Electrical Efficiency and Conservation in the Residential Sector in Alberta
Final Report

Prepared by the
Electrical Efficiency and Conservation Project Team
for the
Clean Air Strategic Alliance

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About CASA

The Clean Air Strategic Alliance (CASA) is a non-profit association composed of stakeholders from three sectors – government, industry and non-government organizations such as health and environmental groups. All CASA groups and teams, including the board of directors, make decisions and recommendations by consensus. These recommendations are likely to be more innovative and longer lasting than those reached through traditional negotiation processes. CASA's vision is that the air will be odourless, tasteless, look clear and have no measurable short- or long-term adverse effects on people, animals or the environment.

More information about the electricity project is available online at http://www.casahome.org/electricity/finalreports.asp.

Clean Air Strategic Alliance
10035 108 ST NW FLR 10
EDMONTON AB T5J 3E1

Ph (780) 427-9793
Fax (780) 422-3127
E-mail: casa@casahome.org
Web: http://www.casahome.org

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Improving efficiency and conservation was an important issue for CASA's Electricity Project Team. One of the EPT's four recommendations on this topic was that a multi-stakeholder process be established to continue work on electrical efficiency and conservation. The Electrical Efficiency and Conservation Project Team was formed in March 2004 to implement EPT recommendations, with the aim of increasing electrical efficiency and expanding conservation efforts in Alberta. The team was also asked to identify the resources required to implement the various programs recommended.

Although the team identified four key sectors for which targets should be developed (residential, industrial, commercial, and the MUSH sector), members concentrated on the residential sector to (a) simplify the immediate task, and (b) develop a model that could be used as a template for developing targets and recommending mechanisms for other sectors.

After reviewing achievements in other jurisdictions, a target of a 160-GWh reduction in annual electricity use (about 2.1% of estimated 2005 consumption) to be achieved by 2010 was discussed. It was estimated that one possible method of reaching this target is to implement a package of four consumer incentive programs. The team focused on lighting and appliances as these are the largest residential uses of electricity in Alberta and are also the areas where the biggest impacts could be achieved. The four programs identified, all of which have been proven to work, and will also accomplish a range of co-benefits, are:

1. Decommissioning of old refrigerators
2. Promotion of ENERGY STAR™ appliances
3. Promotion and installation of compact fluorescent light bulbs
4. Promotion of high efficiency furnace motors.

The team also discussed many other actions that could be taken to improve electrical efficiency within the residential sector.

It was not possible for the team to decide on a possible target for the residential sector, and instead recommended, in a separate report, that the Government of Alberta develop an overarching Energy Conservation and Efficiency Framework for Alberta.[1] Where appropriate, the original EPT recommendations were also referred to the Government of Alberta for consideration in the development of the framework.

The work completed to develop the 160 GWh electrical efficiency target for the residential sector, along with several other actions, is therefore summarized here for the information of stakeholders.

[1] *The Need for an Overarching Energy Conservation and Efficiency Framework in Alberta*. Clean Air Strategic Alliance 2007. Is available online at http://casahome.org/electricity/finalreports.asp.

1 Introduction

Electricity is an essential commodity and Alberta is in the fortunate position of having several options for generating its power. Gas- and coal-fired units (thermal generation) have traditionally been the source of most of Alberta's electricity, and this continues to be the case in 2005.

With Alberta's growing economy, demand for electricity has also increased. At the same time, concerns are being raised about the health and environmental impacts of air emissions, particularly from coal-fired generation plants. Coal-fired generation produces a range of air emissions including sulphur dioxide, oxides of nitrogen, mercury, primary particulate matter and greenhouse gases. Gas-fired units are sources of nitrogen oxides and greenhouse gases.

One of the most effective ways of reducing air emissions from this sector is to reduce demand for generation by increasing the efficiency of electricity use and expanding conservation efforts. Benefits of efficiency and conservation initiatives are many and diverse. Among other things, electrical energy efficiency and conservation measures are some of the least expensive ways to reduce emissions from electricity generation while simultaneously saving money for end users.

Funding, standards and regulations, market transformation programs and behavioural change all contribute to improved energy efficiency. Technology, economics and desire are important factors that influence the extent to which energy efficiency and conservation programs are developed and implemented. Experience in many jurisdictions has shown that successful programs use a variety of approaches to bring about change in energy consumption.

Interest in energy efficiency and conservation measures has grown in Canada, as in many other countries, particularly in light of international commitments for reducing greenhouse gases. In 2002, the Government of Alberta released *Albertans & Climate Change: Taking Action*[2], part of the Government's plan for reducing greenhouse gas emissions. This plan specifically identified energy efficiency and conservation as two means by which the province will reduce its greenhouse gas emissions.

[2] This document is online at http://www3.gov.ab.ca/env/climate/docs/takingaction.pdf

2 Background on the Electrical Efficiency and Conservation Project Team

Early in 2002, then Minister of Environment, Hon. Lorne Taylor, asked CASA to develop an approach for managing air emissions from the electricity sector. CASA established a multi-stakeholder Electricity Project Team (EPT) to undertake this task.

Because of the potential for electrical efficiency and conservation to improve air quality and reduce greenhouse gas emissions, the EPT established the Energy Efficiency and Energy Conservation working group. Its mandate was to examine the issues of efficiency and conservation as they affect air quality and emissions from the electricity sector, and make recommendations on how these issues might be addressed.[3] As the working group notes in its report, there are a number of challenges related to implementing efficiency and conservation programs in Alberta:

a) Some of the sectors that could make significant gains in efficiency are "disaggregated"; that is, there is no one organization that speaks for the sector. For example, many commercial buildings have absentee owners, such as out of province pension funds, and negotiating with these one by one would be complicated and expensive.
b) Small to medium sized companies need resources and support in planning and implementing energy efficiency in their businesses. Companies that understand the financial implications are often more receptive to implementing energy efficiency programs.
c) The transmission companies might be in a good position to address some of these issues. However, they have not been part of the discussions to date, and they should be engaged.
d) Some long-term power contracts are for a specified amount of power and include penalties if the customer doesn't use the amount of power in the contract (referred to as "take-or-pay" contracts). Retailers must purchase the power required to fulfill these contracts whether the power is used or not. This may be a strong economic disincentive for pursuing efficiency and conservation.
e) The residential and small business sectors can be the most difficult places to get efficiency without price drivers or incentives.
f) Experience has shown that significant increases in efficiency will require a combination of funding, education, capacity building among energy and building professionals, targets, regulatory support, and market transformation initiatives.
g) Financial barriers can be significant, and energy efficiency and conservation work often requires more funding than is currently available.
h) In landlord and tenant situations, the party who pays the electricity bills is often not the same one who makes the decisions about expenditures that would lead to less electricity use, such as the installation of energy efficient appliances.

During the EPT's public consultations in 2003, Albertans expressed strong support for promoting efficiency and conservation to achieve the many benefits this approach offers. With this input and the support of the working group, the EPT was able to:

[3] The *Report of the Energy Efficiency and Energy Conservation Working Group to the CASA Electricity Project Team* is available online at http://casahome.org/electricity/finalreports.asp.

