

Alternatives to a Proposed Rossdale Expansion: A Preliminary Review

An unsolicited briefing note for:

City of Edmonton
EPCOR
Concerned Citizens and Ratepayers of Edmonton

March 1, 1999

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About the Pembina Institute

The Pembina Institute is an independent, citizen-based think tank, an activist public interest organization and a non-profit consulting group with a solid reputation for technically reliable and innovative results. Since 1985, the Institute has been committed to protecting the environment and to developing environmentally sound solutions to meet human needs. Our work focuses on three related themes:

- energy and the environment
- environmental economics
- sustainable resource management

Within these broad areas, our research and analysis integrates expertise from a number of disciplines, including engineering, economics, ecological science, politics and education. This multidisciplinary approach and an understanding of the interests of a wide range of stakeholders also positions us to catalyze action by bringing together key players and driving for creative solutions. The Institute is based in Drayton Valley, Alberta with another office in Ottawa and research associates in Edmonton, Calgary, Victoria, and Vancouver.

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City of Edmonton

Alternatives to a Proposed Rossdale Expansion: A Preliminary Review

Summary

Edmonton Power is proposing a \$90 million expansion and upgrade to the Rossdale gas plant, which will provide an additional 170 MW of electrical capacity. There has been little to no discussion about alternatives to this expansion, including co-generation of electricity and heat, energy conservation and efficiency, and power from renewable resources.

Part or all of the 170 MW electricity requirement could be achieved through energy conservation and energy efficiency measures, as part of a comprehensive Demand Side Management program. A modest component of the new capacity could also be generated through renewable energy resources, such as wind, solar or biomass. Furthermore, any changes to the Rossdale gas plant should, at a minimum, be designed to accommodate a district energy system that would achieve much better efficiencies and improved long term economics by fully utilizing what would otherwise be waste heat. Any or all of these options are promising in terms of their economic and environmental results.

As members of national climate change initiatives (as described below), and having made associated commitments for greenhouse gas reductions, it behooves the City of Edmonton and Epcor to carefully consider and then implement measures to reduce greenhouse gas emissions. This is particularly true where opportunities can be pursued for the same general level of investment – investment that would also yield improved long-term economic benefits, greater benefits in terms of regional air pollution, and higher levels of job creation for the local economy.

Before proceeding with plans for the Rossdale expansion, the following questions need to be answered:

1. Does the capacity need to be increased by 170 MW at this stage, or what lower amount would suffice in the medium-term?
2. How effectively can the capacity requirement be met through energy efficiency and conservation measures as part of a DSM program?
3. How could the capacity requirement be supplied with the least amount of overall emissions, such as by including renewable resources?
4. Which of the above options, or in what combination, could yield the best overall results in terms of economics, environment and employment?
5. How will Edmonton Power and the City of Edmonton meet their climate change commitments without embarking on a comprehensive DSM strategy at this time?
6. How would new standalone gas-fired generation fare in a competitive electricity marketplace against co-generated gas-fired electricity, in which much higher efficiencies yield lower-cost electricity and heat products?

This paper briefly explores these questions. It is a preliminary analysis only, but points to the need to consider alternative options in more depth. It is recommended that the Rossdale expansion plans be put on hold until a wider range of technical and public consultation has been completed. This consultation could include establishment of a public advisory committee (as desired by local stakeholders) that would report to City Council, Epcor's single shareholder, on the results of detailed analyses of the feasibility and desirability of optional approaches.

1.0 Introduction

Edmonton Power, a subsidiary of the City of Edmonton's Epcor, is planning an expansion and upgrade to the Rossdale gas-fired electricity generating station. Current plans are to generate more electricity with natural gas. However, other options have not received the serious consideration, or the public attention, that is warranted. This report briefly outlines key alternatives and their relative merits. The analysis is at a general level at this stage, but points to the need for further research into viable alternatives that would have better project economics for Epcor shareholders, as well as being more beneficial for the environment and local employment. Further analysis at this time is also limited by the lack of publicly-available detail on the Rossdale expansion proposal.

