A Smart Electricity Policy for Alberta

Enhancing the Alberta Advantage

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March 2001

Pembina Institute
for Appropriate Development

About the Pembina Institute

The Pembina Institute is an independent, citizen-based environmental think-tank specializing in the fields of energy-environment, climate change and environmental economics. The Institute engages in environmental education; policy research, analysis and advocacy; community sustainable energy development; and corporate environmental management services to advance environmental protection, resource conservation, and environmentally sound and sustainable resource management. Incorporated in 1985, the Institute's head office is in Drayton Valley, Alberta with additional offices in Ottawa and Calgary and research associates in Edmonton, Vancouver, Saskatoon, and other locations across Canada. The mission of the Pembina Institute is to implement holistic and practical solutions for a sustainable world.

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About this Report

This report was written to present some options and concepts and to reflect initial thoughts of the Pembina Institute on electricity sector planning for Alberta. The Institute will be doing further work on this crucial public policy issue, including additional research and analysis and engagement with government and industry in advancing the policy concepts introduced here.

About the Author

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Executive Summary

Alberta is in the middle of an electricity crisis, with high electricity prices causing economic grief for consumers and businesses. The provincial government has tried to mitigate the impacts by providing huge and unprecedented rebates. These rebates help ease the short-term financial pain but they do nothing to address the fundamental causes of the problem nor do they offer a long-term sustainable solution. If these issues are not dealt with, Albertans are likely to face even larger problems in the not-too-distant future.

In this initial concept paper, the Pembina Institute describes a new approach to electricity sector planning in Alberta. The proposed Smart Electricity Policy for Alberta addresses the current pricing and supply crisis while also ensuring the development of a stable and sustainable electricity market for the future. It shows how the provincial government could take a leadership role in managing an electricity sector that would be competitive, and whose supply would be secure, cost-effective and environmentally efficient. This approach would help alleviate the current electricity crisis at a fraction of the cost of the recent multi-billion dollar rebates.

The Pembina Institute's policy proposals focus on conserving energy and improving energy efficiency, and on increasing the use of low-impact renewable energy. These new policies would protect consumers from various risks, including price and resource instability, and human health and environmental degradation. They also increase electricity supply diversity and competition and promote regional economic development.

Energy conservation and efficiency is one of the cheapest "sources" of new electricity supply in Alberta. Alberta has a huge opportunity to free up electricity already being generated and still maintain our standard of living and industrial economy. This can be achieved by a three-pronged approach:

1. Establish and fund an Energy Efficiency Office to facilitate the removal of barriers to energy efficiency.
2. Establish an Alberta Energy Efficiency Revolving Fund to provide zero-interest loans to end-use consumers to implement energy efficiency measures.
3. Establish a performance-based mechanism for retailers to facilitate energy efficiency.

Low-impact renewable energy is a secure source of electricity and has the lowest risk portfolio in terms of price stability, resource scarcity, and minimizing human health and environmental impacts and liability. Alberta has made some progress towards diversifying its electricity supply through the use of renewable energy sources, but this process would be significantly accelerated by the following actions:

4. Develop a renewable energy portfolio standard to ensure that a minimum amount of electricity supply in Alberta is coming from renewable sources.
5. Establish a production incentive for low-impact renewable energy to help the market adapt to the renewable energy portfolio standard and ensure that consumer rates are not affected negatively.
6. Implement a net metering program for all Alberta retailers to allow consumers who generate some of their own power to get credit for any excess generation by selling it back into the electricity grid.

The costs of these six policy proposals to Alberta taxpayers are estimated at a maximum of $170 million in the first year, far below the several billions that have been earmarked for consumer rebates. Savings to Alberta consumers are estimated at up to $500 million dollars per year.

The table below compares the current electricity market policy and the Pembina Institute's proposals against key objectives of a Smart Electricity Policy for Alberta. The table on the following page summarizes the costs of the proposed programs and the savings to Albertans.

Comparison of Electricity Policies

Objective	Current Alberta Policy	Pembina Institute Policy
Provide price stability	• Existing policy a key contributor to current price instability. • Rebates have provided only partial, short-term relief. • Significant sources of new supply will take several years to establish. • No protection from environmental liabilities.	• Contribute to price stability through reduced energy consumption, protection from fuel price swings, and environmental liabilities. • Rapid implementation will offer immediate benefits.
Increase diversity of supply	• Very high percentage of electricity supplies from coal. • Liability of $400 million to $1 billion per year for greenhouse gases plus direct human health costs.	• At least 800 MW of energy savings from efficiency and 800 MW of low-impact renewables.
Increase competition	• While many new entrants are poised to enter the market, significant new coal generation could re-concentrate market power into the hands of dominant players, undermining the ultimate effectiveness of a truly competitive market.	• Inclusion of low-impact renewable energy supplies would further improve competitiveness.
Improve consumer efficiency	• High prices will improve efficiency, but support for small consumers to implement efficiency is limited.	• Half a billion dollars of annual energy savings could be achieved through technologies and management practices.
Increase the use of low-impact renewable energy	• Limited development of low-impact renewable energy in niche marketplaces.	• A minimum of 800 MW of fossil fuel capacity could be displaced.
Promote regional economic development	• Most of the new supply to be developed at existing industrial locations.	• Energy efficiency produces five times more jobs than conventional energy. • Employment is distributed across the province.
Inform consumers	• Rebates discourage consumer action on energy efficiency and distort a competitive market.	• Emphasis on empowering consumers to use energy efficiently and help them better understand the environmental impacts of their electricity use.
Minimize impacts on human health and the environment	• 1,700 MW of new coal-fired capacity will greatly exacerbate emissions of heavy metals, particulate matter, and/or smog precursors, as well as acidifying pollutants and greenhouse gases.	• New energy sources from low-impact renewable energy and savings from efficiency will be provided with no net impacts on human health.