- identify potential policy mechanisms to facilitate energy efficiency in the province;
- outline the advantages and disadvantages of various funding methods; and
- identify some of the challenges that will be faced in implementing energy efficiency and conservation initiatives.

The EPT's final report in November 2003 contained four recommendations on energy efficiency and conservation (recommendations 65 to 68), one of which was to establish a multi-stakeholder process to continue work, particularly in relation to setting targets.[4] The CASA board accepted all of the recommendations, including that a new project team be established to address the outstanding issues. The Electrical Efficiency and Conservation Project Team was formed (see Appendix A for a list of members), and its terms of reference were approved in March 2004 by the CASA board (see Appendix B).

2.1 Goal and Objectives

The goal of the Electrical Efficiency and Conservation Project Team was to implement the efficiency and conservation recommendations (65-68) found in the EPT's report, with the aim of increasing electrical efficiency and expanding conservation efforts within the province. The team was also asked to identify the resources required to implement the various programs recommended.

To achieve its goal, the Electrical Efficiency and Conservation Project Team had the following objectives:

1. Develop efficiency measurement mechanisms for the electricity supply chain and set a numerical target for electrical energy efficiency.
2. Collect and develop credible information on electricity efficiency to support the proposed targets and programs.
3. Identify tools and mechanisms to implement the energy efficiency and energy conservation recommendations in the November 2003 report of the EPT to the CASA board.
4. Identify the costs, benefits, co-benefits, and barriers and assists to market penetration of electrical efficiency and conservation measures for all users of electricity.
5. Identify cost effective approaches and programs to develop electrical efficiency and energy conservation, including implementers and time frames.
6. Make recommendations to the CASA board.

The team identified four key sectors for which targets should be developed: residential, industrial (which includes oil and gas; electricity production; and selected mining and manufacturing industries), commercial, and the MUSH sector (municipalities, universities, schools and hospitals). Small and medium-size enterprises, or SMEs, are part of the industrial as well as the commercial sector, and the team agreed that targets should be developed for both. Recognizing that developing targets for all sectors would be a very lengthy and demanding task, members decided to focus on the residential sector to (a) simplify the immediate task, and (b) develop a model that could be used as a template for developing targets and recommending mechanisms for other sectors. As part of the team's research and data collection activities, it commissioned three reports, which are listed in Appendix C.

[4] These recommendations appear as part of the team's terms of reference in Appendix B.

The team recognized that measures to improve efficiency differ significantly from measures to increase conservation. Members agreed to focus on specific programs and approaches to improve efficiency, noting that conservation can be jointly promoted through efficiency programs. This is further addressed in section 4.

CASA's air quality management goals, which seek to balance environmental, economic and social considerations, were taken into account in the team's discussions. The team discussed providing flexibility in the mechanisms used for achieving targets, and to balance the need for an open market with more prescriptive approaches.

This report is the culmination of the team's work to date on electrical efficiency in the residential sector specifically; it contains a summary of the research and analysis performed on improving electrical efficiency and increasing conservation in the residential sector in Alberta.

3 Why Improve Electrical Efficiency and Conservation in Alberta's Residential Sector?

The Government of Alberta acknowledged the need to improve efficiency and conservation as one of the core principles of its 2002 climate change action plan: "As energy consumption drives emissions, energy conservation and efficiency must be a core part of our climate change response."[5] One section in the plan is devoted to broader energy conservation, noting that, "Energy conservation and improved energy efficiency are key ways Albertans can begin breaking the link between economic prosperity and emissions growth" (p. 29).

If they are to be wholly engaged in energy conservation and improving energy efficiency, Albertans – individuals and businesses – need information and they need the tools to use information successfully. Albertans have become more aware of the benefits of improving energy efficiency, particularly with rising energy prices, and are now more receptive to messages about conservation. Research has shown that effective engagement programs require the use of marketing and incentives to create significant behavioural change, and programs also need to assess barriers to accessing energy efficient products and services. The Electrical Efficiency and Conservation (EEC) Project Team encourages the development and promotion of various approaches to engaging a wide range of Albertans with differing needs, interests and ability to take action.

Improving efficiency and using less electricity creates "wins" for everyone by:

a) Saving consumers money,
b) Extending the life of Alberta's non-renewable fossil fuels,
c) Avoiding or postponing the need for capital investment in new facilities and infrastructure, and
d) Reducing the air emissions, including greenhouse gases, associated with the burning of fossil fuels.

These benefits accrue to all sectors, including the Government of Alberta, the electricity sector and Albertans as a whole.

a) **Benefits to consumers.** The financial benefits to consumers of improving residential electrical efficiency and conservation depend on consumption rates, which average about 800 kWh/month in Alberta, at a cost of $0.07 per kWh. Most of this power is used for lighting and refrigeration, two uses for which more efficient options are available. Other benefits include consumer protection from volatile energy prices and reduced exposure when prices rise.
b) **Extending the life of Alberta's non-renewable fossil fuels.** Coal and natural gas are still the source of most of the province's power generation and natural gas, in particular, is also a major source of provincial prosperity. Improving efficiency and reducing the consumption of these fuels means more is available for other uses for a longer time.
c) **Capital investment in new facilities and infrastructure.** More efficient use of power benefits the electricity sector as a whole by avoiding costs associated with construction of new facilities as well as investment in transmission and distribution infrastructure.

[5] *Taking Action: Albertans and Climate Change*, 2002, page 8, document online at http://www3.gov.ab.ca/env/climate/docs/takingaction.pdf

d) **Reducing air emissions.** The improved air quality as a result of fewer emissions would have environment, health and, potentially, economic benefits. Reductions in criteria air contaminants and mercury would be expected with reduced electricity use, and the reductions in greenhouse gases could create credits to help Canada meet its international climate change commitments.

The Alberta Government is committed to a deregulated electricity market and does not wish to favour any one fuel or electricity generating process. The EEC team believes that adopting strategies to improve efficiency and conservation makes good economic and environmental sense, irrespective of the source of the energy used to produce the power. The team also recognizes the challenge of promoting and encouraging electrical efficiency and conservation in a deregulated marketplace; for example, the electricity rate structure for retailers means that fewer options are available for retailers to engage consumers. Thus, in a deregulated marketplace with no formal mechanisms for requiring, or even encouraging, the implementation of electrical efficiency and conservation programs, even modest incentives and partnerships can be a deciding factor in supporting consumer behaviour to achieve efficiency and conservation goals.

The EEC team acknowledges the need for energy efficiency and conservation targets in all sectors, and decided to address each sector individually to ensure that unique sectoral circumstances could be adequately considered. The residential sector was the first to be discussed by the team. Many of the same benefits offered by improving efficiency and reducing electricity consumption in the residential sector would also be achieved with similar strategies in other sectors.

The team focused first on the residential sector for several reasons:

1. It represents a significant portion of the electricity marketplace in Alberta, consuming about 20% of the power produced.
2. Technology is available in this sector to support cost-effective investments that improve electrical efficiency and reduce consumption without compromising quality of life (for example, compact fluorescent lights and Energy Star appliances).
3. Such initiatives would engage Albertans directly and enable them to be partners in sustainable resource and environmental management.
4. It offers a timely opportunity to advance one of the four elements comprising the Government's approach to energy conservation as noted in *Albertans & Climate Change*; that is, "Increasing the awareness of, and choices for, Albertans to adopt energy conservation opportunities" (p. 29).