2.0 Climate Change

Climate change is increasingly understood to be one of the main issues facing humankind.¹ Serious commitments and actions to reduce greenhouse gases are being undertaken at an international, national, provincial, and municipal level, as well as by corporations and individuals.

The City of Edmonton signed up as a member of the Federation of Canadian Municipalities' "20% Club", and has committed to establishing a baseline inventory of greenhouse gas emissions and to working towards reducing these by 20% at a community-wide level.² For municipal operations, the City is targeting to reduce emissions by 6% by 2008, and by 20% by 2015-2020.³ However, the current trend is going in the opposite direction, with emissions having increased some 9% between 1990 and 1995.

In 1995, Edmonton Power was a signatory to the Canadian Electricity Association's voluntary commitment to reduce and offset carbon dioxide emissions. Edmonton Power's original target was 1,000,000 tonnes per year of carbon dioxide emission

¹ Refer to Appendix A for a brief on climate change, particularly in relation to Alberta and municipalities. The Pembina Institute has a wealth of information on the topic which can be drawn upon as requested.

² The FCM program has since merged with the International Council for Local Environmental Initiative's (ICLEI's) Cities for Climate Protection program, to become the "Partners for Climate Protection" initiative.

³ The City of Edmonton also has an environmental policy which should be taken into account in reviewing the Rossdale plans.

reductions and offsets. In keeping with Canada's commitments in Kyoto in 1997,⁴ Epcor as a whole has established a new target of reducing net emissions 6% below their 1990 baseline between the years 2008 and 2012. Although undertaking and reporting on some actions through the Voluntary Challenge and Registry, Epcor's greenhouse gas emissions have increased by almost three million tonnes of carbon dioxide per year, due to the addition of the 800 MW Genesee coal-fired generating station in 1994.

While natural gas is a cleaner-burning fuel than diesel or coal, it is nonetheless a fossil fuel, the combustion of which produces greenhouse gases. Other options are available for matching supply of and demand for electricity in the Edmonton area that produce far less greenhouse gas emissions. Furthermore, increasing financial value is being associated with greenhouse gas credits, either by selling them to others or using them to be able to continue other operations in the face of caps on allowable emissions.⁵

It also is extremely important to understand that standalone gas-fired electricity, even from high-end integrated combined cycle plants, has higher intensities of greenhouse gases per MWh of electricity than electricity from gas-fired cogeneration, in which most of the waste heat is captured and used for industrial process heat and/or district heating and cooling. The project economics of co-generation plants are also much stronger, which is why virtually all of the emerging gas-fired capacity from independent power producers and industrial sources is being configured as co-generation.

3.0 Edmonton – Energy Efficiency, Water Conservation and Alternative Energy

Edmonton has already seen substantial gains from implementing energy efficiency and water conservation measures.

A \$1 million Energy Efficiency Revolving Fund was created by the City of Edmonton from a portion of the 1993 surplus. In the first two years after the fund became available to City departments in 1995, 27 projects valued at \$990,000 were initiated. Utility or energy savings are used to repay the fund, which is then reinvested in further energy efficiency projects. The average combined payback for these projects is just under three years, and total estimated carbon dioxide offset amounts to 2,230 tonnes per year.

The City of Edmonton developed and implemented a water conservation program between 1990 and 1996. The estimated payback for the whole project was five years. By 1992/93, a 6% reduction in per capita usage was obtained, and the project was scaled back due to its early success. The total cost to the City was less than \$2 million, and the program displaced the need to spend over \$200 million on a water plant

⁴ Canada agreed to reduce its national greenhouse gas emissions to 6% below 1990 levels between 2008 and 2012.

⁵ Alongside controls on greenhouse gas emission levels, companies are learning how to offset their emissions. Emissions trading systems are being established under which reductions in greenhouse gases can be sold as credits to polluters who are in a better position to buy such credits than to effect their own reductions.

expansion. The net present value of delaying the plant expansion was estimated to be \$45 million in savings.⁶

Capitol Square, Epcor's corporate headquarters, has been transformed into a model of energy efficiency. The retrofit included 14 measures in the areas of lighting, electric motors, and overall building energy-management systems. All measures involve state of the art technical improvements and also address issues of comfort and environmental quality. Energy consumption has been reduced by 50%, saving approximately \$200,000 per year. The retrofit was estimated to cost the utility in the neighbourhood of \$700,000, yielding a payback of less than four years on the overall investment.