Summary of Program Costs

Program	Cost to Taxpayers	Cost to Consumers
Energy Efficiency Office	$5 million per year	No cost
Alberta Energy Efficiency Revolving Fund	$100 million total	Monthly loan payments equivalent to or less than energy savings
Performance Mechanism and Energy Efficiency Target for Electricity Retailers	$5 million per year	Energy savings potential of 10% of the total current electricity demand is worth up to half a billion dollars per year.[†]
Low-Impact Renewable Energy Portfolio Standard	No cost	No cost, given current electricity prices; otherwise, costs will be covered by production incentive.
Low-Impact Renewable Energy Production Incentive	Maximum $60 million per year Under current market conditions, the cost would be zero.	No cost
Net Metering legislation	Cost of administration – $100,000 per year	Cost of installing renewable energy for a small number of consumers Potential payback on investment through reduced purchases of grid electricity
TOTAL: Substantial net savings to Albertans	Maximum of $170 million in the first year, reducing to $70 million in subsequent years	Up to $500 million in annual consumer savings

[†] Assuming $0.11/kWh at current rates, the savings of 6,000 GWh of energy efficiency amount to $660 million per year.

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The Alberta Electricity Market Crisis

Alberta is in the midst of an electricity crisis, with high electricity prices causing economic pain for consumers and businesses. Wholesale electricity prices on the Alberta Power Pool have been increasing steadily and are now five times what they were three years ago.[1] Meanwhile, major power generators are enjoying record profits.

On January 29, 2001, the provincial government attempted to reassure Albertans by stating that the crisis in Alberta's electricity market is the result of factors largely outside of government control, and that the development of 3,000 megawatts[2] of new power, including 1,700 megawatts of new coal-fired resources in the province,[3] will help to alleviate the crisis. The government has also offered billions of dollars in subsidies to energy consumers, with part of that rebate directed toward electricity purchases.[4] A rebate of this size is unprecedented and does help consumers ease short-term financial difficulties, but it does nothing to create the structural changes required to protect consumers from mid- to long-term exposure to high prices.

While politically expedient, such large rebates grossly distort the signals received by consumers and producers who are supposedly participating in a free, competitive market. Consumers are shielded from a key incentive to use electricity more efficiently—that is, cost. Rebates fuel further dependency on ongoing taxpayer subsidies of the business of electricity generation, producing huge uncertainty for prospective developers who recognize that government subsidies will have to end, but have no sense of what policy tools will be used instead.

The current crisis may be a precursor to more significant problems that will arise if the Alberta government does not take steps to address a range of fundamental issues in the electricity market. The roots of these future problems can be found in four main areas:

- Alberta's limited diversity of energy supplies,
- the negative environmental impacts of fossil fuel energy use,
- a failure to account for the increasing cost of complying with emerging international environmental agreements, and
- the lack of support for Alberta consumers to use electricity more efficiently.

Coal is the dominant fuel for generating power in Alberta, providing 81% of the supply in 1997.[5] Recent announcements of the intent to build new coal-fired plants would significantly increase the use of this fuel source. No other Canadian jurisdiction relies as heavily on coal for its electricity as Alberta. This province's strong dependence on a single resource for generating electricity makes it much more vulnerable to risk than jurisdictions that use a combination of

[1] In January 2001, the average pool price was $0.13/kilowatt-hour, compared with $0.046/kWh, $0.032/kWh, and $0.027/kWh in January of 2000, 1999, and 1998 respectively. In contrast, the cost of new generation from natural gas is approximately $0.05/kWh, wind is about $0.07/kWh, biomass $0.06/kWh, and hydroelectricity can be as low as $0.03/kWh. The generating cost of coal-fired facilities is $0.01 - $0.05/kWh, depending on the specific technology being employed and the extent to which capital costs have been paid off. Reference: A. Pape. *Implementing Sustainable Energy Policy under Competitive Electricity Markets.* Graduate Thesis, Simon Fraser University. 1997. Summary available at http://www.island.net/~sustener/Thesis.doc

[2] One megawatt (MW) provides enough energy for more than 1,000 homes.

[3] 900 MW at Keephills (TransAlta), 400 MW at Genesee 3 (EPCOR), and 400 MW at Brooks (Enmax)

[4] The residential rebate is $40/month on electricity bills and $150/month for gas customers. Commercial consumers receive a $0.02 - $0.03/kWh rebate on their electric bills.

[5] Canadian Electricity Association (CEA), *Electric Power in Canada 1997*, published in 1999.

hydroelectricity, wind, biomass, natural gas, nuclear, and coal. Risks associated with global price fluctuations are unlikely to affect the price of Alberta coal since Alberta's supplies are abundant and are not an export commodity. However, risks associated with the environmental and social impacts of coal mining, transportation, and combustion could have a deleterious impact on the Alberta electricity market in the future.