The team reviewed residential electrical efficiency programs from other jurisdictions. The purpose of these programs was to engage consumers through marketing, incentives and, to some degree, availability of products. To engage the residential sector in Alberta, the team concluded that it would be appropriate to use a combination of several programs that have been successfully implemented elsewhere. The expected costs and results of these programs in Alberta are based on actual results in other jurisdictions.

4 Residential Sector Strategy

Natural Resources Canada (NRCan) defines the residential sector as including "four major types of dwellings: single detached homes, single attached homes, apartments, and mobile homes.[6] Households use energy primarily for space and water heating, the operation of appliances, lighting and space cooling."[7] The residential sector accounted for 17% of secondary energy use[8] in Canada and 16% of related greenhouse gas emissions in 2002.

In Alberta, natural gas is the primary energy source for space and water heating, with electricity powering appliances, lighting and air conditioning. The "average" Alberta household uses 800 kWh per month, or about 9600 kWh of electricity per year. However, as Table 1 shows, electricity consumption varies significantly according to the type of residence. Assuming a cost of seven cents per kWh,[9] consumption of 800 kWh amounts to $56 per month for electricity consumption, or almost $2 per day.

Table 1: Monthly Residential Electricity Consumption in Alberta[10]

Type of residence	Electricity consumption (kWh/month)	Average monthly cost @$0.07/kWh
Apartment	200-500	$24.50
Condominium	500-700	$42
House	800-1200	$70
Mobile home[11]	1000-1500	$88
Average	**625-975 (800)**	**$56**

4.1 Electrical Efficiency and Conservation Target

The Electrical Efficiency and Conservation Project Team explored opportunities to improve electrical efficiency and conservation for both new and existing dwellings, noting that typically, electrical efficiency and conservation initiatives are rarely done in isolation. They tend to be part of larger programs and projects such as those designed primarily to address climate change by reducing greenhouse gas emissions. The team tried to develop a challenge target, based on sound research, that the Government of Alberta could adopt with a good chance of success.

The team focused much of its work on lighting and appliances as these are the largest residential uses of electricity in Alberta and are also the areas where the biggest impacts could be achieved. Lighting (at 31.7%) and refrigeration (at 29.6%) use over 60% of residential electricity consumption between them, followed by appliances powered by substitutable fuels

[6] The "mobile homes" category refers to those mobile homes on permanent foundations.
[7] *Energy Efficiency Trends in Canada, 1990 to 2002.* Natural Resources Canada, June 2004. p. 11. Online at http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/data_e/trends05/index.cfm.
[8] Secondary energy use is energy used by final consumers for residential, agricultural, commercial, industrial and transportation purposes. Source: Natural Resources Canada, at http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/data_e/glossary_e.cfm?attr=0#s
[9] The team used $0.07/kWh as a reasonable representative cost for electricity in all its calculations.
[10] Source: EPCOR, June 2005
[11] This does not include modular homes.

(i.e., clothes dryers and stoves, which could use gas) at 24.9%, and items that cannot use another power source (e.g., computers, televisions, washing machines) at 13.4%.[12]

Within the appliance category, and consistent with NRCan's categories,[13] the team differentiated between major appliances and "other," which includes home electronics and small appliances. Acknowledging that the "other" category does represent a substantial portion of home electricity use, the team nevertheless looked in more detail at the "major appliance" category, which includes refrigerators, freezers, washing machines, clothes dryers and ranges.[14]

An important part of the team's mandate was to propose electrical efficiency and conservation targets, and the initial focus was on the residential sector. Members discussed a variety of targets including an intensity-based target, an absolute reduction target and a target based on direct program participation.

The team reviewed achievements in other jurisdictions and considered possible approaches for Alberta[15] before discussing a possible target. Thus, as well as discussing a possible target, the team also discussed an associated package of incentive programs that directly involve consumers and enable the target to be met. It was expected that the programs would be developed and delivered for both new and existing housing stock.

A target of 160 GWh was discussed, which represents a reduction in electricity consumption of just over 2% from the projected Alberta residential consumption of 7503 GWh for 2005.[16] This reduction would be measured based on participation in a set of electrical efficiency programs. It was estimated that the four programs outlined in Section 4.1.1 could be used to meet the entire 160 GWh reduction. The team discussed that program implementers would need to measure program participation, and forward participation data and resulting reductions to the government agency that is designated to report on progress toward achieving the target (recommendation 3).

4.1.1 Consumer Incentive Programs to Achieve the Target

Various incentive programs have been developed and implemented in a number of jurisdictions, including Canada; these are described in the report prepared for the team by the Pembina Institute. Incentives are an effective mechanism for change, but they need to take into account current market penetration of existing technology. For example, energy efficient refrigerators are already in widespread use in Canadian households so may not be a good candidate for an incentive program. Also, some energy-efficient appliances provide benefits in several areas (co-benefits); for example, front-loading washing machines use less hot water, which means that a) fewer greenhouse gases are emitted to heat the water, and b) less water is

[12] Source: *Study on the Electrical Efficiency of Alberta's Economic Sectors*, prepared by the Canadian Energy Research Institute for CASA, September 2004; online at http://www.casahome.org/casa_library/bygroup.asp?idnumber=66
[13] *Energy Use Data Handbook, 1990 and 1996 to 2002.* Natural Resources Canada, June 2004.
[14] *Residential Electrical Efficiency Data Review*. Pembina Institute. 2005.
[15] *Residential Electrical Efficiency Data Review*. Pembina Institute. 2005.
[16] The 2005 residential electricity consumption figure for Alberta was derived by projecting 1992 to 2000 numbers from Natural Resources Canada's Office of Energy Efficiency Energy Use Database.

used. Conversely, programs designed to achieve other goals, such as reducing greenhouse gases or conserving water often also reduce electricity consumption.

The purchase of a new home presents a particularly good opportunity to reach consumers. The Alberta Home Builders Association presently promotes ENERGY STAR™ appliances when a new home is sold. The Electrical Efficiency and Conservation Project Team discussed the benefits of this approach, as it saves consumers from having to do their own research, provides savings on monthly utility bills immediately, and increases the penetration of energy efficient appliances in the marketplace. This program could be enhanced to expand the uptake by consumers.

Because of the ways in which electricity is used in the Alberta residential sector, the team focused on the areas that would deliver the greatest benefits for the investment (that is, the "biggest bang for the buck") and that have a proven track record in other jurisdictions: appliances (including refrigerators) and lighting.