Epcor has also installed demonstration photovoltaic (PV) solar panels on the roof at the corporate head office. This is the tallest building-integrated PV system in the world, and the first time in Canada that such a large PV system has been installed on the horizontal. The panels generate the power to run the lights on the 19th and 20th floors. Epcor is looking into commercial PV niches that the utility might serve, and are assessing PV opportunities for commercial applications of the technology within their customer base.⁷

A group is working to establish a Green Communities Initiative in Edmonton, modeled after a similar program in Ontario that undertakes home retrofits to save energy and water. Private operators have begun energy and environmental audits of homes in Edmonton, independently of the Green Communities Initiative. The Edmonton Catholic School Board is saving approximately \$3 million per year from investments in energy efficiency retrofits.

4.0 Planned Rossdale Expansion

The planned Rossdale expansion would add a new high-efficiency combined-cycle gas turbine on to the existing plant to increase its capacity by 170 megawatts from 225 to 395 MW. The project also involves repowering an existing unit, enabling the utility to retire a 71 MW steam boiler. Anticipated project completion would be early in 2001. The expansion represents a 10% increment in Edmonton Power's capacity of 1,701 MW. The project is expected to cost \$90 million, generated by the publicly owned company, including some debt financing. Epcor is expecting a 10 to 12% return on the project, through increased power sales.

It is planned that the unit would be housed in a smaller building, replacing a larger one on site, and that the number of stacks at the plant would be reduced from ten to four.

⁶ A May 1991 Department of Environmental Services report on the City of Edmonton Water Conservation Program concluded in Section 3 on Economic Implications: "Projections indicated that a plant expansion could be delayed by at least 10 years with an overall per capita consumption reduction of 10%. Assuming an inflation rate of 5% and interest rate of 12%, the net present value of a 200+ million dollar water plant expansion in the early 2000s being delayed by ten years would be in the order of 45 million dollar savings...In the long term, significant economic benefit can be gained by deferring or downsizing plant expansion. The environmental benefits reduce both river pollution and air pollution potentials."

⁷ Also, EPCOR is a sponsor of North Sun '99, the 25th annual conference of the Solar Energy Society of Canada (SESCI), which is being held in Edmonton August 11-14, 1999.

Although the new plant will be more efficient per unit of power produced, the net increase in capacity would result in higher emissions overall, estimated by Epcor at 450,000 tonnes of carbon dioxide per year.⁸

While this plant produces less emissions than a coal-fired plant, it is still burning fossil fuels, with all the associated emissions of greenhouse gases such as carbon dioxide and nitrogen oxides, and the life cycle environmental impacts.⁹

5.0 Cogeneration and District Energy

Although not planned as part of the initial project, the proposed expansion is being designed to accommodate a possible district energy add-on in future. This would capture excess heat from the combustion process and use it for heating and cooling a series of nearby buildings. What would otherwise be waste heat becomes a saleable by-product of the process, displacing the need to produce that heating (and cooling) energy from additional resources, and displacing the associated emissions. This option was analyzed in detail in the early 1990s and a report produced outlining the project attributes.¹⁰ If the Rossdale expansion were to go ahead, it would be very important to ensure that this feature were included as part of the package, to maximize the use of the otherwise waste energy.

