Griffiths, 2002). The government was forced to act, and do so quickly. Alberta Environment reviewed the national standards, and on June 15, 2001 the government produced the "Emission Standards for New Coal-Fired Plants" (Angle, 2002). See Table 7 for a comparison of the 1993 national standards with the provincial

standards established in 2001. It should be noted that the provincial emission standards for coal-fired plants will be reviewed again by Alberta Environment in 2005 (Geekie, 2002).

TABLE 7 – COMPARISON OF EMISSION STANDARDS, 1993 VS. 2001

Emission	1993 - ng/joule	2001 - ng/joule
Particulate Matter	43	13
Sulphur Dioxide	258	180
Nitrogen Oxides	170	125

(Angle, 2002)

Table 8 compares the newly established Alberta emission standards with those of other provinces and countries.

TABLE 8 – REGIONAL AND COUNTRY COMPARISON TO ALBERTA AIR EMISSION STANDARDS

Location	Total Particulates (ng/J)	Sulphur Dioxide (ng/J)	Nitrogen Dioxide (ng/J)
Alberta (2001)	13	180	125
British Columbia	10	90	150
US EPA	13	70-90% Removal	64
Germany	18	140 (or 85% Removal)	70
The Netherlands	7	70	70
United Kingdom	9	70-105	21-95

(Griffiths & Marr-Laing, 2001, p.21)

Reviewing the information presented in Table 8 shows that the 2001 Alberta standards are generally weaker as compared to some of the other provinces and countries. This has lead to some criticism. The Pembina Institute points out that the development of these standards was questionable (Griffiths, 2002). They stated that the standards themselves were rushed as a result of the impending development of coal-fired plants (Griffiths, 2002). The initial draft had the limit for sulphur dioxide set at 150 ng/J, but when the final document was announced the limit had increased to 180 ng/J (Griffiths, 2002). There was also a concern expressed regarding the lack of consultation relating to the development of these new standards (Griffiths, 2002; Page, 2002). The Pembina Institute

also argued "the interim standards were not based on scientific criteria, and therefore, should not be relied upon" (AEUB, 2001, p.55).

Despite the negative opinions surrounding the development of the emissions standards, these standards dictate the environmental performance of coal-fired generating plants in Alberta. Small changes in the emission standards dramatically influence the overall economic projections for power generating assets (Page, 2002). The stricter the air emission standards get, the more expensive environmental technology is required to met them (See Chapter 4 for an exploration of economic issues surrounding power generating assets). Increased environmental technology also impacts the overall efficiency of the operation (Griffiths, 2002). Efficiency is negatively impacted as a result of the increased energy demands of the additional technology (Griffiths, 2002).

There are also other considerations about setting the emission standards at strict levels. If the standards in a deregulated market are too strict, this may discourage investment, as the risk premium required by investors would also rise (OECD/IEA, 1999a). This could create similar problems to those experienced in Alberta during the transition to deregulation. The transition caused a great deal of regulatory uncertainty resulting in a decline in the investment relating to power generating assets (OECD/IEA, 1999a). The lack of investment prompted higher prices as the provincial supply of electricity became limited. Therefore recommendations will address both the established level of emissions standards as well as the resulting impacts on market stability that is caused by uncertainty.

While there is a concern that strict environmental standards would act to discourage investment, environmental groups feel that the emission standards should be stricter, resulting in fewer emissions. Both the Pembina Institute and Pollution Probe have stated this opinion in interviews (Griffiths, 2002; Ogilvie, 2002). These groups also felt that the government needs a comprehensive policy regarding all of the environmental issues of power generation (Griffiths, 2002; Ogilvie, 2002). Suggestions were made regarding a long-term government initiative to outline a complete set of regulations covering all

environmental impacts of power production (i.e., sulphur dioxide, nitrogen oxides, mercury, particulate matter, and carbon dioxide) (Griffiths, 2002; Ogilvie, 2002). One type of long-term environmental initiative that has been used by governments is a covenant or sectoral agreement (Bastmeijer, 1994). This type of negotiated agreement between government and industry sectors has been used to provide long-term stability and certainty regarding environmental regulations and legislation (Bastmeijer, 1994). The need for a comprehensive long-term plan and the covenant agreement will be discussed directly in the final recommendations.

Both environmental groups recognized the need for a comprehensive plan addressing the environmental performance issues of the power-generating industry, and they also expressed recognition of the important role of the government (Griffiths, 2002; Ogilvie, 2002). While it is understood that individual power-generating corporations could do more individually, they must meet the established government standards. This highlights the importance and responsibility of the government in determining the environmental performance of power generators (Griffiths, 2002; Ogilvie, 2002).

The establishment of emissions standards is one key element used by the Alberta government. There are also other less direct methods that the government can use to regulate the environmental performance of the power generating industry. Two recent applications to the AEUB for the development of coal-fired plants in Alberta demonstrate the methods that the government can use to influence power generator's environmental performance. The rulings made by the AEUB can both direct and recommend that companies pursue environmental initiatives. These directions and recommendations specifically shape the environmental performance of the power generating industry. These applications also reveal the problems and limitations that can occur in a deregulated market with respect to the government's attempts at improving environmental performance.

3.5 - Applications to the AEUB for New Coal Plants

Recently the AEUB received two applications for the development of coal-fired power generating facilities in Alberta. EPCOR was the first to apply to the AEUB in the spring of 2001. "EPCOR Generation Inc. and EPCOR Power Development Corporation have applied to the Alberta Energy and Utilities Board and Alberta Environment for approval to construct and operate a 490-megawatt expansion at its existing coal-fired Genesee plant (GP3)" (AEUB, 2001, p.1). TransAlta applied shortly after in the summer of 2001 in order to "construct and operate two 450 Megawatt generating units (Keephills 3 and 4) at its existing Keephills coal-fired power plant site" (AEUB, 2002a, p.1). Given that there had not been a proposal for coal-fired plants within the province for roughly 20 years, the decisions from the AEUB would be very important (Griffiths, 2002). The board responded accordingly and placed Neil McCrank, the chairman of the board, to oversee both of the applications. This was viewed as recognition of the significance of these two proposals (Griffiths, 2002).

In order to better understand the AEUB's rulings on these applications it is important to be familiar with the basics of each proposal. EPCOR's application proposed a 490 MW expansion (GP3) to its existing Genesee coal-fired power plant. After reviewing the available coal combustion technologies, EPCOR selected supercritical pressure pulverized coal combustion technology. This technology is approximately 10% more efficient than the existing subcritical units in their Genesee plant (AEUB, 2001). As a result of the improved efficiency there would be a reduction in EPCOR's air emissions from the newly installed unit. "Through this selection process, EPCOR believed that it had put together a project, which represented the most advanced coal combustion power generating facility ever built in Canada" (AEUB, 2001, p.51).

EPCOR's application also selected a variety of equipment in order to effectively deal with the emission of sulphur dioxide, nitrogen oxides, and particulate matter. EPCOR stated that the coal-fired plant would greatly outperform the standards that were in place at the time (AEUB, 2001). The standards being referred to were the older national

standards established in 1993 (Griffiths, 2002). It was at this time that the new 2001 provincial standards were being developed. The government announced the new source performance standards while EPCOR's application was with the AEUB. EPCOR followed this announcement with a statement saying that it would meet the new provincial standards, and repeated earlier claims that the plant would be the most efficient in Canada (AEUB, 2001). Following this, EPCOR made further voluntary commitments to reduce emissions of sulphur dioxide and particulate matter closer to the standards established by the United States Environmental Protection Agency (EPA) (AEUB, 2001). See Table 9 for a comparison of EPCOR Genesee 3 performance standards compared to the 2001 provincial standards, and the United States EPA standards.

TABLE 9 – COMPARISON OF ALBERTA, US EPA, AND EPCOR GENESEE 3 PERFORMANCE STANDARDS

Standards	Total Particulates (ng/J)	Sulphur Dioxide (ng/J)	Nitrogen Dioxide (ng/J)
Alberta (2001)	13	180	125
US EPA	13	70-90% Removal	64
EPCOR Gen 3	8.6	78	125

EPCOR's application also addressed the issue of greenhouse gases (GHG). "Specifically for GP3, EPCOR committed to offset carbon dioxide emissions to the equivalent of a natural gas, combined-cycle generating facility of the same capacity, on a corporate net basis, which represents a 53% reduction of GHGs attributable to GP3" (AEUB, 2001, p.53). This target was achieved through the use of supercritical technology, offset programs as well as carbon dioxide emissions trading.

The interveners in the hearings raised a number of issues with EPCOR's application. The Clean Energy Coalition (CEC - of which the Pembina Institute is a member) suggested that the least polluting coal combustion technology should have been used (AEUB, 2002). Currently this technology is considered to be the integrated gasification combined cycle technology (IGCC). The CEC also stated that the new generating unit would produce emissions for sulphur dioxide and nitrogen oxides at levels far greater than the

US EPA standards (AEUB, 2001). In response to this criticism, EPCOR pointed out that the plant was going to be the most efficient coal-fired generating unit in Canada, and that the IGCC technology was not commercially proven or ready for market (AEUB, 2001).

As a result of TransAlta's proposal following EPCOR's, the two applications were compared throughout the approval process. The consequences and impacts from this comparison will be addressed in Chapter 5. TransAlta was proposing the addition of two 450 MW generating units to its Keephills coal-fired plant. TransAlta decided upon a subcritical cycle boiler for its expansion (AEUB, 2002a). This decision was based on internal reviews against established corporate criteria, as well as its own corporate experience in operating boiler technology (Page, 2002).

> "TransAlta admitted that the selected subcritical cycle technology would be about 3% less efficient than a same-sized super critical technology (the technology selected by EPCOR) but defended its decision stating that the expected down-time due to failures for a super-critical boiler could be as high as 6% to 7%, as compared to just 2.6% for a conventional subcritical boiler. This posed unacceptable business risk for the company" (AEUB, 2002a, p.60).

TransAlta then selected the technology that would be used in order to address the primary source emissions from the plant. TransAlta selected technology similar to that used in the EPCOR application. However, some of the equipment was smaller and less efficient (AEUB, 2002a). This fact, combined with the use of subcritical technology resulted in the Keephills 3 and 4 units to produce emissions of 13 ng/J of particulate matter, 180 ng/J of sulphur dioxide, and 125 ng/J of nitrogen oxides. These levels were the exact amounts specified by the recently adopted 2001 provincial source emission standards. Two of the interveners in the application process, the CEC and the Paul First Nation pointed out that the TransAlta design achieved a level of environmental performance far below the proposal of EPCOR (AEUB, 2002a). The CEC stated;

> "that the net efficiency of the proposed Keephills 3 and 4 using sub-critical boiler technology would be 35.6%. This would be almost 3% less efficient than EPCOR's proposed Genesee plant, which would be using super critical technology. This difference of 3% lower efficiency would translate into 8%

> or 9% higher level of emissions of pollutants and green-house gases per unit of heat" (AEUB, 2002a, p.61).

This section has outlined the basic details of both TransAlta's and EPCOR's applications to the AEUB, as well as some of the comments and concerns raised by hearing participants. Using the details of the applications as well as the views from the interveners, the AEUB evaluated the proposals and made rulings on both applications.

3.6 - AEUB RULINGS

Given the differences between the applications, the AEUB had to carefully consider each project in order to determine if the proposals were in the public interest. The wording of the decision, directions and recommendations is significant as each of these items will likely appear in the final plant approval. The distinction between a direction and recommendation is that directions are items that the AEUB has direct legal jurisdiction over, and has the authority to direct the actions of the company. Recommendations are items that another government body (e.g., Alberta Environment) has legal jurisdiction over and through the process of the hearing the AEUB felt that a particular course of action was appropriate (Roberts, 2002).

EPCOR's proposal for the expansion of the Genesee plant was approved, and the AEUB stated that the project was in the public's interest (AEUB, 2001). The AEUB made a number of statements regarding EPCOR's selection of supercritical pressure pulverized coal combustion technology.

> "The Board is very encouraged at EPCOR's decision to improve upon the coal combustion technology used in plants currently operating in Alberta and elsewhere in Canada. Indeed, the Board is of the view that it is prudent for proponents of new coal fired generating capacity addition in Alberta to show improvement in technology selection over that used at existing coal fired power plants" (AEUB, 2001, p.58).

In response to the previously mentioned claims of CEC regarding the suggestion for the use of IGCC, the AEUB stated that it accepted EPCOR's technology review, and that IGCC is "some years away from commercial adoption for the plant size proposed for

GP3" (AEUB, 2001, p. 59). The AEUB also commented on the fact that the plant would be emitting relatively high levels of nitrogen oxides (Table 9). The AEUB noted that while GP3 will meet the current standards for nitrogen oxides, there does exist technology that could significantly limit this emission (AEUB, 2001). This comment has no legal ramifications but does point out that the AEUB is aware that EPCOR could do better in this area. In order to improve the application, the AEUB included a number of directions. The majority of the 18 directions outlined in the AEUB ruling document focused on developing and improving studies, as well as the monitoring of the various impacts of plant emissions on the surrounding area (e.g., water monitoring, mercury monitoring, health exposure study) (AEUB, 2001).

The AEUB also included 11 recommendations that largely dealt with data accumulation, sampling, monitoring, and health issues (AEUB, 2001). One of the AEUB recommendations stated: "The Board recommends EPCOR to continue to strengthen its research efforts regarding: 1) cleaner coal burning technology, and 2) the processes and pathways of EPCOR's source emissions of mercury in the local and regional environment" (AEUB, 2001, p.67). The issue of clean coal technology will be discussed throughout the document and addressed in the final recommendations. Mercury emissions will be discussed further in the following sections of this chapter. Using these directions and recommendations, the application would then be passed on to Alberta Environment for Environmental Protection and Enhancement Act approval.

The AEUB also ruled to approve TransAlta's two-unit expansion of its Keephills coal-fired power plant. Similar to the ruling on EPCOR's technology selection, the AEUB made comments regarding TransAlta's selection of pulverized coal combustion subcritical cycle technology and the related emission control technology.

> "The Board is of the view that the selection of technology, as it directly affects the economics of the project, should be left to the decision of the proponent. This would be consistent with the intention of legislation that the electric generation sector in Alberta should be developed through workings of a competitive market. It follows that a company's ability to remain

> competitive in the market would ultimately determine the choice of technology" (AEUB, 2002a, 64).

The board in this statement is directly commenting on the issues of deregulation, environmental performance. and corporate competitiveness. The AEUB bounded by legislation in the province, must allow the corporations to make the ultimate decision on what they deem to be economically viable. The AEUB's ability to enforce environmental performance can only go as far as the legislation allows. This relates to the previous comments regarding the recognition by the Pembina Institute that government's are only as effective as the standards that it enforces (Griffiths, 2002).

> "The Board is satisfied that the technologies selected by TransAlta are capable of meeting the Alberta regulatory requirements and guidelines and would not represent a risk to the health and safety of the public. Therefore, the Board will not require TransAlta to change its proposed technologies" (AEUB, 2002a, p.64).

The AEUB included in its comments statements saying that there is technology available that is more efficient and effective at pollution abatement (AEUB, 2002a). The AEUB ruling also includes 21 directions and 24 recommendations relating to monitoring, studies, information gathering, reclamation, and community development (AEUB, 2002a). The final recommendation made by the board demonstrated the new reality that power generators face when developing thermal fuelled generating plants in a deregulated market.

> "The Board recommends that since changes to the current source emission standards are reasonably foreseeable, it is prudent for proponents of new power plants to incorporate flexibility into their projects so that compliance could be assured within a reasonable timeframe" (AEUB, 2002a, p.75).

This section summarizes the AEUB rulings on the EPCOR and TransAlta applications. The information in this section was utilized to make recommendations that deal with the limitations of the government and reflect the important environmental issues identified by the AEUB. The rulings provided by the AEUB highlight three key issues relating to environmental performance and ultimately corporate competitiveness in the province. These three issues include the notion of 'grandparenting' with respect to environmental

legislation, the future of mercury emission standards, and the notion of project need. Each of these issues will be described in more detail in the following sections of this chapter.

3.7 - GRANDPARENTING

Despite differences in the environmental performance of the technology proposed in the two applications described above, the AEUB was clear in stating that environmental regulation is going to change in the future, and so will the new power plants. In the ruling on TransAlta's expansion the AEUB stated "that it is desirable for Keephills 3 and 4 to take into account the likelihood of stricter environmental standards, and in particular, more stringent emissions source guidelines and standards" that are coming from both the provincial and federal governments in the near future (AEUB, 2002a, p.68). The AEUB went further and suggested that Alberta Environment during their Environmental Protection and Enhancement Act (EPEA) approval process should "define how reasonably foreseeable revisions to Alberta's emission standards, including mercury, are to be implemented by TransAlta, including appropriate compliance timelines" (AEUB, 2002a, p.68).

EPCOR received similar comments from the AEUB stating that they "consider it to be very important that proponents must consider incorporating flexibility in the design of new power plants so they may adaptively respond to a changing regulatory environment" (AEUB, 2001, p.58). The Environment Minister Lorne Taylor made public remarks relating to the issue of grandparenting, stating "that he is not personally inclined to 'grandfather' the expansion plans for the Epcor and TransAlta Utilities power plants west of Edmonton" (Edmonton Journal, 2002, A14). Mr. Taylor went on to state "it would be a disaster if TransAlta was allowed to hold to those standards for the next 40 years" (Edmonton Journal, 2002, A14). These statements clearly demonstrate that the issue of grandparenting is receiving significant attention from all levels of government and should therefore be an issue that is addressed in the recommendations of this document.

The fact that the AEUB and Alberta Environment are suggesting this type of environmental regulation has significant impacts on both the environmental performance and competitiveness of power generating assets within the province. This will ensure that power-generating assets, despite their age or environmental performance, will be given timelines to meet "reasonably foreseeable" environmental standards (AEUB, 2002a, p.75). In the past, once permits were granted for power generating assets, the corporations were not asked to change their facilities beyond their 10-year operating licences (Page, 2002; Roberts, 2002). This will have the impact of changing the forecasting done by power generators to address periods of less than 10 years. This creates a number of challenges for power generating corporations as a result of the plants being operational for much longer periods of time (i.e., 30-40 years).

Interviews with power generating representatives revealed two concerns relating to this issue. The first concern related to the words "reasonably foreseeable" (AEUB, 2002a, p.75). The AEUB's statement of 'reasonably foreseeable' environmental regulations was referring to the provincial review of emissions standards in 2005, as well as the national review of mercury standards (likely in 2003) (AEUB, 2002a). However, there is a concern over the interpretation of the words 'reasonably foreseeable' (Page, 2002). Corporations are wondering what this phrase means, how far into the future it applies, and what type of legal liability might be attached to an EPEA approval that includes those words. The second concern relates to the notion of flexible design. The AEUB also states that the generating facilities should be built with a flexible design (AEUB, 2001; AEUB, 2002a). Executives point out that it is difficult to design a plant for technology that does not currently exist (Page, 2002). This increases the level of uncertainty in a corporation's investment strategy.

The uncertainty regarding future environmental standards only adds to the already volatile nature of the deregulated market. The uncertainty caused by the issue of grandparenting will be directly addressed in the final recommendations, while the economic considerations regarding the issue of grandparenting will be discussed in the following chapter.

3.8 - MERCURY AND POWER GENERATION

The subject of mercury emissions relating to power generation raises a number of important issues regarding environmental performance and corporate competitiveness. The release of mercury into the environment is a very serious concern given the negative biological impacts of this substance.

> "Mercury is a toxic heavy metal that persists in the environment once it is released into the atmosphere. Concern about high levels of mercury deposition and subsequent bioaccumulation in aquatic ecosystems – a phenomenon that can pose health risks for humans and animals that eat mercury-contaminated fish" (NESCAUM, 2000).

Mercury is connected to power generation as a result of the fact that "coal-fired power plants are the main source of anthropogenic mercury in Western Canada" (Griffiths & Marr-Laing, 2001a, p.14). Given the negative consequences of mercury being released into the environment it is clear that power generators must address this issue. The AEUB rulings discussed this problem in detail and stated, "the issue of mercury contamination is one that remains of significant concern" (AEUB, 2001, p.63). Both rulings stated that the companies should be aware of the Federal initiative involving the Canadian Council of Ministers of the Environment (CCME) which is going to be meeting in 2003 to develop Canada-wide standards for fine particulates, ozone and mercury emissions (EPCOR, 2002, p.28). Mercury emissions are an environmental performance issue that is gaining attention from both provincial and federal governments. Yet, the future of environmental regulation relating to mercury remains uncertain.

The Canadian Electricity Association (2002) recently released a document entitled "Investing In a Sustainable Electricity Future" which addressed the issue of mercury emissions from power production (CEA, 2002). The document states that "mercury emissions must be steadily reduced, but at present the technology is not available even to accurately measure, far less reliably capture, such emissions" (CEA, 2002, p.7). This comment highlights the complexity of mercury emissions for power generators.

Technology is available that is designed to remove mercury from emissions. However this technology has been shown to be both unpredictable and unreliable (Page, 2002).

Despite the current uncertainty, power generators will be forced to act once a standard is implemented. This fact was established in the previous section on grandparenting. TransAlta and EPCOR will be required to meet the forthcoming mercury emission standards (AEUB, 2001; AEUB, 2002a). The cost and nature of the technology that will be used to address the issue of mercury are currently unknown. Power generators are told to build their generating stations with a flexible design to allow for future additions of environmental technology (AEUB, 2002a). This is a difficult task given that at this time no one is certain what type of technology will be developed to deal with the issue of mercury emissions (CEA, 2002). There is also significant uncertainty regarding the cost of the technology that would be developed or implemented (CEA, 2002). These factors add to the overall uncertainty of future plant economics. The issue of mercury also demonstrates the importance of technology in shaping the environmental performance of power generation. Recommendations regarding environmental performance will reflect the current availability and limitations of existing technology. Currently the AEUB addresses mercury emissions by ensuring that power generators are involved in monitoring and measuring studies that will be used to provide information to the CCME in order to establish future standards (AEUB, 2001; AEUB, 2002a; CEA, 2002). The final recommendations will consider and reflect the complex issues raised by mercury emissions.