Alberta's electricity sector produced 178,000 tonnes of sulphur dioxide emissions in 1997 and 102,000 tonnes of nitrous oxide emissions, both of which contribute to the formation of acid deposition (i.e., contributing to acidification of lakes and soils) as well as ground level ozone (i.e., smog) and subsequent human health impacts.[6] Alberta's electricity sector emissions of these gases are the highest in Canada. Coal combustion also produces significant emissions of heavy metals and particulate matter, both of which have important human health impacts. The advent of state-of-the art coal-fired technologies, such as pressurized fluidized bed combustion, can help to reduce these emissions, but these technologies are much more costly to build than Alberta's existing coal plants, and substantial amounts of pollutants will still be produced.

Coal-fired plants also emit huge volumes of greenhouse gases that contribute to global climate change. The Canadian Government has signed the Kyoto Protocol to the United Nations Framework Convention on Climate Change. This global agreement will require Canada to reduce its greenhouse gas emissions to 6% below 1990 levels by 2012—a 26% reduction from projected 2010 levels.

In 1990, Alberta's greenhouse gas emissions from electricity were 40 million tonnes (megatonnes or Mt).[7] They increased to 47 Mt in 2000 and are expected to be over 57 Mt in 2010 with the introduction of new coal supplies.[8] Future efforts to control greenhouse gas (GHG) emissions will likely include establishing market-based systems for reducing these emissions. Given a conservative price of $20/tonne for GHG emissions,[9] Alberta's electricity consumers will be on the hook for a minimum of $400 million every year, increasing in proportion to the rate of growth of electricity demand. This represents the minimum necessary to return emissions from the electricity sector back to 6% below 1990 levels. Some potential market-based instruments under consideration would, however, cover all emissions from the sector, increasing the liability to over $1 billion per year.

While Albertans are more likely to use electricity more efficiently now that prices have escalated, they are disadvantaged by the lack of utility and government programs to help energy consumers become more efficient. In reality, many Albertans need help to overcome barriers to the implementation of energy efficiency technologies even though these technologies will save money over time. One-time infusions of taxpayer dollars and royalty proceeds should be directed towards helping consumers make permanent reductions in their energy demand—not to help them pay high bills for a few months, only to face higher energy bills again, year after year.

[6] CEA. 1999.
[7] Emission amounts are expressed in units of carbon dioxide-equivalents.
[8] Natural Resources Canada's 1999 forecast for emissions in 2010 was 49 million tonnes, assuming natural gas supplies. We have added eight million tonnes to reflect the net increases of coal above new natural gas supplies that were anticipated in the NRCan forecast.
[9] This is a conservative estimate that includes the cost of mitigation and/or purchasing emission reduction offsets, transaction costs of undertaking these measures, and regulatory administration costs.

A Smart Electricity Policy for Alberta

The Pembina Institute proposes a new approach for electricity sector planning in Alberta. This proposal, a Smart Electricity Policy for Alberta, helps to address the current pricing and supply crisis while ensuring the development of a stable and sustainable electricity market for the future.

In the Institute's view, the key issue is not one of de-regulating or re-regulating the electricity sector. Rather, Alberta needs smart regulations—ones that force markets to deliver better performance while providing maximum flexibility in doing so. Markets will not deliver competition and good performance if existing major generators are protected and encouraged to take larger profits out of the system, while new entrants face ongoing uncertainty and high risk. Markets will not optimize supply and demand if they do not accurately convey the real price of electricity to consumers because taxpayer-funded consumption rebates tell people to keep using electricity inefficiently.

A Smart Electricity Policy for Alberta should:

1. provide price stability,
2. increase diversity of supply,
3. increase competition,
4. improve efficiency,
5. increase the use of low-impact renewable electricity supplies,
6. promote regional economic development,
7. inform consumers, and
8. minimize impacts on human health and the environment

1. **Provide Price Stability**. A Smart Electricity Policy would emphasize price stability to protect consumers from significant and unpredictable fluctuations in their rates and to protect electricity retailers from financial burdens due to fluctuations in wholesale prices. The current electricity market structure is not providing for price stability.

2. **Increase Diversity of Supply.** Every supply resource has inherent risk, such as exposure to global price fluctuations, environmental and human health impact-related liabilities, social impacts, or resource scarcity. Today coal may appear to be the cheapest option, but tomorrow, global and national air quality legislation may significantly increase the cost of using coal to generate electricity in Alberta.[10] Distributing the electricity supply "eggs" among several technology "baskets" is a fundamental principle of a Smart Electricity Policy. Unfortunately, the current Alberta policy is to encourage further reliance on coal through the proposed installation of 1,700 MW of new coal capacity in a jurisdiction that already has the highest percentage of coal-generated electricity in Canada.

3. **Increase Competition.** A competitive marketplace is created when there are multiple buyers and sellers. Until recently, there were only three major electricity sellers in Alberta, each of which had a considerable amount of market power. While auctions were held in 2000 to divest these dominant players of their market power, the dramatic increase in coal-fired capacity being championed by the Alberta government could result in a re-concentration of market power to those original players. What is needed instead are new market entrants providing new generation from a diversity of sources.