The Canadian District Energy Association (CDEA) has estimated an average internal rate of return of 12% for standalone district energy systems. The CDEA identified 23 district energy projects in Canada that, together, could achieve energy savings of 36.5 million MWh, resulting in 6.9 megatonnes of annual carbon dioxide reductions.¹¹

Charlottetown's district energy system heats and cools over 70 buildings including hospitals, schools, government, university, and commercial buildings. The system has operated since the 1980s, with several upgrades since the original implementation. It is a 40-MW system, producing electricity and space heating and cooling. The system displaces 12.9 million litres of oil that would otherwise have been burned at the individual buildings, and overall it prevents the release of over 40,000 tonnes of greenhouse gas emissions annually.¹²

The potential application of a district energy system in conjunction with the Rossdale plant needs to be fully examined as a primary design option for the core project, and not simply dismissed as a possible future upgrade. Factors that held back such a project some years ago need to be revisited. For example, with improving efficiency,

⁸ A 170 MW combined-cycle gas turbine plant running at a capacity factor of 80% would generate about 1,200 GWh and produce some 474,000 tonnes of carbon dioxide.

⁹ There are numerous upstream environmental impacts associated with the extraction, processing and transmission of fossil fuels, in addition to those associated with combustion.

¹⁰ Requests for this report could be directed to EPCOR, who commissioned the study.

¹¹ Refer to the 1995 Hathaway report listed in Appendix B - References. This report notes that the federal tax system puts such investments at a disadvantage, but the economics are changing over time.

¹² For more information, see the Pembina Institute's Greenhouse Gas Success Stories report listed in the References.

fewer buildings may need to be involved to make the project worthwhile.¹³ Such a project would increase Epcor's sales, save the customers money due to increased energy efficiency from lower fuel use, and further reduce greenhouse gas emissions that would otherwise be produced from heating those buildings directly with gas.

6.0 Energy Efficiency and Conservation

Epcor's EnVest program, offered to its 750 largest customers, allows the capital costs of energy retrofits to be repaid in monthly utility bills through the savings achieved. After the retrofit cost is paid off, the monthly charges are reduced; typical payback periods are five years. Thus far, 100 customers have participated and have experienced a 20 to 30 percent energy savings.

A comprehensive Demand Side Management (DSM) Program could yield enough savings to equate to the 170 MW.¹⁴ This would be done through energy conservation and efficiency measures led by the utility and undertaken internally and in conjunction with its 250,000 customers. Customer sectors would include residential, commercial, institutional and industrial. The types of initiatives would include incentive programs for home and office energy retrofits to cover lighting, building envelope, space heating, and water heating. Other programs would focus on industrial energy efficiency such as lighting and power for industrial processes from electrical motors. The utility would also increase its efforts to implement internal energy efficiency improvements. All parties would be further encouraged to practise energy conservation in managing activities around the home and office.

Such programs have been implemented widely in North America and abroad; the results have eliminated the need to add incremental generation capacity. This saves money and other resources, reduces emissions, and creates more jobs than do additions to supply. Examples of such results are provided below.

- BC Hydro's PowerSmart programs yielded cumulative energy savings to March 1998 of 2,448 GWh, and 480 MW of capacity. Program benefits amount to over \$550 million; with utility costs at almost \$280 million, the benefit to utility cost ratio is 1.6.¹⁵ BC Hydro estimates the total cost of their DSM programs amount to \$0.037/kWh.

¹³ It is our understanding at the Pembina Institute that the main reason cited for not proceeding further at the time was that not enough buildings were signed up.

¹⁴ DSM savings in the range of 5-20% of total capacity have been achieved by other utilities, such as those highlighted below. A report prepared for Alberta Energy in 1997 noted that if all parts of society practised widespread conservation measures (including transportation), energy use in the province could be reduced by 18% (the report and a previous one from 1990 can be obtained from the Environmental Affairs Branch of Alberta Energy). This is in contrast to Alberta's electrical demand which is forecast to continue growing at 3% per year, in the absence of significant conservation efforts. Full savings from DSM would not be immediate, as implementation would be phased in over a number of years. However, it is likely that enough could be achieved per year in the early years to offset growing demand and manage peak loads, by early implementation of needed measures as part of an overall DSM strategy.

¹⁵ Program benefits equal the direct costs that would otherwise have been incurred by BC Hydro on new facilities, had the PowerSmart programs not been implemented. This does not include an estimate of the environmental and social benefits, and indirect cost savings. The savings of 480 MW represents almost 5% of BC Hydro's total dependable capacity of about 10,300 MW.