Incentive programs in four particular areas have yielded notable reductions in electricity use in the residential sector (see Appendix D for more details). The project team wants to provide flexibility in the approaches for meeting the target but, based on the experience of others, the team is confident that the four programs it considered could potentially achieve the entire 160 GWh target. However, Alberta should not necessarily limit its efforts to these programs; the team discussed the opportunity to implement other well-planned, effective initiatives to improve electrical efficiency and conservation in the residential sector.[17] The four programs identified are:

1. **Disposal of old refrigerators.** The likely method of implementation would involve a refrigerator buy-back program in which consumers receive a cash payment for surrendering an old working refrigerator.
2. **Promotion of ENERGY STAR™ appliances.** The likely method of implementation would involve a rebate to purchasers of ENERGY STAR™ qualified appliances.
3. **Promotion of compact fluorescent light bulbs.** One method of implementation would involve giving away compact fluorescent bulbs to each customer through voucher redemption and supplementary offers from manufacturers and retailers.
4. **Promotion of variable speed furnace motors in conjunction with high efficiency furnace promotions.** Energy Solutions Alberta (ESA) piloted a furnace program in 2004, providing consumers with a $300 rebate on an energy efficient furnace plus a further $100 rebate if the furnace had an efficient electric motor. The pilot ran from January 19 to March 31 and motivated over 4,000 Albertans in 257 communities to purchase a high-efficiency furnace. A second program was announced in July 2005. The focus of both programs was reducing greenhouse gases, with a co-benefit of improved electrical efficiency. ESA estimates that Albertans will save over $1.5-million annually with their new furnaces, and 94,000 tonnes of greenhouse gases will be avoided over ten years. {Note that NRCan has $200 rebate for ECM motors for R2000 certified homes.}

The expected costs and benefits of these proposed programs are summarized in Table 2, based on the successful implementation of the first three in other Canadian jurisdictions, and the

[17] For example, other programs have been developed and implemented for the multi-unit residential sector in Alberta, including an exit lighting program and a program to improve efficiency in common area lighting.

fourth one in Alberta. This package of programs reflects a multi-pronged approach that could stimulate interest and result in widespread enthusiastic uptake. Laying out the advantages and giving people information and tools, along with a modest financial incentive, could allow Albertans to make the efficiency and conservation decisions that are most appropriate for their household.

Table 2: Potential Incentive Programs for Alberta

Program	Cost to implement (million $)*	Total electricity reduction (GWh)*	Program cost per kWh reduction*	Total consumer savings (million $)* **	Timeframe to achieve total results (yrs)*
Disposal of old refrigerators	6.7	48	$0.14	3.3	1.5
Promotion of ENERGY STAR™ appliances	10	20	$0.50	1.4	1.6
Promotion of compact fluorescent light bulbs	23	92	$0.25	6.4	0.5
TOTAL	39.7	160		11.1	

* Data for the first three programs in this table are based on their delivery in the jurisdiction where the program was implemented.
** Based on an assumed electricity cost of $0.07/kWh.

Based on the success of energy efficiency and conservation incentive programs implemented across Canada, the Electrical Efficiency and Conservation Project Team believes that similar programs could be developed and delivered in Alberta to achieve the target of a 2.1% reduction in electricity use in the residential sector. It would be advantageous to include a strong public outreach and awareness campaign and private sector engagement in the incentive programs, as demonstrated by the City of Edmonton's CO_2RE initiative. (Consumer awareness is further discussed in section 4.)

Alberta already has a delivery agent for province-wide consumer incentive programs in the form of Energy Solutions Alberta. Energy Solutions Alberta was created as part of Climate Change Central to be a one-stop source for information and action on energy efficiency and conservation in the province. The Energy Solutions website features success stories of Albertans and Alberta companies and organizations taking innovative steps to reduce their energy use, as well as practical information, tips and links for actions to improve energy efficiency and conservation.[18]

In addition to direct engagement with consumers, there are also opportunities for the program delivery agents to work with other groups such as new homebuilders and renovators to promote and implement these programs. These individuals make many decisions on behalf of their clients and their involvement can expand the reach of efficiency and conservation programs; for example, they can promote higher-efficiency appliances at the time a house is sold or renovated, and make consumers aware of any incentive programs so they can claim their rebate.

The goal of these incentive programs is to make the residential electricity market more energy efficient. This will mean offering financial incentives to consumers as well as working with

[18] Source: http://energysolutionsalberta.com/default.asp?V_DOC_ID=865

manufacturers and retailers, and raising consumer awareness of efficient products and energy conservation actions. As consumer demand for energy efficient appliances grows, additional training may be needed for retailers to ensure they are knowledgeable about the benefits, maintenance and any other aspects related to the ownership of these appliances.

Further opportunities to reduce electricity consumption are available through fuel switching; e.g., changing from an electric range or clothes dryer to a gas one. The team did not look in detail at this area, but does address it in section 6.1.

4.1.2 Engaging Albertans in Electrical Efficiency and Conservation Initiatives

Alberta consumers regularly receive information on energy-related issues, from climate change to deregulation of the electricity sector. Making the connections, showing people the benefits of wise energy use, and providing the tools for them to become engaged is an ongoing challenge, but can assist in the successful implementation of the initiatives outlined in section 4.1.1. Various approaches can be used to engage the public:

- *Prompts:* Visual or auditory aids as reminders to action.
- *Norms:* Building visible community norms reinforces behaviour.
- *Communication:* Properly targeted and well-developed communication supplements campaigns to engage the public.
- *Incentives:* Properly designed incentives can have a substantial impact on choice and behaviour.
- *Commitment:* In most cases, people who have initially agreed to a small request or action are more likely to agree to or participate in a larger request or action.

To ensure that consumers actually adopt initiatives to reduce electricity use, the team discussed the benefits of:

- Each of the four proposed incentive programs having its own public engagement component that is implemented as part of the overall initiative;
- The public engagement programs for each initiative could be coordinated to ensure maximum benefit and exposure; and
- Any future CASA team that undertakes work on electrical efficiency and conservation could consider what a larger public engagement program might entail, and assess the costs and benefits of such a program.

4.1.3 Reporting on Progress Toward the Target

Reporting on progress toward achieving a target will ensure that both the Government of Alberta and citizens know how effective programs have been and how close we are to reaching the target. The team discussed not prescribing which government department or agency should be responsible for overseeing the development and implementation of any electrical efficiency and conservation programs. The team also discussed that whichever department or agency is responsible for these initiatives should also have a system in place for reporting on the progress of the programs.

The team discussed leaving decisions about timing of program delivery up to the implementers, but also discussed a goal of having all programs completed by 2010. The team

also discussed that it would be advantageous to have all data provided by March 31, 2011 to align with the Government of Alberta's time frame for performance reporting.

The team discussed having progress toward the target reported in absolute terms (that is, annual reductions in GWh of electricity consumed) as well as on a percentage basis, which will allow Albertans to see how close the province is to the overall target.

4.1.4 Funding Electrical Efficiency and Conservation Programs

The team recognized that a great deal of study and analysis has gone into developing programs in other jurisdictions, many of which now have very good information on penetration, cost and overall impact. Alberta agencies and organizations have experience in developing and delivering programs to reduce consumer energy use. Matching funding is typically needed for such programs, which presents a significant challenge. While a number of funding partners have traditionally supported such programs, they often have different application dates and mechanisms for accessing their funds, making it difficult for project developers to secure sufficient funding in a timely manner.