3.9 - Project Need

The AEUB rulings also demonstrate the newly developing (i.e., post deregulation) issue of project need. Prior to deregulation, the AEUB was forced to consider whether or not power-generating assets were needed within the province given the level of supply and the current reserve margins (Roberts, 2002). The issue of need is no longer considered by the AEUB, and the power generators themselves acting within the market will be required to make these decisions. The interveners of the EPCOR and TransAlta

applications made statements with regards to project need (AEUB, 2001; AEUB, 2002a). Interveners suggested that the citizens of Alberta do not require the power that will be generated from the two plants, and that the intention of both developments is to export to other markets (AEUB, 2001, 2002a). There is concern that the power plants will export their power, resulting in Albertans dealing with the environmental consequences without receiving any of the benefits.

The AEUB states that although issues relating to health, safety, and the environment relating to an export plant are of concern, the legislative changes that have occurred have replaced its authority with a competitive electricity generation market (AEUB, 2002a). This is a definitive response from the AEUB, and makes the issue seem simplistic. However, project need raises a number of issues and concerns regarding the role of the AEUB, and the environmental performance of power generators in a deregulated market.

Comments made by the Pembina Institute on behalf of the CEC describe a number of the issues and impacts regarding project need and the notion of developing power plants that will export their production.

> "If Alberta is to export surplus electricity to the U.S., which is clearly the long-term intention of the utility companies and government, Albertans should be consulted as to whether or not they are willing to accept the social and environmental impacts of the new power projects. It would also seem reasonable to ensure that Alberta's standards are not lower than those in the U.S. Otherwise, Alberta could become a pollution haven, while the U.S. benefits from the electricity at no environmental or human health costs – with negative results for the health of Albertans and our environment, and placing our industry at potential future risk of cross-border trade challenges" (Griffiths & Marr-Laing, 2001, p.20).

An interview with Mary Griffiths (2002) from the Pembina Institute revealed that as part of the CEC they were taking legal action regarding this issue and appealing both the EPCOR and TransAlta AEUB decisions. The CEC is currently launching an appeal using the Sierra Legal Defense Fund and the case is before the courts (Griffiths, 2002). This limited the ability of the Pembina Institute to comment on the issue of project need. It is known that the precedent for leave to appeal an AEUB decision related to a proposal

for the development of a gas plant in the city of Edmonton (Griffiths, 2002). A court of appeal judge had previously decided to grant leave to appeal the AEUB's decision regarding the approval of the gas plant. The legal challenge put forward by the CEC is based on the notion that the AEUB did not fully consider the public interest regarding the need for the power generating facilities (Griffiths, 2002).

There are a number of areas that should be considered when discussing the export of power from Alberta. The current provincial transmission system is not designed for a significant export market. Recently, there has been interest shown regarding plans to improve this system. The main discussion of the issue is in regards to a proposal that would create a link from Alberta to British Columbia, Saskatchewan and the US. This is known as the Alberta "T" proposal (GCSI, 2001, p.20). Other statements outside of this proposal have come from the provincial government stating that they support the development of transmission lines for the purpose of exporting electricity (Teel, 2002).

While the government seems to be showing interest in a growing electricity export market, the reality of the situation is more complicated. The provincial system does not currently have the capacity to export a large amount of electricity. The current exporting that does occur between Alberta and British Columbia results in economic advantages for both markets (Page, 2002). The nature of the two provincial power production methods (i.e., hydro and thermal) allows for the systems to complement each other, resulting in lower prices for both markets (Page, 2002). The development of a transmission link to the United States would be limited due to the prohibitive distance to large American electricity markets (Page, 2002). In addition, there currently are no applications before the AEUB regarding the development of plants designed to export electricity outside of Alberta (Page, 2002). Therefore the likelihood of the development of an export market under current conditions and current technology is minimal. However, the topics of project need and electricity export markets raises a number of important issues.

Corporations now have the ability to decide the details of project development in the province of Alberta (AEUB, 2002a). Regardless of the growth of an export market the

topic of project need does affect issues of environmental performance and corporate competitiveness. Although the development of an export market seems unlikely, industry stakeholders including the government and environmental groups are concerned with this topic. This means that the debate over project need will likely continue into the future. Project need also raises a number of questions for the AEUB. At what point will the AEUB deem a power generation project to not be in the interest of the public? How large could Alberta's energy export market grow before the environmental consequences become an issue? The outcome of the appeal process may help to answer these questions, as will the development of new projects in Alberta. This is important for power-generating corporations due to the fact that they would likely be interested in any export opportunities that would expand the market for their power plants. As previously mentioned, the issue of project need raises direct questions regarding the impact of deregulation on environmental performance and corporate competitiveness. Recommendations will directly address the factors related to the potential growth of an Alberta export market and the related environmental concerns.

3.10 - The Kyoto Protocol

Another significant topic regarding environmental legislation is the national issue of the Kyoto Protocol and its potential impacts (Page, 2002). This agreement will likely influence both the environmental performance and corporate competitiveness of Canadian power generators. A complete review of the impact of the Kyoto Protocol on the Alberta power-generating industry is beyond the scope of this project. However, the impending ratification of this agreement raises a number of issues that should be addressed. These include the implementation plans put forth by both the federal and provincial governments and the broad range of impacts on the power generating industry. The response by the industry to these government plans and initiatives also demonstrates how power-generating corporations are addressing climate change and their concerns regarding implementation. Each of these issues will be discussed in the following section.

On an international scale, addressing climate change began in 1992 when 180 countries (including Canada) "signed the United Nations Framework Convention on Climate change (UNFCCC), which set out the principles and framework for a global response to reduce GHG emissions" (Government of Canada, 2002, p.12). The UNFCCC came into effect in March of 1994, and had a minimal impact on global emissions (Government of Canada, 2002). In response to this the Kyoto Protocol was completed in 1997 (Government of Canada, 2002). The new agreement established legally binding emissions targets for industrialized countries. Canada established a target of 6% reduction of GHGs below 1990 levels, to be completed between 2008 and 2012. In the fall of 2001, international negotiations were completed that outlined the methods that would be used to reach the Kyoto targets (Government of Canada, 2002). At that time, the Canadian Federal Government began to seriously consider the ratification of the protocol.

In the spring of 2002 the Federal Government released "A Discussion Paper on Canada's Contribution to Addressing Climate Change" (Government of Canada, 2002). This paper outlined four proposed plans that outlined how Canada would meet the established Kyoto targets. The government's plan to reduce GHGs included comments regarding the electricity sector. The likely reason for this attention is that "electricity production currently accounts for about 17 percent of human-induced GHG emissions" in Canada (CEA, 2002, p.3). Any plan addressing GHGs would have to consider the electricity industry. The federal government's plan outlined a number of initiatives directed towards the power generating industry (Government of Canada, 2002).

The initiatives relating to the electricity industry focused mainly on the areas of research and production (Government of Canada, 2002). The document stated that the GHG reduction strategy for the electricity sector would focus on "zero- or low-emission technologies for new-generating capacity, reducing emissions from existing generating stations, expanding east-west transmission systems, increasing hydraulic generation and developing and commercializing technologies for clean coal combustion and carbon

dioxide capture and storage, particularly from coal-fired generation" (Government of Canada, 2002, p.27).

The document also addressed the likely impact that the Kyoto Protocol would have on the overall competitiveness of the power generation industry. "Some parts of the Canadian electricity industry could also face competitiveness pressures, particularly in western Canada, due to electricity imports from the U.S. These pressures are expected to increase with increased integration of the North American electricity market and wholesale competition" (Government of Canada, 2002, p.17). The Federal government also recognised that in order to achieve the goals of Kyoto it would have to begin working directly with industry to achieve environmental performance goals (Government of Canada, 2002). The willingness of government to work directly with industry will be discussed in more detail in the following sections. Given the serious commitment outlined by the Kyoto protocol, many groups, industries and provinces reacted to the issue (Government of Alberta, 2002; CEA, 2002a; EPCOR, 2002a; ATCO Power, 2002a; Page, 2002a). As described in the following paragraphs the majority of the reaction by these organisations to the Federal Government's plan was negative.

The provincial government of Alberta released their plan to address climate change in response to the Federal Government's document. The document was released in the spring of 2002 and titled "Albertans and Climate Change: A Plan for Action" (Government of Alberta, 2002). The purpose of the document was to demonstrate that Alberta was concerned with the issue of climate change and that they could develop a plan that was "made-in-Alberta" (Government of Alberta, 2002, p.1). The plan was intended to provide an alternative to Kyoto, using what Alberta described as a technologically driven solution as opposed to a political solution (Government of Alberta, 2002). The plan also intended to take immediate action and "set a more realistic, and longer time frame to reflect technology lead times and expected capital stock turnover" (Government of Alberta, 2002, p.1). The document also provided a number of key actions that could be taken by the government. The key initiatives relating to the power generating industry included the following actions.

- Implement a mandatory greenhouse gas emissions reporting program for large emission sources.
- Facilitate and negotiate agreements with specific economic sectors, (including electricity, oil and gas, transportation, forestry, municipalities and other industries to gain commitment for action for reducing greenhouse gas emissions).
- Lead the development of an approach to emissions trading that reflects Alberta's unique needs and circumstances, complements the negotiated sectoral agreements, and works with national, continental and international systems (Alberta Government, 2002, p.3)
- Development of cleaner coal technologies for electricity generation. (Alberta Government, 2002, p.15).
- Facilitating access to electricity generated from a diversity of energy sources and energy conservation alternatives.
- Assess opportunities to enhance market signals for low impact generation.
- Continue to reduce regulatory barriers for low impact electrical generation.
- Examine roles of different players in the market (e.g. generators, distribution companies, retailers, energy performance contractors) and identify opportunities for pursuing energy efficiency improvements. (Alberta Government, 2002, p.15).

The plan proposed by the Alberta Government was very specific with regards to two issues, local conditions and the role of technology. First, the plan attempts to reflect the economic nature of the Alberta energy industry in order to allow for more effective and efficient integration and implementation (Alberta Government, 2002). This is an important consideration for national environmental legislation. This also links directly to the previously mentioned point regarding the understanding of the Alberta power generating industry, and how this allows for more effective and relevant recommendations to be developed. Secondly, the provincial government's plan

recognizes the important role of technology, and the time needed to develop it (Alberta Government, 2002). The importance of technology in addressing environmental performance was mentioned previously and will be discussed further in the next chapter. These are two important aspects of the provincial government's plan that are considered and reflected in the final recommendations of this project.

While the Federal and Provincial plans are different, they did contain two similarities that are relevant to this research. Both plans recognised the important role of clean coal technology in addressing the environmental performance of power generation in Canada (Alberta Government, 2002; Government of Canada, 2002). Clean coal technology was previously mentioned in a recommendation from the AEUB and this will be dealt with specifically in the final recommendations. The second similarity of the two proposed plans was the willingness of the governments to negotiate or work directly with industry (Alberta Government, 2002; Government of Canada, 2002). The Alberta government made specific plans to negotiate a sectoral agreement with the electricity industry (Alberta Government, 2002). This willingness to negotiate directly with industry demonstrates further support for the previously mentioned covenant agreement. These negotiations regarding GHG emissions could be expanded to include a broader range of environmental performance issues related to power production. The recommendation of the covenant agreement will be discussed further in the final chapter.

The release of the Federal and Provincial documents prompted significant media attention. However it was the Federal Government's document that received the most feedback. There was a strong reaction from provincial governments and industry regarding the proposal put forward by the Federal Government (Alberta Government, 2002; CEA, 2002a). In June of 2002 the Canadian Electricity Association (CEA) released a "Commentary on the Federal Discussion Paper on Climate Change" (CEA, 2002a). The document outlined the views of the electricity industry and pointed out that the timeline for meeting the Kyoto targets was unrealistic (CEA, 2002a). It stated that the government paper provided little detail on how these targets were going to be achieved (CEA, 2002a). The paper also stated "Canada's electricity industry has one of

the world's lowest greenhouse gas (GHG) emissions rates due to the huge role that hydro and nuclear play in our mix (61% and 13% respectively). Only about 26% of Canada's power comes from CO2-emitting sources such as coal, oil or gas" (CEA, 2002a, p.2). The CEA directly supported the fuel source of coal and stated that this resource would be an integral component of the future of Canadian power production (CEA, 2002a). This demonstrates further support for the use of coal for power production in Canada. CEA also stated that a number of the estimates, models and figures presented in the document were likely incorrect (CEA, 2002a). The document also pointed out that the government should consider options other than the Kyoto Protocol for developing a greenhouse gas reduction strategy (CEA, 2002a).

The government's discussion paper also prompted a response from the power generating companies in Alberta, including EPCOR, TransAlta and ATCO. The large response from the power generating companies can be linked to the issue of deregulation and the new market structure in Alberta. Given that companies in Alberta are operating under a competitive market structure they are more likely to be affected by any Federal environmental legislation. The majority of provinces (with the unique exception of Ontario) operate under regulated conditions. These provincially owned utility companies will receive support and backing from their governments. Deregulated utility corporations operate in a competitive market and are more independent than regulated companies. Therefore the issue of Kyoto impacts the province of Alberta's power-generating industry differently than in other Canadian markets. This explains why EPCOR, ATCO and TransAlta all responded directly to the federal government's paper. The following paragraphs outline the corporate response from these three Alberta power-generating companies.

EPCOR's response stated that as a company, it had been addressing the issue of climate change internally since 1995 (EPCOR, 2002a). As a result, EPCOR expressed concern regarding the acknowledgement of early action (EPCOR, 2002a). "Given that EPCOR and other companies have been engaged directly in GHG emission reduction projects for a number of years, the issue of banking and credit for early action must be addressed"

(EPCOR, 2002a, p.2). The statement also outlined EPCOR's issues with the government's plan and that it supported the earlier statements made by the CEA. EPCOR raised the concern that the current government plan lacks clarity and is therefore difficult to interpret (EPCOR, 2002a). EPCOR also stated that with some clarification, they supported the proposal made by the Alberta Government (EPCOR, 2002a).

ATCO's statement regarding the national climate change plan was somewhat different. ATCO stated that the Federal Government's plan did not address the sectoral or regional implications of the proposed plans (ATCO, 2002a). ATCO also raised the concern about the direct impact that Kyoto would have on its corporation. "Undoubtedly access to and cost of capital to industry would be severely impacted. For investor owned utilities such as ATCO Power, there is a considerable concern on the impact on the shareholders that have invested in our business" (ATCO, 2002a, p.1-2). Similar to EPCOR, ATCO raised the concern regarding the lack of detail in the current government plan (ATCO, 2002a). ATCO also stated that it supported the Alberta Government's proposed plan (ATCO, 2002a). Other statements demonstrated ATCO's support for an extension in the response time to meet the Kyoto targets (ATCO, 2002a). The company also stated that the focus should be on intensity targets, rather than broad caps on GHG emissions (ATCO, 2002a).

TransAlta also made a direct response to the Federal Governments proposal. This document outlined that TransAlta recognised the need to address the issue of climate change and that the company was working toward its own internal goals.

> "We have embarked on a comprehensive twenty-five year plan to improve our efficiency, build offset credits, finance renewable generation, and deliver clean coal technology for Canada. We are hard at work in addressing the environmental challenges and delivering on our goal of no NET GHG emissions from our Canadian operations by 2024, which is way beyond Kyoto" (Page, 2002a, p.2).

The document stresses the fact that because Alberta has a 900-year supply of coal, and a 20-year supply of natural gas, the likely outcome will be a provincial reliance on coal (Page, 2002a). The document stated that the Federal Government's plan placed a significant burden on thermal energy producers. "We believe that the thermal electricity

sector is being asked to shoulder an unfair burden in terms of other industrial sectors. First, the electricity sector cuts would be largely the responsibility of the thermal sector which is only 20% of the total industry" (Page, 2002a, p.5). In addition to this point, the document also outlined 12 issues with the Federal proposal including the US role in the Canadian economy, the use of clean coal, the timeline for new technology, competitiveness, and the transition to Kyoto (Page, 2002a). TransAlta's opinions on the Federal Paper state, "the four options paper seriously underestimates the costs, the risks, and the consequences of the proposed actions. The numbers are not credible estimates and the allocated burden to thermal electricity is inequitable" (Page, 2002a, p.6).

It is clear from all of these statements that the provincial government of Alberta and the power generators are not supportive of the Federal Government's plan to implement Kyoto. At the time of writing (Fall, 2002), the Federal Government has expressed its commitment to ratify the Kyoto agreement in the very near future (Chase, 2002). The impacts and repercussions of Kyoto ratification on Canada and the power generating industry will depend largely on the method and means that the government uses to implement the agreement. Given the uncertainty regarding the implementation of Kyoto, speculation on impacts is extremely varied. For example, the Alberta government states that ratification "could wipe out 450,000 jobs, raise income taxes, double electricity costs, push natural gas prices up 60 per cent and send gasoline prices soaring to $1.10 a litre" (Bloom, 2002). Recent analysis from the Federal government states that the ratification could cost Canada 200,000 jobs, increase electricity prices by 2% and raise the price of natural gas by 14% (Chase & Mahoney, 2002). These comments demonstrate the current uncertainty surrounding both the approach and the impacts of the ratification of Kyoto in Canada. This relates to the previously discussed issue of market uncertainty. It has been shown that uncertainty regarding the power-generating market can result in a situation that prevents investment in power-generating assets (Chapter 2). The issue of uncertainty has been referred to a number of times and will be addressed directly in the recommendations chapter of this document.

If the ratification and implementation of a national climate change strategy does raise the price of electricity in Canada, this will dramatically impact the energy producers who export to the US. This may also act to further limit or restrict the potential for the development of transmission lines linking Alberta to US markets. This could limit the competitive opportunities for the Alberta power-generating industry. Any initiative relating to environmental performance should consider this issue. This relates to the early comments made regarding the environmental and competitive issues surrounding the potential growth of an export market for Alberta power.

Regardless of the plan or implementation strategy, it is likely that the power generating industry will be significantly affected. It is also likely that any attempt to reduce GHG emissions will focus on the thermal generators in Canada, including EPCOR, TransAlta and ATCO. If the Kyoto implementation does impact the profitability of power generating operations in Alberta, it may impact the research and development that is being conducted by these companies (e.g., clean coal technology) (Page, 2002). While the implementation of Kyoto could result in the short-term reduction of GHG emissions, it may change the long-term ability of the industry to improve their environmental performance by negatively affecting their economic competitiveness.

The Alberta government has outlined other implications of the ratification of Kyoto. The provincial government has stated that it will alter its approach to environmental technology development based on the Federal government's decision to ratify Kyoto. "Alberta Energy Minister Murray Smith said the province would develop plans for a national energy and environment – research institute if Canada does not approve the Kyoto Protocol" (Brethour, 2002). If this statement is true, this is a significant shift in the investment in environmental technology development by the Alberta government. While these statements may be a part of political posturing, the Alberta government has gone even further in stating its case regarding Kyoto. In late September of 2002, the Alberta government launched a "$1.5 million anti-Kyoto advertising campaign" (Bloom, 2002). These facts demonstrate that the Alberta government is resistant to the Kyoto protocol and the federal government. The relationship of the Federal and provincial

governments is an important consideration that has an influence on environmental performance and corporate competitiveness. This will be addressed in the final recommendations.

This section has outlined a number of the potential positive and negative issues surrounding the implementation of the Kyoto protocol. As demonstrated, the major issue surrounding the Kyoto protocol is uncertainty. Both the Alberta government as well as the power generating industry stated their concern regarding the uncertainty of the strategy and implementation of Kyoto (Alberta Government, 2002; ATCO, 2002a; EPCOR, 2002a). Regardless of the details of the Kyoto protocol and the implementation strategy, it is likely that the power generating industry will have both its environmental performance and corporate competitiveness affected in the near future by the issue of GHGs.

3.11 - CONCLUSIONS

This chapter has documented the regulatory and legislative frameworks that power generators are forced to deal with while operating in the deregulated market. Important points regarding environmental performance and competitiveness have been highlighted from the review of air emission standards, grandparenting, mercury standards and the issue of project need. These topics demonstrated the environmental regulatory uncertainty faced by power generators and the resulting impacts on the decision making process. The important role and shared responsibility of the government in establishing the environmental performance of the power generating industry was also established. This chapter also reviewed the concerns and questions raised by the future implementation of the Kyoto Protocol. In addition, this chapter has highlighted support for the recommendations of clean coal technology and a covenant agreement. These will be dealt with specifically in the final chapter. The commonality found throughout this chapter is the uncertainty created by varied and vague initiatives established by the government. All of the key points of this chapter (summarized in the following section)

will be used in establishing recommendations that address the environmental performance and corporate competitiveness of the Alberta power generating industry.

3.12 - KEY ISSUE SUMMARY

Recommendations will consider and reflect:

- the role and cost of government regulation,
- the established level of air emission standards and the impacts caused by these standards (i.e., cost to power generators and market stability),
- the need for a comprehensive long-term plan to address the environmental performance of power generators (i.e., a covenant agreement),
- the recognition that the government is only as effective as the standards that they enforce,
- the importance and limitations of technology in addressing environmental performance issues and the required time needed to develop it,
- the environmental concerns created by the potential growth of the export market for power from Alberta,
- the current market and regulatory uncertainty created by varied and vague environmental legislation and regulation (i.e., implementation of Kyoto, grandparenting, mercury, project need),
- the importance of integrating national environmental issues with the economic realities of the Alberta energy industry (i.e., Kyoto),
- the willingness of government to interact directly with industry to address issues of environmental performance,
- the relationship between the Alberta government and the Federal government regarding national issues such as climate change,

4.0 - Chapter 4 – Economic Considerations of Power Generation

> "The Romans had a saying, 'Character fashions fate.' Today, as never before, a company's recognition of, and response to, environmental challenges and opportunities will influence its economic destiny" (Thomas, 2001, p. 942).

4.1 - Chapter Introduction

The purpose of this chapter is to develop the economic considerations caused by the deregulated electricity market, as well as the corporate economic considerations involved in the selection of projects and technology. Documentation of the economic decision-making process of corporations regarding investments, partially addresses the fourth objective outlined in the first chapter. The analysis from this chapter is used to develop recommendations that reflect the economic needs and considerations of power-generating corporations.