- The City of Austin, Texas, achieved capacity savings of 310 MW and energy savings of 149 GWh on a cumulative basis from 1990 to 1993, from an investment of \$41 million (1990 US\$). The City's energy efficiency initiatives are managed by the Environmental and Conservation Services Department, a separate City agency, which works with the Electric Department and the local natural gas utility to coordinate activities.
- From 1990 to 1993, the Sacramento Municipal Utility District (SMUD) achieved capacity savings of 309 MW and energy savings of 269 GWh from an investment of \$196 million (1990 US\$). Based on 511 million kWh saved, carbon dioxide emission reductions are estimated to be in the neighbourhood of 600 million pounds (assuming the energy would otherwise have been produced from natural gas).
- To avoid building a costly new power plant, Jasper, Alberta invested in energy conservation, and within eight months reduced electricity consumption by 20%.
- Osage, Iowa's electric and gas utilities are municipally owned and operated, and managed by a Board that reports to City Council. A city-wide energy conservation program was launched in 1974. As of 1996, the full conservation program cost the city about \$350,000 per year and was saving more than \$1 million/year. Since 1980, the program has allowed the utility to cut electric rates five times for a total reduction of 19%, cut gas rates by 5.5%, and keep total energy demand growth below 3% even though the town has experienced growth in its three largest industries. This allowed the utility to forestall major developments in generation capacity for 10 years.¹⁶

Therefore, it can be very worthwhile to postpone additions to supply by implementing efficiency and conservation measures.¹⁷

7.0 Renewable Energy

Alternatively, some of the capacity addition could be realized through harnessing renewable energy resources, such as solar, wind, and/or biomass. Currently, these are not likely to be suitable on the scale required for this application, due to the availability of resources and the cost to produce the power. The technologies are there, however, and it is important for Edmonton Power and others to expand from demonstration projects and into higher generation levels from renewable sources. These should be examined in more depth to see how they can become part of the mix, now and in the future, particularly as the costs of such technologies continues to decline.

Often these projects can be implemented in conjunction with federal government initiatives, such as two leading examples in Alberta:

¹⁶ Almost 30% of commercial buildings have had energy audits and a number have been upgraded, with one building reducing its utility costs by 75%. Over 60% of homes have been audited at no cost to the customer.

¹⁷ In looking at the spending on these and other programs and the megawatts saved, it appears that on average these DSM initiatives cost in the neighbourhood of \$580,000 per MW. Generally, utilities prefer to calculate the cost per kWh and other factors for decision making purposes; however, for illustrative purposes if we assume the above average cost, then a DSM program to achieve 170 MW would cost \$99 million, which is in the same ballpark as the \$90 million cost of the planned Rossdale expansion.

- The Whitecourt Generating Station, northwest of Edmonton, was the first power plant in Canada to receive the Environmental Choice Program's Eco-Logo designation. The plant sells over 170 million kWh of "green power"¹⁸ to the grid, generated from biomass obtained from regional sawmills (replacing the use of high-emissions teepee burners) and Alberta Newsprint. Part of the sales goes toward the federal government's green power procurement pilot project in Calgary, described below.
- Vision Quest Wind-Electric of southwestern Alberta has installed four wind turbines, and is selling power to the City of Calgary for their ENMAX program. Under this program, customers choose to pay a premium for green power. Thus far, the uptake is quite high for this relatively new program.¹⁹ It was initiated in conjunction with the federal government, who implemented a pilot project whereby its Environment and Energy department offices in Calgary would run on green power. Some customers in Edmonton are choosing to purchase wind power directly from Vision Quest by paying them a premium, on top of the power bill received from Epcor.²⁰

8.0 Employment Effects

Besides the financial merits and the environmental benefits of some of these other options, there are also substantial net benefits to local and regional employment levels. The Pembina Institute recently reviewed studies across North America on employment from investments in various forms of energy supply, efficiency, and conservation. The figures were adjusted to a common denominator for purposes of comparison. For every one million dollars of investment, the number of jobs created by different energy options, including capital construction jobs and ongoing operating jobs, was determined. Jobs included the direct, indirect, induced and re-spending effects.²¹

The resulting jobs generated for every million dollars in investment were found to be:

- energy conservation and efficiency = 37
- renewable energy = 12
- district energy = 9
- gas-fired electricity generation = 6

Therefore, the overall job creation in the economy from energy efficiency and other DSM measures has been shown to be on average six times higher than that from

¹⁸ Green power comes from sustainably managed renewable resources, such as small-scale hydro power developments, wind, solar, biomass, and geothermal.