Members discussed keeping program development and implementation in Alberta flexible to encourage customized approaches and partnerships, particularly in the area of funding. However, they also discussed a need for better coordination in timing the allocation of funds, as well as commitments to longer-term funding. Coordinated timing enables funds to be more effectively leveraged, and commitments to longer-term stable funding allow for better program planning and delivery, resulting in better uptake by consumers, especially when combined with social marketing campaigns.

The Canadian Council of Energy Ministers (CEM) has a working group on energy efficiency and conservation, made up of representatives from federal, provincial and territorial governments. Since concerns about coordinating access to funding for energy efficiency and conservation initiatives are not unique to Alberta, the Electrical Efficiency and Conservation Project Team discussed the CEM working group as the appropriate place to discuss these concerns with the aim of harmonizing funding cycles between the federal and provincial governments for energy efficiency and conservation initiatives.

Because many initiatives take several years to achieve the desired consumer uptake, secure funding for more than an annual funding cycle is important. The Electrical Efficiency and Conservation Project Team discussed the opportunity for the Alberta Government to allocate funds for electrical efficiency and conservation programs in the form of five-year commitments to facilitate more efficient and effective planning and coordination of program development and delivery.

4.2 New Homes

The easiest and most economical time to make energy efficiency improvements to buildings is during construction. Several national and provincial organizations are working to incorporate energy efficient technology into new homes. The Electrical Efficiency and Conservation Project Team discussed supporting these efforts, some of which are described below, and encourages their widespread adoption.

4.2.1 Net Zero Energy Homes

In April 2004, a group of corporate and non-profit organizations formed the Net Zero Energy Home Coalition to help accelerate the development and application of green energy and energy efficiency technologies for Canada's residential building sector. The Coalition's goal is that, by 2030, new home construction design will meet a net-zero energy standard. A net zero energy home at a minimum, supplies to the grid an annual output of electricity that is equal to the amount of power purchased from the grid. In many cases the entire energy consumption (heating, cooling and electrical) of a net zero energy home can be provided by renewable energy sources.

The Electrical Efficiency and Conservation Project Team was pleased to learn that the Net Zero Energy Home Coalition will be housed in Alberta at Climate Change Central. The team discussed supporting the Net Zero Energy Home Coalition's goal, and discussed the opportunity for the Alberta Government to support implementation of the national Net Zero Energy Home initiative in Alberta.

4.2.2 Green Mortgages

Some real estate lenders in Britain, the US and Canada have begun offering special mortgage programs to encourage and reward energy efficiency and more sustainable building techniques. Sometimes referred to as "green" mortgages, these programs are generally available to new home buyers as well as those who want to buy an existing energy efficient home or renovate an older house.

In this country, the Canada Mortgage and Housing Corporation (CMHC) offers a 10% refund on its mortgage loan insurance premium and extended amortization when a borrower buys or builds an energy-efficient home or makes energy-saving renovations to an existing home. To qualify for this refund, the home's energy efficiency must receive a rating of 77 or more on the EnerGuide for Houses system or be R-2000 certified and meet certain minimum requirements.[19] This program represents the first step in a national green mortgage program that could be expanded.

The Electrical Efficiency and Conservation Project Team discussed the opportunity for Alberta Economic Development to work with CMHC and lending institutions to further develop and expand the offering of green mortgages in Alberta.

4.2.3 Built Green™ Program

Built Green™ was launched in October 2003 by the Calgary Region Home Builders Association, and became a national society in 2004.[20] In 2005, the program expanded to include all home builder associations across Alberta and BC. As of February 2007, there were more than 4,000 homes enrolled and/or labelled in the program. Membership is open to all members of home builders associations including builders, renovators, suppliers, service providers and developers. Built Green™ is a voluntary program whose primary purpose is to

[19] Source: CMHC website, at http://www.cmhc-schl.gc.ca/en/moinin/moinbuho/moinbuho_022.cfm
[20] Source for information on Built Green™ Society of Canada: http://www.builtgreencanada.ca

encourage homebuilders to use a house-as-a-system approach to select technologies, products and practices that will:

- Provide greater energy efficiency and reduce pollution
- Provide healthier indoor air
- Reduce water usage
- Preserve natural resources
- Improve durability and reduce maintenance

Built Green™ focuses on four areas of environmental concern:

- Energy efficiency
- Indoor air quality
- Resource use (including waste management)
- Overall environmental impact

Only certified Built Green™ builder members can construct a Built Green™ home.[21] A checklist provides the criteria for the program's three achievement levels of gold, silver and bronze (a fourth level – Platinum is being considered). This includes an energy efficiency requirement that is achieved by rating and labelling the home through the EnerGuide for New Houses rating system; and a menu of options addressing a range of "green" items from which the builder selects a minimum number to meet a chosen achievement level.

Built Green™ adopted a multi-story and residential tower pilot program in 2006. This program utilizes the EnerGuide for New Houses (MURB) or EE4 (CBIP) energy modeling tools to benchmark energy efficiency. Currently 5 builders are involved in the pilot that includes 7 projects in Alberta that range in size from 3 storey condominiums to 28 storey residential / mixed use towers. The Built Green™ Society of Canada also adopted a community standard which has helped municipalities such as Lethbridge offer an entire community of Built Green™ homes, and Strathcona County and the City of Calgary to offer financial rebates on building permits for homes that achieve the Built Green™ label. A Built Green™ Renovations program for exsiting homes is under development.

The Electrical Efficiency and Conservation Project Team discussed the opportunity for the Alberta Government to support and promote the Built Green™ program.

4.3 Existing Homes

Given the housing stock already in place, the team expects that significant gains in efficiency are possible by encouraging homeowners to systematically plan and undertake appropriate renovations and upgrades to their dwellings and to consider more efficient appliances.

4.3.1 EnerGuide for Houses

Natural Resources Canada's EnerGuide labelling has been familiar to Canadians for many years. The EnerGuide for Houses (EGH) program is expected to be replaced by a new EcoEnergy program shortly. The new program is expected to be similar to the previous one.

[21] Some multi-unit town homes have also been built under this program, all less than six stories.

EGH assesses overall performance of the whole house "system." Electricity use and efficiency are relatively small components of the EGH assessment, although homeowners do receive a package of information on ENERGY STAR™ appliances, lighting, furnace motors and other topics related to electricity use. Although substantial improvements are possible through electrical efficiency and conservation, even bigger gains can be made when renewable energy is used to directly decrease electricity consumption.

A house that has been assessed through the EnerGuide for Houses program receives a report that describes the home's energy rating and the potential rating the house could obtain if upgrades were done. Included with the report is a label that can be displayed on the furnace or electrical box to show the rating. This program provides valuable information to homeowners, and could potentially influence decisions for both buyers and sellers, but has not been widely accessed by Albertans. The Electrical Efficiency and Conservation Project Team would like to see the benefits of the EGH more widely promoted, with the goal of having all houses receive an EGH label.

The Electrical Efficiency and Conservation Project Team discussed the opportunity for the Government of Alberta to work with EnerGuide for Houses delivery agents to promote and expand the EGH and EnerGuide for New Houses programs in the province.