[10] In the U.S., coal-fired electricity supplies are now subject to stringent air quality requirements in many states, increasing the price so that coal is no longer the cheapest resource. In Oregon, electricity generators, which are predominantly natural gas based, are required to offset emissions of greenhouse gases.

4. **Improve Efficiency.** Improving efficiency is one of the cheapest ways to free up new energy supplies in Alberta. Examples include improved lighting in buildings; using more efficient variable speed motors in industry; managing electrical loads; optimizing building designs for efficiency; retrofitting heating, ventilation and cooling systems; avoiding the use of air conditioning by using natural cooling systems; automatically switching off electric water heaters temporarily during periods of critical supply shortages; and using energy controls. Many of these measures have not been implemented because electricity consumers do not have access to the tools and financing to make them happen. Various barriers need to be removed to facilitate the implementation of energy efficiency.[11]

5. **Increase the Use of Low-impact Renewable Electricity Supplies.** Low-impact renewable energy is a secure source of electricity and has the lowest risk portfolio from the perspective of price stability, resource security, and minimizing environmental impacts and liability. Renewable resources are not prone to rising fuel prices and subsequent price variability. Also, low-impact renewable energy is compatible with the emerging Kyoto Protocol (which Canada has signed), and does not adversely affect local air quality. Such energy supplies include wind, solar, low-impact biomass, and low-impact hydroelectricity resources.[12] A Smart Electricity Policy would encourage greater development of renewable energy similar to the competitive mechanisms in Texas, other American states, and British Columbia.

6. **Promote Regional Economic Development.** A Smart Electricity Policy maximizes regional economic development, skill development, and job creation by facilitating investments in energy efficiency and low-impact renewable energy. Investments in energy efficiency have been shown to provide five times more employment per dollar invested than conventional energy.[13] Investments in energy efficiency and renewable energy also emphasize developmental benefits that are more evenly distributed across the province. In comparison, new proposed fossil fuel projects will generally occur in areas that have already experienced extensive industrial development.

7. **Inform Consumers.** A Smart Electricity Policy enlightens the public on their energy use, where their electricity comes from, and the social and environmental impacts of their consumption. This helps people to make more informed choices about their electricity purchases, thereby encouraging conservation and efficiency and creating a demand for clean renewable energy sources.

8. **Minimize Impacts on Human Health and the Environment**. Energy sources that minimize negative human health and environmental impacts should be encouraged. Key human health considerations include emissions of heavy metals, smog-creating substances, and toxic waste buildup. Primary environmental concerns include emissions that acidify soils and waterbodies, and greenhouse gases that contribute to climate change. The Pembina Institute can provide further information on these issues.

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[11] Many proven, cost-effective and widely beneficial energy efficiency technologies and management practices are not being realized because of non-financial barriers. These include lack of information, lack of interest in energy issues, the lack of technological literacy, and split responsibilities between landlords and tenants of buildings; for example, the landlord is responsible for capital investments needed to implement energy efficiency, but the tenant usually receives the benefits of such investments via lower energy bills.

[12] For more information on low-impact renewable energy, see the *Pembina Institute Green Power Guidelines for Canada*, downloadable at no charge from http://www.pembina.org/pubs/greenpower.htm. Note: Biomass resources are only considered "low impact" if they do not adversely affect local air quality.

[13] Pembina Institute. 1997. *Comparative Analysis of Employment from Air Emission Reduction Measures.* Energy efficiency programs produce an average of 37 jobs per million dollars of investment, compared to seven jobs for conventional energy supplies including natural gas and coal.

Why the Alberta Government Needs to Take Action

The Alberta Government has an opportunity to constructively manage a competitive electricity marketplace so it develops in a way that provides a secure, cost-effective, and environmentally efficient supply base. Other jurisdictions are doing this, even as they restructure their electric power industries.

The Government of Texas has required electricity retailers to produce a minimum of their supply from renewable energy sources such as wind, biomass, solar, and hydro power. The law states that a minimum of 2,000 MW of new renewable energy capacity must be online by 2009. This will provide enough electricity for at least 700,000 homes. To maintain competitiveness, Texan electricity companies can trade "certificates" of renewable electricity production among themselves, thus ensuring that this requirement is met in the most cost-effective manner. Retailers who do not meet the requirement will face a financial penalty. In fact, it is expected that at least 1,600 MW of wind capacity and 1,050 MW of other renewable sources will be online in 2002 when the Texas electricity market is opened to retail competition.[14] Most of this renewable energy capacity is competitive with natural gas and coal supplies.[15]

Furthermore, Texas has required all retailers to disclose where their electricity comes from, and has also permitted net metering. Net metering allows farmers, residents, and small businesses to produce their own electricity, receive credit for any power they generate and apply this credit against their cost of electricity supplied by the grid. Market analysts in Texas have speculated that the quick response to the legislation is a result of the high price of oil and natural gas, which is making energy diversity and a firm price for fuel (e.g., from wind power) more attractive.[16]

The sections below describe how the government of Alberta could effectively support the development of a Smart Electricity future through policies designed to help consumers save energy and protect them from various risks, including price and resource instability, human health and environmental degradation, and negative financial impacts on low-income earners. This approach could help alleviate the current electricity crisis at a fraction of the cost of the recent multi-billion dollar consumer rebates.