4.2 - Economic Considerations of Electricity

The economics of the commodity of electricity are different than other goods as a result of its unique properties. Since electricity cannot easily be stored, the supply and demand must be coordinated at all times (Heintz & Lurie, 2000). "Electricity has value only if it can be produced and delivered to users simultaneously. These attributes give producers and transporters unusual leverage over market prices, particularly because users have only limited ability to say 'no' if prices rise" (Smith, 2001). The reliance of matching supply and demand, means that electricity prices can be extremely volatile. As mentioned in the project introduction, the commodity of electricity is often considered a necessity among consumers (Trebing, 2001). This also impacts the pricing of electricity. Due to the societal need for electricity, an increase in price does not have the same impact that it might have on another commodity (Smith, 2001). This means that the price elasticity for electricity is low. Price elasticity refers to "the proportional change in demand for a given proportional change in price" (GCSI, 2001, p.9). As there are no

effective substitutes for electricity, increasing the price does not dramatically change the demand for it.

External costs are another consideration related to the pricing of electricity. External costs can be defined as "the cost of impacts, emissions, pollution, rubbish, waste, heat, accidents or scrap for which the firm is not legally responsible" (Bennett & James, 1998, p.312). The air emissions that cause human health issues as a result of power generation are an example of electricity's external costs. The Clean Energy Coalition (CEC) raised the issue of external costs to the Alberta Energy and Utilities Board (AEUB) in a submission regarding the planned expansion of TransAlta's Keephills coal-fired plant.

> "There are no figures specific to Alberta, but a study in the European Union estimates that the cost of producing electricity from coal would double if the external costs such as damage to the environment and to health were taken into account. These figures are supported by a recent U.S. study, that estimates the environmental and health costs of air emissions from coal-fired electricity generation at 3 to 6.5 cents per kilowatt-hour (KWh, converted to Canadian $). This is approximately the same as the cost of generating electricity in Alberta, which is between 4 and 5 cents per kWh. Based on these figures, the total cost of coal-fired electricity is between 7 and 11.5 cents per kWh. Even if one takes the lowest estimates, it is evident that if a company generating the electricity from a coal-fired power plant had to bear the associated external environmental and health costs, the economics of coal-fired generation would change substantively" (Griffiths & Marr-Laing, 2001a, p.14).

The implementation of Kyoto (as previously discussed) could have the effect of making power generators internalize the cost of GHGs. However, there is still significant speculation regarding the effect of the Kyoto protocol, and the resulting impacts on electricity prices (Chapter 3). Growing public awareness of environmental issues and the impending ratification of Kyoto, make external costs an important consideration for power generators. Externalities will be discussed further in this chapter and will also be addressed in the final recommendations. Currently, the electricity prices in Alberta do not reflect any of the external costs described above. Alberta electricity consumers pay a fee that includes: "a wholesale price determined in the Power Pool, transmission costs, distribution costs, a fixed monthly billing charge" (NEB, 2001, p.23).

4.3 - Economic Considerations of the Deregulated Electricity Market

The intention of the deregulated market is to establish an economic system that allows the price of electricity to act as an indicator that delivers messages to the market participants (NEB, 2001). The economic theory of the competitive market is that if consumers are paying high prices for power, they will attempt to reduce consumption as best they can (Doucet, 2000). If the price is low, then the consumers have less motivation to reduce their consumption (Doucet, 2000). The price of electricity also sends signals to the power generating corporations. These signals help to determine the investment strategy for the industry as a whole. Higher costs will attract investment, while lower costs discourage investment in new generation assets (Doucet, 2001). These are simple market forces that are initiated by the price of electricity. Prices were less significant in the previously regulated market as they were more stable and were set by provincial regulators (NEB, 2001). In comparison, the establishment of the price of electricity in a deregulated market can present a number of problems.

Within the Alberta market, there are a number of issues regarding the price paid by consumers and the actual price of generation. This occurs due to the process used by the Power Pool of Alberta in setting the price of electricity.

> "The Power Pool currently operates a real-time market. Suppliers (and importers) offer generation at specified prices and distributors and large industrials (and exporters) submit bids for demand to the Pool on a day-ahead basis. The Pool Administrator then calculates a day-ahead (forecasted) pool price which is determined by the cost of the bid of the most expensive generator to meet demand" (Heintz et al., 2000, p. 21).

This means that the last, most expensive offer of generation sets the market price in Alberta. As a result of this market structure, the lowest cost producers of power (i.e., coal-fired generators) will be able to realize profitable operating margins. It is important to consider that the majority of power sold within the province is under the long term fixed rate contracts known as power purchase agreements (PPAs – described in Chapter

2). Therefore it is not the generators who benefit from this market system but the contract owners or retailers of power (Page, 2002). The new independent power projects developed within the province (following deregulation) will be able to take advantage of this pricing system. Overall, the market structure attempts to establish the price of power based on market forces. However, when the environmental performance of the industry is considered, the method of price establishment becomes a concern

> "In Alberta's deregulated electricity system, however, there is no longer a direct relationship between the cost of generation and the prices paid by consumers. As a result, consumers will receive little or no economic benefit from so-called "cheap" coal-fired generation under this new system" (Griffiths & Marr-Laing, 2001a, p.5).

This raises the problem of externalities, similar to those described above. The citizens of Alberta will pay similar prices for coal-fired generation, as they would for gas-fired generation. The difficulty occurs because the environmental costs of these two forms of production are significantly different (Griffiths & Marr-Laing, 2001). The electricity consumer is now disconnected from the environmental consequences of power production and does not receive the appropriate market signals through the cost of power. Therefore market forces are not reflecting or addressing environmental performance. One method of communicating directly with the consumer is through the information provided on their electricity bill. This is a tool that can provide market information to the customer with limited government expenditure. The final chapter will directly discuss the provision of information on the customer bill in order to link environmental performance with market forces.

Aside from price, there are other corporate concerns regarding market forces and signals. As market forces begin to operate in the power generating industry, it is likely that a cyclical pattern of supply and demand will develop over time. Heintz & Lurie (2000) suggest that the electricity market will cycle through three phases. One phase will be a time of surplus supply, when the price received for electricity is roughly equal to the cost to produce it. The next phase would be when supply and demand is relatively balanced. At this time the cost of electricity will be slightly higher than the cost of production. The

given level of security that the market will accept for reliability purposes will decide this premium price (Heintz & Lurie, 2000). The last phase occurs when the market is near capacity or there is a significant level of demand. This will result in a market-clearing price that is above the cost of production as the market attempts to ensure the delivery of every megawatt of capacity (Hientz & Lurie, 2000). The fact that the market establishes the security of the system (or reserve margins) is a significant shift from the regulated market when the government established the appropriate level of reserve. These margins will now be established by the prices that participants are willing to pay. This further demonstrates the importance of market forces in shaping the competitive nature of the power-generating industry in the deregulated market.

The business cycle concept and theory raise a number of concerns for power generators. One issue is determining what stage the cycle is at, or when it will begin. Chapter 2 demonstrated that the regulatory uncertainty of deregulation resulted in a number of economic conditions including a lack of investment and rising prices (Heintz et al., 2000, Heintz & Lurie, 2000, Carlisle, 2001). These factors could be used to determine the stage of the business cycle. This would mean that the business cycle is in the last phase where prices are high and supply is limited. The higher prices should therefore attract investment and eventually increase supply. The importance for power-generators is to understand and evaluate their options based on the predicted future of the market. The volatility of the newly deregulated market is in contrast to the stability of the previously regulated market (NEB, 2001). The regulated market provided power generators (with a degree of certainty) the long-term outlook for the market and the likely price that they would receive for generated power (Page, 2002).

Despite the stage the Alberta market is currently involved in, economic forecasters at Alberta power generating corporations need to be aware of these fluctuations and plan accordingly. With assets that have a 30-40 year lifespan, it is imperative to consider the investment over a long period of time. Power generators will only "consider building generation if over the expected lifetime of the plant the owner will recover the total costs of the plant plus a reasonable return on investment. This decision will be based on the

expected price within the market" (Heintz & Lurie, 2000, p.21). The ability to predict and understand the future market price of electricity will have a significant impact on the corporate competitiveness of power generating companies. Recommendations will directly deal with both the issue of market instability as well as the power generators need for reliable long-term forecasting. The long-term perspective (as discussed in Chapter 3) required for investments by power-generators will also be considered and addressed in the final recommendations.

Deregulation has caused corporate competitiveness to become a central driving force within the industry (Kostler, 2002; Lewin, 2002; Page, 2002). Although the Alberta market structure prior to deregulation was somewhat competitive, the newly established market brings competition to the forefront. As described above, the regulated market was stable and corporations received consistent rates for their generated power (Page, 2002). The market structure limited the impacts and effects of competition. The introduction of competition raises two observations related to environmental performance. The first issue is the economic constraints of a business operating in a competitive market.

> "In markets where generation becomes open to competition, individual decisions on generating capacity will no longer take into account non-economic requirements unless they are made explicit by regulation and all potential competitors are subject to them. Instead, individual plant developers will aim to provide electricity at the lowest possible cost by minimising cost of fuel, equipment, and labour within the set of environmental regulations applicable to all competitors" (OECD/IEA, 1999a, p.21).

These economic circumstances now increase the risk for those companies who do invest in environmental initiatives. Under the regulated market structure, companies were assured that they would obtain a 9 ¼ per cent rate of return on the investment capital used for environmental technology (Page, 2002). Although this rate was lower than what power companies would have preferred, it assured a given level of compensation for the investment (Page, 2002). Under the deregulated system, any investment in environmental technology would have to be covered by the fluctuating market price for electricity. "Without access to capital at low, government-backed interest rates, private

utilities will have a greater incentive to minimise capital costs" (OECD/IEA, 1999a, p.35). Essentially, power generators are not certain what the rate of return on their investments will be. The economic risk related to investing in environmental technology has increased for companies operating in the deregulated market. Consequently, recommendations should consider methods of reducing economic risks for power generating corporations that would allow for increased investment in environmental technology.

The second issue resulting from an increased focus on competition is the role of environmental regulation within that market. As a result of the corporate shift caused by the competitive nature of the deregulated market, the role of environmental regulations becomes more important. This issue is highlighted as a result of the reduced role of the government in the market. As outlined in the discussion of project need, the government no longer makes decisions related to the development of power generating assets (Chapter 3). This has the effect of increasing the importance of the government's remaining role of ensuring that environmental standards are developed and enforced. Further emphasis is required as a result of the shift in focus by corporations towards issues of competition. Corporations should be conflicted by the need to optimize economic standing versus the government's need to address environmental performance. Without strong government regulation in a deregulated market, corporations could allow their focus to remain on profitability and improved efficiency without a regard for the environment.

The approach that the government takes in designing and implementing environmental regulations can also have a number of impacts on the economic performance of power generating assets. Depending on the timing, nature, and level of environmental regulations, the established rate of return on corporate investments can be altered. If the government implements environmental regulations that are too strict, power generators can face significant increases in costs affecting their ability to compete in the market. If the legislation is rigid, this can also prevent power-generators from seeking the least cost solutions relating to environmental performance. One method of addressing the timing

and manner in which governments establish environmental legislation is through the negotiations regarding the previously mentioned covenant agreement. Allowing industry to interact directly with the government to discuss the structure and timing of environmental legislation lead to the development of least-cost solutions for both parties. This could reduce the potentially negative impacts of strict environmental legislation. The final recommendations will consider both the importance of government regulations in shaping the environmental performance of the industry, and the economic consequences caused by changes in environmental regulation.

The rate of return on investments is an important consideration for power generators. This rate is considered internally by the company as well as externally by industry stakeholders. The groups most interested in the rate of return are the power generator's shareholders or potential investors. External sources have established a benchmark for the return on investments. The New York investment community requires that companies achieve a hurdle rate of 15% return on their capital investments (Page, 2002). This is a standard established to ensure that the companies have adequate working capital (Page, 2002). It is generally accepted that companies that receive a return rate that is less than 15% will have difficulty achieving long-term profitability (Page, 2002). This adds another level of consideration and concern within power generating companies.

The return on investment links directly to the corporation's ability to generate capital. The cost of capital tends to increase in deregulated markets (OECD/IEA, 1999a). This occurs due to the demand for higher rates of return on investments as a result of the increased risk (OECD/IEA, 1999a). This increase in capital costs adds further pressure for companies to reduce overall costs, and seek projects that have shorter construction times, and utilise less capital-intensive technologies (OECD/IEA, 1999a). The power generating corporations must be able to demonstrate to relevant stakeholders that they can in fact run their operations and develop new generating assets in a way that is profitable. If a corporation makes investors or shareholders think otherwise, the company will not be able to generate capital and fund new investments.

The issue of generating capital and obtaining strong return on investment rates is critical for companies operating in a deregulated market. Companies such as TransAlta and ATCO must obtain capital based on their own merit, whereas other regulated utilities have backing from government sources (Page, 2002). EPCOR is an example of a corporation that receives backing from a larger institution. As a result of EPCOR being owned by the City of Edmonton, the corporation has an increased level of support when attempting to gain capital from the market (Page, 2002). Companies that compete with Alberta power generators such as BC Hydro or Sask Power are able to have bonds guaranteed by their provincial governments (Page, 2002). This demonstrates the unique situation for independent companies operating in a deregulated market. It also requires increased levels of economic prudence for corporations that compete directly with those companies that are able to obtain backing from larger government institutions.

When each individual company attempts to obtain capital for new investments, the specific details of development can influence the overall economics of the project. Details such as fuel selection, technology used, and the operating market of the new plant can be important factors. Selecting the fuel source for a power generation project has a number of considerations and consequences regarding both the environmental performance and the economic viability of the project. One of the first economic considerations is the cost of the input. For example, the price per energy unit of natural gas is, and has been, consistently higher than for coal (Heintz & Lurie, 2000; NRC, 2000). Recent trends in natural gas prices have also been rising (Wallace, 2001). In comparison there are no cost for fuel inputs for wind-powered projects (Nguyen, 2002c).

The next consideration is the overall cost of development of the physical plants or generating units. Coal and wind generating units require high initial capital outlay costs in order to be developed (Heintz & Lurie, 2000; Nguyen, 2002c). The cost of natural gas generating units has recently decreased as a result of advances in natural gas turbine technology (NEB, 2001). Other options include generating power from fuel cells or using solar energy. However, industry analysis has shown that the capital costs for the

development of these energy sources are currently too high to be economically feasible (Clark, 2002).

Another economic consideration is the length of time required to build and develop power-generating plants. Each of the individual generating units requires different construction timelines. Natural gas plants and wind generating stations have relatively short construction and development timeframes (NEB, 2001; Nguyen, 2002c). In comparison, coal plants are generally much larger in scale and take longer to build (Heintz & Lurie, 2000). Regardless of construction lead times, the convenience of the fuel source also needs to be considered. The location and availability of wind power requires viable weather and geographical conditions to ensure economic feasibility. Alberta currently generates a small amount of wind-power. However analysis shows that this market could grow to be ten times larger than the current production (Nguyen, 2002c). The comparison of wind to natural gas and coal demonstrates the variability in the availability of resources. Estimates have stated that the province of Alberta currently has a 20-year supply of natural gas, and a 500 to 900 year supply of coal reserves (Page, 2002a; Amey, 2002). These economic factors must be considered when developing a new power-generating project.

The abundance of a fuel input does not automatically ensure the economical viability of a resource for power-generating companies. The cost of retrieving and delivering the fuel input to the power plant is an important consideration. The ownership of fuel resources also impacts the economic viability of a project. For example, TransAlta owns significant coal resources that allow the company to develop coal-generating assets in a cost effective manner. Typically, the mining and processing of coal accounts for 20 to 50 per cent of operating costs for power generators (TransAlta, 2002). However, TransAlta has "pioneered ways to economically mine and process" its coal assets in order to have operating costs that are closer to 20 per cent (TransAlta, 2002). EPCOR also owns a small amount of coal reserves that factor into their development planning (Page, 2001). ATCO Power currently does not own any coal resources, and therefore faces a different set of economic considerations (Kostler, 2002).

In addition to these economic deliberations, the environmental performance of a power project should also be considered. As previously mentioned, the air emissions from the burning of fossil fuels (i.e., coal and natural gas) are a significant environmental concern. When comparing the burning of coal to natural gas, the emissions from current coal plants are greater, resulting in increased damage to the environment (Griffiths & Marr-Laing, 2001a). The environmental consequences of wind development projects are minimal in comparison (Nguyen, 2002c). This overview of environmental consequences needs to be combined with the economic considerations described above.

The cost of wind power is declining and has recently begun to be competitive with the cost of coal and natural gas (Nguyen, 2002c). As mentioned previously, the number of viable locations within the province limits the potential growth for wind power. Natural gas projects are faster and cheaper to build and they have fewer environmental impacts than coal projects (Nguyen, 2002c). Yet natural gas is a limited resource and presents economic risk associated with the volatility in price (Page, 2002a; Amey, 2002; Nguyen, 2002c). Recent provincial trends have shown a significant increase in the development and investment in natural gas projects (Wallace, 2001). Similar to wind, the limited natural gas reserves limit the future growth of power generation using this energy source. Coal as a resource has low input costs, high initial capital costs, and currently has significant environmental externalities. Despite the negative environmental consequences, the economics of this fuel source (abundance and cost-effectiveness) continue to make it a viable option (CEA, 2002). In fact, coal is responsible for the production of the most inexpensive power in the province (Griffiths & Marr-Laing, 2001a). For this reason, the future development of coal has been mentioned when discussing potential plans to expand the export market for Alberta power. The notion of exporting inexpensive coal-generated power was part of the considerations for improving the transmission system (GCSI, 2001). As mentioned in the previous chapter, the potential growth of an export market for Alberta is limited. However, the interest in the use of coal demonstrates the economic viability of the resource.

Despite the environmental consequences of power generated from coal, the province of Alberta relies on it for the majority of its power (Chapter 2). The future of the industry will most likely rely on coal as a fuel source due to the positive economic attributes and abundance of this resource (CEA, 2002). The viability of coal as a fuel will depend largely on the ability to reduce the environmental issues related to its use. This raises the previously mentioned suggestions regarding the development clean coal technology. As demonstrated (Chapter 3), there is large support for the advancement of this new technology. The Alberta government, the Federal government as well as the Alberta Energy and Utilities Board have all demonstrated their support for the development of clean coal technology. In addition, all three power-generating corporations have confirmed their support for clean coal technology through the participation in the Canadian Clean Power Coalition (CCPC) (CCPC, 2002). This is a group of corporations pooling resources to develop clean coal technology in Alberta (CCPC, 2002). The final recommendations will discuss both the CCPC and the development of clean coal technology.

Deregulation has caused: an increase in the risk and volatility of corporations obtaining capital from the market, an increase in the need for high return on investment rates, and increased risk for independent power generating companies competing with regulated companies. This makes the companies existing assets (i.e., fuel resources) a critical factor in developing an investment strategy. The three companies being researched all own and operate a different set of assets resulting in different economic deliberations. Recommendations will have to provide as much flexibility as possible in order to accommodate the different corporations that will be affected. This section has outlined the economic considerations that are created by the deregulated market. The following section reviews the economic issues regarding the technology used by power-generating corporations.

4.4 - Economic Considerations of Power Generation Technology

Once the fuel source has been selected and the price forecasts for electricity have been established, the technology required to generate power must be chosen. As demonstrated in the applications made by TransAlta and EPCOR to the AEUB (outlined in Chapter 3), technology selection is an important matter. The two applications provide valuable insight into the corporate considerations used when selecting power-generating technology. The application by TransAlta to expand its Keephills generating plant used the following criteria to select the appropriate generating technology:

- compatibility with 450 MW size
- commercially proven technology
- acceptable business risk
- compliance with environmental and regulatory requirements
- cost
- safety, (AEUB, 2002, p.59).

In the EPCOR application a more extensive description of selection criteria was provided. "To select the best available and commercially reliable combustion and pollution abatement technology for controlling and reducing air emissions, EPCOR used the following six guiding principles and criteria:

Commercially proven technology

- combustion technology selected must have a proven track record
- commercial units must demonstrate reliable operations for at least 5 years
- approximately 400-600 MW capacity
- must meet and/or exceed current capacity of the existing units to be economically feasible

Reliable, operable, and maintainable

- must be no major concerns with the reliability of system components

- no unusual limitations to start up, shut down and load changes, frequency and duration of shutdowns for repairs must be comparable to existing units

Environmental Performance & Efficiency

- must improve on current technology operating in Alberta

Cost and economically competitive

- must allow Genesee to remain competitive in the deregulated marketplace

Safety

- must be safe for operation and not present a concern for surrounding communities" (AEUB, 2001, p.51).

Although the criteria outlined by these two corporations are somewhat different, they cover similar concepts; including, commercially proven technology, environmental performance, competitiveness, and safety. The criteria provide an understanding of what corporations consider when selecting a generating technology. These lists demonstrate that corporations attempt to balance the projects competitiveness with environmental performance.

The phrase 'commercially proven technology' appears on both TransAlta's and EPCOR's criteria list. This is an important concept to consider when selecting a technology. Stating that a given technology is commercially proven indicates two characteristics, reliability and availability. "Availability measures facility readiness to deliver electricity during a specified period while reliability quantifies the ability of the facility to generate electricity for extended periods without outages or capacity reductions" (Ellsworth, 2002, p.35). The capacity of a plant to operate when needed over an extended period of time dictates the profitability of the asset (Page, 2002).

Corporations often have very high standards for both availability and reliability (Page, 2002). Having high standards can often eliminate the use of new technology based on these risks. For example, TransAlta was not willing to accept the risk of using the new supercritical boiler technology due to the availability numbers provided by the equipment supplier (Page, 2002). TransAlta based this decision on extensive internal reviews along

with their experience related to the operation of boiler technology (Page, 2002). TransAlta was concerned with the environmental performance of an unreliable boiler (Page, 2002). If the unit continually had problems and needed to be shut down, the environmental performance of the expansion would likely be very poor (Page, 2002). The decline in performance would most likely occur, despite the use of more efficient boiler technology (Page, 2002).