4.4 Appliance Standards

As more efficient appliances achieve greater market penetration, standards can be raised so that the next generation of products continually improves in efficiency. In Canada, the federal government is responsible for developing and overseeing standards for consumer products. Improving efficiency will involve the application of new technologies and a commitment by manufacturers to use them, regulatory backstops to ensure continuous improvement, and incentives and social marketing to encourage consumer purchases of such appliances. The Electrical Efficiency and Conservation Project Team discussed having the provincial government take a leadership role in working with the federal government to raise appliance efficiency standards. The team is aware that an advisory group, including representatives from Alberta, is looking at standards, and the team discussed encouraging the continuation of this work.

Recently developed mechanisms are enabling the provincial, territorial and federal governments to work together on improving the efficiency of energy using equipment. The federal government takes an integrated approach to improving equipment efficiencies in Canada. This includes providing information to consumers, endorsements for efficient equipment, equipment labeling, and, once a market for the more efficient equipment has been established, setting minimum energy performance standards.

To establish this integrated approach across the country and reinforce this interaction, it is important to build consensus among jurisdictions as to which products will be promoted and regulated, and what level of efficiency improvement will be targeted. One mechanism for jurisdictions to work together is the Demand Side Management advisory group to the Assistant Deputy Ministers' sub-group on energy efficiency, which is part of the Canadian Council of Energy Ministers. This advisory group is developing a process to facilitate inter-jurisdictional cooperation to improve equipment efficiencies in Canada.

The Electrical Efficiency and Conservation Project Team discussed the opportunity for the Alberta government to continue to work through existing mechanisms within provincial, territorial and federal government forums to define equipment types to be targeted for efficiency improvements, in an integrated fashion, over the next five years, and to establish the level of efficiency improvements to be targeted.

4.5 Phantom Loads

"Phantom load" refers to the electricity consumed by a device when it is turned off; this is also referred to as "standby power." An appliance likely has a phantom load if it has any of the following features:

- It has a remote control.
- It has a soft touch key pad.
- It charges the battery of a portable device.
- It is warm to the touch near the switch when turned off.
- It gets power from a main source through a stand-alone power supply.
- It doesn't have an "off" switch.[22]

Examples include the clock on a coffee maker or microwave, VCRs, computers, and television instant-on features. A 2001 study by the Canadian Residential Energy End-use Data and Analysis Centre (CREEDAC) at Dalhousie University estimated that annual average standby energy consumption per household was 329 kWh.[23] This is slightly less than two weeks of average electricity consumption by an Alberta household. Other studies have suggested that phantom loads could be responsible for up to 10% of a home's electrical energy load.[24] Consumers need to be aware of and understand the significance of phantom loads and the impact these loads have on total electricity consumption.

The International Energy Agency is encouraging manufacturers to limit the phantom loads of their products to one watt or less through a program called the One Watt Challenge. CREEDAC estimates that standby consumption could be reduced by 71% to 96 kWh if all appliances with a standby power requirement over one watt were reduced to one watt. The Electrical Efficiency and Conservation Project Team discussed supporting the concept behind this program and discussed the opportunity for Canada to develop, promote and market, through Natural Resources Canada, a Canadian program based on the One Watt Challenge.

Just as consumers now look for and are influenced by the EnerGuide appliance labels, the team discussed the ability of a similar product label to be used in Canada to indicate how much power is used to service a standby load. If an international label to denote a maximum standby load for appliances exists or is being developed, Natural Resources Canada (NRCan) could promote it in Canada, or if such a label does not exist, NRCan could take the lead and develop one.

[22] Source: http://www.earth.columbia.edu/library/earthmatters/spring2000/pages/page25.html
[23] Source: *Stand-By Power Requirements for Household Appliances*, May 2001; online at http://creedac.mechanicalengineering.dal.ca/reports/pdfs/StandByMeasurement.pdf
[24] Source: http://www.isf.uts.edu.au/whatwedo/proj_energy.html#standby

5 Consumer Awareness and Education

Consumer education and outreach are important components in efforts to achieve any electrical efficiency and conservation targets and goals, but this is particularly true for the residential sector. Consumer understanding of the available options and benefits underpins virtually all of the recommendations in this report.

5.1 Electricity Use

Having a baseline understanding of how much electricity they use is the first step to increasing consumer awareness. The profile of electricity costs has risen in recent years with public discussion over restructuring of the electricity sector in Alberta and the opportunity to choose an electricity provider. The EnerGuide for Houses program and several incentives offered by the federal and provincial governments have also helped raise consumer awareness.

Another tool for raising consumer awareness is the use of "smart" meters. Pilot projects in two Alberta municipalities are testing these meters, which have been shown to reduce consumption in other jurisdictions. These meters can be programmed with various features, depending on the overall goal of the program. For example, if the goal is to reduce peak electricity consumption, smart meters can be used to record time of use and thus give consumers an incentive to use certain appliances (such as the washing machine or dishwasher) during off-peak hours in return for a lower rate per kWh. In other cases, consumers pay in advance for their power, and can thus monitor the drain on their account as the month proceeds. Having a smart meter in an easily visible location, such as the kitchen, enables consumers to see if lights or other electricity-using items are on but not in use.

The Electrical Efficiency and Conservation Project Team discussed the opportunity to consider smart meters as a part of the overall suite of measures to improve electrical efficiency and conservation in Alberta. However, one important consideration for Alberta is that off-peak power in this province is generated by coal, which is neither as clean nor as expensive as the gas used to meet peak demands. Thus, encouraging people to use more power in off-peak periods could potentially result in lower air quality in areas around coal-fired plants. The concept of using smart meters to encourage off-peak electricity use needs further consideration.

5.2 Product Labels

Product labels provide valuable information to consumers when they are contemplating a purchase. Energy efficiency labelling indicates how much electricity an appliance or other electronic item uses and compares it with other products in that category. In Canada, the EnerGuide rating has appeared on appliance labels for many years, and the Electrical Efficiency and Conservation Project Team has proposed a similar labelling system for standby loads. ENERGY STAR™ was introduced in the United States in 1992 as a voluntary labelling program to identify and promote energy-efficient products. Computers and monitors were the first products to be assessed and labelled, but the program has since expanded substantially.[25]

[25] Source: http://www.energystar.gov/index.cfm?c=about.ab_history

Natural Resources Canada is implementing ENERGY STAR™ in this country for a broad range of products including office equipment, consumer electronics, heating and cooling equipment, home appliances, lighting and signage, distribution transformers, commercial solid door refrigerators and freezers, and windows.[26] In April 2005, NRCan announced that ENERGY STAR™ labels will now give information on efficiency levels corresponding to Canada's climate zones for entry doors and skylights. [27] In addition, ENERGY STAR™ levels have been strengthened for windows and sliding glass doors, reflecting the vast improvements in products offered to Canadians.

The ENERGY STAR™ symbol is widely recognized and provides reliable efficiency information to consumers. The Electrical Efficiency and Conservation Project Team discussed supporting the ENERGY STAR™ program and the opportunity for Natural Resources Canada to continue to work with ENERGY STAR™ to expand the scope of the labelling and evaluation system for Canadian consumers to include a wider array of products.