[14] *Windpower Monthly*. October 2000; pp. 22-23.
[15] This includes the U.S. Federal Government Production Tax Credit of US$0.015/kWh.
[16] *Windpower Monthly*. October 2000; pp. 22-23.

Energy Conservation and Efficiency

Energy conservation and efficiency is one of the cheapest sources of new electricity supply in Alberta. The province has an immense opportunity to "free up" electricity while still maintaining our standard of living and industrial economy. The potential for energy efficiency in Alberta is large, given that electric utilities and the government have done little to tap the "efficiency resource" and that, until about a year ago, consumer prices were very low, providing little incentive to reduce electricity consumption.

In fact, Alberta energy consumers are at a big disadvantage compared with those in British Columbia, Ontario, Nova Scotia, and the Yukon, where government and electric/gas utility programs have supported consumer energy efficiency through government-mandated programs. For example, customers of West Kootenay Power in British Columbia are eligible for free energy audits for their facilities, recommendations for energy savings retrofits, below-market-rate loans to implement them and, in some cases, rebates for key energy saving technologies.[17]

While the total energy savings potential for Alberta has not yet been researched, a study of potential savings in British Columbia was quite revealing. B.C. has pursued efficiency gains through BC Hydro's PowerSmart, West Kootenay Power's PowerSense, and specific provincial government programs. The untapped energy efficiency potential was estimated in 1998 at 2,500 to 8,500 GWh per year,[18] with the low end reflecting efficiency measures that have no impact on consumers' uses of energy and the high end reflecting the full application of energy conservation measures by consumers. The B.C. efficiency resource prediction is equivalent to new thermal power plants of 335 to 1,150 MW of capacity.[19]

Alberta could expect similar efficiency gains with comprehensive programs that reduce barriers to tapping the efficiency resource. A three-pronged approach could be used to tap the efficiency resource in this province, and it would cost a fraction of the amount spent on one year of Alberta government energy rebates:

- Establish and fund an Energy Efficiency Office
- Establish an Alberta Energy Efficiency Revolving Fund
- Establish a performance-based mechanism for retailers to facilitate energy efficiency

Policy Proposal 1. Establish and Fund an Energy Efficiency Office

A new non-profit Alberta Energy Efficiency Office (EEO) would help overcome barriers to energy efficiency. The EEO would act as a central coordinating body for energy efficiency with an emphasis on education and information, coordination of zero-interest energy efficiency loans to consumers, targeted efficiency rebates, and the development of technical standards.

The principal objective of the EEO would be to work with retail electricity companies to help them implement their energy efficiency portfolio standard described below. Existing electric retailers could be the main facilitative and delivery agents for energy efficiency in Alberta. They have the best access to information about consumers and are in an excellent position to help facilitate energy savings, provided that they can be financially compensated for doing so through a performance-based mechanism coordinated by the EEO.

[17] http://www.wkpower.com/powersense
[18] B.C. Task Force on Electricity Market Reform. Final Report. January 1998. B.C. Government.
[19] This assumes an 85% capacity factor.

Nearly every state in the U.S. that has restructured its electricity market[20] has established a specific mechanism to encourage energy efficiency, with several adopting the approach proposed here.

It is estimated that the EEO would require a budget of approximately $5 million per year to operate.

Policy Proposal 2. Establish an Alberta Energy Efficiency Revolving Fund

The Alberta Energy Efficiency Revolving Fund, created through a one-time Alberta government contribution of $100 million, would act as an endowment for energy efficiency for the province. The primary function of this fund would be to provide zero-interest loans to end-use consumers to implement energy efficiency measures; these loans would be coordinated by the Energy Efficiency Office.

The fund would be replenished through loan payments equivalent to, or less than, the financial value of energy savings from energy efficiency measures. One of the most significant barriers to cost-effective energy efficiency in Alberta is the lack of access to capital to implement appropriate measures, even in situations where the financial value of energy savings is large enough to pay off capital costs in one to two years. Currently, consumers are limited in their ability to borrow capital to pay for energy efficiency improvements. Homeowners can only access conventional financing at rates of prime plus one percent or more, and small businesses can also be constrained in their access to capital.

The revolving fund could be used to leverage financing from other sources. For example, a portion of the fund could be used as a guarantee for financing from banks or insurance companies. Thus, the value of the pool of funds could be doubled or more.

The "revolving fund" approach to energy efficiency has been applied in several jurisdictions. For example, the City of Edmonton has established an energy management revolving fund for retrofits of city buildings. From 2000-2007, the City expects to spend $13.5 million to fund energy efficiency improvements; it expects to save $21.3 million between 2001 and 2012 due to improved energy efficiency.[21]

The City of Toronto established a Better Buildings Partnership, which has already led to greenhouse gas emissions reductions of 110,000 tonnes and saved $11.8 million in energy costs in city and private buildings. The City of Toronto initially provided $2 million of seed money to establish the loan fund, which has now expanded to more than $10 million of private and public financing for zero-interest loans to building owners. The City itself has achieved a 25-percent return on its $2 million investment.[22]

[20] At least 25 states have restructured to allow for greater competition in the marketplace.
[21] *Overview of Greenhouse Gas Emissions Reduction Plan for City Operations*. September 23, 1999. Available at http://www.gov.edmonton.ab.ca/
[22] http://www.climatechangesolutions.com/english/municipal/stories/buildings/toronto-bbp.htm

Policy Proposal 3. Establish a Performance Based Mechanism for Retailers to Facilitate Energy Efficiency

Existing electric retailers are in the best position to act as facilitative and delivery agents for energy efficiency in Alberta, as they have the best access to information about consumers and are in an excellent position to make energy savings possible.