Following the AEUB's approval of the Keephills expansion, TransAlta's supplier announced that availability rates would now meet the corporate standards (Page, 2002). As a result, TransAlta will now use supercritical technology in its expansion plans (Page, 2002). Risk management is an important consideration related to the availability of technology. TransAlta had not received the necessary guarantees regarding the supercritical boiler technology. This would result in the corporation being directly liable for its operation and causing the cost of insurance premiums to rise (Page, 2002). Ensuring the availability and reliability of the technology meant that TransAlta was practising effective risk management. This example demonstrates the importance of the commercially reliable technology in the selection process. The issues of availability and reliability also demonstrate the limitations of technology in addressing environmental performance. Power generating corporations can only select from the environmental technology that is commercially viable. Recommendations will address the limitations and commercial viability of existing environmental technology.

As previously mentioned the issue of no longer grandparenting environmental regulations associated with power generating assets presents a number of economic considerations for corporations (Chapter 3). Both TransAlta and EPCOR's proposed power plants will have to meet "reasonably foreseeable" environmental standards (AEUB, 2002a, p.75). This adds an element of uncertainty and risk to corporate investments. Investors and corporations do not like to develop projects in markets that are risky or uncertain (Lewin, 2002; Page, 2002). Depending on the changes that are made to the environmental standards, the entire economic structure of power generating assets could change. If

corporations fail to anticipate these risks, it could result in significant losses to the company, stranded assets, or even bankruptcy (Page, 2001).

Power generating corporations generally consider their projects over a 30-40 year lifespan, as well as within the established 10 year operating licences (as outlined in Chapter 3). In the past this has meant that the project is developed and the capital stock remains the same throughout the plant's operating licence (Roberts, 2002). The operating licence provides the corporation with enough stability to calculate a rate of return on their investment over that time period. If a company is required to meet evolving standards this may increase the uncertainty of a project. Being required to invest repeatedly in technology in time spans shorter than the 10 year operating licences will significantly increase the costs for power generating corporations. The costs add up as a result of the long lifespan of the assets (i.e., 30-40 years). Determining the economics of such a project becomes significantly more difficult as a result of the increased uncertainty (Page, 2002). As mentioned in the previous chapter, the problem of uncertainty will be addressed in the final recommendations.

Changing environmental standards also relates to the issue of capital stock turnover. A significant amount of work has already been done on the Genesee plant expansion (Page, 2002). The expansion of TransAlta's Keephills plant will likely remain uncertain as the impending environment regulations continue to develop. TransAlta and EPCOR will have to ensure that they meet the newly established national standards for mercury (likely in 2003), and the provincial air emission standards in 2005. As mentioned, this can cause significant changes in the overall economic viability of the projects. An interview with the Manager of Environment Health and Safety at ATCO Power revealed that the company's concern for shareholder value made the issue of capital stock turn over important (Kostler, 2002). Shareholders and investors may be hesitant to invest in a company that has flexible projects that may change over time. Prior to deregulation, shareholders and investors have had stability in investments relating to power generating companies in Alberta (Geekie, 2002). Given the identified importance of shareholders

and investors, the issue of grandparenting and capital stock turnover are very important to power generation companies.

Another subject raised by both grandparenting and capital stock turnover is the cost of retrofitting versus the use of new technology. In response to any future changes in environmental legislation, power-generating corporations will have to determine how they will meet the new standards. If the plant has not been built, the addition or use of new technology is an option. If the plant is already designed, retrofitting is a consideration. The Clean Energy Coalition (CEC) raised this issue during TransAlta's expansion application to the AEUB. The CEC felt that TransAlta should consider using improved emission control technology in order to be better prepared for the more stringent air emission standards that are likely to occur in the future (AEUB, 2002a).

The CEC argued that the best time to invest in environmental technology was at the beginning of the project. "It asserted that it is almost always technically more difficult and more costly to retrofit an existing power plant. The cost could be 20% to 50% higher for various technologies" (AEUB, 2002a, p.62). TransAlta responded by stating that they "cannot make a business decision today on future emission guidelines that have yet to be defined," and added "that, if and when new guidelines are adopted, it would make a decision on how to respond to new emission guidelines at that time" (AEUB, 2002a, p.63). As mentioned in the previous chapter, corporations have a difficult time developing plants that are flexible and adaptive to additional environmental technology. Therefore, this highlights the previously mentioned need for a long-term plan to address environmental performance issues.

The positions of TransAlta and the environmental group are in direct contrast. The group supports the use of new technology, while TransAlta felt that the business risk was too high. As previously mentioned, TransAlta had concerns regarding the reliability of the technology. The uncertainty caused by having to meet unknown future environmental standards forces tough decisions on corporate power generators. Regardless of the circumstances, using complex market forecasting, corporations must make the business

case for each of their investments and proceed only when the project is deemed to be economically viable.

This section has demonstrated the complex challenges that power generating corporations face when dealing with the economic and environmental performance issues related to technology selection. Table 10 provides a summary list of the typical economic risks faced by power generators developed by the Organization of Economic Cooperation and Development.

Table 10 - Typical Economic Risks Faced by Power Generators

Type of Risk	Outcome Compared to Expectation
Construction	
Cost overruns	construction costs more
Schedule delays	long construction time; purchased replacement power may be needed to meet shortfall
Technology	poor plant performance, especially when using new technology low plant efficiency; low plant availability
Financial	high plant financing costs
Operating	
Market	low electricity sales, leading to excess capacity major customers find alternative supplies low electricity sales price
Operation & Maintenance	high labour or material costs
Fuel	high fuel price inadequate fuel quantities
Financial	returns are lower than expected capital is poorly structured
Policy	
Regulatory	regulations result in higher costs administrative procedures cause delays tax burden increases
Environmental	environmental laws become stricter environmental assessment criteria
Siting	land purchased for a plant becomes ineligible

(OECD/IEA, 1999a, p.23)

4.5 - CHAPTER CONCLUSION

This chapter demonstrates the complex economic considerations of electricity, the market within which it is sold, as well as the considerations involved in selecting the technology to generate power. Externalities, the importance of market forces, and the overall market instability caused by environmental legislation were also reviewed. These issues demonstrated the link between economics and environmental performance. This chapter showed that in order to improve environmental performance, flexible and cost effective solutions are required. Flexible solutions will respect the economic constraints facing power-generating corporations while reducing the impact on the environment. The analysis in this chapter emphasized three key concepts that will be addressed in the final recommendations.

The first concept was the use of the electricity bill to provide environmental information to the customer. This was discussed based on the need to link environmental performance with market forces. The second recommendation addressed was the negotiated covenant agreement between the government and the industry. This suggestion was in response to the need for clarity in governmental regulation and legislation of the industry. A negotiated agreement would also minimise the economic risk for corporations and improve the investment market for companies and shareholders. This can be achieved "by providing a credible and clear regulatory framework" for both the market and environmental standards (OECD/IEA, 1999a, p.72). By establishing clear long-term strategies for both the market and environmental standards, the government would allow the corporation's economic forecasters to predict with more certainty future market elements. The third recommendation was identified through the economic analysis of fuel inputs for newly developing power projects. The analysis in this chapter showed that the economics of Alberta's coal resources are favourable, and that there is a need to address the environmental problems associated with its use. This provides further evidence to suggest that the development of clean coal technology is essential in improving the environmental performance of the Alberta power generating industry.

4.6 - KEY ISSUE SUMMARY

Recommendations will consider and reflect:

- the need to address the external costs related to the production of electricity,
- the lack of market forces currently linked to issues of environmental performance,
- the increased economic risk and volatility in the deregulated market,
- the importance and difficulty of long-term future market forecasting for determining power-generators investment strategies,
- the importance of government regulations in shaping the environmental performance of the power-generating industry as well as the economic consequences that can be caused by changes to these regulations,
- the significant role that coal will play in the future of the Alberta power-generating industry, and the need to address the environmental performance issues related to its use through the development of clean coal technology,
- the varying assets owned and operated by power-generating corporations that will require flexible mechanisms to address the issues of environmental performance,
- the limitations and commercial viability of existing environmental technology,
- the uncertainty caused by vague environmental regulations,
- the need for long-term perspective and planning regarding environmental regulations for the Alberta power-generating industry given the long term perspective of power-generating projects (i.e., 30-40 years).

5.0 - CHAPTER 5 – CORPORATE STRATEGY

> "This sweeping search for corporate identities and missions is also changing how the electric power industry perceives economic development" (Griffin & McCourt, 1999, p.15).

5.1 - CHAPTER INTRODUCTION

The purpose of this chapter is to analyse the corporate strategies of the three power-generating companies in order to determine the ways that these strategies influence both environmental performance and corporate competitiveness. The information presented in this chapter is used to develop recommendations that consider subjects other than economics and environmental regulations. The analysis and documentation of the decision-making process relating to the power generators' corporate strategy directly addresses the second and fourth objectives outlined in the first chapter.

5.2 - CORPORATE RESPONSE TO DEREGULATION

The three power generating companies mentioned within this document have had varied responses to deregulation. As outlined in Chapter 2, the majority of change occurred as a result of a response to deregulation legislation that required the companies to divide their corporations into four business units (i.e., generation, transmission, distribution, and retail). The three power generating corporations each addressed this mandate using different tactics. ATCO created a new business entity (ATCO Power) in advance of the legislation in order to effectively create a competitive business division to compete in the deregulated market (Kostler, 2002). EPCOR's response was to change the internal corporate structure. The corporation was divided into separate divisions to address each area of the electricity market (Lewin, 2002). EPCOR reported that it has experienced minor difficulties in establishing new communication lines between the newly developed business units. EPCOR is currently working on addressing these minor problems (Lewin, 2002).

TransAlta's response to deregulation was the largest among the three corporations. The corporation has undergone dramatic changes resulting from a shift in business focus. The corporation recently sold its transmission, distribution and retail assets in order to focus solely on the generation of electricity. This was a result of the new legislation and the provincial government's concern regarding TransAlta's market share (Page, 2002). "TransAlta had the province's largest transmission and distribution systems and, with 350,000 households, the largest customer base, including Calgary (through power sold to Enmax) and many smaller centres and rural areas" (Taft & Cooper, 2000, p.10). Overall, the three companies have stated that the transitions caused by deregulation have been successful (Kostler, 2002; Lewin, 2002; Page, 2002).

The response to deregulation has been diverse among the three researched corporations, resulting in the aforementioned changes. However, each of the three corporations reports that their position and strategy with regards to environmental concerns has not changed as a result of deregulation (Kostler, 2002; Lewin, 2002; Page, 2002).

5.3 - Corporate Environmental Strategy

Despite the lack of change in environmental strategy, it is still important to understand exactly what their corporate strategies are, and what factors or motivators have helped to create them. The literature provides a number of useful frameworks to analyse corporate environmental strategy (Henriques & Sadorsky, 1999). Within the literature there have been a number of efforts to classify a firm's environmental strategy based on their "degrees of proactivity in environmental management" (Henriques & Sadorsky, 1999, p.87). While a number of classification schemes have been developed over time, they have been established based on similar criteria. The criteria include:

- the existence of an environmental plan,
- whether this plan is in written form,
- how environmental issues and concerns are communicated and reported,

- whether there is a division within the corporation dedicated to environmental concerns, and
- the commitment of upper management to environmental issues (Henriques & Sadorsky, 1999).

The activities a company is taking within each of these areas can be used to classify the company as reactive, defensive, accommodative or proactive. Table 11 provides a summary and breakdown of the classification schemes found within the corporate strategy literature.

TABLE 11 - CONCEPTUAL CLASSIFICATION OF FIRMS' APPROACHES TO THE NATURAL ENVIRONMENT

Environmental Management Literature		Corporate Social Responsibility Literature	
Roome : (1992)	Hunt and Auster : (1990)	Wartick and Cochran : (1985); Carroll : (1979)	Characteristics
Noncompliance	Beginner	Reactive	* No support or involvement of top management * Environmental management is not necessary * No environmental reporting * No employee environmental training and involvement
Compliance	Firefighter	Defensive	* Piecemeal involvement by top management * Environmental issues only dealt with when necessary * Satisfy environmental regulations * Little employee environmental training and involvement
Compliance Plus	Concerned Citizen	Accomodative	* Some involvement by top management * Environmental management is a worthwhile function * Internal reporting but little external reporting * Some employee environmental training and involvement
Commercial and Environmental Excellence Leading Edge	Pragmatist Proactivist	Protactive	* Top management supports and is involved in Environmental issues * Environmental management is an important business Function * Internal and external reporting * Employee environmental training and involvement Encouraged

(Henriques & Sadorsky, 1999, p.88)

This classification scheme can be applied to the three power generating companies in Alberta. Each of the above listed criteria was reviewed against the corporate literature presented in Chapter 2, as well as the AEUB application literature presented in Chapter 3. The criteria were also specifically discussed in interviews with senior environmental staff from the three power generating companies (Johnston, 2002; Kostler, 2002; Lewin, 2002; Page, 2002; Wharton 2002). When TransAlta and EPCOR were assessed based on the outlined criteria, it was found that both corporations demonstrated: commitment of top management to environmental issues, had extensive resources and dedication to environmental management, participated in external reporting regarding environmental performance, as well as training and the overall involvement of their employees in environmental initiatives. The analysis confirmed that both TransAlta and EPCOR met or surpassed all of the outlined criteria provided in Table 11. This resulted in the classification of those corporations as 'proactive' with respect to their environmental strategy.

The review of ATCO's approach to environmental concerns was somewhat different. While the corporation does have an environmental strategy, it is implemented and operated differently than TransAlta or EPCOR's. ATCO's strategy is reviewed internally and key managers are made aware of the strategy and can pass it along to their staff if they desire (Kostler, 2002). The corporation does have an environment health and safety unit that reports to the board of directors and some environmental issues are dealt with through a risk management unit (Kostler, 2002). While ATCO is showing that environmental matters are being dealt with, the initiatives do not meet the criteria for a proactive company (Table 11). This information and analysis leads to a classification of 'accomodative' according to the corporate strategy literature.

Now that the corporate environmental strategies have been identified, it is important to understand the reasons why they are pursued. Interviews at TransAlta revealed three reasons why the corporation has adopted a proactive environmental strategy; (1) it allows the company to get in early on projects, identify opportunities, and gain an advantage over its competitors (Page, 2002), (2) allows the company to take an active role in

shaping government policies that impact its business (Wharton, 2002), and (3) by going beyond compliance, allows a greater margin of error, and therefore reduces the economic risk of the company (Page, 2002). The proactive environmental strategy has also evolved because of corporate leaders. Former CEO Ken McCready stated that in order for the company to be competitive in the future, it would have to learn to deal with environmental issues (Wharton, 2002). This mentality began as early as 1992 following the Rio Summit, and the current CEO Stephen Snyder continues this work (Wharton, 2002). Thus allowing a tradition of strong support and motivation regarding environmental issues from upper management to be an integral part of the TransAlta Corporation (McNeil, 2002; Page, 2002; Wharton, 2002).

At EPCOR, the motivation behind the environmental strategy was found to be the strong link between environmental issues and business decisions caused by encouragement and commitment from upper management (Lewin, 2002). EPCOR has also had a long history of being environmentally proactive, making this type of thinking and acting an ingrained part of corporate behaviour (Lewin, 2002). EPCOR states that power-generating projects that do not demonstrate a strong commitment to the environment will not be sustainable, and may impact long-term profitability (Lewin, 2002). EPCOR also recognizes that in any project there has to be a balance between economics and the environment (Johnston, 2002). The definitive reason that EPCOR utilizes a proactive environmental strategy is because it is "good for business" (Johnston, 2002).

Determining the motivation behind ATCO Power's environmental strategy was more difficult. As previously mentioned (Chapter 2), the available literature on the company is minimal, and the existing literature focuses on the larger corporate conglomerate known as the ATCO Group (as opposed to ATCO Power) (ATCO, 2001). The literature and websites that refer to ATCO Power provide little information with respect to environmental issues (ATCO, 2001; ATCO, 2002b). Interviews with representatives at ATCO revealed that environmental concerns were not prominent throughout the organization (Gunn, 2002; Kostler, 2002). The environmental health and safety unit is the singular division that was aware of, and dealt with the majority of corporate

environmental concerns (Gunn, 2002; Kostler, 2002). Interviews with the manager of the environment health and safety division revealed that while the company recognizes that addressing environmental issues is part of being a responsible member of the business community, the majority of the work within this division focuses on compliance (Kostler, 2002).

The previous chapter demonstrated that the three corporations faced different issues when assessing the economic considerations of project development. The analysis in this section demonstrates that the environmental strategies, and the motivations that create them are also different among the power generating companies. TransAlta and EPCOR view their environmental strategy as a business advantage, while ATCO mainly focuses on compliance. Given the variations among the three power generating corporations, the recommendations will consider and reflect the different environmental strategies of the companies. This section analysed the internal corporate response regarding environmental strategy. The following section reviews the subject of corporate environmental strategy from an external perspective.

5.4 - External Influences On Corporate Strategy

5.4.1 - Institutional Theory

Assessing the external factors that influence corporate strategy is explained by a number of theories in the literature (Boons et al., 2000; Hoffman, 1999; Meyer & Rowan, 1977). One inclusive strategy that considers the external environment is known as institutional theory. This theory is based on the notion that forces outside of the organization (including stakeholders) create an area of influence that develop a series of social processes and behaviours that ultimately apply pressure on an organization (Boons et al., 2000). This compels the corporation to act in a manner that is deemed appropriate by this sphere of influence (Boons et al., 2000). The impact of social pressure affects the available choices that a company can make. "A firm's action is seen not as a choice among an unlimited array of possibilities determined by purely internal arrangements, but

rather as a choice among a narrowly defined set of legitimate options determined by the group of actors composing the firm's organizational field" (Hoffman, 1999, p.1). This theory essentially states that organizations reflect the social reality in which they operate (Meyer & Rowan, 1977).

One concept that is part of institutional theory that is relevant to the Alberta power generating industry is the previously mentioned concept of the organizational field. An organizational field is defined as "organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resources and product customers, regulatory agencies, and other organizations that provide similar services or products" (Dimaggio & Powell, 1983, p.148). "In an organizational field, actors continuously adapt to the pressures and values of the field. Organizations within the field also contribute to the development of these pressures and values, act accordingly, and thus contribute to the characteristics of the organizational field" (Boons & Strannegard, 2000, p. 11). The corporations operating in this organizational field must select a strategy to determine their role and behaviour within this network of relations.

The notion of institutional theory and the concept of the organizational field emphasize that the power generating corporations operate in an environment that is filled with factors that influence the behaviour and decisions of the company. The previous chapters have delineated the organizational field in which the Alberta power generating companies operate. As outlined in Chapter 3, all companies must deal specifically with both the Alberta Energy and Utilities Board (AEUB) and Alberta Environment. These organizations provide the environmental legislation that limits or defines the choices that can be made by the companies with respect to operations, and technology selection. The companies also operate within the larger legislative framework outlined by the provincial and federal governments. This framework can involve specific issues such as national standards regarding mercury, or broader policy initiatives such as the Kyoto protocol. The companies also deal with similar customers, media, and market regulators (e.g., The Power Pool of Alberta).

Interviews with corporate representatives regarding their organizational field found that there is a degree of institutional influence on power generating companies that ultimately shape their corporate strategy (Johnston, 2002; Kostler, 2002; Page, 2002; Wharton, 2002). The power generating companies do respond to the activities and actions in their external environment. Events that can elicit a response include: future air emission standards to be released by Alberta Environment, the actions of a competitor, and changing public opinions (Johnston, 2002; Kostler, 2002; Page, 2002; Wharton, 2002). The companies are strongly influenced and limited by the views of their organizational field (Johnston, 2002; Kostler, 2002; Page, 2002; Wharton, 2002). Research revealed that the corporations felt that their external environment actually limited the available options of corporate decision-making. This supports the previously mentioned notion that corporation's have a group of choices within a defined set of alternatives (Hoffman, 1999). Within the Alberta power-generating industry, it is recognized that the options range from compliance to varying degrees of proactive environmental behaviour (Kostler, 2002; Lewin, 2002; Page, 2002). This is due to the fact that government legislation and public expectation demand a given level of environmental performance in order to meet the minimum standard of acceptance in the industry. Therefore the external environment, or organizational field, literally shapes the environmental strategies pursued by power generating companies in Alberta. ATCO pursues a strategy of compliance, while TransAlta and EPCOR both are attempting to remain environmentally proactive.

This strategic analysis of the external environment provides further evidence of the importance of the government in shaping the environmental performance of power generating companies in Alberta. This section also demonstrated that corporations are concerned with, and respond to their external environment. Therefore recommendations should consider methods of utilizing the external environment in order to shape the environmental performance of the power generating corporations. The previously mentioned recommendation regarding the use of customer electricity bills is one method that can influence the external environment of power generators. The provision of environmental information to the consumers could ultimately result in the improved environmental performance of the power-generating industry. This recommendation will

be discussed further in the following chapter. The next section provides a more detailed review of power-generating corporations stakeholders and the supporting strategy theory.

5.4.2 - Stakeholder Theory

Another area of the strategy literature that considers external influences on environmental strategy development is stakeholder theory. The notion that stakeholders outside of the organization have the capacity to shape and influence corporate activities has been well documented (Harvey & Schaefer 2001; Mitchell et al, 1997; Henriques & Sadorsky, 1999). Freeman (1984) provides the most commonly referenced definition of a stakeholder, "any group or individual who can affect or is affected by the achievement of the organization's objectives" (p.46). The development of a list of relevant stakeholders to power generating corporations would include the AEUB, Alberta Environment, the Federal Government, environmental groups, industry competitors, the general public (i.e., customers, community groups), employees, the media, shareholders and investors. The companies were presented with this list and asked to rank them in terms of their ability to impact their corporation's environmental strategy. TransAlta, ATCO, and EPCOR selected their shareholders and investors as stakeholders that would have the largest impact on corporate decision-making, including environmental strategy decisions (Kostler, 2002; Lewin, 2002; Page, 2002). Any environmental strategy adopted by the company would have to be in the best interest of shareholders and investors. This is similar to the previously identified economic importance of corporate shareholder and investor opinions (Chapter 4).

In addition to the importance of the shareholder, TransAlta and EPCOR also identified the general public as being influential. These corporations felt that the opinion of the public was a factor that influenced their environmental strategy (Lewin, 2002; Page, 2002). EPCOR was specific in stating that their customers were influential (Lewin, 2002). This is a result of the direct interaction of the corporation with its customer base. This demonstrates that the opinion of the general public and customers can influence the environmental strategies of the two power generating corporations.