5.3 Promoting Electrical Efficiency and Conservation

In a province such as Alberta where there has always been an abundance of energy, the total benefits of improving efficiency often do not receive the attention they should. The team discussed the wide range of economic, environmental, health and social benefits of improved electrical efficiency and conservation as well as the opportunity to have a provincial study undertaken to quantify these co-benefits. Members also discussed the opportunity to have the co-benefits widely promoted and actions to attain them encouraged throughout the province.

[26] Source: http://www.energystar.gov/index.cfm?c=partners.intl_implementation#canada
[27] Source: http://www.eurekalert.org/pub_releases/2005-04/nrc-esn042905.php

6 Areas for Further Work

During the course of its activities, the Electrical Efficiency and Conservation Project Team identified several areas that require further work. These areas include fuel switching, information on consumer purchases of efficient appliances, and community energy planning.

6.1 Fuel Switching

The team recognized the economic, environmental and social complexity of this issue and discussed the need for additional research before a strategy can be developed. In particular, a full life-cycle assessment could be done to determine the potential costs and benefits of any fuel switching options.

6.2 Market Penetration of More Efficient Appliances

Additional information on sales and consumer shifts to more efficient appliances could be valuable in assessing overall market penetration. This could be done by having Climate Change Central continue to build a relationship with the Canadian Appliance Manufacturers Association to share information (such as sales data) on a regular basis.

6.3 Community Energy Planning

The team is aware that work is underway to assist communities, particularly those in remote areas, with energy planning. Such initiatives can make a significant contribution to reducing electrical energy consumption in the residential and other sectors. Community energy planning is a process to address energy supply and use at a community level. It includes land use planning and transportation, site planning and building design, infrastructure efficiency, and alternative energy supply. The team discussed the work now underway and the opportunity for all orders of governments to continue working with NGOs and the private sector to expand and enhance these efforts.

Appendix A: Members of the Electrical Efficiency and Conservation Project Team

Darren Aldous	AUMA
Denise Chang-Yen	EPCOR
Raynald Charest	Natural Resources Canada
Kevin McLeod	CASA
Alex Joseph	SAIT/EnerVision
Simon Knight	Climate Change Central
Phyllis Kobasiuk	AAMDC
Bevan Laing	Alberta Energy
Brian Mitchell	Mewassin Community Action Council
Jesse Row	Pembina Institute
Rob Schnell	Direct Energy
Brian Waddell	Alberta Environment

Former Team Members

Keith Denman	CASA
Kevin Gunn	SAIT/EnerVision
Zahir Karmali	Direct Energy
Glenn McIntyre	Direct Energy
Nashina Shariff	Toxics Watch
Halyna Tataryn	Canada Housing and Mortgage Corporation
Kerra Chomlak	CASA

Appendix B: Terms of Reference

Date: February 23, 2004

Background:

In the Alberta government's Climate Change Action Plan energy efficiency and conservation are identified as two of the means by which the province will reduce its green house gas emissions. The CASA Electricity Project Team (EPT) established the Energy Efficiency and Energy Conservation working group to examine the potential for Electrical efficiency and conservation to contribute to improved air quality in Alberta. Its mandate was to examine the issues of efficiency and conservation as they affect air quality and emissions from the electricity sector, and to make recommendations on how these issues might be addressed. A key recommendation from the working group is that a multi-stakeholder team be formed to explore these issues in more detail and to address other recommendations found in the October 2003 Report of the Energy Efficiency and Conservation Working Group to the CASA Electricity Project Team. This group is being formed in response to those recommendations.

The Alberta government has also tasked Climate Change Central's Energy Solutions Alberta with delivering programs to reduce energy usage in the province. Climate Change Central has been at the table throughout the work of the sub-group and is a member of the proposed project team. It is the understanding of both Climate Change Central and the CASA Electrical Efficiency and Conservation group that the work of these two groups will not overlap but will be a valuable partnership between strategic direction and program delivery.

Goal:

The overall goal of the Electrical Efficiency and Conservation Project Team is to implement the energy efficiency and conservation recommendations (#s 65 – 68) found within the November 2003 report of the Electricity Project Team to the CASA Board, with the aim of increasing electricity efficiency and expanding conservation efforts within the province. This work will include identifying the resources required to implement the various programs recommended.

Objectives:

In order to achieve its goal, the Electrical Efficiency and Conservation Project Team will accomplish the following objectives:

1. Develop efficiency measurement mechanisms for the electricity supply chain and set a numerical target for electrical energy efficiency.
2. Collect and develop credible information on electricity efficiency to support the proposed targets and programs.
3. Identify tools and mechanisms to implement the energy efficiency and energy conservation recommendations in the November 2003 report of the EPT to the CASA Board.
4. Identify the costs, benefits, co-benefits, and barriers and assists to market penetration of electrical efficiency and conservation measures for all users of electricity.

5. Identify cost effective approaches and programs to develop electrical efficiency and energy conservation, including implementers and time frames.
6. Make recommendations to the CASA Board.

Key Task Areas:

The tasks set before this group break down into the following areas:

1. Data Collection

a. Determine the data that is currently available from various sources on Alberta's electrical system's efficiency
b. Determine the measurement needs of a proposed efficiency target, including the level of dis-aggregation and aggregation that is feasible and appropriate
c. Collect the needed data for setting targets and determining program needs.

2. Measurement

a. Work with Climate Change Central's Energy Solutions Alberta, relevant Alberta government agencies and existing data centers to develop measurement tools and to monitor overall electrical energy efficiency for the province.
b. Develop a process to determine the overall efficiency of the Alberta electrical system, "energy source to end user."

3. Targets

a. Based on the measurement work outlined above, undertake a detailed technical assessment as to the feasibility of developing a province-wide electric energy efficiency target and, if feasible, define what the target amount should be (including appropriate metrics) and costs to meet the target, its relationship to sector agreements and other ongoing programs, and mechanisms to meet this target.

4. Tools and Programs

a. Reviewing electrical energy efficiency and conservation tools and programs and making recommendations for their implementation, including pilot projects through appropriate organizations.
b. Determine which sectors of the electrical system will be focused on in the work of this project team.
c. Working with retailers and the "wires" companies to ensure that "time of use" metering and rates are made available where they are not available currently.
d. Seeking ways in which the purchase of ENERGY STAR™ appliances can be encouraged.
e. Work with electricity retailers to find ways to assist retailers in managing the risks and recovering lost revenues associated with energy efficiency and energy conservation programs. This could involve but would not be limited to performance-based incentive mechanisms that reward the achievement of targeted energy savings and program costs.
f. Examine the issue of thermal loss at generation facilities, and explore means of encouraging the co-location of other facilities that are able to use waste heat. This could include the use of emission credits and offsets for the use of this energy.
g. Work with Alberta Energy, Alberta Environment, NewEra, and the Alberta Electric System Operator with the goal of ensuring that the metering and transmission interconnection needs of distributed generation are met.

h. Work with Alberta Environment and other CASA groups with the goal of ensuring that verifiable improvements in energy efficiency and energy conservation are classified as useable offsets.
i. Work with the federal government to examine tax issues relating to energy efficiency and conservation, such as district heating, in order that energy efficiency and conservation not be disadvantaged relative to other energy policies and programs.

4) Reporting

a. Preparing a final report and recommendations to the CASA Board covering the goals and objectives set out above
b. Preparing and implementing a plan to communicate to CASA stakeholders and other potentially interested people the results of the team's work.