To achieve these energy efficiency savings, the government should establish a performance-based mechanism. This mechanism would require electricity retailers to help reduce their customers' electricity consumption and it would financially compensate retailers for their program costs. Electricity retailers would need to facilitate customer energy efficiency savings equivalent to 5% of 2001 electricity sales by 2005, rising to 10% by 2010. Thus, a company that sells 1,000 units of electricity in 2001 would be required to help consumers reduce electricity demand by 50 units in that year, maintain it for each year following the year 2005, and increase the total annual savings to 100 units by 2010 and beyond.

The Energy Efficiency Office (EEO) and the Alberta Energy Efficiency Revolving Fund would be key elements in the success of this program. For example, through building energy audits, a retailer could identify consumers who have energy efficiency opportunities, then recommend retrofits to those consumers (e.g., change lighting systems, replace boilers, improve insulation, etc.). At that point, the Fund would provide financing and the EEO would provide technical support. Following the delivery of the energy efficiency retrofits by the private sector, the electricity retailer could monitor the actual energy savings and report them to the EEO who would coordinate the management of the energy efficiency requirement.

Electricity retailers would receive a financial return on their implementation costs through a performance mechanism coordinated by the EEO. The EEO would pay retailers for energy savings based on their achievement of financial and energy saving targets.[23]

Establishing such a program with efficiency targets of 5% by 2005 and 10% by 2010 would reduce province-wide electricity demand by an estimated minimum of 3,000 Gigawatt-hours (GWh) by 2005, effectively eliminating the need for a 400-MW fossil fuel power plant. By 2010, the savings would double, displacing the equivalent of an 800-MW plant.

This "performance mechanism" approach has been applied in British Columbia, Ontario, and Québec to encourage electricity and natural gas companies to achieve savings. Companies such as West Kootenay Power, BC Gas, and Enbridge Consumers Gas are profiting from this approach, which is well-established in other Canadian provinces with much lower and more stable electricity prices.

The total cost of funding the performance mechanism is estimated at $5 million per year.[24]

[23] Their return on investment would be based on a formula that is tied to performance.
[24] Estimate based on the historical costs of utility energy efficiency programs in British Columbia.

Low-Impact Renewable Energy

Low-impact renewable energy is a secure source of electricity and has the lowest risk portfolio in terms of price stability, resource security, and minimizing human health and environmental impacts and liability. Low-impact renewable energy produces negligible greenhouse gas emissions, helps lessen hazardous air quality problems, and does not deplete natural resources.

Currently, about two percent of Alberta's electricity supply is derived from low-impact renewable energy through biomass wood waste plants in Drayton Valley and Whitecourt, low-impact hydroelectric plants in southern Alberta, and several wind generators in southwest Alberta. Resource inventories indicate that a significant proportion of Alberta's electricity needs could be met by wind, low-impact hydro, and biomass resources at prices in the range of $0.04 to $0.07/kWh,[25] reducing the need for new baseload fossil fuel plants. The current high electricity prices are creating a boom for wind power in southwestern Alberta, but this boom pales compared with the pace of development of low-impact renewable energy in competitive jurisdictions, such as Texas, that have comprehensive legislative support.

Low-impact renewable energy could be implemented in Alberta through the three programs described below:[26]

- Develop a renewable energy portfolio standard
- Establish a production incentive for low-impact renewable energy
- Implement a net metering program for all Alberta retailers

Policy Proposal 4. Develop a Renewable Energy Portfolio Standard

All electricity retail companies would need to demonstrate that at least 5% of their electricity sales are provided by low-impact renewable energy sources in 2005, and 10% in 2010. Generators of low-impact renewable energy would receive certificates for production of electricity. The retailers would purchase the most cost-effective certificates, thus effectively creating a competitive market for the supply of renewable energy in Alberta. This mechanism would be virtually identical to the approach undertaken in Texas with their electricity market restructuring.[27]

Implementation of a portfolio standard would provide substantial technical, economic, social and environmental benefits to the province at no net cost to ratepayers, given current electricity rates.[28] If rates do fall below the price of low-impact renewable energy, then consumers would be protected from price increases through a government-funded production incentive proposed below. The portfolio standard would also contribute to improved resource reliability and price security.

[25] For example, up to 10,000 MW of new wind capacity could be developed in southwest Alberta with about half of that being economical sites. Reference: Natural Resources Canada, *Economic Characteristics of Large Scale Wind Turbines in Alberta.* 1997. Also, see A. Pape, 1997 (reference in footnote 1).
[26] These were presented by the Canadian renewable energy industry associations in 1999 as part of the Low-Impact Renewable Energy Coalition. For more information, see: http://www.canwea.ca/LIRE-Options.PDF
[27] See the detailed description of the Texas mechanism above.
[28] In A. Pape. 1997 (reference in footnote 1). The net cost of a 10% portfolio standard in 2025 was estimated at $0.013/kWh over conventional electricity costs. Since the time of this research, conventional energy costs have increased significantly over the historical prices of electricity.