¹⁹ The program available to residential customers is called "Greenmax."

²⁰ The customers use the same amount of power, still delivered by Epcor, but are helping to finance the generation of wind power that is distributed through the Alberta electrical grid.

²¹ Direct employment relates to the activity itself, such as conducting home energy retrofits. Indirect employment arises from suppliers of products and services to the direct activities, such as insulation manufacturing. Induced employment is generated when direct and indirect employees spend their wages, such as at restaurants and stores. The total of direct, indirect, and induced is generally termed gross employment. Re-spending employment occurs when money saved from taking measures such as energy-saving retrofits is re-spent on goods and services (as an increment to disposable income). The displacement effect refers to employment displaced, such as from the energy supply sector. Gross employment plus re-spending less displacement is referred to as net employment.

additions to electricity supply from natural gas, per million dollars of investment. The jobs calculated per megawatt of power also tended to be higher for DSM and renewable energy investments, though not by such a large margin.²²

9.0 Conclusions and Next Steps

The option of pursuing a comprehensive DSM program can yield substantial savings in energy and money for both the utility and its customers. Whether alone or in combination with other options such as renewable power generation, it is the most environmentally sound approach to move towards achieving the greenhouse gas reduction commitments made by the City of Edmonton and by Epcor. Clearly, based on the preliminary material presented in this brief, it warrants further serious consideration.

Re-configuring the project to include a fully integrated district heating and cooling component from the outset is also likely to reduce risk and improve project economics, as well as certainly improving regional air quality, reducing net greenhouse gas emissions from the City of Edmonton, and increasing local employment.

It is recommended that City Council formally engage in further technical analysis of options and establish adequate public consultation procedures prior to any decision to proceed with the current Rossdale expansion project. Consultation could include a Public Advisory Committee on Energy, such as the highly successful Committee established for water management several years ago. With input from Epcor and others, this committee could look into the various available options in more depth, and invite public discussion.

In the meanwhile, plans to proceed with the Rossdale expansion should be put on hold.

There are significant opportunities for collaboration between the City, Edmonton Power, environmental and energy-efficiency non-profit organizations, and other partners such as energy auditors and energy service companies (ESCOs), Natural Resources Canada, and electricity customers. These opportunities should be pursued.

Implications of all options on Epcor and the City's future greenhouse gas liability, as well as on the potential to generate and secure revenue from greenhouse gas emission reduction credits should be carefully assessed before making further investment decisions. The City should note that such analysis is now routine for most large private sector power projects. This is, in no small part, responsible for the private sector push towards extracting maximum economic and environmental value out of energy service projects – something the current Rossdale Expansion Project clearly does not do.

²² Job years per megawatt were shown to be highest for conservation, solar and co-generation options, in Pacific Northwest Laboratory, *Employment and Land-Use Impacts of Resource Program Elements*, 1992. See also the findings of the Saskatchewan report referred to in the References.

Appendix A. Climate Change and Municipal Action

Municipalities and Climate Change

Fact: Canada has made an international commitment to reduce greenhouse gas emissions to 6% below 1990 levels before the year 2012.

Fact: Canada's greenhouse gases were already 12% above 1990 levels by 1996.

Reality: We are facing a 20% reduction from current levels to meet our commitment.

Reality Check: It can be done and municipalities can be a big part of the solution.