While it was clear that all three corporations recognized the importance of stakeholders, each company takes a slightly different approach to managing and interacting with them. TransAlta and EPCOR take a very active role in working with their stakeholders (Lewin, 2002; McNeil, 2002). Activities include participating in advisory groups, being members of committees, distributing newsletters, as well as directly investing in the communities in which they operate facilities (Lewin, 2002; McNeil, 2002; Wharton, 2002). This includes dedicating staff resources specifically to stakeholder management and relations. ATCO's approach to stakeholders is somewhat different. While ATCO does the mandatory consultation processes and is a member of various committees, the company ultimately uses a project-by-project approach to stakeholder issues (Kostler, 2002). This variation in strategy could occur as a result of the fact that ATCO has not dedicated themselves to environmental issues in the same way that TransAlta and EPCOR have. Also, ATCO currently pursues operations that attract less attention from the general public and industry stakeholders. ATCO does own and operate coal-powered plants. Although the company has been recently developing natural gas and cogeneration plants. These projects are generally smaller in scale, and have a reduced environmental impact as compared to coal-powered plants.

All three companies recognize the importance of their stakeholders, and choose to deal with them in different ways. It was previously mentioned that the three corporations felt that their shareholders and investors were the most influential stakeholder. Nonetheless, a link can be made between the shareholder and the broader range of stakeholders.

> "The strategic issue for the utility companies is one of risk minimisation and reducing potential business threats. Recognising the needs of the key stakeholders in relation to the business is arguably central to minimising strategic business risk. Strategies designed to respect the interests of critical stakeholder groups – customers, employees, regulators, government and local community – could therefore be a winning formula in pursuit of maximum shareholder value. Utility boards are however unlikely to adopt longer-term strategies without a stable political climate and constructive development of regulatory and institutional frameworks" (Jones, 2001, p.227).

This quote demonstrates that effective stakeholder management can result in increased shareholder value for the company. This analysis also identified the important role that the public and the consumers can have on corporate decision making. This provides further evidence that the use of the electricity bill as a tool to deliver environmental information is appropriate. Empowering the customer with information may allow the stakeholder to influence corporate actions and decisions regarding environmental performance. However, stakeholders are not the only component of power generators external environment that can be used in shaping their environmental strategy.

5.4.3 – LEGITIMACY

Another strategic issue relating to the previously mentioned institutional theory is the notion of legitimacy. The strategic literature suggests that corporations begin to seek legitimacy within their organizational fields (Hoffman, 1999). This behaviour is known as organizational legitimacy, which is defined as "a generalized perception that an organization is behaving appropriately according to some culturally shared definition of what is appropriate" (Scott & Lane, 2000, p.55). Aldrich & Fiol (1994) have demonstrated that firms can pursue a wide range of strategies (organizational, intra-industry, inter-industry, institutional) in order to achieve legitimacy for their actions. A number of examples are found throughout the literature. Sharma (2000) demonstrates that corporations can take measures to legitimize their approach to environmental concerns by creating a strong link between environmentalism and the corporation itself. "When concern for the environment becomes an integral component of corporate identity, environmental issues become 'harder to disown'. This not only channels resources for action on these issues, but also provides 'important political ammunition for justifying and legitimating further issue commitment'" (Sharma, 2000, p.688).

Legitimacy is a relevant concept to the power generating industry. For example, TransAlta's public declaration to achieve no net GHG emissions by 2024 is one method that the company uses to ensure that environmental issues are associated directly with the company. Another example is the recent application by TransAlta to the AEUB to

expand its coal-fired plant. TransAlta has generally been known for its proactive environmental strategy (Griffiths, 2002). Throughout the hearings, TransAlta's application was compared directly to EPCOR's. This resulted in TransAlta appearing less environmentally progressive (Geekie, 2002; Griffiths, 2002; Nguyen, 2002b). This caused industry stakeholders to react strongly to the decisions made by TransAlta during the application process (Geekie, 2002; Griffiths, 2002).

> "When a company's behaviour runs counter to public expectations (or at least the expectations of a large part of the public), the company will suffer a major loss of reputation – and often a loss of business, and share price as well. In these instances, the public's expectations of corporate behaviour have risen to a higher level – one that generates disappointment (even a sense of public betrayal) when not matched by revealed reality" (Greyser, 1999, p.181).

TransAlta's dedication to its reputation should be strongly considered given the fact that the corporation makes significant public announcements such as achieving zero emissions by 2024. Making public claims as significant and as bold as these will require dedication of resources and a strong corporate commitment to ensure that the company follows through on these goals. As with the AEUB application, if TransAlta's behaviour strays in any way from its targets, it will likely tarnish its reputation. Given the strong dedication to environmentally proactive behaviour, TransAlta will have to remain dependable in the eyes of the public. "A firm's pro-environment reputation demands continued investment in consistency of action, so that the firm's advantage does not erode from within" (Russo & Fouts, 1997, p.553). The establishment of a strong link between the corporation and environmentally proactive behaviour has previously had the effect of legitimizing TransAlta's actions. In order to maintain and foster this positive reputation, it will require consistent and likely increased attention in the future.

An additional method that corporations can use to gain legitimacy is to seek approval from external sources (Aldrich & Fiol, 1994; Meyer & Rowan, 1977). Having external bodies recognize the actions of a corporation provides the company with the knowledge that its' strategy is socially acceptable, and therefore legitimate. There are multiple examples of where power-generating corporations have received external approval for

their environmental initiatives. One example is the fact that TransAlta is currently listed on the Dow Jones Sustainability Index. This achievement makes the corporation's environmental efforts externally legitimate. As previously mentioned, TransAlta has been recognised by the Canadian Institute of Chartered Accountants for its environmental reporting (CICA, 2002). Another example is the rankings achieved by both TransAlta and EPCOR in the previously mentioned study of sustainability reporting (Chapter 2).

The actions of both EPCOR and TransAlta are creating strong links between their environmentally progressive behaviour and their individual corporate identity. This indicates that the companies are projecting their environmental strategy outward into the public and media, and this helps to legitimize the corporation's actions. However, as demonstrated by the example of TransAlta's recent application to the AEUB, any deviation from environmentally progressive behaviour can cause significant repercussions for the company. Through the continual pursuit of their corporate strategies, and seeking to legitimize their actions, the companies can continue to achieve business advantages from their reputations. The topic of reputation will be dealt with in more detail in the following sections of this chapter. Recommendations will encourage the promotion of environmentally progressive behaviour on the part of power-generating corporations as well as identifying areas where corporate actions can be legitimized by external sources.

5.4.4 – ISOMORPHISM

When corporations operate within an organizational field, research has demonstrated that there is often a tendency for companies to begin to adopt similar strategies and business practices (Boons et al., 2000; Boons & Strannegard, 2000; Aldrick & Fiol, 1994). The process of members of an organizational field becoming similar is referred to as isomorphism (Boons et al., 2000). Research has identified a number of mechanisms that cause companies to homogenize. The first mechanism is coercive isomorphism, which occurs when pressure is put on companies from the industry, regulators, and society, to behave in a specific manner (Boons & Strannegard, 2000). The second mechanism is

mimetic isomorphism, whereby companies imitate the behaviour of an organization that is viewed as an industry leader (Aldrich & Fiol, 1994; Boons et al., 2000).

Although each of the three corporations approach environmental issues differently, the notion of mimetic isomorphism could be applied to EPCOR and TransAlta. The companies have begun to develop growing similarities in their approaches to environmental issues. Both corporations continue to develop new ways of being environmentally proactive and they have recently become business partners on the Genesee and Keephills expansions (Page, 2002). Examples can also be found to demonstrate the theory of coercive isomorphism within the Alberta power-generating industry. The recent establishment of the Canadian Clean Power Coalition includes funds from all three power-generating companies (ATCO, EPCOR, and TransAlta) (Dinning, 2002). This demonstrates that the three companies consider this organisation to be valuable and can collectively work towards a common goal. As previously mentioned, each of the three corporations also recognise that there is a minimum standard that is acceptable in the industry (Kostler, 2002; Lewin, 2002; Page, 2002). This minimum level of compliance is consistently being raised by new and improved government regulation as well as pressure from the public, and stakeholders.

There are growing similarities occurring between power generating companies as a result of partnerships. As previously mentioned, TransAlta and EPCOR are now partners in both of their proposed expansion projects. Through the mimicking of behaviour, or formulation of partnerships, the power generators are attempting to minimise the risk of their operations. The growing similarities between companies have largely been a positive influence on environmental performance. As long as the environmentally proactive companies continue to dominate the industry, this trend will likely continue. The previous examples have demonstrated that partnerships can be economically beneficial and recommendations should consider the use of partnerships to address the environmental performance of the power-generating industry.

5.5 - Reputation and Risk

The decisions made by a corporation, including their environmental strategy, help in establishing the reputation of the company. A corporate reputation is a valuable asset and often receives less attention as compared to economic or regulatory concerns. In cases when a corporation's reputation is negatively impacted, this can create a great deal of risk for the company. The issues of risk and reputation are very important for power generators. Helen Howes, Vice-President of Sustainable Development at Ontario Power Generation, stated that reputation was very important given the nature of the power generating business. "We sell a commodity that nobody sees, an electron, and in most cases reputation is all we have" (Howes, 2002). Reputation also becomes more valuable in a deregulated market. As customers are able to switch energy providers, the reputation of the generator could be a deciding factor (OECD/IEA, 2001). Although cost would likely be the initial consideration for consumers, the environmental performance of a power generator may also be of concern. These market factors could be supported through the previously mentioned recommendation regarding the provision of environmental information on customer bills. The issue of reputation goes far beyond the views of the electricity customer.

> "Reputation is a broad and far-reaching asset incorporating concepts such as corporate image, goodwill and brand equity. It is a compilation of views held by all of the firm's stakeholders-investors, clients, customers, employees, suppliers, partners, vendors, media, financial analysts, special interest groups, politicians, labor unions, shareholder activists and regulators" (Kartalia, 2000, p.51).

Given the broad nature of a corporate reputation, maintaining positive status can provide a number of benefits. "Academic research, market surveys, consultant studies and major business publications conclude that a strong reputation is a strong competitive edge. Significant advantages of a solid reputation are:

- superior share valuation
- improved access to capital

- reduced marketing costs
- premium pricing capability
- attracting the best employees and their continued retention
- increased productivity and employee morale
- loyal (repeat) customers
- higher level of respect and deference from the press, and politicians
- preferred relations with advocacy and special interest groups
- easier crisis management response" (Kartalia, 2000, p.57).

Others have reported that a strong reputation "has considerable financial value" and can also "sustain a company in times of controversy" (Greyser, 1999, p.179). As previously mentioned there is a link between reputation and risk. Corporations that attempt to maintain a positive reputation also minimise corporate risk. "Prevention is the least costly and most efficient means to protect a treasured reputation. Preventing defects that can tarnish or destroy a reputation saves an extraordinary amount of anguish, time, effort and money" (Kartalia, 2000, p.56). Given the recognised value in establishing and maintaining a positive corporate reputation it is important to review the corporate approaches to reputation and risk management.

ATCO states that because it is an investor owned corporation, its reputation is maintained by addressing the needs of its shareholders. The corporate position is that as long as the needs of the shareholders are addressed, then ATCO is sufficiently maintaining its reputation (Kostler, 2002). ATCO also stated that shareholder value is considered in every corporate decision (Kostler, 2002). EPCOR takes a different approach to reputation management. EPCOR has a specific business unit designed to deal with the problems and matters related to reputation (Lewin, 2002). Representatives of the company state that the corporation does make an effort to maintain and monitor its reputation (Lewin, 2002). TransAlta also stated that it is continually concerned with its reputation and does its best to attempt to maintain a positive corporate image (Page, 2002). Overall, the interview questions regarding reputation found that the topic was difficult to discuss. The lack of detailed information provided on the issue of corporate

reputation may be a result of the intangible nature of the subject. In order to address this lack of information, the following paragraphs will use examples to illustrate key issues relating to reputation.

While the three companies express an interest in preserving or maintaining their reputations, a number of recent incidents within the power generating industry demonstrate some of the associated problems with reputation and risk. One basic example relates to ATCO Power. Among the industry stakeholders, ATCO was found to have a very limited reputation. Representatives from both the AEUB and Alberta Environment stated that they had a small amount of information regarding the company (Geekie, 2002; Roberts, 2002). Even the Pembina Institute had little to comment on ATCO Power (Griffiths, 2002). Given the minimal knowledge regarding the company, an assumption was made that the corporation must be meeting all of the required regulatory standards for compliance (Griffiths, 2002). It would appear that ATCO Power has almost no tangible reputation among the prominent industry stakeholders. When TransAlta and EPCOR were asked about ATCO Power as a company, the response was that the company has a low profile, and was known more for compliance rather than proactive environmental initiatives (Lewin, 2002; Page, 2002). TransAlta and EPCOR have also had problems related to reputation.

TransAlta has had a prominent and positive corporate and environmental reputation for a number of years in the province (Griffiths, 2002; Page, 2002). However, a number of recent events have affected this positive reputation. As previously mentioned, the recent application to the AEUB has caused industry stakeholders to reconsider their opinions regarding TransAlta (Geekie, 2002; Griffiths, 2002). This is a result of the notion that EPCOR's application was thought to be more environmentally progressive than the proposal put forward by TransAlta (Geekie, 2002; Griffiths, 2002). Another incident was the recent investigation by the California Attorney General's Office regarding the allegation that TransAlta participated in "unlawful and unfair business practices" regarding the trading of energy in the California market (Nguyen & Stueck, 2002). Prior to the announcement of the investigation, the company "admitted it used some of the

controversial trading practices being investigated in the California energy market, but insists it has done nothing legally or morally wrong" (Nguyen, 2002a). The company responded very quickly to the allegations and was forthcoming with information that resolved the issue with the Federal Regulatory Energy Commission in the US (Page, 2002). Despite the fact that TransAlta was cleared of all wrongdoing with regards to these allegations, it may have an impact on the corporation's reputation. The very fact that the corporation was implicated can cause investor uncertainty, and public distrust.

The timing of TransAlta's involvement in the controversy also compounded the effect on its reputation. There is a recently growing demand from the public regarding corporate governance as a result of the corporate scandals in the United States (NRDC, 2002). Scandals such as the collapse of Enron have caused investors and the public to demand increased transparency from corporations. "In the wake of Enron, investors are anxious to have as much information as possible to help assess a company's worth and liability" (PSEG, 2002). This call for increased transparency includes details regarding a corporation's environmental performance. The environmental risks and liabilities of a company can be an important indicator to investors. For power generators, "air pollutant emissions are one of the most measurable, relevant, and significant indicators of risk" (PSEG, 2002). One method of addressing transparency regarding environmental performance is through the provision of emissions information on customer bills. This recommendation would have the affect of making vital environmental performance information available to a broader range of stakeholders. This is an important consideration as the issue of transparency includes all power generating companies. Corporations in general are now in positions to defend their reputations as the daily news continues to provide additional information regarding corporate misconduct (NRDC, 2002).

TransAlta is not the only power generating company dealing with its reputation. EPCOR was also recently reviewed regarding incidents of power price manipulation in the Alberta Power Pool.

> "Alberta electricity prices can be artificially increased by power trading firms operating under the province's deregulated rules, according to an Alberta Power Pool investigation of three "major incidents" of price distortion. The power pool, the provincial body that oversees the wholesale market, says in a report that power trading firms sometimes withhold power from the grid, creating a shortfall which forces up the price for periods ranging from minutes to hours. As a result, Alberta customers occasionally may be paying higher prices than necessary" (Avery, 2002).

While the report released by the Alberta Power Pool indicates that these trading practices are somewhat abusive and are a part of gaming tactics, the practices are allowed under the existing market structure and regulations (Avery, 2002). The trading corporations are merely operating and executing competitive behaviour within the established rules of the Power Pool (Avery, 2002). This may be a serious reputation concern for EPCOR as it has a large customer base that it directly interacts with through the retailing of both water and electricity.

EPCOR has also recently been implicated in two other incidents that have negatively impacted its corporate reputation. The first incident is with regards to mishandled power delivery and billing within the province (Gregoire, 2002). A number of complaints have been made regarding the billing for power in rural Alberta. EPCOR attempts to shift the blame towards the government, citing that the rules and regulations that it is operating under are responsible for the problems. In return, the government states that it is EPCOR's responsibility to provide accurate services to its customers including matters relating to billing discrepancies (Gregoire, 2002). This incident has attracted enough attention to impact EPCOR's reputation.

> "Epcor proposes that these rules and regulations be revisited by a joint government, industry and consumer task force as soon as possible. We will not tolerate any further damage to Epcor's reputation caused by events over which we have no control or jurisdiction" (Gregoire, 2002).

This conflict has significant ramifications as it directly involves EPCOR's customers. The importance of the customer in a deregulated market has been described throughout

this research and therefore this problem is a considerable concern for EPCOR (Chapter 2).

The second incident involving EPCOR relates to a recent study released by the Pembina Institute and the David Suzuki Foundation (Mittelstaedt, 2002). The study was intended to review the emissions made by companies involved in the federal-industry partnership known as the Voluntary Challenge and Registry program (Mittelstaedt, 2002). The program was established in 1997 and was one of the ways Canada was going to begin to reduce the emissions of greenhouse gases (GHG) to comply with the Kyoto targets. This study found that EPCOR was the worst performer among those companies participating in the program (Mittelstaedt, 2002). EPCOR's emissions increased "141 per cent between 1990 and 2000" (Mittelstaedt, 2002, A4). This relates to the material presented in Chapter 3 regarding the Kyoto Protocol. Power generators are increasingly being discussed and scrutinized as a result of the impending national agreement regarding GHGs. EPCOR being cited as a poor performer demonstrates that the Kyoto protocol may have implications for power generators reputations. Improved reputation management and environmental performance among power-generating corporations are important considerations given the growing attention caused by Kyoto. These topics will be addressed in the final recommendations.

Fortunately for EPCOR, not all events involving its reputation are negative. The examples described above are recent, and EPCOR has maintained a positive reputation prior to these events. There are a number of reasons for EPCOR's positive corporate image. First, the company has a long history of corporate wide proactive environmental performance (Lewin, 2002). Secondly, the recent process of applying to the AEUB for the Genesee plant expansion was a positive experience for the majority of the parties involved (Geekie, 2002; Roberts, 2002). This has had the impact of improving EPCOR's image among industry stakeholders. Both the Pembina Institute and Alberta Environment recognised the efforts and positive approach to the process taken by EPCOR during its application to the AEUB (Geekie, 2002; Griffiths, 2002). EPCOR worked closely with Alberta Environment to develop and learn from the environmental

impact assessment application (Geekie, 2002). The efforts made by EPCOR during this process were well received and recognised by Alberta Environment (Geekie, 2002). This has prompted comments such as, "EPCOR has good stakeholder relations, a good public image, and is a good neighbour" (Geekie, 2002). Even TransAlta recognises EPCOR's commitment to environmentally proactive behaviour, encouraging them to join in a partnership to develop both the Genesee and Keephills coal-fired power plant expansions (Page, 2002).

Discussing matters of reputation forces the consideration of reality verses perception. As mentioned earlier, whether or not a company has done anything wrong is not important. The headlines only state the allegations and scandals. This is often enough to damage a corporate reputation. The power generating industry does not often receive media attention regarding their daily operations or environmental initiatives, but tends to make headlines when electricity prices rise, or when corporate misconduct has occurred (Page, 2002). This means that the general public is receiving mostly negative information regarding the provincial power generators. The lack of information provided to the public is an obstacle that has to be overcome by power generating companies in order to improve their reputations. Providing environmental information on customer bills can highlight the positive efforts taken by proactive companies and address this information gap. This will help to address both corporate reputation as well as the increased need for transparency.

As outlined in the previous section there are a growing number of negative incidents involving power-generating corporations. The increase in incidents should be of concern given that these corporations are now operating in a deregulated market. This section has also shown that a positive reputation can be a useful asset during times of controversy. Therefore, the previously mentioned need for improved reputation management for power generating corporations will be directly addressed in the final recommendations.

5.6 - CONCLUSION

This chapter demonstrates that there are a number of considerations for power-generating corporations outside of economics, regulations, and legislation. Through the use of various frameworks and concepts taken from the corporate strategy literature, it has been demonstrated that the three power generating companies in Alberta take varied approaches to environmental issues, and achieve mixed results. A number of different elements in the external environment have been shown to shape and influence the strategy and decision-making of the three corporations. Research regarding stakeholders established the importance and impact of investors and shareholders in determining the environmental strategy of the three power generating companies. The role of the customer and public was also shown to influence decisions. This prompted further consideration of the recommendation regarding transparent customer bills in order to utilize this influence. Environmental strategy and corporate reputation are likely to become more important considerations for customers as they begin to exercise the option of choosing their electricity supplier. This chapter also provided a number of examples where corporations sought external legitimization for their environmental initiatives. Legitimization will be considered as a method to improve the recommendations of the final chapter. The last section highlighted the growing number of negative incidents that have been occurring and the resulting impacts on corporate reputations. This has established the need for corporations to improve both their reputation management practices and their environmental performance.

5.7 - KEY ISSUE SUMMARY

Recommendations will consider and reflect:

- the varied environmental strategies among the power-generating corporations,
- the potential method of utilizing the external environment of power-generating corporations in influencing their environmental performance,
- the important role that the public can play in shaping and developing the environmental performance of power-generating companies,
- the importance of creating opportunities for allowing corporations to promote their own environmentally progressive behaviour,
- the need for identifying methods that continue to allow the legitimization of corporate environmental initiatives by external sources,
- the potential benefit that could be obtained through the use of partnerships in addressing issues of environmental performance within the power-generating industry,
- the importance of the electricity customer in shaping the environmental performance of power-generating corporations,
- the lack of information provided to the public regarding power-generating corporations,
- the need for improved reputation management within the power-generating industry of Alberta, as supported by the increase attention caused by the Kyoto protocol.

6.0 - Chapter 6 – Conclusions and Recommendations

> "Environmental performance represents in itself a necessary condition to be satisfied in order to reach any satisfactory level of industrial performance in the long run" (Rugman & Verbeke, 1998, p.365).