Assuming that 2.5% of the electricity supply in 2005 will be supplied by low-impact renewable energy under the current marketplace, a 5% portfolio standard would require an additional 2,000 GWh of electricity in Alberta to be generated by renewables in 2005, and 6,000 GWh in 2010.[29] In 2010, this would be equivalent to about 800 MW of new fossil fuel capacity in the province.

BC Hydro is currently implementing a 1999 commitment that 10% of all new power supplies will be derived by "green power" and, having found many resources to be priced only slightly higher than gas thermal generation, is now considering a higher renewables standard of 20%. In the U.S., Texas, Nevada, Minnesota, Wisconsin, Iowa, New Jersey, Pennsylvania, Massachusetts, Connecticut, and Maine require that up to 30% of supplies be met by low-impact (green) renewable energy over the next decade.[30] Texas will be requiring the development of 2,000 MW of renewable energy and the Chairman of Texas Public Utilities recently suggested that this target should be increased given the immense market response well in advance of the legislated deadline.

Policy Proposal 5. Establish a Production Incentive for Low-impact Renewable Energy

To help the market adapt to the requirement to meet a renewable energy portfolio standard and to ensure that consumer rates are not affected negatively, the government could invest in a small financial incentive for the production of low-impact renewable energy. This incentive should be structured to allow a variety of developers to use it, including large and small for-profit electricity companies as well as non-profit organizations such as First Nations and municipalities. This incentive should be designed to cover the difference between the average annual market price of electricity (i.e., the Alberta Power Pool price) and the cost of generation from low-impact renewable energy. The maximum contribution would be $0.03/kWh of new electricity production from low-impact renewables, equivalent to U.S. incentives for wind, solar, and biomass, which are available across the country. This incentive would cost the Alberta government a maximum of $60 million per year.[31] The incentive would end when the Canadian government implements a management plan for greenhouse gases that includes a financial value for emissions reductions from low-impact renewable energy.

Policy Proposal 6. Implement a Net Metering Program for all Alberta Retailers[32]

A net metering program would allow consumers who generate some of their own power to receive credit for any excess generation by selling it back into the electricity grid. Net metering is established in Manitoba, parts of Ontario, 30 states in the U.S., and several other industrialized countries. Enabling legislation should require the establishment of reasonable interconnection standards that protect the reliability of the grid and ensure that the costs to interconnect are fair and reasonable. Net metering would be implemented by retail electricity companies.

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[29] Data source: *Canada's Emissions Outlook, 1997-2020;* published in 1999. Statement assumes about 1,400 GWh of current low-impact renewable energy generation; that is, about 2.5% of 1997 generation.

[30] For more information, see the report by the Union of Concerned Scientists, *Clean Power Surge: Ranking the States*. April 2000. http://www.ucsusa.org/

[31] This assumes that the entire portfolio standard for 2005 takes advantage of the incentive, equivalent to 2,000 GWh of electricity production.

[32] For more information, see the technical report on net metering at: http://www.davidsuzuki.org/files/Clean.pdf

This option is particularly attractive to farmers, such as those in southwestern Alberta who have access to reliable wind resources; to large livestock farms which could use livestock wastes to produce biogas; and to people across Alberta who could install solar photovoltaics.

The costs of net metering are borne almost entirely by the private participant. Net metering does not affect electricity rates or government expenditures, yet it provides social and environmental benefits and creates more true choice for customers who want the option to self-generate and remain connected to the grid. The government of Alberta should support the administrative costs to retail electricity companies, estimated at $100,000 per year.

Although net metering would make only a small contribution to new supply, it has substantial benefits for economic development and for building capacity for the emerging renewable energy industry. It also gives customers an option for managing the uncertainties of price instability in a de-regulated environment.

Summary of Benefits

The Smart Electricity Policy proposed by the Pembina Institute would help to alleviate the current crisis in the Alberta electricity market by achieving the following outcomes.

- Introducing energy efficiency programs would allow Alberta to avoid the need for 400 MW of coal electricity supply by 2005, and 800 MW by 2010.
- New, low-impact renewable energy resources would provide 800 MW of equivalent electrical capacity by 2010, including wind, hydroelectric, and biomass supplies.
- All of the new energy sources would provide a hedge against price volatility in the marketplace because they are not affected by global energy market prices.
- Up to five times more jobs would be created through a Smart Electricity Policy than through the expansion of conventional electricity supplies such as natural gas or coal.[33]
- The environmental benefits would be immense, including reductions in: greenhouse gas emissions, local and regional air pollutants, toxic wastes, impacts on land and, most importantly, human health impacts.
- The Smart Electricity Policy would better position Alberta to meet future environmental regulations resulting from the Kyoto Protocol. This global treaty would require Canada to reduce emissions to 6% below 1990 levels by 2012, and could cost the Alberta electricity industry up to $1 billion per year to implement.
- Public participation in the electricity sector would be increased through informed consumers who can better manage their electricity demand as a result of energy efficiency programs, and through a new policy that would enable them to get credit for generating electricity with small-scale renewable energy (i.e., through net metering).
- After full implementation of the Smart Electricity Policy, any remaining capacity shortfall could be met through natural gas cogeneration or combined-cycle plants which have a significantly smaller human health and environmental impact than coal-fired generation. Although outside of the scope of this paper, considerable potential remains in Alberta for cost-effective, high-efficiency, natural gas electricity generation. In many cogeneration applications, an additional benefit is the supply of heating and cooling to industry and communities.