No matter how we divide Canada's inventory of greenhouse gas emissions, many of them originate in the centers of human activity – our communities. Municipal governments are the local leaders on this issue of regional, national and international importance. By taking cost-effective actions to improve eco-efficiency within their own operations, local governments signal to their ratepayers and to other municipalities that they are acting in the long-term interest of their community and the world. These efforts are effectively multiplied when municipal governments promote and encourage action to reduce greenhouse gas emissions in the community as a whole. And the best part is – these solutions make economic as well as environmental sense.

How Serious is Climate Change?

On January 5th, 1999, Environment Canada announced that 1998 was the warmest year on record in Canada, with areas of the Arctic recording annual temperatures 4°C above normal. On a worldwide basis, 1998 continued the trend of increasingly warm years by being the warmest year ever recorded. Clearly the message is this: Climate change is happening now.

The Canadian National Forum on Climate Change is a group of respected, knowledgeable Canadians who were assembled to consider the climate change issue. In June 1998, they declared: *We, the members of the National Forum on Climate Change, believe that climate change will touch the life of every Canadian. Decisions taken today on this complex and controversial issue will have implications for our communities, our children and future generations. Climate change, caused by the buildup of greenhouse gases, could lead to dramatic changes in sea levels, storm patterns and average temperatures. Every Canadian has a role to play in reducing greenhouse gas emissions....Canadians have little to lose and everything to gain by taking action immediately. Each of us can and must make a difference.*

What about Alberta?

First, climate change may increase the frequency and intensity of drought throughout the prairies increasing demand for irrigation in places like southern Alberta as well as effecting domestic water supplies. Moreover, greater variability in weather conditions could negatively affect all types of crop growth in all regions.

Secondly, climate change is likely to cause grasslands in Alberta and Saskatchewan to expand at the expense of forested regions. Alberta's boreal forests will face more frequent and severe forest fires and a spread of forest pests and disease. Some models predict that up to 80 percent of Canada's boreal forest could be wiped out.

Alberta is the largest emitter of greenhouse gases in Canada, accounting for 31 percent of the country's total greenhouse gas emissions in 1995. Alberta's emissions are high relative to provinces with larger populations because: a) Alberta is the home of Canada's petroleum industry, and: b) virtually all of Alberta's electricity is produced by the combustion of coal. At the same time, Albertans produce just as many greenhouse gas emissions from the other major greenhouse gas emission sources (e.g., transportation) as Canadians in other parts of the country.

The Eco-Efficient Communities Initiative

This program is designed specifically to address the issue of climate change by improving your municipality's eco-efficiency. Becoming eco-efficient means providing more goods and services with less cost, less pollution and less harm to the environment. This is accomplished, by lowering both capital and operating costs related to energy use, waste management, and the provision of water services.

EECI provides small and mid-sized communities with information, tools and assistance they need to identify, design and implement actions to reduce operational costs, create local jobs, and protect the environment by reducing greenhouse gas emissions. EECI activities focus on the following areas:

- Improving Energy Efficiency
- Alternative Energy Sources
- Solid Waste Minimization
- Water Conservation
- Wastewater Management
- Reduced use of Transportation Fuels
- Green Spaces
- Urban Agriculture

Working with EECI staff, member municipalities are provided with the tools and assistance they need to:

- develop baseline inventories of energy use, water consumption and waste production
- identify priority areas for action
- set performance targets for environmental and economic improvements
- prepare a 5-year local action plan to meet the targets
- establish and implement monitoring and reporting procedures

There is no cost to join and resources available for EECI members include our 350 page "How-to-Guide," the EECI website with downloadable tools and an electronic

database of municipal success stories, priority-setting workshops, technical conferences, quarterly newsletter and simple baseline software.

The EECI was developed through Alberta's Clean Air Strategic Alliance. In addition to corporate and institutional financial support, the EECI has received in-kind support from the Alberta Urban Municipalities Association and the Alberta Association of Municipal Districts and Counties. The program is managed and delivered by the Pembina Institute, a citizen-based, non-profit, environmental education, policy and consulting organization based in Drayton Valley, Alberta.

If your municipality is interested in capturing the benefits of eco-efficiency, please contact us. We would be happy to discuss the issues and opportunities for improving the eco-efficiency of your municipality.

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