6.1 - Chapter Introduction

The purpose of this chapter is to present the recommendations that will address the issues identified throughout the previous research. In addition, brief conclusions will be provided, along with a modest outline of the future of the Alberta power-generating industry. Providing the list of recommendations along with the outline of the future of the industry directly addresses objective five and six (outlined in the first chapter) as well as the overall research purpose.

6.2 - Recommendation 1 – A Covenant (or Sectoral) Agreement

The first recommendation is for the government and industry to develop a covenant agreement. A covenant or sectoral agreement is defined as a "written agreement between the government and others (local authorities, industry, non-governmental organizations) aimed at realising policy" or government objectives (Bastmeijer, 1994; Kwant & Wink, 2000). The agreement would be a comprehensive long-term plan addressing the environmental impacts of energy production. It would cover all of the identified environmental consequences related to power production from fossil fuels, including the emission of carbon dioxide, sulphur dioxide, nitrous oxides, particulate matter, and mercury. In order to deal with these emissions, the covenant would outline the timeline, and the resources and efforts that would be made by both government and industry to meet the established targets and objectives. The plan would likely cover a period of 25 to 30 years.

The goals of the covenant would be based on long-term government objectives for the environmental performance of the power generating industry. The contents of the covenant would likely include goals relating to the previous list of air emissions, but may

include other issues such as the development of renewable energy in the province. An example of a government target would be a 30% reduction in carbon dioxide emissions (below 1990 levels) from provincial power production over the next 30 years. This objective would then be brought before the assembled group of negotiators from industry, government and non-governmental organizations. The task would then be for the group to establish the most cost effective and efficient method of reaching this goal, using a broad range of tools and resources. The government may participate by stating that it has earmarked a given amount of money for the attainment of this goal and could outline the ways that it could support this effort (e.g., tax incentives, guaranteed loans). The industry could then negotiate knowing the position of the government and the long-term goals that need to be achieved. Decisions could be made as to whether or not to pursue these objectives individually, or if there are cost effective measures that could involve combined efforts or partnerships. The plan would include checkpoints that would require independently audited reports verifying the progress of the individual corporations. An example of this would be a 6% reduction by 2012. The industry would have to provide evidence of attaining the 6% target to the government at that time. This is just one example of the types of negotiations that could be a part of a provincial covenant agreement. The government would likely establish similar targets for each individual air emission related to power production. The targets and objectives for the covenant would be established based on the long-term views of the government, combined with future estimates of technology, as well as the economic capability of the power generating industry. Using this information, the groups participating in the negotiation process would likely establish the contents of the covenant agreement.

The covenant agreement was selected as a result of the support that was expressed from industry representatives as well as nongovernmental organisations (Griffiths, 2002; Howes, 2002; Kostler, 2002; Lewin, 2002, Ogilvie, 2002; Page, 2002). This recommendation also addresses a number of the issues raised in the previously outlined research, such as market instability and uncertainty, the need for a long-term perspective regarding environmental performance, and creating more effective and efficient environmental legislation. The following paragraphs will review why the covenant is an

effective policy to address environmental performance and corporate competitiveness in the deregulated market. This discussion will also link these topics to the identified concepts that were highlighted in the previous chapters.

Chapter 2 identified the concern over government's spending an increasing amount of money in order to monitor and regulate the deregulated market. Given this counterintuitive issue, the government needs to find ways of efficiently addressing the environmental performance of the power generating industry. The use of a covenant can greatly reduce the cost of implementation and enforcement as compared to other methods (Bastmeijer, 1994; RRI, 2001). Cost reductions are achieved by negotiating a voluntary agreement directly with the power-generating industry (Bastmeijer, 1994). This can reduce costs by eliminating the need for the establishment of government bodies and the reduction of time required to develop and implement new legislation (Bastmeijer, 1994). Efficiencies can also be achieved by establishing an agreement that encompasses all the air emissions from power generation. As opposed to developing multiple programs to deal with each individual emission. This recommendation directly addresses the concern regarding the growing costs of government regulation identified in Chapters 2 and 3.

Environmental groups, among others, expressed the need for a comprehensive long-term plan to deal with the environmental performance of the power generating industry (Griffiths, 2002; Ogilivie, 2002). These comments made in Chapter 3 would be directly addressed by the development of a covenant agreement. The section on grandparenting, described in Chapter 3, and reviewed further in Chapter 4, would also be dealt with by a covenant agreement. Outlining long-term goals for the industry (as described above) would provide power generators with a certainty that does not exist under the current operating licence structure. Corporations would be able to more effectively forecast the economics of their developments as a result of the increased certainty caused by the covenant agreement. This would deal with the need for the long-term perspective that was also highlighted in Chapter 4. A covenant agreement would also improve the conditions of the investment market. Investors and the capital market would likely approve of the certainty provided by a long-term agreement. Other economic criteria

would also be met by a covenant. Industry participation would ensure that issues of capital stock turnover, timelines for technology development, and overall policy efficiency and flexibility were included in the negotiations. Therefore a covenant would address the economic concepts outlined in Chapter 4.

The covenant can create a forum that could be used to improve the relationship between the provincial and federal governments related to the Kyoto protocol (Chapter 3). Existing examples of implemented covenant agreements have found that this policy tool is effective in transferring national government objectives into action plans for individual companies. (Bastmeijer, 1994). Covenants have also been able to "integrate environmental efforts across institutional and jurisdictional boundaries, providing a framework to coordinate activities among, for example, competing government agencies or industries" (RRI, 2001). Linking the national objective of reduced GHG emissions within the provincial covenant agreement, would allow for the achievement of multiple objectives. This increases the overall efficiency of policy development in the province. The example provided above regarding the reduction target of carbon dioxide, demonstrates that these two interests can be combined. The long-term nature of the covenant agreement would also deal with the current uncertainty that is affecting the power generating industry as a result of the Kyoto protocol (Chapter 3).

The Kyoto protocol also raised the subject of the reputation of power generating corporations. The growing media attention is causing increased scrutiny of these companies. Chapters 3 and 5 pointed out that this might increase the need for improved reputation management regarding the Kyoto protocol. Power generating corporation's involvement in a covenant could help to address this issue. The willingness of corporations to enter into a long-term voluntary agreement regarding their environmental performance would likely improve their corporate reputations. A covenant would provide the public with a comprehensive, long-term guarantee that the current operating licences do not provide.

A covenant agreement could also acknowledge the matter of project need and the concerns regarding the growth of an electricity export market (Chapter 3, 4). If a covenant agreement was negotiated and implemented, the Alberta Energy and Utilities Board (AEUB) as well as groups such as the Clean Energy Coalition (CEC) would have a reduced concern regarding project need. Both the AEUB and the CEC would have assurances that new power developments would be covered under the covenant agreement and would therefore be included in the long-term environmental performance targets for the province. This may also deal with the apprehension about the potential development of power plants to export electricity. Similar to project need, any export development project would be covered by the covenant agreement. Therefore it could be likely that the development of the export market could proceed with fewer incidents (i.e., legal challenges).

A covenant agreement is also an effective method of acknowledging the unique circumstances of Alberta's power generating industry. The previous chapters have outlined the specific conditions that help to create the overall environmental performance of the Alberta industry. The very nature of a covenant agreement is designed to meet local circumstances. The covenant is negotiated by the industry stakeholders themselves and will therefore reflect the "specific environmental, economic, and social conditions" of the Alberta situation (RRI, 2001).

Previous chapters have demonstrated that a covenant would be an effective solution given the current nature of environmental problems, as well as the actions and initiatives of industry stakeholders. For example, Chapter 3 outlined the willingness of the federal and provincial governments' to work directly with industry in order to improve environmental performance. The Alberta government currently is developing plans to negotiate a sectoral agreement with the electricity industry regarding greenhouse gases (Government of Alberta, 2002). This initiative could be expanded to acknowledge a larger range of environmental performance issues. Other groups have also shown support for addressing environmental problems through negotiated agreements. The Canadian Electricity Association (CEA) has encouraged government and industry agreements and

has stated that the industry should "pursue long-term integrated approaches to air emissions management that provide increased investor certainty" (CEA, 2001, p.6). The Canadian Clean Power Coalition (CCPC) also states its support for a long-term multi-pollutant approach (Dinning, 2002).

The province of Alberta currently has an excellent forum for the development of a covenant or sectoral agreement. This group is the Clean Air Strategic Alliance (CASA).

> "CASA is a non-profit association composed of diverse stakeholders from three sectors. Senior representatives from each sector, government, industry and non-government organizations (such as health and environment groups) are committed to developing and applying a comprehensive air quality management system for the people of Alberta through a collaborative, consensus-base process" (CASA, 2002).

This organization is dedicated to provincial air quality, but is also focusing on specific industry sectors including electricity (CASA, 2002a). CASA has formed an electricity project team "with representatives from federal, provincial and municipal governments, the utility sector and other industries, and non-governmental organizations" (CASA, 2002a). The team is to develop an air emissions management approach for Alberta's electricity sector (CASA, 2002a). The group intends to make recommendations to the CASA board in June 2003; resulting in those standards being implemented in 2005 (CASA, 2002a). The work being done by CASA is an excellent starting point for the development of longer term plans to address environmental performance. Each of the three power generating corporations as well as the Pembina Institute are actively involved in the organization (Griffiths, 2002; Kostler, 2002; Lewin, 2002; Page, 2002). The process could be modified slightly to include a longer-term vision and broader scope of issues to be dealt with by the management approach. This could also be linked to the previously mentioned Alberta government initiative, regarding the negotiation of a sectoral agreement. The current work being done by both CASA and the provincial government makes the covenant agreement an appropriate recommendation for the industry.

In addition to the support from the industry stakeholders there are also a number of precedents of a covenant agreement being used as a policy tool to address environmental performance. The Netherlands has used the covenant as a tool for a number of years (Chasek, 1998).

> "The government set twenty-five-year environmental goals to be achieved by different industrial groups, but asked the groups themselves to design credible strategies for meeting these goals. The Netherlands recognizes the proper roles of the public and private sectors. The private sector alone could not choose an optimal level of environmental protection, but it should be given freedom to devise the most cost-effective way to assist in achieving the country's environmental goals" (RRI, 2001).

The shift in policy was a result of the changing role of government due to deregulation (Bastmeijer, 1994). This makes the Dutch example more comparable to the situation in Alberta. The Netherlands has also negotiated a covenant with the electricity generating industry in order to reduce the emission of sulphur dioxide and nitrous oxides (Bastmeijer, 1994). This agreement has been considered a success by both government and industry. "The outcomes were satisfying for both parties. A substantial reduction of SO2 and NOx emissions was combined with freedom for the electricity sector to implement in the most cost-effective way" (Lulofs, 2000). The government in the Netherlands has also suggested that developing an agreement with coal-fired plant owners to reduce carbon dioxide emissions will be a policy tool used to address climate change (van Rooijen et al., 2001; de Boer, 2002). The covenant policy has also been used to promote fuel efficiency, as well as the development of renewable energy (Chasek, 1998). Overall, the Netherlands has enjoyed a significant amount of success using the covenant as a policy tool to deal with environmental problems (Quik, 1999).

> "Results for the Dutch industry have demonstrated that the original objectives of the 1990 plan are realized and that the growth of the economy has been accompanied by overall emissions reductions. .Hence uncoupling of economic growth and environmental burden has been achieved" (Quik, 1999).

> "As an overall result of almost 10 years of green planning we can now see that most of the planned reduction targets are realized and that new profitable relationships have been built. Industry estimates that as a result of the

> covenant approach, environmental investments could be reduced by 10-15% to achieve the same environmental benefits" (Quik,1999).

The covenant agreement is a tool that has successfully been used for a number of years in the Netherlands. Recently there has been a Canadian example of the use of a covenant agreement to address environmental performance issues.

> "In January 2002, the Aluminum Association of Canada and the Government of Quebec signed a Covenant on voluntary reduction goals of an additional 200,000 t of greenhouse gas emissions by the end of 2007. The Covenant proposes gradual, permanent reductions, allows for growth in the industry, and acknowledges the importance of aluminum's life cycle and contribution to the collective effort to reduce greenhouse gas emissions" (Wagner, 2002).

This is an important example that demonstrates that both the Aluminum Asssociation and the Government of Quebec found value in the development of a covenant agreement. This also shows that a covenant agreement can be negotiated and implemented in a Canadian market. Both examples from the Netherlands and Quebec, illustrate that the covenant can be an effective tool to address environmental performance while respecting the need for a competitive market. These examples also provide useful background information and knowledge regarding covenant agreements that could be applied to the Alberta power-generating industry.

Key informant interviews raised two concerns with regards to the implementation of a covenant agreement in Alberta. Two interviewees suggested that there was currently considerable work being done in the area of negotiated contracts in the power generating industry (Kostler, 2002; Lewin, 2002). The work being done by CASA was cited as an example (Kostler, 2002). This was in reference to the previously mentioned air emission management strategy being developed by the CASA organisation (CASA, 2002). A second reference was made to the current work being done by the Canadian Electricity Association (CEA). A representative from EPCOR stated that the CEA is currently establishing a covenant approach relating to the emission of carbon dioxide and other emissions from power generating plants (Lewin, 2002). This is a reference to the

"Emissions Performance Equivalent Standard (EPES)" that is being implemented throughout the power generating industry in Canada (CEA, 2002b). The EPES is a "binding industry commitment to limit its emissions per unit of production in exchange for which government would agree to provide investor certainty for the duration of the commitment" (CEA, 2002b). The standard is based on the emissions of a combined cycle gas turbine (CEA, 2002b).

The work being done by CASA and the CEA is an important aspect of managing the environmental performance of the power generating industry. The covenant being suggested could be based on these initiatives, and make them more comprehensive and address environmental performance over a longer timeframe. Therefore these current examples of proactive work could be used as a foundation for the development of an improved and more effective environmental policy.

A second concern that was raised during interviews was the length of time a covenant takes to develop and implement (Lewin, 2002). This observation can be dealt with in two ways. First, the long-term nature of the covenant (i.e., 20 – 30 years) may make the potentially lengthy negotiation phase a worthwhile effort. Although the agreement may take a long time to develop, it will in all likelihood result in long-term benefits for the environmental performance and competitiveness of the power-generating industry. Secondly, there are steps that can be taken to ensure that the process does not drag on too long. The work being done in the Netherlands has found that the government has the capacity to speed up the process of covenant negotiations and implementation (Lulofs, 2000). The Dutch government uses the threat of strict environmental regulation to encourage the development of both an efficient and environmentally effective covenant agreement (Lulofs, 2000). The government makes a firm commitment that if a voluntary agreement is not reached then government regulation will be put in place to deal with the long-term policy objectives (Lulofs, 2000). The threat of strict environmental regulations forces the industry to consult as efficiently and effectively as possible. The negotiation process also ensures that the industry perspective is established and expressed (Lulofs,

2000). This allows the development of a more flexible and cost effective method of meeting the established environmental objectives (Lulofs, 2000).

In addition to the covenant agreement, other recommendations were considered to address corporate competitiveness and environmental performance. One recommendation that was reviewed but then later rejected was the implementation of a Renewable Portfolio Standard.

> "The Renewable Portfolio Standard (RPS) is a flexible, market-driven policy that can ensure that the public benefits of wind, solar, biomass, and geothermal energy continue to be recognized as electricity markets and become more competitive. The policy ensures that a minimum amount of renewable energy is included in the portfolio of electricity resources serving a state or country, and – by increasing the required amount over time – the RPS can put the electricity industry on a path toward increasing sustainability" (AWEA, 1997).

The RPS has become a popular policy mechanism that is often implemented during the deregulation process (Griffiths, 2002). "RPS polices have been established by legislation in 10 U.S. states, and in the countries of Australia, Austria, Belgium, Italy, and the United Kingdom, but little experience has been gained with the actual operation of the policy" (Wiser & Langniss, 2001, p.2).

An interview with a representative of the Pembina Institute revealed that implementation of a RPS in the Alberta power-generating industry was unlikely, as the deregulation process had already occurred (Griffiths, 2002). The majority of RPSs are implemented prior to the deregulation process as opposed to after (Griffiths, 2002). This does not make it a functional recommendation for the Alberta power-generating industry. While a RPS would focus upon some of the points outlined in the research, a covenant was found to be more effective. A RPS directly created a market for renewable energy but did not deal with the environmental performance of the power-generating industry's existing assets. The economic analysis provided in Chapter 4, illustrated that there will likely be increased investment in coal-fired generation in the province. A RPS will not address these developments. In addition, the RPS creates a demand for renewable energy

developments and increases the competitiveness of this market. However, the forced investment in renewable energy may impact the competitiveness of the individual power generating corporations.

6.3 - Recommendation 2 – Customer Bill Transparency

The second recommendation is the implementation of provincial bill transparency in Alberta. This would mean that electricity retailers would provide information on customer bills regarding the fuel source used to generate the power and other information such as emissions per unit of energy where possible. If the specific information such as fuel type cannot be provided as a result of the energy being purchased from the Alberta Power Pool, other information could be included. Electricity bills could incorporate the overall energy mix being supplied to the power pool. This recommendation could be implemented through a standardization of provincial electricity bills based on the information that is already known within the province and the industry. The recommendation of transparent customer bills is intended for the government services division, the Ministry of Energy, the Alberta Energy and Utilities Board and provincial power retailers.

Customer bill transparency was selected as a result of the support expressed by non-governmental organisations and industry representatives (Griffiths, 2002; Kostler, 2002; Ogilvie, 2002; Page, 2002). This recommendation also dealt with a number of the problems identified in the research. The ability of the customer to select an energy provider has a significant influence on corporate behaviour (Chapter 2). The provision of environmental information on every customer bill in the province provides more information to market participants. This will act to supplement the media information that customers receive, therefore helping to address the information gap of Alberta energy consumers (Chapter 2, 5). Providing customers with more information regarding the environmental performance of the industry and their supplier can set a number of market forces to work. This deals with the separation of market forces and environmental performance identified in Chapter 4. The theory behind bill transparency

is that if customers are given information regarding the environmental performance of their energy provider, they will begin to use this as a part of their selection criteria (UCS, 2000, Weimer, 1999).

This recommendation may also improve the competitive nature of the power-generating industry in Alberta, as well as meeting the identified government criteria (Chapter 2). Providing information to consumers allows them to utilize market forces to shape the environmental performance of the industry. This has the effect of shifting control and influence of environmental performance from the government to the consumer. This is done efficiently and cost effectively, with little involvement or intervention from the government. This acknowledges both the role of government in shaping environmental performance as well as the concern over increasing cost of government control (Chapter 3).

As explained in Chapter 2, the ability of consumers to switch suppliers forces a degree of market discipline on the power generating industry (Harris, 2001). Forcing the companies to share their environmental performance information with their customers will cause companies to address environmental issues, and could result in increased attention or improvement in these areas (Russo & Fouts, 1997; Chapter 5). This method also is effective in that it will focus attention on energy providers with lower environmental performance while proactive companies will likely receive benefits from this measure (Russo & Fouts, 1997).

Implementing a simple recommendation such as bill transparency would also provide companies with opportunities to improve their corporate reputation. As outlined in Chapter 5, the consumers' ability to chose their electricity supplier makes the issue of corporate reputation more important. Bill transparency would increase the need for companies to address corporate reputation. Given that both the general public and customers are stakeholders that are considered influential by power generating corporations. This recommendation will likely cause corporations to acknowledge and improve their environmental performance (Chapter 5).

A few American electricity markets are currently using a transparent billing system (Weimer, 1999). California and Massachusetts currently have transparent billing, while other states such as Michigan and Texas are considering this idea (Heintz et al., 2000). These markets could be used as precedents for the development of the details for the standardization of customer bills in Alberta.

There are also two reasons why this recommendation is timely within the context of the Alberta power-generating industry. The first reason is because of the recent media attention that power-generators are receiving (Chapter 3 and 5). Publicizing the emissions from the industry or corporation would help the public understand the impacts caused by power-generation and allow them to make appropriate decisions. This may allow the public to be more involved with environmental problems, such as GHGs and the Kyoto Protocol (Chapter 3). The second reason that this recommendation is timely is that the provincial government is currently establishing a task force to "look at simplifying and standardizing bills across the province" (Cryderman, 2002). Although the task force was formed to deal with problems related to billing discrepancies. The group could also be used to consider the environmental transparency of customer billing. The timing of this recommendation adds to the overall cost effectiveness of the measure (Chapter 3).

In order to address similar concerns, other recommendations were reviewed and later rejected. These included other methods of public education as well as increased efforts regarding demand-side management. Both of these recommendations are effective to address certain aspects of the research, but were not as comprehensive as bill transparency. The deregulated structure of the Alberta power-generating industry would likely cause the government to be responsible for the development and funding of these programs. This would conflict with the concern over the growing cost of government regulation identified in Chapters 2 and 3. Although demand-side management programs are offered by both ATCO and EPCOR, the deregulated market structure limits the growth potential for industry led programs (Griffiths, 2002; Kostler, 2002; Lewin, 2002).

At the corporate level these services are provided to consumers, but are not a main policy drive of either company. In fact, EPCOR's demand-side management service often results in consumers using increased amounts of energy (Lewin, 2002). These programs are also less dependent on market forces, and would have a limited impact on the environmental performance of power generation in the province. For these reasons the two recommendations were rejected, and the concept of environmentally transparent customer bills was selected.

6.4 - Recommendation 3 – Research and Development of Clean Coal Technology

The third recommendation would be to continue the focus of research and development efforts on the establishment of clean coal technology. The recommendation would involve the development of commercially viable clean coal technology at the earliest date possible. This recommendation is intended for the Alberta power-generating industry as well as the provincial and federal governments.

This recommendation was selected as a result of the positive support expressed by industry representatives during key informant interviews (Kostler, 2002; Lewin, 2002; Page, 2002). Support was also identified in the current circumstances of the industry. The issue of clean coal technology was raised in both the Federal and Provincial government's plans to deal with climate change (Government of Alberta, 2002; Government of Canada, 2002). In addition, clean coal was mentioned in the recommendations made by the Alberta Energy and Utilities Board in the ruling on EPCOR's expansion plans (AEUB, 2001). These references to clean coal were made in Chapter 3. This recognition of clean coal as a method to address issues of environmental performance by a large number of industry stakeholders demonstrates the validity and applicability to the Alberta power generating industry.