[33] Pembina Institute. 1997. *Comparative Analysis of Employment from Air Emission Reduction Measures.*

Table 1 below compares the current electricity market policy and the Pembina Institute's proposals against the key objectives of a Smart Electricity Policy for Alberta. Table 2 summarizes the costs of the proposed programs and the savings to Albertans.

Table 1. Comparison of Electricity Policies

Objective	Current Alberta Policy	Pembina Institute Policy
Provide price stability	• Existing policy a key contributor to current price instability. • Rebates have provided only partial, short-term relief. • Significant sources of new supply will take several years to establish. • No protection from environmental liabilities.	• Contribute to price stability through reduced energy consumption, protection from fuel price swings, and environmental liabilities. • Rapid implementation will offer immediate benefits.
Increase diversity of supply	• Very high percentage of electricity supplies from coal. • Liability of $400 million to $1 billion per year for greenhouse gases plus direct human health costs.	• At least 800 MW of energy savings from efficiency and 800 MW of low-impact renewables.
Increase competition	• While many new entrants are poised to enter the market, significant new coal generation could re-concentrate market power into the hands of dominant players, undermining the ultimate effectiveness of a truly competitive market.	• Inclusion of low-impact renewable energy supplies would further improve competitiveness.
Improve consumer efficiency	• High prices will improve efficiency, but support for small consumers to implement efficiency is limited.	• Half a billion dollars of annual energy savings could be achieved through technologies and management practices.
Increase the use of low-impact renewable energy	• Limited development of low-impact renewable energy in niche marketplaces.	• A minimum of 800 MW of fossil fuel capacity could be displaced.
Promote regional economic development	• Most of the new supply to be developed at existing industrial locations.	• Energy efficiency produces five times more jobs than conventional energy • Employment is distributed across the province.
Inform consumers	• Rebates discourage consumer action on energy efficiency and distort a competitive market.	• Emphasis on empowering consumers to use energy efficiently and help them better understand the environmental impacts of their electricity use.
Minimize impacts on human health and the environment	• 1,700 MW of new coal-fired capacity will greatly exacerbate emissions of heavy metals, particulate matter, and/or smog precursors, as well as acidifying pollutants and greenhouse gases.	• New energy sources from low-impact renewable energy and savings from efficiency will be provided with no net impacts on human health.

Table 2. Summary of Program Costs

Program	Cost to Taxpayers	Cost to Consumers
Energy Efficiency Office	$5 million per year	No cost
Alberta Energy Efficiency Revolving Fund	$100 million total	Monthly loan payments equivalent to or less than energy savings
Performance Mechanism and Energy Efficiency Target for Electricity Retailers	$5 million per year	Energy savings potential of 10% of the total current electricity demand is worth up to half a billion dollars per year.[34]
Low-Impact Renewable Energy Portfolio Standard	No cost	No cost, given current electricity prices; otherwise, costs will be covered by production incentive.
Low-Impact Renewable Energy Production Incentive	Maximum $60 million per year Under current market conditions, the cost would be zero	No cost
Net Metering Legislation	Cost of administration – $100,000 per year	Cost of installing renewable energy for a small number of consumers Potential payback on investment through reduced purchases of grid electricity
TOTAL: Substantial net savings to Albertans	Maximum of $170 million in the first year, reducing to $70 million in subsequent years	Up to $500 million in annual consumer savings

The Pembina Institute believes that taxpayer dollars should be channeled into smart investments that ease the current electricity market crisis, rather than perpetuate it through short-term solutions that do not address the core of the problem. The current Alberta government policy of energy rebates does not help electricity consumers and companies to adapt to the crisis. Rather, it provides a justification for continuing the current system—which caused the crisis in the first place—at the expense of Alberta taxpayers.

Instead of investing in additional energy rebates, new resources should be directed into a Smart Electricity Policy that will help establish a robust electricity market, similar to what other jurisdictions have done. The costs of such an approach are less than $200 million, which is a fraction of the value of energy rebates recently provided to Albertans. Some of the future costs of Alberta electricity retailers' greenhouse gas emissions liability, estimated at $400 million to $1 billion per year, could also be alleviated through the Smart Electricity Policy.

Implementation of these programs must be led by the government of Alberta. Without public policy guidance, the private interests of the marketplace will not advance the objectives of a smart electricity program. Other jurisdictions across Canada and the U.S. are using the policy mechanisms recommended here to advance efficiency and renewables in concert with developing a competitive electricity market. The costs are manageable and the benefits are large.

[34] Assuming $0.11/kWh at current residential rates (higher for general service and wholesale), the savings of 6,000 GWh of energy efficiency amount to $660 million per year.