Timelines:

It is expected that the Energy Efficiency and Energy Conservation Project Team will report to the CASA Board in November 2004.

Budget:

The financial needs and available resources of this project team are unknown at this time, although it is anticipated that some of this work will involve the hiring of consultants to perform some of the background studies that the team's work will be based on. It is anticipated that there will be some funding available from Alberta Environment to be shared between this group and the Renewable and Alternative Energy Project Team, and also that the remaining funding from the EPT will be made available to these two groups. Fundraising for this work beyond the available monies, if required, will be one of the tasks for this group.

Membership:

- Electricity Industry:
  - "Wires" companies
  - Retailers
  - Energy Service Companies
  - Generators
- ENGOs
- Alberta Environment
- Alberta Energy
- Municipalities
- Small Business Association
- Consumer groups
- Federal Government
  - Natural Resources Canada
- Climate Change Central/Energy Solutions Alberta
- Canadian Association of Petroleum Producers
- Canadian Petroleum Products Institute
- Alberta Electricity System Operator
- Canadian Industry Program for Energy Conservation (CIPEC)
- The Alberta Energy and Utilities Board

EPT Energy Efficiency and Energy Conservation Recommendations

65	**Energy Efficiency and Conservation Implementation Team** A CASA multi-stakeholder implementation team be struck and provided with sufficient funds to undertake the following tasks, and that it report to the CASA board in November 2004: a) Working with Climate Change Central's Energy Solutions Alberta, relevant Alberta government agencies and existing data centres in developing measurement tools and monitoring overall electrical energy efficiency for the province. b) Developing a process to determine the overall efficiency of the electrical system, "energy source to end user." c) Once tasks a) and b) are completed, the implementation team will undertake a detailed technical assessment as to the feasibility of developing a province-wide electric energy efficiency target and, if feasible, define what the target amount should be (including appropriate metrics) and costs to meet the target, its relationship to sector agreements and other ongoing programs, and mechanisms to meet this target. d) Reviewing electrical energy efficiency and conservation tools and programs and making recommendations for their implementation, including implementation of a pilot project. e) Working with retailers and the "wires" companies to ensure that "time of use" metering and rates are made available where they are not available currently. f) Seeking ways in which the purchase of ENERGY STAR™ appliances can be encouraged and incented. g) Working with electricity retailers to find ways of assisting retailers in managing the risks and recovering lost revenues associated with energy efficiency and energy conservation programs. This could involve but would not be limited to performance-based incentive mechanisms that reward the achievement of targeted energy savings and program costs. h) Examining the issue of thermal loss at generation facilities, and exploring means of encouraging and incenting the co-location of other facilities that are able to use waste heat. This could include the use of emission credits and offsets for the use of this energy. i) Working with Alberta Energy, Alberta Environment, New Era, and the Alberta Electric System Operator with the goal of ensuring that the metering and transmission interconnection needs of distributed generation are met. j) Working with Alberta Environment with the goal of ensuring that verifiable improvements in energy efficiency and energy conservation are classified as useable offsets. k) Working with the federal government with the goal of examining the tax issues relating to district heating and other energy efficiency and conservation issues, in order that energy efficiency and conservation not be disadvantaged relative to other energy policies and programs.
66	**Encouraging Electrical Energy Efficiency and Conservation by Industry** The Alberta government, in its upcoming greenhouse gas sectoral agreements with all sectors, consider including and encouraging electrical energy efficiency and energy conservation as options for reducing emissions from electricity generation in Alberta.
67	**Encouraging Electrical Energy Efficiency and Conservation by Governments** Climate Change Central • work with Alberta and municipal governments to encourage energy efficiency in residential housing design, both in building codes and in municipal planning. • examine the issue of "take or pay" contracts. This work would include: o gathering information on the extent of the issue; o providing information for consumers to assist them in making informed decisions about their electricity purchases; and o developing and piloting alternatives that would meet the retailer's needs while allowing for consumers to benefit fully from energy efficiency and conservation practices. • provide a resource in which information about the various government programs all levels and funding options be made available.
68	**Funding Energy Efficiency and Conservation Programs** The Alberta and federal governments consider means for providing stable and sufficient funding to allow for the development and implementation of energy efficiency and energy conservation programs, and that the various options for funding described in the Energy Efficiency and Conservation Working Group's report to the EPT be considered.

Appendix C: Background Reports

The following reports were commissioned by the Electrical Efficiency and Conservation Project Team and are available online at http://www.casahome.org/casa_library/bygroup.asp?idnumber=66.

Study on the Electrical Efficiency of Alberta's Economic Sectors, prepared by Canadian Energy Research Institute, September 2004

A Study on the Efficiency of Alberta's Electrical Supply System, prepared by JEM Energy and Associates, October 2004

Residential Electrical Efficiency Data Review, prepared by the Pembina Institute, June 2005.

Appendix D: Summary of Potential Incentive Programs for Alberta[28]

Summary of Potential Incentive Programs for Alberta[29]

Direct Annual Electricity Savings	Consumer Annual Savings (@ $0.07/kWh)	Program Cost	Program Length	Program Cost per kWh	Annual GHG Emission Reduction[30]
Refrigerator Buy-Back Program (based on BC Hydro program)					
48 GWh	$3.3 million	$6.7 million	1.5 years	$0.014 / kWh (@ 10 years of savings)	57 kt CO_2eq
Refrigerator Exchange Program (based on Yukon Economic Development program)					
19 GWh	$1.4 million	$11 million	2 years	$0.057 / kWh (@ 10 years of savings)	19 kt CO_2eq
Energy Star Appliance Rebate I (based on Government of Ontario program)					
20 GWh	$1.4 million	$10 million	20 months	$0.051 / kWh (@ 10 years of savings)	20 kt CO_2eq
Energy Star Appliance Rebate II (based on Government of Saskatchewan program)					
14 GWh	$0.99 million	$4.1 million	17 months	$0.029 / kWh (@ 10 years of savings)	14 kt CO_2eq
CFL Give-Away Program (based on BC Hydro program)					
92 GWh	$6.4 million	$23 million	6 months	$0.025 / kWh (@ 7 years of savings)	91 kt CO_2eq
Furnace Motor Upgrade Program (based on Climate Change Central Program)					
1.7 GWh	$0.12 million	$0.37 million	71 days	$0.022 / kWh (@ 10 years of savings)	1.7 kt CO_2eq
Furnace Upgrade Offer (based on Terasen Gas program)					
1.2 GWh	$0.09 million	$0.34 million	3.5 months	$0.028 / kWh (@ 10 years of savings)	1.2 kt CO_2eq
Energy Star Products and Marketing (based on New York program)					
23 GWh	$1.7 million	$11.6 million	5.5 years	$0.049 / kWh (@ 10 years of savings)	23 kt CO_2eq

[28] Source: *Residential Electrical Efficiency Data Review*. Pembina Institute. 2005.
[29] Based on actual results of previous programs delivered in North America.
[30] Assumes an average emission factor of 884t CO_2eq / GWh of electricity generated, and transmission and distribution losses of 11.6%.