The intention of this recommendation is to focus research and development funds towards clean coal, in order to secure an economical and environmentally responsible source of energy for the province of Alberta. The proposal regarding clean coal

technology was selected based on the criteria and concerns outlined in this document. Chapter 2 described Alberta's reliance on coal as a fuel source to generate power. This dependence on coal is also currently responsible for significant environmental problems such as air quality and greenhouse gas emissions. Regardless of the negative environmental effects, the economic review of coal in Chapter 4 illustrated that it was both an abundant and cost effective resource (CEA, 2002). The prominence and importance of coal in the Alberta power-generating industry demonstrates that dealing with the environmental performance issues related to its use would have a significant impact.

The heavy reliance on coal makes the development of this technology an important factor in improving environmental performance. Research has shown that a retrofit of 10,000 megawatts of coal-fired capacity with newly developed technology "could potentially annually reduce or avoid:

- 72 million tonnes of carbon dioxide
- 100,000 tonnes of nitrogen oxide
- 125,000 tonnes of sulphur
- 7,500 tonnes of ash
- 750 kilograms of mercury" (Dinning, 2002).

In addition, the proposed technologies are also more efficient at generating electricity from coal (Dinning, 2002). This technology would dramatically improve the environmental performance of the Alberta power generating industry.

The ability of Alberta to establish an economically viable energy source that has minimal environmental consequences would also address a number of other concerns identified in the research. For example, the potential development of an export market identified in Chapter 3 and 4 would likely be dealt with through the development of clean coal technology. If the public and the AEUB could be satisfied that increased power production would not negatively impact the environment, the approval of plants

developed specifically to export power would have greater acceptance. This would deal with the problems related to project need, identified in Chapter 3. In addition to this, clean coal would reduce the problems and concerns regarding external costs. Removing or improving the environmental consequences related to the burning of coal would eliminate the associated externalities (Chapter 4).

Another topic related to the potential growth of the export market and clean coal technology is the time required to develop the equipment. The development of clean coal technology will require significant time and money (Dinning, 2002). The time required to development any new technology will likely be similar to the time required to develop new transmission lines required for the growth of an export market (Dinning, 2002; GCSI, 2001). The similar timelines allow for progressive development with assurances that issues of environmental performance will be addressed once the infrastructure required to export electricity is available. In addition to the growth of the export market for power there are a number of other potential competitive benefits in developing clean coal technology.

A number of business opportunities could be developed from work related to the establishment of clean coal technology. The skills and knowledge obtained through the development of this technology within the province of Alberta may allow corporations to begin to export this knowledge to international markets. As deregulation continues to spread across the globe, opportunities for the development of new power plants will continue to arise. Large power markets such as China also have a heavy reliance (81%) on coal, and would be a likely market for skills and knowledge of clean coal technology (Dinning, 2002). "Worldwide, coal is expected to double from current 25 percent to 50 percent of worldwide energy consumption by 2015. For the foreseeable future, coal will remain the primary fuel for electric power generation" (Smith, 2001, p.8). In addition, the growing awareness of global problems such as climate change will likely cause an increased interest and demand for clean coal technology. This provides incentives for corporate involvement and investment. This will result in increased business opportunities for those power-generating companies operating in international markets

(i.e., ATCO, EPCOR, and TransAlta). The development of this technology could result in the improvement of the environmental performance of industries outside of Alberta.

Other business opportunities could be created by the ratification of the Kyoto Protocol. The international agreement promotes the use of Clean Development Mechanisms to reduce GHG emissions (Government of Canada, 2002). This is the one tool promoted by the protocol that encourages investment in "emission reduction projects in developing countries" (Government of Canada, 2002, p.13). Clean coal could become a valuable tool that would help Canada achieve its Kyoto targets, and increase the business opportunities for power generating companies.

The only negative comments regarding clean coal technology came from the Pembina Institute (Griffiths, 2002). This is a result of a policy mandate that requires a focus on alternative and renewable sources of energy (Griffiths, 2002). The Institute felt that research and development efforts should focus on non-carbon based fuel sources (Griffiths, 2002). This concern can be addressed by several observations. Recent speculation on the timeline for the development of commercially viable clean coal technology is roughly 10 years (Dinning, 2002). This is a relative short time period and can result in significant improvements in the power-generating industries environmental performance. Removing the air emissions related to coal-fired production would also help Alberta reach the targets outlined in the Kyoto Protocol (Chapter 3). The numbers shown above demonstrate that a significant reduction of carbon dioxide can be achieved (Dinning, 2002). Once clean coal technology has been proven commercially viable the province can then begin to invest in other areas of research and development (i.e., renewable energy, distributed energy). This is an appropriate strategy given that other technologies (i.e., fuel cells, solar, and distributed generation) have been identified by the industry as being expensive, and have longer lead times to develop as compared to clean coal technology (Clarke, 2002; Chapter 4). Finally, the overall economics and abundance of coal in Alberta make this a logical focus for research and development (Chapter 4).

The industry has already made excellent progress in this area with the development of the Canadian Clean Power Coalition (CCPC). The CCPC is a group of power generating companies (representing over 90 per cent of Canadian coal-fired generation) and the American Electric Power Research Institute (CCPC, 2002). TransAlta, EPCOR and ATCO are currently involved in this consortium (CCPC, 2002). This demonstrates the potential value that can be created through power-generating corporations joining together to address common problems or issues. The coalition intends to "research, develop and demonstrate commercially viable clean coal technology" (CCPC, 2002). The group will first develop a retrofitted coal fire power plant that will remove all greenhouse gases and emissions from the power production process (CCPC, 2002). This plant is expected to be in operation by 2007 (CCPC, 2002). They also intend to develop a second coal-fired generation plant that will be operational sometime in 2009 (CCPC, 2002). The work being done by the CCPC has also been linked to the Kyoto targets (Dinning, 2002). The CCPC feels that this technology can achieve GHG reductions that go beyond the suggested levels of the Kyoto Protocol (Dinning, 2002). This demonstrates the potential improvements in environmental performance that can be made with clean coal technology. The existing effort and resources developed by the CCPC make it a likely focus for the development of clean coal technology in Alberta.

Other recommendations that were considered and rejected included the previously mentioned Renewable Portfolio Standard, and focused research and development in other areas such as renewable energy or distributed generation. As described above and outlined in Chapter 4, the research indicated that development of clean coal technology was a critical step in dealing with the long-term environmental performance and corporate competitiveness of the Alberta power-generating industry. Research in other areas (i.e., renewable energy) is valuable and should be considered by other markets or power generating corporations. However, an immediate focus on clean coal technology will likely produce long-term environmental and competitive benefits for the Alberta power generating industry.

6.5 - Recommendation 4 – Improved Corporate Reputation Management

The final recommendation is for the improvement of reputation management on the part of individual power generating corporations. On a corporate level this would involve improved awareness and resources dedicated to the issue of reputation management. It would also involve the consideration of corporate reputation during the decision-making process relating to project development, technology selection, and environmental initiatives.

This recommendation was selected based on the analysis provided in Chapter 5 and the supporting concepts identified throughout the document. One of the likely outcomes from the improvement of reputation management practices would be an improved public perception of power generating companies. This recommendation is also important as the three power-generating corporations identified the public to be an important and influential stakeholder (Chapter 5). Improvements to reputation management would likely result in corporations providing the public with more information regarding their environmental initiatives. This will allow the corporations to continue to be influenced by public opinion (as demonstrated in Chapter 5). Similar to the transparent bill recommendation, this will result in the use of market forces (i.e., consumer choice) to improve environmental performance.

An enhanced corporate reputation is a valuable asset in a deregulated market (Chapter 5). A number of business advantages can be achieved through the management of a positive corporate reputation. Benefits of a positive reputation include sustaining "a company in times of controversy" (Greyser, 1999, p.179). As demonstrated in Chapter 5, recent media attention regarding power generators has been somewhat negative. Improved reputation management efforts by corporations would help to deal with this problem by increasing the potential for positive media coverage (Chapter 2, 5). It was also highlighted that reputation and risk are closely linked (Chapter 5). Through the development and implementation of reputation management, corporations may decrease or limit the risks facing the company.

Reputation management is also becoming more important as a result of the growing media attention being given to climate change (Amey, 2002). While the oil and gas companies receive the majority of coverage, power generators are often discussed regarding plans to reduce GHG emissions (Brethour, 2002a). The growing attention being paid to power generators as a result of the Kyoto Protocol has the government, and the public considering the role of energy providers in this country (Chapter 3). If the Alberta power-generating industry increases its awareness of reputation management, this will likely be valuable in addressing the issues presented to them as a result of global and national concerns such as climate change and the Kyoto Protocol.

Support for improved reputation management was limited among interviewees (Kostler, 2002; Lewin, 2002; Page, 2002). The three Alberta power-generating companies did recognize the importance of reputation management, and felt that their corporations were doing an adequate job of addressing their individual reputations. The examples provided in Chapter 5 show that these corporations were implicated in a number of negative incidents that affected their reputations. The analysis also indicated that each corporation had a unique set of challenges regarding their reputations. This demonstrates that there is perhaps more that these companies could be doing to address the issue of corporate reputation.

Given the degree of individuality among the power generating corporations reviewed in this research, the recommendation is directed at each of the three companies. As demonstrated throughout the document there are cases where these corporations have partnered in order to address common issues (Chapter 2, 3, 5, 6). The Alberta power-generating industry may want to consider ways of pooling resources and knowledge in order to deal with corporate reputation on a larger scale. There are similarities that occur between power-generating companies and the issues regarding reputation may be better addressed through a coalition or partnership. These partnerships could be exploited and used to develop methods and means for improving the reputation of the individual corporations as well as the industry.

Currently, there is an industry coalition that attempts to address the issue of reputation management within the power-generating industry. This is the "Environmental Commitment and Responsibility (ECR) Program" that is administered through the Canadian Electricity Association (CEA) (CEA, 2002c). This program was launched in 1997 and "provides a forum to address the electricity industry's commitment to sustainable development" (CEA, 2002c). Through the program, member utilities are required to monitor and report on 16 program indicators (including GHG emissions) and these figures are used to assess the environmental performance of the utility and the industry (CEA, 2002c). The program also requires companies to implement environmental management systems and participate in a number of other initiatives (CEA, 2002c). The environmental efforts required by this program are significant and are legitimized by the CEA. Despite these efforts, both the media and the public are not aware of the ECR program, or the individual environmental initiatives taken by the power-generating corporations (Howes, 2002). The industry may want to use the ECR program as a foundation for improving and publicizing corporate reputations (CEA, 2002c). The benefit of using the ECR program is that the actions of the corporations will be verified by the CEA (CEA, 2002c). This relates to the concept of legitimization outlined in Chapter 5. Furthermore, the ECR program could be used to publicize the positive attributes of the power-generating industry in the same manner that the "Responsible Care" program was used to improve the reputation of chemical industry (ACC, 2002; Howes, 2002).

CASA is another potential organisation that could be used to deal with corporate reputations. As described above this is a group of industry stakeholders that are gathered together to focus on air quality within the province of Alberta (CASA, 2002). This meeting of multiple stakeholders could be used as a forum to improve reputation management. The work being done within CASA by the power-generating corporations could also be presented to the public in order to demonstrate their commitment to environmental performance and their willingness to work directly with their stakeholders. Both the example of the CEA and CASA allow for partnerships to develop between

organizations (including the three power generating corporations) and allow the realization of synergies that can be obtained when confronting a common problem. This relates to the identified potential for partnerships as well as cost effectiveness and efficiency (Chapter 2, 5).

One other recommendation was considered that would deal with similar concepts related to improved reputation management. This was the development of strategic alliances between power generating corporations and environmental groups. The intention of the concept is to combine the attributes of each organisation in order to achieve specific goals and enhance corporate reputations. The motivation for involvement occurs as environmental groups could promote their agendas through a large corporation (Polonsky, 2001). In turn, corporations receive information and input from the environmental group along with an improved corporate image (Polonsky, 2001). While this option was viable and received consideration from both corporations and environmental groups, this would not effectively deal with all of the issues related to corporate reputation (Griffiths, 2002; Kostler, 2002; Lewin, 2002; Page, 2002). There are also a number of risks involved for both environmental groups as well as the corporations (Abrahams & Granof, 2002). One risk associated with a strategic alliance is that if the relationship breaks down, damage can occur to the reputations of both parties (Abrahams & Granof, 2002). The risk, combined with the fact that improving the reputation of a power-generating corporation is a difficult task, made the recommendation of a strategic alliance inappropriate. The relationship between environmental groups and power-generating corporations is a sensitive area, and as stated above, the individual reputation management requirements of each corporation is different. There may be circumstances that make a strategic alliance an appropriate option. However it was not considered suitable for this research.

6.6 – Final Conclusions

Research has identified a number of issues that relate to deregulation, environmental performance and corporate competitiveness. This document began by outlining the significant environmental impacts of generating power from fossil fuels. The main consequences identified were the related air emissions including the release of sulphur dioxide, nitrogen oxides, mercury, carbon dioxide, and particulate matter (Parker & Blodgett, 2001). Chapter 2 outlined the specific details of the deregulation process in Alberta. This research identified that a number of economic uncertainties have been created, resulting in overall market instability. This instability has had a number of impacts on both corporate competitiveness and environmental performance. Chapter 3 then reviewed the existing roles of legislation and regulation regarding power generation in the province of Alberta. This research highlighted the importance of the role of government in establishing and controlling the environmental performance of the industry. It was also found that the government was responsible for the large degree of uncertainty related to environmental legislation.

Chapter 4 reviewed the economic considerations related to power production as well as the economic concerns regarding the selection of power generating technology. It was shown that economic factors have an impact on both the competitiveness as well as the overall environmental performance of the industry. This chapter also demonstrated that the means of achieving financial backing and capital for environmental investments has changed. A more rigorous business case is now required to ensure the economic prudence of power generators investments. Finally, in Chapter 5, the examination of the three power-generating corporation's environmental strategies demonstrated that these companies can be influenced by a number of elements in their external environment. The review of the concepts of risk and reputation showed the vulnerabilities of these corporations as well as identifying the need for increased attention to reputation management.

All of these identified problems are being confronted in a market that is experiencing a shift in decision-making power caused by deregulation. As stated in the introduction, this presents unique internal and external challenges for power generating corporations to address issues of environmental performance while remaining competitive.

This entire document, and more specifically this last chapter, has illustrated that the power-generating industry in Alberta is already involved in initiatives that deal with the environmental performance of power production. Therefore the majority of the recommendations are based on, or can be implemented using the existing industry institutions and initiatives. This demonstrates the current importance and recognition of environmental performance and corporate competitiveness among the power generators of Alberta.

It is clear that although individual power generators and the industry have taken a number of positive steps, more can be done to improve the overall environmental performance of the industry while maintaining corporate competitiveness. These recommendations provide the basic guidelines for areas that require attention and the potential means to achieve them. Through the provision of these four recommendations this document has achieved each of the six objectives outlined in the first chapter, as well as the project purpose.

6.7 - The Future of the Alberta Power Generating Industry

The future of the Alberta power generating industry will likely see an increase in awareness regarding environmental issues from both corporations and the public. This will be caused by the future environmental legislative developments that are going to be implemented over the next five years. At the time of writing (Fall, 2002), the Federal Government is very close to ratifying the Kyoto protocol that will require the power generating industry to reduce their emissions of GHGs. The Kyoto Protocol could have significant ramifications regarding both the environmental performance and competitiveness of the Alberta power generating industry. This issue is gaining significant media attention, and as mentioned, focuses public and government attention towards power generators. Another potential impact on the industry is the national mercury emissions standards expected from the Federal Government some time in 2003. The unknown nature of mercury control technology and the significant environmental consequences of this metal may attract public attention and concern. The economic impact on the industry could also be significant depending on the established standard, and the availability of new technology. The market is also facing new provincial standards pending the CASA negotiations. The results from the CASA consultations will produce recommendations in 2003, resulting in new provincial standards for air emissions related to power production in 2005. This will once again raise the level of environmental performance for new projects being developed in Alberta. The Alberta power-generating industry will also experience a significant increase in reliance on coal power production as new facilities come on line over the next five years.

Each of the events listed above will have dramatic impacts on both the competitiveness and environmental performance of power-generating corporations. A corporation's ability to remain competitive throughout the changing market will depend largely on their capacity to predict the economic ramifications of its own initiatives, as well as the forthcoming regulatory changes described above. Corporations are also becoming more aware of the shift in power caused by deregulation and the resulting change in opportunities and problems. Given that power-generating corporations have increased

decision-making power in the deregulated market, it is likely that the future approach to environmental problems will change. The unique circumstances of the Alberta power-generating industry will allow for equally unique solutions to be developed and implemented.

The stability of the deregulated market has improved with time and will likely continue in to the future. This will provide power generators with the basic market certainty that will allow for long-term planning and investment to take place. In contrast to this stability, the changing environmental regulations will continue to increase the economic uncertainty of investments. Along with these changes, it is likely that public pressure and awareness of environmental issues will intensify. This will increase the need to develop the resources to deal with the environmental performance of energy production. The reliance on existing and newly developed technology to address environmental problems will continue. The knowledge and understanding of these problems and concepts will determine the competitiveness and environmental performance of the individual power-generating company in the deregulated market.

REFERENCE LIST

Abrahams, D., and Granof, E., (2002). Respecting Brand Risk, *Reputation Management.* Vol. 49, Issue 4, p. 40-48.

Alberta Energy, (2002). Key Numbers - Electricity. Alberta Government, July. http://www.energy.gov.ab.ca/com/Electricity/Key+Numbers/Key+Numbers.htm Viewed: September 15, 2002.

Alberta Energy and Utilities Board, (2000). Energy Resources Conservation Act. http://www.eub.gov.ab.ca/BBS/eubinfo/mission.htm Viewed: September 15, 2002.

Alberta Energy and Utilities Board (AEUB), (2001). EPCOR Generation Inc. and EPCOR Power Development Corporation, 490 – MW Genesee Power Plant Expantion, Application No. 2001173, Decision 2001-111. December.

Alberta Energy and Utilities Board, (2002). About the EUB. http://www.eub.gov.ab.ca/BBS/eubinfo/mission.htm Viewed: September 15, 2002.

Alberta Energy and Utilities Board (AEUB), (2002a). TransAlta Energy Corporation: 900-MW Keephills Power Plant Expansion, Application No. 2001200, Decision 2002-014. February.

Alberta Environment, (2002). About Alberta Environment, Government of Alberta. http://www3.gov.ab.ca/env/about.html Viewed: September 15, 2002.

Alberta Resource Development, (2000). New Power Generation in Alberta: A Guide to Bringing New Electric Generation on Stream.

Aldrich, H. E., and Fiol, C. M., (1994). Fools Rush In? The Institutional Context of Industry Creation, *Academy of Management Review*. Vol. 19, No. 4, p. 645-670.

American Chemistry Council (ACC), (2002). General Information Regarding the Responsible Care Program. http://www.americanchemistry.com/rc.nsf/secondaryprofilesid/lsgs-4dnmdz?opendocument Viewed: September 29, 2002.

American Wind Energy Association (AWEA), (1997). The Renewables Portfolio Standard: How It Works and Why It's Needed, October. http://www.awea.org/policy/rpsbrief.html Viewed: June 4, 2002.

Amey, A., (2002). Canada's and Alberta's Climate Change Opportunities and Challenges Lecture. Climate Change Central. University of Calgary Lecture Series. The Kyoto Protocol: Exploring the Critical Issues. October 23.

Angle, R., (2002). Alberta's Air Quality Management System, Alberta Environment. Presentation to CASA Electricity Project Team, Information Workshop. Terratima Lodge, May 27-29.
http://www.casahome.org/electricity/eptdocs.asp
Viewed: September 12, 2002.

ATCO Ltd., (2001). 2000 Annual Report. Calgary.

ATCO Power, (2002). ATCO Power, Our Facilities, Project Summary.
http://www.atcopower.ca/Our_Facilities/project_summary.htm
Viewed: September 18, 2002.

ATCO Power, (2002a). National Climate Change Plan, National Stakeholder Process. File Number: 024-5. June 26.
http://www.canelect.ca/connections_online/pdfs/ATCO.pdf
Viewed: September 13, 2002.

ATCO Power, (2002b). Commitment to Environmental Excellence.
http://www.atcopower.ca/Environment/Commitment/commitment_to_environmental_excellence.htm
Viewed: September 21, 2002.

ATCO Power, (2002c). Environmental Reports.
http://www.atcopower.ca/Environment/Reports/environmental_reports.htm
Viewed: September 21, 2002.

Avery, B., (2002). Electricity: no stable price anymore. *Edmonton Journal*, Saturday June 01.

Bastmeijer, C. J., (1994). The covenant as an instrument of environmental policy in the Netherlands, March. Resource Renewal Institute.
http://www.rri.org/gparchive/necoven.html
Viewed: June 10, 2002.

Bennett, M., and James, P. (ed.), (1998). *The Green Bottom Line: Environmental Accounting for Management*. England, Greenleaf Publishing.

Bloom, R., (2002). Kyoto Threatens Factories, Morgan Says, *The Globe and Mail*. Tuesday, September 24.

Boons, F., et al., (2000). Trajectories of Greening, *International Studies of Management & Organizations*. Vol. 30, No. 3, p. 18-40.

Boons, F., and Strannegard, L., (2000). Organizations Coping with their Environment, *International Studies of Management & Organizations*. Vol. 30, No. 3, p. 7-17.

Brethour, P., (2002). Alliance to fight Kyoto ratification: Parliament to hear party's warnings that deal would cost billions of dollars, *The Globe and Mail*. Monday, September 20, p. A4.

Brethour, P., (2002a). Support for Kyoto Plunges: Poll, *The Globe and Mail*. Saturday, November 2.

Brethour, P., and Chase, S., (2002). Kyoto cited as oil-sands project delayed, *The Globe and Mail*. Friday, September 20.
http://www.globeandmail.com/servlet/ArticleNews/business/RTGAM/20020920/wralf919/Business/BusinessBN/breakingnews-business
Viewed: September 20, 2002.

Caffrey, A., (2001). What Now? – Never Mind: Once deregulation starts, undoing it is a monumental task, *Wall Street Journal*. New York: September 17.

Canadian Broadcasting Corporation (CBC) – Calgary, (2001). The Road to Deregulation, Part One. February 19.
http://calgary.cbc.ca/power/story1.html
Viewed: January 10, 2002.

Canadian Broadcasting Corporation (CBC) – Calgary, (2001a). Alberta's Coal Rush. February 21.
http://calgary.cbc.ca/power/story3.html
Viewed: January 10, 2002.

Canadian Clean Power Coalition, (CCPC), (2002). Who is CCPC?
Last Updated: March 10, 2002.
http://www.canadiancleanpowercoalition.com/Customer/ccpc/ccpcwebsite.nsf/AllDoc/9361307AC6374A498725697A006930F3!OpenDocument
Viewed: September 22, 2002.

Canadian Electricity Association (CEA), (2002). Canadian Electricity and the Environment: Investing In a Sustainable Electricity Future. Winnipeg, Manitoba. September.

Canadian Electricity Association (CEA), (2002a). Commentary on the Federal Discussion Paper on Climate Change. June.
http://www.canelect.ca/connections_online/pdfs/CEA_Commentary.pdf
Viewed: September 14, 2002.

Canadian Electricity Association (CEA), (2002b). The Emissions Performance Equivalent Standard: A Proposal by the Canadian Electricity Association. Michael Cleland.
http://www.caelect.ca/connections_online/pdfs/EPES/pdf
Viewed: September 13, 2002.

Canadian Electricity Association (CEA), (2002c). Climate Change and the Electricity Sector: A Responsible Partner.
http://www.canelect.ca/connections_online/this_week/Resp_Partner.htm
Viewed: September 13, 2002.

Canadian Institute of Chartered Accountants (CICA), (2001). Scotiabank receives the Award of Excellence at the 50th Annual Report Awards, December 6, 2001.
http://www.cica.ca/index.cfm?la_id=1&ci_id=846&highlight_keywords=TransAlta
Viewed: November 9, 2002.

Canadian Institute of Chartered Accountants (CICA), (2002). Annual Report Awards celebrates golden anniversary. January- February, 2002.
http://www.cica.ca/index.cfm?la_id=1&ci_id=1302&highlight_keywords=TransAlta
Viewed: November 9, 2002.

Carlisle, T., (2001). California May Not Squeeze Much More Juice Out of Canada – State Gets Energy Boost From British Columbia, Whose Own Flow is Low, *Wall Street Journal*. New York, June 15, (A.13).

Case, P., and Akman, M., (2001). Canadian Electricity Deregulation: No Need To Fear California-Style Disaster. CIBC World Markets – Equity Research – Pipelines & Utilities. January 31.

Chase, S., (2002). Kyoto Job Losses Projected, *The Globe and Mail*. Saturday, October 11.

Chase, S., and Mahoney, J., (2002). Ottawa pegs Kyoto job risk at 200,000, *The Globe and Mail*. Wednesday, September 25.

Chasek, P., et al., (1998). European Union Views on International Greenhouse Gas Emissions Trading. Environmental Policy Studies Working Paper #3. Columbia University School of International and Public Affairs. May 18.
http://www.columbia.edu/cu/sipa/FUNC/EPS.wkpaper-3.pdf
Viewed: September 22, 2002.

Clarke, P., (2002). New Electricity Technology. Presentation by Paul Clarke, Director of Fuel Supply at TransAlta Utilities Corporation. ASRA Retreat, Fort McMurray. June 7.
http://www.aeri.ab.ca/sec/new_res/docs/ASRA_pre_clarke.pdf
Viewed: October 4, 2002.

Clean Air Strategic Alliance, (CASA), (2002). About CASA.
http://www.casahome.org/about_casa/index.asp
Viewed: June 12, 2002.

Clean Air Strategic Alliance, (CASA), (2002a). Electricity Project.
http://www.casahome.org/electricity/index.asp
Viewed: June 12, 2002.

Conklin, D.W., and Hunter, T., (2001). Ensuring the Successful Privatization of Ontario Hydro, *Ivey Business Journal.* Vol. 65, Issue 6, p. 59-65.

Cryderman, K., (2002). Task force will look into electricity price complaints, *Edmonton Journal.* Friday, May 31.

de Boer, Y., (2002). Dutch Climate Policy and Clean Development Mechanism. Director of International Environmental Affairs, Ministry of Housing, Spatial Planning and the Environment, The Netherlands. May 31.
http://www.oranda.or.jp/index/pdf/De%20Boerspeech.pdf
Viewed: September 22, 2002.

DiMaggio, P., and Powell, W.W., (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields, *American Sociological Review.* Vol. 48, No. 2, p. 47-60.

Dinning, J., (2002). Comments on "Discussion paper on Canada's contribution to addressing climate change" Management Committee: Canadian Clean Power Coalition. For Calgary Session, June 14.
http://www.nccp.ca/NCCP/national_stakeholders/pdf/submissions/Cdn%20Clean%20Power%20Coalition.pdf
Viewed: September 22, 2002.

Doucet, J. A., (2000). Power Problem An Issue of Too Little Supply, *The Edmonton Journal.* December 17.
http://www.bus.ualberta.ca/jdoucet/joseph%20news%20articles/EDM%20Journal.pdf
Viewed: February 11, 2002.

Doucet, J.A., (2001). Alberta's Electricity Market: After the Shock, What's Next? *Alberta Venture Magazine*. March. http://www.bus.ualberta.ca/jdoucet/joseph%20news%20articles/AB%20Venture%20magazine.pdf Viewed: February 11, 2002.

Ellsworth, R. K., (2002). Industrial facility valuation: Electric generating projects, *The Appraisal Journal*. January, Vol. 70, Issue 1, p. 34-38.

EPCOR Utilities Inc., (2001). 2000 Environment and Sustainable Development Report. Edmonton.

EPCOR Utilities Inc., (2002). Transformation: EPCOR 2001 Annual Report. Edmonton.

EPCOR Utilities Inc., (2002a). EPCOR Issue Statement on Climate Change. June 14. http://www.canelect.ca/connections_online/pdfs/EPCOR.pdf Viewed: September 13, 2002.

Freeman, Edward, R. (1984). *Strategic Management: A Stakeholder Approach*. Boston, Pitman Publishing.

Geekie, K., (2002). Key Informant Interview with Kris Geekie, Environmental Impact Assessment Co-ordinator with Alberta Environment. April 2.

Global Change Strategies International (GCSI), (2001). Report: A Bird's-Eye View of Electricity Supply and Demand to 2020, Prepared for: Canadian Electricity Association. Ottawa, July 23.

Government of Alberta, (2002). Albertans and Climate Change: A Plan for Action. http://www3.gov.ab.ca/env/climate/actionplan/docs/actionplan.pdf Viewed: June 6, 2002.

Government of Canada, (2002). A Discussion Paper On Canada's Contribution to Addressing Climate Change. May 14. http://www.climatechange.gc.ca/english/actions/what_are/canadascontribution/Report051402/englishbook.pdf Viewed: May 16, 2002.

Gregoire, L., (2002). Epcor shoves blame back on gov't, *The Edmonton Journal*. Saturday, October 5.

Greyser, S. A., (1999). Advancing and enhancing corporate reputation, *Corporate Communications*. Vol. 4, Issue 4, p. 177-181.

Griffin, J., and McCourt, J., (1999). Economic Development After Deregulation: New Roles for the Electric Power Industry, *Economic Development Review*. December, Vol. 16, Issue. 3, p. 13-20.

Griffiths, M., (2002). Key Informant Interviews with Mary Griffiths, Environmental Policy Analyst, Energy Watch Group at the Pembina Institute. April 9, June 12.

Griffiths, M., and Marr-Laing, T., (2001). EPCOR Power Development Corporation, Expansion of Genesee Power Plant, EUB Application No. 2001173. Submission on behalf of the Clean Energy Coalition by the Pembina Institute for Appropriate Development. September.

Griffiths, M., and Marr-Laing, T., (2001a). TransAlta Utilities Corporation Expansion of Keephilss Power Plant, EUB Application No. 2001200: Submission on behalf of the Clean Energy Coalition by the Pembina Institute for Appropriate Development. October.

Harris, P. G., (2001). Where Deregulation Works, *Wall Street Journal*. New York, May 16, (A.22)

Harvey, B., and Shaefer, A., (2001). Managing Relationships with Environmental Stakeholders: A Study of U.K. Water and Electricity Utilities, *Journal of Business Ethics*. Vol. 30, No. 3, p. 243-260.

Hauter, W., and Slocum, T., (2001). It's Greed Stupid! Debunking the Ten Myths of Utility Deregulation, Public Citizen – Critical Mass Energy and Environment Program. January.
http://www.citizen.org/cmep/energy_enviro_nuclear/electricity/deregulation/articles.cfm?ID=4179
Viewed: February 22, 2002.

Heintz, H., and Lurie, I., (2000). *The Alberta Electricity Market: An Analysis and Price Forecast,* Canadian Energy Research Institute. Study No. 99, June.

Heintz, H., Spragins, R., and Suurkask, D., (2000). *Electricity and Gas: Market and Price Convergence: Restructuring of the Electricity and Natural Gas Industries*, Canadian Energy Research Institute. Study No. 96, June.

Henriques, I., and Sadorsky, P., (1999). The Relationship Between Environmental Commitment and Managerial Perceptions of Stakeholder Importance, *Academy of Management Journal*, Vol. 42, No 1, p 87-99.

Higley, C., (2000). Disastrous Deregulation. Public Citizen Publication. December.
http://www.citizen.org/cmep/energy_enviro_nuclear/electricity/deregulation/articles.cfm?ID=4180
Viewed: January 26, 2002.

Hoffman, A.J., (1999). Institutional Evolution and Change: Environmentalism and the U.S. Chemical Industry, *Academy of Management Journal*, Vol. 42, No. 4, p.351-371.

Johnston, L., (2002). Key Informant Interview with Les Johnston, Director of Environmental Affairs at EPCOR Utilities. April 3.

Jones, A., (2001). Social responsibility and the utilities, *Journal of Business Ethics*. Vol. 34, Issue 3, p. 219-229.

Kartalia, J., (2000). Reputation at Risk?, *Risk Management*. July, Vol. 47, Issue 7, p. 51-58.

Kostler, J., (2002). Key Informant Interviews with the Manager of Environment, Health and Safety at ATCO Power. March 20, April 11, June 19.

Kwant, K. W, and Wink, S., (2000). Renewable Energy in the Netherlands, EnR Renewable Energy Working Group – Renewable Energy in the European Union and Norway. NOVEM – April.
http://www.agores.org/Publications/EnR/NetherlandsRE2000.pdf
Viewed: June 10, 2002.

Kwoka Jr., J. E., (1997). Transforming Power: Lessons from British Electricity Restructuring, *Regulation*. Vol. 20, No. 3.

Lakeman, B., (2002). Alberta Air Emissions from the Electricity Sector, Alberta Environment. Presentation to CASA Electricity Project Team, Information Workshop. Terratime Lodge, May 27-29.
http://www.casahome.org/electricity/eptdocs.asp
Viewed: September 12, 2002.

Lewin, D., (2002). Key Informant Interview with Senior Vice-President of Sustainable Development at EPCOR Utilities. March 19, June 20.

Lota, S., (2002). The Role of the Alberta Energy and Utilities Board, Alberta Energy and Utilities Board. Presentation to the CASA Electricity Project Team, Terratima Lodge, May 27-29.
http://www.casahome.org/electricity/eptdocs.asp
Viewed: September 12, 2002.

Lulofs, K., (2000). Adjustments in the Dutch electricity producing sector in the context of the European Directive 88/609/EEC: A case study on national implementation, environmental effectiveness, allocative efficiency, productive efficiency and administrative costs. Centre for Clean Technology and Environmental Policy. http://cerna.ensmp.fr/Documents/2000-B-4.pdf
Viewed: September 22, 2002.

Mah, B., and Cryderman, K., (2002). City fears forced sale of Epcor, Edmonton Journal. Wednesday, May 29.

Marr-Laing, T., (2002). Dirty Energy Plan, *The Globe and Mail*. Thursday, June 13, A16.

Marr-Laing, T., (2002a). An Environmental Perspective on Alberta's Deregulated Electricity Market. Presentation to the CASA Electricity Project Team, Terratima Lodge, May 27-29.
http://www.casahome.org/electricity/eptdocs.asp
Viewed: September 12, 2002.

McNeil, L., (2002). Key Informant Interview with Lynn McNeil, Former Director of Environment and Stakeholder Relations at TransAlta Corporation. March 15.

Meyer, J.W., and Rowan, B., (1977). Institutionalized Organizations: Formal Structure as Myth and Ceremony, *American Journal of Sociology*. Vol. 83, No. 2, p.340-363.

Mitchell, R., Agle, B., and Wood, D. (1997). Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. *Academy of Management Review;* Vol.22, No 4., p 853-886.

Mittelstaedt, M., (2002). Firms breaking promises on emissions, study says, *The Globe and Mail*. Friday, October 18, A4.

National Energy Board (NEB), (2001). Canadian Electricity, Trends and Issues: An Energy Market Assessment, May.

Natural Resources Canada (NRC), (2000). Energy in Canada 2000.
Chapter 3 – Natural Gas
http://www.nrcan.gc.ca/es/ener2000/online/html/chap3b_e.htm
Chapter 3 – Coal
http://www.nrcan.gc.ca/es/ener2000/online/html/chap3e_e.htm
Viewed: September 22, 2002.

Natural Resources Defence Council (NRDC), et al. (2002). Benchmarking Air Emissions of the 100 Largest Electric Generation Owners in the U.S. – 2000, Second Edition. March.

Nguyen, L., (2002). 'Agnostic' oil patch seeks Kyoto clarity: Some firms don't see climate treaty as a threat, *The Globe and Mail*. Saturday, March 16, p. B1.

Nguyen, L., (2002a). TransAlta admits to California-style energy trading, *The Globe and Mail*. Wednesday, May 29.

Nguyen, L., (2002b). Unfettered electricity markets fuel cynics in Alberta, *The Globe and Mail*. Thursday, June 6, p.B1.

Nguyen, L., (2002c). TransAlta plans major wind power investment, *The Globe and Mail*. Tuesday, October 29.

Nguyen, L., and Stueck, W., (2002). California sues TransAlta, TransCanada, *The Globe and Mail*. Saturday, June 1.

Noble, K., (2001). Power Crunch: California, Alberta. And soon - Ontario? How the Province's Struggle With Reform Could Affect Electric Bills Across Canada, *Maclean's*. April 23, p42-45.

Northeast State for Coordinated Air Use Management, (NESCAUM)., (2000). Environmental Regulation and Technology Innovation: Controlling Mercury Emissions from Coal-Fired Boilers (Executive Summary). Boston. September. http://www.nescaum.org/pdf/hg-exec-summ.pdf Viewed: June 11, 2002.

Ogilvie, K., (2002). Key Informant Interview with Ken Ogilvie, Executive Director of Pollution Probe. April 9, June 12.

Organization for Economic Co-operation and Development and the International Energy Agency (OECD/IEA), (1999). *Electricity Market Reform*. France.

Organization for Economic Co-operation and Development and the International Energy Agency (OECD/IEA), (1999a). *Electricity Reform: Power Generation Costs and Investment*. France.

Organization for Economic Co-operation and Development and the International Energy Agency (OECD/IEA), (2001). *Competition in Electricity Markets*. France.

Osborne, R., (2001). Executive Perspectives: Richard Osborne CRO, Duke Energy, *Risk Management*. New York, Vol. 48, Issue 9, p.16-22.

Parker, L.B., and Blodgett, J.E., (2001). Electricity Restructuring and Air Quality: Uncertain technological, economic, and policy changes make the likelihood of environmental deterioration hard to gauge in the wake of deregulation, *Forum for Applied Research and Public Policy*. Vol. 16, i3, p. 70-77.

Page, R., (2001). The Challenges for Sustainability in the North American Electricity Sector. TransAlta Corporation and the Carleton Research Unit on Innovation, Science and the Environment – Carleton University. Ottawa. (Forthcoming)

Page, R., (2002). Key Informant Interviews with Robert Page, Vice President of Sustainable Development at TransAlta Corporation. January 18, February 20, March 25, April 23, May 10, May 24, May 28, June 7.

Page, R., (2002a). Comments on the Federal Government's "Four Options" Paper on Climate Change From TransAlta Corporation for Calgary Session. TransAlta Corporation, Calgary, Alberta. June 14. http://www.canelect.ca/connections_online/pdfs/TransAlta.pdf Viewed: September 13, 2002.

Polonsky, M. J., (2001). Strategic bridging within firm-environmental group alliances: Opportunities and pitfalls, *Journal of Marketing Theory and Practice*. Vol. 9, Issue 1, p. 38-47.

Power Pool of Alberta, (2002). Power Pool of Alberta Monthly Operations Reports. www.powerpool.ab.ca Viewed: September 15, 2002.

Public Service Enterprise Group Incorporated (PSEG), (2002). New Report Benchmarks Air Pollution from Top 100 Electric Companies, Shows Wide Disparities Among Competitors. Washington, March 21.

Resource Renewal Insititute, (RRI), (2001). What Are Green Plans? http://www.rri.org/primer/what.html Viewed: September 17, 2002.

Roberts, L., (2002). Key Informant Interview with Laura Roberts, Science Specialist and Environmental Advisor at the Alberta Energy and Utilities Board. Personal Communication, April 1, April 16.

Rugman, A. and Verbeke, A., (1998). Corporate Strategies and Environmental Regulations: An Organizing Framework, *Strategic Management Journal*, Vol. 19, p. 363-375.

Russo, M.V., and Fouts, P.A., (1997). A Resource-Based Perspective on Corporate Environmental Performance and Profitability, *Academy of Management Journal*, Vol. 40, No. 3, p. 534-559.

Scott, S.G., and Lane, V.R., (2000). A Stakeholder Approach to Organizational Identity, *Academy of Management Review*. Vol. 25, No. 1, p. 43-62.

Sharma, S., (2000). Managerial Interpretations and Organizational Context as Predictors of Corporate Choice of Environmental Strategy, *Academy of Management Journal*. Vol. 43, No. 4, p. 681-697.

Simpson, W. J., (2001). Canada's Deregulation Fiasco, *Petroleum Economist*. London February. vol. 68, issue 2, p. 16-17.

Slocum, T., (2001). Electric Utility Deregulation and the Myths of the Energy Crisis, *Bulletin of Science, Technology & Society*, Vol. 21, No. 6.

Smith, D. J., (2001). No energy independence without coal, *Power Engineering*. April, Vol. 105, Issue 4, p. 10.

Stinson, M., (2002). Ontario Electricity Jolts Inflation, *The Globe and Mail*. Saturday, September 21, B1.

Stratos Inc., (2001). Stepping Forward: Corporate Sustainability Reporting in Canada.

Taft, K., and Cooper, D.J., (2000). Change & Opportunity: EPCOR in a De-regulated Electricity Industry. The Parkland Institute, University of Alberta, Edmonton.

Teel, G., (2002). Guidelines expected to reduce power rates, *Calgary Herald*. Thursday, May 30.

Thomas, W. L. "The Green Nexus: Financiers and Sustainable Development. Washington, *Georgetown International Environmental Law Review*. Vol. 13, Issue 4, p. 899-947.

TransAlta Utilities Corporation, (2001). 2000 Sustainable Development Annual Report: SD2000, Calgary.

TransAlta Corporation, (2002). Annual Report 2001, Calgary.

TransAlta Corporation, (2002a). Industry Coalition Announces Plans for a Canadian Clean Coal Demonstration Power Plant. March 11. http://www.transalta.com/website2001/TAWebsite.nsf/AllDoc/D249392A87484BE287256B7B0056ADF6?OpenDocument Viewed: March 13, 2002.

Trebing, H. M., (2001). New Dimensions of Market Failure in Electricity and Natural Gas Supply, *Journal of Economic Issues*. Vol. 35, Issue 2, p. 395-403.

Union of Concerned Scientists (UCS), (2001). Study Finds Federal Renewable Energy Standard Would Help Prevent Energy Price Shocks, October 15. http://www.ucsusa.org/releases/10-15-01.html Viewed: June 4, 2002.

van Rooijen, S.N.M., et al., (2001). Interaction in EU Climate Policy, Work Package 4, Climate Policy Context in the Netherlands: Non-trading Instruments. Energy Research Centre of the Netherlands, October. http://www.sussex.ac.uk/spru/environment/research/wkpack4holland.pdf Viewed: September 22, 2002.

Wallace, R., (2001). The British Columbia Advantage: Lessons from Alberta on the De-regulation of the Electricity Industry. The Parkland Institute, University of Alberta, Edmonton.

Weimer, D., (1999). Utilities – Complications of Electricity Deregulation, *Business Week*. January 11, p. 138.

Wharton, D., (2002). Key Informant Interviews with Don Wharton, Manager of Business Integration at TransAlta Corporation. January 18, April 3.

Wilcox, J., (2001). The Politics of Competition: Electricity Deregulation in California and the UK, *Modern Power Systems*. Vol. 21, Issue 2, p 17.

APPENDIX – A

Interview List

Alberta Energy and Utilities Board:

Roger Creasey, Former Senior Environmental Scientist, March 14.
Laura Roberts, Science Specialist & Environmental Advisor, April 1.
Eric Degan, Business Analyst, Corporate Compliance, April 15.

Alberta Environment:

Kris Geekie, Environmental Impact Assessment Co-ordinator, April 2, September 19.

ATCO:

Joe Kostler, Manager of Environment Health and Safety, March 20, April 11, June 19.
John Gunn, Senior Vice President, March 22.

EPCOR:

David Lewin, Vice President of Sustainable Development, April 19, June 20.
Les Johnston, Director of Environmental Affairs, April 3.

Mirant Canada Energy Marketing Inc.

Adam White, Energy Trader, August 15

Ontario Power Generation

Helen Howes, Senior Vice-President of Sustainable Development, September 19.

Pembina Institute:

Mary Griffiths, Environmental Policy Analyst, Energy Watch Group, April 9, June 12.

Pollution Probe

Ken Ogilvie, Executive Director, August 14.

TransAlta:

Robert Page, Vice President of Sustainable Development, January 18, February 20, March 25, April 23, May 10, May 24, May 28, June 7.
Don Wharton, Manager, Business Integration, January 18, April 3.
Lynn McNeil, Former Director of Environment and Stakeholder Relations, April 15.